

ServiceStream

M12 East Retained Works Operational Environmental Management Plan

Westlink Services Operations and
Maintenance

NorthWestern Roads
Management Services

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March 2026

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Safety

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For this document, Service Stream refers to the primary operating entity responsible for delivering operations and maintenance services. This includes Westlink Services, which operates as a business unit within Service Stream. To ensure clarity and consistency throughout this plan, any reference to Service Stream should be understood to include Westlink Services, unless explicitly stated otherwise.

This document establishes a new standardised process and supersedes all previous versions or similar plans. Any prior documents are now considered obsolete, and this plan serves as the baseline reference for all future updates and revisions.

Table of Contents

Plan Administration.....	1
Glossary/Abbreviations	4
1. Introduction	7
1.1. M12 Motorway approval history	9
1.2. Guidelines and standards.....	9
1.3. Purpose of this OEMP	9
1.4. Objectives	10
1.5. Management, update and approval	11
1.6. OEMP consultation.....	11
2. Asset Description	12
2.1. Location.....	12
2.2. Environmental setting.....	12
2.3. Asset components	12
2.4. Asset Operators.....	15
2.5. Nearby stakeholders.....	15
3. Legislative and Regulatory Obligations.....	17
3.1. Environmental standards and guidelines	17
3.2. Approvals, permits and licences	17
4. Operation and Maintenance Activities	19
5. Implementation.....	26
5.1. Environmental management systems and procedures.....	26
5.2. Operator structure and responsibilities	27
5.3. Induction, training, awareness and competencies	30
5.4. Communication.....	31
6. Specific Environmental Aspects.....	35
6.1. Environmental aspects and controls.....	35
6.2. Environmental management.....	37
6.3. Sustainability	49
7. Risks, Incidents and Emergency Preparedness and Response	50
7.1. Risk Identification and Analysis.....	50
7.2. Incident and Emergency Preparedness and Response.....	51
8. Operational Performance	53
8.1. Environmental inspections	53
8.2. Monitoring.....	54
8.3. Reporting	54

8.4. Operational audits.....	56
8.5. Non-conformances and corrective actions.....	56
8.6. Compliance tracking.....	57
9. OEMP Review and Records Management	58
9.1. OEMP Review.....	58
9.2. Records Management.....	58
10. References.....	59

Appendices

Appendix A: Conditions of Approval

Appendix B: Legislation, Guidelines and Permits

Appendix C: Surface Water and Groundwater Monitoring Plan - M12 Motorway Operational Stage

Glossary/Abbreviations

Abbreviation	Expanded Text
AHIMS	NSW Environment and Heritage Aboriginal Heritage Information Management System
AMS	Asset Management System
Asset	The M12 East Retained sections of the M12 motorway
AR	Amendment Report
ARSR	Amendment Report Submissions Report
CCTV	Closed Circuit TV
ChemAlert	Chemical management software to assist companies in managing chemicals used and stored on site.
CIP	Community Involvement Plan
Compliance audit	Verification of how implementation is proceeding with respect to an Operational Environmental Management Plan (OEMP) (which incorporates the relevant approval conditions).
CSSI	Critical State Infrastructure
Dangerous Goods	"Dangerous goods" has the meaning given to it in section 4 of the Dangerous Goods (Road and Rail Transport) Act 2008 (NSW) or as amended from time to time
DCCEEW	Department of Climate Change, Energy, the Environment and Water (NSW)
DPHI	Department of Planning, Housing and Infrastructure (NSW) (formerly Department of Planning and Environment) herein referred to as DPHI throughout the OEMP
DPI	Department of Primary Industries (NSW) superseded by the Department of Primary Industries and Regional Development
DPIE	NSW Department of Planning, Industry and Environment
DPIRD	Department of Primary Industries and Regional Development (NSW)
EAD	All environmental assessment documentation, comprising the relevant planning approvals for the Asset described in Section 1.1 of this OEMP and including the plans and documents incorporated into those approvals
ECP	Environmental Control Plan
EHG	Environment and Heritage Group part of DCCEEW (NSW)
EIS	Environmental Impact Statement
EMS	Environmental Management System
Environmental aspect	Defined by AS/NZS ISO 14001:2015/Amd 1:2024 as an element of an organisation's activities, products or services that can interact with the environment.
Environmental impact	Defined by AS/NZS ISO 14001:2015/Amd 1:2024 as any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisation's environmental aspects.
Environmental incident	An unexpected event that has, or has the potential to, cause material harm to the environment and requires some action to minimise the impact or restore the environment.

Abbreviation	Expanded Text
Environmental objective	Defined by AS/NZS ISO 14001:2015/Amd 1:2024 as an overall environmental goal, consistent with the environmental policy, that an organisation sets itself to achieve.
Environmental policy	Statement by an organisation of its intention and principles for environmental performance.
Environmental target	Defined by AS/NZS ISO 14001:2015/Amd 1:2024 as a detailed performance requirement, applicable to the organisation or parts thereof, that arises from the environmental objectives and that needs to be set and met in order to achieve those objectives.
Environmental Representative	A suitably qualified and experienced person independent of Project design and construction personnel employed for the duration of construction. The principal point of advice in relation to all questions and complaints concerning environmental performance.
EPA	Environmental Protection Authority (NSW)
EPL	Environment Protection Licence
ESA	Environmentally Sensitive Areas
FCC	Fairfield City Council
HSE	Health, Safety and Environment
HSEQ	Health, Safety, Environment and Quality
ISO 14001	Australian/ New Zealand Standard 14001: 2015/Amd 1:2024 – Environmental Management Systems
JSEA	Job Safety and Environmental Analysis
LCC	Liverpool City Council
mbgl	Metres below ground level
MCoA	Minister's Conditions of Approval / Conditions of Approval
Minister, the	Minister of the NSW Department of Planning, Housing, Industry and Environment (or delegate)
NCR	Noise Compliance Report
Non-compliance	Failure to comply with the requirements of the Project approval or any applicable licence, permit or legal requirements.
Non-conformance	Failure to conform to the requirements of Project system documentation including this OEMP or supporting documentation.
NSW	New South Wales
NWR	NorthWestern Roads Group
O&M	Operation and Maintenance
OEMP	Operational Management Plan
ONCR	Operational Noise Compliance Report
ONR	Operational Noise Review
Operator	Westlink Services is the primary operations and maintenance provider for the Asset (herein referred to as Operator) and is wholly owned by Service Stream.

Abbreviation	Expanded Text
POEO Act	<i>Protection of the Environment Operations Act 1997 (NSW)</i>
POEO Regulation	Protection of the Environment Operations (Waste) Regulation 2014
REMM	Revised Environmental Management Measures
ROL	Road Occupancy Licence
SDS	Safety Data Sheets
SSI	State Significant Infrastructure
SWC	Sydney Water Corporation
SWMS	Safe Work Method Statement
T&I SEPP	State Environmental Planning Policy (Transport and Infrastructure) 2021
TCR	Traffic Control Room
TCRO	Traffic Control Room Operators
TfNSW	Transport for New South Wales
Westlink Services	Westlink Services Pty Ltd
WHSMF	Work health and safety management plans
WSO Co	Western Sydney Orbital Co Pty Limited

1. Introduction

This document is the Operation Environmental Management Plan (OEMP) for the M12 East Retained Works (M12ER) section of the M12 Motorway.

The M12 Motorway is a major new transport corridor in Western Sydney, New South Wales (NSW). This motorway has been delivered by Transport for NSW (TfNSW) to provide the primary access between the future Western Sydney Airport at Badgerys Creek and Sydney's broader motorway network. The M12 Motorway extends approximately 16 kilometres (km) from the Westlink M7 Motorway at Cecil Hills to The Northern Road at Luddenham. This motorway forms a critical east-west connection supporting the region's long-term growth and strategic transport needs. The location of the motorway in the regional and local context is shown in **Figure 1**. The alignment is shown in yellow on the western side of the figure.

The M12 Motorway incorporates several major bridge structures across waterways including Ropes Creek, Kemps Creek, South Creek, Badgerys Creek and Cosgroves Creek, as well as bridges over the Westlink M7 Motorway to maintain access to Western Sydney Parklands, local utilities and surrounding road networks.

The M12 Motorway comprises a new dual-carriageway motorway between the Westlink M7 Motorway and The Northern Road with two lanes in each direction and a central median designed to accommodate future expansion to six lanes. Key features include three primary connection points:

- a motorway-to-motorway interchange at the Westlink M7 Motorway (the subject of this OEMP)
- the Western Sydney Airport interchange providing direct access to the Airport's Main Access Road
- a signalised intersection at The Northern Road with provision for future grade separation.

Construction of the M12 Motorway has been delivered via three separate construction contracts:

- West section: Award of Construction contract April 2022. Main construction commenced August 2022
- Central section: Award of Construction contract in April 2022. Main construction commenced August 2022
- East section: Part of the M7/M12 Integration project. Main construction commenced August 2023.

The three sections (east, central and west) are shown in Figure 1. The M12 East section of the motorway comprises the M7-M12 interchange and Elizabeth Drive connections. Once operational it will be further divided into two components:

- M12 East returned works areas – this includes the M12 Motorway mainline, Elizabeth Drive connections, Elizabeth Drive, Wallgrove Road and Cecil Road. The TfNSW Stewardship Contractor will operate and maintain most of these areas, while local roads and some road verges will be handed back to the relevant Council for operation. Property adjustments on private property will be handed back to land owners.
- M12ER area (the subject of this OEMP) – M7-M12 interchange and the associated on and off ramps will be operated and maintained by the existing Westlink M7 Motorway Operator, NorthWestern Roads Group (NWR).

The M7-M12 interchange is a grade-separated interchange to provide a free-flowing connection between both motorways, which, in turn, link to the wider Sydney motorway network that includes the M5 Motorway, the M4 Motorway and the M2 Motorway.

The existing Operator of the Westlink M7 Motorway will concurrently manage the M12ER area via existing systems and procedures that have been successfully implemented for management of the Westlink M7 Motorway to date. These systems and procedures are described in this OEMP. The remainder of the M12 Motorway will be operated by TfNSW and subject to a separate OEMP (M12 Motorway OEMP: M12 West, M12 Central and M12 East Returned).

The Ministerial conditions of Approval (MCoA) and environmental approval documents (EAD) set out requirements for the operation and maintenance of the M12 Motorway. The Westlink M7 Motorway Project Deed has been updated to include the M12ER area and includes the provision of operations, maintenance, and project management services through to 2051. These services are delivered continuously, 24 hours a day, 7 days a week, to ensure the safe, efficient, and reliable operation of the motorway.

MCoA D1 requires that an OEMP (this document) be prepared in accordance with the MCoA, all relevant Acts, Regulations and accepted best practice management plans. In accordance with MCoA D2, this OEMP has been developed to address the performance outcomes, commitments and mitigation measures, made and identified in the approval documentation in accordance with MCoA A1. This OEMP also outlines relevant procedures for rectifying any non-compliance and identifies auditing, incident management and monitoring requirements. Relevant MCoA are detailed in **Appendix A**.

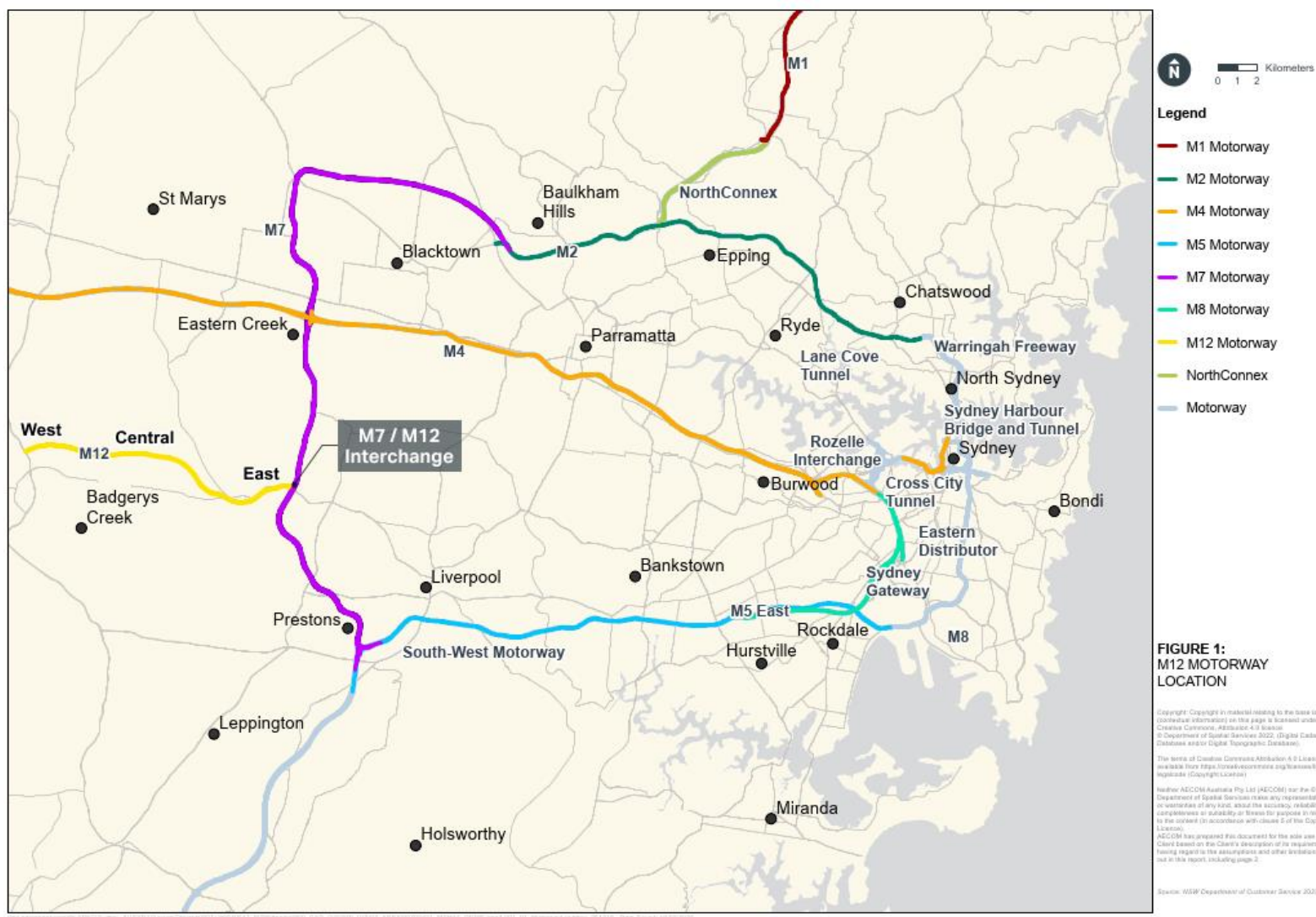


Figure 1 M12 motorway location

1.1. M12 Motorway approval history

An Environmental Impact Statement (EIS) was prepared to describe and assess impacts in relation to construction, operation and maintenance of the M12 Motorway. The scope of this EIS included all sections of the M12 Motorway; west, central and east (returned works and retained works).

The EIS identified a range of environmental, social and planning issues associated with the construction and operation of the M12 Motorway and proposed measures to mitigate and manage those potential impacts. The EIS was publicly exhibited for 34 days from 16 October 2019 to 18 November 2019 to give the community and stakeholders the opportunity to provide comment.

Matters raised in submissions were addressed within the Submissions Report. In response to design developments, post exhibition of the EIS, an Amendment Report (AR) was developed to assess the impacts of these amendments. The AR was exhibited by DPIE for 14 days from 21 October 2020 to 4 November 2020. Following exhibition of the AR, an Amendment Report Submissions Report (ARSR) was developed in December 2020 to address the identified issues, followed by the ARSR – Amendment in March 2021 which addressed biodiversity matters only.

The Project was approved on 23 April 2021 under Division 5.2 of the Environmental Planning and Assessment Act 1979 as Critical State Significant Infrastructure (CSSI) (SSI-9364). Upon commencement of operation an OEMP (or an Environmental Management System (EMS)) is required to be implemented in accordance with the MCoA for SSI-9364.

The construction of the Project was a controlled action under Section 75 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), requiring a separate approval from the Australian Minister for the Environment (EPBC 2018/8286), granted on 3 June 2021. The controlling provisions being listed threatened species and communities, which have been mapped in the vicinity of the M12-M7 interchange. TfNSW has retained responsibility for compliance reporting against the conditions of this approval.

1.2. Guidelines and standards

An OEMP is the overarching and governing document that outlines the approach to manage key environmental issues during operation and maintenance.

This OEMP has been prepared in accordance with:

- Guideline for the Preparation of Environment Management Plans, Department of Infrastructure, Planning and Natural Resources (DIPNR, 2004).
- The Environmental Management Plan Guideline, Guideline for Infrastructure Projects, NSW Department of Planning, Industry and Environment, (NSW Government, 2020).
- Environmental Management Plan Guidelines, Commonwealth of Australia, 2014
- EMS Guidelines (EPA NSW, 2022), which helps prepare and implement systematic practices to manage environmental performance and conformance.
- ISO 14001:2024/Amd 1:2024 Environmental Management Standards, which provide a defined system for managing operations to minimise their environmental impacts, ensure legal compliance, and allow for continual improvement over time.
- Relevant MCoA and Revised Environmental Management Measures (REMMs) relating to the operation of the M12 Motorway Project (the Approved Project) (see **Appendix A**).
- Applicable and relevant TfNSW specifications, guidelines, and documents.

Relevant guidelines and standards of relevance to different aspects of operation of the M12ER area are included in **Appendix B**.

References in the terms of this approval to any guideline, protocol, Australian Standard or policy are to such guidelines, protocols, standards or policies in the form they are in as at the date of this approval.

1.3. Purpose of this OEMP

This OEMP outlines the approach to manage environmental issues associated with the operations and maintenance of the M12ER area (which is defined herein as the 'Asset'). The OEMP is an integral part of Operator's EMS. It encompasses all operation and maintenance activities and processes that are carried out within the Asset (M12ER area) corridor boundary, as well as those performed off-site by its employees and

subcontractors. As the Asset will be transparently managed with the Westlink M7 Motorway by a single Operator, the existing Westlink M7 OEMP has informed the development of this M12ER OEMP.

Note that where the Operator is identified within this OEMP, this refers to the Operator and the contractor(s) that have been engaged to operate and maintain the Asset.

This OEMP and supporting plans and procedures outline and describe how the Asset operations will comply with the appropriate legal obligations, and how the Operator will minimise the environmental risks and achieve environmental outcomes during the day-to-day operation of the Asset.

The OEMP has been prepared to:

- Ensure relevant operational environmental obligations under the Ministerial Conditions of Approval (MCoA) and revised environmental mitigation measures (REMMs) identified in the M12 Motorway EAD are achieved.
- Identify best environmental management practices for operation the Asset
- Outline relevant operational environmental management activities, commitments, safeguards and management measures including those outlined in the EAD
- Describe relevant legal and regulatory provisions
- Manage environmental risk.

This OEMP also:

- Sets out how compliance with environmental policy, legislative requirements will be achieved
- Sets out how the Asset Operator's EMS is consistent with Australian/New Zealand Standard 14001:2015/Amd 2024 – Environmental Management Systems
- Ensures environmental management, mitigation, monitoring and reporting requirements are to be implemented as well as outlining who is responsible, when controls should be implemented, and any corrective actions required as a result of this process
- Provides the tools for the Asset Operator, including sub-contractors and other third parties, to reasonably and feasibly manage environmental performance during the operation and maintenance of the Asset.

Note that if there are any inconsistencies with the environmental documentation related to the Asset, then the MCoA shall prevail.

1.4. Objectives

The objectives of this OEMP are:

- Comply with the MCoA and mitigation measures proposed in the EAD
- Outline Operator responsibilities
- Identify legislative requirements
- Provide a reference document that defines the environmental commitments for the Asset
- Satisfy the M12 Motorway MCoA and REMMs associated with the operation of the motorway
- Outline training requirements for the Operator, subcontractors or third-party personnel undertaking activities to ensure these are carried out in an environmentally responsible manner
- Identify environmental risks during operation of the Asset and methods to prevent, manage or minimise the potential for environmental harm
- Provide environmental processes, procedures and management measures to mitigate and manage environmental impacts to road users and local community
- Outline the environmental monitoring requirements and performance criteria
- Detail appropriate incident responses, environmental protection controls and continual improvement processes to manage activities associated with the operation of the Asset.

To ensure continual improvement, specific environmental objectives have been established to:

- Meet and be consistent with Environmental Policy, and

- Provide the basis on which the Operator manages and measures performance.

These objectives are documented in POL-EN-002 Environmental Objectives and Targets.

1.5. Management, update and approval

The OEMP is designed to be a live and fluid document that permits continual improvement. Minor updates to the OEMP in response to regular review may be approved internally if the update is considered a minor change.

Minor updates characteristically:

- Encompass editorial changes (i.e. changes in personnel or agency name changes)
- Do not increase the magnitude of environmental risk/impact
- Are in response to scheduled reviews or audit findings,
- Do not compromise the Asset from meeting its approval or regulatory commitments.

The OEMP will be reviewed by the Operator annually during the life of the Asset. If a non-conformance is detected in the OEMP and/or the supporting plans, if Asset implementation methodologies change, or if safeguard methodologies improve, the OEMP will be modified so that it remains continually effective in managing environmental impacts from the Asset.

A review of the OEMP will typically be undertaken:

- If there is a change in the nature or scope of Asset operation
- Following significant environmental incidents
- Annually following the completion of audits.

Minor updates to the OEMP in response to regular review may be approved internally if the update is considered a minor change. Minor updates characteristically encompass editorial changes (i.e. changes in personnel or agency name changes), do not increase the magnitude of environmental risk/impact, are in response to scheduled reviews or audit findings, or do not compromise the Asset from meeting its approval or regulatory commitments. All updates to this OEMP will be reviewed and approved by NWR prior to publishing the document.

This OEMP must be submitted to the Planning Secretary no later than one month before the commencement of operation of Asset, or as otherwise agreed, for information .

1.6. OEMP consultation

The Operational Surface Water and Groundwater Monitoring Program for the OEMP has been developed in consultation with the relevant agencies as outlined in the MCoA which are detailed in **Table 1** and attached in Appendix C. Relevant requirements in relation to operational monitoring of the surface water quality and groundwater are contained in the Soil and Water Environmental Control Plan (ECP) (refer to Section 6.2.4).

The Operational Monitoring Plan was provided to relevant stakeholders as outlined in **Table 1** for review and comment and has been updated in response to comments provided.

Table 1 OEMP consultation

Operational Monitoring Programs	CoA	DCCEEW Water	Liverpool Council	Penrith Council	Fairfield Council
Surface water quality	D5	x	x	x	x
Groundwater	D5	x			

2. Asset Description

The M12 Motorway plays a key role in supporting both existing and future transport infrastructure across Western Sydney, providing a high-capacity link between the orbital motorway network and the new airport precinct. The corridor also facilitates efficient access for private vehicles, commercial traffic and freight, improving regional mobility and supporting long-term economic development within the Western Parkland City.

The Asset includes the M7-M12 interchange and the associated on and off ramps and is described as follows in the M12 Motorway Environmental impact statement (TfNSW, 2019).

2.1. Location

Figure 2 shows the location and key features of the Asset. Key features of the Asset are detailed in Section 2.3.

2.2. Environmental setting

The M12 Motorway is located within the Cumberland Plain, a subregion of the Sydney Basin which consists of relatively flat and low-lying topography, with small ridgelines present around Horsley Park, Orchard Hills and Cecil Hills. The Asset interacts with one major creek, Ropes Creek, and its associated tributaries. The Asset also interacts with tributaries of Hinchinbrook Creek, located to the south of the Asset. Additional surface water features surrounding the Asset include Doujon Lake and areas mapped as coastal wetlands associated with major watercourses.

Land uses in the area of the Asset are predominantly recreation, rural residential and residential, but also include small areas of commercial/industrial and conservation areas.

Environmentally sensitive areas are recognised adjacent to the motorway which includes the Western Sydney Parklands conservation areas and water infrastructure such as the State Heritage Register listed Sydney Water Upper Canal (Pheasants Nest Weir to Prospect Reservoir) near Elizabeth Drive.

Refer to the M12 Motorway Environmental impact statement (TfNSW, 2019) for additional information.

2.3. Asset components

The M7-M12 interchange (subject of this OEMP) is a motorway-to-motorway interchange, extending about 4 km within the existing WestLink M7 Motorway corridor.

Vehicles on the M12 Motorway and Westlink M7 Motorway travel at variable speeds of up to 100 km/h. The M12 Motorway will comprise four lanes with a dual carriageway in both directions from the Westlink M7 Motorway at Cecil Hills to The Northern Road at Luddenham.

The M12 Motorway interchange with the Westlink M7 Motorway is a grade-separated interchange to provide a free-flowing connection to and from the Westlink M7 Motorway which, in turn, links to the wider Sydney motorway network that includes the M5 Motorway, the M4 Motorway and the M2 Motorway. Key features of the Asset are shown in the **Figure 2**.

2.3.1. M7 Motorway northbound exit ramp

The northbound exit ramp from the Westlink M7 Motorway to the M12 Motorway westbound is a two-lane exit. An auxiliary lane about 300 m long and starting about 900 m south of the existing exit to Elizabeth Drive, has been provided. The two-lane section of ramp diverges from the Westlink M7 Motorway about 700 m south of the existing exit to Elizabeth Drive. The ramp runs parallel to the Westlink M7 Motorway before curving to the west to merge with the M12 Motorway. A new pedestrian and cycle footbridge has been provided, in line with the existing Westlink M7 Motorway pedestrian and cycle footbridge just south of Elizabeth Drive to span across the new exit ramp. This will maintain Western Sydney Parklands' connectivity with the Westlink M7 Motorway shared user path.

The Westlink M7 Motorway northbound exit ramp also includes construction of a new bridge alongside the existing Westlink M7 Motorway bridges over an existing access way that passes under the Westlink M7 Motorway about 900 m south of Elizabeth Drive.

The existing northbound Westlink M7 Motorway exit ramp to Elizabeth Drive remains unchanged.

2.3.2. Westlink M7 Motorway northbound entry ramp

The entry ramp connecting the M12 Motorway eastbound to the Westlink M7 Motorway northbound is a two-lane ramp from the M12 Motorway, bridging over Elizabeth Drive and Wallgrove Road. The entry ramp merges

with the Westlink M7 Motorway in about the same location as the existing Wallgrove Road connection to the Westlink M7 Motorway. The ramp runs parallel to the existing Westlink M7 Motorway lanes for about 400 m before merging with the Westlink M7 Motorway through lanes. The Westlink M7 Motorway northbound entry ramp also includes the widening of an existing bridge over Villiers Road and an adjacent private property access, about 1.3 km north of Elizabeth Drive.

Wallgrove Road has been realigned, and a connection provided to the Westlink M7 Motorway via a loop ramp joining the M12 Motorway to the Westlink M7 Motorway entry ramp. Access from Elizabeth Drive to the Westlink M7 Motorway has been maintained via the realigned Wallgrove Road.

2.3.3. Westlink M7 Motorway southbound exit ramp

The southbound exit ramp from the Westlink M7 Motorway to the M12 Motorway westbound diverges from the Westlink M7 Motorway about 360 m north of the existing exit to Elizabeth Drive. The ramp runs parallel to the Westlink M7 Motorway before curving west and bridging over the Westlink M7 Motorway to form the start of the M12 Motorway westbound carriageway.

The existing southbound exit ramp from the Westlink M7 Motorway to Elizabeth Drive remains unchanged. However, the existing shared user path running alongside the Westlink M7 Motorway in this location has been realigned slightly to accommodate the new exit ramp to the M12 Motorway. The existing shared user path has been relocation to the east for about 2 km between Villiers Road and south of Elizabeth Drive. The relocated path ties into the existing Westlink M7 Motorway shared user path north and south of Elizabeth Drive.

2.3.4. Westlink M7 Motorway southbound entry ramp

The southbound entry ramp to the Westlink M7 Motorway from the M12 Motorway is a two-lane ramp starting as a continuation of the M12 eastbound carriageway after the exit ramp to the Westlink M7 Motorway northbound. It curves to the south, passing under the Westlink M7 Motorway southbound exit ramp. It then bridges over the existing Elizabeth Drive northbound exit, the Westlink M7 Motorway main alignment and the existing Westlink M7 Motorway shared user path.

The existing southbound entry ramp from Elizabeth Drive to the Westlink M7 Motorway has been slightly realigned to merge with the new Westlink M7 Motorway southbound entry ramp.

The ramp also includes a new bridge over an existing access way that passes under the Westlink M7 Motorway about 900 m south of Elizabeth Drive.

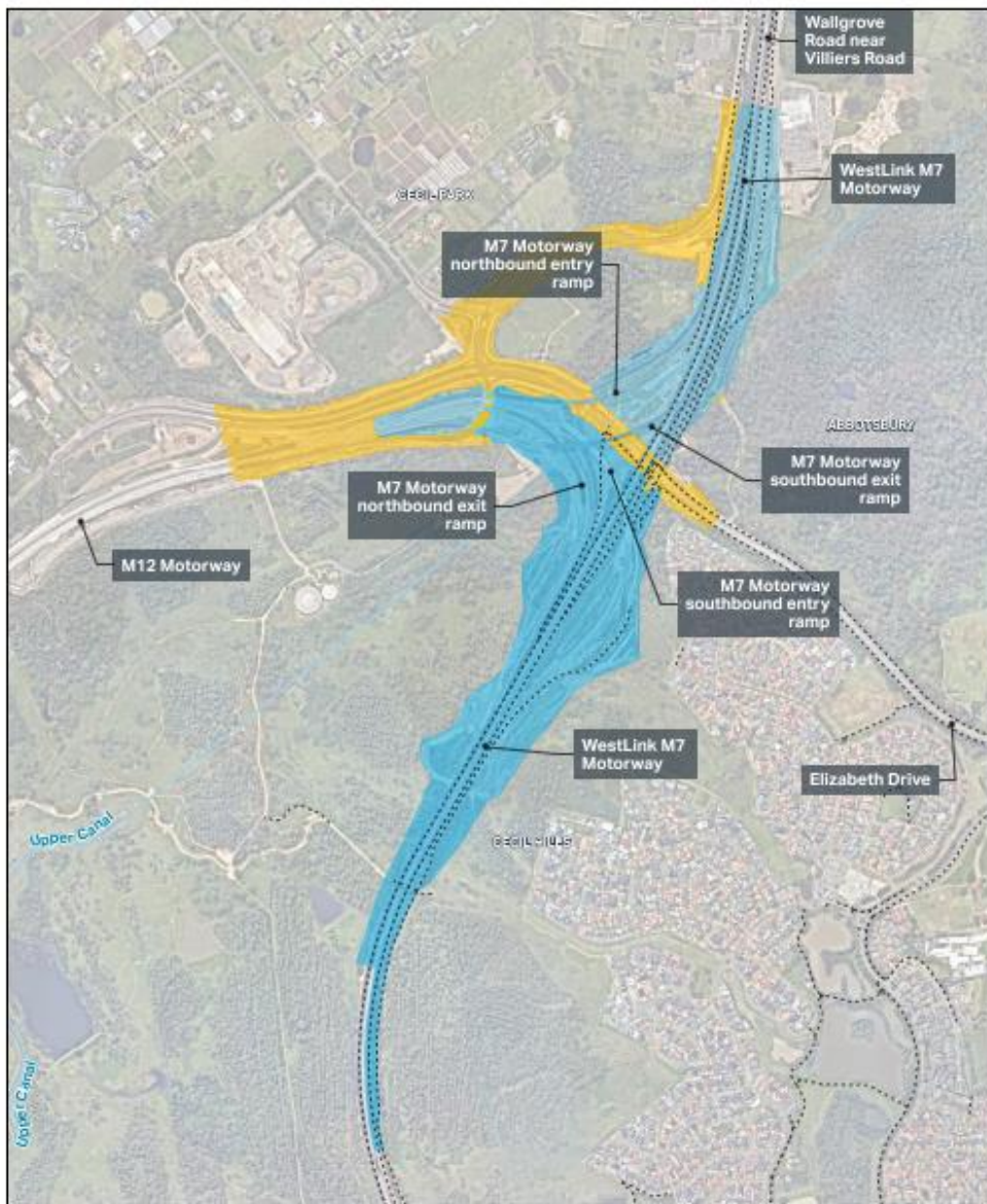


FIGURE 2-:
M12 EAST RETAINED
MOTORWAY KEY
FEATURES

Legend

- Cycle Path
- Retained Works
- Returned Works



Figure 2 M12 East retained key features

2.4. Asset Operators

TfNSW is the primary owner of the M12 Motorway. Interface between TfNSW and NWR is detailed in an approved Operational Interface Protocol and Operations Management Plan which will be reviewed and updated over time. Operational works are undertaken by an operating entity (WSO Co) and operations and maintenance service provider (Westlink Services), on behalf of NWR.

Additional nearby stakeholders are also responsible for areas adjacent to the Asset. These stakeholders are identified in **Section 2.5**.

2.4.1. Transport for NSW

TfNSW manages State roads and regional roads across NSW, maintaining and coordinating maintenance and incident response and traffic management 24 hours, 7 days per week. The road network is made up of key integral parts which are managed by teams focusing on their respective special needs (TfNSW, 2025).

An important part of the road network is Sydney's 160 km of privately operated tolled and untolled motorways fully integrated with the state road network. TfNSW facilitates end to end management of the NSW motorways network in partnership with private sector Operators (TfNSW, 2025).

2.4.1. NorthWestern Roads Group

The NWR has interfaces with the TfNSW Motorways Partnership team regarding operation and maintenance activities of the Asset as well as the Westlink M7 Motorway. NWR provides WSO with the required management resources under a Management Services Agreement to operate the Asset in compliance with the Western Sydney Orbital Project Deed and associated Project Documentation.

2.4.2. WSO Co

WSO Co is the operating entity and is responsible for operating and maintaining the Asset in accordance with the WSO Operations and Maintenance Deed. The WSO Operations and Maintenance Deed contains the compliances and requirements that have been passed on to Westlink Services for the duration of the operation and maintenance contract.

2.4.3. Westlink Services

Westlink Services is the primary operations and maintenance provider for the Asset and is wholly owned by Service Stream (herein referred to as the Operator). Westlink Services are also the primary operations and maintenance provider for the Westlink M7 motorway.

Operations and maintenance activities are carried out in accordance with the WSO Operations and Maintenance Deed between Westlink Services and WSO Co. This includes motorway operations, asset management, maintenance, and project management for the Asset.

Maintenance sub-contractors are engaged to undertake operation and maintenance activities for the Asset. Operation and maintenance activities are outlined in Section 4.

2.5. Nearby stakeholders

The full list of stakeholders relevant to the M12 Motorway at the time of preparing this document are detailed below. It is noted that some of these stakeholders will not be relevant to the operation and maintenance of the Asset.

Government agencies relevant to the M12 Motorway:

- TfNSW
- NSW Department of Planning, Housing and Infrastructure (DPHI)
- NSW Department of Climate Change, Energy, the Environment and Water (DCCEEW)
- Department of Primary Industries and Regional Development (NSW) (DPIRD)
- Sydney Water Corporation (SWC)
- NSW Environmental Protection Authority (EPA)
- Western Sydney Parklands Trust
- Local councils relevant to the Asset

- Liverpool City Council
- Fairfield City Council
- Infrastructure and service providers relevant to the M12 Motorway:
 - Jemena
 - Endeavour Energy
 - Transgrid Energy
 - Ausgrid
 - APA Group
 - NBN Co (National Broadband)
 - Telstra and Optus
 - Ausgrid
 - Sydney Water
 - Verizon
 - Vocus
 - AAPT
 - Special interest groups
 - Bicycle NSW
 - Bike North
 - Western Sydney Cycling Network
- Emergency Services
- Industry groups:
 - Road Freight NSW
 - Roads Australia.

Landowners, businesses, and the community are also included as nearby stakeholders, including neighbouring residents, businesses and sensitive receivers.

A Community Involvement Plan (CIP) has been developed for the Asset (BMS-PL02 Community Involvement Plan). This document also includes a list of stakeholders who NWR actively seek to inform, consult, collaborate, engage, or partner with, in relation to operation and maintenance activity, as well as preferred communication management practices and methods.

3. Legislative and Regulatory Obligations

This section, along with **Appendix A** details the compliance obligations in accordance with ISO 14001:2015/Amd 2024 Environmental Management Systems. Legislation, regulatory obligations and guidelines relevant to different aspects of the operation and maintenance of the Asset are outlined in **Appendix B**.

It is noted that not all MCoA for the M12 Motorway are relevant to this M12ER OEMP as some do not relate to the operational phase of the Asset and some are not located in the vicinity of the Asset or impacted by the operations of the Asset (that is they apply to other parts of the M12 Motorway only). Relevant MCoA are noted in **Appendix A**.

All activities being undertaken by the Operator must be planned and implemented in accordance with relevant legislation. The activities must also consider best-practice standards and guidelines described by Government agencies, including TfNSW guidelines.

Permits and licences will be identified and progressively obtained as required during the operation and maintenance of the Asset by the Operator. Permits and licences will also be reviewed if there are changes in legislation or changes in scope for the operation and maintenance of the Asset. This will require the OEMP and relevant supporting plans to be assessed periodically to ensure all environmental obligations are being met.

Refer to **Section 9** for further information on updating the OEMP.

3.1. Environmental standards and guidelines

The Operator's Environmental Policy (POL-EN-001) is documented in the EMS. The Environmental Policies are to be understood, implemented and maintained by all staff and sub-contractors involved with the operation and maintenance of the Asset. The Environmental Policies will be provided as part of the site induction. The Operator's Environmental Policy will be reviewed on an annual basis.

The Asset is required to be operated in accordance with relevant guidelines. Section 1.2 and **Appendix B** detail the standards and guidelines that may be required to be implemented in relation to different aspects of the operation and management of the Asset to support this OEMP.

Relevant legal requirements in relation to environmental aspects of operational activities are also registered in RES-BS-008 Environmental Legal Requirements Register.

3.2. Approvals, permits and licences

The Asset is required to be operated in accordance with relevant State and Commonwealth guidelines.

Table 2 summarises the secondary approvals, permits and licences that are held and/or may be required during the operational stage of the motorway. Note that an Environment Protection Licence (EPL) under the *Protection of the Environment Operations Act 1997* (NSW) (POEO Act) is not required for the operation of the Asset as no scheduled activities are carried out.

Permits and licences will be identified and progressively obtained during the operation and maintenance of the Asset by all Operators. Permits and licences will also be reviewed if there are changes in legislation or changes in scope for the operation and maintenance of the Asset.

Relevant permit and licences are listed in the ECP's included in **Section 6.2**.

Table 2 Schedule of Environmental Regulatory Approvals

Authority	Issue	Approval Required
Local Council or SWC	Maintenance of stormwater and wastewater systems	It is noted that all operational stormwater and wastewater systems of the Project including stormwater drainage, erosion, sedimentation and water pollution control systems and facilities shall be operated and maintained to meet the requirements of the relevant authorities as per existing approvals.
SafeWork NSW	Dangerous goods must only be transported by licensed transporters.	License required under the <i>Road and Rail Transport (Dangerous Goods) Act 1997</i> (NSW)

Authority	Issue	Approval Required
NSW EPA	Classification and management of wastes in accordance with the Waste Levy Guidelines and the Protection of the Environment Operations (Waste) Regulation 2014 (POEO Regulation).	Payment of contributions under Section 88 of the <i>Protection of the Environment Operations Act 1997</i> are required. Wastes may be exempt from calculation of contributions. Appropriate records and disposal dockets are to be maintained and submitted to the NSW EPA.
	Transportation of operational wastes.	Licence required under the POEO (Waste).
	Specification of requirements for licences and the regulation of various activities that have the potential to pollute or harm the environment.	Activities listed under Schedule 1 of the POEO Act require an EPL.
	Transport, treatment and disposal of trackable waste.	Waste records kept in accordance with Protection of the Environment Operations (Waste) Regulation 2005 (NSW)
TfNSW	Traffic detours and traffic management.	Road Occupancy Licence (ROL)
	Refer to Table 3 below for examples of maintenance works that do not require additional assessment or approval.	Step 2 Memo or Minor Works Review of Environmental Factors under the <i>Environmental Planning and Assessment Act 1979</i> (NSW) or Project REF Procedure
	Environmental impact assessment for applicable tree related works	Step 2 Memo and/or Minor Works Review of Environmental Factors
Office of Environment and Heritage (NSW) (now NSW DCCEEW)	A permit or other authorization is required for removal of trees of a threatened species, threatened ecological community or a protected plant in urban areas.	Permit required under <i>Biodiversity Conservation Act 2016</i> (NSW) It is noted that remediation measures to maintain landscaping works to a high standard including replacement planning are authorised under existing approvals (refer Table 3).
	Approval is required for a permit to excavate any archaeological sites and relics. Approval would also be required for a "Consent to Destroy" at Indigenous heritage sites.	Consent to Destroy required under Section 90 of the <i>National Parks and Wildlife Service Act 1974</i> (NSW)
Heritage Council of NSW	Non-Indigenous heritage item	Permit required under Section 144 of the <i>Heritage Act 1977</i>

4. Operation and Maintenance Activities

Operations and maintenance activities are managed from the Westlink M7 Eastern Creek Control Centre and are carried out in accordance with the WSO Operations and Maintenance Deed with WSO Co. This includes motorway operations, asset management, maintenance, and project management for the Asset.

Operation and maintenance activities may be undertaken 24 hours per day, 7 days per week. This includes routine maintenance and minor works undertaken outside of “standard working hours” where those activities are carried out in accordance with this OEMP and the MCoA ,or are otherwise carried out as exempt development (refer to Table 3 below).

Works associated with routine operation and maintenance for the Asset are to be conducted as outlined in **Table 3** below. Operation and maintenance activities have been divided into two (2) groups. These activities have either been approved under MCoA or are exempt development and do not require secondary approvals.

Routine Activities – defined as activities carried out regularly for the operation and maintenance of the Asset. The environmental impacts from these activities will be managed under the controls and procedures noted within this OEMP.

Incident Response – defined as those activities that are not performed at predetermined time intervals, these include responses to events including chemical spills and traffic incidents which may involve emergency services or other assistance and requires notification to the control room.

All other works, that are not considered routine activities or incident response, will be managed via the following procedures:

- PRO-EN-010 Minor Works Environmental Assessment
- PRO-EN-007 Minor Works Environmental Assessment – Tree Management.

It is noted that these procedures include environmental assessment of work practices and safeguards, including safeguards to address potential noise impacts for proposed works,

Table 3 Operation and maintenance activities for the Asset

Issue	Activity	Frequency/ Timing	Minimum Requirements	Relevant Procedure	Approval Source
Routine Activities					
Traffic	Overall traffic management including monitoring traffic signalling devices by the transport management centre and quality upkeep for traffic to run smoothly.	24 hours / 7 days	Daily	- SMP-MT-004 Road Marking Maintenance Procedure - SMP-MT-008 Safety Barrier Repairs Maintenance Procedure - SMP-MT-012 Signage Maintenance Procedure.	T&I SEPPs¹ 2.113(a)
Road furnishings and signage	Maintain road furnishings (such as directional signs) and electronic equipment such as variable message boards, speed signs and tolling equipment including: - Repair or replacement of permanent signage - Repair of repair or replacement of roadside furniture - Maintenance and repair of the VDC controller - Maintenance and repair of technical shelters - Maintenance and repair of toll point gantries - Toll point maintenance including lighting - Repair and replacement of cameras - Cleaning of structures.	Standard operation hours. Maintenance activities may need to be undertaken out of standard hours under ROL to permit safe access.	Regular routine inspections Maintenance In accordance with the Operator's management plans or the relevant procedure.	- SMP-MT-012 Signage Maintenance Procedure - SMP-MT-022 Roadside Furniture Maintenance Procedure - SMP-MT-024 Toll Point Inspection and Maintenance Procedure - PRO-EN-001 Environmental Inspection and Audit Procedure.	T&I SEPPs 2.113(a)

¹ State Environmental Planning Policy (Transport and Infrastructure) 2021

Issue	Activity	Frequency/ Timing	Minimum Requirements	Relevant Procedure	Approval Source
Rubbish	Maintain visual amenity of the Asset including: • Removing rubbish • Maintain visual appearance • Remove graffiti.	Standard operation hours. Maintenance activities may need to be undertake out of standard hours under ROL to permit safe access.	Regular routine inspections	• SMP-MT-001 Graffiti Inspection and Maintenance Procedure • SMP-MT-002 Waste Collection and Disposal Maintenance Procedure • PRO-EN-003 Waste Management Procedure • POL-EN-002 Environmental Objectives and Targets.	• T&I SEPPs 2.113(b)
Landscaping	Maintain the landscaping of the Asset including: • Vegetated verges • Grassed areas • Replant damaged/dead vegetation with like for like replacement. Mowing, slashing, blower/vacs, skid steers, augers, watercarts and operation and maintenance light vehicles may be required to undertake the above activities. Grassed areas: • Remove litter prior to mowing • Mowing, slashing of grass in the median and verges of the road and shared path. Landscape planting: • Replacement of plants • Removal of dead or dying plants • Weed Control. Garden beds: • Weed control, mulching, and watering	Standard operation hours. Maintenance activities may need to be undertaken out of standard hours under ROL to permit safe access. Quarterly Replacement of plants as required. Removal of dead or dying plants and weed control as required/identified during monitoring. Weed control to be conducted quarterly.	Minimum Routine Maintenance in accordance with the relevant procedure.	Routine maintenance activities are to be undertaken by the Operator in accordance with the relevant management plans or procedure. • SMP-MT-002 Waste Collection and Disposal Maintenance Procedure • SMP-MT-021 Grass Cutting Maintenance Procedure • SMP-MT-020 Tree Pruning, Mulching and Removal Maintenance Procedure • SMP-MT-018 Noxious Weed Removal Maintenance Procedure • SMP-MT-036 Vegetation, Planting and Maintenance Procedure • POL-EN-002 Environmental Objectives and Targets.	• MCoA E73 • MCoA E74 • T&I SEPPs 2.113(d)

Issue	Activity	Frequency/ Timing	Minimum Requirements	Relevant Procedure	Approval Source
	- Plant where appropriate plant density is not achieved - Mulch annually to ensure depth of mulch is maintained at 75 mm depth - Planting, trimming, and pruning as required to maintain sight distances and minimise blind spots. - Vegetation screening - Plant replacement to maintain screening.	Planting and mulching to be conducted as required. Trimming and pruning to be conducted in conjunction with routine inspections. Planting in spring or autumn as required.			
Landscape monitoring	Vegetation Management	Annual targeted inspection.	Minimum Routine Maintenance in accordance with the relevant procedure.	- PRO-EN-001 Environmental Inspections and Audits - SMP-MT-026 General Inspections and Surveillance - SMP-AS-011 Batters and Embankment Inspection Procedure - SMP-AS-004 Shared Path Inspection Procedure - SMP-AS-005 Basin and Detention Ponds Inspection Procedure - SMP-AS-007 Motorway Inspection 2W Procedure - SMP-AS-014 Perimeter Fence Line Inspection Procedure - SMP-AS-020 Noise Wall Inspection Procedure.	- MCoA E73 - MCoA E74 - T&I SEPPs 2.113(d)
	Noxious Weeds	Ongoing, during all inspections and maintenance activities.			
	Threatened Species	Annually.			
	Bushfire Management	Annually, prior to the fire season.			
	Tree Hazards	As per tree monitoring schedule, and as new hazards are identified.			

