MOOREBANK INTERMODAL PRECINCT

Moorebank Precinct West:
Annual Operations Compliance Report

Report: #2

Period: November 2024 – November 2025

19 December 2025

MOOREBANK INTERMODAL PRECINCT

November 2024 – November 2025

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REVISIONS

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KEY TERMS AND ACRONYMS

Acronym/Term	Meaning
CoC	Conditions of Consent
DPE	Department of Planning and Environment
DPH&I	Department of Planning, Housing and Infrastructure
EPBC Act	Environmental Protection and Biodiversity Conservation Act 1999
ERP	Emergency Response Plan which includes the Bushfire Emergency and Evacuation Plan (BEEP), Bushfire Management Plan (BMP) and Flood Emergency Management Plan (FEMP)
IMEX	Import Export
MIP	Moorebank Intermodal Precinct
MPE	Moorebank Precinct East
MPW	Moorebank Precinct West
OAQMP	Operational Air Quality Management Plan
OCR	Six Monthly Operational Compliance Report
OCCS	Operational Community Communication Strategy
OEMP	Operational Environmental Management Plan
ONVMP	Operational Noise and Vibration Management Plan
OTAMP	Operational Traffic and Access Management Plan
OWRMP	Operational Waste and Resource Management Plan
POCR	Pre-operations Compliance Report
POPD	Program for Operational Phase Delivery
SIOMP	Operational Stormwater Infrastructure and Operation and Maintenance Plan
SSD	State Significant Development
UDLP	Urban Design and Landscape Plan
WTP	Workplace Travel Plan
SSD 7709	It involves the construction and operation of an IMEX terminal and associated Rail Link.

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1 EXECUTIVE SUMMARY

In accordance with SSD 7709 Condition of Consent (CoC) C14, an annual operational compliance report (OCR) must be prepared.

The Department approved the Operational Compliance Monitoring and Report Program (OCMRP) on 14/06/2024 under condition A42 of SSD 7709. The Operational Compliance Monitoring and Report Program (OCMRP) has been prepared in accordance with condition of consent (CoC) C14 of the consolidated MPW Stage 2 State Significant Development 7709 (SSD 7709) Development Consent.

Regular reviews of compliance against the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC 2011/6229) Conditions of Approval are undertaken but are not the subject of this compliance report.

This OCR has been prepared in accordance with the requirements of the *Compliance Reporting Post Approval Requirements (NSW DP&E, June 2018)* and has been prepared to outline the progress of compliance for all operational requirements against the Project Approvals.

2 INTRODUCTION

2.1 Project Overview

Application Number	
Project name:	Moorebank Intermodal Precinct
Proponent	Moorebank Intermodal Precinct
Site Address	Moorebank Precinct West site, Moorebank Avenue, Moorebank
Project Phase	Annual Operation Compliance Report (OCR)
Project Activity	Operation of an import-export terminal, rail link and warehouse and distribution facilities and associated infrastructure.
Report date	Friday, 19 December 2025

2.2 Moorebank Precinct West (MPW) Approvals

The Development is being undertaken in accordance with the following approvals:

- MPW EPBC (EPBC 2011/6086), approved on 27 September 2016 by Department of Climate Change, Energy, the Environment and Water (DCCEEW) (formerly Department of the Environment and Energy (DotEE))
- Consolidated MPW Stage 2 (SSD 7709) Development Consent (SSD 7709), approved on 11 November 2019 by NSW Independent Planning Commission (IPC); reissued by the NSW Land & Environment Court on 24 December 2021
- MPW Stage 2 Modification 1 (SSD 7709 MOD 1), approved on 24 December 2020 by IPC
- MPW S2 MOD 1 - Building Height Increase - 03 Instrument of Modification
- MPW S2 MOD 1 - Building Height Increase - 00 Assessment Report
- MPW S2 MOD 1 - Building Height Increase - 01 Response to Submissions
- MPW Stage 2 Modification 2 (SSD 7709 MOD 2), approved on 30 September 2021 by IPC.
- MEW S2 Notice of Modification SS07709
- MPW S2 MOD 2 - Adjustment to Construction Related Conditions - 03 Instrument of Modification
- MPW S2 MOD 2 - Adjustment to Construction Related Conditions - 00 Assessment Report
- MPW S2 MOD 2 - Adjustment to Construction Related Conditions - 01 Response to Submissions
- MPW S2 MOD 3 - Increase to Dangerous Goods Volumes

2.3 Scope and Purpose

In accordance with SSD 7709 Condition C14, an annual operation compliance report (OCR) is required to outline progress of compliance for all operation requirements against the MPW Stage 2 approval. The Report has been prepared in accordance with the requirements of the *Compliance Reporting Post Approval Requirements* (NSW DP&E, June 2018).

3 PROJECT DESCRIPTION

3.1 Site Location

The MPW Stage 2 Site is located at Moorebank Avenue, in the Liverpool local government area in New South Wales, approximately 27km south-west of the Sydney central business district and approximately 26km west of Port Botany.

The Site is generally described as the land immediately to the west of Moorebank Avenue and to the north of the East Hills passenger rail line, South of the M5 and east of the Georges River.

The Development location and overview are shown in Figure 1 and the indicative site layout areas are shown in Figure 2.

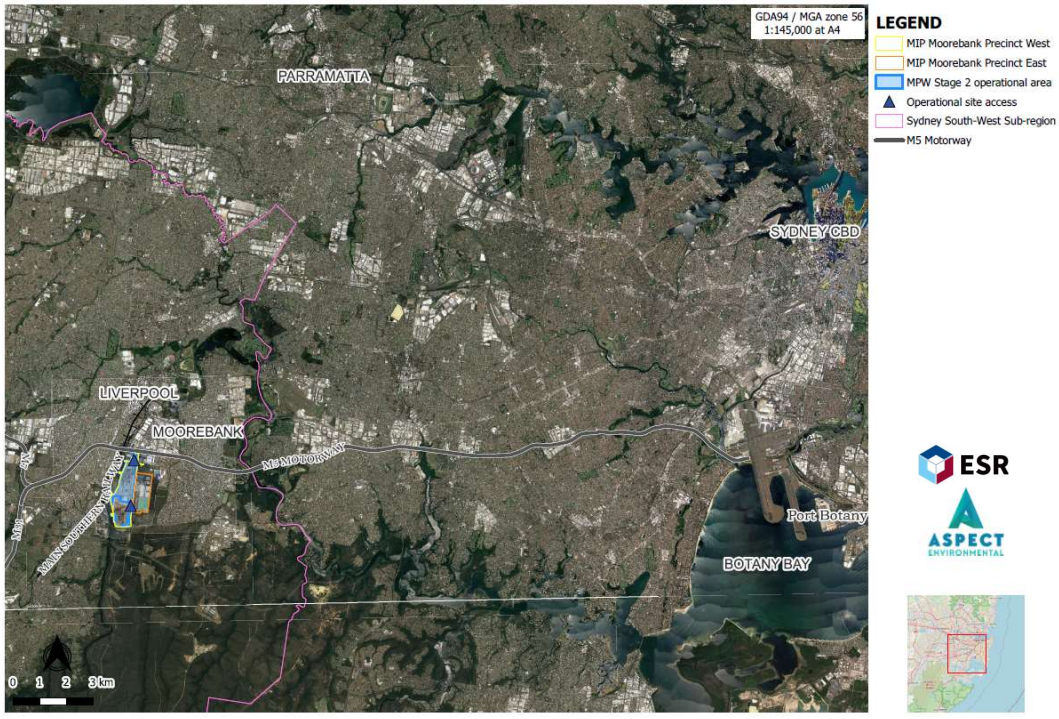

Figure 1 – MPW 2 operational site location

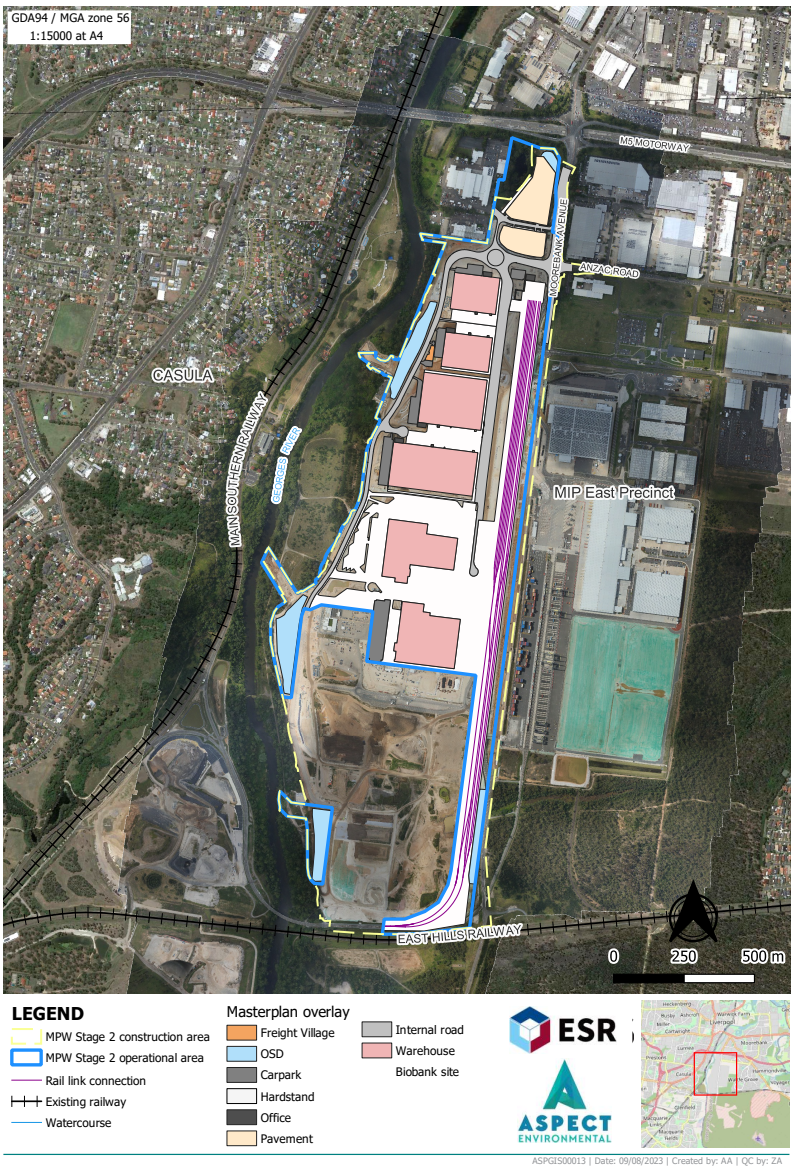

Figure 2 – MPW 2 development area

3.2 Scope of Works

The main features of the Moorebank Precinct West include:

- The 24/7 operation of an intermodal terminal (IMT) facility to support a container freight throughout volume of 500,000 twenty-foot equivalent units (TEUs) per annum
- Operation of the IMT facility includes operation of the rail link to the Southern Sydney Freight Line (SSFL) and container freight movement by truck to and from the Moorebank Precinct West (MPW) Site
- The 24/7 operation of a warehousing estate on the northern part of the site servicing the IMT facility
- The operation of on-site detention basin, bioretention/biofiltration systems and trunk stormwater drainage for the entire site.

3.3 Operational Activities Undertaken

Documents can be submitted in stages as permitted by CoC A42. The application of the operational documents will be staged to take progressive affect across the MPW site as construction is completed and operations commences.

This Operational Compliance Monitoring and Report Program (OCMRP) has been prepared in accordance with condition of consent (CoC) C14 of the consolidated MPW Stage 2 State Significant Development 7709 (SSD 7709) Development Consent. This OCR covers the period from November 2024 – November 2025.

The NSW Compliance Reporting Post Approval Requirements (CRPAR) (DPIE, 2018) set out the minimum requirements to be met when preparing compliance monitoring and reporting programs and compliance reports pursuant to CoC. These requirements apply to State significant projects where compliance monitoring and reporting is required by the CoC. Compliance reporting enables:

- All requirements in the CoC to be identified and the approach for assessing compliance to be considered, and where possible, documented
- The development's performance in terms of compliance with CoC to be evaluated, monitored and communicated
- The reporting obligations required by the CoC to be met
- Opportunities for improvement to be identified and adopted where appropriate.

These requirements do not replace the obligation to comply with specific requirements of the CoC in respect of compliance monitoring and reporting. If there is any inconsistency between the requirements of a CoC and the requirements in this document, the CoC prevail.

The MPW Stage 2 Development involves the operation of the IMT facility, rail link connection and warehousing. The operational activities within the Development are detailed below:

IMT facility

- Rail freight – Trains would enter the IMT facility using the Rail link. They would then be unloaded, with freight distributed through a container flow. Empty trains would then be re-loaded with freight containers. Full trains would be sent interstate and interstate Terminal.
- Road freight – Trucks would enter the IMT facility at the northern end via the main entrance off Moorebank Avenue or via the internal road if coming from the warehousing area. Trucks would be

loaded/unloaded using manual container handling equipment. Once loaded/unloaded, trucks would exit the IMT facility.

- Inter-precinct freight transfer – A portion of freight would be transferred from the IMT facility to the warehousing area within the Development or to the Import/Export (IMEX) terminal on the MPE Site without accessing the broader road network. These containers would be transferred using designated site transfer trucks.

Rail link connection – The Rail link will enable freight trains to connect the IMT facility and travel from both north and south.

Warehousing – Heavy and light vehicles would access the warehouses via the main site access off Moorebank Avenue. Table 1 provides a list of warehouses and their respective tenants.

Freight village (precinct amenities) – Vehicles would access the precinct amenities area via the main site access off Moorebank Avenue and the internal road. The following works have been undertaken:

- 4 warehouses are now operating (N1, N2, WH 5 & 6)
- The Interstate Terminal is operational
- Testing of the movement and storage of containers in and out of the terminal via rail
- Testing of truck processing, holding, and loading areas.
- Primary and secondary container loading/ unloading areas established.
- a freight village (operating from 7am to 6pm, 7 days/ week) including staff/ visitor amenities. Pickup and delivery of goods to warehouses via truck movements from IMEX
- Warehousing and Administrative Activities
- Security, maintenance and monitoring of all infrastructure and equipment related to the above activities.
- Status of warehouses noted in table 1.

Table 1: Warehouse Status

Warehouse	**Tenant**
Warehouse N1	Maersk Logistics & Services Australia Pty Ltd
Warehouse N2	Sydney Tools Pty Ltd
Warehouse N3	TBA
Warehouse N4	TBA
Warehouse 5	Woolworths – Moorebank Regional Distribution Centre (MoRDC)
Warehouse 6	Woolworths – Moorebank National Distribution Centre (MoNDC)
Warehouse S1 to S9	Existing warehouses and not appliable to SSD 7709

3.4 Operational Compliance

In accordance with the CoC and OEMP, environmental monitoring activities are required to be undertaken for the operation phase of the MPW Stage 2 project. These activities include air quality monitoring, noise monitoring, storm water infrastructure and water quality monitoring, Biodiversity Monitoring, and Biannual trip and origin destination reports. A summary of the monitoring results required for this reporting period is addressed in the following sections. The full reports for each of these monitoring requirements are available in the appendices Section.

3.4.1 Operations Reporting

3.4.1.1 Operations Compliance Report #1

There were two non-compliances from the previous compliance report (OCR #1, May 2024 to November 2024 reporting period). The status of these non-compliances have been identified in table 2.

Table 2 : Non-compliances in reporting period May 2024 – November 2024

CoC Ref	Type	Detail	Proposed or Completed Action	Current Status
SSD 7709 – B110a	Non-compliance	No evidence that the operational access point to the site is via the Chatham Avenue/Moorebank Avenue intersection	Obtain evidence that the operational access point to the site is via the Chatham Avenue/Moorebank Avenue intersection, or any other alternative as agreed by Transport for NSW in writing.	Closed
SSD 7709 – B176c	Non-compliance	Pending Safety Management System	Safety Management System was finalized and prepared for the next reporting period.	Closed

3.4.1.2 Operations Compliance Report #2 (Current Reporting Period)

There are eleven non-compliances from the current compliance report (OCR #2, November 2024 to November 2025 reporting period). The status of these non-compliances have been identified in table 3.

Table 3: Non-compliances in reporting period November 2024 – November 2025

CoC Ref	Type	Detail	Proposed or Completed Action	Current Status
SSD 7709 – A3	Non-compliance	Non-compliances were identified throughout this consent.	Identify and close out any non-compliances in relation to this consent.	Closed

CoC Ref	Type	Detail	Proposed or Completed Action	Current Status
SSD 7709 – B51	Non-compliance	No direct evidence for 4-star Green Star certification	Obtain 4-star Green Star certificates, Q2 2026	Open
SSD 7709 – B123	Non-compliance	No evidence of implementation of Workplace Travel Plan	Obtain evidence from tenants of implementation of Workplace Travel Plan, Q1 2026	Open
SSD 7709 – B131	Non-compliance	No discussion of handling of containers at MPW warehouses	Provide evidence of controls in place on site to demonstrate compliance, Q1 2026	Open
SSD 7709 – B176d	Non-compliance	No Hazard Audit report has been completed for this reporting period	Obtain updated Hazard Audit report, Q1 2026	Open
SSD 7709 – C11	Non-compliance	Department must be notified of any non-compliances	Notification provided to the Department via email	Closed
SSD 7709 – C14	Non-compliance	No evidence showing that the Department and Certifier were made aware of publication of the OCMRP at least 7 days prior to this occurring	Notify the Department of the publication of any reports under the OCMRP	Closed
SSD 7709 – C17	Non-compliance	Audit was conducted after the required date	Conduct next audit prior to the required date, i.e. August 2028	Closed

3.4.1.3 DPHI Notifications

No warning letters were received from DPHI during the reporting period.

3.4.1.4 Independent Environmental Audit

The environmental independent audit for the SSD 7709 consent was undertaken and finalized during the second reporting period. The audit report was received, filed and lodged with DPHI on 11/11/2025.

3.4.1.5 Incidents Management

There were 7 operational incidents reported in MPW operations in the reporting period.

Of the 7 recorded, none were significant (resulting in Environmental damage or reportable).

All incidents are managed in accordance with the incidents reporting procedure.

Incidents are summarized in Appendix J.

3.4.1.6 Complaints Management

50 complaints were received relating to MPW operations in this period.

These complaints were managed in accordance with the complaints reporting procedure.

Complaints are summarized in Appendix G.

3.4.1.7 Conditions of Consent

Compliance against the CoC is outlined in Appendix A, B and C. The status of each compliance requirement during the reporting period is recorded using the descriptors prescribed by the CRPAR (DPHI, 2018). These are provided in table 4.

Table 4: Compliance status descriptors (CRPAR 2018)

Status	Description
Compliant	The proponent has collected sufficient verifiable evidence to demonstrate all elements of the requirement have been complied with.
Non-compliant	The proponent has identified a non-compliance with one or more elements of the requirement.
Not triggered	A requirement has an activation or timing trigger that has not been met at the phase of the development when the compliance assessment is undertaken, therefore an assessment of compliance is not relevant.

3.5 Project Compliance Summary

This OCR outlines the progress of compliance for all operational requirements against Project Approvals. Compliance against the project CoC is outlined in SSD 7709, Appendix A, B & C.

A declaration of compliance is available in Appendix M.

4 AIR QUALITY MONITORING

Air quality monitoring and compliance results are summarised in the section below for the last reporting period:

4.1 Air Quality Monitoring Station Availability

A summary of availability (time of operation) of the continuous air quality monitoring stations for this reporting period is summarized in Table 5, with the most recent calibration date also stated.

Table 5: Monitoring station availability (%)

Monitoring station	Nov 2024	Dec 2024	Jan 2025	Feb 2025	Mar 2025	Apr 2025	Average %	Latest calibration date
	% availability each month							
AQM01	99	100	100	100	97	100	99	March 2024
AQM02	99	100	100	100	97	100	99	March 2024
AQM03	99	100	100	100	97	100	99	March 2024
AQM04	99	100	100	100	97	100	99	March 2024
Monitoring station	May 2025	Jun 2025	Jul 2025	Aug 2025	Sep 2025	Oct 2025	Average %	Latest calibration date
	% availability each month							
AQM01	100	100	100	98	100	100	100	March 2024
AQM02	100	100	100	98	100	100	100	March 2024
AQM03	100	100	100	98	100	100	100	March 2024
AQM04	100	100	74	98	100	100	95	March 2024

- All monitors were replaced around mid-April 2024. The older existing monitoring system (Sentinel) was also replaced with Omnis to support operations of the new monitors.
- All monitors had an average of 99% availability throughout the November 2024 – April 2025 reporting period.
- Monitors AQM01, AQM02 and AQM03 had 100% availability throughout the May 2025 – October 2025 reporting period.
- Comparing the November 2024 – April 2025 to the May 2025 – October 2025 reporting periods, the average availability of AQM03 and AQM04 improved.
- Monitor AQM04 had 74% availability in July 2025 as it was moved to accommodate works for a period during the month.