Issue	Activity	Frequency/ Timing	Minimum Requirements	Relevant Procedure	Approval Source
Drainage	Maintain the kerbs, gutters, drains and pits of the Asset including: - Cleaning out drains and pits - Inspect pipes for structural integrity and flow obstructions - Cleaning kerbs - Ensuring the roadway remains free of debris/litter.	Standard operation hours. Maintenance activities may need to be undertaken out of standard hours under ROL to permit safe access. Stormwater and wastewater facilities and soil quality are inspected regularly in accordance with an inspection Schedule.	Minimum Routine Maintenance In accordance with the Operator's management plans or the relevant procedure.	- SMP-MT-002 Waste Collection and Disposal Maintenance Procedure - SMP-MT-007 Pit Maintenance Procedure - SMP-MT-013 Surface Drainage Maintenance Procedure - SMP-MT-014 Subsoil Drainage Maintenance Procedure - SMP-MT-015 Pipe and Culvert Maintenance Procedure - SMP-MT-016 Basins, Floodway and Scour Protection Maintenance Procedure - PRO-EN-001 Environmental Inspections and Audit Procedure - PLN-EN-003 Soil and Water Management Plan.	- REMM – SWHO6 - T&I SEPPs 2.113(a)
Dust and emissions	General maintenance works or road works activities requiring ground disturbing works.	Visual inspection will be undertaken daily where maintenance activities take place in dust generating areas in accordance with procedure PRO-EN-001 Environmental Inspection and Audit Procedure. The effectiveness of dust controls must be especially checked during periods of strong winds.	Monitoring of dust and plant emissions should be undertaken. The effectiveness of dust controls must be especially checked during periods of strong winds. All feasible measures shall be taken to minimise the consumption of energy and production of carbon emissions by all individuals.	- PRO-EN-001 Environmental Inspection and Audit Procedure. - PRO-EN-002 Energy Management Procedure - PRO-EN-004 Air Quality Control Procedure - PRO-EN-001 Environmental Inspections and Audit Procedure.	T&I SEPPs 2.113(1)(b)
Maintenance waste	Monthly inspections will be undertaken of temporary waste facilities and compounds during road maintenance works.	Monthly	All waste must be segregated, stored, transported, and disposed of by waste stream.	- PRO-EN-003 Waste Management Procedure - SMP-MT-002 Waste Collection & Disposal Maintenance Procedure.	MCoA E100

Issue	Activity	Frequency/ Timing	Minimum Requirements	Relevant Procedure	Approval Source
Noise Walls and Boundary Fencing	Repair or replace walls and fencing that are missing, broken, rotten, corroded, or protective coating damaged.	As required, when identified through regular inspections.	Repair / replace any panels that are missing, cracked, broken, rotten, discoloured-stained, paint peeling/faded, graffiti or not securely fixed. If repair / replacement requires significant works, then consult with management before proceeding.	- SMP-MT-035 Boundary Fencing Repairs Maintenance Procedure - SMP-MT-034 Noise Wall Maintenance Procedure - SMP-MT-001 Graffiti Inspection and Maintenance Procedure.	T&I SEPPs 2.21, Sch 1
Road and shared traffic	Maintain the pavement, roads and shared traffic of the Asset including: - Cleaning out and patching potholes - Removing unsuitable materials (materials that have failed to support intended use) - Crack sealing - Concrete maintenance.	As required, when identified through regular inspections.	Remove debris or loose material from around the proposed repair area to ensure maximum surface area attachment by hand or machine grinding.	- SMP-MT-005 Pavement Maintenance Procedure - SMP-MT-002 Waste Collection & Disposal Maintenance Procedure - SMP-MT-011 Concrete General Maintenance Procedure - SMP-MT-010 Crack Sealing and Joint Maintenance Procedure.	T&I SEPPs 2.113(a)
Chemical use	The use of chemicals involved in maintenance of landscape, roads, and other Assets, including but not limited to: Spraying herbicides and pesticides.	As required, when identified through regular inspections. Ongoing, during all inspections and maintenance activities.	Pesticide notification signage - operation and maintenance vehicles used for spraying herbicides will display signs notifying that pesticide spraying is in progress and listing a contact number for further information.	- SMP-MT-019 Herbicide Application Maintenance Procedure - SMP-MT-018 Noxious Weed Removal Maintenance Procedure.	- REMM HS04 - T&I SEPPs 2.113(d)

Issue	Activity	Frequency/ Timing	Minimum Requirements	Relevant Procedure	Approval Source
Incident Response					
Chemical Spill	In the event where chemicals are released from a vehicle or hazardous/non-hazardous chemicals are released by road network user, then spill kits are to be used to contain and absorb the material and prevent the material from entering nearby drains. The material may then be removed and disposed of at an appropriately licenced facility. If the material spilled is hazardous or unable to be safely managed by the Operator, emergency services is to be notified, and assistance received to safely manage the material. Stormwater pollution control basins low flow valves to be capped (where safe to do so) to capture all contaminants and prevent downstream pollution.	As required and safe to do so	Regular routine inspections are to be undertaken of the road network to identify any spill events, or otherwise if reported through alternate communication mediums. Routine inspections of stormwater pollution control basins. As identified after inspections or reported through any of the communication mediums.	- PRO-BS-002 Incident, Hazard, and Noise Compliance Report (NCR) Reporting - SMP-OP-004 Spill Clean-up Procedure.	- REMM HS04 - T&I SEPPs 2.113(c)
Incident Management	Incident management including responding to, contacting emergency services (if required) and attending to any vehicle breakdowns or other incidents. Breakdowns and/or incidents are to be cleared (including spills) on the Asset if safe to do so. Notify the control room and manager of the incident and any assistance required.	24 hours / 7 days.	As required. Incidents recorded in the operational management control system	- PRO-BS-002 Incident, Hazard, and NCR Reporting - SMP-MT-028 Electrical Fault Finding or Diagnostic Maintenance Procedure - SMP-MT-038 Electrical Isolation and Lock Out Maintenance Procedure - Environmental Inspection Procedure and Environmental Incident Procedure.	T&I SEPPs 2.113(c)

5. Implementation

This section details how the OEMP will be implemented to ensure compliance with State and Commonwealth legislation, standards, guidelines and contractual requirements.

5.1. Environmental management systems and procedures

The existing, operational Westlink M7 Motorway EMS, that will transparently incorporate the operational and maintenance requirements of the Asset, comprises the following:

- Policy, documenting the commitment to ecologically sustainable development in addition to local and commonwealth environmental legislation
- POL-EN-002 Environmental Objectives and Targets.
- Procedures to provide guidance on management processes, including:
 - PRO-EN-010 Minor Works Environmental Assessment
 - PRO-EN-007 Minor Works Environmental Assessment – Tree Management.
 - PRO-EN-001 Environmental Inspections & Audit Procedure
 - PRO-EN-002 Energy Management Procedure
 - PRO-EN-003 Waste Management Procedure
 - PRO-EN-004 Air Quality Control Procedure.
- Additional supporting documents such as the Service Stream EMS guidelines and Health, Safety and Environment (HSE), including:
 - Acid Sulphate Soil - HSE Compliance Guide
 - Asbestos Containing Material - HSE Compliance Guide
 - Biosecurity - HSE Compliance Guide
 - Bushfire Management - HSE Compliance Guide
 - Contaminated Land Management - HSE Compliance Guide
 - Emissions to Air - HSE Compliance Guide
 - Environmental Management of Oils Fuels and Other Chemicals - HSE Compliance Guide
 - Environmental Noise and Vibration - HSE Compliance Guide
 - Environmental Policy
 - Environmental Resource Use - HSE Compliance Guide
 - Erosion and Sediment Control - HSE Compliance Guide
 - Fauna - HSE Compliance Guide
 - Flora - HSE Compliance Guide
 - Heritage Buildings and Sites - HSE Compliance Guide
 - HSE Risk Control Standards
 - Health, Safety, Environment and Quality (HSEQ) Management Standards
 - Indigenous Heritage - HSE Compliance Guide
 - Visual Amenity - HSE Compliance Guide
 - Waste Management - HSE Compliance Guide.

The purpose of the EMS is to mitigate environmental impacts by adopting the Plan-Do-Check-Act process outlined in ISO 14001:2024 Environmental Management Systems. The EMS also meets the NSW EMS Guidelines (2022) requirements.

5.2. Operator structure and responsibilities

The OEMP roles and responsibilities are detailed in **Table 4**.

The current Asset Operator structure for the WestLink M7 Motorway is detailed in the organisational chart Figure 3. This same structure will apply to the M12ER areas of the motorway. The organisational chart details the resources and site personnel involved in the effective implementation of the OEMP.

The management team is responsible for environmental performance. This responsibility includes providing leadership, resources, and support to ensure that activities are carried out to avoid, mitigate or minimise environmental risks and improve environmental performance in line with the Environmental Policy.

Table 4 OEMP Roles and Responsibilities

Key Role	Responsibilities
Operations and Maintenance Manager	- Has overall responsibility for environmental performance on the Asset - Approve OEMP for issue - Ensures consistency with legislative standards and contractual obligations and procures the resources required for implementation of the OEMP - Oversees implementation of HSE systems (includes environmental). - Conduct environmental inspections and monitoring - Deliver environmental training and inductions - Ensure subcontractor compliance - Lead/support incident investigations and reporting - Liaise with authorities and stakeholders
Environmental Advisor	- Maintain and update OEMP and supporting procedures - Maintain environmental records and compliance tracking - Maintain environmental risk register - Participate in audits and continuous improvement - Prepare and submit environmental reports - Update legal requirements register - Reporting Environmental incidents to EPA and TfNSW.
Asset and Performance Manager	- Ensure all monitoring and reporting is conducted as required - Review of OEMP and other EMS documents prior to issue - Ensure compliance with legal and other requirements, including follow up actions from Environmental Advisor notifications - Identifies and manages risks across business, community, and environment - Ensures environmental approvals and licenses are managed - Identifies HSEQ hazards and risks in project systems and processes. - Integrates risk management into planning and reviews HSEQ controls - Ensure the environment is accounted for and considered when identifying and prioritising work.
Network Integration and Operations Coordinator	- Review of Security and Crime Management Plan and Traffic Management and Safety Plan - Incident management including notifying the Environmental Adviser of environmental incidents - Ensures environmental approvals and licenses are managed - Identifies HSEQ hazards and risks, including environmental.
Delivery Manager	- Ensure that environmental impact assessment is conducted where necessary for minor and routine works - Plan and implement all maintenance works with appropriate environmental safeguards - Supports emergency response and asset recovery (may include environmental incidents) - Ensure environmental performance by complying with the requirements of this OEMP - Effective identification, investigation, reporting, and resolution of environmental issues.
Maintenance supervisors	- Understand environmental risks and legal requirements relevant to works - Conduct toolbox training for new staff - Ensure environmental documents are accessible to workers

Key Role	Responsibilities
	• Ensure that workers have adequate supervision, training and resources to comply with procedures and instructions • Overseeing maintenance crews and ensure appropriate environmental safeguards are followed through • Communicate environmental issues/incidents on site • Reporting Environmental incidents to Traffic Control Room Operators (TCRO) on (02) 9834 9261.
Workers and subcontractors	• Take due care to minimise environmental harm • Report environmental incidents • Reporting Environmental incidents to TCRO on (02) 9834 9261
Traffic Control Room (TCR) personnel	• 24 hour Emergency Response contact • Environmental Incident Response dispatch • Contacting and reporting to Environmental Advisor of all environmental incidents.

Organisation Chart Westlink M7

V2 Sept. 25



ServiceStream

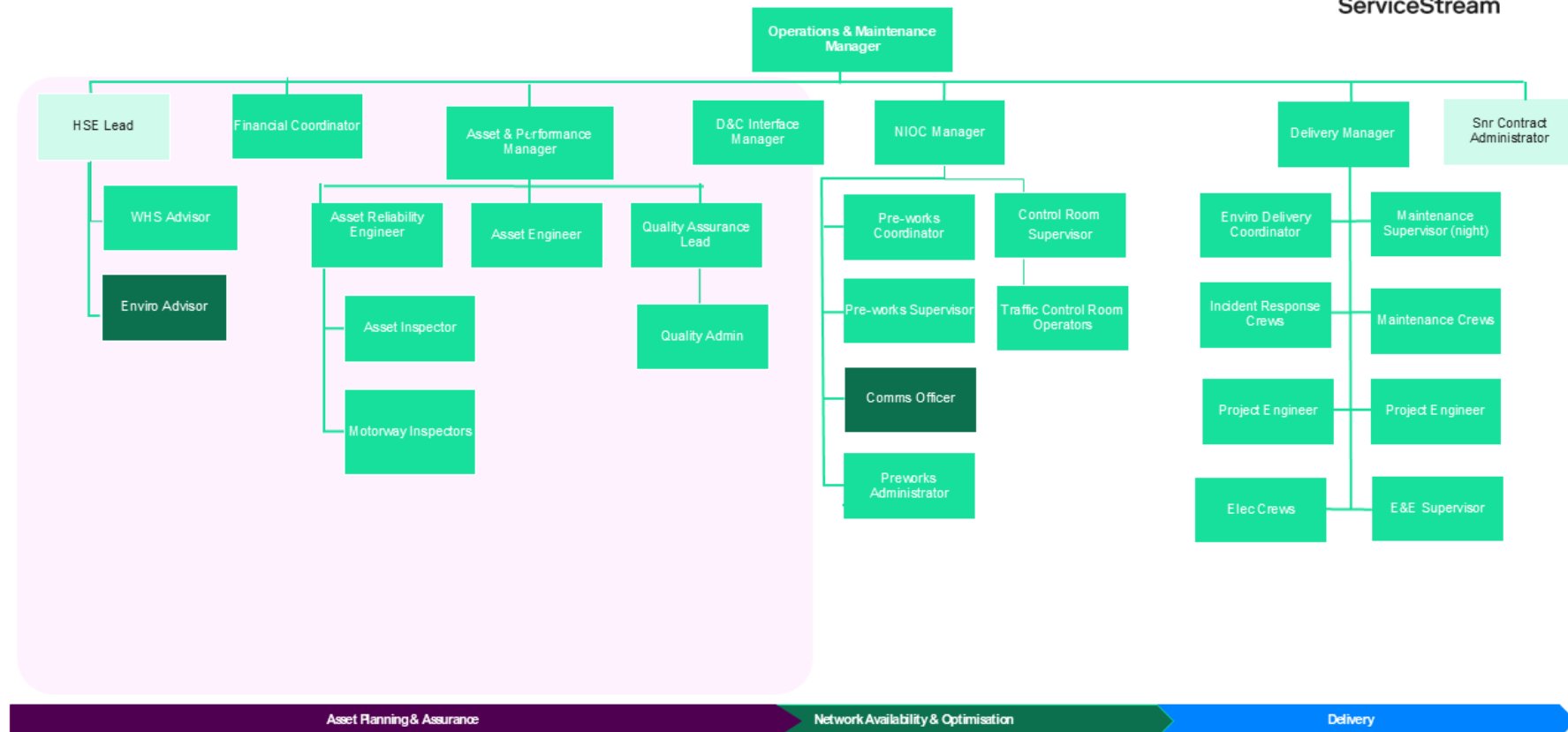


Figure 3 Organisational Chart

5.2.1. Control of subcontractors

The Operator has a responsibility to ensure that all persons on the Asset, including sub-contractors and their employees comply with the relevant environmental requirements.

All sub-contractors' personnel are considered equivalent to Asset personnel in all aspects of environmental management and control and their responsibilities in this respect mirror those of operational personnel.

Appropriate references to environmental management and control requirements will be included in sub-contract documentation supplied as required by the Operator as per the CCD-MS-PRO-0196 Contractor Management Procurement Process.

Sub-contractors working for the Operator are required to:

- Observe sub-contract and statutory requirements relating to environmental protection and to follow instructions issued by management and supervisory personnel
- Nominate site representatives to liaise with the Proponent's representatives as they arrive on the site
- Ensure that their staff are knowledgeable of the environmental obligations and are fully inducted as required for their role
- Adhere to the management system as it applies to their operations on the site
- Maintain an open reporting culture regarding issues, incidents and non-compliances
- Provide the Operator with resources-use and waste management records for works carried out
- Maintain a clean and tidy site with all environmental controls in place
- Co-operate fully with site emergency procedures and consultative arrangements.

Where required, sub-contractor EMPs will be consistent with this OEMP, and should include:

- Responsibilities and authorities
- Training and qualifications in relation to work to be performed
- Environmental procedures in relation to the scope of works
- Control measures adopted by the sub-contractor.

Internal audits of onboarded sub-contractors will be carried out annually in line with contractor procedures. CCD-MS-PRO-0196- Contractor Management HSEQ Process.

5.3. Induction, training, awareness and competencies

The Operator provides training to ensure that all personnel able to influence environmental performance have the necessary education, skills, experience, and knowledge.

Sub-contractor personnel are to be included in the on-site induction process. A record of all sub-contractors inducted is to be maintained as part of the Asset induction and training register, by the training manager.

5.3.1. Site inductions

All personnel, sub-contractors and consultants will be required to undertake a site induction.

The site induction will address the following topics as a minimum:

- Details of this OEMP
- High-risk environmental issues
- Planning approval conditions and associated environmental licences, permits and/or guidelines
- Environmental management requirements and responsibilities
- Mitigation measures required to manage environmental issues
- Incident/emergency response procedure and reporting requirements
- Activity specific environmental impacts
- Environmental management system obligations

- Community interface requirements.

5.3.2. Other environmental training

Environmental training needs are identified by firstly determining the responsibilities of individuals for managing environmental aspects and the environmental management system, and the responsibilities of individuals performing tasks that have a potential to cause a significant environmental impact. Following this, competency is determined, and training needs identified.

Training may be delivered during initial inductions, with additional ongoing awareness provided during toolbox, pre-start or similar communications. An environmental skills and training matrix documents environmental training for workers (staff and contractors) undertaking work for the Operator. This matrix identifies minimum training requirements of all roles utilised for Works Under the Contract.

5.3.3. Training records

Records of induction and training are to be kept on the training database and include the topic of the training carried out, dates, names, and trainer details.

Induction attendance forms are signed by attendees to confirm that they have been informed of the environmental issues and that they understand their responsibilities.

5.4. Communication

5.4.1. Internal communications

Relevant representatives from TfNSW and the Operator will meet at regular intervals to discuss on-site environmental management, monitoring requirements and results, operational activities, environmental performance and other relevant aspects in relation to the management of the Asset.

Internal communication of significant environmental aspects and contents of the EMS will occur through the site induction, toolbox training and environmental awareness updates, and in management reviews.

The items to be communicated internally will include the following:

- Environmental Policy
- Environmental Objectives
- Environmental management practices, processes, and procedures
- Environmental performance and strategies for improvement
- Environmental incident reporting procedure
- Changes to the environmental management system.

5.4.2. External communications

The M712UDC-JHGRP-M7A-CY-PLN-000001 Communication Management Plan was developed by John Holland to address communication requirements throughout design and construction. This plan references both the M7 and M12 Conditions of Approval and is to remain in place up to 12 months following the completion of construction works (refer MCoA B6).

During operations external communications are to be received, documented, and responded to in accordance with BMS-PL02 M7 Community Involvement Plan and the PRO-OP-010 Communication Procedure. Other relevant procedures include:

- BMS-PR10 - Stakeholder Contacts Procedure
- BMS-PR16 - Public Alerts Email Procedure
- BMS-PR15 - Complaints and Unreasonable Complainant Conduct Protocol
- BMS-PR-03 – Media, Brand and Corporate Communications Protocol
- BMS-PL03 - Community Relations Strategy.

Monthly reporting to WSO Co is to include a summary of environmental performance including compliance, incident and hazard items from the previous month.

Contact with Government agencies and the community may be required at various times during operations. Communication with external agencies will take place in consultation with WSO Co and in accordance with guidelines set out by TfNSW.

Examples of external environmental communications include:

- Advice to the NSW EPA of a major spill or incident
- Notification to DPI (Department of Primary Industries) (NSW Fisheries) of works involving the removal of sediment or snags from a waterway in accordance with the TfNSW Code of Practice for Minor Works in NSW Waterways
- Notification to the Environment and Heritage group (EHG) of DCCEE (NSW) regarding a threatened flora/fauna find
- Notification to EHG regarding an Indigenous heritage item or relic
- Notification to Heritage Council of NSW relating to a non-Indigenous heritage item
- Notification to related Council of impending work, changes to road conditions, environmental incidents or emergencies and tree management works adjacent to property boundaries
- Notification to the community of a proposed change to traffic conditions or after hours works activity
- Notification to WSO Co and TfNSW of any visit to the site by the EPA or other authority, followed by a report of the visit.

5.4.3. Advertised planned maintenance

All scheduled maintenance is to be advertised on the Westlink M7 Motorway website ([Scheduled maintenance - Westlink M7](#)). All planned traffic changes and detours will be regularly updated via the website. Where maintenance of the Asset is expected to cause impacts to nearby stakeholders, letter drops are to be conducted for those properties affected.

5.4.4. Media protocols

The Operator maintains a community engagement team responsible for public media interface. In principle, employees and/or sub-contractors are not to engage with the media unless approved by the community engagement team. Public contact line number is to be provided to any member of the public or media outlet. A public contact line number is to be provided to any member of the public or media outlet.

5.4.5. 24/7 Emergency contact line and community management

A complaints and enquiry handling system is implemented and maintained by WSO Co to ensure all contacts are responded to accordingly.

A complaints register is to be maintained in accordance with MCoA B8 and B9 that details the following information relevant to the complaint:

- number of complaints received;
- the date and time of the complaint;
- the method by which the complaint was made;
- any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect
- (e) nature of the complaint;
- means by which the complaint was addressed and whether resolution was reached, with or without mediation; and
- if no action was taken, the reason(s) why no action was taken.

The key community engagement contacts include:

- 24 hours, 7 days per week phone number [(02) 9834 9200] answered by the Westlink Services Stakeholder and Community Specialist or delegated on-site supervisor during out of hours works
- Website address – <https://www.westlinkm7.com.au/contact>.

Further details on community consultation and complaint management are provided in the BMS-PL02.03 M7 Community Involvement Plan.

As a general rule, the steps summarised below are to be followed upon receiving a community complaint.

1. Complaint reported to the delegated communications officer
2. Register the complaint
3. Acknowledge you have received a complaint with a complaint
4. Verify any gaps in the information provided by the complainant
5. Implement any remedial actions as appropriate
6. Refer to relevant contractual requirements
7. Investigate the complaint
8. Implement corrective actions as appropriate
9. Respond/close out with the complainant.

The Complaints Register must be provided to the Planning Secretary upon request, within the timeframe stated in the request.

5.4.6. New or changed maintenance activities

Community members and stakeholders are to be notified about any new or changed maintenance activities which will affect access to their properties or otherwise disrupt the use of their premises. Letters to residents and businesses must be issued at least five (5) working days before commencing work affecting residents.

Notification will be managed in coordination with WSO Co. The Asset and Performance Manager or designated representative is to conduct letterbox drops.

Notifications must state the nature of the work, why it is necessary, the expected duration, details of any changes to the traffic arrangements or property access, and the name and contact telephone number of a representative who can respond to resident concerns.

Community and stakeholders may include:

- Local residents
- Local businesses
- Road users
- Government including councils, MPs, and TfNSW
- Sensitive community members such as schools and nursing homes
- Western Sydney Parklands.

The types of external communication that may be used are:

- Westlink M7 Motorway website
- Specific contact to affected community and stakeholder groups e.g., online forums
- Letters to residents
- Advertising
- Media releases
- Door knocking
- Variable Message Signs campaigns.

In accordance with the WSO Operations and Maintenance Deed, any communication material relevant to the Asset is to be reviewed and approved by TfNSW. All dates and times are set in the material.

5.4.7. Extended working hours

Out of hours contact for members of the public during projects is to be to the phone number provided on all communication material, which is Westlink M7 on (02) 9834 9200.

During business hours, community contacts are forwarded to the Communications Officer. After hours, the contact number is directed to the TCR, who will take relevant details. The TCR will pass this to the designated project manager for the work. Issues are to be addressed by the supervisor on site where possible. Where a response is required, contact will be made within the next working day, during business hours by the Communications Officer.

6. Specific Environmental Aspects

6.1. Environmental aspects and controls

In order to manage environmental impacts for significant environmental aspects, a series of Environmental Control Plans (ECPs) and supporting environmental management plans have been already successfully implemented for the Westlink M7 Motorway. These control measure will be extended to include the Asset.

Table 5 details each environmental aspect relevant to the operation of the Asset and the relevant potential impacts associated with each aspect. The table also outlines the relevant section of this OEMP that:

- provides an overview of the relevance of each respective aspect
- the corresponding ECP, and, where applicable
- references existing Westlink M7 Motorway management plans that will be extended to include the Asset area.

Significant environmental aspects are to be reviewed annually as part of the OEMP review (refer **Section 9**) to determine if the impacts and risks for programmed operational activities are being appropriately mitigated and managed according to best practice.

Table 5: Environmental aspects, potential impacts and references

Environmental Aspect	Potential Impacts	Report Section Reference	Environmental Management or Control Plan Reference
Traffic and Transport	• Reduced vehicle speeds along the Asset, due to increased traffic demand • Decreased intersection performance at some intersections (associated with increased traffic volumes and growth in the area).	Section 6.2.1	Table 6 Traffic and Transport Environmental Control Plan
Noise and vibration	• Excessive noise and vibration generated by maintenance activities causing exceedances with the Asset noise objectives • Excessive light impacts on adjacent and adjoining properties • Damage to property or services • Disturbance to residents.	Section 6.2.2	Table 7 Noise, Vibration and Lighting Environmental Control Plan
Air quality	• Dust generation and fume emissions resulting in environmental nuisance or impacting visibility, terrestrial or aquatic ecology • Decrease in air quality from emissions or dust • Production of carbon monoxide, sulfur dioxide, nitric oxide and particulates associated with power generators, plant and equipment exhausts.	Section 6.2.3	Table 8 Air Quality Environmental Control Plan
Soil and water	• Chemicals, nutrients, oil, hydrocarbons, other liquid pollutants or 'dead' water discharged from the lease boundary • Sedimentation and eutrophication of waterways • Sedimentation, scouring, erosion and contamination of soil • Localised flooding • General surface run off and excavation stockpile run off into waterways.	Section 6.2.4	Table 9 Soil and Water Environmental Control Plan Appendix C Surface Water and Ground Water Monitoring Plan – M12 Motorway operational stage
Biodiversity and landscape	• Loss of habitat for flora and fauna including threatened species	Section 6.2.5	Table 10 Biodiversity and Landscape

Environmental Aspect	Potential Impacts	Report Section Reference	Environmental Management or Control Plan Reference
	- Removal or damage to vegetation to carry out maintenance work - Disturbance of soil and ground cover - Sediment release to waterways - Damage to riparian vegetation - Introduction and/or spread of weed species through operation and maintenance vehicle movements across the site - Introduction and/or increase of feral and pest species - Spread of weed species through operation and maintenance vehicle movements across the site - Introduction and/or increase in weed species. - Spread of plant diseases		Environmental Control Plan M712UDC-JHGRP-M7A-LA-PLN-000001 Stage 1 Design and Landscape Plan. M712UDC-JHGRP-M7A-LA-PLN-303001 Stage 2 Design and Landscape Plan.
Waste management	- Use of potable water where other sources included water reuse could be considered - Inappropriate disposal of waste, including waste disposed in landfill that could be avoided or diverted - Generation of hazardous or contaminated waste - Stormwater and surface water pollution - Soil contamination - Water pollution due to sediment runoff from stockpiles or disturbed areas.	Section 6.2.6	Table 11 Waste Management Environmental Control Plan
Cultural heritage	- Damage to or adverse impacts to cultural heritage sites/objects, places or values - Entrance into restricted access non-Aboriginal archaeological sites.	Section 6.2.7	Table 12 Cultural Heritage Environmental Control Plan
Bushfire management	- Adverse impacts to Asset infrastructure and public safety - Impacts to vegetation, fauna habitat and landscape, including potential decrease in quality and/or abundance of vegetation - Impacts to water and air quality - Increased risk of erosion and sediment impacts.	Section 6.2.8	Table 13 Bushfire Management Environmental Control Plan
Environmentally Sensitive Areas	Adverse environmental impacts to Environmentally Sensitive Areas (ESA).	Section 6.2.9	Table 14 Environmentally Sensitive Areas Environmental Control Plan

6.2. Environmental management

The following sections describe the management measures to mitigate and prevent environmental impacts from the operation of the Asset in relation to:

- Traffic and transport
- Noise, vibration and light
- Air quality
- Soil and water
- Biodiversity and landscape
- Waste
- Cultural heritage
- Bushfire
- Environmentally sensitive areas.

For each environmental impact a corresponding ECP has been developed which details:

- Performance criteria (expected outcomes)
- Management strategies (mitigation measures)
- Monitoring requirements
- Reporting requirements
- Corrective actions for complaints and non-conformances.

6.2.1. Traffic and transport

The main potential adverse transport and traffic impacts during operation of the Asset include:

- Reduced vehicle speeds along the Asset, due to increased traffic demand
- Decreased intersection performance at some intersections (associated with increased traffic volumes and growth in the area).

A Traffic and Transport ECP has been implemented for the Westlink M7 Motorway to manage adverse traffic and transport impacts (refer **Table 6**).

Table 6 Traffic and Transport Environmental Control Plan

Traffic and Transport Environmental Control Plan	
Performance criteria	• Minimise verified complaints or community concerns relating to traffic disruptions, planned maintenance works, incidents or cyclist safety risks.
Management strategies	• Changed traffic conditions that have the potential to impact on road users, are to be advertised via the Westlink M7 Motorway website and TfNSW weekly traffic update.
Monitoring	• Traffic conditions will be monitored by the Traffic Control Room.
Reporting	• Reporting in accordance with the: – MAN-AS-003 Tolling RSE Maintenance Manual Traffic Management and Safety Reporting Procedure – PRO-OP-012 Daily Reporting Procedure. • All environmental incidents shall be reported to the Environment Advisor. • All complaints can be reported to the Communications Officer and the Westlink M7 Motorway Contact Number [(02) 9834 9200]. • The TfNSW Environmental Incident Classification and Reporting Procedure will need to be followed for the reporting of the incident to TfNSW.
Corrective action	• Complaints and corrective actions will be recorded in Enablon. • Performance reviews relating to repetitive or major traffic non-conformances will be undertaken on notification of these incidents.

6.2.2. Noise, vibration and lighting

Operational noise and vibration mitigation measures include at-source and at property noise treatments identified through the Operational Noise and Vibration Review (ONR). A Noise, Vibration and Lighting ECP (refer **Table 7**) has been developed to minimise noise, vibration and lighting impacts to receivers. Treatments identified as required as a result of the ONR will be implemented in accordance with TfNSW Noise Mitigation Guidelines (2015).

Although not part of the scope of this OEMP it is noted that the MCoA include the following requirements that are relevant to operations and maintenance:

- E52 – An ONR must be prepared to confirm noise control measures that would be implemented for the operation of the CISI. The ONR must be prepared in consultation with the Planning Secretary and relevant council(s) and must address the requirements of MCoA E52 and MCoA E54. This ONR has been completed and submitted to the Planning Secretary.
- E58 - Within 12 months of commencement of operation, monitoring of operational noise must be undertaken to compare actual noise performance of the project against the noise performance predicted in the ONR prepared in accordance with MCoA E52. Classified traffic counts must be undertaken simultaneously with noise measurements to confirm traffic volumes and traffic mix assumptions.
- E60 - An Operational Noise Compliance Report (ONCR) must be prepared to document the findings of the operational noise monitoring carried out under MCoA E58 and in accordance with the Model Validation Guideline (RMS, 16 May 2018 Version 1.1) and must address the conditions listed in MCoA E60.

The ONCR must be submitted to the Planning Secretary and the EPA for information within 60 days of completing the operational noise monitoring (required by MCoA E58) and be made publicly available.

Preparation of the ONCR will be undertaken by TfNSW (or TfNSW contractor), for the whole M12 Motorway (including the M7/M12 interchange) and any additional mitigation measures required because of the validation monitoring will be implemented by TfNSW, if required.

In accordance with MCoA E62, operation and maintenance activities must minimise light spillage to surrounding properties. All lighting associated operation and maintenance must be consistent with the requirements of AS/NZS 4282:2019 Control of the obtrusive effects of outdoor lighting and relevant Australian Standards in the series AS/NZS 1158 – Lighting for Roads and Public Spaces. Additionally, mitigation measures must be provided to manage any residual night lighting impacts to protect properties adjoining or adjacent to the project, in consultation with affected landowners.

Table 7 Noise, Vibration and Lighting Environmental Control Plan

Noise, Vibration and Lighting Environmental Control Plan	
Performance criteria	• Compliance with the <i>M12 East Motorway Operational Noise and Vibration Review</i>. • Compliance with CCD-MS-CG-2631 Environmental Noise and Vibration HSE Compliance Guide. • Compliance with POL-EN-002 Environmental Objectives and Targets. • Minimise complaints or community concerns regarding noise or vibration. • No regulatory action initiated against the Asset due to noise or vibration.
Management strategies	• Plan maintenance works, minor works and associated control measures in accordance with TfNSW and EPA guidelines. • Maintain existing noise walls and property-specific noise mitigations. • All maintenance equipment is to be fitted with effective and properly maintained noise suppression devices in accordance with manufacturer's specifications and operated in a proper and efficient manner. • All vehicles, plant and equipment shall be switched off when not in use. • All lighting associated will be consistent with the requirements of AS/NZS 4282:2019 and relevant Australian Standards in the series AS/NZS 1158 – Lighting for Roads and Public Spaces. • In areas where maintenance activities or minor works are likely to impact on nearby residences, adequate notification is to be given to advise them of the works and likely duration. • Ensure that worksite lighting is directed away from residential areas and does not spill into surrounding properties.

Noise, Vibration and Lighting Environmental Control Plan

Monitoring	Respond to community complaints in accordance with BMS-PL02 Community Involvement Plan.
	- Operational road traffic noise monitoring would be undertaken to determine compliance with the operational noise levels predicted in the ONR. - Effectiveness of noise and vibration controls shall be regularly reviewed for adequacy having regard for changing circumstances. - In accordance with MCoA E58 monitoring of operational noise will be undertaken within 12 months of the commencement of the Asset, to determine compliance with the operational noise levels predicted in the ONR. The need for additional mitigation or management measures will be assessed and implemented (by TfNSW) where feasible and reasonable.
	- Records will be kept of noise and vibration complaint to identify causes, management measures implemented, and monitor recurring complaints. This log will be available to regulatory authorities upon request. - All incidents regarding noise and vibration shall be reported to the Environment Advisor. - All complaints can be reported to the Communications Officer and the Westlink M7 Motorway Contact Number [(02) 9834 9200].
	- Complaints and corrective actions will be recorded in Enablon. - In the event of a noise or vibration complaint during maintenance activities and minor works, the Site Supervisor is to amend the site activities or scheduling where practical.
Reporting	- Records will be kept of noise and vibration complaint to identify causes, management measures implemented, and monitor recurring complaints. This log will be available to regulatory authorities upon request. - All incidents regarding noise and vibration shall be reported to the Environment Advisor. - All complaints can be reported to the Communications Officer and the Westlink M7 Motorway Contact Number [(02) 9834 9200].
Corrective action	- Complaints and corrective actions will be recorded in Enablon. - In the event of a noise or vibration complaint during maintenance activities and minor works, the Site Supervisor is to amend the site activities or scheduling where practical.

6.2.3. Air quality

All reasonably practicable measures are required to be employed to minimise air quality emissions of dust and other air pollutants during operation.

At a minimum, general mitigation measures to be employed across the Asset are:

- To maintain the landscaped areas and ensure areas remain stabilised
- To implement appropriate mitigation measures during maintenance activities, including dust suppression activities and ensuring maintenance vehicles are functioning as per their specifications.

An Air Quality Management ECP has been developed to manage impacts of activities that could generate dust, odour and other pollutants impacting air quality during operation (refer **Table 8**). The plan has been developed in accordance with the requirements of the *Protection of the Environment Operations Act 1997*, Protection of the Environment Operations (Clean Air) Regulation 2022, and any conditions of approvals, licences or permits in relation to management of air pollution and maximum air pollutant levels.

Table 8 Air Quality Environmental Control Plan

Air Quality Environmental Control Plan	
Performance criteria	- Compliance with CCD-MS-CG-2625 Emissions to Air HSE Compliance Guide. - Compliance with POL-EN-002 Environmental Objectives and Targets. - No verified complaints or community concerns relating to emissions or dust generation from maintenance. - No significant visible dust outside of the maintenance area.
Management strategies	- Check for smoky exhaust emissions included in daily operation and maintenance vehicle prestart. - Maintain and operate plant to avoid/minimise air pollution. - Minimise ground disturbing works as far as practicable. - Measures (including watering or covering exposed areas) are to be used to minimise or prevent air pollution and dust during routine maintenance and minor works activities. - Works (including the spraying of paint and other materials) are not to be carried out during strong winds or in weather conditions where high levels of dust or air borne particulates are likely.

Air Quality Environmental Control Plan

Monitoring	- Operation and maintenance vehicles transporting waste or other materials that may produce odours or dust are to be covered during transportation. - Visual inspection will be undertaken daily where maintenance activities take place in dust generating areas. - Operation and maintenance vehicles, plant, equipment and machinery shall be regularly inspected daily to ensure good working order.
	- Record all dust, odour and other air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken. This log will be available to regulatory authorities upon request. - All incidents regarding air quality shall be reported to the Environment Advisor. All complaints can be reported to the Communications Officer and the Westlink M7 Motorway Contact Number [(02) 9834 9200]. The TfNSW Environmental Incident Classification and Reporting Procedure will need to be followed for the reporting of the incident to TfNSW.
	- In the event of an air quality complaint during maintenance activities and minor works, the Site Supervisor will make amendments to site activities where practical. An investigation will be conducted to determine the factors that may have contributed to or have been responsible for the complaint. - Complaints and corrective actions will be recorded in Enablon.

6.2.4. Soil and water

Numerous aspects of Asset operation and maintenance have the potential to impact soil and water quality including but not limited to:

- Use of chemicals, herbicides, oil and hydrocarbons
- Sedimentation and eutrophication of waterways from runoff
- Sedimentation, scouring, erosion and contamination of soil
- General surface run off into waterways.

In accordance with MCoA D5- D11, surface water quality and groundwater must be monitored during operation to compare actual operational performance against predicted performance (refer **Appendix A**). Surface water impact from the Asset is also required to be monitored under REMM SWH06 for a minimum of 12 months following construction (refer **Appendix A**). REMM GW01 requires operational groundwater monitoring for at least 6 months (refer **Appendix A**). The results of the monitoring program are provided to DPHI, DPIRD, Fairfield City Council, Liverpool City Council, Water NSW, and Sydney Water (if discharges are made to their asset/s) in the form of an Operational Monitoring Report at six monthly intervals for the duration of the monitoring program.

A Surface Water and Ground Water Monitoring Plan has been developed by TfNSW (2025b) for the operational stage of the M12 Motorway (refer **Appendix C**) and will be implemented during operation to observe any changes in surface water and groundwater and inform appropriate management responses. The program is based on the water quality monitoring methodology, water quality indicators, and the monitoring locations presented in the Surface water and hydrology assessment report (Appendix M of the EIS), and Groundwater quality and hydrology assessment report (Appendix N of the EIS).

The monitoring program will be implemented by TfNSW routinely on a monthly basis and supplemented by up to three wet weather sampling events per six monthly monitoring period. The wet weather is defined as being >20 mm over a 24-hour period, this criterion will be used to identify wet weather event triggers.

Operational data for surface water and groundwater will be reviewed after the first six months of monitoring. If data is deemed to have met all project requirements for being rehabilitated to an acceptable condition and/or the permanent water quality structures are deemed to be operating satisfactorily, the report will include certification by a suitably qualified and experienced independent expert and be submitted to DPHI. Should the results of monitoring identify that the water quality management measures are not effective in adequately mitigating water quality impacts, additional mitigation measures will be identified and implemented as required and monitoring will continue for an additional six months following completion of the report to close out any recommendations.

A Soil and Water ECP (refer **Table 9**) has been developed in accordance with the requirements of the conditions of approval and relevant legislative requirements.

Table 9 Soil and Water Environmental Control Plan

Soil and Water Environmental Control Plan	
Performance criteria	• Compliance with the Surface Water and Groundwater Monitoring Plan – M12 Motorway operational stage. • Compliance with the following Compliance Guides: - CCD-MS-CG-2626 Erosion and Sediment Control - CCD-MS-CG-2624 Contaminated Land Management - CCD-MS-CG-2639 Acid Sulphate Soil. • Compliance with POL-EN-002 Environmental Objectives and Targets. • Manage contaminated soils in accordance with environmental legislation and EPA guidelines.
Management strategies	• Surface and groundwater is to be managed in accordance with the Appendix C which specifies requirements in relation to monitoring requirements, assessment criteria and water quality objectives. • Control measures are inspected and maintained according to procedures set out in relevant maintenance procedures. • Impervious surfaces such as workshops and bridge decks are to be swept instead of being hosed down. • Vegetation clearance and ground disturbance is to be minimised, particularly near waterways or on batters. • Works should be planned such that the extent and duration of exposed soil is minimised. • Scour protection and energy dissipation measures are to be maintained at drainage outlets to treat localised increases in flow velocities. • Operation and maintenance activities must not destroy, modify or otherwise cause direct or indirect damage to the Upper Canal System, including the Cecil Hills Tunnel, and Tunnel Shafts 3 and 4.
Monitoring	• A Surface Water and Groundwater Monitoring Plan – M12 Motorway operational stage will be undertaken throughout operation in accordance with MCoA D5 and D6. Operational data for surface water and groundwater will be reviewed after the first six months of monitoring. If data is deemed to have met all project requirements, the monitoring report will include certification by a suitably qualified and experienced independent expert and be submitted to DPHI. • If monitoring requirements have not been met, monitoring will continue for an additional six months post completion of the report and any recommendations from the report will be implemented. • Regular inspection of all water quality, erosion and sediment controls shall be undertaken, and maintenance undertaken as required. • Effectiveness of erosion and sediment controls shall be regularly reviewed for adequacy (especially prior to any significant expected rainfall event (defined as being > 20 mm over a 24-hour period), and immediately after) having regard for changing circumstances. • Basin monitoring following significant rainfall events in accordance with SMP-AS-006 Motorway Weather Event Inspection Procedure.
Reporting	• All incidents regarding soil and water shall be reported to the Environment Advisor. All complaints can be reported to the Communications Officer and the Westlink M7 Motorway Contact Number [(02) 9834 9200]. • The TfNSW Environmental Incident Classification and Reporting Procedure will need to be followed for the reporting of the incident to TfNSW. • All complaints, investigations, corrective actions, and other information relevant to soil and water management are to be included in the Operators Monthly Report.
Corrective action	• Complaints and corrective actions will be recorded in Enablon.

6.2.5. Biodiversity and landscape

Operation and maintenance of the asset will comply with relevant sections of the M7-M12 Integration Project Design and Landscape Plan (John Holland 2024) and the project's Landscape Management Plan and Operations and Maintenance (O&M) Manuals.

The above documentation provides guidance on the management, monitoring, and maintenance of:

- Landscaping, revegetation, and rehabilitation
- Protection of flora and fauna
- Screening vegetation
- Protection, management, and monitoring of the vegetation adjacent to the Western Sydney Parklands
- Weed management and pesticide use
- Tree hazard management.

Biodiversity offsets for the project have been purchased and retired in accordance with the Biodiversity Offset Strategy prepared for the project. There are no outstanding operational obligations related to biodiversity offsets.

A Biodiversity and Landscape ECP (refer **Table 10**) has been developed in accordance with the requirements of the conditions of approval and relevant legislative requirements.

Table 10 Biodiversity and Landscape Environmental Control Plan

Biodiversity and Landscape Environmental Control Plan	
Performance criteria	• Compliance with M712UDC-JHGRP-M7A-LA-PLN-000001 Stage 1 Design and Landscape Plan. • Compliance with M712UDC-JHGRP-M7A-LA-PLN-303001 Stage 2 Design and Landscape Plan. • Compliance with PRO-EN-006 Landscaping and Rehabilitation Procedure. • Compliance with the following Compliance Guides: - CCD-MS-CG-2628 Flora - CCD-MS-CG-2627 Fauna - CCD-MS-CG-2622 Biosecurity. • Compliance with POL-EN-002 Environmental Objectives and Targets.
Management strategies	• Management of flora and fauna should be undertaken in accordance with the requirements the TfNSW Biodiversity Management Guidelines (TfNSW, 2024). • Clearing of native vegetation is to be minimised with the objective of reducing impacts to threatened ecological communities and threatened species habitat. • Maintenance of all soft landscaped and revegetated works shall be carried out in accordance with TfNSW Specification R178 'Vegetation' and R179 'Landscape Planting' and relevant local Council guidelines and strategies. • Any activity that may affect fish habitat especially pertaining to the creation of an obstruction that could block the free passage of fish, must be referred to NSW Fisheries unless it is an already approved activity such as maintenance of stormwater controls (refer Section 3.2). • Landscaped areas to be inspected and vegetation, weeds and waste in landscaped areas to be management in accordance with the requirements of PRO-EN-006 Landscaping and Rehabilitation Procedure. • All pathogens (e.g. Chytrid, Myrtle Rust and <i>Phytophthora</i>) are to be managed in accordance with the TfNSW Biodiversity Management Guidelines (TfNSW, 2024). • Maintenance works will be carried out to avoid or minimise the spread of weeds. • Ongoing weed removal following restoration works and planting. • Weeds are to be managed according to:

Biodiversity and Landscape Environmental Control Plan

- General Biosecurity Duty of Care requirements under the Biosecurity Act 2015 to prevent the introduction and spread of pests, diseases, weeds and contaminants
 - TfNSW Weed Management and Disposal Guide
 - TfNSW EMF-BD-GD-0039 Biodiversity Management Guideline - Guide 6 (TfNSW, 2024)
 - PLN-EN-007 Noxious Weed Recovery Plan
 - SMP-MT-019 Herbicide Application Procedure.
 - Ongoing maintenance of vegetation in accordance with Appendix A of M712UDC-JHGRP-M7A-LA-PLN-303001 Stage 2 Design and Landscape Plan will include, but not limited to:
 - maintenance weeding to target all woody and vine weed regrowth and maintain exotic ground covers below 300 mm in height and kept from setting seed
 - supplementary replanting to replace plants by the same species, or where that species is not available, with the same growth form
 - geomorphology and scour protection including rectification of any erosion or areas that are not free draining that are holding stagnant water.
 - Pesticide use is to be in accordance with the *Pesticides Act 1999* and Pesticides Regulation 2017.
 - Mobile plant and operation and maintenance vehicles must be clean of any mud or organic material, prior to arriving or departing from site to prevent the spread of weeds and disease.
 - Any chemical weed or pest treatment and eradication will be undertaken by appropriately qualified and licensed personnel.
 - Qualified trades people experienced in horticultural, maintenance and management techniques will be responsible for the undertaking of all works, in line with the Operator's requirements.
- | | |
|-------------------|---|
| Monitoring | <ul style="list-style-type: none"> • Vegetation, impacts to threatened species, tree hazards and presence of noxious weeds should be monitored as per the requirements of the project's Landscape Management Plan and O & M Manuals • Visual inspection of weed and pest matters to be undertaken as part of regular inspections. |
| Reporting | <ul style="list-style-type: none"> • Under the Biosecurity Act 2015 "a person who becomes aware of, or suspects, that a prohibited matter event has occurred, is occurring or is about to occur has a biosecurity duty to immediately notify the prohibited matter event in accordance with the requirements specified in the regulations". • Additionally, "a person who becomes aware of, or suspects, the existence of a biosecurity event has a biosecurity duty to immediately notify the biosecurity event in accordance with the requirements specified in the regulations". • Records of pesticide application and other weed management activities are to be kept in the document management system. • All environmental incidents shall be reported to the Environment Advisor All complaints can be reported to the Communications Officer and the Westlink M7 Motorway Contact Number [(02) 9834 9200]. • The TfNSW Environmental Incident Classification and Reporting Procedure will need to be followed for the reporting of the incident to TfNSW. • All complaints, investigations, corrective actions, and other information relevant to landscape management are to be included in the Operators Monthly Report. • Report any waste dumped or deposited at the sites. |
| Corrective action | <ul style="list-style-type: none"> • If unexpected threatened fauna or flora species are discovered, stop works immediately and follow the Unexpected Threatened Species Find |

Biodiversity and Landscape Environmental Control Plan

Procedure in the TfNSW EMF-BD-GD-0039 Biodiversity Management Guideline 2011 – Guide 1 (Pre-clearing process) (TfNSW, 2024).

- Corrective actions relating to non-conformance will be reported in Enablon.

6.2.6. Waste

To achieve positive waste and resource management outcomes, the Operator will adopt waste management strategies in accordance with the waste hierarchy and requirements of the *Waste Avoidance and Resource Recovery Act 2001*, the *Waste Avoidance and Resource Recovery Strategy 2014-2021*, *NSW Waste and Sustainable Materials Strategy 2041* and the *Environmental Legislation Amendment (Hazardous Chemicals) Act 2024* (refer **Figure 4**).

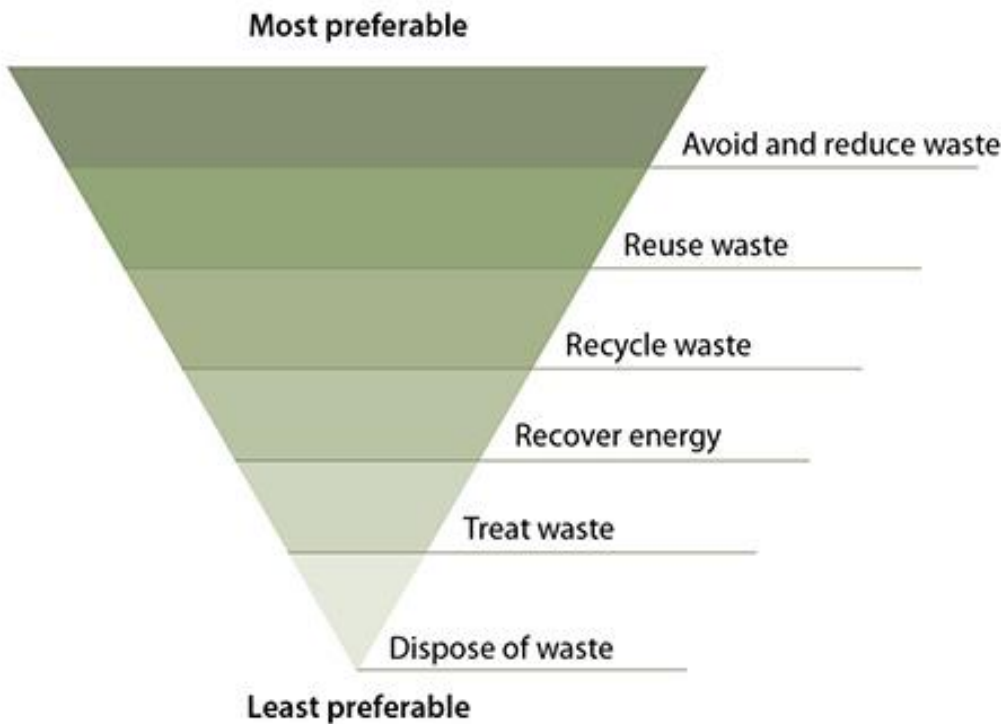


Figure 4 Waste management hierarchy (EPA 2014)

Waste is expected to be produced during operation of the Asset from operational control centre activities, maintenance of road infrastructure and landscaping. Waste streams will include the following:

- Waste from maintenance activities such as filling potholes, re-paving, re-painting and line marking, traffic light maintenance and replacement or repair of utilities.
- Food waste (liquid) and food waste (solid)
- Office wastes including electronic waste, paper, cardboard, plastics and wastes relating to office equipment such as printer cartridges etc.
- Mulch and organics
- Recovered aggregate
- Slag (stony waste matter)
- Stormwater
- Tyres

- Greenhouse gas emissions.

Waste produced during the operation of the Asset is to be managed or processed in accordance with the following measures:

- Avoidance and minimisation of wastes where practicable.
- Where avoidance or minimisation of waste is unable to be achieved, waste is to be reused, recycled, or recovered in accordance with a Resource Recovery Exemption or Order issued under the Protection of the Environment Operations (Waste) Regulation 2014.
- Where on-site reuse is not a viable option, material would be transported offsite for potential re-use or disposal at a licenced receival facility.

All wastes are to be appropriately classified in accordance with the EPA's Waste Classification Guidelines or in accordance with a Resource Recovery Exemption/Order. The Operator will be responsible for the appropriate management, tracking and disposal of their waste in accordance with this plan and the relevant legislation.

A Waste Management ECP (refer **Table 11**) and a more detailed PLN-EN-004 Waste Management Plan have been prepared to in accordance with the requirements of the conditions of approval, and relevant legislative requirements.

Table 11 Waste Management Environmental Control Plan

Waste Management Environmental Control Plan	
Performance criteria	• Implementation of waste management hierarchy onsite (reduce, re-use, recycle, disposal) and effective and sustainable disposal strategies on site. • Implementation of M712UDC-JHGRP-M7A-QM-PLN-000001 M7-M12 Integration Project Sustainability Management Plan. • Compliance with the following Compliance Guides: - CCD-MS-CG-2636 Waste - CCD-MS-CG-2634 Environmental Resource Use - CCD-MS-CG-2535 Asbestos Containing Material - CCD-MS-CG-2624 Contaminated Land Management - CCD-MS-CG-2632 Environmental Management of Oils, Fuels and Other Chemicals. • No environmental incidents resulting from improper waste management. • Hazardous and non-hazardous chemicals and substances are to be managed to minimise the potential adverse environmental impacts associated with their disposal.
Management strategies	• All waste wherever practicable is to be either segregated on-site or comingled and separated off-site. Waste will then be reused, recycled or disposed of in an appropriate manner at licensed facilities. • Storage, handling and use of dangerous goods and hazardous substances would be in accordance with the <i>Work Health and Safety Act 2011</i> and the Storage and Handling of Dangerous Goods Code of Practice (WorkCover NSW, 2005). • Containers and storage areas are to comply with storage requirements as per Safety Data Sheets (SDS) and relevant Australian Standards. • Waste is to be removed by an appropriately licensed waste subcontractor and taken to an appropriately licensed recovery or disposal facility. • Disposal of any contaminated material shall only be to a landfill approved by the EPA to accept that type of waste. • Where practicable, the movement of hazardous materials and regulated wastes will occur at non-peak times to minimise the possibility of traffic conflicts and associated risks. • All feasible measures shall be taken to minimise the consumption of energy and production of carbon emissions by all individuals, including: - purchase energy efficient equipment and fuel-efficient operation and maintenance vehicles - turn off equipment/operation and maintenance vehicles/machinery when not in use

Waste Management Environmental Control Plan

	- minimise unnecessary operation and maintenance vehicle movement on site - minimise operation and maintenance vehicle usage where possible - regular servicing of plant and equipment. • A water reuse strategy will be developed to reduce reliance on potable waters. The strategy will include operational water requirements and potential water sources to supply the water demand in consultation with Sydney Water. Alternative water supply options to potable water will be investigated, with the aim of reusing water using recycled water where feasible.
Monitoring	• Monitoring and inspection will be undertaken in accordance with the relevant HSE Compliance Guides. • Monitoring of energy use and greenhouse gas emissions will be in accordance with M712UDC-JHGRP-M7A-QM-PLN-000001 M7-M12 Integration Project Sustainability Management Plan. • Sustainability performance will be monitored to evaluate the Project's sustainability performance against sustainability targets and compliance obligations.
Reporting	• Records of waste quantities generated (including that reported by subcontractors) and any associated waste transport certificate documentation. • Report any illegal dumping to NSW EPA. • The TfNSW Environmental Incident Classification and Reporting Procedure will need to be followed for the reporting of the incident to TfNSW.
Corrective action	• Corrective actions relating to non-conformance will be reported in Enablon.

6.2.7. Cultural heritage

Known Aboriginal and non-Aboriginal heritage sites which require protection during operation of the Asset are outlined in the NSW Environment and Heritage Aboriginal Heritage Information Management System (AHIMS) and the relevant ESA Plans.

A Cultural Heritage ECP has been developed to manage activities that could impact heritage values (refer to **Table 12**). The ECP has been developed in accordance with the conditions of approvals, licences or permits in relation to management of cultural heritage.

Table 12 Cultural Heritage Environmental Control Plan

Cultural Heritage Environmental Control Plan	
Performance criteria	• Cultural heritage duties of care are met • No loss of heritage value. • Compliance with the following Compliance Guides: - CCD-MS-CG-2630 Indigenous Heritage - CCD-MS-CG-2629 Heritage Buildings and Sites. • Compliance with POL-EN-002 Environmental Objectives and Targets.
Management strategies	• Review relevant ESA Plans and AHIMS (see Section 6.2.9) prior to disturbing soil. • Complete an environmental assessment for works near heritage items and areas in accordance PRO-EN-010 Minor Works Environmental Assessment Procedure, AHIMS and Operational ESA Plans and any applicable TfNSW requirements. • Heritage management will be in accordance with Operators CCD-MS-CG-2630 Indigenous Heritage HSE Compliance Guide and CCD-MS-CG-2629 Heritage Buildings and Sites HSE Compliance Guide. • If an existing heritage item is on site or in the near vicinity of works, the item is to be protected to prevent any damage or disturbance.

Cultural Heritage Environmental Control Plan

	- Do not, without an approval from the Heritage Council (NSW) or local council, demolish, damage, move or develop around any place, building, work, relic, moveable object, precinct, or land that is: - the subject of an interim heritage order; - listed in the State Heritage Register; or - listed in the Local Environmental Plan. - Do not demolish, develop or alter the appearance of a local heritage item or land in the vicinity of a local heritage item without first obtaining development consent from the local council. - If unexpected historical items are uncovered in areas of the site not subject to an excavation permit, all works in proximity must cease, and the Heritage Council of NSW shall be informed in accordance with Section 146 of the <i>Heritage Act 1977</i>. Steps in the TfNSW <i>Unexpected Heritage Items Procedure</i> (2022) must be followed. - Should, skeletal material be discovered within works areas, work must stop and the TfNSW must be contacted immediately for guidance.
Monitoring	Inspect and maintain ESA and known heritage areas including signs, fences and gates that restrict access to the site.
Reporting	- ESA inspection records are to be maintained and reported to TfNSW in the monthly report. - All cultural heritage incidents shall be reported to the Environment Advisor. - The TfNSW Environmental Incident Classification and Reporting Procedure will need to be followed for the reporting of the incident to TfNSW. - Any findings of any historical relics shall be reported to Heritage Council of NSW in accordance with Section 146 of the <i>Heritage Act 1977</i> and TfNSW. - Any findings of skeletal remains shall be reported to TfNSW immediately.
Corrective action	- If unexpected heritage items are uncovered, all works in proximity must cease, and the TfNSW Aboriginal cultural heritage advisor and the environmental advisor be contacted immediately. Steps in the TfNSW <i>Unexpected Heritage Items Procedure</i> (2022) must be followed. - Non-conformance and corrective actions are to be recorded in Enablon. - Unexpected finds are to be managed in accordance with guidance and advice from TfNSW as specified in the TfNSW <i>Unexpected Heritage Items Procedure</i> (2022).

6.2.8. Bushfire

Operation of the asset will involve works that have potential to increase the likelihood of a bushfire, including hot works, welding, angle grinding and other spark generating activities, storage of waste tyres and green waste, refuelling, smoking, maintaining electrical equipment that has the potential to arc, and operation and maintenance vehicles idling or undergoing the automatic Diesel Particulate Filter thermal cleaning cycle while parked on dry grass.

A Bushfire Management ECP (refer to **Table 13**) has been developed in accordance with the requirements of the *Rural Fires Act 1997* and associated regulations for the Westlink M7 Motorway and will be expanded to include the Asset.

Table 13 Bushfire Management Environmental Control Plan

Bushfire Management Environmental Control Plan	
Performance criteria	- Compliance with the CCD-MS-CG-2623 Bushfire Management HSE Compliance Guide. - Compliance with POL-EN-002 Environmental Objectives and Targets.
Management Strategies	- Assets will be managed in accordance with standards and control measures set out in the CCD-MS-CG-2623 Bushfire Management HSE Compliance Guide and local council bushfire management plans. - Maintenance works will be carried out to minimise fuel load and fire hazard in accordance with the Bushfire Fuel Load Monitoring Program.

Bushfire Management Environmental Control Plan

	- Check if a Total Fire Ban is in place before commencing hot works (Fire Danger Ratings and Total Fire Bans in NSW), and comply with total fire ban directions. - Isolate hot work activities using appropriate warning barriers and signage and hot works activities to be clear of combustible matter. - Do not, without lawful authority, set fire to land or property of another person, the Crown or a public authority when a total fire ban is in force. - Do not allow a fire to escape from the land where it causes, or is likely to cause, injury or damage to another person, land or property of another person, the Crown or a public authority. - Do not leave any fire in the open air unless it has been thoroughly extinguished. - Take steps to prevent bush fires and minimise the danger of their spread including all possible steps to extinguish a fire burning during a bush fire danger period, and if unable to do so, inform an appropriate officer of its existence and locality, if practicable to do so without leaving the fire unattended. - Designated smoking areas and cigarette butt containers are to be provided. Do not light or carry a lighted tobacco product or match within 15 m of dry grass. Do not leave or discard any lighted tobacco product, match or incandescent material on any land. - Clean up fuel spills immediately. - Keep adequate fire-fighting equipment immediately at hand and extinguish any fire as soon as possible.
Monitoring	- Regular inspections of vegetation, access tracks, fencing, clearance zones to include assessment of bushfire hazards. - Bushfire fuel load monitoring annually in accordance with the Bushfire Fuel Load Monitoring Program (Peterson Bushfire, 2016) to confirm effectiveness of bushfire management strategies.
Reporting	- Report all fires immediately to the local Rural Fire Service, National Parks and Wildlife Service, and TfNSW (if required). - All incidents regarding bushfire management shall be reported to the Environment Advisor. All complaints can be reported to the Communications Officer and the Westlink M7 Motorway Contact Number [(02) 9834 9200]. - The TfNSW Environmental Incident Classification and Reporting Procedure will need to be followed for the reporting of the incident to TfNSW.
Corrective action	Non-conformance and corrective actions are to be recorded in Enablon.

6.2.9. Environmentally Sensitive Areas

ESAs are sites comprised of items of natural and cultural heritage. Operational control measures are set out in the relevant ESA Plans associated with the Asset. The ESA Plans show the locations of ESA including threatened ecological communities, threatened flora and fauna, Indigenous and non-Indigenous heritage. ESA Plans must be checked prior to undertaking maintenance work to assess potential environmental impacts and ensure that works are not carried out within an ESA without necessary approvals.

An ESA ECP has been developed to control and minimise risks to ESA (refer **Table 14**).

Table 14 Environmentally Sensitive Areas Management Environmental Control Plan

Environmentally Sensitive Areas Management Environmental Control Plan	
Performance criteria	- Compliance with the relevant Operational ESA Plans. - Impacts to ESA are avoided or minimised. - Necessary approvals are obtained for all maintenance works to be carried out within an ESA if required.
Management strategies	- Ensure that ESA plans are current and up to date. - Vehicles are not to enter ESAs without approval.

Environmentally Sensitive Areas Management Environmental Control Plan

	• Check ESA plans prior to undertaking maintenance work. • Assess any potential environmental impacts to ESA prior to undertaken works. • Acquire any relevant approvals for works within an ESA. • Inspect and maintain ESA areas including signs, fences and gates that restrict access to ESA. • Preserve vegetation by excluding plant, equipment and works that could cause damage.
Monitoring	• Inspect and maintain ESA areas including signs, fences and gates that restrict access to ESA. • Excessive light impacts on ESA's and adjacent ESAs.
Reporting	• ESA inspection records are to be maintained and reported to TfNSW in the monthly report. • All incidents regarding ESA shall be reported to the Environment Advisor. • The TfNSW Environmental Incident Classification and Reporting Procedure will need to be followed for the reporting of the incident to TfNSW.
Corrective action	• Any unapproved confirmed or potential impacts to an ESA and corrective actions will need to be recorded in Enablon.

6.3. Sustainability

The M712UDC-JHGRP-M7A-QM-PLN-000001M7-M12 Integration Project Sustainability Management Plan (SMP) has been developed by John Holland which includes the provision of a Sustainability Management Strategy in accordance with MCoA E92. This SMP has been developed and will be implemented to give effect to the Sustainability Strategy for the wider M12 as prepared by Transport for NSW. This SMP has been submitted to the Planning Secretary for information before the commencement of construction and will be implemented throughout operation.

Initiatives to minimise waste, consumption of energy, and production of carbon emissions as well as to reuse and recycle are captured in the Waste Management ECP which is discussed in Section 6.2.6.

7. Risks, Incidents and Emergency Preparedness and Response

Section 7 identifies the processes to analyse, manage and respond to emergencies associated with operational environmental risks.

It is noted that the road assets that are the subject of this OEMP are connected to a larger road network covered with other asset performance contracts/owners who are using their existing plans which will be further updated to incorporate the information pertaining to the Asset.

7.1. Risk Identification and Analysis

The below risk analysis utilises the methods of Australian Standard AS ISO 31000:2018 Risk Management, Principles and Guidelines (Standards Australia, 2018) and ISO 14001:2015/Amd 2024 Environmental Management Systems. The risk analysis method has been used by TfNSW Operators to develop their risk registers for the management of all their assets. The Operators Environmental Aspects and Impacts Register documents environmental hazards, controls and consequences for the environmental aspects identified. To manage environmental risks, the controls identified in the register will be included in the supporting environmental plans and the work activity documents relevant to each task.

The potential consequence, likelihood and risk level matrix are outlined **Table 15** to **Table 17**. These tables provide an example on how to assess Asset management activities however specific risk management protocols are used by the respective entities in State and Commonwealth Jurisdictions.

Table 15 Potential environmental consequence

	Insignificant	Minor	Significant	Major	Catastrophic
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 16 Potential environmental likelihood

	Almost certain	Likely	Possible	Unlikely	Rare
Likelihood	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 17 Potential environmental likelihood

	Potential Consequence Level					
		Insignificant	Minor	Significant	Major	Catastrophic
Potential Likelihood Level	Almost certain	Medium	High	High	Extreme	Extreme
	Likely	Medium	Medium	High	High	Extreme
	Possible	Low	Medium	Medium	High	High
	Unlikely	Low	Low	Medium	Medium	High
	Rare	Low	Low	Low	Medium	Medium

Environmental risks will be reviewed against the above risk rating matrix for activities and the associated mitigation measures implemented on a regular basis. The review frequency will be dependent on inspections, audits, incidents, emergencies, changes in legislation, changes in activities/procedures or otherwise on an annual basis. Where additional risks are identified TfNSW risk registers will be required to be updated to reflect this assessment where relevant.

It is noted that the road assets subject of this OEMP will be integrated in the road network covered by a current roads asset performance contract/owner who are using their existing plans which will be further updated to incorporate the information pertaining to Westlink M7 Motorway.

7.2. Incident and Emergency Preparedness and Response

Environmental management of the Asset looks to primarily mitigate potential of an incident or emergency. In the event that an incident or emergency response is required, this section outlines the procedure. It is noted that a coordinated response between the Operator, relevant authorities and emergency services may be required.

An 'incident' as defined within the MCoA is "An occurrence or set of circumstances that causes or threatens to cause material harm and which may or may not be or cause a non-compliance". "Material harm" as defined within the MCoA is "harm that:

(a) involves actual or potential harm to the health or safety of human beings or to the environment that is not trivial, or

(b) results in actual or potential loss or property damage of an amount, or amounts in aggregate, exceeding \$10,000, (such loss includes the reasonable costs and expenses that would be incurred in taking all reasonable and practicable measures to prevent, mitigate or make good harm to the environment)."

7.2.1. Incident and Emergency Management

Incidents are to be reported, investigations conducted, and action plans established in order to prevent the event from occurring again. All personnel are required to report hazards and incidents. Incident reporting and investigation will be undertaken in accordance with the PRO-BS-002 Incident Hazard and NCR Reporting Procedure and the CCD-MSPRO-2584 Incident Management procedure. Any changes to operations or practices resulting from actions are to be communicated to employees and sub-contractor(s) as required.

Incident and emergency planning relating to traffic and field work is detailed in an Emergency Response Plan, the PLN-BS-012 Westlink Services Emergency Response Plan. Emergency preparedness and response procedures, testing and review are referred to within this plan.

The Traffic Control Room will be contacted during any emergency on: **(02) 9834 9261**.

Asset and Performance Manager will be the contact person for environmental incidents and emergencies and will have the authority to stop or direct works and contacting and reporting environmental incidents to relevant Government Agencies in accordance with PRO-OP-007 Incident Response Procedure.

7.2.2. Emergency preparedness and response

Monitoring and surveillance activities are undertaken to prevent environmental accidents and incidents. The Operator will respond to incidents and emergency situations and will act to prevent or mitigate associated adverse impacts.

Appropriate materials such as spill kits, absorbent materials and sandbags, will be kept in the main depot. Spill kits will also be kept in all appropriate operation and maintenance vehicles. A spill trailer will be maintained and be available to respond to major spills on the motorway.

Spill response is detailed in the CCD-MS-CG-2632 Environmental Management of Oils, Fuels and Other Chemicals HSE Compliance Guide. SDS for all substances are available electronically through a subscription to - ChemAlert.

Incident notification and reporting during an environmental pollution incident will occur in accordance with SOP-OP-018 Spills and Hazardous Chemicals Procedure. Notifiable incident records will be kept for at least 5 years. All environmental incidents will be reported in accordance with RES-OP-001 Control Room Contact List for Incidents and PRO-BS-002 Incident Hazard and NCR Reporting Procedure.

Reportable incidents include but are not limited to:

- Pollution events including spills
- Land contamination
- Effects of significant rainfall events (defined as being > 20 mm over a 24-hour period) and flooding
- Failure of stormwater basins or GPTs
- Failure of bunding
- Disturbance/impact on cultural heritage item
- Disturbance/impact on threatened species.

Contact details of key external organisations, to be contacted in order in the event, for Material Harm pollution incidents that DO NOT present an immediate threat to human health or property are listed below in **Table 18**. In the event of a Material Harm pollution incident that presents an immediate threat to human health or property, emergency services must be contacted prior to organisations listed in **Table 18**:

- Emergency Services: 000
- SafeWork NSW: 131 050

The Operator will notify each relevant stakeholder/authority immediately of pollution incidents where material harm to the environment is caused or threatened.

Table 18 Authorities to notify for Material Harm pollution incidents that DO NOT present an immediate threat to human health or property

Order	Authority	Contact details
1	NSW EPA	131 555
2	TfNSW Management Centre	131 700
3	Local authority: Fairfield City Council Liverpool City Council	(02) 9725 0222 (02) 8711 7000
4	SafeWork NSW	131 050
5	Fire and Rescue NSW	1300 729 579

8. Operational Performance

Operational performance of the Asset is to be assessed and reviewed via ongoing inspections and monitoring. Reporting obligations, non-conformances and periodic audits will also be used to inform operational performance reviews. These activities will focus on compliance and continuous improvement and be undertaken throughout the operation of the Asset as outlined in the following sections. Subcontractors' works will also be included in inspections, observations, monitoring and audits as appropriate.

8.1. Environmental inspections

Key environmental inspections are described in **Table 19** and are further detailed in the attached management plans. Copies of inspection records are to be kept on file and any corrective actions arising from inspections are to be reported on a three-monthly basis unless specified otherwise elsewhere within this Plan.

Table 19 Environmental inspection requirements

Item	Frequency	Standards / Document	Reporting	Responsibility
Environmental site inspection	Three monthly or as otherwise advised.	Environmental Inspection Checklist PRO-EN-001 Environmental Inspections and Audits	Completed inspection report (internal) with evidence of corrective action close out Observation notes	Operator environmental team
Plant/equipment inspections including maintenance and emissions	Regularly or in accordance with manufacturer's specifications. Pre-start check each shift prior to use and in accordance with manufacturer specifications	POEO Act 1997	Plant and operation and maintenance vehicle inspection logs	Operator mechanical team (including sub-contractors)
Management observations	Quarterly	Management Environmental Inspection Checklist	Observation notes. Operators	Operator Environment Advisor (or delegate)
Visual surveillance	During activities with high environmental risk including after extreme weather events.	Operator EMS PRO-EN-001 Environmental Inspections and Audits	Observation notes. Operators	Operator environmental team or supervisor
Stormwater basin weather event (rainfall)	If significant rainfall event occurs (> 20 mm rain in 24 hours)	SMP-AS-006 Motorway Weather Event Inspection Procedure	Site inspection checklist Observation notes	Operator Environment Advisor (or delegate)
Stormwater basin weather event (rainfall)	If significant rainfall event occurs (> 20 mm rain in 24 hours)	SMP-AS-006 Motorway Weather Event Inspection Procedure	Site inspection checklist Observation notes	Operator Environment Advisor (or delegate)
Environmentally Sensitive Areas	ESA inspections conducted annually (rolling 12 month program).	Operator EMS PRO-EN-001 Environmental Inspections and Audits	Site inspection checklist	Operator environmental team or supervisor

8.2. Monitoring

In addition to the inspections described in Section 8.1, validation monitoring is to also be undertaken to confirm the environmental impact due to the operation of the Asset. Monitoring requirements for each of the environmental aspects and impacts identified in Section 6 are included in each corresponding ECP (Section 6.2). Additionally, monitoring requirements will be undertaken during the operation of the Asset as outlined in **Table 20**.

In accordance with MCoA D5-D11, a construction monitoring program was prepared for surface water quality and groundwater in consultation with relevant government agencies which will continue to be implemented following the completion of construction for the duration of the program.

The proposed Surface Water and Groundwater Quality Monitoring Plan for the operational stage of the M12 Motorway is attached in **Appendix C**. The operational surface water and groundwater monitoring program must be submitted to the Planning Secretary for information at least one month before the commencement of operation. Operations must not commence until all relevant baseline data has been collected. The monitoring program will be implemented by TfNSW on a monthly basis.

Operational surface water and groundwater quality data will be reviewed after the first six months of monitoring. If data is deemed to have met all project requirements for being rehabilitated to an acceptable condition and/or the permanent water quality structures are deemed to be operating satisfactorily, the report will include certification by a suitably qualified and experienced independent expert and be submitted to DPHI.

Should the results of monitoring identify that the water quality management measures are not effective in adequately mitigating water quality impacts, additional mitigation measures will be identified and implemented as required and monitoring will continue for an additional six months to close out any recommendations.

It is noted that condition CG03 states that an adaptive management approach will be applied to workplace health and safety planning during construction and operation in line with the work health and safety management plans (WHSMP). This will include use of TfNSW Work Health and Safety Procedures. In practice this means that future revisions of this OEMP should consider the results of health and safety monitoring programs and be revised according to address any issues identified.

Table 20 Operational performance monitoring

CoA/REMM	Monitoring	Implementation	Responsibility
MCoA D5-D11, REMM SWH06 and GW01	Surface water and groundwater	Refer to Surface Water and Groundwater Quality Monitoring Plan (Appendix C)	TfNSW
MCoA E58 – E60/REMM NV15	Operational noise validation	Operational noise was modelled for the Asset and requires verification monitoring and preparation of an operational noise compliance report to determine if additional mitigation measures are required.	TfNSW

8.3. Reporting

The following environmental reporting documents will be prepared and maintained by the Operator:

- Inspection records
- Maintenance records
- Risk assessments
- Approvals, licenses, and environmental assessments for routine maintenance and minor works, where required
- Calibration records
- External consultant/subcontractor reports
- Environmental incident reports
- Monthly reports
- Audit reports

Records of environmental inspections and any associated corrective actions are recorded in the asset management system. Monthly reporting will be provided to WSO Co summarising environmental performance including compliance, incident and hazard items from the previous month. Reports and compliance assessments are stored on the server. Audit findings and any associated actions are recorded in Enablon. Compliance tracking of the MCoA will be recorded in Protecht. A register of all non-conformances raised during operation of the Asset will also be maintained by Westlink Services.

As described in **Section 7.2.1** all personnel are required to report hazards and incidents. Incidents are to be reported and investigated. Action plans are to be prepared to resolve issues and prevent the incident from recurring. Incident reporting and investigation will be undertaken in accordance with the PRO-BS-002 Incident Hazard and NCR Reporting Procedure and the Operator's CCD-MS-PRO-2584 Incident Management procedure.

When identified, opportunities for improvement are to be evaluated and a plan established to implement corrective actions. Planned improvements are to be enacted to ensure resolution of issues and continual improvement.

8.3.1. Reporting and deliverable requirements

Table 21 outlines the reporting and deliverable requirements under the MCoA that are relevant to the Operation of the Asset.

Table 21 Operational reporting requirements

CoA/REMM Reference	Details/timing	Responsibility
OEMP Submission (MCoA D1-D4)	The OEMP must be submitted to DPHI no later than one month prior to commencement of operation	WSO Co
Operational Noise and Vibration Compliance Report (MCoA E58-E60)	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). Any additional mitigation measures identified will be implemented within 18 months of submitting the ONCR to the Planning Secretary, unless an alternative timeframe is agreed to by the Planning Secretary.	John Holland (Design and Construct Contractor)
Operational monitoring plan (MCoA D5, D6 and D9)	The Operational Surface Water and Groundwater Monitoring Program must be submitted to the Planning Secretary for information at least one (1) month before the commencement of operation. It must be implemented for the duration specified in the program and results reported in an Operational Monitoring Report at 6 monthly intervals.	TfNSW / NWR
Independent environmental audit (MCoA A38 – A43)	An independent environmental audit is required within 26 weeks of commencing operation and an audit report provided to the Secretary within two months of receiving the audit report.	Westlink Services
Sustainability Strategy (MCoA E92)	A Sustainability Strategy must be submitted to the Planning Secretary for information one month prior to construction and be maintained throughout construction and operation. Prior to construction, a Sustainability Strategy was developed for construction and operation of the Asset. The Sustainability Strategy will be integrated into the existing Sydney Roads Asset Performance Contract Sustainability Management Plan. This will include integrating the relevant operational sustainability targets and construction information from the Strategy.	Westlink Services
Communication Strategy (MCoA B1, B6 - B10)	The Communication Strategy, Complaints Register and Complaints Management System must be in place during construction and for 12 months following the completion of construction works. The Project Website must be maintained for a period of 24 months following construction completion. Complaint register and information must be made available to the Planning Secretary upon request.	John Holland (Design and Construct Contractor)

8.4. Operational audits

Independent Environmental Audits are required under MCoA A38 in accordance with the Independent Audit, Post Approval Requirements (DPIE 2020). The independent audit will cover operational maintenance activities, management and overall effectiveness of the OEMP and its implementation.

The independent audit is required within 26 weeks of commencing operation in accordance with MCoA A39.

An independent auditor is required to be appointed and endorsed by the Secretary. Within 2 months of conducting the independent audit, a copy of the audit report is to be submitted to the Secretary, or as otherwise agreed with the Secretary. The audit report will contain responses to corrective actions and recommendations as advised by the independent auditor.

The Planning Secretary may require the initial and subsequent Independent Audits to be undertaken at different times to that set out in Independent Audit, Post Approval Requirements (DPIE, 2020), upon giving at least one (1) months-notice to the Proponent of the date upon which the audit must be commenced. The Planning Secretary may also direct the Proponent to undertake Independent Audits in addition to those provided for in Condition A38 when considered necessary to address a particular issue.

NWR will facilitate the independent audit of the Operator's processes. Should the audits identify issues, appropriate responses and/or mitigation measures, NWR will direct the Operator to implement corrective actions as required. .

Should the audits identify issues, appropriate responses and/or measures will be identified by NWR and implemented as required.

8.5. Non-conformances and corrective actions

To ensure all maintenance and construction activities meet the required standards, specifications, and contractual obligations, Service Stream implements a structured Quality Inspection and Defect Management Process. This process supports continuous improvement, risk mitigation, and compliance with ISO standards, the Operations and Maintenance (O&M) Manual and the SSTR-QA-MP-009 Quality Management Plan.

Non-conformity occurs when a requirement is not fulfilled. Requirements may relate to the management system or to environmental performance. Non-conformity may be found during audits and reviews or as the result of hazard identification and incidents.

Where a non-conformance is detected via inspection, review, audit or otherwise, a non-conformity report must be submitted to TfNSW within two business days of detection. Notification to TfNSW will be via InEight Team Binder with an attached report identifying the non-conformance.

As described in MCoA A46 and A47, the Planning Secretary must be notified in writing via the Major Projects website within seven (7) days after the Proponent becomes aware of any non-compliance. A non-compliance notification must identify the CSSI and the application number for it, set out the condition of approval that the CSSI is non-compliant with, the way in which it does not comply and the reasons for the non-compliance (if known) and what actions have been, or will be, undertaken to address the non-compliance.

Potential sources of environmental nonconformances include, but are not limited to:

- Breaches of safeguards
- Non-compliance with OEMP requirements
- Environmental incidents resulting from negligence or insufficient environmental controls
- Undertaking works without relevant and appropriate environmental approvals or permits
- Regulatory breaches.

Details included in non-conformance reports will be specific to the event that has taken place (for example, specific reference to the MCoA will be noted where a non-conformance to a condition of approval has been identified).

When identified, opportunities for improvement are to be evaluated and a plan established to implement corrective actions. Planned improvements are to be enacted to ensure resolution of issues and continual improvement.

All non-conformances, opportunities for improvement, observations, hazards and corrective actions are recorded in Enablon.

8.5.1. Identification and Reporting of Non-Conformances

Non-conformances (defects or deviations from standards) are identified through:

- Routine field inspections and desktop reviews
- Internal and external audits
- Incident reports and stakeholder feedback
- Quality verification processes by NorthWestern Roads.

All identified issues are logged in the Maintenance Defects Register within the relevant Asset Management System (AMS). Field staff use handheld devices or inspection forms to capture:

- Location and asset details
- Nature and severity of the defect
- Date and time of identification.

8.5.2. Classification of Non-Conformances

Non-conformances are assessed and classified as follows:

- Minor non-conformances
 - Isolated breaches of procedures or standards
 - No significant risk to safety, operations, or compliance
 - Typically, due to one-off errors or inadequate implementation
 - Investigated and resolved by the Operational Leadership Team.
- Major and repeat non-conformances
 - Significant or systemic failures in controls or procedures
 - Potentially serious risk to personnel, contractual obligations, or the organisation
 - Repeat issues are treated with elevated priority
 - Require root cause analysis, corrective and preventive actions
 - Managed by the Assurance and Improvement Coordinator.

8.5.3. Corrective Action and Work Orders

For each non-conformance requiring action, a work instruction is generated in the relevant AMS that includes:

- Scope of work
- Required resources
- Safety documentation. (e.g., Safe Work Method Statement (SWMS), Job Safety and Environmental Analysis (JSEA))
- Quality controls. (e.g., Inspection and Test Plans (ITPs)).

Completion is verified through post-work inspections and the submission of evidence.

All corrective actions are documented and tracked in Enablon, including root cause analysis where applicable, and are subject to effectiveness review to ensure resolution and prevent recurrence.

8.6. Compliance tracking

A compliance tracking program (Protech) has been developed for the operation of the Asset to ensure all MCoA are being tracked and managed appropriately.

The Operator is to keep copies of applicable approvals, licences or permits on the business management system and track for currency. This includes subcontractor approvals, licences or permits obtained during onboarding and annual insurance reviews prior to the commencement of works, as applicable.

9. OEMP Review and Records Management

The OEMP and the supporting plans are to be reviewed on an annual basis or otherwise required if there are significant changes to legislation, operation, activities, personnel, organisational structure, Operator or in response audit outcomes.

9.1. OEMP Review

The management team and Environmental Adviser will review the EMS to ensure its continuing suitability, adequacy and effectiveness for operation and maintenance activities.

The management review will assess environmental performance, opportunities for improvement and the need for changes to the EMS including the revision of environmental objectives.

The review and update aims to ensure that all obligations are accurately reflected within the OEMP, and any issues or corrective actions are appropriately managed/documentated within this Plan. The Environmental Advisor will ensure that review and update of the OEMP addresses any comments received from the Operator during the review of the OEMP.

9.2. Records Management

Environmental records are subject to review and continual improvement to ensure optimum operational performance of the Asset. All records are to be maintained for at least 10 years, whereby all Operators, the EHG, DPPI, EPA and other key government agencies will have access to all records upon request. Records will be managed in accordance with the Operator's records management system.

Documents that must be maintained, include:

- OEMP and supporting plans
- Monitoring data and inspections
- Audits, non-compliance reports and corrective actions
- Environmental incidents and report notification
- Training and inductions
- Operations and maintenance activities
- Complaints
- Waste management
- Operational planning obligations
- Stakeholder and government agency correspondence/minutes
- Greenhouse gas/energy usage.

All completed environmental activities in the form of environmental inspections, maintenance records, audits, evaluations and reports, in line with environmental performance requirements, are to be recorded in the main operational asset management program Enablon.

10. References

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Appendix A: Conditions of Approval

The development of the M12 Motorway has been conducted in accordance with the following:

- Ministerial Conditions of Approval relevant to operation of the M12 Motorway (**Table A1**)
- Revised Environmental Mitigation Measures for the M12 Motorway Report (**Table A2**).

Table A-1 Ministerial Conditions of Approval relevant to operation of the Asset.

Condition	Details	Reference
SCHEDULE 2, PART A – ADMINISTRATIVE CONDITIONS		
A1	The Proponent must carry out the CSSI in accordance with the terms of approval and generally in accordance with: • M12 Motorway Environmental Impact Statement (dated October 2019); • M12 Motorway Submissions Report (dated October 2020); • M12 Motorway Amendment Report (dated October 2020); • M12 Motorway Amendment Report - Submissions Report (dated December 2020); and • M12 Motorway Amendment Report - Submissions Report - Amendment (dated 8 March 2021).	This OEMP
A2	The CSSI must only be carried out in accordance with all procedures, commitments, preventative actions, performance outcomes and mitigation measures set out in the documents listed in Condition A1 unless otherwise specified in, or required under, this approval.	This OEMP
A3	In the event of an inconsistency between: • the terms of this approval and any document listed in Condition A1, the terms of this approval will prevail to the extent of the inconsistency; and • any document listed in Condition A1, the most recent document will prevail to the extent of the inconsistency. <i>Note: For the purpose of this condition, there will be an inconsistency between a term of this approval and any document if it is not possible to comply with both the term and the document.</i>	This OEMP
A4	GENERAL The Proponent must comply with all written requirements or directions of the Planning Secretary, including in relation to: - the environmental performance of the CSSI; - any document or correspondence in relation to the CSSI (including the provision of such documentation or correspondence); - any notification given to the Planning Secretary under the terms of this approval; - any independent appointment or withdrawal of an appointment made in relation to the CSSI; - any audit of the construction or operation of the CSSI; - the terms of this approval and compliance with the terms of this approval (including anything required to be done under this approval); - the carrying out of any additional monitoring or mitigation measures; and - in respect of ongoing monitoring and management obligations, and following consultation with the Proponent, compliance with an updated or revised version of a guideline, protocol, Australian Standard or policy required to be complied with under this approval.	This OEMP

Condition	Details	Reference
A7	References in the terms of this approval to any guideline, protocol, Australian Standard or policy are to such guidelines, protocols, standards or policies in the form they are in as at the date of this approval.	Section 1.2
A38	AUDITING The Proponent must engage an independent auditor and conduct auditing and audit reporting of the CSSI in accordance with the document Independent Audit Post Approval Requirements (DPIE, 2020). Note: The independent auditor must be approved by the Planning Secretary no later than two weeks following the commencement of construction as required by Independent Audit Post Approval Requirements (DPIE, 2020).	Section 8.4
A39	Operational compliance auditing is only required at 26 weeks following the commencement of operation unless an alternative timeframe is agreed to be the Planning Secretary.	Section 8.4
A40	The Planning Secretary may require the initial and subsequent Independent Audits to be undertaken at different times to that set out in Independent Audit, Post Approval Requirements (DPIE, 2020), upon giving at least one (1) months-notice to the Proponent of the date upon which the audit must be commenced.	Section 8.4
A41	The Planning Secretary may direct the Proponent to undertake Independent Audits in addition to those provided for in Condition A38 when considered necessary to address a particular issue.	Section 8.4
A43	Independent Audit Reports and the Proponent's response to audit findings must be submitted to the Planning Secretary for information within two (2) months of undertaking the independent audit site inspection as outlined in the Independent Audit Post Approval Requirements (DPIE, 2020).	Section 8.4
A46	NON-COMPLIANCE NOTIFICATION The Planning Secretary must be notified in writing via the Major Projects website within seven (7) days after the Proponent becomes aware of any non-compliance.	Section 8.5
A47	A non-compliance notification must identify the CSSI and the application number for it, set out the condition of approval that the CSSI is non-compliant with, the way in which it does not comply and the reasons for the non-compliance (if known) and what actions have been, or will be, undertaken to address the non-compliance.	Section 8.5
A48	A non-compliance which has been notified as an incident does not need to also be notified as a non-compliance.	Section 8.5

Condition	Details	Reference
SCHEDULE 2, PART B – COMMUNITY INFORMATION AND REPORTING		
B1	COMMUNITY INFORMATION, CONSULTATION AND INVOLVEMENT Communication Strategy A Communication Strategy must be prepared to provide mechanisms to facilitate communication about Work, construction and operation of the CSSI with: (a) the community (including adjoining affected landowners and businesses, and others directly impacted by the CSSI); and (b) the relevant councils and relevant government agencies. The Communication Strategy must address who (the Proponent, Independent Appointments and/or construction contractor) will engage with the community, relevant councils and agencies, how they will engage and the timing of engagements.	M712UDC-JHGRP-M7A-CY-PLN-000001 Communication Management Plan BMS-PL02 M7 Community Involvement Plan
B6	COMPLAINTS MANAGEMENT SYSTEM A Complaints Management System must be prepared and implemented before the commencement of any Work and maintained for the duration of construction and for a minimum for 12 months following completion of construction of the CSSI. The Complaints Management System must require complainants to be advised that: (a) the Complaints Register may be forwarded to Government agencies, including the Department, to allow them to undertake their regulatory duties; (b) by providing personal information, the complainant authorises the Proponent to provide that information to government agencies; (c) the supply of personal information by the complainant is voluntary; and (d) the complainant has the right to contact government agencies to access personal information held about them and to correct or amend that information (Collection Statement) The Collection Statement must be included on the Proponent's or project website to make prospective complainants aware of their rights under the Privacy and Personal Information Protection Act 1998. For any complaints made in person, the complainant must be made aware of the Collection Statement.	Section 5.4 M712UDC-JHGRP-M7A-CY-PLN-000001 Communication Management Plan BMS-PL02 M7 Community Involvement Plan
B7	The following information must be available to facilitate community enquiries and manage complaints one (1) month before the commencement of Work and for 12 months following the completion of construction: (a) a 24- hour telephone number for the registration of complaints and enquiries about the CSSI; (b) a postal address to which written complaints and enquires may be sent; (c) an email address to which electronic complaints and enquiries may be transmitted; and (d) a mediation system for complaints unable to be resolved. This information must be accessible to all in the community regardless of age, ethnicity, disability or literacy level and must be provided on the website required under Condition B10.	Section 5.4.2 M712UDC-JHGRP-M7A-CY-PLN-000001 Communication Management Plan BMS-PL02 M7 Community Involvement Plan

Condition	Details	Reference
B8	A Complaints Register must be maintained recording information on all complaints received about the CSSI during the carrying out of any work and for a minimum of 12 months following the completion of construction. The Complaints Register must record the: (a) number of complaints received; (b) the date and time of the complaint; (c) the method by which the complaint was made; (d) any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect (e) nature of the complaint; (f) means by which the complaint was addressed and whether resolution was reached, with or without mediation; and (g) if no action was taken, the reason(s) why no action was taken.	Section 5.4.5 M712UDC-JHGRP-M7A-CY-PLN-000001 Communication Management Plan BMS-PL02 M7 Community Involvement Plan
B9	The Complaints Register must be provided to the Planning Secretary upon request, within the timeframe stated in the request.	Section 5.4.5 M712UDC-JHGRP-M7A-CY-PLN-000001 Communication Management Plan BMS-PL02 M7 Community Involvement Plan
SCHEDULE 2, PART D – OPERATIONAL ENVIRONMENTAL MANAGEMENT		
D1	OPERATIONAL ENVIRONMENTAL MANAGEMENT An Operational Environmental Management Plan (OEMP) must be prepared having regard to the Environmental Management Plan Guideline for Infrastructure Projects (Department Planning, Industry and Environment 2020). The OEMP must 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. Condition D1 does not apply if Condition D2 of this approval applies.	Section 1.2 Section 1.4 Section 5 Section 6 Section 6.2 Section 7 Section 8 Section 9
D2	An OEMP is not required for the CSSI if the Proponent has an Environmental Management System (EMS) or equivalent as agreed with the Planning Secretary, and demonstrates, to the satisfaction of the Planning Secretary, that through the EMS or equivalent: (a) the performance outcomes, commitments and mitigation measures, made and identified 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.	Section 1 Section 1.4 Section 6.2 Refer to D1
D3	The OEMP or EMS or equivalent as agreed with the Planning Secretary, must be submitted to the Planning Secretary for information no later than one (1) month before the commencement of operation.	This OEMP