4.2 Dust Deposition

Dust deposition data from seven DDGs located around the site are provided by SERS and have been provided for incorporation into the monitoring program since May 2021. Another three were added in November 2024 and Stage 1 DDG 1 was removed in the first quarter of 2025 due to its location within the IMEX terminal. As of April 2025, nine DDGs provide representative dust deposition across the Precinct. NSW DCCEEW has set the criteria for dust deposition rates, and these are provided in Table 6.

Table 6: Dust deposition criteria

Averaging Period	Maximum increase in deposited dust* level	Maximum total deposited dust level
Annual	2 g/m²/month (incremental)	4 g/m²/month (cumulative)

* Deposited dust is assessed as insoluble solids. This is the mass of the insoluble portion of the deposited matter, as defined under AS 3580.10.1: 2016.

4.3 Dust Deposition Gauge Results

The results of the collection period November 2024 to November 2025 as provided by SERS is shown in Table 7.

Table 7: Dust deposition (insoluble solids g/m²/month) results from 29 April 2025 to 3 November 2025

Date	Stage 1 DDG 1	Stage 2 DDG 1	Stage 2 DDG 2	Stage 2 DDG 3	Stage 2 DDG 4	Stage 2 DDG 5	Stage 2 DDG 6	MPW1	MPW2	MPW3	Average
November 2024	2.2	1.1	0.8	1.1	0.9	0.8	0.5	3.6	**9.7**	3.7	2.4
December 2024	3.0	1.3	1.1	2.0	1.6	0.7	**5.5**	**4.2**	**13.0**	3.4	3.6
January 2025	N/A*	0.2	1.3	3.2	0.7	0.8	2.0	1.8	1.3	0.9	1.4
February 2025	2.7	0.2	0.3	1.4	0.4	0.5	<0.1	2	**8.7**	1.3	1.8
March# 2025	N/A**	0.1	0.3	0.2	0.3	<0.1	0.2	1.5	**4.2**	1.1	0.9
April 2025	N/A**	1.6	0.9	0.8	0.3	<0.1	1.0	2.9	3.0	1.1	1.3

NOTE: Bold/grey indicates an exceedance of the criteria.

* Stage 1 DDG 1 was unable to be collected during the reporting period.

Date	Stage 2 DDG 1	Stage 2 DDG 2	Stage 2 DDG 3	Stage 2 DDG 4	Stage 2 DDG 5	Stage 2 DDG 6	MPW1	MPW2	MPW3	Average
May 2025	**6.0**	2.3	**4.8**	**7.2**	**7.1**	**5.9**	**8.5**	**8.2**	**7.8**	**6.4**
June 2025	0.9	N/A*	1.0	0.3	0.4	0.5	1.6	**4.7**	2.1	1.4
July 2025 #	1.8	0.1	1.6	1.5	0.5	**7.9**	1.6	**12.0**	2.6	3.3
August # 2025	0.7	0.1	0.6	0.7	0.8	0.7	1.3	**6.1**	3.9	1.7
September # 2025	0.2	**6.0**	**110.0**	**5.6**	1.1	1.6	0.9	**4.9**	2.8	**14.8**
October 2025	<0.1	**4.2**	2.0	N/A**	N/A**	2.7	1.8	**9.4**	2.2	3.2

NOTE: Bold/grey indicates an exceedance of the criteria.

* Stage 2 DDG 2 was damaged and unavailable for the reporting period.

** Stage 2 DDG4 and Stage 2 DDG5 were unable to be accessed for the reporting period due to construction activities

Two reports were used to capture the entire month

As shown in Table 7, there were six individual gauge exceedances between November 2024 – April 2025 reporting period, and eighteen individual gauge exceedances between May 2025 – October 2025 reporting period.

- May 2025 had the highest number of exceedances for the annual reporting period. These exceedances are likely to be attributed to fugitive dust from construction activities across MPW, Moorebank Avenue upgrade works and the commencement of MARW excavation works.
- MPW2 DDG showed the highest rate of exceedance for the annual reporting period. MPW2 is located adjacent west of an area of the MPW site that is still under construction.
- Exceedances at Stage 2 DDG1, Stage 2 DDG2, Stage 2 DDG4 and Stage 2 DDG6 are likely due to construction activities associated with MARW, where there have been extensive excavations and material importation activities during the reporting period.
- The SERS report for September 2025 notes that the elevated concentrations of insoluble solids at sample location STG 2 DDG 3 are likely attributable to the presence of sand particles within the dust gauge.

4.4 $PM_{2.5}$ and PM_{10} Monitoring

The 12-month rolling annual average for the period November 2024 to October 2025 for all four monitors combined was below the annual average criteria (i.e. 7.0 µg/m3 for PM2.5 and 25.0 µg/m3 for PM10) for each month. As of October 2025, the 12-month rolling annual average for all four monitors was 4.3 µg/m3 for PM2.5 and 11.6 µg/m3 for PM10.

4.5 NO_2 Monitoring

The 12-month rolling annual average for all four monitors for the period November 2024 to October 2025 was below the annual average criteria (0.03 ppm) for each month.
As of October 2025, the 12-month rolling annual average for NO_2 for all four monitors is 0.006 ppm, well below the annual average criteria of 0.03 ppm.

4.6 CO

CO does not require annual reporting.

4.7 24-hour exceedances

24-hour exceedances are reported in the sections below:

4.7.1 $PM_{2.5}$ Monitoring

A review of the data for the reporting period (November 2024 to November 2025) did not identify any exceedance of the 24-hour average criteria (25 µg/m3) for PM2.5 for the annual reporting period.

4.7.2 PM_{10} Monitoring

A review of the data for the reporting period (November 2024 to November 2025) identified three (3) exceedances of the 24-hour average criteria (50 µg/m^3) for PM_{10} for the annual reporting period.

- 5 August 2025 (24-hour average of 62.5 µg/m^3) at monitor AQM03, mainly between 4am and 10am.
- 5 August 2025 (24-hour average of 68.5 µg/m^3) at monitor AQM04, mainly between 4am and 10am.
- 18 September 2025 (24-hour average of 55.4 µg/m^3) at monitor AQM02, mainly between 11am and 3pm.

The exceedance at AQM03 could be attributed to the ongoing construction activities associated with MPW, whilst the exceedances at AQM04, could be related to the construction activities for MARW at the intersection of Moorebank Avenue adjacent north of Piccolo Me. The exceedance at AQM02 is likely to be related to the construction of MARW due to the proximity of works to the monitor (approximately <50 metres).

4.8 NO_2 1-hour exceedances

No exceedance of NO_2 1-hour criteria (0.12 ppm / 120 ppb) were observed during the annual reporting period.

4.9 CO 8-hour exceedances

No 8-hour criteria exceedances for CO occurred during the annual reporting period.

4.10 Complaints (Air Quality)

Two complaints were made relating to air quality in the November 2024 to November 2025 period:

- First complaint was related to dust and an increase in the complainant's pool cleaning.
- Second complaint was from tenants at MPE and related to dust generated from MARW.

4.11 Ad-hoc monitoring

No ad-hoc monitoring was undertaken during this reporting period.

5 NOISE MONITORING

Throughout the annual review period, a range of ambient noise monitoring surveys were undertaken to address the range of noise monitoring requirements outlined in Table 4-1 of the MPW ONMP. To address SSD 7709 CoC B141, a rail noise monitoring system is permanently installed to measure noise levels from freight train operations on the Moorebank Intermodal Precinct (MIP) Rail Link. The reporting of this is included in the annual and six-monthly reporting periods to address SSD 7709 CoC B143.

5.1 Continuous Noise Monitoring

Noise monitoring was undertaken during February 2025 for Moorebank Precinct West (MPW) to address SSD 7709 CoC B140A. As the MPW noise requirements are cumulative this monitoring also considered MPE noise emissions.

The noise monitoring surveys determined that the noise emissions from MIP operations were less than the SSD 7709 Conditions of Consent (CoC) $L_{Aeq15min}$ noise limits at all surrounding receiver locations for all monitoring periods. Typically, the maximum noise levels from MIP operations were generally compliant with the L_{Amax} noise limits, however, several periods were identified where the L_{Amax} noise levels were above the L_{Amax} noise limit for residences in Casula. As exceedances were measured a further investigation of the identified noise events was undertaken, and recommendations for feasible and reasonable mitigation and management measures included to reduce these noise levels at receivers as required by Section 4.3 of the MPW S2 ONMP.

The noise report can be found in Appendix E.

6 WATER QUALITY MONITORING

The stormwater network water quality monitoring data and reporting done by the MIP Stormwater Infrastructure Operation and Maintenance Plan (SIOMP) contractor forms the basis for the ongoing monitoring program to assess stream health in accordance with MPW Stage 2 SSD 7709 CoC B38. This water quality monitoring program is guided by the SIOMP and helps determine any change in stream health or water quality throughout the life of the Project and to ascertain whether these changes can be attributed to the Project works. The full water quality monitoring reports can be found in Appendix F.

The stormwater infrastructure system discharges water into the natural drainage system via three outlets:

- Basin 5 detains water from the northern section of MPW before discharging into Georges River
- Basin 6 detains water from the mid-section of MPW before discharging into Georges River
- Basin 8 detains water from the southern section of MPW before discharging into Georges River

Key water quality monitoring metrics for this reporting period are outlined in tables 8, 9 and 10 below:

Table 8: Spring 2024 water quality monitoring results

	Dissolved Oxygen (ppm)	pH (%)	Phosphorous (µg/L)	Nitrogen (µg/L)
OSD 5	10.5	6.21	30	400
OSD 6	10.4	6.51	160	400
OSD 8	10.5	6.21	50	800

Table 9: Autumn 2025 water quality monitoring results

	Dissolved Oxygen (ppm)	pH (%)	Phosphorous (µg/L)	Nitrogen (µg/L)
OSD 5	10.19	8.32	10	400
OSD 6	10.47	8.08	30	400
OSD 8	9.09	8.12	40	400

Table 10: Spring 2025 water quality monitoring results

	Dissolved Oxygen (ppm)	pH (%)	Phosphorous (µg/L)	Nitrogen (µg/L)
OSD 5	5.30	7.50	20	300
OSD 6	9.50	8.37	90	1000
OSD 8	8.70	6.30	50	600

Dissolved oxygen is oxygen held in the water and available to aquatic organisms. Dissolved oxygen levels typically range between 5 and 14 mg/L (ppm), and thus the results from OSD 5, 6 and 8 throughout this reporting period are satisfactory.

The pH refers to the degree of acidity or alkalinity of a substance. The values for pH readings are as expected, with pH of 6.5–9 for rural streams and rivers and pH 6–9 for urban lakes and ponds being considered acceptable.

There are quite a few exceedances in the phosphorous and nitrogen values, with the preferred limit for phosphorous and nitrogen being 50 µg/L and 350 µg/L respectively. These exceedances can be attributed to the water outflow volumes being low and highly concentrated at the time of the assessment. Low volume pools will concentrate nutrient particles and sediments and contribute to elevated levels for both phosphorous and nitrogen values under these test / sample conditions.

7 STORMWATER INFRASTRUCTURE

Stormwater infrastructure managed under the Stormwater Infrastructure Operation and Maintenance Plan (SIOMP) was inspected and assessed during the period. An annual independent audit was undertaken per SSD 7709 CoC B36 during this annual reporting period by a suitably qualified WSUD professional.

The conclusion of the audit was that the Development is compliant with the requirements set out in CoC B36 and that the constructed stormwater systems are working as intended and are being maintained and cleaned. The stormwater infrastructure is free from excessive build-up of material. Based on site observations of the outlets there was no visual evidence of sediment build up, and the water quality at the Georges River discharge point did not appear to be impacted at all.

The stormwater infrastructure audit report can be found in Appendix K.

8 FLORA AND FAUNA MONITORING

Biodiversity monitoring will now be managed internally with no separate reporting required under SSD 7709

Monitoring activities undertaken in the period included:

- Monitoring of weed cover
- Monitoring of threatened species occurrence
- Monitoring of viability of native vegetation adjoining the rail easement
- Monitoring of feral fauna occurrence
- Monitoring of Nest boxes

The biodiversity (Flora and Fauna) monitoring report has been provided to the department for information. Actioning requirements and recommendations raised from the report are consistently being addressed as a part of daily operations.

Regarding biodiversity monitoring results, except for weed cover and nest boxes monitoring results, for this compliance report due to different reporting frequencies between the compliance report and the annual biodiversity report, this compliance report will have no applicable results for this section. The compliance reporting periods for Moorebank Intermodal Precinct (MIP) West versus the annual biodiversity monitoring reporting is as follows:

- MIP West: Annual reporting (e.g., November 2024 to November 2025, November 2025 to November 2026)
- Biodiversity monitoring reporting: Annual reporting (e.g., May 2024 to May 2025, May 2025 to May 2026)

Due to the similarity in the biodiversity monitoring requirements which are required annually across MIP East and MIP West, it was decided to compile the findings into a single annual monitoring report, which is delivered in May. In combining the monitoring results of MIP East and West into a single annual report, it has created a lag in biodiversity reporting from May 2025 to November 2025 for the MIP West reporting period. Instead, the reporting components of biodiversity monitoring MIP West for this period (November 2024 to November 2025) will be included in the combined annual report in May 2026. In essence, the biodiversity monitoring requirements for operation of MIP West are being met, however the submission of reporting components for MIP West does not strictly align to the compliance reporting period as set by the Department. Any biodiversity monitoring results for the November 2024 to November 2025 reporting period will be included in operations compliance report #3.

8.1 Weed Monitoring

Weed monitoring has been continued to be conducted across MPW. The MPW operational facility includes the landscaped vegetation along Bushmasters Avenue. Monitoring involved traversing the MIP operational facility on foot, surveying landscaped areas, stormwater infrastructure and soft batters adjoining the RALP. Results of the weed monitoring surveys during the June 2025, August 2025 and October 2025 surveys are summarised below in table 11, 12 and 13. The full reports can be found in Appendix H.

Table 11: Weed Monitoring Results for June 2025

Inspection area	Weed abundances for current survey
Landscaped areas along	• Landscapes vegetation is in good condition, with minor weed incursions • Weed species present include Sonchus oleraceus (Common Sowthistle), Chloris virgata (Rhodes Grass), Bidens pilosa, Conyza bonariensis

Bushmasters Avenue)	(Fleabane), Cyclospermum leptophyllum (Slender Celery), and Tagetes minuta (Stinking Roger). • Areas with limtied to no landscaped vegetation are particularly susceptible to weed incursion from cleared areas (see adjacent photo)

Table 12: Weed monitoring results for August 2025

Inspection area	Weed abundances for current survey
Landscaped areas along Bushmasters Avenue	• Landscapes vegetation is in good condition, with minor weed incursions • Weed species present include Sonchus oleraceus (Common Sowthistle), Chloris virgata (Rhodes Grass), Bidens pilosa, Conyza bonariensis (Fleabane), Cyclospermum leptophyllum (Slender Celery), and Tagetes minuta (Stinking Roger). • Areas with limtied to no landscaped vegetation are particularly susceptible to weed incursion from cleared areas (see adjacent photo)

Table 13: Weed Monitoring Results for October 2025

Inspection area	Weed abundances for current survey
Landscaped areas along Bushmasters Avenue	• Landscapes vegetation is in good condition, with minor weed incursions • Weed species present include Sonchus oleraceus (Common Sowthistle), Chloris virgata (Rhodes Grass), Bidens pilosa, Conyza bonariensis (Fleabane), Cyclospermum leptophyllum (Slender Celery), and Tagetes minuta (Stinking Roger). • Areas with limtied to no landscaped vegetation are particularly susceptible to weed incursion from cleared areas (see adjacent photo)

8.2 Artificial Hollow Management Strategy

Based on the results of nest box monitoring over the past six years, it was recommended that the artificial hollow management strategy at MIP be revised. Thus, an Artificial Hollow Management Strategy was developed to supersede the Nest Box Strategy (CPB 2017) and provide direction to ESR going forward for how artificial hollows will be managed across MIP to maintain the required tree hollow offset. The Georges River Corridor is comprised of a narrow, linear strip of bushland that extends for approximately three kilometres, alongside the MPW project. This vegetation is within the Moorebank offset area. A total of 195 nest boxes have been installed in this area, including a mix of boxes designed for microbats, small, medium and large arboreal mammals, small birds, parrots, cockatoos and owls.

Three different artificial hollow types are to be implemented: nest boxes, log hollows and carved hollows. The results of this new Artificial Hollow Management Strategy will be prepared following each annual spring monitoring event, and a summary report will be provided to describe the results of the monitoring program, also identifying any corrective maintenance activities that were completed or are recommended. For the management strategy report, please refer to Appendix L.

9 BIANNUAL TRIP AND ORIGIN DESTINATION REPORT

The BTODR has been undertaken for the reporting period and addresses the relevant requirements of the Project Approvals and other guidelines and standards applicable during operations of MPW. The BTODR is proposed to keep an accurate record of the shipping containers and vehicle arrivals / departures against approved volumes.

The data provided within this report has been collected in accordance with the SSD 7709 CoC B120 and enables a comparative assessment of traffic accessing the Site and future growth in operational activities. The full report will be submitted separately under SSD 7709 CoC B120.

Moorebank Intermodal Precinct

APPENDIX A – SSD 7709 PART A

Approval (ID)	Compliance Requirement	Development Phase	Compliance Status of Current Reporting Period (November 2024 to November 2025)	Status of Previous Reporting Period (May 2024 to November 2025)	Monitoring Requirement Methodology (See condition and management plan)	Ongoing Activities and Implementation	Evidence and Comments (Received to date from tenants and consultants)	DPHI Receipt / Consultant Document Name	Outstanding Information / Actions (Required from tenants and consultants)
A1	In addition to meeting the specific performance measures and criteria in this consent, all reasonable and feasible measures must be implemented to prevent, and if prevention is not reasonable and feasible, minimise, any material harm to the environment that may result from the construction and operation of the development, and any rehabilitation required under this consent.	Construction and Operation	Compliant	Compliant	Community Communication Strategy (CCS)	A CCS report has been prepared to address this condition	18/11/2024 - Revision K of the CCS has been filed and lodged 31/07/2025 - This condition is implemented under the OEMP and sub plans for operations. The condition is implemented under the CEMP and sub plans (including CCS) for construction.	Document name: SSD7709_CCS_Rev_K_Clean DPHI receipt: Post Approval Form_20241126061336	Outstanding Information Required - Nil
A2	The Applicant must ensure that all of its employees, contractors (and their sub-contractors) are made aware of, and are instructed to comply with, the conditions of this consent relevant to activities they carry out in respect of the development.	Construction and Operation	Compliant	Compliant	Operational Environmental Management Plan (OEMP)	Ensure all employees and contractors have received a copy of the latest version of the OEMP	27/3/2025 - Revision 8 of the OEMP has been filed and lodged to the MIP website for employees and contractors to review. Knight Frank (property manager) have provided all tenants with latest versions of the OEMP and sub plans.	Document Name: SSD 7709 MPW S2 OEMP_Rev08 DPHI receipt: Post Approval Form_20241126044549	Outstanding Information Required - Nil
A3	The development may only be carried out: (a) in compliance with the conditions of this consent; (b) in accordance with all written directions of the Planning Secretary; (c) in accordance with the EIS, Response to Submissions (RtS) and Consolidated assessment clarification responses; and (d) in accordance with the modification application SSD-7709-Mod-3 and supporting documentation; and (e) in accordance with the management and mitigation measures in Appendix 2	Operation	Not Compliant	Compliant	Pre-Operation Compliance Report (POCR)	A POCR has been developed to ensure all development criteria listed in this condition are satisfied	14/05/2024 - Revision 1 of the POCR has been filed and lodged 8/12/2025 - Findings from the independent audit, September 2025: Refer to evidence and findings from specific non-compliances elsewhere in this table. Non-compliances have been identified against various conditions and thus compliance with A3a) has not been achieved. Each condition will be actioned accordingly.	Document Name: SSD 7709_POCR_Rev01 DPHI receipt: Post Approval Form_20240515093350	Outstanding Information Required - Nil
A4	Consistent with the requirements in this consent, the Planning Secretary may make written directions to the Applicant in relation to: (a) the content of any strategy, study, system, plan, program, review, audit, notification, report or correspondence submitted under or otherwise made in relation to this consent, including those that are required to be, and have been, approved by the Planning Secretary; and (b) the implementation	Operation	Compliant	Not Triggered	Pre-Operation Compliance Report (POCR)	A POCR has been developed to ensure all development criteria listed in this condition are satisfied	No evidence at moment as condition not triggered	Not applicable as condition not triggered	No outstanding information as condition not triggered
A5	The conditions of this consent and directions of the Planning Secretary prevail to the extent of any inconsistency, ambiguity or conflict between them and a document listed in Conditions A3(c) – (d). In the event of an inconsistency, ambiguity or conflict between any of the documents listed in Conditions A3(c) – (d), the most recent document prevails to the extent of the inconsistency, ambiguity or conflict. Note: For the purposes of this condition, there will be an inconsistency between documents if it is not possible to comply with both documents, or in the case of a condition of consent or direction of the Planning	Operation	Not Triggered	Not Triggered	Pre-Operation Compliance Report (POCR)	A POCR has been developed to ensure all development criteria listed in this condition are satisfied	No evidence at moment as condition not triggered	Not applicable as condition not triggered	No outstanding information as condition not triggered
A6	This consent lapses five years after the date from which it operates, unless the development has physically commenced on the land to which the consent applies before that date.	Operation	Compliant	Not Triggered	Pre-Operation Compliance Report (POCR)	A POCR has been developed to ensure all development criteria listed in this condition are satisfied	No evidence at moment as condition not triggered	Not applicable as condition not triggered	No outstanding information as condition not triggered
A13	The container freight throughput for MPW must not exceed 500,000 TEU p.a.	Operation	Compliant	Compliant	Biannual Trip Origin and Destination Report (BTODR) Tenant Lease Agreements	A BTODR has been prepared to address the requirements of this condition.	8/07/2025 - Revision 1 of the BTODR has been filed and uploaded to the Major Projects website. 25/09/2025 - Tenant lease agreements to ensure condition compliance have been obtained.	Document Name: P2588r02_MPW BTODR May 2025 DPHI receipt: Post Approval Form_20250625051550	Outstanding Information Required - Nil
A14	Containers that are transferred between the site and Port Botany must be transferred by rail, unless there is planned track maintenance or where unforeseen circumstances have occurred (e.g. an incident, breakdown, derailment or emergency maintenance on the rail line).	Operation	Observation	Compliant	Biannual Trip Origin and Destination Report (BTODR) Tenant Lease Agreements	A BTODR has been prepared to address the requirements of this condition.	8/07/2025 - Revision 1 of the BTODR has been filed and uploaded to the Major Projects website. 25/09/2025 - Tenant lease agreements to ensure condition compliance have been obtained.	Document Name: P2588r02_MPW BTODR May 2025 DPHI receipt: Post Approval Form_20250625051550	Outstanding Information Required - Nil
A15	The transfer of containers between Port Botany and the intermodal terminal facility must not commence until the rail connection to the Southern Sydney Freight Line is operational.	Operation	Compliant	Compliant	Biannual Trip Origin and Destination Report (BTODR)	A BTODR has been prepared to address the requirements of this condition.	8/07/2025 - Revision 1 of the BTODR has been filed and uploaded to the Major Projects website. 30/07/2025 - This condition is satisfied indefinitely as the Southern Sydney Freight Line became operational prior to the INTS receiving its first train on the 16/06/2025.	Document Name: P2588r02_MPW BTODR May 2025 DPHI receipt: Post Approval Form_20250625051550	Outstanding Information Required - Nil
A15a	The development must not generate more than: (a) 2670 light vehicle movements a day during operation; and (b) 1654 heavy vehicle movements a day during operation.	Operation	Compliant	Compliant	Biannual Trip Origin and Destination Report (BTODR)	A BTODR has been prepared to address the requirements of this condition.	8/07/2025 - Revision 1 of the BTODR has been filed and uploaded to the Major Projects website.	Document Name: P2588r02_MPW BTODR May 2025 DPHI receipt: Post Approval Form_20250625051550	Outstanding Information Required - Nil
A15b	The applicant must keep accurate records of the number of heavy and light vehicles entering and leaving site each day. These records must be provided to the Planning Secretary upon request, and to the approved traffic auditor upon the trigger events in B120B occurring and prior to the commencement of the Traffic Audit required under condition B120A.	Operation	Compliant	Compliant	Biannual Trip Origin and Destination Report (BTODR)	A BTODR has been prepared to address the requirements of this condition.	8/07/2025 - Revision 1 of the BTODR has been filed and uploaded to the Major Projects website.	Document Name: P2588r02_MPW BTODR May 2025 DPHI receipt: Post Approval Form_20250625051550	Outstanding Information Required - Nil
A17	The warehousing and distribution facilities must only be used for activities associated with freight using the either the MPE or MPW rail intermodal terminal.	Operation	Compliant	Compliant	Biannual Trip Origin and Destination Report (BTODR) Tenant Lease Agreements	A BTODR has been prepared to address the requirements of this condition. Additionally, warehouse freight documentation has been collected to record warehousing and distribution facility activities.	8/07/2025 - Revision 1 of the BTODR has been filed and uploaded to the Major Projects website. 25/09/2025 - Tenant lease agreements to ensure condition compliance have been obtained.	Document Name: P2588r02_MPW BTODR May 2025 DPHI receipt: Post Approval Form_20250625051550	Outstanding Information Required - Nil
A18	Notwithstanding Condition A17, movements of containers between a rail intermodal terminal on either MPE and MPW site, and a warehouse on either the MPE or MPW site, are permitted where those movements are also approved for MPE.	Operation	Compliant	Compliant	Warehouse Freight Documentation	A BTODR has been prepared to address the requirements of this condition. Additionally, warehouse freight documentation has been collected to record warehousing and distribution facility activities.	8/07/2025 - Revision 1 of the BTODR has been filed and uploaded to the Major Projects website. Warehouse freight documentation has also been received and filed.	Document Name: P2588r02_MPW BTODR May 2025 DPHI receipt: Post Approval Form_20250625051550	Outstanding Information Required - Nil

Approval (ID)	Compliance Requirement	Development Phase	Compliance Status of Current Reporting Period (November 2024 to November 2025)	Status of Previous Reporting Period (May 2024 to November 2025)	Monitoring Requirement Methodology (See condition and management plan)	Ongoing Activities and Implementation	Evidence and Comments (Received to date from tenants and consultants)	DPHI Receipt / Consultant Document Name	Outstanding Information / Actions (Required from tenants and consultants)
A19	For the avoidance of doubt, nothing in this consent permits: (a) the occupation or use of a warehouse and/or distribution facility on the site before the commencement of operation of either the MPE or MPW rail intermodal terminal; or (b) truck-to-truck movements.	Operation	**Compliant**	**Compliant**	Biannual Trip Origin and Destination Report (BTODR) Tenant Lease Agreements	A BTODR has been prepared to address the requirements of this condition. Additionally, warehouse freight documentation has been collected to record warehousing and distribution facility activities.	8/07/2025 - Revision 1 of the BTODR has been filed and uploaded to the Major Projects website. 25/09/2025 - Tenant lease agreements to ensure condition compliance have been obtained.	Document Name: P2588r02_MPW BTODR May 2025 DPHI receipt: Post Approval Form_20250625051550	Outstanding Information Required - Nil
A20	Freight village tenants and occupations are restricted to those activities that provide: (a) ancillary support for the development, its tenants, worker population and visitors; (b) a nexus with activities undertaken in relation to the warehouse, logistics functions of the IMT development and/ or; (c) provide aligned services to the intermodal functions.	Operation	**Compliant**	**Compliant**	Warehouse Freight Documentation	KF to seek from tenants the proof of occupation activities			Outstanding Information Required - Nil
A27	References in the conditions of this consent 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 consent. However, consistent with the conditions of this consent and without altering any limits or criteria in this consent, the Planning Secretary may, when issuing directions under this consent in respect of ongoing monitoring and management obligations, require compliance with an updated or revised version of such a guideline, protocol, Standard or policy, or a replacement of them.	Operation	**Compliant**	**Compliant**	Applicability of Guidelines	Planning secretary may make written directions to the applicant	No evidence at moment as condition not triggered	No outstanding information as condition not triggered	No outstanding information as condition not triggered
A28	Where conditions of this consent require consultation with an identified party, the Applicant must: (a) consult with the relevant party prior to submitting the subject document to the Planning Secretary for approval; and (b) provide details of the consultation undertaken in the document submitted to the Planning Secretary including: (i) the outcome of that consultation, matters resolved and unresolved (and the justification for matters remaining unresolved); and (ii) details of any disagreement remaining between the party consulted and the Applicant and how the Applicant has addressed the matters not resolved.	Operation	**Compliant**	**Compliant**	Evidence of Consultation	Applicant will consult with an identified party and notify the planning secretary	No evidence at moment as condition not triggered	No outstanding information as condition not triggered	No outstanding information as condition not triggered
A32	The Applicant must: (a) not commence Construction until the Community Communication Strategy has been approved by the Planning Secretary. (b) implement for the Community Communication Strategy for the duration of construction and for 12 months following the commencement of operation.	Construction and Operation	**Observation**	**Compliant**	Community Communication Strategy	A CCS has been developed to satisfy this condition	19/12/2025 - Revision K of the community communication strategy filed and uploaded to the Major Projects website	Document Name: SSD7709_CCS_Rev_K_Clean DPHI receipt: Post Approval Form_20241126061336	Outstanding Information Required - Nil

Approval (ID)	Compliance Requirement	Development Phase	Compliance Status of Current Reporting Period (November 2024 to November 2025)	Status of Previous Reporting Period (May 2024 to November 2025)	Monitoring Requirement Methodology (See condition and management plan)	Ongoing Activities and Implementation	Evidence and Comments (Received to date from tenants and consultants)	DPHI Receipt / Consultant Document Name	Outstanding Information / Actions (Required from tenants and consultants)
A37	For the duration of the works until 6 months after the commencement of operation (or staged operation), or as agreed with the Planning Secretary, the approved ER must: (a) receive and respond to communication from the Planning Secretary in relation to the environmental performance of the development; (b) consider and inform the Planning Secretary on matters specified in the terms of this consent; (c) consider and recommend to the Applicant any improvements that may be made to work practices to avoid or minimise adverse impact to the environment and to the community; (d) review documents required under this consent and any other documents that are identified by the Planning Secretary, to ensure they are consistent with requirements in or under this consent and if so: (f) make a written statement to this effect before submission of such documents to the Planning Secretary (if those documents are required to be approved by the Planning Secretary); or (ii) make a written statement to this effect before the implementation of such documents (if those documents are required to be submitted to the Planning Secretary/ Department for information or are not required to be submitted to the Planning Secretary/ Department); (e) regularly monitor the implementation of the documents required under this consent to ensure implementation is being carried out in accordance with the document and the terms of this consent; (f) as may be requested by the Planning Secretary, help plan, attend or undertake audits of the development commissioned by the Department including scoping audits, programming audits, briefings, and site visits, but not Independent Audits required under Condition C19 of this consent; (g) as may be requested by the Planning Secretary, assist the Department in the resolution of community complaints; and (h) assess the impacts of minor ancillary facilities comprising lunch sheds, office sheds and portable toilet facilities as required by Condition A40 of this consent; (i) consider any minor amendments to be made to the CEMP or CEMP sub-plans that require updating, or amendments of an administrative nature, and are consistent with the conditions of this consent and the most recent version of the CEMP or CEMP sub-plan approved by the Planning Secretary, and if satisfied that such an amendment is necessary, approve the minor amendment; and	Operation	**Compliant**	**Compliant**	Environmental Representative Report	The environmental representative will provide reports to the planning secretary on an ongoing basis for six months after the commencement of operation	16/07/2025 - Environmental representative reports from February 2024 to August 2024 have been filed and lodged. 23/09/2025 - The scope of ER inspections/reporting is limited to construction activities. The extension of the ER's construction role 6 months post commencement of operations concerns the construction defects period rather than operational activities.	Refer to A37 Environmental representative requirements folder for documents	Outstanding Information Required - Nil
A38	The Applicant must provide all documentation requested by the ER in order for the ER to perform their functions specified in Condition A37 (including preparation of the ER monthly report), as well as: (a) the complaints register (to be provided on a monthly basis); and (b) a copy of any assessment carried out by the Applicant of whether proposed work is consistent with the consent (which must be provided to the ER before the commencement of the subject work).	Operation	**Compliant**	**Compliant**	Environmental Representative Report	The applicant will provide the ER all documentation requested	16/07/2025 - Complaints registers, assessments and revision K of the CCS have been filed and lodged. 23/09/2025 - The scope of ER inspections/reporting is limited to construction activities. The extension of the ER's construction role 6 months post commencement of operations concerns the construction defects period rather than operational activities.	Refer to A38 Environmental representative support folder for documents	Outstanding Information Required - Nil
A39	The Planning Secretary may at any time commission an audit of an ER's exercise of its functions under Condition C20. The Applicant must: (a) facilitate and assist the Planning Secretary in any such audit; and (b) make it a term of their engagement of an ER that the ER facilitate and assist the Planning Secretary in any such audit.	Operation	**Not Triggered**	**Compliant**	Environmental Representative Audit	The Secretary will be assisted if an audit is prompted	No evidence at moment as condition not triggered	No outstanding information as condition not triggered	No outstanding information as condition not triggered
A41	Unless stated otherwise, the Applicant must submit strategies, plans and programs required under this consent to the Planning Secretary at least one month prior to commencement of construction or operation.	Construction and Operation	**Compliant**	**Not Triggered**	Documentation Submission	Strategies, plans and programs will be submitted to the Secretary at least one month prior to the commencement of construction or operation	16/07/2025 - Strategies, plans and programs required under this consent prior to the commencement of operation have been received, filed and lodged at least one month prior. The documents and revisions are as followed: 1. LVMP, revision 3 2. POAQMP, revision 15 3. OERP, revision 4 4. OFFMP, revision 6 5. ONMP, revision 4 6. OTAMP, revision 7 7. SIOMP, revision 3 8. SQMP, revision 3	Refer to A41 Submit documents one month prior folder for documents	Outstanding Information Required - Nil
A42	Unless stated otherwise in this consent, the Applicant with the approval of the Planning Secretary may: (a) prepare and submit any strategy, plan or program required by this consent as part of the construction or operational environmental management plan on a staged basis; (b) combine any strategy, plan or program required by this consent (if a clear relationship is demonstrated between the strategies, plans or programs that are proposed to be combined); and (c) update any strategy, plan or program required by this consent (to ensure the strategies, plans and programs required under this consent are updated on a regular basis and incorporate additional measures or amendments to improve the environmental performance of the development). Note: Documents that cannot be staged include Development Layout Drawings required under Condition B2, and Stormwater Design Development Report and Revised Stormwater System Design Drawings and supporting documentation required under Condition B4, and Site Audit Statement required under Condition B169. Any strategy, plan or program prepared in accordance with Condition A42, where previously approved by the Planning Secretary under this consent, that is subsequently updated in accordance with Condition A42(c), must be submitted to the satisfaction of the Planning Secretary.	Construction and Operation	**Compliant**	**Compliant**	Documentation Submission	Strategies, plans and programs will be submitted to the Secretary at least one month prior to the commencement of construction or operation and if there are any updates	16/07/2025 - Strategies, plans and programs required by this condition have been received, filed and lodged	Refer to A42 Document submission requirements folder for documents	Outstanding Information Required - Nil
A43	If approved by the Planning Secretary, updated strategies, plans or programs supersede the previous versions of them and must be implemented in accordance with the condition that requires the strategy, plan or program.	Construction and Operation	**Compliant**	**Compliant**	Documentation Submission	Updated strategies, plans and programs will be submitted to the Secretary and will be implemented in accordance with the relevant conditions	16/07/2025 - Strategies, plans and programs that have been updated have superseded previous versions of them, and have been received, filed and lodged	Refer to A43 Updated document requirements folder for documents	Outstanding Information Required - Nil
A45	Prior to the commencement of operation of each warehousing sub-stage, evidence must be provided to the satisfaction of the Planning Secretary that all estate infrastructure, including internal estate roads, bushfire protection infrastructure, utilities, drainage and stormwater quality infrastructure, has been constructed to the extent required to service the sub-stage. Note: These conditions do not relate to staged development within the meaning of section 83B of the EP&A Act.	Operation	**Not Triggered**	**Compliant**	Estate Infrastructure Evidence	Estate infrastructure evidence report(s) will be submitted to the planning secretary prior to the commencement of operation	10/07/2025 - Estate infrastructure documents have been sent to the Secretary	Refer to A045 WH sub-stage Infrastructure condition folder for documents	Outstanding Information Required - Nil
A46	The date of commencement of each of the following phases of the development must be notified to the Department in writing, at least 2 weeks before that date: (a) any work; (b) vegetation clearing required to conduct remediation; (c) remediation; (d) low impact works; (e) construction; (f) operation; (g) cessation of operations; and (h) decommissioning.	Operation	**Not Triggered**	**Compliant**	Notification of Commencement	The Department will be notified at least two weeks before the date of the works listed in this condition	Refer to A46 condition folder for the DPHI receipts. Please note below the warehouse occupation dates: WHN1: Occupation 22/05/2024 WHN2: Occupation 29/05/2024 WHN3: Occupation 19/05/2025 WHN4: Occupation 19/05/2025 JR RDC West 12: 13/06/2024 JN NDC West 13: 15/04/2024 2/09/2025 - Commencement of operations statement received and filed 26/11/2025 - RDC operations commencement notification received and filed	Refer to A046 and A047 WH Notification of Commencement of Operation condition folder for documents	Outstanding Information Required - Nil
A47	If the construction, operation or decommissioning of the development is to be staged, the Department must be notified in writing at least 2 weeks before the commencement of each stage, of the date of commencement and the development to be carried out in that stage.	Construction and Operation	**Compliant**	**Compliant**	Notification of Commencement	The Department will be notified at least two weeks before the date of the works listed in this condition	Refer to A47 condition folder for the DPHI receipts. Please note below the warehouse occupation dates: WHN1: Occupation 22/05/2024 WHN2: Occupation 29/05/2024 WHN3: Occupation 19/05/2025 WHN4: Occupation 19/05/2025 JR RDC West 12: 13/06/2024 JN NDC West 13: 15/04/2024	Refer to A046 and A047 WH Notification of Commencement of Operation condition folder for documents	Outstanding Information Required - Nil

Approval (ID)	Compliance Requirement	Development Phase	Compliance Status of Current Reporting Period (November 2024 to November 2025)	Status of Previous Reporting Period (May 2024 to November 2025)	Monitoring Requirement Methodology (See condition and management plan)	Ongoing Activities and Implementation	Evidence and Comments (Received to date from tenants and consultants)	DPHI Receipt / Consultant Document Name	Outstanding Information / Actions (Required from tenants and consultants)
A51	Before the commencement of operation of the development, the Applicant must obtain a Compliance Certificate for water and sewerage infrastructure servicing of the site under section 73 of the Sydney Water Act 1994.	Operation	**Not Triggered**	**Compliant**	Utilities and Public Infrastructure Certificate	Obtain a Compliance Certificate for water and sewerage infrastructure	9/09/2024 - Sydney Water compliance certificate (dated 20/06/2023) received and filed	Document Name: 193389 signed section 73.pdf	Outstanding Information Required - Nil
A52	Before the issue of an Occupation Certificate for the development, the Applicant is to provide evidence, satisfactory to the Certifying Authority, that arrangements have been made for: (a) the installation of fibre-ready facilities to all individual lots and/ or premises to enable fibre to be readily connected to any premises that is being or may be constructed on those lots; and (b) the provision of fixed-line telecommunications infrastructure in the fibre-ready facilities to all individual lots and/ or premises demonstrated through an agreement with a carrier.	Operation	**Compliant**	**Compliant**	Telecommunications Documentation	Ensure arrangements have been made for the installation of fibre-ready facilities	Refer to A52 condition folder for supporting documents that arrangements have been made for the installation of fibre infrastructure	Refer to A052 & A053 Telecommunications conditions folder for documents	Outstanding Information Required - Nil
A53	The Applicant must demonstrate that the carrier has confirmed in writing they are satisfied that the fibre ready facilities are fit for purpose.	Operation	**Compliant**	**Compliant**	Telecommunications Documentation	Confirmation from the carrier that they are satisfied with the fibre ready facilities has been obtained	Refer to A53 condition folder for supporting documents that the carrier is satisfied	Refer to A052 & A053 Telecommunications conditions folder for documents	Outstanding Information Required - Nil
A54	Prior to the commencement of any works, and for the life of the development, the Applicant must ensure that there is a suitable meteorological station operating on the site or within the vicinity of the site that: (a) complies with the requirements in the latest version of EPA's Approved Methods for Sampling of Air Pollutants in New South Wales (DEC, 2016) (as may be updated or replaced from time to time); and (b) is capable of continuous real-time measurement of atmospheric stability category determined by the sigma theta method in accordance with the NSW Noise Policy for Industry (NPI, EPA, 2017) (as may be updated or replaced from time to time).	Construction and Operation	**Compliant**	**Compliant**	Meteorological Monitoring Station	Obtain evidence of a suitable meteorologication operating station within the vicinity of the site	10/07/2025 - Email from Todoroski Air services to verify a suitable station is near the site.	Document Name: 19070998_Moorebank_Intermodal_Met_Station_200604	Outstanding Information Required - Nil
AN1	All licences, permits, approvals and consents as required by law must be obtained and maintained as required for the development. No condition of this consent removes any obligation to obtain, renew or comply with such licences, permits, approvals and consents.	Operation	**Not Triggered**	**Compliant**	Advisory Notes	All licences, permits, approvals and consents as required by law must be obtained and maintained as required for the development	27/08/2025 - All licences, permits, approvals and consents as required by law have been obtained and maintained as required for the development.	Refer to MIP website for licences, permits, approvals and consents https://moorebankintermodalprecinct.com.au/	Outstanding Information Required - Nil