Condition	Details	Reference									
D4	The OEMP or EMS or equivalent as agreed with the Planning Secretary, as submitted to the Planning Secretary and amended from time to time, must be implemented for the duration of operation. The OEMP or EMS or equivalent must be made publicly available before the commencement of operation.	This OEMP									
D5	OPERATIONAL MONITORING PROGRAM The following Operational Monitoring Programs must be prepared in consultation with the relevant government agencies identified for each Operational Monitoring Program to compare actual operational performance against predicted performance. Details of all information requested by an agency during consultation must be provided to the Planning Secretary as part of any submission of the relevant Operational Monitoring Program, including copies of all correspondence from those agencies as required by Condition A5. <table border="1"> <thead> <tr> <th></th><th>Required Operational Monitoring Programs</th><th>Relevant government agencies to be consulted for each Operational Monitoring Program</th></tr> </thead> <tbody> <tr> <td>(a)</td><td>Surface water quality</td><td>DPIE Water and relevant council(s)</td></tr> <tr> <td>(b)</td><td>Groundwater</td><td>DPIE Water</td></tr> </tbody> </table>		Required Operational Monitoring Programs	Relevant government agencies to be consulted for each Operational Monitoring Program	(a)	Surface water quality	DPIE Water and relevant council(s)	(b)	Groundwater	DPIE Water	Section 1.6 Section 6.2.4 Section 8.2
	Required Operational Monitoring Programs	Relevant government agencies to be consulted for each Operational Monitoring Program									
(a)	Surface water quality	DPIE Water and relevant council(s)									
(b)	Groundwater	DPIE Water									
D6	Each operational monitoring program must include: (a) details of baseline data; (b) details of all monitoring to be undertaken; (c) the parameters to be monitored; (d) the frequency and duration 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.	Section 6.2.4 Section 8.2 Appendix C									
D7	The Operational Monitoring Program(s) must be submitted to the Planning Secretary for information at least one (1) month before the commencement of operation.	Section 8.2 Appendix C									
D8	Operation must not commence until all relevant baseline data has been collected.	Section 8.2 Appendix C									
D9	The Operational Monitoring Programs must be implemented for the duration specified in the relevant Operational Monitoring Program .	Section 6.2.4 Section 8.2 Appendix C									
D10	The results of the Operational Monitoring Programs must be submitted to the relevant government agencies for information in the form of an Operational Monitoring Report at the frequency identified in the relevant Operational Monitoring Program .	Section 6.2.4 Section 8.2 Appendix C									
D11	Where a relevant OEMP Sub-plan exists, the relevant Operational Monitoring Program may be incorporated into that OEMP Sub-plan .	Section 6.2.4 Section 8.2 Appendix C									

Condition	Details	Reference
E50	Operational Noise An independent and experienced noise specialist must be approved by the Planning Secretary to verify the validity (including being accurate and consistent with the requirements of this approval) of the: (a) Operational noise modelling required under Conditions E51; (b) Operational Noise Review required under Condition E52; and (c) Operational Noise Compliance Report required under Condition E60. The Planning Secretary's approval of the noise specialist must be sought no later than one (1) month before undertaking operational noise modelling. Each verification must be submitted to the Planning Secretary for information within 30 days of the verification and be attached to submitted documentation as relevant.	Section 6.2.2
E58	Operational Noise Validation 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 operational noise mitigation measures required by Condition E52.	Section 6.2.2
E59	Classified traffic counts must be undertaken simultaneously with noise measurements to confirm traffic volumes and traffic mix assumptions.	Section 6.2.2
E60	Operational Noise Compliance Report An Operational Noise Compliance Report (ONCR) must be prepared to document the findings of the operational noise monitoring carried out under Condition E58. The ONCR must be prepared in accordance with the Model Validation Guideline (RMS, 16 May 2018 Version 1.1) and must address the following: (a) Compliance with the operational noise levels predicted in the review of operational noise mitigation measures required under Condition E52; (b) Compliance with the operational noise levels in terms of criteria and noise goals established in the NSW Road Noise Policy (DECCW, 2011); (c) Methodology, location and frequency of noise monitoring undertaken, including grouping monitoring sites at which CSSI noise levels are ascertained with specific reference to locations indicative of impacts on receivers. Monitoring locations must be grouped by – i. pavement type, ii. topography; (d) Visibility of sensitive receivers, i.e. line of sight and shielded by mounds and/or noise walls; (e) Model light and heavy vehicles separately; (f) Pavement corrections for light and heavy vehicles; (g) Details on the acoustic performance of the different pavement types used for the CSSI ; (h) Effects of meteorological conditions on traffic noise consistent with the requirements of the NSW Road Noise Policy (DECCW, 2011); (i) Details of any complaints and enquiries received in relation to operational noise generated by the CSSI between the	Section 6.2.2

Condition	Details	Reference
	date of commencement of operation and the date the report was prepared; (j) Any required recalibrations of the noise model taking into consideration factors such as noise monitoring, and actual traffic numbers and proportions; (k) An assessment of the performance and effectiveness of applied noise mitigation measures together with a review and if necessary, reassessment of mitigation measures; and (l) Identification of additional measures to those identified in the review of noise mitigation measures required by Condition E52, that are to be implemented with the objective of meeting the criteria outlined in the NSW Road Noise Policy (DECCW, 2011), when these measures are to be implemented and how their effectiveness is to be measured and reported to the Planning Secretary and the EPA. The ONCR must be submitted to the Planning Secretary and the EPA for information within 60 days of completing the operational noise monitoring (required by Condition E58) and be made publicly available. Any additional measures identified in Condition E60(l) must be implemented within 18 months of submitting the ONCR to the Planning Secretary, unless an alternative timeframe is agreed to by the Planning Secretary.	
E62	PLACE, DESIGN AND LANDSCAPING Lighting and Security The CSSI must be constructed and operated with the objective of minimising light spillage to surrounding properties. All lighting associated with the construction and operation of the CSSI must be consistent with the requirements of Australian Standard 4282-2019 Control of the obtrusive effects of outdoor lighting, relevant Australian Standards in the series AS/NZS 1158 – Lighting for Roads and Public Spaces, and the National Airports Safeguarding Framework Guideline E: Managing the Risk of Distractions to Pilots from Lighting in the Vicinity of Airports. \ Additionally, mitigation measures must be provided to manage residual night lighting impacts to protect properties adjoining or adjacent to the CSSI, in consultation with affected landowners.	Section 6.2.2
E73	The Place, Design and Landscape Plan must be implemented during construction and operation.	Section 6.2.5
E74	Operational Maintenance The ongoing maintenance and operation costs of place, open space, landscaping and recreational items and work implemented as part of this approval remain the Proponent's responsibility until satisfactory arrangements have been put in place for the transfer of the asset to the relevant authority. Before the transfer of assets, the Proponent must maintain items and work to at least the maintenance requirements established in the Place, Design and Landscape Plan, required by Condition E69.	Section 6.2.2 Section 6.2.5
E82	SOCIO-ECONOMIC, LANDUSE AND PROPERTY Construction and operation of the CSSI must not destroy, modify or otherwise cause direct or indirect damage to the Upper Canal System, including the Cecil Hills Tunnel, and Tunnel Shafts 3 and 4.	Section 6.2.4

Condition	Details	Reference
E92	SUSTAINABILITY The Sustainability Strategy must be submitted to the Planning Secretary for information before the commencement of construction and must be implemented throughout construction and operation.	Section 6.3 M712UDC-JHGRP-M7A-QM-PLN-000001 M7-M12 Integration Project Sustainability Management Plan
E100	WASTE Waste generated during Work and operation must be dealt with in accordance with the following priorities: (a) Waste generation must be avoided and where avoidance is not reasonably practicable, waste generation must be reduced; (b) Where avoiding or reducing waste is not possible, waste must be re-used, recycled, or recovered; and (c) Where re-using, recycling or recovering waste is not possible, waste must be treated or disposed of.	Section 6.2.6
E105	WATER The CSSI must be designed, constructed and operated so as to maintain the NSW Water Quality Objectives where they are being achieved as at the date of this approval, and contribute towards achievement of the NSW Water Quality Objectives over time where they are not being achieved as at the date of this approval, unless an EPL in force in respect of the CSSI contains different requirements in relation to the NSW Water Quality Objectives, in which case those requirements must be complied with. Note: If it is proposed to discharge construction stormwater to waterways, a Water Pollution Impact Assessment will be required to inform licensing, consistent with section 45 of the POEO Act. Any such assessment must be prepared in consultation with the EPA and be consistent with the National Water Quality Guidelines, with the level of detail commensurate with the potential water pollution risk.	Section 6.2.4

Table A-2 Revised Environmental Mitigation Measures for the M12 Motorway

Condition	Details	Reference
Noise and Vibration		
NV15	Within 12 months of start of operation of the project, actual operational noise performance will be compared to predicted operational noise performance. The need for additional mitigation or management measures to address identified operational performance issues and meet relevant operational noise criteria will be assessed and implemented where feasible and reasonable.	Section 6.2.2
Surface water quality and hydrology		
SWH06	An operational water quality monitoring program will be developed and implemented following the completion of construction to observe any changes in surface water and groundwater following construction, and inform appropriate management responses. The program will be based on the water quality monitoring methodology, water quality indicators, and the monitoring locations presented in the Surface water and hydrology assessment report (Appendix M of the EIS), and Groundwater quality and hydrology assessment report (Appendix N of the EIS). The monitoring program will be carried out monthly and will preferentially monitor following wet weather events when rainfall results in discharge from control sites or is greater than a nominated rainfall threshold which will be identified in detailed design. Monitoring will be carried out for a minimum of 12 months following the completion of construction, or until the affected waterways are certified by a suitably qualified and experienced independent expert as being rehabilitated to an acceptable condition and/or the permanent water quality structures are deemed to be operating satisfactorily. Should the results of monitoring identify that the water quality management measures are not effective in adequately mitigating water quality impacts, additional mitigation measures will be identified and implemented as required.	Section 8.2
Groundwater quality and hydrology		
GW01	Groundwater monitoring will be carried out as part of the construction water quality monitoring program for the project. The groundwater monitoring will be based on the water quality monitoring methodology, water quality indicators and the monitoring locations shown in Appendix N of the EIS and Table 7-1 in the groundwater supplementary technical memorandum (Appendix J of amendment report). Baseline groundwater monitoring will be carried out at least monthly for at least six months before construction. Monitoring will also be carried out at least monthly during construction and will continue for at least six months of operation to verify that there are no groundwater impacts, and that management measures are adequate.	Section 6.2.4
Health and safety		
HS04	Storage, handling and use of dangerous goods and hazardous substances would be in accordance with the Work Health and Safety Act 2011 and the Storage and Handling of Dangerous Goods Code of Practice (WorkCover NSW, 2005).	Section 6.2.6

Condition	Details	Reference
Climate change and greenhouse gas		
CG03	An adaptive management approach will be applied to workplace health and safety planning during construction and operation in line with the WHSMP. This will include use of TfNSW Work Health and Safety Procedures.	Section 8.2

Appendix B: Legislation, Guidelines and Permits

Commonwealth legislation

- *Aboriginal and Torres Strait Islander Heritage Protection Act 1984*
- *Airports Act 1996*
- *Airports (Environment Protection) Regulations 1997*
- *Environment Protection and Biodiversity Conservation Act 1999*
- *Native Title Act 1993*

State Legislation

Environmental Planning Legislation

- *Crown Land Management Act 2016* (NSW)
- *Environmental Planning and Assessment Act 1979* (NSW) (including all environmental planning instruments made under the Act)
- *Local Government Act 1993* (NSW)
- *Roads Act 1993* (NSW)
- *Western Sydney Parklands Act 2006* (NSW).

Conservation and Heritage Legislation

- *Aboriginal Land Rights Act 1983* (NSW)
- *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* (NSW)
- *Biodiversity Conservation Act 2016* (NSW)
- *Biosecurity Act 2015* (NSW)
- *Coastal Management Act 2016* (NSW) and associate SEPPs
- *Fisheries Management Act 1994* (NSW)
- *Heritage Act 1977* (NSW)
- *Marine Estate Management Act 2014* (NSW)
- *National Parks and Wildlife Act 1974* (NSW)
- *Native Vegetation Act 2003* (NSW)
- *Protection of the Environment Administration Act 1997* (NSW)
- *Threatened Species Conservation Act 1995* (NSW).
- *Water Management Act 2000* (NSW).

Pollution, Waste and Contamination Management Legislation

- *Contaminated Land Management Act 1997* (NSW)
- *Dangerous Goods (Road and Rail Transport) Act 2008* (NSW)
- *Environmentally Hazardous Chemicals Act 1985* (NSW)
- *Ozone Protection Act 1989* (NSW)
- *Pesticides Act 1999* (NSW)
- *Pesticides Regulation 2017* (NSW)
- *Protection of the Environment Operations Act 1997* (NSW)

- Protection of the Environment Operations (Clean Air) Regulation 2010 (NSW)
- Protection of the Environment Operations (Waste) Regulation 2014 (NSW)
- *Waste Avoidance and Resource Recovery Act 2001*(NSW).

Fire Control Legislation

- *Rural Fires Act 1997* (NSW)
- *Work Health & Safety Act 2011* (NSW)
- Work Health and Safety Regulation 2017 (NSW)
- Work Health and Safety Hazardous Substances Legislation (NSW).

Appendix C: Surface Water and Groundwater Monitoring Plan - M12 Motorway Operational Stage



Surface Water and Groundwater Monitoring Plan

M12 Motorway operational stage

Transport for NSW

27 October 2025

Project name		M12 Motorway water quality and level monitoring services (contract number: 20.0000303606.0590)					
Document title		Surface Water and Groundwater Monitoring Plan M12 Motorway operational stage					
Project number		12554717					
File name		12554717_RPT_Surface Water and Groundwater Monitoring Plan_M12 Motorway Operational Stage.docx					
Status Code	Revision	Author	Reviewer		Approved for issue		
			Name	Signature	Name	Signature	Date
S3	A	Henry Luo Nicole Rosen	Helen Milne	On file	Helen Milne	On file	02/10/2025
S4	Rev 0	Nicole Rosen					21/10/2025
S4	Rev 1	Nicole Rosen	Helen Milne	<i>H Milne</i>	Helen Milne	<i>H Milne</i>	27/10/2025
							

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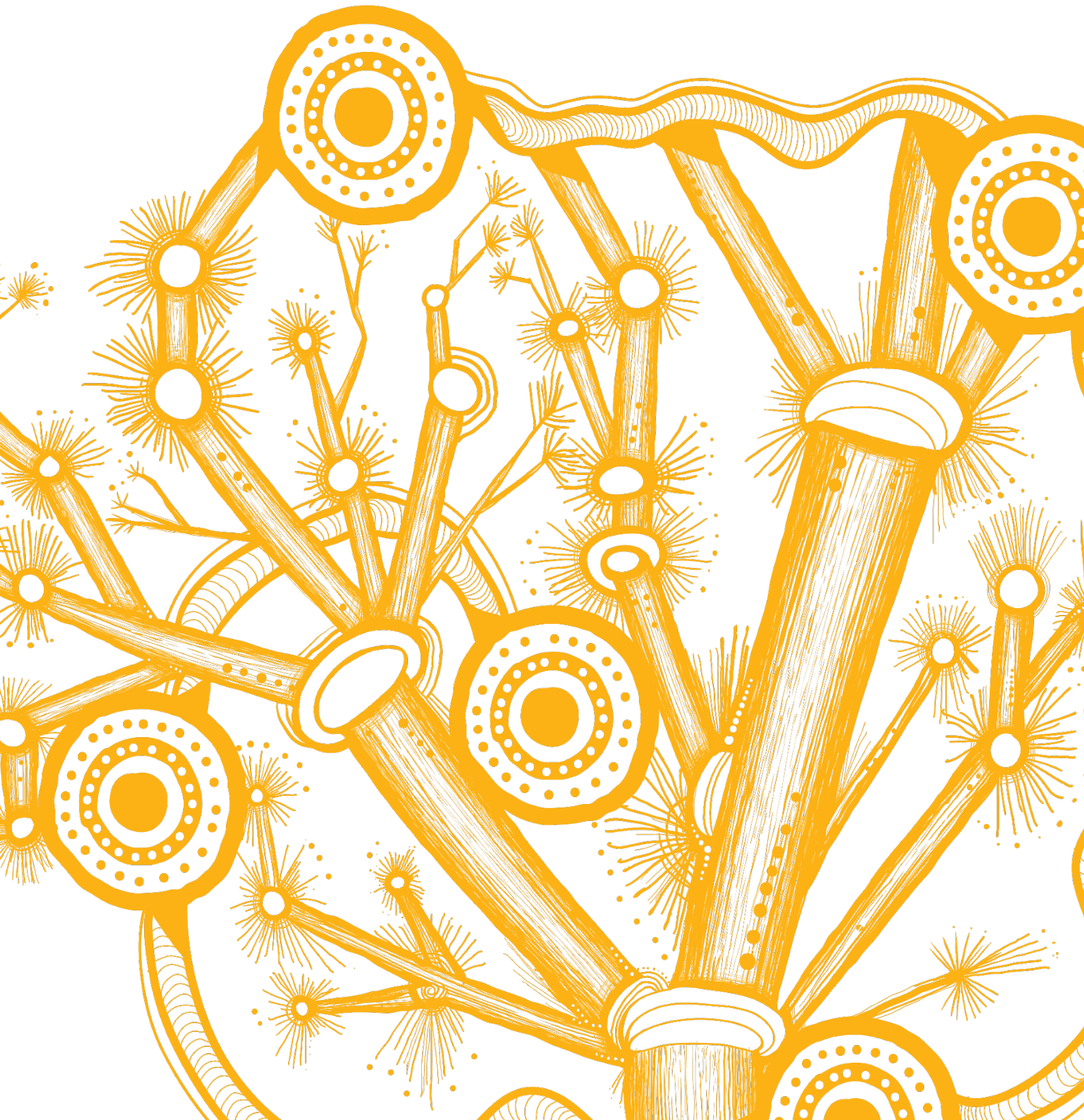
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Acknowledgement of Country

GHD acknowledges Aboriginal and Torres Strait Islander peoples as the Traditional Custodians of the land, water and sky throughout Australia on which we do business. We recognise their strength, diversity, resilience and deep connections to Country. We pay our respects to Elders of the past, present and future, as they hold the memories, knowledges and spirit of Australia. GHD is committed to learning from Aboriginal and Torres Strait Islander peoples in the work we do.



Contents

1.	Introduction	1
1.1	Background (including EIS requirements)	1
1.2	Conditions of Approval	1
1.3	Purpose of this report	4
1.4	Consultation	4
1.5	Scope of work	4
1.6	Deviations from the REMMs	5
1.7	Limitations	5
2.	Project description	7
2.1	Project identification	7
2.2	Historical land use summary	7
2.3	Environmental setting	8
3.	Data quality objectives	9
3.1	Data quality objectives	9
3.2	Adopted assessment criteria	11
3.2.1	Water quality objectives	11
3.2.2	Relevant guidelines	11
3.2.3	Adopted assessment criteria – surface water	12
3.2.4	Adopted assessment criteria – groundwater	12
4.	Proposed monitoring scope	14
4.1	Surface water and groundwater locations	14
4.2	Sample collection and handling	15
4.2.1	Surface water sampling	15
4.2.2	Groundwater sampling	16
4.2.3	Sample handling and transport	17
4.2.4	Calibration	17
4.3	Analytical suite and analysis methods	17
4.3.1	Laboratory NATA accreditation details	17
4.3.2	Analytical schedule	18
4.4	Quality assurance and quality control	18
5.	Details of baseline data	20
5.1	Surface water	20
5.2	Groundwater	20
6.	Data assessment and reporting requirements	21
6.1	Data assessment	21
6.2	Reporting	21
7.	Review and closure of the monitoring program	22
8.	References	23

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Table index

Table 1	Conditions of Approval – Operational Monitoring Plan	2
Table 2	Revised Environmental management measures (REMMs)	3
Table 3	Project identification summary	7
Table 4	Environmental setting summary	8
Table 5	Data quality objectives	9
Table 6	Surface water monitoring locations	14
Table 7	Groundwater quality monitoring locations	15
Table 8	Surface water sampling methodology	16
Table 9	Groundwater sampling methodology	16
Table 10	Laboratory analysis for surface water and groundwater	18
Table 11	DQI acceptance criteria	19

Appendices

Appendix A	Figures
Appendix B	Baseline field parameters and analytical results
Appendix C	Baseline calculated percentiles

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1. Introduction

GHD Pty Ltd (GHD) was engaged by Transport for New South Wales (TfNSW) to prepare a surface water and groundwater monitoring plan for the M12 Motorway operational stage (the project).

1.1 Background (including EIS requirements)

The M12 Motorway (the project) in Western Sydney covers approximately 16 kilometres (km). The project is nearing completion and soon to be operational between the M7 Motorway at Cecil Hills and The Northern Road at Luddenham. The project has been constructed in separate stages under separate construction contracts. These include:

- M12 West (main construction) – between The Northern Road, Luddenham and about 250 metres east of Badgerys Creek
- M12 Central (main construction) – between about 250 metres east of Badgerys Creek and the Western Sydney Parklands at Duff Road, Cecil Park
- M12 Central (Temporary Roundabout) - temporary roundabout installation at Elizabeth Drive and Devonshire Road, Kemps Creek
- M12 West and M12 Central Transitional Activities – low risk maintenance activities generally between main construction completion and Operation
- M12 East – (main construction, as part of the M7/M12 Integration Project)
 - Elizabeth Drive Connections (EDC) – a two-kilometre section from Duff Road to about 300 metres east of the M7 Motorway
 - M7/M12 Interchange – An interchange between the M12 Motorway and M7 Motorway and tie-in works for approximately four kilometres on the M7 Motorway

TfNSW estimates that the M12 motorway will open to the public in March 2026 for the western and central portions and in July 2026 for the eastern portion. At the completion of the project, the M12 Motorway will provide direct access between the Western Sydney International Airport (WSIA) at Badgerys Creek and Sydney's motorway network.

The Project is subject to an approval under Division 5.2 of the Environmental Planning and Assessment Act 1979 (EP&A Act) as Critical State Significant Infrastructure (CSSI) (SSI-9364). The project is also a controlled action under Section 75 of the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth) (EPBC Act) (EPBC 2018/8286) for significant impact to threatened species and communities (Section 18 and Section 18A of the EPBC Act). This requires assessment and approval from the Commonwealth Government. As part of the project approval conditions, TfNSW is required to prepare and implement a surface water and groundwater monitoring program for the project. GHD was commissioned to undertake a groundwater monitoring program during the pre-construction (baseline), construction, and operational stages of the project.

Preconstruction monitoring was completed by GHD between April 2019 and July 2022 (groundwater), and April 2021 and July 2022 (surface water). The collection of baseline data was completed in July 2022 as the pre-construction phase for the central and west packages. Construction phase data has been collected from August 2022 onwards. For the eastern package, the collection of baseline data was completed in June 2023 with the construction phase data collected from July 2023.

1.2 Conditions of Approval

This operational surface water and groundwater monitoring plan provides an approach to address the requirements of the State approval. The requirements of the State conditions relevant to the development of this plan are shown in Table 1.

Table 1 Conditions of Approval – Operational Monitoring Plan

Item	Conditions of approval	Where addressed in the plan									
CoA A5	Where the terms of this approval require a document or monitoring program to be prepared or a review to be undertaken and submitted to the Planning Secretary, and the terms of this approval require the document, monitoring program or review to be prepared/undertaken in consultation with identified parties, evidence of the consultation must be submitted to the Planning Secretary with the relevant document, monitoring program or review. The evidence must include: (a) documentation of the engagement with the party identified in the condition of approval that has occurred before submitting the document for approval; (b) a log of the dates of engagement or attempted engagement with the identified party; (c) documentation of the follow-up with the identified party where engagement has not occurred to confirm that they do not wish to engage or have not attempted to engage after repeated invitations; (d) outline of the issues raised by the identified party and how they have been addressed; and (e) a description of the outstanding issues raised by the identified party and the reasons why they have not been addressed.	This plan will be provided to DCCEE* Water and relevant councils prior to submitting to DPHI* and all relevant feedback and how this has been addressed will be included in future versions of this plan. Section 1.4									
CoA D5	The following Operational Monitoring Programs must be prepared in consultation with the relevant government agencies identified for each Operational Monitoring Program to compare actual operational performance against predicted performance. Details of all information requested by an agency during consultation must be provided to the Planning Secretary as part of any submission of the relevant Operational Monitoring Program, including copies of all correspondence from those agencies as required by Condition A5. <table border="1"> <thead> <tr> <th></th><th>Required Operational Monitoring programs</th><th>Relevant government agencies to be consulted for each Operational Monitoring Plan</th></tr> </thead> <tbody> <tr> <td>(a)</td><td>Surface water</td><td>DPIE Water and relevant council(s)</td></tr> <tr> <td>(b)</td><td>Groundwater</td><td>DPIE Water</td></tr> </tbody> </table>		Required Operational Monitoring programs	Relevant government agencies to be consulted for each Operational Monitoring Plan	(a)	Surface water	DPIE Water and relevant council(s)	(b)	Groundwater	DPIE Water	This plan will be provided to DCCEE* Water and relevant councils prior to submitting to DPHI* and all relevant feedback and how this has been addressed will be included in future versions of this plan. Section 1.4
	Required Operational Monitoring programs	Relevant government agencies to be consulted for each Operational Monitoring Plan									
(a)	Surface water	DPIE Water and relevant council(s)									
(b)	Groundwater	DPIE Water									
CoA D6	Each operational monitoring program must include: (a) details of baseline data; (b) details of all monitoring to be undertaken; (c) the parameters to be monitored; (d) the frequency and duration 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.	(a) – Section 5 (b) – Section 4 (c) – Section 4 (d) – Section 4 (e) – Section 4 (f) – Section 6 (g) – Section 6 (h) – Section 6 (i) – Section 7									
CoA D7	The Operational Monitoring Program(s) must be submitted to the Planning Secretary for information at least one (1) month before the commencement of operation.	Section 1.4									
CoA D8	Operation must not commence until all relevant baseline data has been collected.	Section 5									
CoA D9	The Operational Monitoring Programs must be implemented for the duration specified in the relevant Operational Monitoring Program.	Section 7									
CoA D10	The results of the Operational Monitoring Programs must be submitted to the relevant government agencies for information in the form of an Operational Monitoring Report at the frequency identified in the relevant Operational Monitoring Program.	Section 1.4									

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Item	Conditions of approval	Where addressed in the plan
CoA D11	Where a relevant OEMP Sub-plan exists, the relevant Operational Monitoring Program may be incorporated into that OEMP Sub-plan.	Section 1.4

*DCCEE – Department of Climate Change, Energy, the Environment and Water

*DPHI – Department of Planning, Housing and Infrastructure.

The Amendment Report Submissions Report includes Revised Environmental Management Measures (REMMs) that are related to the operational phase. **SWH06** states that surface water monitoring will be carried out for a minimum of 12 months following the completion of construction, or until the affected waterways are certified by a suitably qualified and experienced independent expert as being rehabilitated to an acceptable condition and/or the permanent water quality structures are deemed to be operating satisfactorily. **GW04** states that groundwater quality monitoring will be carried out for a minimum of six months following construction. The REMM management measures are provided in Table 2.

Table 2 Revised Environmental management measures (REMMs)

Item	REMM	Where addressed in the plan
SWH06	An operational water quality monitoring program will be developed and implemented following the completion of construction to observe any changes in surface water and groundwater following construction, and inform appropriate management responses. The program will be based on the water quality monitoring methodology, water quality indicators, and the monitoring locations presented in the Surface water and hydrology assessment report (Appendix M of the EIS), and Groundwater quality and hydrology assessment report (Appendix N of the EIS). The monitoring program will be carried out monthly and will preferentially monitor following wet weather events when rainfall results in discharge from control sites or is greater than a nominated rainfall threshold which will be identified in detailed design. Monitoring will be carried out for a minimum of 12 months following the completion of construction, or until the affected waterways are certified by a suitably qualified and experienced independent expert as being rehabilitated to an acceptable condition and/or the permanent water quality structures are deemed to be operating satisfactorily. Should the results of monitoring identify that the water quality management measures are not effective in adequately mitigating water quality impacts, additional mitigation measures will be identified and implemented as required.	The monitoring program is included in Section 4.
GW04	Groundwater will be monitored at the airport interchange northern and southern cuts and the western cut during the construction phase and operational phase as outlined in Table 7-1 in the groundwater supplementary technical memorandum (Appendix J of amendment report). The groundwater indicators to be monitored will be as per Section 7.2.5 of Appendix N of the EIS. Groundwater inflows to the airport interchange northern and southern cuts and the western cut are to be observed by the groundwater monitoring contractor during the construction and operational phases at monthly intervals. As part of observing the airport interchange northern and southern cuts and the western cut groundwater inflows, the groundwater monitoring contractor is to estimate the groundwater inflow rates and note the areas where groundwater inflow is occurring. During construction, if groundwater inflows are observed from the airport interchange northern and southern cuts and the western cut, the groundwater quality from the cut is to be sampled. Operational phase groundwater quality sampling, including the quality sampling of the airport interchange northern and southern cuts and the western cut inflows, is to occur at a monthly interval for at least 6 months.	Section 1.5

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Item	REMM	Where addressed in the plan
GW05 (amended)	Groundwater quality, levels and inflows will be monitored at Clifton Avenue (Cut 9) during construction and operation as outlined in the M12 Central consistency assessment report (GHD, 2021) and updated in the M12 West and Central Sydney Water Pipeline Crossings consistency assessment report (TfNSW, 2022). The groundwater indicators to be monitored will be as per Section 7.2.5 of Appendix N of the EIS. Groundwater inflows are to be monitored at monthly intervals. As part of observing inflows at the identified cuts, the groundwater inflow rate is to be estimated and the areas where groundwater inflow is occurring noted. Operational phase groundwater quality sampling, including the quality sampling of Cut 9 inflows, is to occur at monthly intervals for at least six months.	Section 1.5

1.3 Purpose of this report

The purpose of this report is to provide a plan to meet the CoA and REMMs for surface water and groundwater monitoring during the operational phase of the M12 Motorway for comparisons of operational data to the baseline data. This sampling program will detail the surface water and groundwater monitoring that will be undertaken to obtain further monitoring data to determine if the operational phase of the M12 is impacting water quality and groundwater levels in the surrounding environment.

This sampling program is intended to be used as a guiding document for the required sampling. The following sections outline the sampling requirements with respect to location, frequency, analytes and collection procedures.

1.4 Consultation

This plan will be provided to DCCEE Water and relevant councils prior to submitting to DPHI and all relevant feedback and how they have been addressed will be included in future versions of this plan.

This plan will be submitted to the Planning Secretary at least one month prior to the commencement of the operation. Additionally, the biannual report on the operation of the surface water and groundwater monitoring program will be submitted to the relevant government agencies for informational purposes.

Where a relevant operation environmental management plan (OEMP) Sub-plan exists, the relevant Operational Monitoring Program may be incorporated into that OEMP Sub-plan.

1.5 Scope of work

GHD is to undertake monthly operational phase surface water and groundwater monitoring events at each of the monitoring locations within the project. This will continue for up to 12 months of monitoring commencing at the opening of each stage.

The scope for the surface water monitoring events undertaken within the project area includes:

- Collection of monthly field observations and samples from up to thirteen surface water locations from six creeks that intersect the project alignment as shown on Figure 1, Appendix A.
- Completion of up to three wet weather sampling events during the six-month reporting period.
- Laboratory analysis of surface water samples for contaminants of potential concern (CoPC), as detailed in Section 4.3.2.
- Preparation of a surface water monitoring report every six months.

The scope for the groundwater monitoring events undertaken within the project includes:

- Monthly sampling of four existing monitoring wells (BH104R, BH107R, BH112R and BH145R) along the project alignment, including groundwater levels using an interface probe (IP) to determine the presence

of light non-aqueous phase liquid (LNAPL) and measure groundwater levels. The groundwater monitoring locations are shown on Figure 2, Appendix A.

- Collection of samples from four existing monitoring wells (BH104R, BH107R, BH112R and BH145R) using a micro-purge pump, employing low-flow sampling methodology to determine water quality and estimate flow direction.
- Laboratory analysis of groundwater samples for contaminants of potential concern (CoPC), as detailed in Section 4.3.2.
- Bi-monthly (every second month) downloading of the data loggers from the four monitoring wells.
- Collation and graphing of groundwater level data from the four groundwater monitoring wells, which includes data from manual gauging and data loggers.
- Preparation of a groundwater monitoring report every six months.

1.6 Deviations from the REMMs

The REMMs (GW04 and GW05) required that the four cuts mentioned in the GW04 (JAJV, 2020) and GW05 (GHD, 2021) requirements are to be visually inspected and sampled if seepage is visible. These cuts included:

- Western cut
- Airport interchange northern cut
- Airport interchange southern cut
- Cut 9 at Clifton Avenue

Groundwater level monitoring will continue at Western Cut location via monitoring well BH104R. To date, there has been no observed decrease in groundwater levels below baseline conditions, and no seepage has been detected during visual inspections.

No recent groundwater level monitoring has been undertaken at the airport interchange northern and southern cuts, and Cut 9 at Clifton Avenue, as the relevant monitoring wells have been decommissioned or destroyed for some time. Visual inspections at these cuts undertaken during construction have not identified any seepage.

The Groundwater supplementary technical memorandum (Appendix J, (JAJV, 2020)) stated *that operational impacts to groundwater levels are not expected to differ from those which are likely to occur due to construction impacts. No impacts to existing licensed bores, groundwater dependant ecosystems (GDEs) or regional groundwater systems are predicted because of potential groundwater level drawdown.*

Given that no groundwater seepage has been observed at these locations during construction (as per the M12 West and M12 Central Construction soil and water management sub-plans (CPB / Georgiou, 2024) (Seymour Whyte, 2025)), and the quarterly construction monitoring reports prepared under CoA 18 (CPB Georgiou, 2025) (Seymour Whyte, 2025a), it is not expected to occur during operation and therefore no further visual monitoring of these cuts is deemed necessary.

1.7 Limitations

This report has been prepared by GHD for Transport for NSW and may only be used and relied on by Transport for NSW for the purpose agreed between GHD and Transport for NSW as set out in section 1.3 of this report.

GHD otherwise disclaims responsibility to any person other than Transport for NSW arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

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The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.

Site conditions (including the presence of hazardous substances and/or site contamination) may change after the date of this Report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

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2. Project description

2.1 Project identification

A summary of available information pertaining to the project is presented in Table 3. A location plan of the project is provided in Figure 1, Appendix A.

Table 3 *Project identification summary*

Item	Description
Description of the project	The M12 Motorway project is approximately 16 km in length. This will extend between the M7 Motorway at Cecil Hills and The Northern Road at Luddenham.
Local Government Area	Fairfield City Council – north eastern portion Liverpool City Council - eastern portion up to Mamre Road Penrith City Council - westwards from Mamre Road
Traditional Custodians	Darug and Dharawal people
Local Land Use Zoning	Liverpool LEP 2008: – RU4 – primary production small lots – SEPP Western Sydney Parklands 2009 Fairfield LEP 2013: – RU4 – primary production small lots – RU1 – primary production Penrith LEP 2010: – RU4 – primary production small lots – C2 – environmental conservation – RU2 – rural landscape – SP2 – classified road State Environmental Planning Policy (Western Sydney Aerotropolis) 2020: – ENZ – environment and recreation – ENT – enterprise – SP2 – infrastructure
Land Use	The project is currently used for agricultural, industrial, residential, and rural purposes. Potentially contaminating activities within and/or directly adjacent to the project include the SUEZ Kemps Resource Recovery Park, Brandown Quarry and general agricultural land use.
Surrounding Land Use	A range of land uses including industrial, commercial, residential, agriculture and landfill surround the project. Potentially contaminating activities outside of the project include the Hi-Quality Group Quarry and Sydney Recycling Park (located adjacent to the Hi-Quality Group Quarry). An Ampol service station is located approximately 300 m north-east of the project at 1163 Mamre Road, Kemps Creek. Regulation under the Contaminated Land Management (CLM) Act is not required at the site. Major infrastructure projects surround the alignment including the Western Sydney International Airport, Sydney Metro Western Sydney Airport, the Sydney Water Upper South Creek Recycling Centre Water Recycling Centre, and upgrades to Elizabeth Drive.

2.2 Historical land use summary

The M12 Environmental Impact Statement (Roads and Maritime Services, 2019c) included a historical aerial photograph review of the project and the surrounding area. The review indicated that the project and the surrounding area have remained largely rural/agricultural and residential since the 1940s. Increased rural residential density in suburban pockets and a number of commercial/industrial premises in Kemps Creek have been observed since the 1950s and 1960s to the present day.

2.3 Environmental setting

The M12 Environmental Impact Statement (Roads and Maritime Services, 2019c) included a desktop review of the existing environment for the entire M12 Motorway construction footprint. An updated summary of this information is presented in Table 4.

Table 4 Environmental setting summary

Item	Description
Climate	The long-term average monthly rainfall for the project ranges between 33.1 millimetres (mm) in July to 106.7 mm in March, with an average annual rainfall of 729.5 mm (Badgerys Creek AWS Station ID 067108) (BOM, 2025). Long-term maximum mean temperatures range between 17.6°C in July to 30.0°C in January, and minimum mean temperatures between 4.3°C in July to 17.2°C in January (Badgerys Creek AWS Station ID 067108) (BOM, 2025).
Topography and drainage	The ground surface along the project ranges between reduced level (RL) 70 metres (m) Australian Height Datum (AHD) to RL 115 metres AHD. The landscape comprises relatively flat terrain with low rising crests. Flat floodplains are present at South Creek and Kemps Creek. Low rolling hills are situated between the floodplain areas, typically comprising gentle rises and undulations with broad rounded crests (Geological Survey of NSW, 1991; NSW EPA, 2020). Based on the project's topography, surface runoffs are expected to drain to nearby dams and creeks (e.g., Kemps Creek and South Creek) and infiltrate into subsurface soils across unsealed lands in the surrounding area.
Soil and landscapes	The project is primarily underlain by the Blacktown residual soil unit (Geological Survey of NSW, 1991). The South Creek and Kemps Creek areas are underlain by the South Creek fluvial soil landscape. The Blacktown residual soil landscape typically comprises of clayey soils over gently undulating crests. The soil unit can have moderately reactive, highly plastic subsoils and poor drainage. The South Creek fluvial soil comprises floodplains and drainage depressions of very deep layered clays and sands. These fluvial soils are prone to erosion and frequent flooding.
Acid sulfate soils (ASS)	The project is not covered by areas mapped in the Acid Sulfate Soil Risk Maps prepared by Department of Land and Water Conservation.
Geology	The majority of the project is underlain by two geological units, Bringelly Shale (Rwb) and Quaternary aged alluvial deposits (Qal) (Geological Survey of NSW, 1991). - Bringelly Shale is the predominant geological unit for the project. Bringelly Shale is described as comprising shale, carbonaceous claystone, laminite and rare coal. Bringelly Shale is the upper portion of the Wianamatta Group and the upper sedimentary sequence in the Sydney Basin with a thickness of typically 150 m. - Quaternary aged alluvial deposits (Qal) are described as comprising quartz and lithic fluvial sand, silt and clay. These are present near South Creek and Kemps Creek.
Hydrology	The project crosses South Creek in the western portion and Kemps Creek in the eastern portion. Kemps Creek is a tributary of South Creek, joining approximately three kilometres north of Elizabeth Drive, which then flows north to discharge into the Hawkesbury River.
Hydrogeology	The underlying aquifers are composed of shale, siltstone, and other sedimentary rocks. They have a low potential for groundwater movement and comprise salinity levels greater than 16,000 micro-Siemens per centimetre (µs/cm), being unsuitable for stock use (DPI, 2014). According to the groundwater data collected during the groundwater baseline period (April 2019 to July 2022), groundwater levels within the project range between 9.114 m below top of casing (m bTOC) and 19.85 m bTOC.

3. Data quality objectives

3.1 Data quality objectives

The Data Quality Objective (DQO) process is an iterative planning approach used to define the type, quantity and quality of data that is needed to inform decisions relating to the environmental condition of a site. The seven step DQO process:

- Clarifies the study objective.
- Defines the most appropriate collection of data as relevant to the study objective.
- Determined the conditions from which to collect data.
- Specifies tolerable limits on decision errors, which will be used as the basis for establishing the quantity and quality of data, needed to support the decision.

The DQOs for monitoring are presented in Table 5. They have been prepared in line with the DQO process as outline in the ASC NEPM (Schedule B2) (NEPC, 2013).

Table 5 Data quality objectives

Process	Description
Step 1: State the problem	The M12 Motorway (the project) is located between the M7 Motorway at Cecil Hills, and The Northern Road at Luddenham in Western Sydney, covering approximately 16 km. The intention of the project is to provide direct access between the Western Sydney International Airport at Badgerys Creek and Sydney's motorway network. As part of the project approval conditions, TfNSW has implemented a surface water and groundwater monitoring program for the M12 Motorway development, covering the baseline, construction, and post-construction phases. As part of the project, ongoing surface water and groundwater monitoring at locations is required to ensure that the operational phase of the project does not impact the surrounding environment. This dataset will provide data to compare to baseline to understand the impact (if any).
Step 2: Identify the decision/goal of the study	The key goal of the baseline monitoring program was to collect background monitoring data to identify baseline conditions in at least the first 12 months "pre-construction", prior to commencement of construction of the M12 Motorway. The baseline data would support the development of a surface and groundwater monitoring program and management plans for the construction and operation of the project. This information is gained through the baseline: – Undertaking surface water and groundwater monitoring to assess the changes in the nature and extent (spatial and temporal) of CoPC concentrations. – Collecting of data during operation for comparison to baseline – Conducting surface water monitoring to assess seasonal effects on water flow and CoPC concentrations, including during or immediately after extreme or high rainfall events. From these objectives, the following questions need to be understood: – How do the concentrations compare to baseline monitoring? lower, higher or stable? Has the nature, extent and magnitude of CoPC concentrations changed significantly? – Has the nature, extent and magnitude of CoPC concentrations changed significantly to warrant refinement of any existing management measures? – Is the data reliable, valid and of sufficient quality to make informed decisions?
Step 3: Identify the information inputs	To allow assessment of the data against the study goal listed in Step 2 above, the following inputs will be considered: – Existing data obtained from previous reports: Surface water and hydrology assessment report (Roads and Maritime Services, 2019a), Groundwater quality and hydrology assessment report (Roads and Maritime Services, 2019b), and M12 Motorway Amendment Report – Appendix J Groundwater quality and hydrology supplementary technical memorandum (JAJV, 2020). – Groundwater and surface water collected and analysed. – Comparison of data with relevant public health and environmental water quality criteria to identify baseline conditions prior to commencement of the construction of the project.

Process	Description
	– Confirmation that data generated by sampling and analysis are of a suitable quality to allow reliable comparison to baseline data as per the assessment of the data quality indicators (DQIs) (further discussed below). – The calculated baseline 20th and/or 80th percentiles are to be compared to the operational monitoring period to ensure that the operation of the motorway is not impacting the groundwater and surrounding surface waters. – Field data (i.e. groundwater SWL, physio-chemical parameters) on groundwater and surface water. – Weather conditions preceding sampling events, particularly rainfall events. – Site status and surrounding land use scenarios and whether these have changed. – Changes in land uses or groundwater usage.
Step 4: Define the boundaries of the study	The spatial and temporal boundaries of the study area are as follows: – The lateral boundary of the project is defined as the extent of the surface water and groundwater monitoring locations as shown in Figure 1 and Figure 2, Appendix A. – The vertical boundary of the project is defined as the depth of the deepest groundwater well, approximately 72.15m AHD (BH112) – The temporal boundary of the project is defined as the previous baseline monitoring periods (April 2019 to July 2022) and the construction monitoring period (August 2022 to the end of 12 months after operation has begun). The monitoring will be up to 12 months, or until the affected waterways are certified by a suitably qualified and experienced independent expert as being rehabilitated to an acceptable condition and/or the permanent water quality structures are deemed to be operating satisfactorily. The frequency of the sampling is every month.
Step 5: Develop the analytical approach/decision rules	The degree of impact by contaminants and the associated decisions will be assessed with reference to assessment criteria, as discussed in Section 3.2. Acceptable relative percentage difference (RPD) limits for CoPC detected in Quality Assurance and Quality Control (QA/QC) samples, such as field duplicates, rinsate blanks, trip blanks, trip spikes, matrix spikes and matrix spike duplicates, are identified in the following sections. The decision rules to be applied are as follows: – To make this assessment, monitoring data will be compared against relevant public health and environmental water quality guidelines, as well as the baseline 20th and 80th percentiles. – If the data has been collected in a manner from which it is possible to establish completeness, comparability, representativeness, precision and accuracy, the data will be considered suitable for the purposes of this assessment. – If changes in surface water and groundwater conditions are observed between monitoring events during the operational phases and previous baseline periods that cannot be plausibly explained by natural environmental fluctuations, and the concentrations of contaminants of potential concern have become elevated to levels in exceedance of the adopted public health and environmental water quality criteria, then further assessment may be required to evaluate the need for additional investigation and / or management activities. – The decision on the acceptance of analytical data should be made on the basis of data quality indicators (DQIs) detailed in this Plan. If detections of CoPC are reported in field blanks or rinsate blanks, then consider if there is a potential for cross-contamination between sample locations and what impact this has on conclusions.
Step 6: Specify performance or acceptance criteria	Two primary decision error-types may occur due to uncertainties or limitations in the project data set. This may include: – Groundwater and/or surface water networks are no longer adequate to assess risks. – A sample/area may be deemed to pass the nominated criteria, when in fact it does not. This may occur if contamination is 'missed' due to limitations in the sampling plan, or if the project analytical data set is unreliable. – A sample/area may be deemed to fail the nominated criteria, in actuality, it may not. This may occur if the project's analytical data set is unreliable due to inappropriate sampling, sample handling, or analytical procedures. The following tasks would be undertaken: – An assessment to understand the likelihood of a decision error being made based on the results of a QA/QC assessment and the closeness of the data to the assessment criteria. – A QA/QC assessment, evaluating the reliability and usability of data, which are expressed as five DQIs.

Process	Description
Step 7: Develop the plan for obtaining data	This Plan provides the guidance required for each monitoring event, including the scope of work, sampling methodologies, monitoring locations, and sample analysis. To maintain the integrity and reliability of data, the following measures should be adopted: – Field and analytical data are collected in accordance with the ASC NEPM (NEPC, 2013). – Field personnel should be trained and have sufficient experience to complete the fieldwork to an acceptable standard, as per the protocols outlined in this plan. – Robust field and laboratory QA/QC protocols are adopted – Use laboratories that are National Association of Testing Authorities (NATA) accredited for the selected analysis and ensure laboratory LORs are suitable to meet the relevant adopted assessment levels.

3.2 Adopted assessment criteria

3.2.1 Water quality objectives

The primary water quality objective of the M12 Motorway project was to establish baseline groundwater conditions within the project boundary prior to construction, thereby supporting the development of a comprehensive surface water and groundwater monitoring program during the project's construction and operation. This included forming site-specific water quality guidelines applicable for subsequent assessment. The plans and programs form part of the conditions of approval under Part 5.1 of the *Environmental Planning and Assessment Act 1979*.

The project is designed, constructed, and operated to protect the NSW Water Quality Objectives where they are currently being achieved, and contribute towards the 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 water (if applicable).

The NSW Water Quality Objectives are the agreed environmental values and long-term goals for NSW's surface water (DECCW, 2006). Additionally, following an independent inquiry by the Healthy Rivers Commission (HRC), further environmental values for the waterways were agreed upon by the NSW Government. The environmental values determined in the HRC water quality have been adopted as the relevant environmental values to be protected during this project, which include:

- Protection of aquatic ecosystems.
- Visual amenity.
- Primary and secondary contact recreation.
- Irrigation water supply.
- Homestead water supply.

In order to achieve this, the framework in The Australian and New Zealand Environment Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand (ANZECC & ARMCANZ, 2000) water quality guidelines are adopted to guide the conservation of ambient water quality. These guidelines provide recommended trigger values that have been applied to understand the current health of the waterways and key indicators of concern. These guidelines should be regarded as highly conservative in relation to the current condition of the sampling locations.

3.2.2 Relevant guidelines

The framework for the contamination assessment made herein, was developed in accordance with guidelines "made or approved", by the NSW EPA under Section 105 of the *Contaminated Land Management Act, 1997*. These guidelines include, but are not limited to the following:

- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC & ARMCANZ, 2000).
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, 2018) (updated 26 July 2021).