Moorebank Intermodal Precinct

APPENDIX B – SSD 7709 PART B

Approval (ID)	Compliance Requirement	Development Phase	Compliance Status of Current Reporting Period (November 2024 to November 2025)	Status of Previous Reporting Period (May 2024 to November 2024)	Monitoring Requirement Methodology (See condition and management plan)	Ongoing Activities and Implementation	Evidence and Comments (Received to date from tenants and consultants)	DPHI Receipt / Consultant Document Name	Outstanding Information / Actions (Required from tenants and consultants)
B20	Discharge of stormwater from the development must not cause scour/ erosion of the banks or bed, or pollution of the Georges River or Anzac Creek. Note: Pollution of waters as defined under section 120 of the POEO Act.	Construction and Operation	**Compliant**	**Compliant**	Stormwater Maintenance Report	Obtain stormwater maintenance report from contractor to ensure no scour/erosion	14/04/2025 - Latest maintenance report logbooks from SIOMP contractor have been received and filed	Refer to B20 Georges River or Anzac Creek pollution folder for maintenance report logbooks	Outstanding Information Required - Nil
B36	Prior to commencement of operation, the Applicant must prepare a Stormwater Infrastructure Operation and Maintenance Plan to manage the operation and maintenance of stormwater infrastructure on-site and off-site, to the satisfaction of the Planning Secretary. The plan must form part of the OEMP required under Condition C5 and must be implemented for the life of the assets and must include provision for: (a) the management and maintenance of the assets, including evidence that a maintenance contract is in place with a reputable and experienced maintenance contractor; (b) quarterly inspections, and inspections after major rainfall events including scour/ bank protection structures; (c) schedule for routine checking (at least quarterly), cleaning and servicing of all water quality devices/ systems in accordance with the manufacturer's and/ or designer's recommendations; (d) maintenance of records of all maintenance activities undertaken; (e) preparing quarterly maintenance reports, detailing the results of quarterly inspections, inspections after major rainfall events, and maintenance activities; (f) recording results of water quality monitoring required under Condition B38; (g) investigation, management and mitigation of water quality target exceedances; (h) requiring annual independent auditing; and (I) procedures for submission of the quarterly maintenance reports and annual independent audit reports to the Planning Secretary, including the results of inspections, management and maintenance actions and water quality monitoring.	Operation	**Compliant**	**Compliant**	Stormwater Infrastructure Operation and Maintenance Plan (SIOMP)	A Stormwater Infrastructure Operation and Maintenance Plan has been prepared to address this condition	1/04/2025 - Revision 4 of the SIOMP has been filed and lodged 14/04/2025 - Latest maintenance report logbooks from SIOMP contractor have been received and filed	Refer to B36 Stormwater Infrastructure Operation and Maintenance Plan folder for SIOMP and maintenance report logbooks	Outstanding Information Required - Nil
B37	In addition to the requirements for independent environmental audits under Conditions C16 to C18, the annual audit of the stormwater quality system must be undertaken by a suitably qualified professional with demonstrable experience in WSUD. The audit is to verify the condition of the treatment system(s), verify and document that the system(s) is working as intended, verify the system(s) has been cleaned adequately, verify there is no excessive build-up of material in the system(s) and identify any issues with the treatment system(s) which require rectification for the system(s) to adequately perform its intended function.	Operation	**Compliant**	**Compliant**	Annual Audit	An audit stormwater quality system has been undertaken by a suitably qualified professional with demonstrable experience in WSUD.	27/08/2025 - First audit pending 1/09/2025, as operations only commenced in 2024	Not applicable as condition not triggered	Outstanding Information Required - Nil
B38	Prior to commencement of operation, the Applicant must prepare a Stormwater Quality Monitoring Program in consultation with Council and the EPA. The program must form part of the OEMP required under Condition C5, be implemented for the life of the development and include the following: (a) base line water quality data; (b) monitoring parameters; (c) water quality assessment criteria; (d) receiving water quality monitoring sites in Anzac Creek and upstream and downstream of the site in the Georges River; (e) monitoring of water quality at sediment basin/ on-site detention/ bioretention basin outlet channels and piped outlets discharging to the Georges River; (f) frequency of sampling, including wet weather sampling; (g) method of sampling and analysis; (h) assess water quality and quantify performance for construction discharges and ongoing stormwater discharges from the development to ensure protection of the desired ecological values of Anzac Creek; and (I) include sampling locations and the frequency of sampling including wet weather sampling.	Operation	**Observation**	**Compliant**	Stormwater Quality Monitoring Program (SQMP)	A Stormwater Quality Monitoring Program has been prepared to address this condition	1/04/2025 - Revision 4 of the SQMP has been filed and lodged	Document name: SSD7709-MPW-S2-SQMP_Rev04_Redacted DPHI receipt: Post Approval Form_20241126043118	Outstanding Information Required - Nil
B46	The Applicant must ensure dust emissions generated by the development do not cause exceedances of the following criteria at private property not associated with the development: (a) 2 g/m2/month maximum increase in deposited dust level; and (b) 4 g/m2/month maximum deposited dust level.	Operation	**Observation**	**Compliant**	Precinct Operational Air Quality Management Plan (POAQMP)	A POAQMP and dust monitoring reports will be developed to ensure there are no exceedances	29/04/2025 - Monthly reports are provided by SERS and reflected in Arcadis monthly air quality reports under section 4 (specifically section 4.2). These are also stated in the 6-monthly compliance reports under Section 4.2. Consultant has confirmed air quality reports from SERS and Arcadis from MPE testing also covers MPW: See condition folder for documentation.	Document name: MIP POAQMP - SSD7709 update_Rev16 DPHI receipt: Post Approval Form_20241126042759 Refer to MPES2 B55, B59 & B60 OAQMP Requirements folder for dust emission reports	Outstanding Information Required - Nil
B47A	Prior to the commencement of operation of the MPW development, the Applicant must prepare an Operational AQMP (AQMP) for the entire precinct (MPE + MPW) and submit for the approval of the Planning Secretary. The Applicant may submit a plan approved under an approval for the MPE site, provided it is amended to apply to and address air quality impacts of the MPW development. The AQMP must be prepared by a suitably qualified person(s) and must form part of the OEMP required by condition C5. The AQMP must demonstrate how the development would comply with the conditions of consent, and include: (a) identification of sources and quantify airborne pollutants; (b) best practise reactive and proactive control measures that will be implemented for each emission source; (c) provisions for the implementation of additional measures in response to issues identified during monitoring and reporting; (d) for all emission sources associated with site operations; (i) key performance indicator(s); (ii) monitoring method(s); (iii) location, frequency and duration of monitoring; (iv) recording keeping; (v) complaints register; (vi) response procedures; and (vii) compliance monitoring. (e) phased conversion to reach stackers of Tier 4 standard for particle emissions (or equivalent standard that is satisfactory to the Secretary) at the MPW Site within ten years of first operation of the Site.	Operation	**Compliant**	**Compliant**	Precinct Operational Air Quality Management Plan (POAQMP)	An operational AQMP will be developed to address this condition	16/04/2025 - Revision 16 of the AQMP has been filed and lodged	Document name: MIP POAQMP - SSD7709 update_Rev16 DPHI receipt: Post Approval Form_20241126042759	Outstanding Information Required - Nil
B47B	The Applicant must: (a) not commence operation until the AQMP is approved by the Planning Secretary; and (b) operate the development on accordance with the AQMP approved by the Planning Secretary (and as revised and approved by the Planning Secretary from time to time).	Operation	**Compliant**	**Compliant**	Precinct Operational Air Quality Management Plan (POAQMP)	An operational AQMP will be developed and lodged to the secretary to address this condition	16/04/2025 - Revision 16 of the POAQMP has been filed and lodged	Document name: MIP POAQMP - SSD7709 update_Rev16 DPHI receipt: Post Approval Form_20241126042759	Outstanding Information Required - Nil
B48	The Development must be designed and operated to meet Urban Heat Island Mitigation principles and to achieve a 4°C degree decrease in temperature compared to neighbouring industrial developments by including measures such as: (a) WSUD elements such as wetlands; (b) shade tree planting; (c) vegetation ground cover; (d) use of 'cool' building and pavement materials (i.e. those with high reflectivity in the infrared spectrum); and (e) green roofs.	Design and Operation	**Compliant**	**Compliant**	Urban Design Development Report (UDDR)	A UDDR has been developed to address this condition	3/6/2025 - Q1 2025 UDDR received, filed and lodged to DPHI. Refer to the UDDR for further comments on this condition 5/08/2025 - Draft revision of Q2 2025 UDDR received and filed. 27/11/2025 - Draft revision of Q3 2025 UDDR received and filed. Refer to the UDDR, table 2-2 and the following appendices for each section: a) Appendix A b) Appendix A, Appendix E c) Appendix A, Appendix E d) Appendix B e) N/A	Refer to B48 Urban Heat Island Mitigation principles folder for UDDR and appendices	Outstanding Information Required - Nil
B49	The Development must be designed and operated to meet ESD principles and include measures such as the following: (a) passive solar design; (b) use of energy efficient plant and equipment; (c) use of renewable energy sources; (d) cross-ventilation (e) selection of materials with lower energy manufacturing requirements; (f) use of locally sourced materials to reduce impacts associate with transport; (g) rainwater capture and reuse; (h) water efficient fixtures and fittings; and (I) waste minimisation and recycling.	Design and Operation	**Compliant**	**Compliant**	Urban Design Development Report (UDDR)	A UDDR has been developed to address this condition	3/6/2025 - Q1 2025 UDDR received, filed and lodged to DPHI. Refer to the UDDR for further comments on this condition 5/08/2025 - Draft revision of Q2 2025 UDDR received and filed. 27/11/2025 - Draft revision of Q3 2025 UDDR received and filed. Refer to the UDDR, table 2-2 and the following appendices for each section: a) Appendix A b) Appendix I c) Appendix A d) Appendix B e) Appendix H f) Appendix F g) Appendix A	Refer to B49 Ecologically Sustainable Development principles folder for UDDR and appendices	Outstanding Information Required - Nil

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B51	The Development must be designed and operated to meet minimum 4 star Green Star certification by the Green Building Council of Australia for warehouse design, construction and operation	Construction and Operation	**Not Compliant**	**Compliant**	Ecologically Sustainable Development	Obtain Green Star certifications	The Development has been designed and operated to meet minimum 4 star Green Star certification by the Green Building Council of Australia for warehouse design, construction and operation	Refer to B51 4 star Green Star certifcation folder for certificates	Outstanding Information Required - Nil
B76	Operational lighting must: (a) comply with the latest version of AS 4282-1997 - Control of the obtrusive effects of outdoor lighting (Standards Australia, 1997); and (b) be designed to reduce light spill and be mounted, screened and directed in such a manner that it does not create a nuisance and minimises visual impacts to surrounding properties, the public road network, the Georges River riparian corridor and the Boot Land.	Operation	**Compliant**	**Compliant**	Urban Design Development Report (UDDR)	A UDDR has been developed to address this condition	3/6/2025 - Q1 2025 UDDR received, filed and lodged to DPHI. Refer to the UDDR for further comments on this condition 5/08/2025 - Draft revision of Q2 2025 UDDR received and filed. 27/11/2025 - Draft revision of Q3 2025 UDDR received and filed. Refer to the UDDR, table 2-2 and the following appendices for each section: a) Appendix C b) Appendix A	Refer to B76 Operational lighting requirements folder for UDDR and appendices	Outstanding Information Required - Nil
B77	The following signage is not permitted: (a) general advertising or moving or flashing signs; (b) west facing illuminated building signage visible from residences; and (c) internally illuminated signs that are visible from residences;	Operation	**Compliant**	**Compliant**	Urban Design Development Report (UDDR)	A UDDR has been developed to address this condition	Community Communication Strategy. Revision K 18/11/2024 3/6/2025 - Q1 2025 UDDR received, filed and lodged to DPHI. Refer to the UDDR for further comments on this condition 5/08/2025 - Draft revision of Q2 2025 UDDR received and filed. 27/11/2025 - Draft revision of Q3 2025 UDDR received and filed. Refer to the UDDR, table 2-2 and the following appendices for each section: a) Appendix A b) Appendix A c) Appendix A	Refer to B77 Not permitted signage folder for UDDR and appendices	Outstanding Information Required - Nil
B81	Rainwater must be used for irrigation, all internal non-potable uses, the container washdown facility and be considered for cooling towers; heating, ventilation, and air conditioning; and ground source heat exchange.	Construction and Operation	**Compliant**	**Compliant**	Urban Design Development Report (UDDR)	A UDDR has been developed to address this condition	3/6/2025 - Q1 2025 UDDR received, filed and lodged to DPHI. Refer to the UDDR for further comments on this condition 5/08/2025 - Draft revision of Q2 2025 UDDR received and filed. 27/11/2025 - Draft revision of Q3 2025 UDDR received and filed. Refer to the UDDR, table 2-2 and Appendix A for this condition.	Refer to B81 Rainwater uses folder for UDDR and appendices	Outstanding Information Required - Nil
B82	Prior to commencement of operation, the Applicant must prepare a Landscape Vegetation Management Plan (LVMP) and submit it to the Planning Secretary for approval. The LVMP must be prepared by a suitably qualified and experienced person(s) and form part of the OEMP required under Condition C5. The LVMP must include: (a) an inspection and maintenance schedule and require replacement plantings for shrubs and trees which fail at an equivalent pot size or larger; and (b) graffiti management.	Operation	**Compliant**	**Compliant**	Landscape Vegetation Management Plan (LVMP)	An LVMP will be developed and lodged to the secretary to address this condition	Landscape Vegetation Management Plan (LVMP) - Approved by DPHI in 18th December 2023 16/07/2024 - Revision 3 of the LVMP has been received and filed	Document name: SSD 7709 MPW S2 LVMP Rev3 DPHI receipt: Post Approval Form_20230807075057	Outstanding Information Required - Nil
B83	The Applicant must: (a) implement measures to manage pests, vermin and declared noxious weeds on the site; and (b) inspect the site on a regular basis to ensure that these measures are working effectively, and that pests, vermin or noxious weeds are not present on site in sufficient numbers to pose an environmental hazard, or cause the loss of amenity in the surrounding area. Note: For the purposes of this condition, noxious weeds are those species subject to an order declared under the Biosecurity Act 2015.	Operation	**Compliant**	**Compliant**	Operational Flora and Fauna Management Plan (OFFMP)	An OFFMP will be developed to address this condition	16/07/2025 - Revision 8 of the OFFMP has been received and filed	Document name: SSD7709 MPW S2 OFFMP_Rev08 DPHI receipt: Post Approval Form_20241126044736	Outstanding Information Required - Nil
B89	Heavy vehicles used for haulage of imported fill or freight must not use Cambridge Avenue during construction and operation of the development.	Construction and Operation	**Compliant**	**Compliant**	Operational Traffic and Access Management Plan (OTAMP)	An OTAMP will be developed to address this condition	16/07/2025 - Revision 10 of the OTAMP has been received and filed	Document name: SSD7709_MPW S2_OTAMP_Rev10 DPHI receipt: Post Approval Form_20241126043452	Outstanding Information Required - Nil
B104	The Applicant is to ensure that the construction and operation of the proposed development will not prevent the ongoing use of Moorebank Avenue as a public road to a standard commensurate to its current use prior to the development. A staging plan should be submitted to RMS for approval, as part of the WAD package, to ensure adequate capacity is provided along Moorebank Avenue at all times, including a requirement to maintain two lanes open to traffic. The staging plan should provide details of how the road and intersection upgrade works tie into other road upgrades works approved under the MPE Stage1 and 2 SSD applications. Any temporary diversion works not located within the Moorebank Avenue roadway will require separate planning approval.	Construction and Operation	**Compliant**	**Compliant**	Staging Plan	A staging plan will be prepared for RMS approval	30/04/2025 - Addressed by approved WAD (June 2022) inclusive of Works Phasing Plans (Attachment G) and approved A44 Staging Report (April, 2024, Aspect Environmental) – approved by DPHI 3 May 2024. 6/05/2025 - Condition B104 of MPW 2 SSD 7709 primarily relates to works associated with the Moorebank Avenue/Anzac Rd Intersection. It arguably has some connection to MADR – which (temporarily) supplants Moorebank Ave - but the construction works affecting public use of Moorebank Avenue are for all intents and purposes – the MAAI works. MAAI works are subject to an approved WAD with TfNSW (formerly RMS) which included Works Phasing Plans at Attachment G. MAAI works are also subject to a Staging Report prepared under SSD 7709 A44/A45 and approved by the Department (3/5/2024) – see attached. This Staging Report enabled the requirements of B84 to be considered satisfied, enabling operations to continue beyond the 100,000 GFA threshold identified in B84. The Staging Report addresses the content expectations in the second paragraph of CoC B104. So, in its present form, and approved progressive stages, the MAAI works and operation does "not prevent the ongoing use of Moorebank Avenue as a public road to a standard commensurate to its current use prior to the development". Note B104 identifies a staging report "should" be submitted as part of the WAD package. It is not "must". Noting there is an approved WAD inclusive of Works Phasing Plans and no further WAD applications are required for the works. 16/07/2025 - Revision 6 of the Staging Plan has been received and filed	Document name: MPW 2 B84 Staging Plan_Rev6_clean DPHI receipt: Post Approval Form_20250225025557	Outstanding Information Required - Nil