- Consultants Reporting on Contaminated Land: Contaminated Land Guidelines, NSW EPA (NSW EPA, 2020).
- National Environmental Protection (Assessment of Site Contamination) Amendment Measure NEPM, National Environment Protection Council, NEPC (NEPC, 2013).
- NHMRC & NRMMC (2018) Australian Drinking Water Guidelines 6, 2011 (version 3.7 updated in January 2022) (NHMRC & NRMMC, 2011).
- NSW EPA, Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997 (NSW EPA, 2015).

3.2.3 Adopted assessment criteria – surface water

To assess and understand baseline and operational surface water quality conditions, assessment criteria have been adopted from ANZECC & ARMCANZ (2000), ANZG (2018) and NHMRC & NRMMC (2011). In order to achieve the water quality objectives (Section 3.2.1), which include the protection of environmental values such as aquatic ecosystems, visual amenity, primary and secondary recreational contact, irrigation and homestead water supply, various criteria have been adopted from these guidelines, as discussed below.

The ANZECC & ARMCANZ (2000) guidelines are trigger values for physical and chemical stressors for the protection of waterway health. The guidelines are specific to the type of ecosystem being monitored, which, in this case, are lowland rivers (specifically east-flowing coastal lowland rivers in NSW). These guidelines are based on toxicological studies, which define trigger values for physical and chemical stressors at which an effect on the aquatic ecosystem is observed.

The ANZECC & ARMCANZ (2000) guidelines relate to reference conditions of aquatic systems that are minimally disturbed, and therefore, they are regarded as conservative in relation to the current condition of the sampling locations. However, the trigger values can be used to assess the risks of adverse effects of excessive amounts of pollutants in various ecosystem types.

For the locations monitored in this project, the trigger values for NSW lowland coastal rivers have been applied as the most applicable system group described in ANZECC & ARMCANZ (2000). Additionally, ANZECC & ARMCANZ stock watering guidelines have been adopted to provide criteria where the lowland river criteria do not.

To supplement the ANZECC & ARMCANZ guidelines and facilitate the protection of the environmental values listed above and potential human receptors, additional criteria have been included:

- Australian Drinking Water Guidelines (ADWG) v3.7, updated in January 2022 (NHMRC & NRMMC, 2011), protective of human health.
- ANZG (2018) (updated 26 July 2021) Freshwater – 95% level of species protection (slightly to moderately disturbed systems), protective of ecological health.

These criteria are generally more conservative than those for aesthetic, primary contact recreation and secondary contact recreation, and as such, no criteria have been selected for these environmental values.

3.2.4 Adopted assessment criteria – groundwater

To assess and understand baseline groundwater quality conditions, assessment criteria have been adopted from ANZECC & ARMCANZ, 2000 (updated in 2018), NEPM (NEPC, 2013) and NHMRC & NRMMC (2011, v3.7 updated in 2022).

GHD conducted a search of existing registered groundwater bore records in the vicinity of the project area using the Bureau of Meteorology's Australian Groundwater Explorer (BOM, 2025); accessed 23 April 2025, and identified four non-monitoring groundwater wells within 1000 m of the project area. These groundwater wells were identified as being used for commercial/industrial use, exploration, water supply, stock and/or domestic purposes. The health screening level (HSL) for commercial/industrial have been selected (HSL D) to represent the proposed land use. As three wells used for water extraction purposes were identified within 1000 m of the project area, the Australian Drinking Water Guidelines (ADWG) (NHMRC & NRMMC, 2011) have been selected as the screening criteria protective of human health.

Health screening levels (HSL) for petroleum hydrocarbons

The NEPM (NEPC, 2013) provides guidance relating to the assessment of vapour risks from petroleum hydrocarbons. HSLs for petroleum hydrocarbons for commercial/industrial land use (HSL D) have been adopted for the groundwater assessment to characterise the risk posed to future commercial users of the project area by potential hydrocarbon vapour intrusion.

Groundwater Investigation Levels (GIL) for human health

As previously stated, ADWG v3.7, updated in January 2022 (NHMRC & NRMMC, 2011) health criteria have been selected as a conservative approach to characterise the risk posed to users of the project area and potential off-site drinking water users by contaminants of potential concern (CoPC) via direct contact with groundwater. Drinking water criteria were considered due to the presence of four groundwater wells located within a 1000 m radius of the project area used for non-monitoring purposes.

Ecological assessment criteria

Ecological assessment criteria for the groundwater assessment have been considered due to the close proximity of numerous fresh water bodies throughout the project area, of which there is potential for groundwater to migrate. As such, the following guidelines were adopted for the protection of local freshwater systems.

- ANZG (2018) Freshwater – 95% level of species protection (slightly to moderately disturbed systems)
- ANZECC (2000) – Lowland Rivers (NSW Coastal Rivers)
- ANZECC (2000) – Stock Watering

These criteria were selected as it is possible for plants and/or freshwater bodies to come into contact with groundwater. Assessment criteria for slightly to moderately disturbed systems were considered to be appropriate, as the project area is neither undisturbed systems of high ecological value, nor highly disturbed systems with no to low ecological value.

4. Proposed monitoring scope

4.1 Surface water and groundwater locations

The current surface water locations are detailed below in Table 6 and presented in Figure 1, Appendix A. Surface water location COSUS, was moved slightly upstream during the construction period, and locations COSDS, SOUDS, BADMS, and BADDS were moved slightly downstream from August 2023 as per agreement with TfNSW to provide more representative sampling as the construction phase has continued. Access to these locations will need to be assessed in the lead up to the operation period in consultation with landowners. If access restrictions require changes to the monitoring locations, another suitable location will be established as close as possible to the existing monitoring location and this plan will be updated.

Table 6 Surface water monitoring locations

Location	Approximate latitude	Approximate longitude	Description	Comments and access
COSUS	-33.859602	150.729091	Cosgroves Creek upstream of motorway alignment.	Located east of Luddenham Road. Access through Luddenham Rd via two gates along an access track to the north of the M12.
COSDS	-33.857257	150.732789	Cosgroves Creek downstream of motorway alignment.	Located east of Luddenham Road. Access through Luddenham Rd via two gates along an access track to the north of the M12.
BADUS	-33.873812	150.754808	Badgerys Creek upstream of motorway alignment.	Located under Elizabeth Drive road bridge, public access on north side anytime.
BADMS	-33.859556	150.754736	Badgerys Creek upstream of motorway alignment. Closer than BADUS to the alignment and is considered downstream of the nearby SUEZ waste facility.	Added into monitoring program from October 2021. Located approximately halfway between Luddenham Rd and Mamre Rd. Access via M12 westbound emergency stopping bay.
BADDS	-33.856868	150.757777	Badgerys Creek downstream of motorway alignment.	Located approximately halfway between Luddenham Rd and Mamre Rd. Access via M12 westbound emergency stopping bay.
SOUUS	-33.862360	150.770795	South Creek upstream of motorway alignment.	Located approximately halfway between Luddenham Rd and Mamre Rd. Access via M12 Westbound emergency stopping bay.
SOUDS	-33.860191	150.768887	South Creek downstream of motorway alignment.	Located approximately halfway between Luddenham Rd and Mamre Rd. Access via M12 Westbound emergency stopping bay.
KEMUS	-33.880991	150.798390	Kemps Creek upstream of motorway alignment.	Located under Elizabeth Drive road bridge, public access via gravel road on southeast side anytime
KEMDS	-33.874734	150.799028	Kemps Creek downstream of motorway alignment.	Located west of Mamre Road. Access through Seymour Whyte worksite off Clifton Ave.
ROPUS	-33.865962	150.849636	Ropes Creek downstream of motorway alignment. It was labelled as ROPDS between April 2021 and September 2021.	Pond in Western Sydney Parklands reserve, access negotiated.
ROPDS	-33.865970	150.846230	Ropes Creek upstream of motorway alignment. It was labelled as ROPUS between April 2021 and September 2021.	Located next to roundabout on Wallgrove Road, public access via gravel road on north side anytime.

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Location	Approximate latitude	Approximate longitude	Description	Comments and access
HINUS	-33.885917	150.822292	Hinchinbrook Creek upstream of motorway alignment.	Pond in Western Sydney Parklands reserve, access through Wylde MTB and BMX park.
HINDS	-33.894390	150.842382	Hinchinbrook Creek downstream of motorway alignment.	Access via Kensington Close, sampling from dam adjacent to corner of Vidal Avenue and Antrim Drive.

The locations for the four groundwater quality monitoring wells are summarised below in Table 7 and presented on Figure 2, Appendix A. These monitoring wells are located in the vicinity of the project and were chosen as they represent areas of relatively substantial road cuttings and therefore there was a higher potential for groundwater interception by the project alignment in these areas.

BH104R, BH107R, and BH112R were added to the monitoring program in December 2022 to replace the monitoring wells BH104, BH107, and BH112, which were destroyed by the expansion of the construction footprint. BH145R was added to the monitoring program in April 2023 to replace well BH145 which had not been intersecting the groundwater aquifer.

Due to access restrictions on BH112R between December 2022 and May 2023, BH112R was redrilled for a second time in June 2023 and sampled for the first time in August 2023, after well development had occurred. BH144 was temporarily added to the program in November 2022 to provide additional monitoring data before it was destroyed in December 2022.

Table 7 Groundwater quality monitoring locations

Well ID	Latitude	Longitude	Package	Comments and access
Baseline monitoring wells				
BH104	-33.854952	150.7055015	West	Destroyed in December 2022.
BH112	-33.855866	150.7195004	West	Destroyed in December 2022.
BH107	-33.854432	150.7146769	West	Destroyed in December 2022.
BH145	-33.880292	150.8253916	Central	Destroyed in April 2023. No longer monitored due to low water column.
Operational monitoring wells				
BH104R	-33.854024	150.7056504	West	Installed and monitored from December 2022. Access via M12 eastbound emergency stopping bay.
BH112R	-33.855998	150.71932242	West	Originally installed in December 2022 but could not be sampled due to access restrictions. Redrilled and monitored from August 2023. Access via M12 eastbound emergency stopping bay.
BH107R	-33.854092	150.7146021	West	Installed and monitored from December 2022. Access via M12 eastbound emergency stopping bay.
BH145R	-33.855066	150.720140	Central	Installed and monitored from April 2023. Access via Elizabeth Drive and Western Sydney Parklands gate.

4.2 Sample collection and handling

4.2.1 Surface water sampling

The surface water sampling methodology is presented in Table 8, which will be used for both the monthly and wet weather events.

Table 8 Surface water sampling methodology

Item	Description
Technical guidelines	Australian Standard 5667:1998 Water Quality – Sampling, Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples (AS 5667.1:1998). Australian Standard 5667:1998 Water Quality – Sampling, Part 6: Guidance on the Sampling of rivers and streams (AS 566.6:1998). ASC NEPM (NEPC, 2013). GHD's standard operating procedures (SOP) for surface water quality sampling, which complies with procedures detailed in the ANZECC & ARMCANZ (2000) guidelines and the NSW EPA's Approved Methods for the Sampling and Interpretation of Results of Water Pollutants (NSW EPA , 2022)
Field chemistry and sampling	A surface water sample will be collected as a 'grab sample' mid-way through the water column or approximately 0.5 m below the surface at the individual surface water sampling locations. If the reachable water column is less than 0.5 m deep, the sample will be collected from at least half the water depth, and care should be taken to avoid surface films entering the sample. If the water column is greater than 0.5 m deep, the sample should be taken 20 to 30 cm below the surface of the water. Each individual sample will be collected into a new laboratory-supplied, unpreserved sample container with new nitrile gloved hands. An extendable sampling pole may be used for easier sample collection. Field parameters (pH, EC, redox, DO and temperature) will be measured and recorded for all groundwater locations. In addition, observations of water quality such as the flow (flowing or not flowing), colour, turbidity level, and the presence/absence of odour or sheen will be recorded. The sample containers will be labelled with the job number, sample identification and date collected.
Quality assurance and quality control (QA/QC)	The following field QA/QC samples will be collected and analysed for metals (standard suite) as part of the surface water sampling program: – One intra-laboratory duplicate per ten primary samples. – One inter-laboratory duplicate per ten primary samples. – One rinsate sample per day of sampling (where applicable). – One trip blank per batch.
Sampling schedule	Surface water monitoring locations are to be sampled routinely on a monthly basis and supplemented by up to three wet weather sampling events per six monthly monitoring period. The wet weather criterion as per an agreement with TfNSW and aligning with the Environmental Impact Statement (EIS) is defined as 22 mm over a 24-hour period, this criterion will be used to identify wet weather event triggers.

4.2.2 Groundwater sampling

The groundwater sampling methodology is presented Table 9.

Table 9 Groundwater sampling methodology

Item	Description
Technical guidelines	Australian Standard 5667:1998 Water Quality – Sampling, Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples (AS 5667.1:1998). Australian Standard 5667:1998 Water Quality – Sampling, Part 11: Guidance on the Sampling of Groundwaters (AS 566.11:1998). ASC NEPM (NEPC, 2013). GHD standard operating procedure for groundwater well sampling (GHD, 2021).
Field screening and gauging	The monitoring wells will be gauged prior to groundwater sample collection using a decontaminated oil/water interface probe to measure standing water level (SWL) and assessed for the potential presence of LNAPL (light non-aqueous phase liquid). In addition, the base depth of the monitoring wells will be measured. Depth measurements will be referenced to the top of well casing as an established datum.
Field chemistry and sampling	A micropurge and bladder-pump unit will be used to purge and to draw a sample from the wells. The pump is to be lowered to approximately one metre above the bottom of the well to ensure the pump inlet is within the screened interval.

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Item	Description
	A groundwater sample will be collected from each well after stabilisation of the field parameters (pH, electrical conductivity (EC), oxygen redox potential (redox), dissolved oxygen (DO) and temperature) to be measured and recorded for all groundwater locations prior to sample collection. Field parameters are considered stable after three consecutive readings are obtained within the following ranges: ± 0.05 for pH ± 3% for EC ± 10% for DO ± 0.2 °C for temperature ± 10 mV for redox. In addition, observations of water quality such as the colour, turbidity level, and the presence/absence of odour or sheen will be recorded. Wells will be purged until stabilisation of parameters, after which the sample will be taken in laboratory supplied bottles suitable for the requested analyses. The sample containers will be labelled with the job number, sample identification and date collected.
Decontamination	Prior to and following the collection of each groundwater sample, all non-disposable sampling equipment will undergo decontamination including: Washing of equipment with phosphate free detergent (Liquinox) and/or Rinsing of equipment with laboratory supplied deionised water.
Quality assurance and quality control (QA/QC)	The following field QA/QC samples will be collected and analysed as part of the groundwater sampling program: – One intra-laboratory duplicate per ten primary samples. – One inter-laboratory duplicate per ten primary samples. – One rinsate sample per day of sampling. – One trip blank per batch.
Sampling schedule	The sampling round will include monitoring at 4 groundwater locations.

4.2.3 Sample handling and transport

Following collection of each batch of samples, samples will be immediately stored in a cool, dark environment (esky) prior to being forwarded to the NATA accredited analytical laboratory within the specified holding times along with a standardised chain of custody (COC) form. Analyses will be undertaken on a standard turnaround time of five business days, and analytical results will be emailed to GHD as a compiled report from the laboratory (as Esdat files and PDF report).

4.2.4 Calibration

Prior to use in the field, all field instruments (i.e. water quality meter, interface probe) are to be calibrated by the equipment supplier to optimise the accuracy of the measurements taken. The calibration certificate from the equipment supplier will be checked by the field team to confirm the field instruments are in good working condition.

All calibration certificates for equipment hired will be collected as part of the field documentation and presented as an attachment in the Sampling Event Report.

4.3 Analytical suite and analysis methods

4.3.1 Laboratory NATA accreditation details

The NATA accredited laboratories selected for this monitoring program are as follows:

- Primary laboratory: Australian Life Science (ALS) Environmental, Smithfield, New South Wales (NATA Accreditation No. 825).
- Secondary laboratory: Eurofins, Girraween, New South Wales (NATA Accreditation No. 1261).

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4.3.2 Analytical schedule

All primary samples will be analysed by ALS Environmental and all secondary samples were analysed by Eurofins, both NATA accredited laboratories. The analytical schedule for surface water and groundwater is provided in Table 10

Table 10 *Laboratory analysis for surface water and groundwater*

Analyte	Surface Water	Groundwater	Per sampling event
Heavy Metals (including As, Cd, Cr, Cu, Pb, Hg, Ni, Zn, Fe and Mn)	✓	✓	
Nutrients (including ammonia, NO ₂ , NO ₃ , TKN, total nitrogen, total phosphorous)	✓	✓	
Chlorophyll-a	✓		
Oil and grease	✓		
Ultra trace polynuclear biphenyls (PCB), ultra-trace organochlorine and ultra-trace organo-phosphorous pesticides (OCP/OPP), and volatile organic carbons (VOC).	✓		
Benzene, toluene, ethylbenzene, xylene, naphthalene (BTEXN)	✓	✓	
Total Recoverable Hydrocarbons (TRH)	✓	✓	
Phenols and poly-aromatic hydrocarbons (PAH)	✓	✓	
Total dissolved solids (TDS)	✓	✓	
Total suspended solids (TSS)	✓	✓	
Major Anions and Cations (including chloride, sulphate, sodium, potassium, magnesium, calcium, carbonate and bicarbonate) and Hardness		✓	
Field quality control samples (per monitoring event)			
Intra-laboratory duplicate – Metals (As, Cd, Cr, Cu, Pb, Hg, Ni, and Zn).	✓	✓	
Inter-laboratory duplicate – Metals (As, Cd, Cr, Cu, Pb, Hg, Ni, and Zn).	✓	✓	
Rinsate – Metals (As, Cd, Cr, Cu, Pb, Hg, Ni, and Zn).		✓	
Trip Blank (BTEX, TRH C ₆ -C ₁₀)			✓
Trip Spike (BTEXN)			✓

4.4 Quality assurance and quality control

The data generated during this investigation must be accurate and reliable to enable informed decisions to be made with confidence. Specific limits for this investigation have been adopted in accordance with guidance from the AS4482.1 which includes appropriate indicators of data quality ((DQIs) used to assess QA/QC, and GHD's Standard Field Operating Procedures).

To assess the usability of the data prior to making decisions, the data was assessed against pre-determined DQIs. The DQIs including precision, accuracy, representativeness, comparability and completeness, were reviewed at the completion of the investigation works to assess for the presence of decision errors.

The pre-determined DQIs established for the investigation are discussed below and shown in Table 11.

Table 11 DQI acceptance criteria

DQI	Acceptance criteria
Field QA/QC	
Field program	Fieldwork is to be undertaken by suitably experienced field staff in accordance with the sampling procedures outlined in this Plan.
Rinsate blank samples (where sampling equipment is reused)	Rinsate blank samples should be collected at a rate of one per day of monitoring and analysed. The concentration of CoPCs should be less than the laboratory LOR.
Trip blank samples	Trip blank samples should be submitted to the laboratory at a rate of one per batch. The concentration of BTEX and TRH C ₆ -C ₁₀ should be less than the laboratory LOR.
Trip spike samples	Trip spike samples should be submitted to the laboratory at a rate of one per batch. The concentration of BTEXN should be with 70 to 130% recovery rates.
Intra- and inter-laboratory duplicates	Intra- and inter-laboratory duplicates are to be collected and analysed at a rate of 1 in 10 primary samples. The relative percentage differences (RPDs) are to be calculated for all primary and field duplicate pairs and will be considered acceptable based on the following RPD limits: – 200% for concentrations within 1 to 10 times the analyte LOR. – 50% for concentrations within 10 to 30 times the analyte LOR. – 30% for concentrations greater than 30 times the analyte LOR.
Laboratory QA/QC	
Laboratory duplicates	Laboratory duplicate sample RPDs are to be less than: – 20% for high level concentrations (i.e. greater than 20 times the analyte LOR). – 50% for medium level concentrations (i.e. between 10 and 20 times the analyte LOR).
Matrix spikes	Matrix spike recoveries are to be in the range of 70 to 130% of the theoretical recovery or as nominated in the laboratory's QC report.
Method blanks	Method blank samples are to have a concentration less than the laboratory LOR.
Laboratory control samples	The recovery of laboratory control samples are to be within the laboratories' specified range for the particular analyte or analytical suite.

Where QA/QC performance fails the nominated criteria, the following contingency protocols will be adopted:

- The scale of QA/QC exceedance will be evaluated qualitatively to determine if the exceedance has the potential to alter the overall assessment outcome, including consideration of the entire assessment dataset and available lines of evidence
- If the overall assessment outcome is found to be affected, factors attributing to the failure will be examined (such as sample heterogeneity, sample handling errors), to determine if refinement of the sampling methodology and handling process is required
- If the exceedance is a result of sampling or analysis error, the need for re-sampling will then be assessed and samples will be re-collected if necessary.

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5. Details of baseline data

5.1 Surface water

The majority of surface water sampling locations were relocated following the March 2021 event, and eighteen months of baseline data were subsequently collected from the new locations prior to the construction of the M12 Motorway. Therefore, previous baseline data from events prior to April 2021 have been removed from the data assessment. This was considered appropriate to enable an accurate depiction of the sampling locations moving forward while still providing sufficient data to inform future events. An additional location (BADMS) was added to the current sampling program in October 2021, which is closer to the M12 project alignment to allow more representative sampling of Badgerys Creek.

The Central and Western M12 Motorway construction contractors took possession of the site in August 2022, which triggered the transition into the construction phase of the surface water monitoring program for the Central and Western portions of the site. The Eastern portion construction contractors took possession in July 2023 which triggered the transition into the construction phase of the surface water monitoring program for the Eastern portion. It is noted that although possession occurred in July 2023 for some early low impact work, the official construction start was in August 2023.

The Central and Western packages baseline data covers:

- April 2021 to July 2022

The Eastern Package baseline data covers:

- April 2021 to June 2023

The surface water baseline field parameters are provided in Table B1, Appendix B. The surface water baseline analytical results are provided in Table B2, Appendix B.

To produce surface water baseline values, GHD have calculated the 80th percentile guideline value and 20th percentile values for parameters where low values may be a problem. These percentiles are included in Appendix C.

5.2 Groundwater

The baseline data collected for groundwater started in July 2019 and went through to July 2022 for both the central and western packages (there are no monitoring wells within the Eastern package). Groundwater quality parameters measured in the field during the baseline monitoring period are summarised in Table B3, Appendix B and the baseline analytical results for the baseline monitoring period are summarised in Table B4, Appendix B.

To produce groundwater baseline values, GHD have calculated the 80th percentile guideline value and 20th percentile values for parameters where low values may be a problem. These percentiles are included in Appendix C.

6. Data assessment and reporting requirements

6.1 Data assessment

The purpose of this monitoring program is to implement an environmental management measure to allow the observation of any changes in surface water and groundwater quality that may be attributable to the project, assess the project's performance against the agreed water quality objectives (see Section 3.2), and inform appropriate management responses (if required).

As part of this assessment, the results are to be compared to the calculated 20th and 80th percentiles from the baseline assessment. Summary statistics of field parameters and certain analytes for all available routine monitoring events during the baseline monitoring period have been calculated for all sampling locations and are provided in Appendix C. These summary statistics include the 20th and 80th percentile concentrations of pH, electrical conductivity, and dissolved oxygen, which can be used to define site-specific conditions during the baseline and operational phases of the works. The 20th percentile concentrations have also been included for these field parameters, as declining values in the operational period compared to the baseline period may indicate a risk to receptors. Not all analytes have 80th percentiles if the results have mostly less than the laboratory's limit of detection.

These summary statistics are presented in Appendix C, which presents the number of samples collected that create the percentiles.

Comparison against the adopted assessment criteria is also undertaken to ensure the project is meeting the agreed water quality objectives.

6.2 Reporting

At the end of six months and then twelve months of data collection, the recent data set will be reviewed and compared against the baseline data set, and a separate surface water monitoring report and groundwater monitoring report will be prepared.

As a minimum, the six monthly surface water and groundwater monitoring reports will include the following:

- Introduction and background
- Basis of assessment
- Field observations and field measured parameters
- Gauged groundwater levels and groundwater levels from dataloggers
- Comparison against the baseline percentiles
- A QA/QC assessment and evaluation.
- Data interpretation, including graphs presenting the field parameters at each location since the beginning of the monitoring program and Box and whisker plots have been created for selected field parameters.
- Conclusions and recommendations
- Figures showing the sampling sites
- Results tables with adopted assessment criteria
- Field sheets, field equipment calibration sheets
- Laboratory analysis certificate

7. Review and closure of the monitoring program

The operational data will be reviewed after the first six months of monitoring. The report will assess operational monitoring data in comparison to the baseline and consider whether the affected waterways have been rehabilitated to an acceptable condition and/or whether the permanent water quality structures are operating satisfactorily.

If it is deemed to have met all project requirements, the report will include certification by a suitably qualified and experienced independent expert and will be submitted to the Department of Planning, Housing, and Infrastructure to recommend that monitoring be ceased. If not, then the project will continue for another six months, closing out any recommendations from the report.

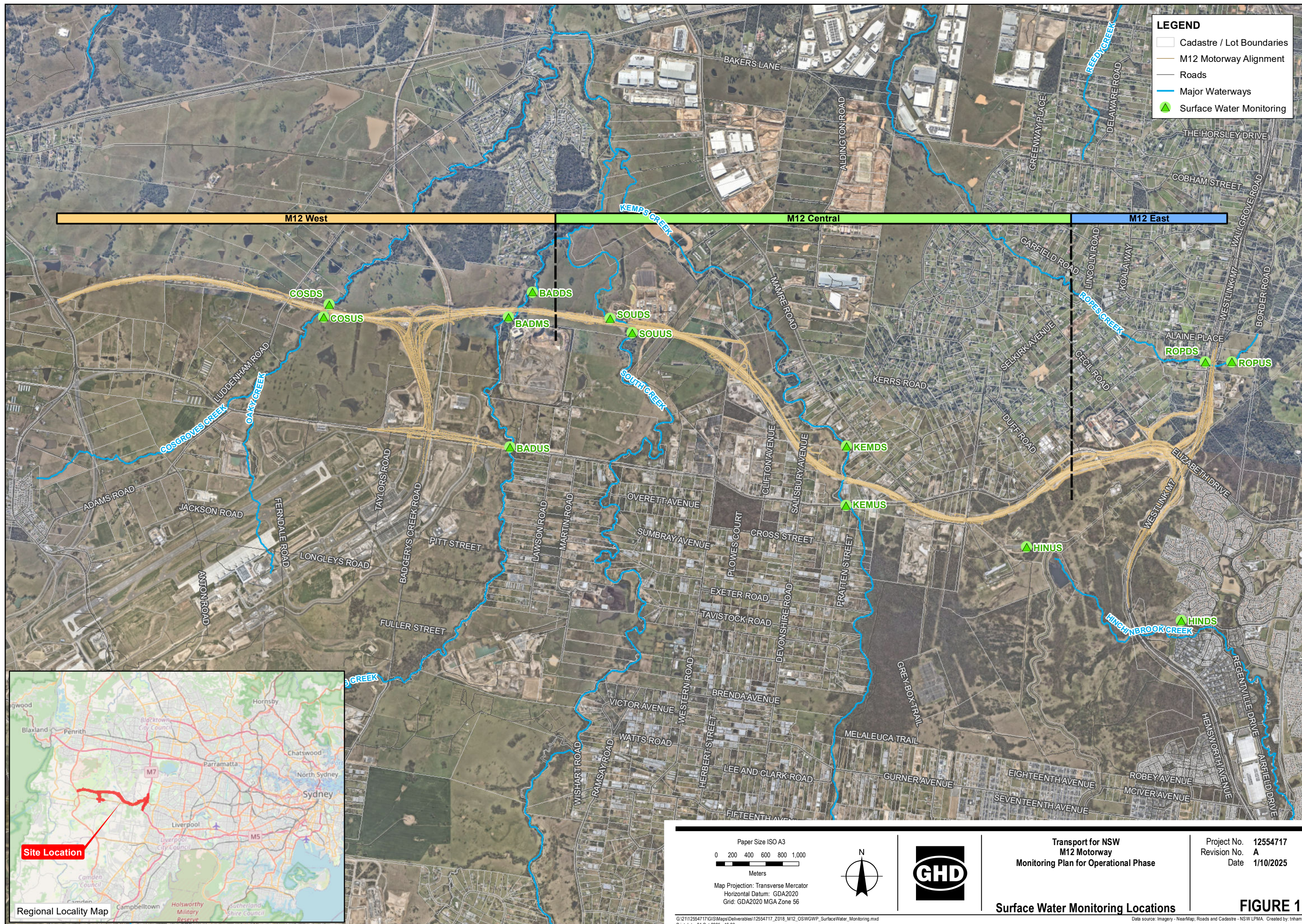
8. References

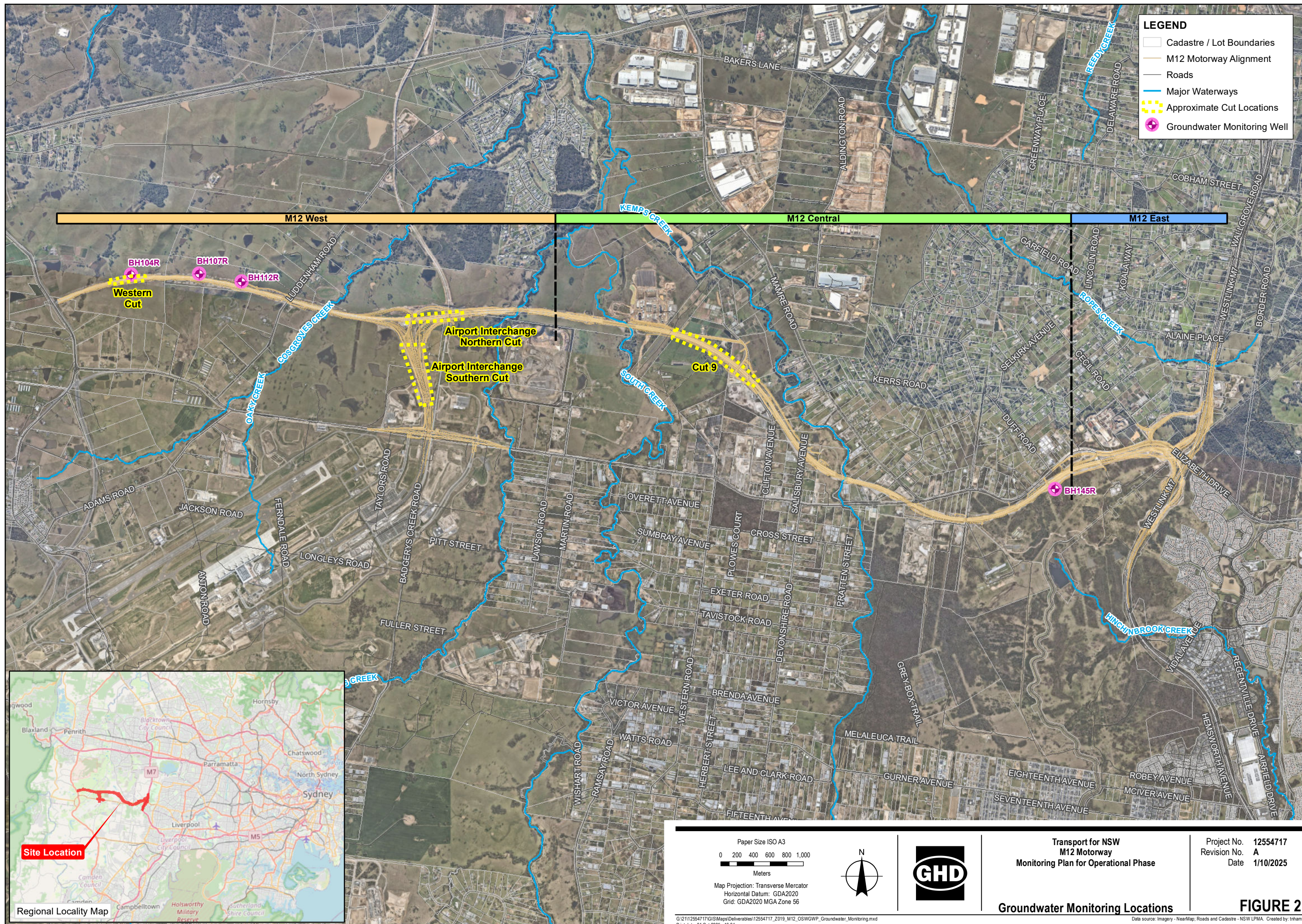
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Appendices

Appendix A

Figures





Appendix B

Baseline field parameters and analytical results

Table B1 Baseline surface Water field parameters

Package	Location	Sampling Event	Sample date	Dissolved oxygen (mg/L)	Dissolved Oxygen (%S)	Electrical conductivity (µS/cm)	pH (pH units)	Redox potential (mV)	Corrected redox potential (mV)*	Temperature (°C)	Turbidity (NTU)	Observations
West	BADDs	Event 25 - April 2021	08/04/2021	3.44	37.1	882	7.68	156.4	361.4	19.1	48.55	Brown
West	BADDs	Event 27 - June 2021	10/06/2021	7.71	65.3	686	7.1	93.2	298.2	8.1	7.7	Turbid, brown
West	BADDs	Event 28 - July 2021	09/07/2021	7.2	61.5	432.7	10	90.7	295.7	8.5	25.3	Clear
West	BADDs	Event 29 - August 2021	13/08/2021	6.78	59.6	610	7.41	54.8	259.8	9.7	17.95	Brown
West	BADDs	WW Event 1 - 25 August 2021	25/08/2021	8.6	77.2	1.21	7.24	169.1	374.1	10.6		Brown
West	BADDs	Event 30 - September 2021	03/09/2021	10.8	100.4	2007	8.1	79.7	284.7	12.1	16.8	Clear
West	BADDs	Event 31 - October 2021	13/10/2021	1.81	17.9	649	7.02	145.3	350.3	14.9		Brown, turbid
West	BADDs	Event 32 - November 2021	09/11/2021	5.31	56.5	1256	7.16	68.7	273.7	18.4	13.25	Cloudy pale brown, Moderate turbidity
West	BADDs	WW Event 2 - 29 November 2021	29/11/2021	4.31	44.9	516	7.21	109	314	17.3		Highly turbid, brown
West	BADDs	Event 33 - December 2021	07/12/2021	3.33	35.9	737	7.02	104.9	309.9	19.0	102.2	Very turbid, brown, high sediment load
West	BADDs	WW Event 3 - 14 January 2022	14/01/2022	9.4	111.0	464	7.59	76.8	281.8	23.7	294.31	Brown, murky, high sediment
West	BADDs	Event 34 - February 2022	08/02/2022	-	-	-	-	-	-	-	-	No access to sample location
West	BADDs	Event 35 - March 2022	17/03/2022	-	-	-	-	-	-	-	-	No access to sample location
West	BADDs	Event 36 - April 2022	12/04/2022	-	-	-	-	-	-	-	-	No access to sample location
West	BADDs	Event 37 - May 2022	27/05/2022	-	-	-	-	-	-	-	-	No access to sample location
West	BADDs	Event 38 - June 2022	28/06/2022	8.78	75.76	956	7.00	74.1	279.1	8.9	19.50	Yellow/brown, very cloudy
West	BADDs	WW Event 4 - 5-6 July 2022	5/07/2022	9.38	88.79	258	6.95	248.0	453.0	12.9	123.00	Brown, very cloudy, no sheen, no odour
West	BADDs	Event 39 - July 2022	21/07/2022	9.25	83.47	1164	7.04	62.3	267.3	10.8	-	Green/brown, turbid, no sheen, no odour
West	BADMS	Event 31 - October 2021	13/10/2021	4.05	39.8	685	7.19	143.5	348.5	14.6		Green, slightly turbid
West	BADMS	Event 32 - November 2021	09/11/2021	5.42	57.6	1263	7.15	74.6	279.6	18.3	11.31	Pale brown, very cloudy
West	BADMS	WW Event 2 - 29 November 2021	29/11/2021	6.24	64.9	521	7.26	112.3	317.3	17.3		Highly turbid, light brown
West	BADMS	Event 33 - December 2021	07/12/2021	5.76	61.9	766	7.13	106.2	311.2	18.9	97.95	Very turbid, brown, high sediment load
West	BADMS	WW Event 3 - 14 January 2022	14/01/2022	8	95.2	489.7	7.97	70.4	275.4	24.1	230.56	Brown, turbid
West	BADMS	Event 34 - February 2022	08/02/2022	-	-	-	-	-	-	-	-	No access to sample location
West	BADMS	Event 35 - March 2022	17/03/2022	-	-	-	-	-	-	-	-	No access to sample location
West	BADMS	Event 36 - April 2022	12/04/2022	-	-	-	-	-	-	-	-	No access to sample location
West	BADMS	Event 37 - May 2022	27/05/2022	-	-	-	-	-	-	-	-	No access to sample location
West	BADMS	Event 38 - June 2022	28/06/2022	7.73	67.2	1108	6.86	70.2	275.2	9.2	11.1	Brown, very cloudy
West	BADMS	WW Event 4 - 5-6 July 2022	5/07/2022	9.59	90.4	247	7.07	239	444	12.7	484	Brown, very cloudy, no sheen, no odour
West	BADMS	Event 39 - July 2022	21/07/2022	9.73	87.6	1079	7.03	122	327	10.7	78.85	Green/brown, turbid, no sheen, no odour
West	BADUS	Event 25 - April 2021	07/04/2021	4.23	46.1	809	8.04	21.33	226.33	19.6	21.33	Brown
West	BADUS	Event 26 - May 2021	10/05/2021	5.13	52.4	1388	7.24	132.3	337.3	16.4	90.1	Brown
West	BADUS	Event 27 - June 2021	10/06/2021	6.05	51.3	928	7.23	92	297	8.2	13.5	Turbid, brown
West	BADUS	Event 28 - July 2021	09/07/2021	8.21	72.5	417.3	9.65	104.3	309.3	9.9	9.49	Turbid, brown
West	BADUS	Event 29 - August 2021	12/08/2021	11.76	118.1	675	7.69	101.4	306.4	15.6	6.96	Slightly green
West	BADUS	WW Event 1 - 25 August 2021	25/08/2021	7.19	63.7	1471	7.21	141.2	346.2	10.0		Brown
West	BADUS	Event 30 - September 2021	03/09/2021	10.1	94.5	1057	7.75	119.1	324.1	12.4	28.9	Green to brown tinge
West	BADUS	Event 31 - October 2021	13/10/2021	2.97	29.4	1081	8.99	-75.4	129.6	15.0		Green, sooty, high turbidity
West	BADUS	Event 32 - November 2021	09/11/2021	5.02	53.2	1254	7.14	144.2	349.2	18.2	12.22	Turbid, brown, high sediment
West	BADUS	WW Event 2 - 29 November 2021	29/11/2021	5.99	63.4	516	7.26	60.1	265.1	18.1		Highly turbid, brown
West	BADUS	Event 33 - December 2021	07/12/2021	3.51	39.7	912	7.12	126.1	331.1	21.4	65.6	Brown, turbid, low sediment
West	BADUS	WW Event 3 - 14 January 2022	14/01/2022	9.24	109.6	440.7	7.58	111	316	23.9	322	Brown, murky, high sediment
West	BADUS	Event 34 - February 2022	08/02/2022	6.66	77.6	1546	7.15	111.2	316.2	23.0	24.15	Brown, murky, high sediment
West	BADUS	Event 35 - March 2022	17/03/2022	2.01	22.1	834	7.79	110.9	315.9	20.1	7.72	Green, brown water, moderatley turbid
West	BADUS	Event 36 - April 2022	12/04/2022	6.45	71.5	514	7.13	77.9	282.9	20.4	189.8	Light brown, turbid, no odour, no sheen
West	BADUS	Event 37 - May 2022	27/05/2022	9.62	92.7	983	7.1	101.9	306.9	13.7	15.19	Brown, cloudy, no odour, no sheen
West	BADUS	Event 38 - June 2022	28/06/2022	12.6	112.9	2253	7.27	144	349	10.5	8.6	Brown/green colour
West	BADUS	WW Event 4 - 5-6 July 2022	5/07/2022	9.57	90.0	128.4	7	142	347	12.6	945	
West	BADUS	Event 39 - July 2022	21/07/2022	9.82	88.0	1280	6.9	132	337	10.5	36.45	
West	COSDS	Event 25 - April 2021	08/04/2021	6.7	73.7	494	8.72	85	290	20.0	85.21	Brown
West	COSDS	Event 26 - May 2021	10/05/2021	6.33	64.4	645	7.49	105.6	310.6	16.2	125.3	Light brown
West	COSDS	Event 27 - June 2021	10/06/2021	9.68	84.1	590	7.31	50.5	255.5	9.2	45.7	Turbid, brown
West	COSDS	Event 28 - July 2021	09/07/2021	8.1	68.6	826	10.3	107.6	312.6	8.1	27.1	Brown
West	COSDS	Event 29 - August 2021	12/08/2021	11.61	105.5	1448	7.75	95.9	300.9	11.1	6.6	Clear
West	COSDS	WW Event 1 - 25 August 2021	25/08/2021	8.3	74.7	489.5	7.46	1480	1685	10.7		Brown
West	COSDS	Event 30 - September 2021	03/09/2021	9.46	94.2	1293	8.26	93.3	298.3	15.2	23.8	Green tinge
West	COSDS	Event 31 - October 2021	13/10/2021	7.1	69.9	1154	6.46	-20.2	184.8	14.7	-	Green/brown, turbid
West	COSDS	Event 32 - November 2021	09/11/2021	7.04	74.0	905	7.34	83	288	17.8	152.39	Pale brown, high turbidity
West	COSDS	WW Event 2 - 29 November 2021	29/11/2021	6.06	63.2	555	7.2	83.7	288.7	17.4		Very turbid, light brown
West	COSDS	Event 33 - December 2021	07/12/2021	5.92	65.0	738	7.27	117.9	322.9	19.9	63.53	Brown, turbid, high sediment load
West	COSDS	WW Event 3 - 14 January 2022	14/01/2022	10.89	129.1	485.4	7.75	88.7	293.7	23.9	234.17	Brown, turbid, high sediment load
West	COSDS	Event 34 - February 2022	08/02/2022	6.28	68.8	1028	7.27	132.9	337.9	19.8	11.35	Green tinge, low sediment
West	COSDS	Event 35 - March 2022	17/03/2022	2.07	22.4	586	7.87	97.7	302.7	19.2	29.67	Brown water, no odour or sheen, moderatley turbid
West	COSDS	Event 36 - April 2022	12/04/2022	-	-	-	-	-	-	-	-	No access to sample location
West	COSDS	Event 37 - May 2022	27/05/2022	9.55	92.42	671	7.29	76.3	281.3	13.9	23.43	Brown, very cloudy, no sheen, no odour
West	COSDS	Event 38 - June 2022	28/06/2022	8.04	69.21	1413	7.24	177.0	382.0	8.8	15.14	Yellow/green/brown, very cloudy
West	COSDS	WW Event 4 - 5-6 July 2022	5/07/2022	9.86	92.92	133	7.20	133.0	338.0	12.7	421.00	
West	COSDS	Event 39 - July 2022	21/07/2022	10.19	91.96	605	6.76	103.2	308.2	10.8	38.73	Green/brown, turbid, no sheen, no odour
West	COSUS	Event 25 - April 2021	08/04/2021	5.88	64.9	473.9	7.77	125.4	330.4	20.2	75.04	Brown
West	COSUS	Event 26 - May 2021	10/05/2021	6.42	65.4	674	7.41	158.7	363.7	16.3	135.28	Turbid, brown
West	COSUS	Event 27 - June 2021	10/06/2021	9.93	87.3	602	7.55	69.5	274.5	9.7	42.2	Turbid, brown
West	COSUS	Event 28 - July 2021	09/07/2021	7.98	68.5	895	10.12	101.8	306.8	8.7	31.58	Green
West	COSUS	Event 29 - August 2021	12/08/2021	7.91	70.7	1491	7.61	89.5	294.5	10.4	5.46	Clear
West	COSUS	WW Event 1 - 25 August 2021	25/08/2021	7.69	69.2	539	7.54	148.9	353.9	10.7		Brown
West	COSUS	Event 30 - September 2021	03/09/2021	9.29	93.5	1492	8.52	85.4	290.4	15.7	25.21	Green tinge
West	COSUS	Event 31 - October 2021	13/10/2021	5.38	53.6	981	8.67	-70.7	134.3	15.2	-	Green, turbid
West	COSUS	Event 32 - November 2021	09/11/2021	5.87	62.1	942	7.33	75.8	280.8	18.1	139.78	Pale creamy brown, very cloudy
West	COSUS	WW Event 2 - 29 November 2021	29/11/2021	4.71	49.3	580	7.57	60.8	265.8	17.6		Highly turbid, light brown
West	COSUS	Event 33 - December 2021	07/12/2021	4.3	46.8	774	7.18	96.7	301.7	19.5	51.3	Brown, very turbid, high sediment load
West	COSUS	WW Event 3 - 14 January 2022	14/01/2022	10.55	124.6	495.4	7.94	81.4	286.4	23.7	243.48	Brown, turbid, high sediment load
West	COSUS	Event 34 - February 2022	08/02/2022	3.67	40.0	927	7.09	103.1	308.1	19.6	19.23	Green tinge, no sediment
West	COSUS	Event 35 - March 2022	17/03/2022	2.14	23.5	649	7.98	87.1	292.1	19.9	44.95	Brown, turbid water, no odour or sheen, low sediment load
West	COSUS	Event 36 - April 2022	12/04/2022	-	-	-	-	-	-	-	-	No access to sample location
West	COSUS	Event 37 - May 2022	27/05/2022	8.99	87.96	692	7.27	92.2	297.2	14.4	28.52	Brown, very cloudy, no sheen, no odour
West	COSUS	Event 38 - June 2022	28/06/2022	7.02	60.14	1516	7.44	183.0	388.0	8.6	10.00	Dark green/brown, very cloudy
West	COSUS	WW Event 4 - 5-6 July 2022	5/07/2022	9.78	92.16	146	7.20	127.0	332.0	12.7	445.00	
West	COSUS	Event 39 - July 2022	21/07/2022	10.28	92.13	529	6.72	115.6	320.6	10.5	26.98	Green/grey, turbid, no sheen, no odour
East	HINDS	Event 25 - April 2021	08/04/2021	3.14	36.3	137.2	7.28	84.2	289.2	22.6	35.14	Light brown
East	HINDS	Event 26 - May 2021	10/05/2021	4.17	45.4	140.1	7.61	131.3	336.3	19.5	78.69	Clear
East	HINDS	Event 27 - June 2021	10/06/2021	6.72	59.4	127.7	8.33	50.5	255.5	9.9	30.4	Clear
East	HINDS	Event 28 - July 2021	09/07/2021	7.05	63.8	135.2	8.95	30.2	235.2	10.9	45.29	Brown