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B112a	Prior to occupation of any warehouse on the site, the Applicant must undertake a pre-opening Road Safety Audit for heavy vehicle movements associated with operation in and out of the development site via the operational access point to the site, and for motorists and construction vehicle movements along Moorebank Avenue. The Road Safety Audit must be prepared by an independent TfNSW accredited road safety auditor in accordance with the relevant Austroads guidelines and TfNSW's Guidelines for Road Safety Audit Practices to identify any safety issues. The Road Safety Audit must consider road safety issues for the proposed operational access arrangements and affected vehicle movements. *Note: In accordance with condition B110A, the operational access point to the site is via the Chatham Avenue/Moorebank Avenue intersection, or any other alternative as agreed by Transport for NSW in writing.*	Operation	**Compliant**	**Compliant**	Road Safety Audit	A road safety audit will be prepared to address this condition	28/04/2023 - Road Safety Audit provided to the department	Document name: SSD 7709 Site Access MPW RSA_LogosWGC.1 DPHI receipt: Post Approval Form_20230428015618	Outstanding Information Required - Nil
B112b	Prior to occupation of any warehouse on the site, the Applicant must incorporate the corrective actions outlined in the pre-opening Road Safety Audit required under condition B112A in consultation with and with the prior approval of the relevant road authority. Details on the proposed corrective actions must be submitted to the Planning Secretary and TfNSW.	Operation	**Compliant**	**Not Triggered**	Road Safety Audit	A road safety audit will be prepared to address this condition	28/04/2023 - Road Safety Audit provided to the department	Document name: SSD 7709 Site Access MPW RSA_LogosWGC.1 DPHI receipt: Post Approval Form_20230428015618	Outstanding Information Required - Nil
B112c	The Road Safety Audit required by condition B112A is not required if the applicant has completed the Moorebank Avenue and Anzac Road intersection upgrades required under condition B84 prior to occupation of any warehouse on the site.	Operation	**Compliant**	**Not Triggered**	Road Safety Audit	A road safety audit will be prepared to address this condition	28/04/2023 - Road Safety Audit provided to the department	Document name: SSD 7709 Site Access MPW RSA_LogosWGC.1 DPHI receipt: Post Approval Form_20230428015618	Outstanding Information Required - Nil
B118	Prior to commencement of operation, the Applicant must prepare an Operational Traffic and Access Management Plan (OTAMP) and submit it to the Planning Secretary for approval. The OTAMP must be prepared by a suitably qualified and experienced person(s) in consultation with Council(s), TfNSW and RMS.	Operation	**Compliant**	**Compliant**	Operational Traffic and Access Management Plan (OTAMP)	An OTAMP will be developed to address this condition	16/07/2025 - SSD7709_MPW S2_OTAMP_Rev07_Redacted has been received and filed	Document Name: SSD7709_MPW S2_OTAMP_Rev07_Redacted DPHI receipt: Post Approval Form_20231114055425	Outstanding Information Required - Nil
B119	The OTAMP must form part of the OEMP and, in addition to the general management plan requirements listed in Conditions C5 and C6, the OTAMP must: (a) detail numbers and frequency of truck movements, sizes of trucks, vehicle routes and hours of operation; (b) detail access arrangements for the site to ensure road and site safety, and demonstrate there will be no queuing on the road network; (c) detail measures to ensure turning areas and internal access roads are kept clear of any obstacles, including parked cars, at all times; and (d) set out a framework and procedures for data collection required to prepare the Biannual Trip Origin and Destination Report required under Condition B120 including a main gate monitoring system (e.g. CCTV) to identify heavy vehicles turning right from the terminal site onto Moorebank Avenue, or turning left from Moorebank Avenue to the terminal site.	Operation	**Compliant**	**Compliant**	Operational Traffic and Access Management Plan (OTAMP)	An OTAMP will be developed to address this condition	8/07/2025 - Revision 1 of the BTODR has been filed and uploaded to the Major Projects website. 16/07/2025 - Revision 10 of the OTAMP has been received and filed	Document Name: SSD7709_MPW S2_OTAMP_Rev10 DPHI receipt: Post Approval Form_20241126043452 Document Name: P2588r02_MPW BTODR May 2025 DPHI receipt: Post Approval Form_20250625051550	Outstanding Information Required - Nil
B120	Each six months following commencement of operation, the Applicant must prepare a Biannual Trip Origin and Destination Report (in a format agreed with TfNSW and RMS) that advises: (a) the total number of actual and standard twenty foot equivalent shipping containers despatched and received during the period; (b) the number of actual and standard twenty foot equivalent shipping containers transported to and from the site by rail during the period; (c) actual hours of operation for the truck gate listing days and hours of operation; (d) records of vehicle numbers accessing the site including a record of heavy vehicle entry by date and approximate time; (e) direction of travel into and out of the site for light vehicle on a representative day; and (f) representative vehicle origins and destinations of all classes of vehicles and covering the intermodal terminal, the warehousing facility and any other uses such as the freight village. A copy of the report required under Condition B120 is to be submitted to the Planning Secretary, TfNSW and RMS within one month of its preparation.	Operation	**Compliant**	**Compliant**	Biannual Trip Origin and Destination Report (BTODR)	A Biannual Trip Origin and Destination Report has been prepared to address the requirements of this condition.	8/07/2025 - Revision 1 of the BTODR has been filed and uploaded to the Major Projects website.	Document Name: P2588r02_MPW BTODR May 2025 DPHI Receipt: Post Approval Form_20250625051550	Outstanding Information Required - Nil
B120a	A Traffic Audit of the development must be undertaken within 90 days of each of the trigger events identified in B120B, by an independent qualified person(s) approved by the Planning Secretary prior to the commencement of the Traffic Audit. The Traffic Audit must include, but not necessarily be limited to: (a) verification of actual traffic movements against condition A15A; (b) assessment of the traffic performance of the project against the predictions made in EIS, RIS and consolidated assessment clarification responses; (c) consideration of the results of the traffic monitoring during a representative period nominated by the auditor; (d) review of compliance with the approved access routes and performance measures prescribed under this consent; (e) consideration of any traffic-related issues raised by TfNSW and Council; and (f) findings and recommendations with respect to the traffic performance of the project and any additional measures that may be required to manage traffic associated with the project. *Note: In accordance with condition B110A, the operational access point to the site is via the Chatham Avenue/Moorebank Avenue intersection, or any other alternative as agreed by Transport for NSW in writing.*	Operation	**Not Triggered**	**Not Triggered**	Traffic Audit	A traffic audit will be prepared to satisfy this condition	No evidences at moment as event not triggered	Not applicable as condition not triggered	Outstanding Information Required - Nil
B120b	Traffic Audits under condition B120A are required to be undertaken within 90 days of the following trigger events: (a) the MPW Stage 2 daily heavy vehicle movements reaching 1,000 heavy vehicle movements for the first time, (b) annual container freight throughput on the MPW Stage 2 site reaching each of the following: 50,000 TEU, 250,000 TEU and 500,000 TEU, (c) as may be directed by the Planning Secretary from time-to-time.	Operation	**Not Triggered**	**Not Triggered**	Traffic Audit	A traffic audit will be prepared to satisfy this condition	No evidences at moment as event not triggered	Not applicable as condition not triggered	Outstanding Information Required - Nil
B120c	Within 28 days of conducting the Traffic Audit referred to under condition B120A of this consent, the Applicant must provide the Planning Secretary with a copy of the Traffic Audit report. If the Traffic Audit report identifies non-compliance with condition A15A, or with traffic predictions, approved access routes, or performance measures, the Applicant must detail what additional measures would be implemented to ensure compliance, clearly indicating who would implement these measures, when these measures would be implemented, and how the effectiveness of these measures would be measured and reported to the Planning Secretary. Notwithstanding the above, nothing permits the Applicant to exceed the traffic movements specified in condition A15A at any time and any non-compliance with condition A15A is a breach of this consent.	Operation	**Not Triggered**	**Not Triggered**	Traffic Audit	A traffic audit will be prepared to satisfy this condition	No evidences at moment as event not triggered	Not applicable as condition not triggered	Outstanding Information Required - Nil
B120d	Following consideration of the outcomes of the Traffic Audit and the Traffic Audit report referred to under conditions B120A and B120C of this consent, the Planning Secretary may require the Applicant to implement additional traffic mitigation, monitoring or management measures to address traffic impacts associated with the project. The Planning Secretary may require any or all of the measures identified in the Traffic Audit report, or other measures considered appropriate by the Planning Secretary (including additional local area traffic management measures or on-site traffic management controls) to be implemented. The Applicant must implement the measures required by the Planning Secretary.	Operation	**Not Triggered**	**Not Triggered**	Traffic Audit	A traffic audit will be prepared to satisfy this condition	No evidences at moment as event not triggered	Not applicable as condition not triggered	Outstanding Information Required - Nil
B121	Prior to the issue of any Occupation Certificate, the Applicant must prepare a specific Workplace Travel Plan and submit it to the Planning Secretary for information. The Workplace Travel Plan must be developed in consultation with TfNSW and outline facilities and measures to promote public transport usage, including: (a) peak period and shift work responsive express buses to/ from the site and Liverpool Station via Moorebank Avenue and Newbridge Roads with frequency dependent on the development of the site; (b) peak period express buses to/ from the site and Holsworthy rail station via Anzac Road, Wattle Grove Drive and Heathcote Road with frequency dependent on the development of the site; and (c) consideration of extension of the 901 bus service and new bus stop locations if required.	Operation	**Compliant**	**Compliant**	Workplace Travel Plan (WTP)	A workplace travel plan will be developed and submitted to the Secretary to address this condition	16/07/2025 - Revision 3 of the WTP has been received, filed and lodged	Document name: SSD7709 MPW S2 WTP MoDC_Rev3 DPHI receipt: Moorebank Intermodal Precinct West - Stage 2 - Post Approval Document Received - (SSD-7709-PA-206)	Outstanding Information Required - Nil
B122	The Applicant must provide an annual report on employee numbers to the Department, TfNSW and RMS, commencing one year after commencement of operation of the IMT facility and for up to 5 years from occupation of the final warehouse building.	Operation	**Observation**	**Not Triggered**	Annual Report	An annual audit will be prepared to satisfy this condition	No evidences at moment as event not triggered	Not applicable as condition not triggered	Outstanding Information Required - Nil
B123	The Applicant and each occupant/operator must implement the most recent version of the Workplace Travel Plan for the duration of the development.	Operation	**Not Compliant**	**Compliant**	Workplace Travel Plan (WTP)	A workplace travel plan will be developed and submitted to the Secretary to address this condition	16/07/2025 - Revision 9 of the WTP has been received, filed and lodged	Document name: SSD7709 MPW S2 WTP_Rev09 DPHI receipt: Post Approval Form_20241126045545	Outstanding Information Required - Nil

Approval (ID)	Compliance Requirement	Development Phase	Compliance Status of Current Reporting Period (November 2024 to November 2025)	Status of Previous Reporting Period (May 2024 to November 2024)	Monitoring Requirement Methodology (See condition and management plan)	Ongoing Activities and Implementation	Evidence and Comments (Received to date from tenants and consultants)	DPHI Receipt / Consultant Document Name	Outstanding Information / Actions (Required from tenants and consultants)
B130	The permitted hours of operation are detailed in Table 3.	Operation	Compliant	Compliant	Operational Noise Management Plan (ONMP)	An operational noise management plan has been prepared to address the requirements of this condition.	16/07/2025 - Revision 5 of the ONMP has been received, filed and lodged	Document Name: SSD7709 MPW S2 ONMP_Rev05 DPHI receipt: Post Approval Form_20241126043705	Outstanding Information Required - Nil
B131	The noise generated by the development must not exceed the noise limits in Table 4 which are generated by the overall precinct operations (defined as all activities approved for MPW and MPE).	Operation	Not Compliant	Compliant	Operational Noise Management Plan (ONMP)	An operational noise management plan has been prepared to address the requirements of this condition.	30/04/2025 - No specific monitoring or reporting is required for B131. The following conditions do require monitoring or assessment considering the limits in B131. The following refer to the B131 limits - B138 (mech plant noise assessment/prediction), B139 (mech plant noise monitoring) B140 (MPW wide noise monitoring (which would include MPW considering the B131 wording), multiple requirements) all. B140A (Noise Impact Monitoring), B140f) should point to the B131 limits instead of self-referencing. 16/07/2025 - Revision 5 of the ONMP has been received, filed and lodged	Document Name: SSD7709 MPW S2 ONMP_Rev05 DPHI receipt: Post Approval Form_20241126043705	Outstanding Information Required - Nil
B132	Terminal and rail port shuttle operations must comply with the following: (a) best practice plant for the intermodal terminal facility, including electronic automated container handling equipment or equipment with equivalent sound power levels; (b) locomotives using the development must meet the air emissions standards and noise requirements as specified in the Moorebank Precinct East – Stage 1 Project: Best Practice Review (SSD 12_6766), prepared by Arcadis dated 19 September 2017); (c) wagons using the development must incorporate available best practice noise technologies, such as "one-piece" freight bogies or three-piece freight bogies fitted with cross-bracing or steering arms; and permanently coupled 'multi-pack' steering wagons using Electronically Controlled Pneumatic (ECP) braking with a wire based distributed power system (or better practice technology); (d) automatic rail lubrication equipment must be used in accordance with ASA Standard T HR TR 00111 ST Rail Lubrication and top of rail friction modifiers, where required; and (e) the rail cross sectional profile must be maintained in accordance with ETN-01-02 Rail Grinding Manual for Plain Track to ensure the correct wheel/ rail contact position and hence to encourage proper rolling stock steering.	Operation	Observation	Compliant	Precinct Operational Air Quality Management Plan (POAQMP)	An operational AQMP will be developed and lodged to the secretary to address this condition	16/04/2025 - Revision 16 of the POAQMP has been filed and lodged 11/07/2025 - Revision 2 of the Best Practice Progress Review has been filed and lodged	Document Name: MIP-POAQMP-_SSD7709-update_Rev16_Redacted DPHI receipt: Post Approval Form_20241126042759 Document Name: MIP_AQ_Best Practice Progress Review_2025_FINAL DPHI receipt: Post Approval Form_20250715042634	Outstanding Information Required - Nil
B133	For all terminal and rail operations, a monitoring and performance management regime is to be established in accordance with the conditions of this consent, including but not limited to the requirements of conditions B140-B143, with the objective of ensuring there is no deterioration in noise performance and continual improvement in rail noise outcomes from rail operations throughout the life of the development.	Operation	Compliant	Compliant	Operational Noise Management Plan (ONMP)	An operational noise management plan has been prepared to address the requirements of this condition.	16/07/2025 - Revision 5 of the ONMP has been received, filed and lodged	Document Name: SSD7709 MPW S2 ONMP_Rev05 DPHI receipt: Post Approval Form_20241126043705	Outstanding Information Required - Nil
B136	Prior to commencement of operation, the Applicant must prepare an Operational Noise Management Plan (ONMP) and submit it to the Planning Secretary for approval. The ONMP must be prepared by a suitably qualified and experienced person(s).	Operation	Compliant	Compliant	Operational Noise Management Plan (ONMP)	An operational noise management plan has been prepared to address the requirements of this condition.	16/07/2025 - Revision 4 of the ONMP has been received, filed and lodged	Document Name: SSD7709 MPW S2 ONMP_Rev4_CLEAN	Outstanding Information Required - Nil
B137	The ONMP must for part of the OEMP and, in addition to the general management plan requirements listed in Conditions C5 and C6, the ONMP must include monitoring and reporting as required under Conditions B139, B140 and B141.	Operation	Compliant	Compliant	Operational Noise Management Plan (ONMP)	An operational noise management plan has been prepared to address the requirements of this condition.	16/07/2025 - Revision 5 of the ONMP has been received, filed and lodged	Document Name: SSD7709 MPW S2 ONMP_Rev05 DPHI receipt: Post Approval Form_20241126043705	Outstanding Information Required - Nil
B139	The Applicant must carry out noise monitoring of mechanical plant and other noisy equipment for a minimum period of one week where valid data is collected following operation/ occupation of the freight terminal, freight village and each warehouse. The monitoring program must be carried out by a suitably qualified and experienced person(s) and a Monitoring Report for Mechanical Plant must be submitted to the Planning Secretary within two months of operation of the freight terminal and occupation of each tenancy to verify predicted mechanical plant and equipment noise levels.	Operation	Compliant	Compliant	Mechanical Plant and Other Noisy Equipment Monitoring	A noise monitoring report has been prepared to address the requirements of this condition.	The status for this condition for the following warehouses are as follows: JR, N3 & N4 yet to be operational INTS - No monitoring required confirmed by Aspect and QUBE 11/09/2025 - N1, N2 and NDC reports have been received and filed	Refer to B139 Noise monitoring of equipment folder for documents	Outstanding Information Required - Nil
B140	Within 12 months of operation of the intermodal terminal facility; occupation of the first warehouse, 50% occupation of the site and 100% occupation of the site, or as otherwise agreed by the Planning Secretary, the Applicant must undertake Operational Noise Monitoring to compare actual noise performance of the project against predicted noise performance and prepare an Operational Noise Report to document this monitoring. The Report must include, but not necessarily be limited to: (a) noise monitoring to assess compliance with the predicted operational noise levels and the noise limits specified in Table 4; b) a validation by predictive modelling of the operational noise levels in terms of criteria and noise goals established in the Road Noise Policy (RNP, EPA, 2001); (c) sleep disturbance impacts compared to those determined in documents specified under Condition A3; (d) impacts associated with annoying characteristics such as prominent tonal components, impulsiveness, intermittency, irregularity and dominant low-frequency content; (e) methodology, location and frequency of noise monitoring undertaken, including monitoring sites at which project noise levels are ascertained, with specific reference to locations indicative of impacts on sensitive receivers; (f) any required recalibrations of the noise model taking into consideration factors such as actual traffic numbers and heavy vehicle proportions; (g) an assessment of the performance and effectiveness of applied noise mitigation measures together with a review and if necessary, reassessment of all feasible and reasonable mitigation measures; (h) identification of additional measures to those predicted in the documents specified under Condition A3, that would be implemented with the objective of meeting the criteria outlined in the RNP and NPI (EPA, 2017), including timing of implementation; (I) details of any complaints and enquiries received in relation to operational noise generated by the project between the date of commencement of operation and the date the report was prepared; and (j) procedures for the management of operational noise and vibration complaints. The Operational Noise Report is to be verified by a suitably qualified and experienced noise and vibration expert. The Operational Noise Report must be submitted to the Planning Secretary and the EPA within 60 days of completing the operational noise monitoring referred to in (a) above or as otherwise agreed by the Planning Secretary.	Operation	Observation	Compliant	Site Noise Monitoring and Reporting	A noise monitoring report has been prepared to address the requirements of this condition.	14/04/2025 - Revision 2 of the noise monitoring report (TM306-22-05F01 MPW B140A Noise monitoring (r2)) received, filed and lodged 3/10/2025 - Commencement of operations of the INTS terminal was the 27/05/2024	Document Name: TM306-22-05F01 MPW B140A Noise monitoring (r2)	Outstanding Information Required - Nil

Approval (ID)	Compliance Requirement	Development Phase	Compliance Status of Current Reporting Period (November 2024 to November 2025)	Status of Previous Reporting Period (May 2024 to November 2024)	Monitoring Requirement Methodology (See condition and management plan)	Ongoing Activities and Implementation	Evidence and Comments (Received to date from tenants and consultants)	DPHI Receipt / Consultant Document Name	Outstanding Information / Actions (Required from tenants and consultants)
B140A	The Applicant is to conduct noise impact monitoring and residual noise impact mitigation in accordance with the following requirements: (a) the Applicant is to engage a Suitably Qualified and Experienced Acoustic Engineer to undertake a noise survey at R1 No. 9 Casula Road, Casula (or an equivalent location if access is denied). Evidence of access being sought and access being denied must be provided to the Planning Secretary before surveying is undertaken at an equivalent location; (b) the noise survey must be undertaken not less than three months and not more than six months from commencement of operation; (c) the noise survey is to be conducted in accordance with the Noise Policy for Industry ((NPfI) EPA 2017) to determine: (d) (e) (f) the noise survey must be both attended and unattended. The attended survey must be for a period of 4 contiguous hours in a single day, evening and night-time period conducted on days when the Precinct is likely to be operating at maximum capacity at the time. The unattended survey must be conducted for a period of 7 contiguous days not adversely affected by weather and must include the days of the attended surveys; a copy of the results of the noise survey must be provided to the Planning Secretary for information within one month of completion of the survey; If the noise survey identifies an exceedance arising from use of the Precinct of the LAeq, 15min and the LAFmax noise limits specified in condition B140A (the residual noise impacts), the Applicant is to conduct an assessment as follows: outlining and justifying the application of the approach to "sustained" exceedance having regard to the number of observed exceedances; the identification of the likely source(s) of the residual noise impact; an assessment of the significance of the LAFmax noise level events in accordance with Section 2.5 of the NPfI; an assessment of the significance of the residual noise impacts in accordance with Table 4.1 of Section 4 of the NPfI; the feasible and reasonable source and pathway noise mitigation measures that have been implemented in respect of	Operation	Compliant	Compliant	Site Noise Monitoring and Reporting	A noise monitoring report has been prepared to address the requirements of this condition.	20/03/2025 - Acoustics monitoring spreadsheet received and filed 26/03/2025 - Revision 1 of the Noise Monitoring report (TM306-22-05F01 MPW B140A Noise monitoring (r2)) received and filed on the Major Projects planning website 14/04/2025 - Revision 2 of the noise monitoring report (TM306-22-05F01 MPW B140A Noise monitoring (r2)) received, filed and lodged	Document Name: TM306-22-05F01 MPW B140A Noise monitoring (r2)	Outstanding Information Required - Nil
B141	The Applicant must install and maintain a rail noise monitoring system on the rail link at the commencement of operation to continuously monitor the noise from rail operations on the rail link. The system must capture the noise from each individual train passby noise generation event, and include information to identify: (a) time and date of freight train passbys; (b) imagery or video to enable identification of the rolling stock during the day and night; (c) LAeq(15hour) and LAeq(9hour) from rail operations; and (d) LAF(max) and SEL of individual train passbys, measured in accordance with ISO3095; or (e) other alternative information as agreed with, or required by, the Planning Secretary. The results from the noise monitoring system, must be publicly accessible from a website maintained by the Applicant. The noise results from each train must be available as live data on the website, unless unforeseen circumstances (i.e. a system malfunction) have occurred. The LAeq(15hour) and LAeq(9hr) results from each day must be available on the website within 1 hour of the period ending.	Operation	Compliant	Compliant	Operational Noise Monitoring	Monitoring in place on site and reporting via Moorebank noise monitoring website	30/04/2025 - This is a monitoring requirement, which requires presentation of the monitoring data. There is no reporting requirement in B141. The reporting is required by SSD 7709 B143. This requirement is currently being met by the permanent noise monitoring system installed and maintained by others, as part of SSD 6766 CoC G7. https://moorebanknoisemonitor-emsbk.trackig.net/NoiseMonitor/	Not applicable as condition addressed via website	Outstanding Information Required - Nil
B142	Prior to the commencement of operation, the Applicant must submit to the Planning Secretary for approval, justification supporting the appropriateness of the location for rail noise monitoring, including details of any alternative options considered and reasons for these being dismissed. The noise monitoring location(s) must be west of the MPW Stage 2 connection to the rail link constructed under MPE Stage 1.	Operation	Compliant	Compliant	Rail Noise Monitoring and Reporting	Rail noise monitoring report has been submitted to the planning secretary	16/07/2025 - Rail noise monitoring report has been approved by the secretary, dated 13/05/2024	Refer to B142 Rail noise monitoring location justification folder for documents	Outstanding Information Required - Nil
B143	From the commencement of operation, the Applicant must provide an annual Rail Noise Monitoring Report to the Planning Secretary for a period of 5 years, or as otherwise agreed with the Planning Secretary. The Planning Secretary shall consider the need for further reporting following a review of the results for year 5. Note: the above rail noise monitoring and reporting conditions may be satisfied by the implementation of relevant monitoring and reporting conditions under the MPE Stage 1 consent.	Operation	Compliant	Compliant	Rail Noise Monitoring and Reporting	Rail noise monitoring report has been submitted to the planning secretary	Rail noise monitoring report has been approved by the secretary 11/08/2025 - Consultant has confirmed that the same annual Rail Noise Monitoring Report from condition G7 in MPE Stage 1 SSD 6766 can be used for compliance with this condition.	Document Name: TM306-24-02F03 MPE Annual Review 2025 (r2) DPHI receipt: Post Approval Form_20250617052152	Outstanding Information Required - Nil
B152	Prior to clearing of native vegetation, a Koala Management Plan (KMP) must be prepared by a suitably qualified person in consultation with OEH and be submitted to the Planning Secretary for approval. The KMP must: (a) make reference to A review of koala tree use across New South Wales (OEH 2018); (b) identify habitat corridors, of adequate dimensions to provide an adequate Koala habitat corridor as supported by a Koala specialist, to provide connectivity both within the Intermodal Precinct area and with other core koala habitat areas (i.e. to the south and to the west along Georges River); (c) include commitment to retain Koala use trees on site in line with phased earthworks (see e.g. Condition B40); (d) include details of structures to eliminate barriers to movement (presented by fences, roads, drainage culverts or pits, rail lines and the like) for koalas and other native fauna likely to use the site or habitat corridor; (e) include details on koala habitat rehabilitation/ restoration within the identified habitat corridors; and (f) include other measures to minimise the risk of harm to koalas.	Operation	Compliant	Compliant	Koala Management Plan (KMP)	A koala management plan has been prepared to satisfy this condition	Koala Management Plan - Dated 12 March 2020 - Rev 3 20/05/2025 - Latest annual monitoring report, revision 1B, received and filed (MIP_Operational_AMR_Arcadis_2024-2025_Final_v1) 6/06/2025 - Latest baseline koala monitoring report, revision 2, received, filed and lodged (MIP_BaselineKoalaMonitoringReport_Final)	Document Name: MIP_BaselineKoalaMonitoringReport_Final DPHI receipt: Post Approval Form_20250724020438	Outstanding Information Required - Nil
B160	Prior to commencement of operation an Operational Flora and Fauna Management Plan (OFFMP) must be prepared by a suitably qualified person in consultation with OEH and be submitted to the Planning Secretary for approval. The OFFMP must include: (a) monitoring, management and maintenance procedures for koala habitat corridors; and (b) management and maintenance of other measures and site operations to minimise the risk of harm to koalas and other native fauna.	Operation	Compliant	Compliant	Operational Flora and Fauna Management Plan (OFFMP)	An OFFMP will be developed to address this condition	16/07/2025 - Revision 6 of the OFFMP has been received and filed	Document Name: SSD7709 MPW S2 OFFMP_Rev 6 DPHI receipt: Post Approval Form_20230727064317	Outstanding Information Required - Nil
B176	The total quantities of dangerous goods present at any time within the development and transport movements to and from the development must be kept below the screening threshold quantities and movements listed in the Department's Hazardous and Offensive Development Guidelines Applying SEPP 33 (January 2011), with the exception of dangerous goods storage at the Warehouses JR and JN Distribution Precinct.	Operation	Compliant	Compliant	Dangerous Goods Register	A dangerous goods register of each operational warehouse will be developed to address this condition	3/10/2025 - Dangerous goods registers have been provided by tenants 10/12/2025 - Ongoing dangerous goods tracking registers are maintained by the tenants. Records are provided by the property managers upon request.	Refer to B176 Dangerous goods quantities folder for documents	Outstanding Information Required - Nil
B176a	The storage of dangerous goods and combustible materials at the Warehouse JR and JN Distribution Precinct must not exceed the maximum storage quantities listed in Table 3-8 of the Preliminary Hazard Analysis prepared by Riskcon Rev 1 (Document No. RCE-21050) dated 13 March 2023 at all times	Operation	Compliant	Compliant	Dangerous Goods Register	A dangerous goods register of each operational warehouse will be developed to address this condition	October 2024: only JR and JN warehouses are authorised to store dangerous goods. Both Sydney Tools and Maersk have confirmed that they do not store any dangerous goods on-site. A copy of the tenants' email confirmation is available in the provided folder for reference. 17/03/2025 - Tenants have provided registers of dangerous goods in currently operational warehouses. 10/12/2025 - Ongoing dangerous goods tracking registers are maintained by the tenants. Records are provided by the property managers upon request.	Refer to B176a Dangerous goods storage folder for documents	Outstanding Information Required - Nil
B176b	Unless otherwise agreed with the Planning Secretary, at least one month prior to the commencement of the storage of dangerous goods at the Warehouse JR and JN Distribution Precinct, the studies set out below must be submitted to the Planning Secretary: (a) a Fire Safety Study for Warehouse JR and/or Warehouse JN, addressing the storage of dangerous quantities listed in Table 3-8 of the Preliminary Hazard Analysis prepared by Riskcon Rev 1 (Document No. RCE-21050) dated 13 March 2023, and covering the relevant aspects of the Department's Hazardous Industry Planning Advisory Paper No. 2, 'Fire Safety Study Guidelines' and the New South Wales Government's Best Practice Guidelines for Contaminated Water Retention and Treatment Systems. The study must be satisfy the operational requirements of Fire and Rescue NSW and include documentary evidence that a suitably qualified and experienced person is satisfied that the Applicant constructed the Warehouse JR and JN Distribution Precinct in accordance with the fire safety systems and proposed designs assessed in the Fire Safety Study. (b) a Final Hazards Analysis for the Warehouse JR and JN Distribution Precinct, consistent with the Department's Hazardous Industry Planning Advisory Paper No. 6, 'Hazard Analysis', and addressing the storage of dangerous quantities listed in Table 3-8 of the Preliminary Hazard Analysis prepared by Riskcon Rev 1 (Document No. RCE-21050) dated 13 March 2023. Storage of dangerous goods at the Warehouse JR and JN Distribution Precinct must not commence until study recommendations have been considered and, where appropriate, acted upon.	Operation	Observation	Compliant	Fire Safety Guide (FSS) and Final Hazards Analysis (FHA)	An FFS and FHA will be developed to address this condition	16/07/2025 - The FFS and FHA have been received, filed and lodged	Document name: RCE-21050_Woolworths_FHA_Final_19Nov21_Rev(1) DPHI receipt: Post Approval Form_20241022225240 Document name: RCE-21050_WoolworthsJR_FSS_Final_Rev(0) DPHI receipt: Post Approval Form_20241022225008	Outstanding Information Required - Nil

Approval (ID)	Compliance Requirement	Development Phase	Compliance Status of Current Reporting Period (November 2024 to November 2025)	Status of Previous Reporting Period (May 2024 to November 2024)	Monitoring Requirement Methodology (See condition and management plan)	Ongoing Activities and Implementation	Evidence and Comments (Received to date from tenants and consultants)	DPHI Receipt / Consultant Document Name	Outstanding Information / Actions (Required from tenants and consultants)
B176c	Unless otherwise agreed with the Planning Secretary, at least one month prior to the commencement of the storage of dangerous goods at the Warehouse JR and JN Distribution Precinct (or prior to commencement of the storage of dangerous goods at the relevant warehouse, should the development be staged), the plans set out below must be submitted to the Planning Secretary: (a) a comprehensive Emergency Plan and detailed emergency procedures for the safety of all people outside the Warehouse JR and JN Distribution Precinct, who may be at risk from the warehouse/s. The plan must be consistent with the Department's Hazardous Industry Planning Advisory Paper No. 1, 'Emergency Planning'. (b) a document setting out a comprehensive Safety Management System covering all on site operations and associated transport activities involving hazardous materials for the Warehouse JR and JN Distribution Precinct. The document must clearly specify all safetyrelated procedures, responsibilities and policies, along with details of mechanisms for ensuring adherence to procedures. The Safety Management System shall be consistent with the Department's Hazardous Industry Planning Advisory Paper No. 9, 'Safety Management'. Records shall be kept on-site at all times and must be available for inspection by the Secretary upon request.	Operation	Compliant	Not Compliant	Warehouse Operations Emergency Plan (WOEP)	A WOEP will be prepared to address this condition	16/07/2025 - WOEP for warehouse JR and JN received, filed and lodged one month prior to the commencement of the storage of dangerous goods	Document name: SSD7709 MPW S2 WOEP_Rev06 DPHI receipt: Post Approval Form_20241126044135	Outstanding Information Required - Nil
B176d	Twelve months after the commencement of operations of Warehouse JR and/or Warehouse JN, should the development be staged, and every five years thereafter, or at such intervals as Council may agree, a comprehensive Hazard Audit of the warehouse/s must be carried out and a report submitted to the Planning Secretary within one month of each audit. The audits must be carried out at the Applicant's expense by a qualified person or team, independent of the development, approved by the Planning Secretary prior to commencement of each audit. Hazard Audits must be consistent with the Department's Hazardous Industry Planning Advisory Paper No. 5, 'Hazard Audit Guidelines'. The audit report must be accompanied by a program for the implementation of all recommendations made in the audit report. If the deferral of the implementation of a recommendation is intended, reasons must be documented.	Operation	Not Compliant	Compliant	Hazards and Risks	A hazard audit will be developed to address this condition	No evidences at moment as event not triggered	Not applicable as condition not triggered	Outstanding Information Required - Nil
B176e	The Applicant must comply with all reasonable requirements of the Planning Secretary in respect of the implementation of any measures arising from the reports submitted in respect of conditions B176B to B176D, within such time as the Planning Secretary may agree.	Operation	Not Triggered	Compliant	Hazards and Risks	Any requirements will be implemented as required	No evidences at moment as event not triggered	Not applicable as condition not triggered	Outstanding Information Required - Nil
B177	The Applicant (the operator/ occupant of each premises) must store and handle all chemicals, fuels and oils, including Dangerous Goods as defined in the Australian Code for the Transport of Dangerous Goods by Road & Rail, in accordance with: (a)the requirements of all relevant Australian Standards; and (b)the NSW EPA's Storing and Handling of Liquids: Environmental Protection – Participant's Manual if the chemicals are liquids. In the event of an inconsistency between the requirements listed above in (a) and (b), the most stringent requirement must prevail to the extent of the inconsistency.	Operation	Compliant	Compliant	Dangerous Goods Register	A dangerous goods register of each operational warehouse will be developed to address this condition	3/10/2025 - Dangerous goods registers have been provided by tenants 10/12/2025 - Ongoing dangerous goods tracking registers are maintained by the tenants. Records are provided by the property managers upon request.	Refer to B177 Dangerous goods storage and handling folder for documents	Outstanding Information Required - Nil
B178	Fuel stored on the site must only be used for the purposes of refueling IMT facility plant and equipment, locomotives and trucks associated with the operation of the Warehouse JR and JN Distribution Precinct.	Operation	Compliant	Compliant	Dangerous Goods Register	A dangerous goods register of each operational warehouse will be developed to address this condition	17/03/2025 - Tenant has confirmed no fuel is currently being stored on site. 3/10/2025 - Dangerous goods registers have been provided by tenants 10/12/2025 - Ongoing dangerous goods tracking registers are maintained by the tenants. Records are provided by the property managers upon request.	Refer to B178 Fuel uses folder for documents	Outstanding Information Required - Nil
B179	Prior to the occupation of each premises and in each instance of occupation by a new occupant, a statement must be submitted to the Planning Secretary confirming that the premises will be operated so as to comply with the requirements of Conditions B176 and B177.	Operation	Compliant	Compliant	Tenant Statement	Tenants will provide a statement which will be submitted and approved by the Secretary to ensure compliance with conditions B176 and B177.	16/07/2024 - The statement from each tenant for each operational warehouse or freight village was provided as follows: 1. INTS - 22/3/2024 2. N1 - 7/3/2024 3. N2 - 7/3/2024 4. JR - 22/10/2024 5. JN - 22/10/2024	Refer to B179 Prior to occupation hazards and risks requirements compliance folder for documents	Outstanding Information Required - Nil
B180	The Applicant must assess and classify all liquid and non-liquid wastes to be taken off site in accordance with the latest version of EPA's Waste Classification Guidelines Part 1: Classifying Waste (EPA, 2014) and dispose of all wastes to a facility that may lawfully accept the waste.	Construction and Operation	Compliant	Compliant	Waste Disposal Dockets	Waste disposal dockets from the SIOMP contractor to prove that all wastes were properly disposed of will be collected	3/06/2025 - Refer to tipping dockets for waste disposal. Water quality testing is carried out within the MPE OSD Basins and MPW discharge spillways during the Autumn and Spring services which would identify contaminants. Additionally, during the Major 6 monthly services of the GPTs, all waste is disposed of to an approved EPA waste facility, which is where the tipping dockets are generated in the SIOMP logbook reports. At the time of disposal each truck load is sample tested at the waste facility to ensure there are no hazardous chemicals, solvents, asbestos or Hydrocarbons etc before it is disposed of. 10/12/2025 - Ongoing waste tracking registers are maintained by the tenants. Records are provided by the property managers upon request.	Refer to B180 Liquid and non-liquid waste management folder for documents	Outstanding Information Required - Nil
B181	All waste materials removed from the site must only be directed to a waste management facility or premises lawfully permitted to accept the materials.	Construction and Operation	Compliant	Compliant	Waste Disposal Dockets	Waste disposal dockets from the SIOMP contractor to prove that all wastes were properly disposed of will be collected	3/06/2025 - Refer to tipping dockets for waste disposal. Water quality testing is carried out within the MPE OSD Basins and MPW discharge spillways during the Autumn and Spring services which would identify contaminants. Additionally, during the Major 6 monthly services of the GPTs, all waste is disposed of to an approved EPA waste facility, which is where the tipping dockets are generated in the SIOMP logbook reports. At the time of disposal each truck load is sample tested at the waste facility to ensure there are no hazardous chemicals, solvents, asbestos or Hydrocarbons etc before it is disposed of. 3/10/2025 - Waste tracking registers have been provided by tenants 10/12/2025 - Ongoing waste tracking registers are maintained by the tenants. Records are provided by the property managers upon request.	Refer to B181 Waste materials removal folder for documents	Outstanding Information Required - Nil
B182	The Applicant must obtain agreement from Council for the design of the waste storage area for each warehouse where the waste collection service will be provided by Council.	Operation	Not Triggered	Not Triggered	Waste Management	Agreement with the Council for the design of the waste storage area for each warehouse will be obtained	No evidences at moment as condition not triggered	Not applicable as condition not triggered	Outstanding Information Required - Nil
B183	The OEMP required under Condition C5 must include measures for waste management in accordance with the waste hierarchy set out in the EPA's NSW Waste Avoidance and Resource Recovery Strategy 2014-2021.	Operation	Compliant	Compliant	Operational Environmental Management Plan (OEMP)	An OEMP will be developed to address this condition	27/3/2025 - Revision 8 of the OEMP has been filed and lodged	Document name: SSD 7709 MPW S2 OEMP_Rev08 DPHI receipt: Post Approval Form_20241126044549	Outstanding Information Required - Nil
B187	The container wash down facility must: (a)include bunding to exclude wash area waste from the stormwater system; (b)be designed and operated to avoid overspray from foams, detergents, mud or fugitive emissions outside wash down bays; (c)include oily water separation, water treatment and recycling; and (d)comply with Sydney Water trade waste requirements for discharge to the sewer.	Operation	Observation	Compliant	Waste Management	Container wash down facility details will be obtained		Refer to B187 Container wash down facility folder for documents	Outstanding Information Required - Nil
B188	All plant and equipment used on site, or to monitor the performance of the development must be: (a)maintained in a proper and efficient condition; and (b)operated in a proper and efficient manner.	Operation	Compliant	Compliant	Plant and Equipment Management	Plant and equipment management records will be obtained	12/08/2025 - Plant and equipment records are maintained and operated in a proper and efficient manner. The following contractors have provided statements to ensure compliance with this condition: - Infinity Fire - Delta HVAC - Force Fire - MPS - CES - Champagne 10/12/2025 - Based on spot checks and records received above, the plant and equipment used on site are being maintained and operated in a proper and efficient manner.	Refer to B188 Plant and equipment management folder for documents	Outstanding Information Required - Nil
B189	Bushfire asset protection zones must not be within the riparian corridor as defined in Condition B2 other than within areas greater than 40m from top of bank as determined in accordance with condition B2 where evidence is provided to the satisfaction of the Planning Secretary that riparian vegetation, and any trees over 3m in height, will be retained.	Operation	Compliant	Not Triggered	Bushfire Risk Management Plan (BRMP)	A BRMP will be developed to address this condition	9/07/2025 - Revision G of the BRMP has been filed and lodged	Document name: MPW-Stage-2-BRMP_Rev-G_Final_Redacted DPHI receipt: Post Approval Form_20241126060454 Document name: SSD 7709 MPW S2 OERP Rev08 DPHI receipt: Post Approval Form_20241126044917	Outstanding Information Required - Nil