Table B1 Baseline surface Water field parameters

Package	Location	Sampling Event	Sample date	Dissolved oxygen (mg/L)	Dissolved Oxygen (%S)	Electrical conductivity (µS/cm)	pH (pH units)	Redox potential (mV)	Corrected redox potential (mV)*	Temperature (°C)	Turbidity (NTU)	Observations
East	HINDS	WW Event 1 - 25 August 2021	25/08/2021	11.1	101.6	147.8	7.67	197	402	11.4		Turbid, brown
East	HINDS	Event 30 - September 2021	03/09/2021	9.71	97.7	300.7	9.05	-4.2	200.8	15.7	20.4	Clear
East	HINDS	Event 31 - October 2021	13/10/2021	6.6	68.1	214.2	7.37	134.4	339.4	16.9	-	Brown, mostly clear
East	HINDS	Event 32 - November 2021	09/11/2021	6.64	74.6	244	7.38	14.9	219.9	21.1	11.52	Slightly cloudy, slime on surface
East	HINDS	WW Event 2 - 29 November 2021	29/11/2021	3.03	33.2	226.3	7.2	78.5	283.5	19.8		Light brown, moderate turbidity
East	HINDS	Event 33 - December 2021	07/12/2021	10.41	116.5	249.3	7.63	107.4	312.4	20.9	106.55	Slight brown tinge
East	HINDS	WW Event 3 - 14 January 2022	14/01/2022	3.93	47.1	290	8.05	-77.4	127.6	24.5		Brown
East	HINDS	Event 34 - February 2022	08/02/2022	2.6	29.0	269.4	6.98	-13	192	20.7	19.01	Green, fairly clear, no sediment
East	HINDS	Event 35 - March 2022	17/03/2022	2.47	25.5	158.1	7.94	-176.7	28.3	16.9	56.76	Fairly clear, slight brown colour
East	HINDS	Event 36 - April 2022	12/04/2022	8.50	96.45	137	7.48	55.2	260.2	21.6	80.60	Green/light brown water, low sediment, no sheen, no odour
East	HINDS	Event 37 - May 2022	27/05/2022	2.67	26.35	238	6.71	143.6	348.6	14.8	21.87	Brown, very cloudy, no sheen, no odour
East	HINDS	Event 38 - June 2022	28/06/2022	9.18	80.93	243	7.62	192.0	397.0	9.8	33.56	Brown, very cloudy
East	HINDS	WW Event 4 - 5-6 July 2022	5/07/2022	9.51	90.42	66	6.90	156.0	361.0	13.1	108.00	
East	HINDS	Event 39 - July 2022	21/07/2022	8.99	84.53	173	7.00	94.2	299.2	12.6	69.90	
East	HINDS	Event 40 - August 2022	15/08/2022	8.63	83.7	222.7	6.8	101.3	306.3	14	1908.42	Green tinge, no odour or sheen
East	HINDS	Event 41 - September 2022	20/09/2022	5.86	40.1	292.7	7.08	101.2	306.2	16.5	39	Brown, very cloudy, no sediment, no odour/sheen
East	HINDS	Event 42 - October 2022	19/10/2022	5.18	54.9	188	7.04	116.4	321.4	18.2	84.11	Pale brown, very cloudy, no sediment, no odour/sheen.
East	HINDS	WW Event 5 - 14-15 November 202	14/11/2022	6.23	74.2	358	7.63	85.4	290.4	24.1	81.6	Brown, turbid, no odour/sheen.
East	HINDS	Event 43 - December 2022	13/12/2022	10.06	118.6	279	8.01	111	316	23.6	13.37	Green-brown, very cloudy, no odour/sheen.
East	HINDS	Event 44 - January 2023	17/01/2023	8.62	106.7	272	8.18	79.7	284.7	26.2	3.8	Brown, somewhat cloudy, no odour/sheen.
East	HINDS	Event 45 - February 2023	7/02/2023	9.91	126.0	403	8.77	66.8	271.8	27.7	3.73	Pale brown tinge, mostly clear, no odour/sheen.
East	HINDS	Event 46 - March 2023	2/03/2023	9.35	114.0	585	8	-696.8	-491.8	25.4	2.19	Clear, no sediment, no odour/sheen.
East	HINDS	Event 47 - April 2023	4/04/2023	7.23	79.7	358	8	126.4	331.4	20	22.25	Brown, turbid, no odour/sheen.
East	HINDS	Event 48 - May 2023	1/05/2023	7.88	83.6	402.7	7.1	130.8	335.8	18.1	207.26	Pale yellow tinge, no odour, no sheen, scum on surface of pond.
East	HINDS	Event 49 - June 2023	6/06/2023	9.63	96.1	432	8.54	68.1	273.1	15.3	3.38	Pale yellow-tinge, mostly clear, no odour, no sheen
East	HINUS	Event 25 - April 2021	07/04/2021	3.09	34.4	133.7	7.76	-40.3	164.7	20.7	12.83	Light brown
East	HINUS	Event 26 - May 2021	10/05/2021	5.43	57.3	175.5	7.24	76.6	281.6	18.0	52.15	Clear to green
East	HINUS	Event 27 - June 2021	10/06/2021	8.48	73.2	156.1	7.78	-5.2	199.8	8.9	34	Clear
East	HINUS	Event 28 - July 2021	09/07/2021	5.23	44.3	193.1	10.46	-63.2	141.8	8.1	13.53	Clear
East	HINUS	WW Event 1 - 25 August 2021	25/08/2021	7.28	64.0	352	7.14	220	425	9.7		Turbid, brown
East	HINUS	Event 31 - October 2021	13/10/2021	3.78	38.4	311.9	6.9	104	309	16.2	-	Slight green tinge, fairly clear
East	HINUS	Event 32 - November 2021	09/11/2021	8.33	99.0	1364	7.46	59.8	264.8	24.0	27.57	Brown tinge, silty sediment
East	HINUS	WW Event 2 - 29 November 2021	29/11/2021	3.65	42.6	520	7.23	-7	198	23.1		Light brown, moderate turbidity
East	HINUS	Event 33 - December 2021	07/12/2021	7.67	85.3	515	7.02	0.1	205.1	20.6	228.79	Slight brown tinge, low sediment
East	HINUS	WW Event 3 - 14 January 2022	14/01/2022	2.13	24.9	281.6	7.19	-27.3	177.7	23.2	283.96	Brown, very turbid, muddy
East	HINUS	Event 34 - February 2022	08/02/2022	7.62	86.5	359.5	7.1	24.4	229.4	21.6	81.7	Fairly clear
East	HINUS	Event 35 - March 2022	17/03/2022	2.22	25.0	140.9	7.6	-6.9	198.1	21.3	64.42	Brown water, turbid, heavily eroded banks
East	HINUS	Event 36 - April 2022	12/04/2022	-	-	-	-	-	-	-	-	No access to sample location
East	HINUS	Event 37 - May 2022	27/05/2022	5.12	48.36	285	6.70	31.0	236.0	12.8	27.38	Dark brown, very cloudy, no sheen, no odour
East	HINUS	Event 38 - June 2022	28/06/2022	9.86	84.07	303	7.06	15.2	220.2	8.4	49.86	Brown/green, very cloudy
East	HINUS	WW Event 4 - 5-6 July 2022	5/07/2022	9.49	90.43	62	6.70	158.0	363.0	13.2	178.00	Cloudy, brown, non-transparent, no sheen, no odour
East	HINUS	Event 39 - July 2022	21/07/2022	9.80	86.40	187	6.64	55.2	260.2	9.8	1980.00	
East	HINUS	Event 40 - August 2022	15/08/2022	9.55	90.0	261.2	6.64	-6.2	198.8	12.7	2788.91	Green/brown, slightly turbid, no odour or sheen
East	HINUS	Event 41 - September 2022	20/09/2022	16.02	109.5	360.8	8.82	46.6	251.6	17.5	62.02	Green-brown, no sediment, very cloudy, no odour/sheen
East	HINUS	Event 42 - October 2022	19/10/2022	1.75	17.9	136.1	6.87	5.07	210.07	16.6	267.45	Pale brown, very cloudy, non-transparent, no sediment, no odour/sheen.
East	HINUS	WW Event 5 - 14-15 November 202	14/11/2022	1.13	12.7	274	6.85	-42.9	162.1	20.9	254	Green-brown, very turbid, no odour/sheen.
East	HINUS	Event 43 - December 2022	13/12/2022	15.71	189.8	248	8.89	136.8	341.8	24.9	7.72	Green-brown, turbid, no odour/sheen
East	HINUS	Event 44 - January 2023	17/01/2023	11.22	144.2	285	7.68	1.4	206.4	28.3	100.97	Green-brown, very turbid, no odour/sheen.
East	HINUS	Event 45 - February 2023	7/02/2023	7.33	90.7	433	7.42	46.7	251.7	26.2	40.61	Green-brown, turbid, no odour/sheen.
East	HINUS	Event 46 - March 2023	2/03/2023	8.38	104.8	703	7.95	272.6	477.6	26.8	3.92	Clear, no sediment, no odour/sheen.
East	HINUS	Event 47 - April 2023	4/04/2023	12.58	151.4	471.4	9.08	110.1	315.1	24.4	63.52	Green-brown, turbid, no odour/sheen.
East	HINUS	Event 48 - May 2023	1/05/2023	6.49	67.1	466	6.98	117.4	322.4	16.9	75.07	Pale yellow tinge, no odour, no sheen.
East	HINUS	Event 49 - June 2023	6/06/2023	9.75	96.5	604	8.54	8.7	213.7	15.2	91.81	Pale yellow-tinge, no odour, no sheen, no sediment
Central	KEMDS	Event 25 - April 2021	08/04/2021	0.5	5.3	225.2	6.88	-72.4	132.6	18.4	32.54	Brown
Central	KEMDS	Event 26 - May 2021	10/05/2021	8.8	87.2	218.5	6.82	-120.3	84.7	15.0	28.53	Turbid
Central	KEMDS	Event 27 - June 2021	10/06/2021	1.04	8.5	187.6	6.83	110.3	315.3	6.9	11	Clear
Central	KEMDS	Event 28 - July 2021	09/07/2021	0.52	4.5	170.5	9.09	-73.6	131.4	8.7	41.5	Clear
Central	KEMDS	WW Event 1 - 25 August 2021	25/08/2021	2.9	26.8	176.4	7.39	143.9	348.9	11.8		
Central	KEMDS	Event 30 - September 2021	03/09/2021	0.8	7.7	174	6.83	89.1	294.1	13.6	35.1	Organic odour
Central	KEMDS	Event 31 - October 2021	13/10/2021	0.26	2.5	148.5	9.69	159.9	364.9	14.5		Green tinge
Central	KEMDS	Event 32 - November 2021	09/11/2021	5.69	60.3	1181	7.36	78	283	18.2	22.6	Pale brown, cloudy
Central	KEMDS	WW Event 2 - 29 November 2021	29/11/2021	5.69	59.0	793	7.45	108.5	313.5	17.1		Highly turbid, Small foam patches, brown
Central	KEMDS	Event 33 - December 2021	07/12/2021	5.8	63.9	1634	7.3	126.3	331.3	20.1	14.61	Brown, turbid, low sediment
Central	KEMDS	WW Event 3 - 14 January 2022	14/01/2022	8.29	97.0	523	7.68	122	327	23.2	64.33	Brown, turbid
Central	KEMDS	Event 34 - February 2022	08/02/2022	5.86	65.3	2481	7.39	134.7	339.7	20.7	4.9	Brown, turbid
Central	KEMDS	Event 35 - March 2022	17/03/2022	1.9	20.8	1118	7.9	109.4	314.4	19.7	13.39	Brown, turbid, no odour or sheen
Central	KEMDS	Event 36 - April 2022	12/04/2022	-	-	-	-	-	-	-	-	No access to sample location
Central	KEMDS	Event 37 - May 2022	27/05/2022	8.18	79.51	1144	7.24	117.0	322.0	14.1	4.27	Brown, very cloudy, no sheen, no odour
Central	KEMDS	Event 38 - June 2022	28/06/2022	10.34	89.65	2322	7.52	149.0	354.0	9.1	1.63	Dark green/brown
Central	KEMDS	WW Event 4 - 5-6 July 2022	5/07/2022	9.16	86.71	161	7.17	144.0	349.0	12.9	213.00	
Central	KEMDS	Event 39 - July 2022	21/07/2022	9.60	84.43	1466	7.02	118.3	323.3	9.7	19.25	
Central	KEMUS	Event 25 - April 2021	7/04/2021	4.09	44.60991809	1726	7.49	135.6	340.6	19.6	8.06	Clear
Central	KEMUS	Event 26 - May 2021	10/05/2021	4.94	51	885	7.41	128.6	333.6	16.9	123.25	Brown, organic odour
Central	KEMUS	Event 27 - June 2021	10/06/2021	7.2	61.38721968	1996	7.29	120.4	325.4	8.4	2.8	Clear
Central	KEMUS	Event 28 - July 2021	9/07/2021	6.79	57.8	1230	9.96	60.4	265.4	8.3	12.5	Clear
Central	KEMUS	WW Event 1 - 25 August 2021	25/08/2021	10.69	94.01938654	477	7.1	175.4	380.4	9.7		Turbid, brown
Central	KEMUS	Event 30 - September 2021	3/09/2021	6.54	60.25236493	1207	7.8	56.9	261.9	11.7	38.4	Clear
Central	KEMUS	Event 31 - October 2021	13/10/2021	3.4	33.6	1801	7.37	131.6	336.6	14.8	-	Brown/green colour
Central	KEMUS	Event 32 - November 2021	9/11/2021	0.8	8.5	141.9	6.5	-81.1	123.9	18.1	148.5	Duck weed, pale brown, murky
Central	KEMUS	WW Event 2 - 29 November 2021	29/11/2021	5.03	52.8	838	7.54	60.3	265.3	17.7		Highly turbid, Brown
Central	KEMUS	Event 33 - December 2021	7/12/2021	5.26	57.4	1644	7.15	96.4	301.4	19.6	13.99	Brown, fairly turbid
Central	KEMUS	WW Event 3 - 14 January 2022	14/01/2022	8.12	93.9	487.2	7.36	59.9	264.9	22.6	69.05	Brown, very turbid, high sediment load, foamy sheen
Central	KEMUS	Event 34 - February 2022	8/02/2022	5.16	56.7	2286	7.4	100.2	305.2	20	5.84	Clear, slight green tinge
Central	KEMUS	Event 35 - March 2022	17/03/2022	2.27	24.31	1077	7.62	74.2	279.2	18.7	17.22	Brown, turbid, no odour or sheen
Central	KEMUS	Event 36 - April 2022	12/04/2022	6.67	73.18811741	768	7.32	55.2	260.2	19.9	38	Yellow tinge/clear, no sediment, no sheen, no odour
Central	KEMUS	Event 37 - May 2022	27/05/2022	8.24	79.21996521	1146	7.17	76.7	281.7	13.6	5.12	Dark brown/green, very cloudy, no sheen, no odour
Central	KEMUS	Event 38 - June 2022	28/06/2022	10.41	90.26137628	2100	7.53	143	348	9.1	1.45	Dark green/brown, cloudy
Central	KEMUS	WW Event 4 - 5-6 July 2022	5/07/2022	7.08	67.46728113	229	7.01	172	377	13.2	203	Cloudy, brown, non-transparent, no sheen, no odour
Central	KEMUS	Event 39 - July 2022	21/07/2022	9.8	86.59918177	1532	7	104	309	9.9	17	
East	ROPDS	Event 25 - April 2021	07/04/2021	6.97	76.9	6757	7.01	80.9	285.9	20.2	12.8	Brown
East	ROPDS	Event 26 - May 2021	10/05/2021	4.55	46.3	2410	7.38	142.5	347.5	16.2	112.33	Clear, biological sheen

Table B1 Baseline surface Water field parameters

Package	Location	Sampling Event	Sample date	Dissolved oxygen (mg/L)	Dissolved Oxygen (%S)	Electrical conductivity (µS/cm)	pH (pH units)	Redox potential (mV)	Corrected redox potential (mV)*	Temperature (°C)	Turbidity (NTU)	Observations
East	ROPDS	Event 27 - June 2021	10/06/2021	6.97	61.3	2966	7.46	93.7	298.7	9.7	9.3	Clear
East	ROPDS	Event 28 - July 2021	10/07/2021	9.5	83.4	4093	9.56	84.4	289.4	9.6	282.7	Clear to brown
East	ROPDS	WW Event 1 - 25 August 2021	25/08/2021	0.75	6.9	564	7.15	148.4	353.4	11.8		Brown
East	ROPDS	Event 30 - September 2021	03/09/2021	10.48	102.1	4537	7.66	125.9	330.9	14.2	176.8	Green
East	ROPDS	Event 31 - October 2021	13/10/2021	6.46	65.3	392.2	9.63	48.7	253.7	15.9	-	Biological sheen, grey tinge
East	ROPDS	Event 32 - November 2021	09/11/2021	8.77	91.5	696	7.34	92.1	297.1	17.4	20.46	Green tinge, heavy algae
East	ROPDS	WW Event 2 - 29 November 2021	29/11/2021	5.45	57.1	807	7.75	97.1	302.1	17.6		Light brown, slightly turbid, light sheen (potentially organic)
East	ROPDS	Event 33 - December 2021	07/12/2021	2.93	31.6	5336	7.07	100.7	305.7	19.0	17.73	Brown tinge, fairly clear
East	ROPDS	WW Event 3 - 14 January 2022	14/01/2022	9.07	103.9	330.8	8.11	52.6	257.6	22.1	33.4	Brown, swampy odour, foamy sheen
East	ROPDS	Event 34 - February 2022	08/02/2022	4.26	45.3	980	7.36	13.2	218.2	18.3	42.2	Fairly clear
East	ROPDS	Event 35 - March 2022	17/03/2022	2.42	25.2	1150	7.72	44.5	249.5	17.3	2.68	Brown, low sediment
East	ROPDS	Event 36 - April 2022	12/04/2022	4.56	48.84	724	7.32	49.3	254.3	18.7	72.50	Brown, black sediment no odour, no sheen
East	ROPDS	Event 37 - May 2022	27/05/2022	1.68	16.22	2967	6.65	-23.1	181.9	13.8	0.93	Brown, cloudy, no odour, no sheen
East	ROPDS	Event 38 - June 2022	28/06/2022	9.56	84.08	5710	7.49	220.1	425.1	9.7	0.22	Brown, mostly clear
East	ROPDS	WW Event 4 - 5-6 July 2022	5/07/2022	9.82	93.99	111	7.28	134.0	339.0	13.4	111.00	
East	ROPDS	Event 39 - July 2022	21/07/2022	8.62	76.89	2943	7.09	193.4	398.4	10.3	3.36	Clear, no sheen, no odour
East	ROPDS	Event 40 - August 2022	15/08/2022	14.6	135.1	5067	7.25	111	316	11.9	6.22	Green/brown, turbid, green algae on surface, no odour or sheen
East	ROPDS	Event 41 - September 2022	21/09/2022	8.83	60.4	2735	7.74	112.9	317.9	13.5	1.43	Clear, no odour or sheen, some algae
East	ROPDS	Event 42 - October 2022	18/10/2022	7.39	75.8	3328	7.54	219.9	424.9	16.6	0.74	Brown-green, transparent, no sediment, no odour/sheen
East	ROPDS	WW Event 5 - 14-15 November 2022	14/11/2022	6.33	69.0	1044	7.73	79.2	284.2	19.6	255.09	Dark grey, turbid, no odour/sheen.
East	ROPDS	Event 43 - December 2022	13/12/2022	4.27	43.7	895	7.72	133.3	338.3	16.5	11.09	Green-brown, turbid, no odour/sheen.
East	ROPDS	Event 44 - January 2023	17/01/2023	3.35	37.4	1363	7.33	75.8	280.8	20.8	0.54	Brown, mostly clear, no odour/sheen.
East	ROPDS	Event 45 - February 2023	7/02/2023	6.07	69.4	1294	7.52	106	311	22	0.94	Brown tinge, mostly clear, black on bottom, no odour, very slight sheen.
East	ROPDS	Event 46 - March 2023	2/03/2023	5.43	61.6	2270	7.33	176.5	381.5	21.6	-1.7	Clear, slightly cloudy, no sediment, no odour/sheen.
East	ROPDS	Event 47 - April 2023	4/04/2023	6.44	69.7	1063	7.5	95	300	19.1	25.57	Slight yellow tinge, mostly clear, no odour/sheen.
East	ROPDS	Event 48 - May 2023	1/05/2023	7.82	74.3	518	7.1	122.3	327.3	13	205.29	Clear, no odour, no sheen.
East	ROPDS	Event 49 - June 2023	6/06/2023	5.97	56.9	4357	7.59	204.5	409.5	12.6	-5.2	Pale yellow tinge, slightly turbid, no odour, no sheen, no sediment
East	ROPUS	Event 25 - April 2021	7/04/2021	5.06	57.19034631	127.8	8.14	92.9	297.9	21.4	9.93	Orange to brown
East	ROPUS	Event 26 - May 2021	10/05/2021	4.28	44.72644007	135.4	7.12	130.8	335.8	17.5	89.28	Red to brown, biological sheen
East	ROPUS	Event 27 - June 2021	10/06/2021	7.15	61.69918557	108	7.71	67.1	272.1	8.9	5.3	Clear
East	ROPUS	Event 28 - July 2021	9/07/2021	8.21	73.91799434	122.7	10.66	24.3	229.3	10.7	35.3	Green
East	ROPUS	Event 32 - November 2021	9/11/2021	8.22	97.8	186.6	9.84	30.6	235.6	24.1	39.93	Turbid, brown
East	ROPUS	WW Event 2 - 29 November 2021	29/11/2021	2.8	29.8	127	6.69	80.9	285.9	18.4		Slightly turbid, light brown
East	ROPUS	Event 33 - December 2021	7/12/2021	8.75	97	175.4	8.75	24.1	229.1	20.4	28.73	Brown, fairly clear, high sediment load
East	ROPUS	WW Event 3 - 14 January 2022	14/01/2022	3.13	36.6	153.4	7.5	-107.4	97.6	23.2	1753.58	Very turbid, brown, high sediment load
East	ROPUS	Event 34 - February 2022	8/02/2022	4.09	45.1	201.1	6.74	89.6	294.6	20.2	18.33	Brown, slightly turbid
East	ROPUS	Event 35 - March 2022	17/03/2022	2.32	25.56	90.1	7.78	42.1	247.1	20.1	67.54	Brown, turbid, no odour or sheen
East	ROPUS	Event 36 - April 2022	12/04/2022	-	-	-	-	-	-	-	-	No access to sample location
East	ROPUS	Event 37 - May 2022	27/05/2022	4.82	46.74941626	142.7	6.78	-18.4	186.6	14	29.85	Brown, cloudy, no odour, no sheen
East	ROPUS	Event 38 - June 2022	28/06/2022	6.2	52.98910447	167	7.01	81.9	286.9	8.5	121.3	Green/brown, very cloudy
East	ROPUS	WW Event 4 - 5-6 July 2022	5/07/2022	8.43	80.33180507	34.5	6.69	122	327	13.2	78.3	
East	ROPUS	Event 39 - July 2022	21/07/2022	6.77	60.24689566	124.1	6.57	45.3	250.3	10.2	48.44	Grey, turbid, no sheen, no odour
East	ROPUS	Event 40 - August 2022	15/08/2022	12.61	125.3	203.7	6.94	-24.5	180.5	15.1	12515.4	Green/brown, turbid, green algae on surface, no odour or sheen
East	ROPUS	Event 41 - September 2022	21/09/2022	7.28	49.8	236.9	7.26	-45.9	159.1	16.4	95.66	Brown, cloudy, no odour or sheen, some algae
East	ROPUS	Event 42 - October 2022	19/10/2022	2.91	30.9	141.9	6.86	-12.9	192.1	18.3	113.64	Pale brown-green, very cloudy, no odour/sheen
East	ROPUS	WW Event 5 - 14-15 November 2022	15/11/2022	12.94	154.3	255	9.16	47.3	252.3	24.2	150	Pale brown tinge, mostly clear, no odour/sheen.
East	ROPUS	Event 43 - December 2022	13/12/2022	13.45	156.2	217.7	8.73	93	298	22.8	6.16	Green-brown, clear with visibly thick sediment layer on bottom, no odour/sheen.
East	ROPUS	Event 44 - January 2023	17/01/2023	10.15	118.1	218	7.57	53.2	258.2	22.9	10.86	Brown, mostly clear, no odour/sheen.
East	ROPUS	Event 45 - February 2023	7/02/2023	14.02	173.8	316.3	7.92	73.6	278.6	26.3	52.3	Brown, turbid, no odour/sheen.
East	ROPUS	Event 46 - March 2023	2/03/2023	15.2	182.3	415	7.84	-394.6	-189.6	24.5	16.82	Light brown/yellow tinge, cloudy, no sediment, no odour/sheen.
East	ROPUS	Event 47 - April 2023	4/04/2023	10.12	120.9	270	8.07	105.5	310.5	24.1	201.5	Green-brown, turbid, no odour/sheen.
East	ROPUS	Event 48 - May 2023	1/05/2023	10.52	102.3	229.5	7.02	114.6	319.6	14.1	203.08	Light brown, mostly clear, no odour, no sheen.
East	ROPUS	Event 49 - June 2023	6/06/2023	7.06	67.3	306.6	8.02	108.9	313.9	13.2	40.44	Pale yellow tinge, slightly turbid, no odour, no sheen, some sediment
Central	SOU DS	Event 25 - April 2021	08/04/2021	7.6	83.6	855	7.8	168.2	373.2	20.0	50.31	Brown
Central	SOU DS	Event 26 - May 2021	10/05/2021	5.19	53.8	988	7.17	109.3	314.3	17.1	113.55	Turbid, brown
Central	SOU DS	Event 27 - June 2021	10/06/2021	8.13	69.7	742	7.32	87.1	292.1	8.6	17	Brown
Central	SOU DS	Event 28 - July 2021	09/07/2021	6.66	57.1	1168	10.07	102.6	307.6	8.6	11	Clear
Central	SOU DS	Event 29 - August 2021	13/08/2021	2.18	20.7	1224	8.97	74.9	279.9	13.0	13.4	Green to brown
Central	SOU DS	WW Event 1 - 25 August 2021	25/08/2021	8.66	76.7	696	7.23	161.9	366.9	10.0		
Central	SOU DS	Event 30 - September 2021	03/09/2021	8.85	82.5	924	7.89	89.8	294.8	12.2	62.1	Brown
Central	SOU DS	Event 31 - October 2021	13/10/2021	6.52	65.7	1014	7.47	128.9	333.9	15.8	-	Brown, turbid
Central	SOU DS	Event 32 - November 2021	09/11/2021	5.03	53.2	888	7.21	83.3	288.3	18.1	26.81	Pale brown, cloudy, moderate turbidity
Central	SOU DS	WW Event 2 - 29 November 2021	29/11/2021	3.95	41.6	484.3	7.35	110.3	315.3	17.9		Highly turbid, light brown
Central	SOU DS	Event 33 - December 2021	07/12/2021	5.32	58.6	753	7.14	114	319	20.1	79.34	Brown, low sediment
Central	SOU DS	WW Event 3 - 14 January 2022	14/01/2022	5.34	62.8	340.2	7.28	86.2	291.2	23.5	125.74	Brown, turbid, high sediment load
Central	SOU DS	Event 34 - February 2022	08/02/2022	4.53	51.4	987	7.3	105.5	310.5	21.6	44.64	Slight green tinge, fairly clear
Central	SOU DS	Event 35 - March 2022	17/03/2022	2.26	24.8	694	8	78.3	283.3	19.8	100.87	Brown, turbid, high sediment load
Central	SOU DS	Event 36 - April 2022	12/04/2022	-	-	-	-	-	-	-	-	No access to sample location
Central	SOU DS	Event 37 - May 2022	27/05/2022	-	-	-	-	-	-	-	-	No access to sample location
Central	SOU DS	Event 38 - June 2022	28/06/2022	10.74	92.01	1084	7.26	118.9	323.9	8.6	34.45	Dark green/brown, very cloudy
Central	SOU DS	WW Event 4 - 5-6 July 2022	6/07/2022	8.80	83.67	240	7.08	222.0	427.0	13.1	355.00	
Central	SOU DS	Event 39 - July 2022	21/07/2022	11.00	99.73	870	6.78	112.3	317.3	11.0	-	Green/brown, turbid, no sheen, no odour
Central	SOU US	Event 25 - April 2021	08/04/2021	5.7	62.0	858	7.5	168.5	373.5	19.5	40.64	Brown
Central	SOU US	Event 26 - May 2021	10/05/2021	5.06	52.3	984	7.23	110.2	315.2	17	120.33	Turbid, brown
Central	SOU US	Event 27 - June 2021	10/06/2021	8.69	74.4	738	7.41	83.5	288.5	8.6	16.6	Brown
Central	SOU US	Event 28 - July 2021	09/07/2021	6.64	56.6	1161	9.98	96.6	301.6	8.4	13.26	Clear
Central	SOU US	Event 29 - August 2021	13/08/2021	2.04	18.5	1155	8.5	84.7	289.7	11	12.34	Green
Central	SOU US	WW Event 1 - 25 August 2021	25/08/2021	8.25	73.6	703	7.23	172.4	377.4	10.3		Brown
Central	SOU US	Event 30 - September 2021	03/09/2021	9.55	90.4	974	7.92	90.6	295.6	12.9	86.3	
Central	SOU US	Event 31 - October 2021	13/10/2021	5.75	58.0	1003	7.51	118.4	323.4	15.8	-	Brown, turbid
Central	SOU US	Event 32 - November 2021	09/11/2021	5.1	54.0	887	7.19	70.7	275.7	18.1	26.85	Pale brown, cloudy, moderate turbidity
Central	SOU US	WW Event 2 - 29 November 2021	29/11/2021	4.2	44.3	486	7.37	107.2	312.2	17.9		Very turbid, light brown
Central	SOU US	Event 33 - December 2021	07/12/2021	5.33	58.8	760	7.17	115.4	320.4	20.2	41.46	Brown, turbid, high sediment load
Central	SOU US	WW Event 3 - 14 January 2022	14/01/2022	6.67	78.8	344.6	7.49	77.7	282.7	23.7	155.17	Brown, turbid, high sediment load
Central	SOU US	Event 34 - February 2022	08/02/2022	5.48	61.9	994	7.41	85.9	290.9	21.4	21.63	Slightly green
Central	SOU US	Event 35 - March 2022	17/03/2022	2.21	24.2	689	7.62	82.6	287.6	19.8	83.92	Brown, turbid, high sediment load
Central	SOU US	Event 36 - April 2022	12/04/2022	-	-	-	-	-	-	-	-	No access to sample location
Central	SOU US	Event 37 - May 2022	27/05/2022	-	-	-	-	-	-	-	-	No access to sample location
Central	SOU US	Event 38 - June 2022	28/06/2022	9.90	84.00	1077	7.26	122.7	327.7	8.2	24.45	Dark green/brown, very cloudy
Central	SOU US	WW Event 4 - 5-6 July 2022	6/07/2022	8.89	84.34	240	7.09	223.0	428	13.0	366.00	Cloudy, brown, non-transparent, no sheen, no odour
Central	SOU US	Event 39 - July 2022	21/07/2022	8.64	76.71	859	6.73	99.7	304.7	10.1	-	Green/brown, turbid, no sheen, no odour

		Inorganics		Biological		Acidity & Alkalinity		Nutrients										Metals										BTEXN										TRH - NEPM 2013										TRH - NEPM 1999										TPH																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
		Total Dissolved Solids		Total Suspended Solids		E.coli		Thermotolerant (Faecal) Coliforms		Hardness as CaCO3		Hardness as CaCO3 (Filtered)		Ammonia as N		Nitrate (as N)		Nitrite (as N)		Nitrogen Total Oxidised (as N)		Nitrogen Total		Kjeldahl Nitrogen Total		Reactive Phosphorus as P		Chlorophyll a		Phosphorus Total		Arsenic		Cadmium		Chromium (III+VI)		Copper		Iron		Lead		Manganese		Mercury		Nickel		Zinc		Benzene		Toluene		Ethylbenzene		Xylene (o)		Xylene (m & p)		Xylene Total		BTEX (Sum of Total) - Lab Calc		Naphthalene (BTEXN suite)		F1 (C8-C10 minus BTEX)		C8-C10 Fraction		F2 (>C10-C16 minus Naphthalene)		>C10-C16 Fraction		F3 (>C16-C34 Fraction)		F4 (>C34-C40 Fraction)		>C10-C40 (Sum of Total)		C8-C9 Fraction		C10-C14 Fraction		C15-C28 Fraction		C29-C38 Fraction		C10-C38 (Sum of Total)		Oil & Grease																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
		mg/L	mg/L	orgs/100mL	orgs/100mL	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	

				Inorganics		Biological		Acidity & Alkalinity		Nutrients						Metals										BTEXN					TRH - NEPM 2013										TRH - NEPM 1999					TPH				
				Total Dissolved Solids	Total Suspended Solids	E.coli	Thermotolerant (Fecal) Coliforms	Hardness as CaCO3	Hardness as CaCO3 (Filtered)	Ammonia as N	Nitrate (as N)	Nitrite (as N)	Nitrogen (Total Oxidised) (as N)	Nitrogen (Total)	Kjeldahl Nitrogen Total	Reactive Phosphorus as P	Chlorophyll a	Phosphorus (Total)	Arsenic	Cadmium	Chromium (II+VI)	Copper	Iron	Lead	Manganese	Mercury	Nickel	Zinc	Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	BTEX (Sum of Total) - Lab Calc	Naphthalene (BTEXN suite)	F1 (C6-C10 minus BTEX)	F2 (>C10-C16 minus Naphthalene)	>C10-C16 Fraction	F3 (C16-C34 Fraction)	F4 (C34-C46 Fraction)	>C10-C40 (Sum of Total)	C6-C9 Fraction	C10-C14 Fraction	C15-C28 Fraction	C29-C36 Fraction	C10-C36 (Sum of Total)	Oil & Grease		
				mg/L	mg/L	orgs/100mL	orgs/100mL	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L		
EQL				10	5	1	1	1	1	0.01	0.01	0.01	0.01	0.1	0.01	0.01	1	0.01	0.001	0.0001	0.001	0.001	0.05	0.001	0.001	0.001	0.005	1	2	2	2	2	2	2	1	5	20	20	100	100	100	100	100	100	20	50	100	50	50	5000
ADWG 2011 Health (v3.7 updated 2022)																																																		
ANZECC 2000 - Lowland Rivers (NSW coastal rivers)				6						0.01166 ^{#3}			0.04	0.35		0.008	0.003	0.025																																
ANZECC 2000 - Stock Watering				5000 ^{#4}			100				90 ^{#5}	9.1 ^{#6}							0.5	0.01	1	1 ^{#7}		0.1		0.002	1	20																						
ANZG (2018) - FW - 95% (updated 26 July 2021)										0.9 ^{#8}	2.4 ^{#9}							0.013 ^{#10}	0.0002	0.001 ^{#11}	0.0014		0.0034	1.9	0.0006	0.011	0.008	950	180	80	350		16																	
Package	Location Code	Sample Date	Field ID	Lab Report Number	245	5	-	-	64	-	0.02	0.04	<0.01	0.04	1.2	1.2	<0.01	25	0.08	<0.001	<0.0001	<0.001	<0.001	0.52	<0.001	0.191	<0.0001	0.002	<0.005	<1	<2	<2	<2	<2	<2	<1	-	-	-	-	-	-	-	-	-	-	<5000			
HINUS	1/05/2023	HINDS	ES2314384	235	16	-	-	-	-	-	0.01	<0.01	<0.01	1.9	1.9	<0.01	27	0.15	0.001	<0.0001	<0.001	<0.001	1.32	<0.001	0.609	<0.0001	<0.001	<0.005	<1	<2	<2	<2	<2	<2	<1	-	-	-	-	-	-	-	-	-	-	<5000				
	6/06/2023	HINDS	ES2319028	244	7	-	-	-	-	-	0.02	0.01	<0.01	0.01	1	1	<0.01	48	0.05	<0.001	<0.0001	<0.001	<0.001	0.86	<0.001	0.279	<0.0001	0.001	0.005	<1	<2	<2	<2	<2	<2	<1	-	-	-	-	-	-	-	-	-	<5000				
	7/04/2021	HINUS	ES2112843	97	39	-	-	-	-	21	0.02	<0.01	<0.01	1.4	1.4	<0.01	2	0.08	<0.001	<0.0001	<0.001	0.003	3.06	<0.001	0.342	<0.0001	<0.001	<0.005	<1	<2	<2	<2	<2	<2	<2	<1	<5	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<5000	
	10/05/2021	HINUS	ES2117470	134	<5	-	-	-	-	26	0.06	0.02	<0.01	0.02	1.3	1.3	<0.01	12	0.09	<0.001	<0.0001	<0.001	<0.001	4.48	<0.001	0.164	<0.0001	0.001	<0.005	<1	<2	<2	<2	<2	<2	<1	<5	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<5000	
	10/06/2021	HINUS	ES2121872	146	8	-	-	-	-	30	0.02	0.04	<0.01	0.04	0.9	0.9	<0.01	3	0.04	<0.001	<0.0001	<0.001	<0.001	3.38	<0.001	0.036	<0.0001	<0.001	<0.005	<1	<2	<2	<2	<2	<2	<1	<5	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<5000	
	9/07/2021	HINUS	ES2125418	130	<5	-	-	-	-	34	<0.01	<0.01	<0.01	<0.01	0.9	0.9	<0.01	<1	<0.02	<0.001	<0.0001	<0.001	<0.001	2	<0.001	0.055	<0.0001	<0.001	<0.005	<1	<2	<2	<2	<2	<2	<1	<5	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<5000	
	13/10/2021	HINUS	ES2136906	215	8	-	-	-	-	-	0.04	0.01	<0.01	0.01	1.5	1.5	<0.01	5	0.06	<0.001	<0.0001	<0.001	<0.001	2.11	<0.001	0.333	<0.0001	<0.001	<0.005	<1	<2	<2	<2	<2	<2	<1	<5	-	-	-	-	-	-	-	-	-	<5000			
	8/11/2021	HINUS	ES2140337	260	235	-	-	-	-	-	0.06	<0.01	<0.01	<0.01	3.5	3.5	<0.01	28	0.35	0.002	<0.0001	0.002	0.008	6.73	0.004	0.347	<0.0001	0.215	0.09	<1	<2	<2	<2	<2	<2	<1	<5	-	-	-	-	-	-	-	-	-	<5000			
	7/12/2021	SWDUP2	849475	-	-	-	-	-	-	-	-	<0.01	<0.01	<0.01	-	-	-	-	-	0.001	<0.0002	0.001	0.003	-	0.001	-	<0.0001	0.002	0.008	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<5000	
	7/12/2021	HINUS	ES2144579	328	7	-	18 ^{#3}	18 ^{#3}	-	-	0.01	<0.01	<0.01	<0.01	1.3	1.3	<0.01	18	0.08	<0.001	<0.0001	0.001	<0.001	2.79	<0.001	0.314	<0.0001	0.001	<0.005	<1	<2	<2	<2	<2	<2	<1	<5	-	-	-	-	-	-	-	-	-	<5000			
	8/02/2022	HINUS	ES2204223	264	<5	-	-	-	-	-	0.01	<0.01	<0.01	<0.01	0.9	0.9	<0.01	-	0.04	<0.001	<0.0001	<0.001	<0.001	2.32	<0.001	0.094	<0.0001	<0.001	<0.005	<1	<2	<2	<2	<2	<2	<1	<5	-	-	-	-	-	-	-	-	-	<5000			
	17/03/2022	SWDUP2	873124	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.002	<0.0002	0.004	0.007	-	0.003	-	<0.0001	0.004	0.032	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<5000	
	17/03/2022	HINUS	ES2209565	98	7	-	-	-	-	-	0.02	<0.01	<0.01	<0.01	1.4	1.4	<0.01	8	0.11	0.002	<0.0001	0.002	0.004	3.4	<0.001	0.116	<0.0001	0.002	0.006	<1	<2	<2	<2	<2	<2	<1	<5	-	-	-	-	-	-	-	-	-	-	<5000		
	27/05/2022	HINUS	ES2218614	299	8	-	-	-	-	-	0.08	0.24	0.03	0.27	1.5	1.2	<0.01	10	0.09	0.001	<0.0001	0.003	0.005	2.08	0.001	0.067	<0.0001	0.002	0.015	<1	<2	<2	<2	<2	<2	<1	<5	-	-	-	-	-	-	-	-	-	<5000			
	28/06/2022	HINUS	ES2222658	286	<5	-	-	-	-	-	0.03	0.04	<0.01	0.04	0.7	0.7	<0.01	1	0.03	<0.001	<0.0001	0.001	0.002	1.86	<0.001	0.035	<0.0001	<0.001	<0.005	<1	<2	<2	<2	<2	<2	<1	<5	-	-	-	-	-	-	-	-	-	<5000			
	20/07/2022	HINUS	ES2225657	261	35	-	-	-	-	-	0.1	0.18	<0.01	0.18	1.5	1.3	<0.01	6	0.14	0.002	<0.0001	0.005	0.007	5.5	0.003	0.109	<0.0001	0.004	0.012	<1	<2	<2	<2	<2	<2	<1	<5	-	-	-	-	-	-	-	-	-	<5000			
	15/08/2022	HINUS	ES2229050	248	5	-	-	-	-	-	0.06	0.12	<0.01	0.12	1.5	1.4	<0.01	2	0.14	0.001	<0.0001</																													

3 of 12

4 of 12

6 of 12

					OP Pesticides																																				Pesticides																
					Bensulide	Natfalofo	Azinphos methyl	Boislar (Sulprobo)	Bromophos ethyl	Carbophenothion	Azinphos Ethyl	Chlorfenvinphos	Chlorpyrifos	Chlorpyrifos-methyl	Coumaphos	Demeton-O	Demeton-S	Demeton-S-methyl	Diazinon	Dichlorvos	Dimethoate	Disulfoton	EPN	Ethion	Ethoprop	Fenamiphos	Fenitrothion	Fen硫硫硫	Fen硫硫	Malathion	Methidathion	Methyl parathion	Mevinphos (Phosdrin)	Monocrotophos	Onehoate	Parathion	Phorate	Pirimphos-ethyl	Pirimphos-methyl	Profenofos	Prothiofos	Pyrazophos	Ronnel	Sulfotep	Terbufos	Thiometon	Trichlorate	Tetrachlorvinphos	Acaphate	Demeton-O & Demeton-S	Formothion	Temephos	Trichlorfon	Triazophos			
					μg/L	μg/L	μg/L	μg/L	μg/L	μg/L	μg/L	μg/L	μg/L	μg/L	μg/L	μg/L	μg/L	μg/L	μg/L	μg/L	μg/L	μg/L	μg/L	μg/L	μg/L	μg/L	μg/L	μg/L	μg/L	μg/L	μg/L	μg/L	μg/L	μg/L	μg/L	μg/L	μg/L	μg/L	μg/L	μg/L	μg/L	μg/L	μg/L	μg/L	μg/L	μg/L	μg/L	μg/L	μg/L	μg/L	μg/L	μg/L	μg/L				
EQL	ADWG 2011 Health (v3.7 updated 2022)				0.1	1	0.02	0.05	0.1	0.02	0.02	0.02	0.02	0.2	0.01	0.02	0.02	0.02	0.01	0.2	0.02	0.05	0.05	0.02	0.01	0.01	2	0.01	0.05	0.02	0.1	0.5	0.02	0.02	0.01	20	0.1	0.01	0.01	0.01	0.1	0.1	10	0.005	0.01	0.5	0.5	0.01	0.5	0.02	20	0.02	0.02	0.005			
ANZECC 2000 - Lowland Rivers (NSW coastal rivers)																																																									
ANZECC 2000 - Stock Watering																																																									
ANZG (2018) - FW - 95% (updated 26 July 2021)							0.02						0.01							0.01		0.15																																			
Package	Location Code	Sample Date	Field ID	Lab Report Number																																																					
M12 - Central	KEMDS	8/04/2021	KEMDS	ES2112843	<0.1	<1	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.01	<0.2	<0.02	<0.05	<0.05	<0.02	<0.01	<0.01	<0.2	<0.01	<0.05	<0.02	<0.1	<0.5	<0.02	<0.02	<0.01	<0.2	<0.1	<0.01	<0.01	<0.01	<0.1	<0.1	<10	<0.005	<0.01	<0.5	<0.5	<0.01	<0.5	<0.02	<20	<0.02	<0.02	<0.005		
		10/05/2021	KEMDS	ES2117470	<0.1	<1	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.01	<0.2	<0.02	<0.05	<0.05	<0.02	<0.01	<0.01	<0.2	<0.01	<0.05	<0.02	<0.1	<0.5	<0.02	<0.02	<0.01	<0.2	<0.1	<0.01	<0.01	<0.01	<0.1	<0.1	<10	<0.005	<0.01	<0.5	<0.5	<0.01	<0.5	<0.02	<20	<0.02	<0.02	<0.005	
		10/06/2021	KEMDS	ES2121872	<0.1	<1	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.01	<0.2	<0.02	<0.05	<0.05	<0.02	<0.01	<0.01	<0.2	<0.01	<0.05	<0.02	<0.1	<0.5	<0.02	<0.02	<0.01	<0.2	<0.1	<0.01	<0.01	<0.01	<0.1	<0.1	<10	<0.005	<0.01	<0.5	<0.5	<0.01	<0.5	<0.02	<20	<0.02	<0.02	<0.005	
		9/07/2021	KEMDS	ES2125418	<0.1	<1	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.01	<0.2	<0.02	<0.05	<0.05	<0.02	<0.01	<0.01	<0.2	<0.01	<0.05	<0.02	<0.1	<0.5	<0.02	<0.02	<0.01	<0.2	<0.1	<0.01	<0.01	<0.01	<0.1	<0.1	<10	<0.005	<0.01	<0.5	<0.5	<0.01	<0.5	<0.02	<20	<0.02	<0.02	<0.005	
		3/09/2021	KEMDS	ES2132112	<0.1	<1	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.01	<0.2	<0.02	<0.05	<0.05	<0.02	<0.01	<0.01	<0.2	<0.01	<0.05	<0.02	<0.1	<0.5	<0.02	<0.02	<0.01	<0.2	<0.1	<0.01	<0.01	<0.01	<0.1	<0.1	<10	<0.005	<0.01	<0.5	<0.5	<0.01	<0.5	<0.02	<20	<0.02	<0.02	<0.005	
		13/10/2021	KEMDS	ES2136906	<0.1	<1	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.01	<0.2	<0.02	<0.05	<0.05	<0.02	<0.01	<0.01	<0.2	<0.01	<0.05	<0.02	<0.1	<0.5	<0.02	<0.02	<0.01	<0.2	<0.1	<0.01	<0.01	<0.01	<0.1	<0.1	<10	<0.005	<0.01	<0.5	<0.5	<0.01	<0.5	<0.02	<20	<0.02	<0.02	<0.005	
		9/11/2021	KEMDS	ES2140480	<0.1	<1	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.01	<0.2	<0.02	<0.05	<0.05	<0.02	<0.01	<0.01	<0.2	<0.01	<0.05	<0.02	<0.1	<0.5	<0.02	<0.02	<0.01	<0.2	<0.1	<0.01	<0.01	<0.01	<0.1	<0.1	<10	<0.005	<0.01	<0.5	<0.5	<0.01	<0.5	<0.02	<20	<0.02	<0.02	<0.005	
		7/12/2021	KEMDS	ES2144579	<0.1	<1	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.01	<0.2	<0.02	<0.05	<0.05	<0.02	<0.01	<0.01	<0.2	<0.01	<0.05	<0.02	<0.1	<0.5	<0.02	<0.02	<0.01	<0.2	<0.1	<0.01	<0.01	<0.01	<0.1	<0.1	<10	<0.005	<0.01	<0.5	<0.5	<0.01	<0.5	<0.02	<20	<0.02	<0.02	<0.005	
		8/02/2022	KEMDS	ES2204223	<0.1	<1	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.01	<0.2	<0.02	<0.05	<0.05	<0.02	<0.01	<0.01	<0.2	<0.01	<0.05	<0.02	<0.1	<0.5	<0.02	<0.02	<0.01	<0.2	<0.1	<0.01	<0.01	<0.01	<0.1	<0.1	<10	<0.005	<0.01	<0.5	<0.5	<0.01	<0.5	<0.02	<20	<0.02	<0.02	<0.005	
		17/03/2022	KEMDS	ES2209565	<0.1	<1	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.01	<0.2	<0.02	<0.05	<0.05	<0.02	<0.01	<0.01	<0.2	<0.01	<0.05	<0.02	<0.1	<0.5	<0.02	<0.02	<0.01	<0.2	<0.1	<0.01	<0.01	<0.01	<0.1	<0.1	<10	<0.005	<0.01	<0.5	<0.5	<0.01	<0.5	<0.02	<20	<0.02	<0.02	<0.005	
		27/05/2022	KEMDS	ES2218614	<0.1	<1	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.01	<0.2	<0.02	<0.05	<0.05	<0.02	<0.01	<0.01	<0.2	<0.01	<0.05	<0.02	<0.1	<0.5	<0.02	<0.02	<0.01	<0.2	<0.1	<0.01	<0.01	<0.01	<0.1	<0.1	<10	<0.005	<0.01	<0.5	<0.5	<0.01	<0.5	<0.02	<20	<0.02	<0.02	<0.005
		27/06/2022	KEMDS	ES2222572	<0.1	<1	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.01	<0.2	<0.02	<0.05	<0.05	<0.02	<0.01	<0.01	<0.2	<0.01	<0.05	<0.02	<0.1	<0.5	<0.02	<0.02	<0.01	<0.2	<0.1	<0.01	<0.01	<0.01	<0.1	<0.1	<10	<0.005	<0.01	<0.5	<0.5	<0.01	<0.5	<0.02	<20	<0.02	<0.02	<0.005
		20/07/2022	SWDUP2	901459	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-</																					