Approval (ID)	Compliance Requirement	Development Phase	Compliance Status of Current Reporting Period (November 2024 to November 2025)	Status of Previous Reporting Period (May 2024 to November 2024)	Monitoring Requirement Methodology (See condition and management plan)	Ongoing Activities and Implementation	Evidence and Comments (Received to date from tenants and consultants)	DPHI Receipt / Consultant Document Name	Outstanding Information / Actions (Required from tenants and consultants)
B190	The entire site must be managed as an inner protection area (IPA) as outlined within section 4.1.3 and Appendix 5 of the Planning for Bush Fire Protection (RFS, 2006) and the NSW Rural Fire Service's document Standards for asset protection zones.	Operation	Compliant	Not Triggered	Bushfire Risk Management Plan (BRMP)	A BRMP will be developed to address this condition	9/07/2025 - Revision G of the BRMP has been filed and lodged	Document name: MPW-Stage-2-BRMP_Rev-G_Final_Redacted DPHI receipt: Post Approval Form_20241126060454 Document name: SSD 7709 MPW S2 OERP Rev08 DPHI receipt: Post Approval Form_20241126044917	Outstanding Information Required - Nil
B191	An updated Bushfire Risk Management Plan must be prepared by a suitably qualified person(s) demonstrating that the bushfire asset protection zones can be contained wholly within the development area and that management of the inner protection zone will not impact on the proposed Biodiversity Offset Area. The Bushfire Risk Management Plan must be submitted to the Planning Secretary prior to construction of permanent built surface works.	Operation	Compliant	Not Triggered	Bushfire Risk Management Plan (BRMP)	A BRMP will be developed to address this condition	9/07/2025 - Revision G of the BRMP has been filed and lodged	Document name: MPW-Stage-2-BRMP_Rev-G_Final_Redacted DPHI receipt: Post Approval Form_20241126060454 Document name: SSD 7709 MPW S2 OERP Rev08 DPHI receipt: Post Approval Form_20241126044917	Outstanding Information Required - Nil
B192	Public road access must comply with section 4.1.3(1) of Planning for Bush Fire Protection (RFS, 2006) except for the requirement for through-access.	Operation	Compliant	Not Triggered	Bushfire Risk Management Plan (BRMP)	A BRMP will be developed to address this condition	9/07/2025 - Revision G of the BRMP has been filed and lodged	Document name: MPW-Stage-2-BRMP_Rev-G_Final_Redacted DPHI receipt: Post Approval Form_20241126060454 Document name: SSD 7709 MPW S2 OERP Rev08 DPHI receipt: Post Approval Form_20241126044917	Outstanding Information Required - Nil
B193	The provision of water, electricity and gas must comply with section 4.1.3 of Planning for Bush Fire Protection (RFS, 2006).	Operation	Compliant	Not Triggered	Bushfire Risk Management Plan (BRMP)	A BRMP will be developed to address this condition	9/07/2025 - Revision G of the BRMP has been filed and lodged	Document name: MPW-Stage-2-BRMP_Rev-G_Final_Redacted DPHI receipt: Post Approval Form_20241126060454 Document name: SSD 7709 MPW S2 OERP Rev08 DPHI receipt: Post Approval Form_20241126044917	Outstanding Information Required - Nil
B194	Prior to the commencement of construction and operation, the Applicant must prepare an Emergency Response Plan(s) covering, but not limited to, flooding and bushfire. The Emergency Response Plan(s) must be consistent with Australian Standard AS3745:2010 Planning for Emergencies in Facilities and include details of: (a)assembly points and evacuation routes; (b)evacuation and refuge protocols; and (c)awareness training for employees and contractors.	Operation	Compliant	Not Triggered	Operational Emergency Response Plan (OERP)	An OERP will be developed to address this condition	8/11/2024 - Revision 8 of the OERP has been filed and lodged	Document name: SSD 7709 MPW S2 OERP Rev08 DPHI receipt: Post Approval Form_20241126044917	Outstanding Information Required - Nil
B195	The Bushfire Emergency and Evacuation Management Plan must: (i)be prepared by a suitably qualified and experienced person(s). (ii)be consistent with the Development Planning – A Guide to Developing a Bush Fire Emergency Management and Evacuation Plan (RFS, 2014); and (iii)a copy of the Operational Bushfire Emergency Evacuation Management Plan must be submitted to the Planning Secretary, NSW Rural Fire Service, Council and the Certifying Authority prior to occupation.	Operation	Compliant	Not Triggered	Operational Emergency Response Plan (OERP)	An OERP will be developed to address this condition	8/11/2024 - Revision 8 of the OERP has been filed and lodged	Document name: SSD 7709 MPW S2 OERP Rev08 DPHI receipt: Post Approval Form_20241126044917	Outstanding Information Required - Nil
B196	Prior to occupancy of any freight village or warehouse tenancy, and every subsequent occupation of these tenancies, details of the tenant and occupation activity is to be submitted to the Planning Secretary demonstrating that the proposed activity complies with Conditions A17 and A20.	Operation	Compliant	Compliant	Tenant Activities	Tenant activities and occupation statements will be obtained to address this condition	24/07/2025 - Tenant activities and statements have been provided for the current warehouses which are operational: - N1 - N2 - WH 5 - WH 6	Refer to B196 Tenant and occupation activity folder for documents	Outstanding Information Required - Nil

Moorebank Intermodal Precinct

APPENDIX C – SSD 7709 PART C

Approval (ID)	Compliance Requirement	Development Phase	Compliance Status of Current Reporting Period (November 2024 to November 2025)	Status of Previous Reporting Period (May 2024 to November 2024)	Monitoring Requirement Methodology	Ongoing Activities and Implementation	Evidence and Comments (Received to date from tenants and consultants)	DPHI Receipt / Consultant Document Name	Outstanding Information / Actions (Required from tenants and consultants)
C01	Management plans required under this consent must be prepared in accordance with relevant guidelines, and include: (a)detailed baseline data; (b)details of: (i)the relevant statutory requirements (including any relevant approval, licence or lease conditions); (ii)any relevant limits or performance measures and criteria; and (iii)the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures; (c)a description of the measures to be implemented to comply with the relevant statutory requirements, limits, or performance measures and criteria; (d)a program to monitor and report on the: (i)impacts and environmental performance of the development; (ii)effectiveness of the management measures set out pursuant to paragraph (c) above; (e)a contingency plan to manage any unpredicted impacts and their consequences and to ensure that ongoing impacts reduce to levels below relevant impact assessment criteria as quickly as possible; (f)a program to investigate and implement ways to improve the environmental performance of the development over time; (g)a protocol for managing and reporting any: (i)incident and any non-compliance (specifically including any exceedance of the impact assessment criteria and performance criteria); (ii)complaint; (iii)failure to comply with statutory requirements; (h)roles and responsibilities for implementing the plan; and (i)a protocol for periodic review of the plan. Note:The Planning Secretary may waive some of these requirements if they are unnecessary or unwarranted for particular management plans	Operation	**Compliant**	**Compliant**	Operational Management Plans	Operational management plans have been developed to comply with this condition	16/07/2025 - Operational management plans have been received, filed and lodged. Each management plan and revision are as follows: 1. LVMP, revision 4 2. OEMP, revision 8 3. OFFMP, revision 8 4. ONMP, revision 5 5. OTAMP, revision 10 6. POAQMP, revision 16 7. SIOMP, revision 4 8. SQMP, revision 4	Refer to C1 Management plan guidelines folder for all management plans and DPHI receipts	Outstanding Information Required - Nil
C05	The Applicant must prepare an Operational Environmental Management Plan (OEMP) in accordance with the requirements of condition C1 and submit it to the Planning Secretary for approval.	Operation	**Compliant**	**Compliant**	Operational Environmental Management Plan (OEMP)	An OEMP has been prepared to comply with this requirement	16/07/2025 - Revision 8 of the OEMP has been received, filed and lodged.	Document name: SSD 7709 MPW S2 OEMP_Rev08 DPHI receipt: Post Approval Form_20241126044549	Outstanding Information Required - Nil
C06	As part of the OEMP required under Condition C5 of this consent, the Applicant must include the following: (a)describe the role, responsibility, authority and accountability of all key personnel involved in the environmental management of the development; (b)describe the procedures that would be implemented to: (i)keep the local community and relevant agencies informed about the operation and environmental performance of the development; (ii)receive, handle, respond to, and record complaints; (iii)resolve any disputes that may arise; (iv)respond to any non-compliance; (v)respond to emergencies; and (c)include the following environmental management plans: (i)Operational Traffic and Access Management Plan (see Condition B118); (ii)Stormwater Infrastructure Operation and Maintenance Plan (see Condition B36); (iii)Stormwater Quality Monitoring Program (see Condition B38); (iv)Landscape Vegetation Management Plan (see Condition B82); (v)Operational Traffic and Access Management Plan (see Condition B118); (vi)Operational Noise Management Plan (see Condition B136); and (vii)Operational Flora and Fauna Management Plan (see Condition B160).	Operation	**Compliant**	**Compliant**	Operational Management Plans	An OEMP and sub plans have been prepared to comply with this requirement	16/07/2025 - Operational management plans have been received, filed and lodged. Each management plan and revision are as follows: 1. LVMP, revision 4 2. OEMP, revision 8 3. OFFMP, revision 8 4. ONMP, revision 5 5. OTAMP, revision 10 6. POAQMP, revision 16 7. SIOMP, revision 4 8. SQMP, revision 4	Refer to C6 Environmental management plan requirements folder for all management plans and DPHI receipts	Outstanding Information Required - Nil
C07	The Applicant must: (a)not commence operation until the OEMP is approved by the Planning Secretary; and (b)operate the development in accordance with the OEMP approved by the Planning Secretary (and as revised and approved by the Planning Secretary from time to time).	Operation	**Compliant**	**Compliant**	Secretary Approval	Approval of the OEMP by the Secretary will be obtained prior to the commencement of operation	16/07/2025 - Approval from the Secretary of the latest revisions of the OEMP and sub plans have been provided, dated 28/01/2025 1/10/2025 - Approval from the Secretary of the all revisions of the OEMP and sub plans post ER comment review have been provided	Document name: SSD7709_OEMP Review Letter_Rev01	Outstanding Information Required - Nil
C08	Within three months of: (a)the submission of an incident report under Condition C10; (b)the submission of an Independent Audit under Condition C17; (c)the approval of any modification of the conditions of this consent; or (d)the issue of a direction of the Planning Secretary under Condition A3(b) which requires a review, the strategies, plans and programs required under this consent must be reviewed, and the Department must be notified in writing that a review is being carried out.	Operation	**Compliant**	**Not Triggered**	Revision of strategies, plans and programs	The strategies, plans and programs outlined in this condition will be reviewed and the department will be notified within three months if these occurrences were to happen.	27/08/2025 - a) No incident reported under C10 b) First independent audit will be carried out in September 2025. The department have been notified by our request to endorse the auditors. c) There has been no modifications. d) First annual review of OEMP and sub plans will be carried out in October 2025. 25/09/2025 - No directions from the Secretary that would require the need for review of operational plans to date	Document Name: RE_ Moorebank Intermodal Precinct West - Stage 2 - Post Approval Document Received - (SSD-7709-PA-354)	Outstanding Information Required - Nil
C09	If necessary to either improve the environmental performance of the development, cater for a modification or comply with a direction, the strategies, plans and programs required under this consent must be revised, to the satisfaction of the Planning Secretary. Where revisions are required, the revised document must be submitted to the Planning Secretary for approval within six weeks of the review. Note:This is to ensure strategies, plans and programs are updated on a regular basis and to incorporate any recommended measures to improve the environmental performance of the development.:	Operation	**Compliant**	**Compliant**	Secretary Approval	If necessary, a new revision of the strategies, plans and programs required under this condition will be finalized and submitted to the secretary for approval.	16/07/2025 - Approval from the Secretary for any updates to the OEMP and sub plans have been filed. First annual review of OEMP and sub plans will be carried out in October 2025.	Refer to C9 Management plan review submission folder for documents	Outstanding Information Required - Nil
C10	The Department must be notified in writing to compliance@planning.nsw.gov.au immediately after the Applicant becomes aware of an incident. The notification must identify the development (including the development application number and the name of the development), and set out the location and nature of the incident. Subsequent notification requirements must be given and reports submitted in accordance with the requirements set out in Appendix 3.	Operation	**Not Triggered**	**Not Triggered**	Department notification	The department will be notified if there is an incident that occurs.	27/08/2025 - Knight Frank have provided an incident register from the commencement of operations to the 31/08/2025. There is no trigger to notify any incidents.	Refer to C10 Department incident notification folder for documents	Outstanding Information Required - Nil
C11	The Department must be notified in writing to compliance@planning.nsw.gov.au within seven days after the Applicant becomes aware of any non-compliance.	Operation	**Not Compliant**	**Not Triggered**	Department notification	The department will be notified if there are any non-compliances.	Not applicable as there are currently no non-compliances	No outstanding information as condition not triggered	Outstanding Information Required - Nil
C12	A non-compliance notification must identify the development and the application number for it, set out the condition of consent that the development 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.	Operation	**Not Triggered**	**Not Triggered**	Department notification	The department will be notified if there are any non-compliances in accordance to the details set out in this condition.	Not applicable as there are currently no non-compliances	No outstanding information as condition not triggered	No outstanding information as event not triggered

Approval (ID)	Compliance Requirement	Development Phase	Compliance Status of Current Reporting Period (November 2024 to November 2025)	Status of Previous Reporting Period (May 2024 to November 2024)	Monitoring Requirement Methodology	Ongoing Activities and Implementation	Evidence and Comments (Received to date from tenants and consultants)	DPHI Receipt / Consultant Document Name	Outstanding Information / Actions (Required from tenants and consultants)
C13	A non-compliance which has been notified as an incident does not need to also be notified as a non-compliance.	Operation	Not Triggered	Not Triggered	Department notification	The department will not be notified multiple times if there is an incident that is also classified as a non-compliance.	Not applicable as there are currently no non-compliances	No outstanding information as condition not triggered	No outstanding information as event not triggered
C14	No later than six weeks before the date notified for the commencement of construction and operation, a Construction Compliance Monitoring and Reporting Program and Operational Compliance Monitoring and Reporting Program respectively, prepared in accordance with the Compliance Reporting Post Approval Requirements (Department 2018) must be submitted to the Department and the Certifying Authority. Compliance Reports of the project must be carried out in accordance with the Compliance Reporting Post Approval Requirements (Department 2018). The Applicant must make each Compliance Report publicly available no later than 60 days after submitting it to the Department and notify the Department and the Certifying Authority in writing at least seven days before this is done.	Operation	Not Compliant	Not Triggered	Compliance Reporting Post Approval Requirements (Department 2018)	An operational compliance monitoring and reporting program is being prepared for submission to the department and certifying authority six weeks prior to operations commencing.	27/08/2025 - First compliance report (May 24 - Nov 24) was issued in December 2024 and approved. Refer to document Compliance Report - PAR_03032025_090928 for approval letter.	Refer to C14 Compliance Monitoring and Reporting Program folder for documents	Outstanding Information Required - Nil
C15	Not withstanding the requirements of the Compliance Reporting Post Approval Requirements (Department 2018), the Planning Secretary may approve a request for ongoing operational compliance reports to be ceased, where it has been demonstrated to the Planning Secretary's satisfaction that an operational compliance report has demonstrated operational compliance.	Operation	Not Triggered	Compliant	Compliance Reporting Post Approval Requirements (Department 2018)	An operational compliance monitoring and reporting program is being prepared for submission to the department to satisfy the secretary to ensure operational compliance.	Outstanding Information Required - Nil as there are no non-compliances	No outstanding information as condition not triggered	Outstanding Information Required - Nil
C16	No later one month before the date notified for the commencement of construction and operation, an Independent Audit Program prepared in accordance with the Independent Audit Post Approval Requirements (Department 2018) must be submitted to the Department and the Certifying Authority.	Construction and Operation	Compliant	Compliant	Operational Independent Audit Program (OIAP)	An independent audit program was prepared and submitted to the department to satisfy the secretary and ensure operational compliance. 8/07/2025 - WolfPeak have been engaged for the first MPW independent audit. The Department has been notified, and the DPHI receipt of the notification has been filed.	16/07/2025 - Revision 4 of the OIAP has been received, filed and lodged	Document Name: SSD7709 MPWS2 OIAP_Rev04 DPHI receipt: Post Approval Form_20241126045211	Outstanding Information Required - Nil
C17	Independent Audits of the development must be carried out in accordance with: (a)the Independent Audit Program submitted to the Department and the Certifying Authority under condition C16 of this consent; and (b)the requirements for an Independent Audit Methodology and Independent Audit Report in the Independent Audit Post Approval Requirements (Department 2018).	Construction and Operation	Not Compliant	Compliant	Operational Independent Audit Program (OIAP)	An independent audit program was prepared and submitted to the department to satisfy the secretary and ensure operational compliance. 8/07/2025 - WolfPeak have been engaged for the first MPW independent audit. The Department has been notified, and the DPHI receipt of the notification has been filed.	16/07/2025 - Revision 4 of the OIAP has been received, filed and lodged	Refer to C17 Independent Audit guidelines folder for documents	Outstanding Information Required - Nil
C18	In accordance with the specific requirements in the Independent Audit Post Approval Requirements (Department 2018), the Applicant must: (a)review and respond to each Independent Audit Report prepared under Condition C17 of this consent; (b)submit the response to the Department and the Certifying Authority; and (c)make each Independent Audit Report and response to it publicly available no later than 60 days after submission to the Department and notify the Department in writing at least 7 days before this is done.	Construction and Operation	Not Triggered	Compliant	Operational Independent Audit Program (OIAP)	An independent audit program was prepared and submitted to the department to satisfy the secretary and ensure operational compliance. 8/07/2025 - WolfPeak have been engaged for the first MPW independent audit. The Department has been notified, and the DPHI receipt of the notification has been filed.	16/07/2025 - Revision 4 of the OIAP has been received, filed and lodged	Document Name: SSD7709 MPWS2 OIAP_Rev04 DPHI receipt: Post Approval Form_20241126045211	Outstanding Information Required - Nil
C19	Notwithstanding the requirements of the Independent Audit Post Approval Requirements (Department 2018), the Planning Secretary may approve a request for ongoing operational audits to be ceased, where it has been demonstrated to the Planning Secretary's satisfaction that an audit has demonstrated operational compliance.	Operation	Not Triggered	Compliant	Operational Independent Audit Program (OIAP)	An independent audit program was prepared and submitted to the department to satisfy the secretary and ensure operational compliance. 8/07/2025 - WolfPeak have been engaged for the first MPW independent audit. The Department has been notified, and the DPHI receipt of the notification has been filed.	16/07/2025 - Revision 4 of the OIAP has been received, filed and lodged	Document Name: SSD7709 MPWS2 OIAP_Rev04 DPHI receipt: Post Approval Form_20241126045211	Outstanding Information Required - Nil
C20	Any condition of this consent that requires the carrying out of monitoring or an environmental audit, whether directly or by way of a plan, strategy or program, is taken to be a condition requiring monitoring or an environmental audit under Division 9.4 of Part 9 of the EP&A Act. This includes conditions in respect of incident notification, reporting and response, non-compliance notification, compliance reporting and independent auditing. Note:For the purposes of this condition, as set out in the EP&A Act, "monitoring" is monitoring of the development to provide data on compliance with the consent or on the environmental impact of the development, and an "environmental audit" is a periodic or particular documented evaluation of the development to provide information on compliance with the consent or the environmental management or impact of the development.	Operation	Compliant	Compliant	Operational Independent Audit Program (OIAP)	All monitoring reports and audits will comply to the standards set out in Division 9.4 of Part 9 of the EP&A act. 25/06/2025 - Aspect to confirm commencement dates of first MPW independent audit	Pending first MPW independent audit	No outstanding information as condition not triggered	Outstanding Information Required - Nil

Moorebank Intermodal Precinct

APPENDIX D – AIR QUALITY MONITORING COMPLIANCE REPORT

ARCADIS Design & Consultancy for natural and built assets

MOOREBANK INTERMODAL PRECINCT – EAST AND WEST PRECINCTS

Operational Air Quality Six Monthly Compliance Report #10

November 2024 – April 2025

23 MAY 2025

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MOOREBANK INTERMODAL PRECINCT – EAST AND WEST PRECINCTS

Operational Air Quality Six Monthly Compliance Report #10

November 2024 – April 2025

Author Samuel Brown

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Approver Heather Tilley

Report No PREC-ARC-EN-RPT-0014

Date 23/05/2025

Revision Text 002

This report has been prepared for Tactical Group in accordance with the terms and conditions of appointment for MIP (East and West Precincts) Operational Air Monitoring Program dated March 2024. Arcadis Australia Pacific Pty Limited (ABN 76 104 485 289) cannot accept any responsibility for any use of or reliance on the contents of this report by any third party.

REVISIONS

Revision	Date	Description	Prepared by	Approved by
001	19/05/2025	Submitted draft to client for review	SB	HT
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1 INTRODUCTION

1.1 Background

The Moorebank Logistics Park[1] – Precinct East Operational Air Quality Monitoring Programme Framework (OAQMPF - dated 19 March 2020) provided a framework to monitor air quality during operation of the Moorebank Intermodal Precinct (MIP) East Precinct and was developed to support the implementation of the monitoring and reporting requirements identified in the Operational Air Quality Management Plan (OAQMP - Revision 18 dated 20 January 2023). MIP East Precinct (MPE) commenced operation in May 2020.

Operation of the first warehouses at MIP West Precinct (MPW) commenced in April 2024. To support the commencement of operation at MPW, under SSD 7709 CoC B47A a precinct wide OAQMP (POAQMP) that covers both MPE and MPW was prepared and approved by the Department on 20 December 2023.

The POAQMP (November 2024) now supersedes the OAQMPF (dated 19 March 2020) as per mitigation measure 2B of the Final Compilation of Mitigation Measures (MPE Stage 1). This Operational Air Quality Six Monthly Compliance Report #10 (this report and Compliance Report #9) covers the entire MIP (East and West Precincts). Compliance Reports #1 to #8 only covered MPE.

MIP (East and West Precincts) is managed in accordance with two Operational Environmental Management Plans (OEMP) and sub-plans:

- *Operational Environmental Management Plan Moorebank Logistics Park – East Precinct* (OEMP MPE) Revision 18 dated 20 January 2023 applies to MPE
- *OEMP Moorebank Intermodal Precinct - West Precinct Stage 2* (OEMP MPW) dated 6 May 2024 applies to MPW.