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					Bensulide	Natallafos	Azinphos methyl	Bolstar (Sulprofos)	Bromophos-ethyl	Carbophenothion	Azinphos Ethyl	Chlorfenvinphos	Chlorpyrifos	Chlorpyrifos-methyl	Coumaphos	Demeton-O	Demeton-S	Demeton-S-methyl	Diazinon	Dichlorvos	Dimethoate	Disulfoton	EPN	Ethion	Ethoprop	Fenamiphos	Fenitrothion	Fenulfosfotion	Fenithion	Malathion	Methidathion	Methyl parathion	Mevinphos (Phosdrin)	Monocrotophos	Omethoate	Parathion	Phorate	Pirimiphos-ethyl	Pirimiphos-methyl	Profenofos	Prothiofos	Pyrazophos	Ronnel	Sulfatepp	Terbufos	Thiometon	Trichlorate	Tetrachlorvinphos	Acaphate	Demeton-O & Demeton-S	Formothion	Temephos	Trichlorfon	Triazophos																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
					µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
EOL					0.1	1	0.02	0.05	0.1	0.02	0.02	0.02	0.02	0.2	0.2	0.01	0.02	0.02	0.02	0.01	0.2	0.02	0.05	0.05	0.02	0.01	0.01	2	0.01	0.05	0.02	0.01	0.01	0.1	0.1	0.1	0.1	0.1	0.1	10	0.005	0.1	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5

				OP Pesticides																																														Pesticides													
				Bensulide	Natfalofo	Azinphos methyl	Bolar (Sulphofos)	Bromophos-ethyl	Carbophenothion	Azinphos Ethyl	Chlorfenvinphos		Chlorpyrifos	Chlorpyrifos-methyl	Coumaphos	Demeton-O	Demeton-S	Demeton-S-methyl	Diazinon	Dichlorvos	Dimethoate	Disulfoton	EPN	Ethion	Ethionprop	Fenamiphos	Fenitrothion	Fensulfotthion	Fenthion	Malathion	Methidathion	Methyl parathion	Mevinphos (Phosdrin)	Monocrotophos	Omethoate	Parathion	Phorate	Priniphos-ethyl	Priniphos-methyl	Profenofos	Prothiofos	Pyrazophos	Romei	Sulfatepp	Terbufos	Thiomelton	Trichloronate	Tetrachlorvinphos	Asaphate	Demeton-O & Demeton-S	Formothion	Temephos	Trichlorfon	Triazophos									
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L										
EOL				0.1	1	0.02	0.05	0.1	0.02	0.02	0.02	0.2	0.2	0.01	0.02	0.02	0.02	0.02	0.01	0.2	0.02	0.05	0.05	0.02	0.01	0.01	2	0.01	0.05	0.02	0.1	0.5	0.02	0.02	0.02	0.01	0.2	0.1	0.01	0.01	0.01	0.1	0.1	0.1	0.1	0.005	0.01	0.5	0.5	0.01	0.5	0.02	20	0.02	0.02	0.005							
ADWGC 2011 Health (v3.7 updated 2022)						30	10	10	0.5		2	10							4	5	7	4		4	1	0.5	7	10	7	70	6	0.7	5	2	1	20																											
ANZECC 2000 - Lowland Rivers (NSW coastal rivers)																																																															
ANZECC 2000 - Stock Watering																																																															
ANZG (2018) - FW - 95% (updated 26 July 2021)						0.02							0.01																																																		
Package	Location Code	Sample Date	Field ID	Lab Report Number																																																											
M12 - West	BADDS	4/04/2023	ROPUS	ES2311425	<0.1	<1	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.2	<0.02	<0.05	<0.05	<0.02	<0.01	<0.01	<2	<0.01	<0.05	<0.02	<0.1	<0.5	<0.02	<0.02	<0.01	<0.2	<0.1	<0.01	<0.01	<0.01	<0.01	<0.1	<0.1	<10	<0.005	<0.01	<0.5	<0.5	<0.01	<0.5	<0.02	<20	<0.02	<0.02	<0.005							
		1/05/2023	ROPUS	ES2314384	<0.1	<1	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.2	<0.02	<0.05	<0.05	<0.02	<0.01	<0.01	<2	<0.01	<0.05	<0.02	<0.1	<0.5	<0.02	<0.02	<0.01	<0.2	<0.1	<0.01	<0.01	<0.01	<0.01	<0.1	<0.1	<10	<0.005	<0.01	<0.5	<0.5	<0.01	<0.5	<0.02	<20	<0.02	<0.02	<0.005							
		6/06/2023	ROPUS	ES2319028	<0.1	<1	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.2	<0.02	<0.05	<0.05	<0.02	<0.01	<0.01	<2	<0.01	<0.05	<0.02	<0.1	<0.5	<0.02	<0.02	<0.01	<0.2	<0.1	<0.01	<0.01	<0.01	<0.01	<0.1	<0.1	<10	<0.005	<0.01	<0.5	<0.5	<0.01	<0.5	<0.02	<20	<0.02	<0.02	<0.005							
		8/04/2021	BADDS	ES2112843	<0.1	<1	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.2	<0.02	<0.05	<0.05	<0.02	<0.01	<0.01	<2	<0.01	<0.05	<0.02	<0.1	<0.5	<0.02	<0.02	<0.01	<0.2	<0.1	<0.01	<0.01	<0.01	<0.01	<0.1	<0.1	<10	<0.005	<0.01	<0.5	<0.5	<0.01	<0.5	<0.02	<20	<0.02	<0.02	<0.005							
		10/06/2021	BADDS	ES2121872	<0.1	<1	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.2	<0.02	<0.05	<0.05	<0.02	<0.01	<0.01	<2	<0.01	<0.05	<0.02	<0.1	<0.5	<0.02	<0.02	<0.01	<0.2	<0.1	<0.01	<0.01	<0.01	<0.01	<0.1	<0.1	<10	<0.005	<0.01	<0.5	<0.5	<0.01	<0.5	<0.02	<20	<0.02	<0.02	<0.005							
		9/07/2021	BADDS	ES2125418	<0.1	<1	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.2	<0.02	<0.05	<0.05	<0.02	<0.01	<0.01	<2	<0.01	<0.05	<0.02	<0.1	<0.5	<0.02	<0.02	<0.01	<0.2	<0.1	<0.01	<0.01	<0.01	<0.01	<0.1	<0.1	<10	<0.005	<0.01	<0.5	<0.5	<0.01	<0.5	<0.02	<20	<0.02	<0.02	<0.005							
		13/08/2021	BADDS	ES2129574	<0.1	<1	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.2	<0.02	<0.05	<0.05	<0.02	<0.01	<0.01	<2	<0.01	<0.05	<0.02	<0.1	<0.5	<0.02	<0.02	<0.01	<0.2	<0.1	<0.01	<0.01	<0.01	<0.01	<0.1	<0.1	<10	<0.005	<0.01	<0.5	<0.5	<0.01	<0.5	<0.02	<20	<0.02	<0.02	<0.005							
			M12SWDUP	ES2129574	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		3/09/2021	BADDS	ES2132112	<0.1	<1	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.2	<0.02	<0.05	<0.05	<0.02	<0.01	<0.01	<2	<0.01	<0.05	<0.02	<0.1	<0.5	<0.02	<0.02	<0.01	<0.2	<0.1	<0.01	<0.01	<0.01	<0.01	<0.1	<0.1	<10	<0.005	<0.01	<0.5	<0.5	<0.01	<0.5	<0.02	<20	<0.02	<0.02	<0.005						
			M12SWDUP	ES2132112	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BADMS		13/10/2021	BADDS	ES2136906	<0.1	<1	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.2	<0.02	<0.05	<0.05	<0.02	<0.01	<0.01	<2	<0.01	<0.05	<0.02	<0.1	<0.5	<0.02	<0.02	<0.01	<0.2	<0.1	<0.01	<0.01	<0.01	<0.01	<0.1	<0.1	<10	<0.005	<0.01	<0.5	<0.5	<0.01	<0.5	<0.02	<20	<0.02	<0.02	<0.005							
		9/11/2021	BADDS	ES2140480	<0.1	<1	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.2	<0.02	<0.05	<0.05	<0.02	<0.01	<0.01	<2	<0.01	<0.05	<0.02	<0.1	<0.5	<0.02	<0.02	<0.01	<0.2	<0.1	<0.01	<0.01	<0.01	<0.01	<0.1	<0.1	<10	<0.005	<0.01	<0.5	<0.5	<0.01	<0.5	<0.02	<20	<0.02	<0.02	<0.005							
		7/12/2021	BADDS	ES2144579	<0.1	<1	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.2	<0.02	<0.05	<0.05	<0.02	<0.01	<0.01	<2	<0.01	<0.05	<0.02	<0.1	<0.5	<0.02	<0.02	<0.01	<0.2	<0.1	<0.01	<0.01	<0.01	<0.01	<0.1	<0.1	<10	<0.005	<0.01	<0.5	<0.5	<0.01	<0.5	<0.02	<20	<0.02	<0.02	<0.005							
		28/06/2022	BADDS	ES2222658	<0.1	<1	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.2	<0.02	<0.05	<0.05	<0.02	<0.01	<0.01	<2	<0.01	<0.05	<0.02	<0.1	<0.5	<0.02	<0.02	<0.01	<0.2	<0.1	<0.01	<0.01	<0.01	<0.01	<0.1	<0.1	<10	<0.005	<0.01	<0.5	<0.5	<0.01	<0.5	<0.02	<20										

10 of 12

11 of 12

12 of 12



Appendix B
Table B3
Baseline Groundwater Field Parameters (April 2019 to July 2022)

Transport for NSW
M12 Motorway
Groundwater Monitoring Program

Well ID	Sampling Event	Date Measured	SWL (mbTOC)	LNAPL present	Temp (°C)	pH	Electrical Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	Redox Potential (mV)	Corrected Redox Potential* (mV)	Comments (sheen, colour, turbidity, sediment, odour)
BH104	Event 4 - July 2019	16/07/2019	9.74	Absent	18.7	6.07	17121	1.13	114.1	319.1	Clear, slight organic sheen
BH104	Event 5 - August 2019	20/08/2019	9.895	Absent	18.9	6.64	16734	1.04	10.04	215.04	Clear, no sheen, no odour
BH104	Event 6 - September 2019	24/09/2019	9.114	Absent	19.3	6.9	16787	2.19	-33	172	Grey-brown, slightly turbid, no sheen, no odour
BH104	Event 7 - October 2019	22/10/2019	10.32	Absent	21.3	7	18174	1.32	-51.4	153.6	Grey, slightly cloudy, no sheen, no odour
BH104	Event 8 - November 2019	07/11/2019	10.25	Absent	20.8	6.22	17997	1.88	47.8	252.8	Grey-brown, turbid, no sheen, no odour
BH104	Event 9 - December 2019	12/12/2019	10.555	Absent	20.1	6.32	17318	1.13	-8.8	196.2	Light grey, slight sheen, no odour
BH104	Event 10 - January 2020	16/01/2020	10.730	Absent	20.1	5.93	17195	1.47	2.6	207.6	Black, cloudy, no sheen, no odour
BH104	Event 11 - February 2020	18/02/2020	10.62	Absent	22.6	5.88	14411	1.01	61.2	266.2	Dark, grey, cloudy, no sheen, no odour
BH104	Event 12 - March 2020	12/03/2020	10.956	Absent	22.1	6.36	8946	1.74	190.6	395.6	Clear, slight organic sheen, no odour
BH104	Event 13 - April 2020	23/04/2020	10.995	Absent	20.3	7.01	12722	1.64	70.5	275.5	Clear, slight organic sheen, no odour
BH104	Event 14 - May 2020	19/05/2020	Not recorded	Absent	-	-	-	-	-	-	No data, grab sample collected
BH104	Event 16 - July 2020	30/07/2020	12.09	Absent	18.8	6.19	11525	0.36	64.8	269.8	Clear, no sheen, no odour
BH104	Event 17 - August 2020	11/08/2020	12.08	Absent	18.4	6.2	4255	1.18	129	334	Clear, no sheen, no odour
BH104	Event 18 - September 2020	10/09/2020	12.420	Absent	20.1	5.99	43.9	3.68	-60.5	144.5	Clear, no sheen, no odour, poor recharge, DO probe malfunction during purging
BH104	Event 19 - October 2020	09/10/2020	12.370	Absent	19.4	6.55	13327	1.40	-90.1	114.9	Clear, no sheen, no odour, poor recharge
BH104	Event 20 - November 2020	13/11/2020	12.400	Absent	20.0	6.23	14403	0.32	-110.5	94.5	Clear, slight organic sheen, no odour, poor recharge
BH104	Event 21 - December 2020	08/12/2020	12.560	Absent	21.0	5.79	15155	11.25	-162.3	42.7	Clearn, no sheen, no odour, poor recharge
BH104	Event 22 - January 2021	14/01/2021	12.740	Absent	20.1	6.26	14179	0.33	-139	66	Clearn, no sheen, no odour, poor recharge
BH104	Event 23 - February 2021	11/02/2021	12.850	Absent	19.9	6.50	14596	0.46	-121.2	83.8	Slightly turbid grey, effluent odour, poor recharge
BH104	Event 24 - March 2021	10/03/2021	12.935	Absent	19.7	6.42	14777	0.38	-121	84	Grey, cloudy, organic odour, no sheen
BH104	Event 25 - April 2021	07/04/2021	11.470	Absent	19.8	6.81	7572	0.58	-46.3	158.7	Dark grey colour
BH104	Event 26 - May 2021	03/05/2021	12.780	Absent	18.4	6.70	12444	1.00	23.4	228.4	Clear, no sheen, no odour, poor recharge
BH104	Event 27 - June 2021	08/06/2021	11.990	Absent	18.2	6.38	12364	7.52	-54.5	150.5	Very dark, black colour, no odour, no sheen, heavy sediment load
BH104	Event 28 - July 2021	07/07/2021	12.400	Absent	18.9	6.20	13097	6.21	-24	181	Clear water with grey tinge, low sediment load, no odour, no sheen, slow purge
BH104	Event 29 - August 2021	13/08/2021	12.430	Absent	18.3	6.21	12451	0.25	45	250	Grey, black tinge, low sediment load, no sheen, no odour, poor recharge, slow flow
BH104	Event 30 - September 2021	01/09/2021	12.450	Absent	19.1	6.64	12683	0.26	-74.3	130.7	Dark grey colour, slightly turbid, no odour, no sheen, poor recharge, slow purge
BH104	Event 31 - October 2021	15/10/2021	12.750	Absent	19.0	6.24	7169	1.02	-70.7	134.3	Black, sooty water. High sediment load, No odour/sheen. Slow recharge
BH104	Event 32 - November 2021	08/11/2021	13.170	Absent	18.4	6.55	12603	0.46	-86.1	118.9	Black, dark grey. High sediment (black silt), no odour/sheen. Good recharge
BH104	Event 33 - December 2021	08/12/2021	14.230	Absent	19.2	6.58	12059	0.21	-81.8	123.2	Clear water, dark grey sediment. No odour/sheen. Slow recharge.
BH104	Event 34 - January 2022	13/01/2022	12.720	Absent	19.4	6.71	11439	12.33	-103.3	101.7	Black, turbid water. Very dark grey sediment. No odour/sheen
BH104	Event 35 - February 2022	10/02/2022	13.900	Absent	19.2	6.64	7550	0.25	-112.6	92.4	Black/dark grey, high turbidity. No odour/sheen.
BH104	Event 36 - March 2022	18/03/2022	12.270	Absent	19	6.95	7451	1.15	-132.6	72.4	Black, no odour/sheen, Good recharge
BH104	Event 38 - May 2022	25/05/2022	12.005	Absent	19.4	6.88	12842	1.97	102.70	307.7	Cloudy, no sheen, no odour, bailer sampled.
BH104	Event 39 - June 2022	27/06/2022	11.55	Absent	18.7	6.47	20281	2.78	189.00	394	Grey tinge, slightly cloudy, no sheen, no odour.
BH104	Event 40 - July 2022	20/07/2022	11.1	Absent	18.5	6.26	23501	1.44	173.60	378.6	Grey/brown, cloudy, non-transparent, no odour, no sheen
BH107	Event 4 - July 2019	18/07/2019	10.705	Absent	-	-	-	-	-	-	No data, grab sample collected
BH107	Event 5 - August 2019	20/08/2019	10.735	Absent	19.7	7.05	8853	1.35	11.7	216.7	Grey, slightly cloudy, no sheen, no odour
BH107	Event 6 - September 2019	24/09/2019	10.754	Absent	18.9	6.85	4102	1.59	88	293	Grey-brown, slightly turbid, no sheen, no odour
BH107	Event 7 - October 2019	22/10/2019	10.755	Absent	20.0	7.08	9226	1.20	23.7	228.7	Grey, slightly turbid, no sheen, no odour
BH107	Event 8 - November 2019	07/11/2019	10.725	Absent	22.7	6.85	9870	1.96	75.9	280.9	Light grey, slightly turbid, no sheen, no odour
BH107	Event 9 - December 2019	12/12/2019	10.795	Absent	21.9	6.89	9387	1.56	7.3	212.3	Light brown, cloudy, no sheen, no odour
BH107	Event 11 - February 2020	20/02/2020	10.836	Absent	22.6	6.84	9375	1.46	32.7	237.7	Grey, slightly cloudy, no sheen, no odour
BH107	Event 13 - April 2020	23/04/2020	10.845	Absent	19.4	6.77	9183	1.18	10.1	215.1	Grey, slightly turbid, no sheen, no odour
BH107	Event 14 - May 2020	21/05/2020	11.182	Absent	18.5	6.77	9247	1.91	172.7	377.7	Turbid, no sheen, no odour
BH107	Event 16 - July 2020	30/07/2020	10.69	Absent	18.8	6.23	7605	0.33	79.1	284.1	Clear, no sheen, no odour
BH107	Event 17 - August 2020	11/08/2020	10.67	Absent	18.6	6.42	9110	1.61	93.1	298.1	Grey, turbid, no sheen, no odour
BH107	Event 18 - September 2020	10/09/2020	10.72	Absent	19.2	6.66	48	2.68	-25.8	179.2	Clear, no sheen, no odour, poor recharge, DO probe malfunction during purging
BH107	Event 19 - October 2020	09/10/2020	10.69	Absent	20.0	6.78	9596	1.24	51.1	256.1	Clear, no sheen, no odour, poor recharge
BH107	Event 21 - December 2020	08/12/2020	10.71	Absent	19.6	6.57	9963	11.15	-170.2	34.8	Clear, no sheen, no odour, poor recharge
BH107	Event 22 - January 2021	14/01/2021	10.710	Absent	22.2	6.70	9349	0.67	-100.1	104.9	Clear, no sheen, no odour, poor recharge
BH107	Event 23 - February 2021	11/02/2021	10.720	Absent	21.0	6.55	9620	0.60	-24.5	180.5	Slight orange tint to clear, poor recharge
BH107	Event 24 - March 2021	10/03/2021	10.770	Absent	19.6	6.80	9607	0.65	-113.2	91.8	Grey, cloudy, organic odour, no sheen
BH107	Event 25 - April 2021	07/04/2021	10.680	Absent	19.7	6.59	6653	0.69	-46.3	158.7	-
BH107	Event 26 - May 2021	03/05/2021	10.63	Absent	20.2	6.91	6651	5.19	125.4	330.4	Light grey colour, fairly clear, no odour, no sheen, slow recharge rate
BH107	Event 27 - June 2021	08/06/2021	9.31	Absent	18.5	6.60	7320	7.62	-53.7	151.3	Very dark, black/grey colour, high sediment load, no odour or sheen
BH107	Event 28 - July 2021	07/07/2021	10.600	Absent	18.8	6.30	7496	6.13	56.7	261.7	Clear water, slight grey tinge, no odour, no sheen, low sediment load, slow purge rate
BH107	Event 29 - August 2021	13/08/2021	10.570	Absent	18.7	6.88	8092	0.72	15.3	220.3	Very dark grey/black water, no odour, no sheen, low sediment load
BH107	Event 30 - September 2021	01/09/2021	10.560	Absent	19.2	6.78	8070	1.30	-18.9	186.1	Very dark grey colour, high sediment load, poor recharge, no odour, no sheen
BH107	Event 31 - October 2021	15/10/2021	10.800	Absent	19.3	6.54	4654	1.37	-87	118	Black water. High sediment load, No odour/sheen. Good recharge
BH107	Event 32 - November 2021	08/11/2021	11.070	Absent	18.4	6.69	7411	0.44	-64.3	140.7	Dark grey. High sediment. No odour/sheen. Good recharge.
BH107	Event 33 - December 2021	08/12/2021	11.060	Absent	19.2	6.70	7582	0.44	-14.2	190.8	Clear, dark grey sediment. Silty. No odour/sheen. Good recharge
BH107	Event 34 - January 2022	13/01/2022	10.090	Absent	20.0	5.98	5555	12.53	25.4	230.4	Micro-purge issues. Grab sample taken.



Appendix B
Table B3
Baseline Groundwater Field Parameters (April 2019 to July 2022)

Transport for NSW
M12 Motorway
Groundwater Monitoring Program

Well ID	Sampling Event	Date Measured	SWL (mbTOC)	LNAPL present	Temp (°C)	pH	Electrical Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	Redox Potential (mV)	Corrected Redox Potential* (mV)	Comments (sheen, colour, turbidity, sediment, odour)
BH107	Event 35 - February 2022	10/02/2022	11.450	Absent	20.2	6.62	6002	0.34	39.7	244.7	Dark grey. High turbidity. No odour/sheen
BH107	Event 36 - March 2022	18/03/2022	10.160	Absent	18.3	6.98	1549	1.13	-59	146	Black, no odour/sheen, Good recharge. Water became clear after 2L
BH107	Event 38 - May 2022	25/05/2022	9.57	Absent	19.1	7.36	4245	2.12	103.30	308.3	Brown, cloudy, no sheen, no odour, bailer sampled.
BH107	Event 39 - June 2022	27/06/2022	9.655	Absent	18.7	7.2	4524	4.83	105.50	310.5	Brown, cloudy, no sheen, no odour, bailer sampled.
BH107	Event 40 - July 2022	20/07/2022	9.64	Absent	19.1	6.97	4068	3.53	86.40	291.4	Grab sample taken, one set of parameters recorded
BH112	Event 4 - July 2019	18/07/2019	17.57	Absent	-	-	-	-	-	-	No data, grab sample collected
BH112	Event 5 - August 2019	20/08/2019	17.625	Absent	19.7	6.59	10985	1.39	67.6	272.6	Brown, turbid, poor recharge
BH112	Event 6 - September 2019	25/09/2019	17.585	Absent	20.4	6.72	11553	1.79	76.7	281.7	Grey-brown, turbid, no sheen, no odour
BH112	Event 7 - October 2019	22/10/2019	17.582	Absent	19.8	6.49	11726	0.92	64.6	269.6	Brown-grey, turbid, no sheen, no odour, poor recharge
BH112	Event 8 - November 2019	07/11/2019	17.580	Absent	22.3	6.60	12865	1.12	48	253	Light brown, cloudy, no sheen, no odour
BH112	Event 9 - December 2019	12/12/2019	17.58	Absent	20.4	6.33	11883	0.97	74.4	279.4	Grey, cloudy, slight sheen
BH112	Event 11 - February 2020	20/02/2020	17.590	Absent	21.1	6.46	12693	1.42	74	279	Brown, no sheen, no odour
BH112	Event 13 - April 2020	21/04/2020	17.601	Absent	20.0	6.49	12419	1.22	169.6	374.6	Grey-brown, turbid, slight organic sheen, no odour
BH112	Event 14 - May 2020	21/05/2020	17.580	Absent	-	-	-	-	-	-	No data, too much sediment, grab sample collected
BH112	Event 16 - July 2020	30/07/2020	17.550	Absent	18.9	6.20	11966	0.49	70.2	275.2	Brown, turbid, no sheen, no odour, poor recharge
BH112	Event 17 - August 2020	13/08/2020	17.590	Absent	18.9	6.26	12274	0.76	99.3	304.3	Grey, turbid, no sheen, no odour, poor recharge
BH112	Event 18 - September 2020	10/09/2020	17.590	Absent	18.9	6.44	38.1	2.01	42.1	247.1	Clear, no sheen, no odour, poor recharge, DO probe malfunction during purging
BH112	Event 19 - October 2020	09/10/2020	17.590	Absent	19.9	6.46	12521	1.45	85.9	290.9	Low sediment load, no sheen, no odour, poor recharge
BH112	Event 21 - December 2020	08/12/2020	17.580	Absent	19.7	6.25	12848	10.74	67.5	272.5	Clear, no sheen, no odour, poor recharge
BH112	Event 22 - January 2021	14/01/2021	17.580	Absent	22.1	6.54	12760	0.49	36.2	241.2	Slightly turbid brown, no sheen, no odour, poor recharge
BH112	Event 23 - February 2021	11/02/2021	17.800	Absent	21.7	6.52	13061	1.08	60.4	265.4	Turbid brown, no sheen, no odour, poor recharge
BH112	Event 24 - March 2021	10/03/2021	17.590	Absent	19.6	6.66	12724	0.54	17.1	222.1	Grey, some sediment, no sheen, no odour
BH112	Event 25 - April 2021	07/04/2021	17.050	Absent	19.9	6.77	4873	0.22	111.8	316.8	light grey tinge
BH112	Event 26 - May 2021	03/05/2021	17.390	Absent	18.0	6.58	8682	1.69	36.7	241.7	brown murky tinge, no odour, no sheen, low sediment load
BH112	Event 27 - June 2021	08/06/2021	17.500	Absent	18.8	6.57	7550	7.58	-17.6	187.4	light grey colour, no odour, no sheen, high sediment load, slow recharge, slow flow
BH112	Event 28 - July 2021	07/07/2021	17.560	Absent	19.3	7.10	8444	5.45	-2.5	202.5	very turbid, brown murky water, no odour, no sheen, slow purge rate, good recharge
BH112	Event 29 - August 2021	13/08/2021	17.590	Absent	18.7	6.52	8007	0.32	444	649	Dark grey/black colour, no odour, no sheen, low sediment load
BH112	Event 30 - September 2021	01/09/2021	17.600	Absent	19.4	6.67	9130	0.72	21	226	Very turbid, brown water, high sediment load, no odour, no sheen, poor recharge
BH112	Event 31 - October 2021	15/10/2021	17.590	Absent	19.3	6.67	9145	0.50	24	229	Very turbid brown/black water. High sediment load. No odour/sheen. Poor recharge
BH112	Event 32 - November 2021	08/11/2021	18.290	Absent	18.4	6.56	9513	0.57	-20.7	184.3	Silty brown colour, High sediment, No odour/sheen
BH112	Event 33 - December 2021	08/12/2021	18.650	Absent	19.4	6.31	9961	1.50	20.7	225.7	Dark sediment. Very silty. No odour/sheen. Poor recharge
BH112	Event 34 - January 2022	13/01/2022	19.090	Absent	19.8	6.55	9987	12.32	6.7	211.7	Light grey. No odour/sheen. Poor recharge
BH112	Event 35 - February 2022	10/02/2022	18.540	Absent	20.6	6.48	10728	1.78	72	277	Light brown. Moderate turbidity. No odour/sheen
BH112	Event 36 - March 2022	18/03/2022	16.090	Absent	18.6	7.00	4150	1.05	31	236	Grey, no odour/sheen, water became clear after 2.5L
BH112	Event 38 - May 2022	25/05/2022	15.235	Absent	19.8	7.1	3233	1.91	98.10	303.1	Brown, cloudy, some sediment, no sheen, no odour, bailer sampled
BH112	Event 39 - June 2022	27/06/2022	15.005	Absent	18.7	7.01	3190	5.88	104.30	309.3	Brown, cloudy, no sheen, no odour, bailer sampled.
BH112	Event 40 - July 2022	20/07/2022	13.97	Absent	19.4	6.89	3921	4.30	94.90	299.9	Grab sample taken, one set of parameters recorded. Pale yellow, no odour, no sheen
BH145	Event 3 - June 2019	13/06/2019	16.350	Absent	17.2	6.7	7307	1.23	165	370	Grey-brown, cloudy, no sheen, no odour, poor recharge
BH145	Event 4 - July 2019	17/07/2019	18.250	Absent	-	-	-	-	-	-	No data, grab sample collected
BH145	Event 5 - August 2019	21/08/2019	18.270	Absent	-	-	-	-	-	-	No data, grab sample collected
BH145	Event 6 - September 2019	26/09/2019	18.317	Absent	-	-	-	-	-	-	No data, grab sample collected
BH145	Event 7 - October 2019	23/10/2019	Not recorded	Absent	20.6	7.09	5334.4	2.94	129.5	334.5	Not recorded
BH145	Event 8 - November 2019	08/11/2019	18.587	Absent	-	-	-	-	-	-	Bailer lost, no sample or data collected
BH145	Event 9 - December 2019	12/12/2019	18.715	Absent	-	-	-	-	-	-	No data, grab sample collected
BH145	Event 14 - May 2020	21/05/2020	16.54	Absent	17.5	6.28	5045	1.15	203.4	408.4	Slightly turbid, no sheen, no odour
BH145	Event 16 - July 2020	30/07/2020	13.93	Absent	16.5	5.57	3145	0.26	179.1	384.1	Brown, turbid, no sheen, no odour, poor recharge
BH145	Event 17 - August 2020	13/08/2020	16.42	Absent	17.1	6.03	4669	1.26	65.7	270.7	Clear, no sheen, no odour, poor and insufficient recharge - grab sample taken
BH145	Event 18 - September 2020	09/09/2020	17.7	Absent	18.8	6.29	3802	0.11	-46.3	158.7	Brown, turbid, no sheen, no odour, poor recharge, DO probe malfunction
BH145	Event 19 - October 2020	08/10/2020	18.96	Absent	19.8	6.46	7948	1.38	80.9	285.9	Brown, turbid, high sediment load, no sheen, no odour, poor recharge
BH145	Event 20 - November 2020	11/11/2020	14.51	Absent	18.9	6.09	2913	0.33	-19.2	185.8	Brown, tubrid, no sheen, no odour, poor recharge
BH145	Event 21 - December 2020	09/12/2020	16.625	Absent	19.8	6.16	3612	0.59	-50.7	154.3	Turbid brown, no sheen, no odour, poor recharge
BH145	Event 22 - January 2021	12/01/2021	18.015	Absent	-	-	-	-	-	-	No data, grab sample collected
BH145	Event 23 - February 2021	09/02/2021	18.21	Absent	-	-	-	-	-	-	No data, grab sample collected
BH145	Event 24 - March 2021	10/03/2021	18.43	Absent	20.1	6.6	6075	0.81	59.3	264.3	Brown, cloudy, some sediemnt, no sheen, no odour
BH145	Event 25 - April 2021	07/04/2021	17.595	Absent	18.6	6.23	3740	0.69	3.7	208.7	Dark brown, turbid
BH145	Event 26 - May 2021	03/05/2021	19.85	Absent	-	-	-	-	-	-	Unable to purge, well was dry, no water coming up due to low SWL
BH145	Event 27 - June 2021	08/06/2021	19.49	Absent	-	-	-	-	-	-	Bailer used for grab sample, less than 1m of water available, very muddy. No data recorded. Half set of samples.
BH145	Event 28 - July 2021	07/07/2021	19.41	Absent	-	-	-	-	-	-	Bailer used for grab sample, less than 1m of water available. No data recorded
BH145	Event 29 - August 2021	13/08/2021	-	-	-	-	-	-	-	-	not sampled
BH145	Event 30 - September 2021	01/09/2021	19.17	Absent	-	-	-	-	-	-	not enough water to purge, took grab sample.
BH145	Event 31 - October 2021	15/10/2021	19.47	Absent	-	-	-	-	-	-	Bailer used for grab sample. No data recorded



Appendix B
Table B3
Baseline Groundwater Field Parameters (April 2019 to July 2022)

Well ID	Sampling Event	Date Measured	SWL (mbTOC)	LNAPL present	Temp (°C)	pH	Electrical Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	Redox Potential (mV)	Corrected Redox Potential* (mV)	Comments (sheen, colour, turbidity, sediment, odour)
BH145	Event 32 - November 2021	08/11/2021	19.32	Absent	-	-	-	-	-	-	Bailer used for grab sample. No data recorded
BH145	Event 33 - December 2021	08/12/2021	19.19	Absent	-	-	-	-	-	-	Bailer used for grab sample. No data recorded
BH145	Event 34 - January 2022	13/01/2022	19.1	Absent	-	-	-	-	-	-	Bailer used for grab sample. No data recorded
BH145	Event 35 - February 2022	10/02/2022	19.17	Absent	-	-	-	-	-	-	Bailer used for grab sample. No data recorded
BH145	Event 36 - March 2022	18/03/2022	18.63	Absent	-	-	-	-	-	-	Bailer used for grab sample. No data recorded
BH145	Event 38 - May 2022	25/05/2022	18.655	Absent	15.8	6.03	4587	0.62	125.60	330.6	Cloudy, no sheen, no odour, bailer sampled.
BH145	Event 39 - June 2022	27/06/2022	19.065	Absent	-	-	-	-	-	-	No data, grab sample collected
BH145	Event 40 - July 2022	20/07/2022	18.402	Absent	15.4	6.1	2978	4.90	101.80	306.8	Grab sample taken, one set of parameters recorded. Pale yellow, no odour, no sheen

*Corrected for standard hydrogen electrode (SHE) by adding 205 mV to YSI redox potential reading

Package	Location Code	Sample Date	Field ID	Sample Type	Lab Report Number																																									
						-	-	-	<1	-	<1	914	-	-	240	-	517	-	27	-	3,120	5,600	-	842	191	194	0.74	914	-	0.09	0.09	<0.01	0.09	0.6	0.5	<0.01	-	0.22	<0.001	0.0002	<0.001	0.018	-	0.001	-	
M12 - West	BH104	16-Jul-19	BH104	Normal	ES1922192	-	-	-	<1	-	<1	914	-	-	240	-	517	-	27	-	3,120	5,600	-	842	191	194	0.74	914	-	0.09	0.09	<0.01	0.09	0.6	0.5	<0.01	-	0.22	<0.001	0.0002	<0.001	0.018	-	0.001	-	
		20-Aug-19	BH104	Normal	ES1926460	-	-	-	<1	-	<1	932	-	-	240	-	565	-	28	-	3,360	5,870	-	882	205	202	0.68	932	-	0.05	0.07	0.04	0.11	<0.2 ^{FI}	<0.2 ^{FI}	<0.01	-	<0.02 ^{FI}	<0.001	<0.0001	<0.001	0.015	-	0.001	-	
		24-Sep-19	BH104	Normal	ES1930997	-	-	-	<1	-	<1	973	-	-	205	-	542	-	28	-	3,240	6,070	-	810	196	208	2.73	973	-	0.02	0.04	0.01	0.05	0.4	0.3	<0.01	-	0.05	<0.001	<0.0001	<0.001	0.001	-	<0.001	-	
		22-Oct-19	BH104	Normal	ES1934707	-	-	-	<1	-	<1	1,030	-	-	245	-	581	-	27	-	3,360	6,010	-	678	207	204	0.64	1,030	-	0.1	0.03	<0.01	0.03	<0.2 ^{FI}	<0.2 ^{FI}	<0.01	-	0.02	<0.001	<0.0001	<0.001	0.009	-	<0.001	-	
		07-Nov-19	BH104	Normal	ES1936840	-	-	-	<1	-	<1	1,180	-	-	280	-	584	-	29	-	3,380	6,160	-	706	210	212	0.53	1,180	-	0.28	0.02	<0.01	0.02	0.6	0.6	<0.01	-	0.16	<0.001	<0.0001	<0.001	0.004	-	<0.001	-	
		12-Dec-19	BH104	Normal	ES1941279	-	-	-	<1	-	<1	1,030	-	-	287	-	624	-	30	-	3,560	6,700	-	892	221	228	1.52	1,030	-	0.15	0.09	0.02	0.11	<0.2 ^{FI}	<0.2 ^{FI}	<0.01	-	0.03	<0.001	<0.0001	0.001	0.016	-	0.001	-	
		16-Jan-20	BH104	Normal	ES2001376	-	-	-	<1	-	<1	1,080	-	-	248	-	562	-	35	-	3,430	6,520	-	747	209	221	2.87	1,080	-	0.11	0.1	<0.01	0.1	<0.5 ^{FI}	<0.5 ^{FI}	<0.01	-	0.27	0.002	<0.0001	0.001	0.081	-	0.005	-	
		18-Feb-20	BH104	Normal	ES2005577	-	-	-	<1	-	<1	603	-	-	87	-	167	-	14	-	1,190	1,920	-	326	70.2	73	1.95	603	-	0.24	1.17	<0.05 ^{FI}	1.17	2.4	1.2	<0.02 ^{FI}	-	0.07	0.001	<0.0001	<0.001	0.039	-	0.001	-	
		12-Mar-20	SD01	Interlab_D	707829	-	-	<10	-	<20	810	-	96	-	190	-	17	-	1,600	-	3,400	420	-	-	-	-	810	-	0.11	1.6	0.03	1.6	2.6	1	<0.01	0.06	-	<0.001	<0.0002	<0.001	0.02	-	<0.001	-		
		12-Mar-20	BD01	Field_D	ES2008731	-	-	-	<1	-	<1	704	-	-	103	-	182	-	16	-	1,580	2,670	-	395	89.2	97.6	4.47	704	-	0.03	1.09	0.04	1.13	1.9	0.8	<0.01	-	0.04	<0.001	<0.0002	<0.001	0.012	-	<0.001	-	
		12-Mar-20	BH104	Normal	ES2008731	-	-	-	<1	-	<1	727	-	-	103	-	182	-	16	-	1,580	2,700	-	393	89.2	98.9	5.11	727	-	<0.01	1.09	0.04	1.13	2.1	1	<0.01	-	0.05	<0.001	<0.0001	<0.001	0.012	-	<0.001	-	
		23-Apr-20	BH104	Normal	ES2013858	-	-	-	-	-	<1	1,090	-	-	159	-	321	-	22	-	2,320	3,980	-	586	136	146	3.69	1,090	<1	0.02	0.12	<0.01	0.12	0.4	0.3	<0.01	-	<0.02 ^{FI}	<0.001	<0.0001	<0.001	0.046	-	0.001	-	
		19-May-20	BH104	Normal	ES2017191	-	-	-	-	-	<1	1,010	-	-	178	-	381	-	23	-	2,710	4,620	-	675	159	164	1.81	1,010	<1	<0.1 ^{FI}	0.13	<0.01	0.13	<0.2 ^{FI}	<0.2 ^{FI}	<0.01	-	<0.02 ^{FI}	<0.001	<0.0001	<0.001	0.026	-	<0.001	-	
		30-Jul-20	BH104	Normal	ES2026408	-	6,030	52	-	-	<1	821	-	-	114	-	231	-	16	-	1,740	3,040	-	436	101	111	4.92	821	<1	0.25	0.02	<0.01	0.02	0.8	0.8	-	-	0.08	<0.001	<0.0001	<0.001	0.015	0.19	<0.001	0.247	
		11-Aug-20	BH104	Normal	ES2027951	-	3,250	14	-	-	<1	690	-	-	67	-	112	-	11	-	1,050	1,270	-	275	58.5	55.3	2.79	690	<1	<0.01	0.03	<0.01	0.03	0.5	0.5	-	-	0.02	<0.001	0.0001	<0.001	0.105	0.15	0.002	0.266	
		10-Sep-20	BD01	Field_D	ES2032115	-	7,430	<5	-	-	<1	1,030	-	-	141	-	286	-	20	-	2,160	3,650	-	511	125	134	3.52	1,030	<1	0.08	0.07	<0.01	0.07	0.4	0.3	-	-	0.03	<0.001	<0.0001	<0.001	0.003	0.72	<0.001	0.339	
		10-Sep-20	BH104	Normal	ES2032115	-	7,380	6	-	-	<1	1,000	1,550	-	141	-	292	-	20	-	2,270	3,650	-	477	130	133	0.97	1,000	<1	0.09	0.05	<0.01	0.05	0.4	0.3	-	-	0.02	<0.001	<0.0001	<0.001	0.002	0.24	<0.001	0.347	
		09-Oct-20	BD01	Field_D	ES2035519	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	0.0001	<0.001	0.074	-	-	0.002			
		09-Oct-20	BH104	Normal	ES2035519	-	8,930	20	-	-	<1	1,200	1,610	-	175	-	285	-	20	-	2,150	4,190	-	612	126	155	10.2	1,200	<1	0.09	0.09	<0.01	0.09	<0.2 ^{FI}	<0.2 ^{FI}	-	-	0.04	<0.001	<0.0001	<0.001	0.001	0.37	<0.001	0.584	
		13-Nov-20	BH104	Normal	ES2040330	-	9,380	19	-	-	<1	1,160	2,020	-	212	-	363	-	24	-	2,570	4,240	-	586	153	155	0.69	1,160	<1	<0.1 ^{FI}	0.12	<0.01	0.12	0.3	0.2	-	-	0.02	<0.001	<0.0001	<0.001	<0.001	1.51	<0.001	0.609	
		08-Dec-20	BH104	Normal	ES2043799	-	10,200	68	-	-	<1	1,340	2,090	-	206	-	382	-	23	-	2,720	4,580	-	630	161	169	2.57	1,340	<1	0.6	0.01	<0.01	0.01	1.5	1.5	-	-	0.08	<0.001	<0.0001	0.002	<0.001	2.83	<0.001	0.93	
		08-Dec-20	M12GW_DUP	Field_D	ES2043799	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.0001	0.002	<0.001	-	<0.001	-			
		14-Jan-21	BH104	Normal	ES2101242	-	9,510	24	-	-	<1	1,430	1,900	-	232	-	322	-	21	-	2,260	4,640	-	603	137	172	11.4	1,430	<1	0.32	<0.01	<0.01	<0.01	1	1	-	-	0.06	<0.001	<0.0001	<0.001	<0.001	3.12	<0.001	1.33	
		14-Jan-21	M12GWDUP	Field_D	ES2101242	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.0001	<0.001	<0.001	-	<0.001	-			
		11-Feb-21	BH104	Normal	ES2104999	-	9,630	48	-	-	<1	1,130	2,110	-	194	-	394	-	25	-	2,790	4,400	-	601	164	159	1.51	1,130	<1	0.59	0.05	<0.01	0.05	1.2	1.2	-	-	0.14	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	0.896	
		11-Feb-21	M12GWDUP	Field_D	ES2104999	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.002	<0.0001	0.002	<0.001	-	<0.001	-			
		10-Mar-21	BH104	Normal	ES2108508	-	10,100	32	-	-	<1	1,290	2,190	-	226	-	394	-	26	-	2,760	4,950	-	686	164	180	4.44	1,290	<1	0.31	0.04	<0.01	0.04	0.4	0.4	-	-	0.04	0.001	<0.0001	<0.001	0.002	2.15	<0.001	1.02	
		10-Mar-21	M12GWDUP	Field_D	ES2108508	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.001	<0.0001	<0.001	0.067	-	0.002	-			
		07-Apr-21	BH104	Normal	ES2112804	-	4,350	22	<1	768	<1	768	833	-	96	-	144	-	14	-	1,260	1,740	-	322	71.8	71.1	0.47	-	-	-	0.19	0.06	<0.01	0.06	0.7	0.6	-	-	0.04	<0.001	<0.0001	<0.001	0.002	0.41	<0.001	0.39
		07-Apr-21	M12GWDUP	Field_D	ES2112804	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.0001	<0.001	0.001	0.003	-	<0.001	-		
		04-May-21	BH104	Normal	ES2116634	-	7,190	21	<1	987	<1	987	1,490	-	151	-	271	-	20	-	2,040	3,280	-	526	119	123	1.7	-	-	-	0.06	0.08	<0.01	0.08	0.7	0.6	-	-	0.06	<0.001	<0.0001	<0.001	0.002	0.16	<0.001	0.274
		04-May-21	M12GWDUP	Field_D	ES2116634	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.0001	<0.001	0.002	-	<0.001	-			
		08-Jun-21	BH104	Normal	ES2121745	-	8,490	42	<1	957	<1	957	1,860	-	176	-	344	-	24	-	2,540	4,010	-	552	148	144	1.53	-	-	-	0.26	0.04	<0.01	0.04	0.5	0.5	-	-	0.04	<0.001	<0.0001	<0.001	0.002	0.77	<0.001	0.313
		08-Jun-21	M12GWDUP	Field_D	ES2121745	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.0001	<0.001	<0.001	-	<0.001	-			
		07-Jul-21	BH104	Normal	ES2125048	-	8,860	57	<1	1,040	<1	1,040	1,860	-	201	-	330	-	23	-	2,520	3,940	-	548	147	143	1.4	-	-	-	0.36	0.01	<0.01	0.01	0.6											

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						Pesticides												OP Pesticides																				Pes											
						Azinphos Ethyl	Chlorfenvinphos	Chlorpyrifos	Chlorpyrifos-methyl	Coumaphos	Demeton-O	Demeton-S	Demeton-S-methyl	Diazinon	Dichlorvos	Dimethoate	Disulfoton	EPN	Ethion	Ethoprop	Fenamiphos	Fenitrothion	Fensulfothion	Fenthion	Malathion	Merphos	Methidathion	Methyl parathion	Mevinphos (Phosdrin)	Monocrotophos	Naled (Dibrom)	Omethoate	Parathion	Phorate	Pirimphos-ethyl	Pirimiphos-methyl	Profenofos	Prothiofos	Pyrazophos	Romei	Sulfotepp	Terbufos	Thiometon	Trichloronate	Tetrachlorvinphos	Acephate	Demeton-O & Demeton-S	Formothion	
						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L			
EQL						0.02	0.02	0.02	0.2	0.01	0.02	0.02	0.02	0.01	0.2	0.02	0.05	0.05	0.02	0.01	0.01	2	0.01	0.05	0.02	0.02	1	0.1	0.5	0.02	0.02	1	0.01	0.2	0.1	0.01	0.01	0.01	0.1	0.1	10	0.005	0.01	0.5	0.5	0.01	0.5	0.02	20
ADWVG 2011 Health (v3.7 updated 2022)							2	10						4	5	7	4		4	1	0.5	7	10	7	70		6	0.7	5	2		1	20		0.5	90	0.3		20			0.9	4		100	8		50	
ANZECC 2000 - Lowland Rivers (NSW coastal rivers)																																																	
ANZECC 2000 - Stock Watering																																																	
ANZG (2018) - FW - 95% (updated 26 July 2021)								0.01					0.01			0.15							0.2			0.05							0.004																
NEPM 2013 Table 1A(4) HSL D Comm/Ind GW for Vapour Intrusion, Sand																																																	
2-4m																																																	
4-8m																																																	
>8m																																																	

Package	Location Code	Sample Date	Field ID	Sample Type	Lab Report Number																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
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						Pesticides												OP Pesticides																				Pesticides													
						Azinphos Ethyl	Chlorfenvinphos	Chlorpyrifos	Chlorpyrifos-methyl	Coumaphos	Demeton-O	Demeton-S	Demeton-S-methyl	Diazinon	Dichlorvos	Dimethoate	Disulfoton	EPN	Ethion	Ethoprop	Fenamiphos	Fenitrothion	Fensulfotion	Fenthion	Malathion	Merphos	Methidathion	Methyl parathion	Mevinphos (Phosdrin)	Monocrotophos	Naled (Dibrom)	Ometoate	Parathion	Phorate	Priniphos-ethyl	Priniphos-methyl	Profenofos	Prothiofos	Pyrazophos	Ronnel	Sulfotepp	Terbufos	Thiometon	Trichloronate	Tetrachlorvinphos	Acephate	Demeton-O & Demeton-S	Formothion			
EQL						0.02	0.02	0.02	0.2	0.01	0.02	0.02	0.02	0.01	0.2	0.02	0.05	0.05	0.02	0.01	0.5	7	10	7	70	1	0.1	0.5	0.02	0.02	1	0.01	0.2	0.1	0.01	0.01	0.01	0.1	0.1	10	0.005	0.01	0.5	0.01	0.5	0.02	20				
ADWG 2011 Health (v3.7 updated 2022)							2	10						4	5	7	4		4	1	0.5	7	10	7	70		6	0.7	5	2		1	20		0.5	90	0.3		20			0.9	4		100	8		50			
ANZECC 2000 - Lowland Rivers (NSW coastal rivers)																																																			
ANZECC 2000 - Stock Watering																																																			
ANZG (2018) - FW - 95% (updated 26 July 2021)								0.01						0.01		0.15							0.2			0.05							0.004																		
NEPM 2013 Table 1A(4) HSL D Comm/Ind GW for Vapour Intrusion, Sand																																																			
2-4m																																																			
4-8m																																																			
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Package	Location Code	Sample Date	Field ID	Sample Type	Lab Report Number																																														
M12 - West	BH107	18-Jul-19	BH107	Normal	ES1922601	<0.02	<0.02	<0.02	<0.2	<0.01	<0.02	<0.02	<0.02	<0.01	<0.2	<0.02	<0.05	<0.05	<0.02	<0.01	<0.01	<2	<0.01	<0.05	<0.02	-	<0.1	<0.5	<0.02	<0.02	-	<0.01	<0.2	<0.1	<0.01	<0.01	<0.01	<0.1	<0.1	<10	<0.005	<0.01	<0.5	<0.5	<0.01	<0.5	<0.02	<20			
		20-Aug-19	BH107	Normal	ES1926460	<0.02	<0.02	<0.02	<0.2	<0.01	<0.02	<0.02	<0.02	<0.01	<0.2	<0.02	<0.05	<0.05	<0.02	<0.01	<0.01	<2	<0.01	<0.05	<0.02	-	<0.1	<0.5	<0.02	<0.02	-	<0.01	<0.2	<0.1	<0.01	<0.01	<0.01	<0.1	<0.1	<10	<0.005	<0.01	<0.5	<0.5	<0.01	<0.5	<0.02	<20			
		24-Sep-19	BH107	Normal	ES1930997	<0.02	<0.02	<0.02	<0.2	<0.01	<0.02	<0.02	<0.02	<0.01	<0.2	<0.02	<0.05	<0.05	<0.02	<0.01	<0.01	<2	<0.01	<0.05	<0.02	-	<0.1	<0.5	<0.02	<0.02	-	<0.01	<0.2	<0.1	<0.01	<0.01	<0.01	<0.1	<0.1	<10	<0.005	<0.01	<0.5	<0.5	<0.01	<0.5	<0.02	<20			
		22-Oct-19	BH107	Normal	ES1934707	<0.02	<0.02	<0.02	<0.2	<0.01	<0.02	<0.02	<0.02	<0.01	<0.2	<0.02	<0.05	<0.05	<0.02	<0.01	<0.01	<2	<0.01	<0.05	<0.02	-	<0.1	<0.5	<0.02	<0.02	-	<0.01	<0.2	<0.1	<0.01	<0.01	<0.01	<0.1	<0.1	<10	<0.005	<0.01	<0.5	<0.5	<0.01	<0.5	<0.02	<20			
		07-Nov-19	BH107	Normal	ES1936840	<0.02	<0.02	<0.02	<0.2	<0.01	<0.02	<0.02	<0.02	<0.01	<0.2	<0.02	<0.05	<0.05	<0.02	<0.01	<0.01	<2	<0.01	<0.05	<0.02	-	<0.1	<0.5	<0.02	<0.02	-	<0.01	<0.2	<0.1	<0.01	<0.01	<0.01	<0.1	<0.1	<10	<0.005	<0.01	<0.5	<0.5	<0.01	<0.5	<0.02	<20			
		12-Dec-19	BH107	Normal	ES1941279	<0.02	<0.02	<0.02	<0.2	<0.01	<0.02	<0.02	<0.02	<0.01	<0.2	<0.02	<0.05	<0.05	<0.02	<0.01	<0.01	<2	<0.01	<0.05	<0.02	-	<0.1	<0.5	<0.02	<0.02	-	<0.01	<0.2	<0.1	<0.01	<0.01	<0.01	<0.1	<0.1	<10	<0.005	<0.01	<0.5	<0.5	<0.01	<0.5	<0.02	<20			
		20-Feb-20	BH107	Normal	ES2005947	<0.02	<0.02	<0.02	<0.2	<0.01	<0.02	<0.02	<0.02	<0.01	<0.2	<0.02	<0.05	<0.05	<0.02	<0.01	<0.01	<2	<0.01	<0.05	<0.02	-	<0.1	<0.5	<0.02	<0.02	-	<0.01	<0.2	<0.1	<0.01	<0.01	<0.01	<0.1	<0.1	<10	<0.005	<0.01	<0.5	<0.5	<0.01	<0.5	<0.02	<20			
		23-Apr-20	BH107	Normal	ES2013858	<0.02	<0.02	<0.02	<0.2	<0.01	<0.02	<0.02	<0.02	<0.01	<0.2	<0.02	<0.05	<0.05	<0.02	<0.01	<0.01	<2	<0.01	<0.05	<0.02	-	<0.1	<0.5	<0.02	<0.02	-	<0.01	<0.2	<0.1	<0.01	<0.01	<0.01	<0.1	<0.1	<10	<0.005	<0.01	<0.5	<0.5	<0.01	<0.5	<0.02	<20			
		21-May-20	BH107	Normal	ES2017665	<0.02	<0.02	<0.02	<0.2	<0.01	<0.02	<0.02	<0.02	<0.01	<0.2	<0.02	<0.05	<0.05	<0.02	<0.01	<0.01	<2	<0.01	<0.05	<0.02	-	<0.1	<0.5	<0.02	<0.02	-	<0.01	<0.2	<0.1	<0.01	<0.01	<0.01	<0.1	<0.1	<10	<0.005	<0.01	<0.5	<0.5	<0.01	<0.5	<0.02	<20			
		30-Jul-20	BH107	Normal	ES2026408	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
		11-Aug-20	BH107	Normal	ES2027951	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
		10-Sep-20	BH107	Normal	ES2032115	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
		09-Oct-20	BH107	Normal	ES2035519	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
		08-Dec-20	BH107	Normal	ES2043799	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		14-Jan-21	BH107	Normal	ES2101242	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		11-Feb-21	BH107	Normal	ES2104999	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		10-Mar-21	BH107	Normal	ES2108508	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		07-Apr-21	BH107	Normal	ES2112804	-	-	-	-																																										

Package	Location Code	Sample Date	Field ID	Sample Type	Lab Report Number																																																
M12 - Central	BH145	13-Jun-19	BH145	Normal	ES1918214	<0.02	<0.02	<0.02	<0.2	<0.01	<0.02	<0.02	<0.02	<0.01	<0.2	<0.02	<0.05	<0.05	<0.02	<0.01	<0.01	<2	<0.01	<0.05	<0.02	-	<0.1	<0.5	<0.02	<0.02	-	<0.01	<0.2	<0.1	<0.01	<0.01	<0.01	<0.1	<0.1	<10	<0.005	<0.01	<0.5	<0.5	<0.01	<0.5	<0.02	<20					
		17-Jul-19	BH145	Normal	ES1922407	<0.02	<0.02	<0.02	<0.2	<0.01	<0.02	<0.02	<0.02	<0.01	<0.2	<0.02	<0.05	<0.05	<0.02	<0.01	<0.01	<2	<0.01	<0.05	<0.02	-	<0.1	<0.5	<0.02	<0.02	-	<0.01	<0.2	<0.1	<0.01	<0.01	<0.01	<0.1	<0.1	<10	<0.005	<0.01	<0.5	<0.5	<0.01	<0.5	<0.02	<20					
		21-Aug-19	BH145	Normal	ES1926628	<0.02	<0.02	<0.02	<0.2	<0.01	<0.02	<0.02	<0.02	<0.01	<0.2	<0.02	<0.05	<0.05	<0.02	<0.01	<0.01	<2	<0.01	<0.05	<0.02	-	<0.1	<0.5	<0.02	<0.02	-	<0.01	<0.2	<0.1	<0.01	<0.01	<0.01	<0.1	<0.1	<10	<0.005	<0.01	<0.5	<0.5	<0.01	<0.5	<0.02	<20					
		26-Sep-19	BH145	Normal	ES1931491	<0.02	<0.02	<0.02	<0.2	<0.01	<0.02	<0.02	<0.02	<0.01	<0.2	<0.02	<0.05	<0.05	<0.02	<0.01	<0.01	<2	<0.01	<0.05	<0.02	-	<0.1	<0.5	<0.02	<0.02	-	<0.01	<0.2	<0.1	<0.01	<0.01	<0.01	<0.1	<0.1	<10	<0.005	<0.01	<0.5	<0.5	<0.01	<0.5	<0.02	<20					
		23-Oct-19	BH145	Normal	ES1934911	<0.02	<0.02	<0.02	<0.2	<0.01	<0.02	<0.02	<0.02	<0.01	<0.2	<0.02	<0.05	<0.05	<0.02	<0.01	<0.01	<2	<0.01	<0.05	<0.02	-	<0.1	<0.5	<0.02	<0.02	-	<0.01	<0.2	<0.1	<0.01	<0.01	<0.01	<0.1	<0.1	<10	<0.005	<0.01	<0.5	<0.5	<0.01	<0.5	<0.02	<20					
		12-Dec-19	BH145	Normal	ES1941279	<0.02	<0.02	<0.02	<0.2	<0.01	<0.02	<0.02	<0.02	<0.01	<0.2	<0.02	<0.05	<0.05	<0.02	<0.01	<0.01	<2	<0.01	<0.05	<0.02	-	<0.1	<0.5	<0.02	<0.02	-	<0.01	<0.2	<0.1	<0.01	<0.01	<0.01	<0.1	<0.1	<10	<0.005	<0.01	<0.5	<0.5	<0.01	<0.5	<0.02	<20					
		21-May-20	BH145	Normal	ES2017665	<0.02	<0.02	<0.02	<0.2	<0.01	<0.02	<0.02	<0.02	<0.01	<0.2	<0.02	<0.05	<0.05	<0.02	<0.01	<0.01	<2	<0.01	<0.05	<0.02	-	<0.1	<0.5	<0.02	<0.02	-	<0.01	<0.2	<0.1	<0.01	<0.01	<0.01	<0.1	<0.1	<10	<0.005	<0.01	<0.5	<0.5	<0.01	<0.5	<0.02	<20					
		30-Jul-20	BD01	Field_D	ES2026408	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					
			BH145	Normal	ES2026408	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.5	<0.02	<0.02	-	<0.01	<0.2	<0.1	<0.01	<0.01	<0.01	<0.1	<0.1	<10	<0.005	<0.01	<0.5	<0.5	<0.01	<0.5	<0.02	<20					
		13-Aug-20	BH145	Normal	ES2028325	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					
		26-Aug-20	BH145	Normal	740880	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
		09-Sep-20	BH145	Normal	ES2032115	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
		08-Oct-20	BH145	Normal	ES2035519	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
		11-Nov-20	BH145	Normal	ES2040330	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
		12-Nov-20	BD01	Field_D	ES2040667	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
		09-Dec-20	BH145	Normal	ES2043799	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
		12-Jan-21	BH145	Normal	ES2101242	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
		09-Feb-21	BH145	Normal	ES2104999	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
		10-Mar-21	BH145	Normal	ES2108508	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
		07-Apr-21	BH145	Normal	ES2112804	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-																											



	Pesticides			Fungicides	Herbicides
	Temephos	Trichlorfon	Triazophos	Fosetyl-al	Dinoseb
EQL	µg/L	µg/L	µg/L	µg/L	µg/L
	0.02	0.02	0.005	10	100
ADWG 2011 Health (v3.7 updated 2022)	400	7			
ANZECC 2000 - Lowland Rivers (NSW coastal rivers)					
ANZECC 2000 - Stock Watering					
ANZG (2018) - FW - 95% (updated 26 July 2021)					
NEPM 2013 Table 1A(4) HSL D Comm/Ind GW for Vapour Intrusion, Sand					
2-4m					
4-8m					
>8m					

Package	Location Code	Sample Date	Field ID	Sample Type	Lab Report Number					
M12 - West	BH104	16-Jul-19	BH104	Normal	ES1922192	<0.02	<0.02	<0.005	<10	-
		20-Aug-19	BH104	Normal	ES1926460	<0.02	<0.02	<0.005	<10	-
		24-Sep-19	BH104	Normal	ES1930997	<0.02	<0.02	<0.005	<10	-
		22-Oct-19	BH104	Normal	ES1934707	<0.02	<0.02	<0.005	<10	-
		07-Nov-19	BH104	Normal	ES1936840	<0.02	<0.02	<0.005	<10	-
		12-Dec-19	BH104	Normal	ES1941279	<0.02	<0.02	<0.005	<10	-
		16-Jan-20	BH104	Normal	ES2001376	<0.02	<0.02	<0.005	<10	-
		18-Feb-20	BH104	Normal	ES2005577	<0.02	<0.02	<0.005	<10	-
		12-Mar-20	SD01	Interlab D	707829	-	-	-	-	<100
		12-Mar-20	BD01	Field D	ES2008731	<0.02	<0.02	<0.005	<10	-
			BH104	Normal	ES2008731	<0.02	<0.02	<0.005	<10	-
		23-Apr-20	BH104	Normal	ES2013858	<0.02	<0.02	<0.005	<10	-
		19-May-20	BH104	Normal	ES2017191	<0.02	<0.02	<0.005	<10	-
		30-Jul-20	BH104	Normal	ES2026408	-	-	-	-	-
		11-Aug-20	BH104	Normal	ES2027951	-	-	-	-	-
		10-Sep-20	BD01	Field D	ES2032115	-	-	-	-	-
			BH104	Normal	ES2032115	-	-	-	-	-
		09-Oct-20	BD01	Field D	ES2035519	-	-	-	-	-
			BH104	Normal	ES2035519	-	-	-	-	-
		13-Nov-20	BH104	Normal	ES2040330	-	-	-	-	-
		08-Dec-20	BH104	Normal	ES2043799	-	-	-	-	-
			M12GW DUP	Field D	ES2043799	-	-	-	-	-
		14-Jan-21	BH104	Normal	ES2101242	-	-	-	-	-
			M12GWDUP	Field D	ES2101242	-	-	-	-	-
		11-Feb-21	BH104	Normal	ES2104999	-	-	-	-	-
			M12GWDUP	Field D	ES2104999	-	-	-	-	-
		10-Mar-21	BH104	Normal	ES2108508	-	-	-	-	-
			M12GWDUP	Field D	ES2108508	-	-	-	-	-
		07-Apr-21	BH104	Normal	ES2112804	-	-	-	-	-
			M12GWDUP	Field D	ES2112804	-	-	-	-	-
		04-May-21	BH104	Normal	ES2116634	-	-	-	-	-
			M12GWDUP	Field D	ES2116634	-	-	-	-	-
		08-Jun-21	BH104	Normal	ES2121745	-	-	-	-	-
			M12GWDUP	Field D	ES2121745	-	-	-	-	-
		07-Jul-21	BH104	Normal	ES2125048	-	-	-	-	-
			M12GWDUP	Field D	ES2125048	-	-	-	-	-
		13-Aug-21	BH104	Normal	ES2129596	-	-	-	-	-
			M12GWDUP	Field D	ES2129596	-	-	-	-	-
		01-Sep-21	BH104	Normal	ES2131753	-	-	-	-	-
			M12GWDUP	Field D	ES2131753	-	-	-	-	-
		15-Oct-21	BH104	Normal	ES2137338	-	-	-	-	-
		15-Oct-21	GWDUP1	Field D	ES2137338	-	-	-	-	-
		08-Nov-21	BH104	Normal	ES2140334	-	-	-	-	-
			GWDUP1	Field D	ES2140334	-	-	-	-	-
		08-Dec-21	BH104	Normal	ES2144782	-	-	-	-	-
			GWDUP1	Field D	ES2144782	-	-	-	-	-
		13-Jan-22	BH104	Normal	ES2201179	-	-	-	-	-
			GWDUP1	Field D	ES2201179	-	-	-	-	-
		10-Feb-22	GWDUP2	Interlab D	863166	-	-	-	-	-
		10-Feb-22	BH104	Normal	ES2204606	-	-	-	-	-
		18-Mar-22	BH104	Normal	ES2209694	-	-	-	-	-
		25-May-22	BH104	Normal	ES2218210	-	-	-	-	-
		27-Jun-22	GWDUP2	Interlab D	901087	-	-	-	-	-
		27-Jun-22	BH104	Normal	ES2222571	-	-	-	-	-
		20-Jul-22	GWDUP2	Interlab D	907459	-	-	-	-	-
		20-Jul-22	BH104	Normal	ES2225656	-	-	-	-	-



	Pesticides			Fungicides	Herbicides
	Temephos	Trichlorfon	Triazophos	Fosetyl-al	Dinoseb
	µg/L	µg/L	µg/L	µg/L	µg/L
EQL	0.02	0.02	0.005	10	100
ADWG 2011 Health (v3.7 updated 2022)	400	7			
ANZECC 2000 - Lowland Rivers (NSW coastal rivers)					
ANZECC 2000 - Stock Watering					
ANZG (2018) - FW - 95% (updated 26 July 2021)					
NEPM 2013 Table 1A(4) HSL D Comm/Ind GW for Vapour Intrusion, Sand					
2-4m					
4-8m					
>8m					

Package	Location Code	Sample Date	Field ID	Sample Type	Lab Report Number					
M12 - West	BH107	18-Jul-19	BH107	Normal	ES1922601	<0.02	<0.02	<0.005	<10	-
		20-Aug-19	BH107	Normal	ES1926460	<0.02	<0.02	<0.005	<10	-
		24-Sep-19	BH107	Normal	ES1930997	<0.02	<0.02	<0.005	<10	-
		22-Oct-19	BH107	Normal	ES1934707	<0.02	<0.02	<0.005	<10	-
		07-Nov-19	BH107	Normal	ES1936840	<0.02	<0.02	<0.005	<10	-
		12-Dec-19	BH107	Normal	ES1941279	<0.02	<0.02	<0.005	<10	-
		20-Feb-20	BH107	Normal	ES2005947	<0.02	<0.02	<0.005	<10	-
		23-Apr-20	BH107	Normal	ES2013858	<0.02	<0.02	<0.005	<10	-
		21-May-20	BH107	Normal	ES2017665	<0.02	<0.02	<0.005	<10	-
		30-Jul-20	BH107	Normal	ES2026408	-	-	-	-	-
		11-Aug-20	BH107	Normal	ES2027951	-	-	-	-	-
		10-Sep-20	BH107	Normal	ES2032115	-	-	-	-	-
		09-Oct-20	BH107	Normal	ES2035519	-	-	-	-	-
		08-Dec-20	BH107	Normal	ES2043799	-	-	-	-	-
		14-Jan-21	BH107	Normal	ES2101242	-	-	-	-	-
		11-Feb-21	BH107	Normal	ES2104999	-	-	-	-	-
		10-Mar-21	BH107	Normal	ES2108508	-	-	-	-	-
		07-Apr-21	BH107	Normal	ES2112804	-	-	-	-	-
		03-May-21	BH107	Normal	ES2116634	-	-	-	-	-
		08-Jun-21	BH107	Normal	ES2121745	-	-	-	-	-
		07-Jul-21	BH107	Normal	ES2125048	-	-	-	-	-
		13-Aug-21	BH107	Normal	ES2129596	-	-	-	-	-
		01-Sep-21	BH107	Normal	ES2131753	-	-	-	-	-
		15-Oct-21	GWDUP2	Interlab D	833147	-	-	-	-	-
		15-Oct-21	BH107	Normal	ES2137338	-	-	-	-	-
		08-Nov-21	BH107	Normal	ES2140334	-	-	-	-	-
		08-Dec-21	GWDUP2	Interlab D	849475	-	-	-	-	-
		08-Dec-21	BH107	Normal	ES2144782	-	-	-	-	-
		13-Jan-22	BH107	Normal	ES2201179	-	-	-	-	-
		10-Feb-22	BH107	Normal	ES2204606	-	-	-	-	-
		18-Mar-22	BH107	Normal	ES2209694	-	-	-	-	-
			GWDUP1	Field D	ES2209694	-	-	-	-	-
		25-May-22	BH107	Normal	ES2218210	-	-	-	-	-
		27-Jun-22	BH107	Normal	ES2222571	-	-	-	-	-
		20-Jul-22	BH107	Normal	ES2225656	-	-	-	-	-
	BH112	18-Jul-19	BH112	Normal	ES1922601	<0.02	<0.02	<0.005	<10	-
		20-Aug-19	BH112	Normal	ES1926460	<0.02	<0.02	<0.005	<10	-
		25-Sep-19	BH112	Normal	ES1931244	<0.02	<0.02	<0.005	<10	-
		22-Oct-19	BH112	Normal	ES1934707	<0.02	<0.02	<0.005	<10	-
		07-Nov-19	BH112	Normal	ES1936840	<0.02	<0.02	<0.005	<10	-
		12-Dec-19	BH112	Normal	ES1941279	<0.02	<0.02	<0.005	<10	-
		20-Feb-20	BH112	Normal	ES2005947	<0.02	<0.02	<0.005	<10	-
		21-Apr-20	BH112	Normal	ES2013464	<0.02	<0.02	<0.005	<10	-
		21-May-20	BH112	Normal	ES2017665	<0.02	<0.02	<0.005	<10	-
		30-Jul-20	BH112	Normal	ES2026408	-	-	-	-	-
		13-Aug-20	BH112	Normal	ES2028325	-	-	-	-	-
		10-Sep-20	BH112	Normal	ES2032115	-	-	-	-	-
		09-Oct-20	BH112	Normal	ES2035519	-	-	-	-	-
		08-Dec-20	BH112	Normal	ES2043799	-	-	-	-	-
		14-Jan-21	BH112	Normal	ES2101242	-	-	-	-	-
		11-Feb-21	BH112	Normal	ES2104999	-	-	-	-	-
		10-Mar-21	BH112	Normal	ES2108508	-	-	-	-	-
		07-Apr-21	BH112	Normal	ES2112804	-	-	-	-	-
		04-May-21	BH112	Normal	ES2116634	-	-	-	-	-
		08-Jun-21	BH112	Normal	ES2121745	-	-	-	-	-
		07-Jul-21	BH112	Normal	ES2125048	-	-	-	-	-
		13-Aug-21	BH112	Normal	ES2129596	-	-	-	-	-
		01-Sep-21	BH112	Normal	ES2131753	-	-	-	-	-
		15-Oct-21	BH112	Normal	ES2137338	-	-	-	-	-
M12 - West	BH112	08-Nov-21	BH112	Normal	ES2140334	-	-	-	-	-
		08-Dec-21	BH112	Normal	ES2144782	-	-	-	-	-
		13-Jan-22	GWDUP2	Interlab D	856978	-	-	-	-	-
		13-Jan-22	BH112	Normal	ES2201179	-	-	-	-	-
		10-Feb-22	BH112	Normal	ES2204606	-	-	-	-	-
			GWDUP1	Field D	ES2204606	-	-	-	-	-
		18-Mar-22	GWDUP2	Interlab D	874238	-	-	-	-	-
		18-Mar-22	BH112	Normal	ES2209694	-	-	-	-	-
		25-May-22	BH112	Normal	ES2218210	-	-	-	-	-
		27-Jun-22	BH112	Normal	ES2222571	-	-	-	-	-
		20-Jul-22	BH112	Normal	ES2225656	-	-	-	-	-



	Pesticides			Fungicides	Herbicides
	Temephos	Trichlorfon	Triazophos	Fosetyl-al	Dinoseb
EQL	µg/L	µg/L	µg/L	µg/L	µg/L
	0.02	0.02	0.005	10	100
ADWG 2011 Health (v3.7 updated 2022)	400	7			
ANZECC 2000 - Lowland Rivers (NSW coastal rivers)					
ANZECC 2000 - Stock Watering					
ANZG (2018) - FW - 95% (updated 26 July 2021)					
NEPM 2013 Table 1A(4) HSL D Comm/Ind GW for Vapour Intrusion, Sand					
2-4m					
4-8m					
>8m					

Package	Location Code	Sample Date	Field ID	Sample Type	Lab Report Number					
M12 - Central	BH145	13-Jun-19	BH145	Normal	ES1918214	<0.02	<0.02	<0.005	<10	-
		17-Jul-19	BH145	Normal	ES1922407	<0.02	<0.02	<0.005	<10	-
		21-Aug-19	BH145	Normal	ES1926628	<0.02	<0.02	<0.005	<10	-
		26-Sep-19	BH145	Normal	ES1931491	<0.02	<0.02	<0.005	<10	-
		23-Oct-19	BH145	Normal	ES1934911	<0.02	<0.02	<0.005	<10	-
		12-Dec-19	BH145	Normal	ES1941279	<0.02	<0.02	<0.005	<10	-
		21-May-20	BH145	Normal	ES2017665	<0.02	<0.02	<0.005	<10	-
		30-Jul-20	BD01	Field_D	ES2026408	-	-	-	-	-
			BH145	Normal	ES2026408	-	-	-	-	-
		13-Aug-20	BH145	Normal	ES2028325	-	-	-	-	-
		26-Aug-20	BH145	Normal	740880	-	-	-	-	-
		09-Sep-20	BH145	Normal	ES2032115	-	-	-	-	-
		08-Oct-20	BH145	Normal	ES2035519	-	-	-	-	-
		11-Nov-20	BH145	Normal	ES2040330	-	-	-	-	-
		12-Nov-20	BD01	Field_D	ES2040667	-	-	-	-	-
		09-Dec-20	BH145	Normal	ES2043799	-	-	-	-	-
		12-Jan-21	BH145	Normal	ES2101242	-	-	-	-	-
		09-Feb-21	BH145	Normal	ES2104999	-	-	-	-	-
		10-Mar-21	BH145	Normal	ES2108508	-	-	-	-	-
		07-Apr-21	BH145	Normal	ES2112804	-	-	-	-	-
		08-Jun-21	BH145	Normal	ES2121745	-	-	-	-	-
		07-Jul-21	BH145	Normal	ES2125048	-	-	-	-	-
		01-Sep-21	BH145	Normal	ES2131753	-	-	-	-	-
		15-Oct-21	BH145	Normal	ES2137338	-	-	-	-	-
		08-Nov-21	GWDUP2	Interlab_D	839397	-	-	-	-	-
		08-Nov-21	BH145	Normal	ES2140334	-	-	-	-	-
		08-Dec-21	BH145	Normal	ES2144782	-	-	-	-	-
		13-Jan-22	BH145	Normal	ES2201179	-	-	-	-	-
		10-Feb-22	BH145	Normal	ES2204606	-	-	-	-	-
		18-Mar-22	BH145	Normal	ES2209694	-	-	-	-	-
		25-May-22	GWDUP2	Interlab_D	892529	-	-	-	-	-
		25-May-22	BH145	Normal	ES2218210	-	-	-	-	-
			GWDUP1	Field_D	ES2218210	-	-	-	-	-
		27-Jun-22	BH145	Normal	ES2222571	-	-	-	-	-
			GWDUP1	Field_D	ES2222571	-	-	-	-	-
		20-Jul-22	BH145	Normal	ES2225656	-	-	-	-	-
			GWDUP1	Field_D	ES2225656	-	-	-	-	-

Appendix C

Baseline calculated percentiles

Surface Water Baseline Percentiles

pH

Phase		Baseline		
	Sampling Location	N	20 th %ile	80 th %ile
West	BADDS	10	7.02	7.76
	BADMS	5	7.00	7.16
	BADUS	15	7.13	7.84
	COSDS	14	7.26	8.03
	COSUS	14	7.23	8.20
Central	KEMDS	13	6.85	7.75
	KEMUS	14	7.16	7.57
	SOUUS	13	7.19	7.96
	SOUUS	13	7.21	7.80
East	HINDS	24	7.06	8.24
	HINUS	22	6.92	8.42
	ROPDS	24	7.19	7.68
	ROPUS	21	6.94	8.14

EC (µS/cm)

Phase		Baseline		
	Sampling Location	N	20 th %ile	80 th %ile
West	BADDS	10	641.20	1182.4
	BADMS	5	749.80	1139.0
	BADUS	15	782.20	1301.6
	COSDS	14	599.00	1209.6
	COSUS	14	630.20	1185.0
Central	KEMDS	13	179.44	1566.8
	KEMUS	14	1000.20	1879.0
	SOUUS	13	793.80	1056.0
	SOUUS	13	799.20	1047.4
East	HINDS	24	150.90	323.62
	HINUS	22	177.80	470.32
	ROPDS	24	946.00	4429.0
	ROPUS	21	127.80	237.0

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DO (% saturation)

Phase		Baseline		
	Sampling Location	N	20 th %ile	80 th %ile
West	BADDS	10	36.86	77.30
	BADMS	5	54.04	71.28
	BADUS	15	44.82	93.06
	COSDS	14	67.16	92.14
	COSUS	14	50.88	87.56
Central	KEMDS	13	6.26	82.46
	KEMUS	14	40.20	75.61
	SOUUS	13	53.44	88.65
	SOUUS	13	55.04	81.08
East	HINDS	24	43.27	101.28
	HINUS	22	45.11	103.66
	ROPDS	24	44.66	79.48
	ROPUS	21	46.75	120.90

TSS (mg/L)

Phase		Baseline	
	Sampling Location	N	80 th %ile
West	BADDS	10	34
	BADMS	5	29
	BADUS	15	36
	COSDS	14	39
	COSUS	14	52
Central	KEMDS	13	42
	KEMUS	14	19
	SOUUS	13	25
	SOUUS	13	26
East	HINDS	24	11
	HINUS	22	37
	ROPDS	24	9
	ROPUS	21	83

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Ammonia (mg/L)

Phase		Baseline	
	Sampling Location	N	80 th %ile
West	BADDS	10	0.07
	BADMS	5	0.18
	BADUS	15	0.08
	COSDS	14	0.05
	COSUS	14	0.06
Central	KEMDS	13	0.26
	KEMUS	14	0.09
	SOUUS	13	0.17
	SOUUS	13	0.21
East	HINDS	24	0.08
	HINUS	22	0.06
	ROPDS	24	0.05
	ROPUS	21	0.02

Total oxidised nitrogen (mg/L)

Phase		Baseline	
	Sampling Location	N	80 th %ile
West	BADDS	10	0.42
	BADMS	5	0.31
	BADUS	15	0.60
	COSDS	14	0.27
	COSUS	14	0.29
Central	KEMDS	13	2.20
	KEMUS	14	5.59
	SOUUS	13	1.78
	SOUUS	13	1.75
East	HINDS	24	0.07
	HINUS	22	0.04
	ROPDS	24	0.13
	ROPUS	21	0.01

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Total nitrogen (mg/L)

Phase		Baseline	
	Sampling Location	N	80 th %ile
West	BADDS	10	2.22
	BADMS	5	1.68
	BADUS	15	2.06
	COSDS	14	1.20
	COSUS	14	1.08
Central	KEMDS	13	8.44
	KEMUS	14	7.10
	SOUDS	13	3.40
	SOUUS	13	3.44
East	HINDS	24	1.50
	HINUS	22	1.50
	ROPDS	24	1.32
	ROPUS	21	2.00

Soluble reactive phosphorus (mg/L)

Phase		Baseline	
	Sampling Location	N	80 th %ile
West	BADDS	10	0.012
	BADMS	5	0.014
	BADUS	15	0.078
	COSDS	14	0.010
	COSUS	14	0.010
Central	KEMDS	13	0.544
	KEMUS	14	0.944
	SOUDS	13	0.138
	SOUUS	13	0.140
East	HINDS	24	0.010
	HINUS	22	0.010
	ROPDS	24	0.020
	ROPUS	21	0.010

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Total phosphorus (mg/L)

Phase		Baseline	
	Sampling Location	N	80 th %ile
West	BADDS	10	0.260
	BADMS	5	0.162
	BADUS	15	0.350
	COSDS	14	0.078
	COSUS	14	0.090
Central	KEMDS	13	1.044
	KEMUS	14	1.074
	SOUDS	13	0.330
	SOUUS	13	0.350
East	HINDS	24	0.150
	HINUS	22	0.108
	ROPDS	24	0.134
	ROPUS	21	0.210

Chlorophyll-a (mg/L)

Phase		Baseline	
	Sampling Location	N	80 th %ile
West	BADDS	10	0.025
	BADMS	5	0.009
	BADUS	15	0.015
	COSDS	14	0.005
	COSUS	14	0.006
Central	KEMDS	13	0.015
	KEMUS	14	0.003
	SOUDS	13	0.020
	SOUUS	13	0.018
East	HINDS	24	0.026
	HINUS	21	0.018
	ROPDS	24	0.003
	ROPUS	21	0.078

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N:P ratios (mg/l)

Phase		Baseline		
	Sampling Location	Mean TN	Mean TP	N:P
West	BADDS	1.80	0.15	11.84
	BADMS	1.24	0.13	9.54
	BADUS	1.76	0.22	7.90
	COSDS	0.79	0.08	10.38
	COSUS	0.75	0.06	13.29
Central	KEMDS	6.13	1.04	5.88
	KEMUS	5.56	0.82	6.79
	SOU DS	2.66	0.25	10.61
	SOUUS	2.76	0.24	11.58
East	HINDS	1.25	0.12	10.64
	HINUS	1.30	0.09	15.03
	ROPDS	1.72	0.23	7.42
	ROPUS	1.51	0.16	9.22

Arsenic (mg/L)

Phase		Baseline	
	Sampling Location	N	80 th %ile
West	BADDS	10	0.0020
	BADMS	5	0.0012
	BADUS	15	0.0020
	COSDS	14	0.0010
	COSUS	14	0.0010
Central	KEMDS	13	0.0016
	KEMUS	14	0.0020
	SOU DS	13	0.0020
	SOUUS	13	0.0020
East	HINDS	24	0.0020
	HINUS	22	0.0018
	ROPDS	24	0.0010
	ROPUS	21	0.0020

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Cadmium (mg/L)

Phase		Baseline	
	Sampling Location	N	80 th %ile
West	BADDS	10	0.0001
	BADMS	5	0.0001
	BADUS	15	0.0001
	COSDS	14	0.0001
	COSUS	14	0.0001
Central	KEMDS	13	0.0001
	KEMUS	14	0.0001
	SOUDS	13	0.0001
	SOUUS	13	0.0001
East	HINDS	24	0.0001
	HINUS	22	0.0001
	ROPDS	24	0.0001
	ROPUS	21	0.0001

Chromium (mg/L)

Phase		Baseline	
	Sampling Location	N	80 th %ile
West	BADDS	10	0.0012
	BADMS	5	0.0020
	BADUS	15	0.0020
	COSDS	14	0.0014
	COSUS	14	0.0010
Central	KEMDS	13	0.0020
	KEMUS	14	0.0010
	SOUDS	13	0.0016
	SOUUS	13	0.0016
East	HINDS	24	0.0020
	HINUS	22	0.0020
	ROPDS	24	0.0010
	ROPUS	21	0.0020

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Copper (mg/L)

Phase		Baseline	
	Sampling Location	N	80 th %ile
West	BADDS	10	0.0042
	BADMS	5	0.0026
	BADUS	15	0.0052
	COSDS	14	0.0024
	COSUS	14	0.0028
Central	KEMDS	13	0.0170
	KEMUS	14	0.0064
	SOUDS	13	0.0046
	SOUUS	13	0.0050
East	HINDS	24	0.0040
	HINUS	22	0.0040
	ROPDS	24	0.0050
	ROPUS	21	0.0050

Iron (mg/L)

Phase		Baseline	
	Sampling Location	N	80 th %ile
West	BADDS	10	2.58
	BADMS	5	2.54
	BADUS	15	1.95
	COSDS	14	2.25
	COSUS	14	1.61
Central	KEMDS	13	4.63
	KEMUS	14	1.23
	SOUDS	13	2.86
	SOUUS	13	2.76
East	HINDS	24	3.84
	HINUS	22	4.26
	ROPDS	24	1.01
	ROPUS	21	5.19

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Lead (mg/L)

Phase		Baseline	
	Sampling Location	N	80 th %ile
West	BADDS	10	0.0016
	BADMS	5	0.0020
	BADUS	15	0.0022
	COSDS	14	0.0010
	COSUS	14	0.0010
Central	KEMDS	13	0.0022
	KEMUS	14	0.0010
	SOUDS	13	0.0010
	SOUUS	13	0.0010
East	HINDS	24	0.0020
	HINUS	22	0.0018
	ROPDS	24	0.0014
	ROPUS	21	0.0020

Manganese (mg/L)

Phase		Baseline	
	Sampling Location	N	80 th %ile
West	BADDS	10	0.38
	BADMS	5	0.49
	BADUS	15	0.33
	COSDS	14	0.40
	COSUS	14	0.45
Central	KEMDS	13	0.79
	KEMUS	14	0.10
	SOUDS	13	0.33
	SOUUS	13	0.39
East	HINDS	24	0.39
	HINUS	22	0.19
	ROPDS	24	1.15
	ROPUS	21	0.32

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Mercury (mg/L)

Phase		Baseline	
	Sampling Location	N	80 th %ile
West	BADDS	10	0.0001
	BADMS	5	0.0001
	BADUS	15	0.0001
	COSDS	14	0.0001
	COSUS	14	0.0001
Central	KEMDS	13	0.0001
	KEMUS	14	0.0001
	SOUDS	13	0.0001
	SOUUS	13	0.0001
East	HINDS	24	0.0001
	HINUS	22	0.0001
	ROPDS	24	0.0001
	ROPUS	21	0.0001

Nickel (mg/L)

Phase		Baseline	
	Sampling Location	N	80 th %ile
West	BADDS	10	0.0032
	BADMS	5	0.0032
	BADUS	15	0.0032
	COSDS	14	0.0020
	COSUS	14	0.0024
Central	KEMDS	13	0.0026
	KEMUS	14	0.0024
	SOUDS	13	0.0036
	SOUUS	13	0.0030
East	HINDS	24	0.0020
	HINUS	22	0.0020
	ROPDS	24	0.0020
	ROPUS	21	0.0030

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Zinc (mg/L)

Phase		Baseline	
	Sampling Location	N	80 th %ile
West	BADDS	10	0.011
	BADMS	5	0.014
	BADUS	15	0.021
	COSDS	14	0.007
	COSUS	14	0.009
Central	KEMDS	13	0.020
	KEMUS	14	0.015
	SOUDS	13	0.011
	SOUUS	13	0.011
East	HINDS	24	0.008
	HINUS	22	0.007
	ROPDS	24	0.022
	ROPUS	21	0.012

The following analytes do not have 80th percentiles as the results are below the laboratory limit of detection. They include:

- Thermotolerant coliforms and E. coli
- BTEXN
- PAHs
- Phenols
- OCPs
- OPPs
- Oil and grease
- Halogenated hydrocarbons, VOCs and PCBs

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Groundwater Baseline Percentiles

Dissolved oxygen mg/L

Phase:	Baseline Monitoring Period		
Location ID	N	20th %ile	80th %ile
BH104 / BH104R	34	0.372	2.058
BH107 / BH107R	31	0.670	3.530
BH112 / BH112R	29	0.558	2.926
BH145R	--	--	--

Electrical Conductivity (µs/cm)

Phase:	Baseline Monitoring Period		
Location ID	N	20th %ile	80th %ile
BH104 / BH104R	34	10441	16920
BH107 / BH107R	31	4654	9375
BH112 / BH112R	29	6479	12589
BH145R	--	--	--

Redox (mV)

Phase:	Baseline Monitoring Period		
Location ID	N	20th %ile	80th %ile
BH104 / BH104R	34	98.82	272.08
BH107 / BH107R	31	151.30	291.40
BH112 / BH112R	29	225.88	301.18
BH145R	--	--	--

pH

Phase:	Baseline Monitoring Period		
Location ID	N	20th %ile	80th %ile
BH104 / BH104R	34	6.20	6.70
BH107 / BH107R	31	6.57	6.91
BH112 / BH112R	29	6.45	6.71
BH145R	--	--	--

Temperature (°C)

Phase:	Baseline Monitoring Period	
Location ID	N	80 th %ile
BH104 / BH104R	34	20.1
BH107 / BH107R	31	20.2
BH112 / BH112R	29	20.2
BH145R	--	--

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Ammonia (mg/L)

Phase:	Baseline Monitoring Period	
Location ID	N	80 th %ile
BH104 / BH104R	35	0.328
BH107 / BH107R	32	0.070
BH112 / BH112R	32	1.978
BH145R	--	--

Nitrate (mg/L)

Phase:	Baseline Monitoring Period	
Location ID	N	80 th %ile
BH104 / BH104R	35	0.122
BH107 / BH107R	32	2.484
BH112 / BH112R	32	1.922
BH145R	--	--

Nitrite (mg/L)

Phase:	Baseline Monitoring Period	
Location ID	N	80 th %ile
BH104 / BH104R	35	0.010
BH107 / BH107R	32	0.020
BH112 / BH112R	32	0.018
BH145R	--	--

Nitrogen (Total Oxidised) (as N) (mg/L)

Phase:	Baseline Monitoring Period	
Location ID	N	80 th %ile
BH104 / BH104R	35	0.122
BH107 / BH107R	32	2.534
BH112 / BH112R	32	1.922
BH145R	--	--

Total Nitrogen (mg/L)

Phase:	Baseline Monitoring Period	
Location ID	N	80 th %ile
BH104 / BH104R	35	1.260
BH107 / BH107R	32	3.080
BH112 / BH112R	32	3.840
BH145R	--	--

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Total Phosphorus (mg/L)

Phase:	Baseline Monitoring Period	
Location ID	N	80 th %ile
BH104 / BH104R	35	0.108
BH107 / BH107R	32	0.222
BH112 / BH112R	32	0.432
BH145R	--	--

Arsenic (mg/L)

Phase:	Baseline Monitoring Period	
Location ID	N	80 th %ile
BH104 / BH104R	35	0.001
BH107 / BH107R	32	0.001
BH112 / BH112R	32	0.001
BH145R	--	--

Cadmium (mg/L)

Phase:	Baseline Monitoring Period	
Location ID	N	80 th %ile
BH104 / BH104R	35	0.0001
BH107 / BH107R	32	0.0001
BH112 / BH112R	32	0.0001
BH145R	--	--

Chromium (mg/L)

Phase:	Baseline Monitoring Period	
Location ID	N	80 th %ile
BH104 / BH104R	35	0.001
BH107 / BH107R	32	0.001
BH112 / BH112R	32	0.001
BH145R	--	--

Copper (mg/L)

Phase:	Baseline Monitoring Period	
Location ID	N	80 th %ile
BH104 / BH104R	35	0.028
BH107 / BH107R	32	0.032
BH112 / BH112R	32	0.033
BH145R	--	--

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Iron (mg/L)

Phase:	Baseline Monitoring Period	
Location ID	N	80 th %ile
BH104 / BH104R	24	1.054
BH107 / BH107R	23	0.162
BH112 / BH112R	23	0.182
BH145R	--	--

Lead (mg/L)

Phase:	Baseline Monitoring Period	
Location ID	N	80 th %ile
BH104 / BH104R	35	0.001
BH107 / BH107R	32	0.001
BH112 / BH112R	32	0.001
BH145R	--	--

Manganese (mg/L)

Phase:	Baseline Monitoring Period	
Location ID	N	80 th %ile
BH104 / BH104R	24	0.699
BH107 / BH107R	23	0.502
BH112 / BH112R	23	0.266
BH145R	--	--

Mercury (mg/L)

Phase:	Baseline Monitoring Period	
Location ID	N	80 th %ile
BH104 / BH104R	35	0.0001
BH107 / BH107R	32	0.0001
BH112 / BH112R	32	0.0001
BH145R	--	--

Nickel (mg/L)

Phase:	Baseline Monitoring Period	
Location ID	N	80 th %ile
BH104 / BH104R	35	0.1054
BH107 / BH107R	32	0.0696
BH112 / BH112R	32	0.1162
BH145R	--	--

Zinc (mg/L)

Phase:	Baseline Monitoring Period	
Location ID	N	80 th %ile
BH104 / BH104R	35	0.0962
BH107 / BH107R	32	0.0848
BH112 / BH112R	32	0.1276
BH145R	--	--

Total Suspended Solids (mg/L)

Phase:	Baseline Monitoring Period	
Location ID	N	80 th %ile
BH104 / BH104R	24	61
BH107 / BH107R	23	275
BH112 / BH112R	23	726
BH145R	--	--

Total Dissolved Solids (mg/L)

Phase:	Baseline Monitoring Period	
Location ID	N	80 th %ile
BH104 / BH104R	24	9778
BH107 / BH107R	23	6210
BH112 / BH112R	23	8290
BH145R	--	--

There are no percentiles calculated for the following as they have mostly been less than the laboratory limit of detection:

- BTEXN
- TRH
- PAHs
- Speciated phenols



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