The POAQMP includes requirements from the following approvals:

- **EPBC Act Approval (2011/6229)** Condition of Approval (CoA) 8(f) which requires the implementation of a comprehensive air quality monitoring program (including locations, frequency, and duration)
- **Moorebank East Precinct Stage 1 (SSD 6766)**:
  - Condition of Consent (CoC) F4(f)(iv) which requires measurement of air emissions generated by the Facility.
  - Final Compilation of Mitigation Measures (FCMM) 2C which requires the implementation of an air quality monitoring programme during operation for nuisance dust and air emissions [PM_{10}[2] and nitrogen dioxide (NO_2)].
- **Moorebank East Precinct Stage 2 (SSD 7628**):
  - CoC C21(c)(iii) which requires the submission of six-monthly operational compliance reports for the life of the project.
  - CoC B59(d)(i), (ii), (iii), (iv) and (vii) which require the identification of air quality monitoring methods and implementation of compliance monitoring for all emissions associated with operations of the Facility.
  - FCMM 3C which requires real-time boundary monitoring be undertaken during operation of the Facility.

[1] With LOGOS purchasing the MLP, the MLP will now be referred to as Moorebank Intermodal Precinct (MIP).

[2] PM_{10} - Particles with a diameter of 10 micrometres or less, which are small enough to pass through the throat and nose and enter the lungs.

- **Moorebank West Precinct Stage 2 (SSD 7709)**:
  - CoC B47A requires the development of an OAQMP, that covers both MPE and MPW.

In 2022, LOGOS Property took over the management of the warehouse and distribution facilities, as well as the overall management of MPE and MPW. In July 2024, ESR Group acquired the remaining interest in LOGOS, and overall management of the MIP East and West Precinct, is now the responsibility of ESR Australia & NZ (ESR). Qube Logistics will continue to maintain responsibility for the IMEX (Import Export Rail Terminal) and the Rail Link for MPE. This change in ownership does not impact the current reporting period or the current reporting requirements.

1.2 MIP (East and West Precincts) Site operation

1.2.1 MPE

MPE operates 24 hours, 7 days a week (24/7). This currently includes operation of the IMEX terminal, Rail Link, Warehouse 1, Warehouse 3, Warehouse 4, Warehouse 5, Warehouse 6 and Warehouse 7a and 7b. No major construction related activities are expected to occur during 2025. Warehouse 2 (Area 5) and the freight village (Area 6) are the last of the areas to be constructed. These are scheduled to be operational by Q4 2026. Construction activities would be undertaken during standard working hours, unless stated otherwise.

1.2.2 MPW

The MPW Stage 2 development is located west of Moorebank Avenue and involves the construction and operation of a multi-purpose Intermodal (freight) Terminal (IMT) facility, which includes:

- A rail link connection
- Warehousing
- Freight village
- Upgrades to the Moorebank Avenue and Anzac Road intersection and the subdivision of site including ancillary works.

Operation of the IMT facility includes:

- Operation of the rail link to the Southern Sydney Freight Line (SSFL) and container freight movement by truck to and from the MPE Site (included as part of MPE Stage 1 (SSD 6766)).
- A warehousing estate on the northern part of the site servicing the IMT facility, including:
  - six warehouses and associated infrastructure and amenities and
  - a freight village (operating from 7am to 6pm, 7 days/ week) including staff/ visitor amenities.

Currently Warehouses N1, N2, NDC and JN are operational, with the rest of the development still under construction.

MPW Stage 2 has been granted approval to receive imported material outside of standard construction hours, along with specific types of work.

1.2.3 MIP Wide

There are also works and activities that occur outside of standard construction hours under specific approvals processes from time-to-time. These can include construction works and activities associated with both MPE and MPW.

Table 1-1 summarises the works, activities and material importation undertaken outside of standard construction hours during the six-monthly reporting period.

Table 1-1: Summary of works outside of standard construction hours

Dates	Activities undertaken
17 December 2024	Moorebank Avenue upgrade (Including Anzac Road)
6 January 2025 to 31 March 2025	Moorebank Avenue upgrade and Moorebank Avenue and Anzac Road intersection upgrade
1 April 2025 to 30 June 2025	Moorebank Avenue upgrade and Moorebank Avenue and Anzac Road intersection upgrade

1.1 Purpose of the report

This six-monthly air quality report has been prepared to meet reporting requirements of SSD 7709 CoC B47A and as detailed in Section 5 of the OAQMPF (March 2020) and Section 4.3 of the POAQMP (November 2024).

This six-monthly air quality report includes:

- A background to the air quality monitors and their locations (Section 2)
- Weather data and regional air quality (Section 3)
- Analysis of the raw data and comparison against identified criteria / trigger level, identification of exceedances, complaints or ad hoc monitoring undertaken (Section 4)
- An overview of any investigations undertaken to determine the cause of the exceedance or complaint (Sections 4.2, 4.3, 4.4 and 4.5).
- A high-level overview of the dust deposition data (Section 4.2).
- Conclusions and recommendations based on the 6-month's data (Section 5)
- Summarised data in graphs and tables (Appendix A).

1.2 Reporting period

MPE commenced operations on 13 May 2020 and MPW commenced operations in April 2024.

This six-monthly air quality report has been prepared to provide an overview of operational air quality results for the six-month operational period from 1 November 2024 to 30 April 2025 (inclusive) to inform the six-monthly operational compliance reports required for the life of the project.

This report will be the tenth report since MPE operations began in May 2020. Reports 1-8 were for MPE only, with Reports 9 and 10 (this report) combining the operations of MPE and MPW.

1.3 Limitations

All findings contained in this report are based on downloaded monitoring data at the time of writing the monthly reports and information relating to air quality provided by Tactical Group, Envirosuite (Omnis), NEON system (weather monitor), Bureau of Meteorology (BOM) and Site Environmental and Remediation Services (SERS) who manage the dust deposition gauges (DDG). Arcadis do not take responsibility for the accuracy or limitations of the downloaded and provided DDG data.

2 OVERVIEW OF AIR QUALITY MONITORING

2.1 Air quality monitors

The dust and air quality monitoring system installed across the MIP Precincts comprises four Kunak AIR Lite units integrated with Omnis™ software, which is hosted in the cloud.

The Kunak AIR Lite units measure the following dust and air quality parameters:

- NO_2 (range: 0-25 ppb)
- PM_{10} (particles with have a diameter less than 10 microns)
- $PM_{2.5}$ (range: 0-1000 µg/m^3)
- CO (installed since March 2020).

The original air quality monitors installed at the start of the MPE operations were replaced in mid-April 2024 with the Kunak AIR Lite sensors. The Kunak system also measures PM_1 i.e. particulates of less than one micron in size.

2.2 Dust deposition gauges

Seven DDGs were installed in May 2021. Another three DDG's were added to the Precinct in November 2024, bringing the total to ten across the Precinct. However, Stage 1 DDG 1 was removed in the first quarter of 2025, for a total of nine DDGs across the Precinct as of April 2025. The DDG's are currently managed and monitored by Site Environmental and Remediation Services (SERS). SERS provide monthly to quarterly DDG reports which are used to inform the monthly Air Quality Reports.

The gauges consist of 5-litre glass bottles with 150 mm diameter glass funnels and silicone bungs. The purpose of this sampling is to determine which particles settle from the ambient air over an approximate 31-day sampling period. This equipment is compliant with the Australian Standard AS/NZS 3580.10.1:2016.

2.3 Monitoring locations

The locations of the continuous air quality monitoring stations are identified on Figure 2-1 and the DDG locations are shown on Figure 2-2.

The site boundary is considered representative of the closest receptors (including the adjacent commercial premises). The locations of the continuous air quality monitors means that the construction and operation activities for both MPE and MPW Stage 2 have been captured.

DDG locations were also chosen so that a true representation of dust generated from operational activities at MPE could be established. The additional three DDGs capture construction activities occurring at MPW Stage 2 (see Figure 2-2).

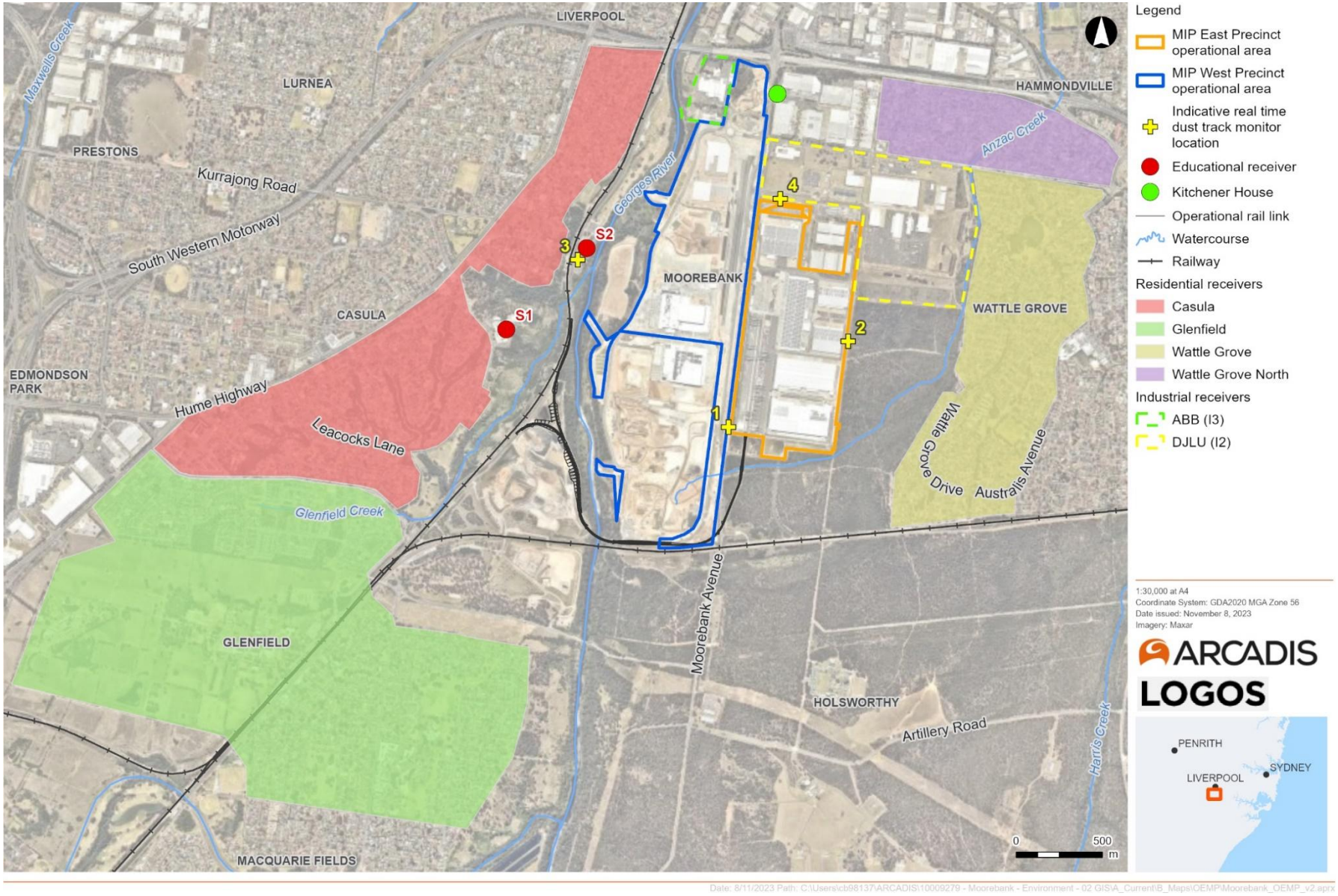


Figure 2-1: Continuous real-time air quality monitors (Source: Arcadis, 2023)

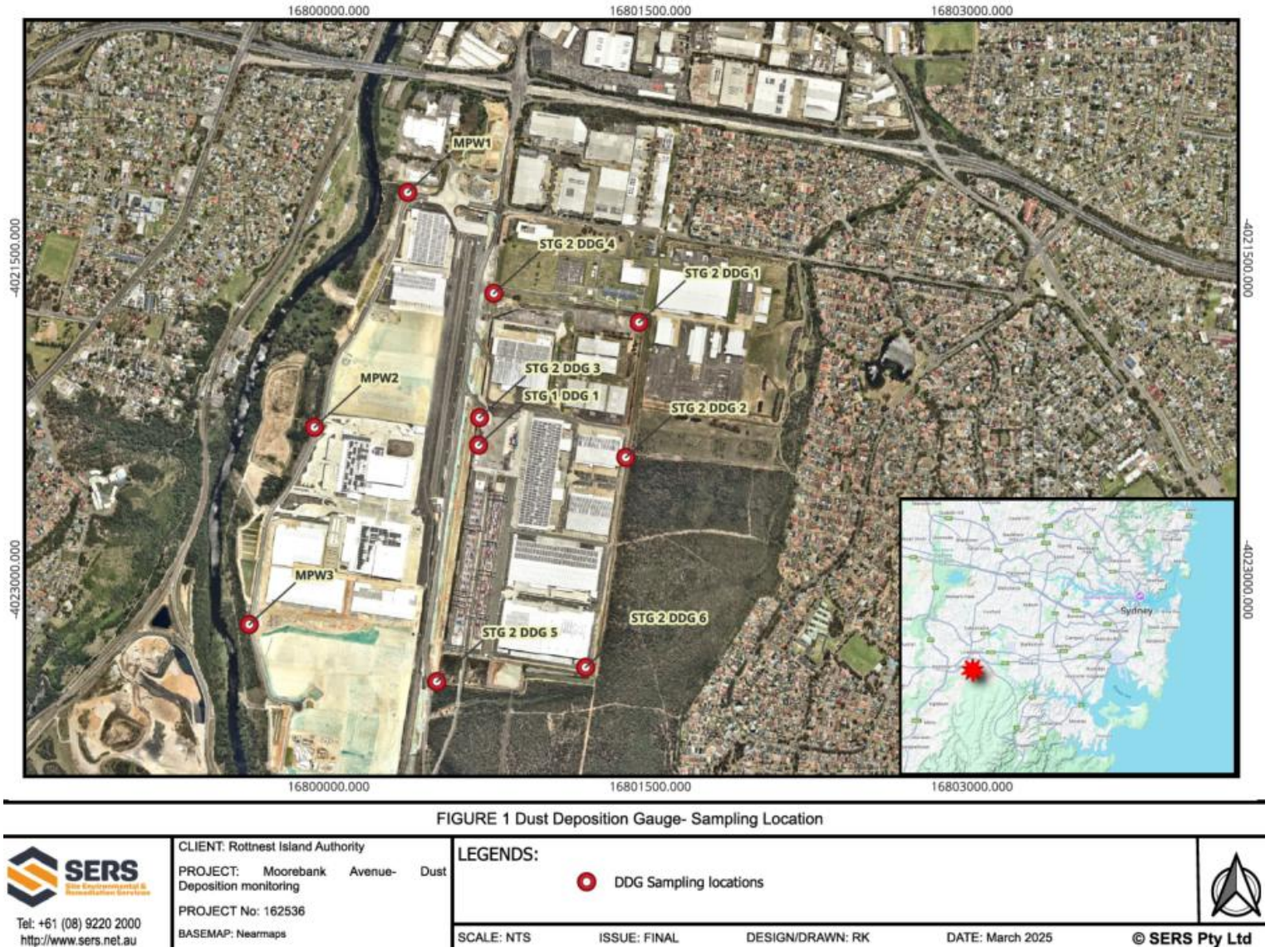


Figure 2-2: Location of Dust Deposition Gauges (Source: SERS, May 2025). Stage 1 DDG1 was removed in the first quarter of 2025.

Stage 1 (STG 1) refers to MPE Stage 1 and Stage 2 (STG 2) refers to MPE Stage 2

2.4 Air quality monitoring station availability

A summary of availability (time of operation) of the continuous air quality monitoring stations for this reporting period is summarised in Table 2-1, with the most recent calibration date also stated.

Table 2-1: Monitoring station availability (%)

Monitoring station	Nov 2024	Dec 2024	Jan 2025	Feb 2025	Mar 2025	Apr 2025	Average %	Latest calibration date
	% availability each month							
AQM01	99	100	100	100	97	100	99	March 2024
AQM02	99	100	100	100	97	100	99	March 2024
AQM03	99	100	100	100	97	100	99	March 2024
AQM04	99	100	100	100	97	100	99	March 2024

All monitors were replaced around mid-April 2024. The older existing monitoring system (Sentinel) was also replaced with Omnis to support operations of the new monitors.

All monitors had an average of 99% availability throughout the reporting period.

3 WEATHER

3.1 Meteorological Conditions

3.1.1 Prevailing wind conditions

Prevailing winds influence the dispersion of dust, and other air emissions potentially generated by the Facility. A weather station is located adjacent to Moorebank Avenue at MPW to capture representative conditions at the site. The prevailing wind speed and direction is discussed in more detail below.

3.1.2 Observed wind data

3.1.2.1 Site weather station

The average wind speed and direction data from the site weather monitor from November 2024 to April 2025 is summarised below in Table 3-1.

Table 3-1: Site weather station average wind speed and direction for November 2024 to April 2025

Month	Wind speed (m/s)	Beaufort Wind scale category[3]	Wind direction
November 2024	1.81	Light breeze	South (175°)
December 2024	2.02	Light breeze	South (184°)
January 2025	2.42	Light breeze	South (192°)
February 2025	1.85	Light breeze	South (184°)
March 2025	1.77	Light breeze	South-southwest (201°)
April 2025	1.39	Light air	Southwest (223°)

3.1.3 Ambient temperature and rainfall

Ambient temperature and rainfall are recorded at the Bankstown Airport AWS due to the availability of long-term averages for ambient temperature and rainfall which can compared to the reporting period data. Based on the AWS, the monthly mean temperatures (minimum and maximum) and rainfall (long-term monthly average and total) for the reporting period are summarised in Table 3-2.

Table 3-2: Temperature and rainfall recorded at the Bankstown Airport AWS for the reporting period

Month	Mean minimum temperature (°C)	Mean maximum temperature (°C)	Total rainfall (mm)	Long-term monthly average rainfall (mm)
Nov 2024	17.2	27.8	52.8	76.0
Dec 2024	18.5	30.3	56.0	66.9
Jan 2025	18.8	28.7	163.0	92.5
Feb 2025	18.7	28.8	68.8	109.2

[3] Based on the Beaufort wind force scale which is an empirical measure that relates wind speed to observed conditions at sea or on land (https://en.wikipedia.org/wiki/Beaufort_scale)

Month	Mean minimum temperature (°C)	Mean maximum temperature (°C)	Total rainfall (mm)	Long-term monthly average rainfall (mm)
Mar 2025	18.8	27.8	105.6	111.6
Apr 2025	14.3	25.6	78.6	85.5

Source: Bankstown, NSW - April 2025 - Daily Weather Observations

Rainfall for the reporting period was mixed throughout the 6-month period. However, January 2025 was well above the long-term monthly average rainfall and February was well below the long-term monthly average.

3.2 Ambient Air Quality

The NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW) uses air quality categories (AQC) for NSW. These categories are based on air quality data readings which are taken continuously from the various monitoring sites throughout NSW and are averaged to give hourly and daily air quality information. NSW DCCEEW use minute data, and report concentrations as hourly and daily averages. All averages are arithmetic means. Air quality data is updated hourly, and a daily air quality forecast is made for the Greater Sydney Metropolitan Region at 4 pm each day.

The AQC is generally used by government agencies to communicate to the public how polluted the air currently is or how polluted it is forecast to become. The AQC ranges from 'Good' to 'Extremely Poor' and is summarised in Figure 3-1[4].

			Air quality categories (AQC)				
Air pollutant	Averaging period	Units	GOOD	FAIR	POOR	VERY POOR	EXTREMELY POOR
Ozone O_3	1-hour	pphm	<6.7	6.7–10.0	10.0–15.0	15.0–20.0	20.0 and above
	4-hour rolling	pphm	<5.4	5.4–8.0	8.0–12.0	12.0–16.0	16.0 and above
Nitrogen dioxide NO_2	1-hour	pphm	<8	8–12	12–18	18–24	24 and above
Visibility Neph	1-hour	bsp	<1.5	1.5–3.0	3.0–6.0	6.0–18.0	18.0 and above
Carbon monoxide CO	8-hour rolling	ppm	<6.0	6.0–9.0	9.0–13.5	13.5–18.0	18.0 and above
Sulfur dioxide SO_2	1-hour	pphm	<13.3	13.3–20.0	20.0–30.0	30.0–40.0	40.0 and above
Particulate matter < 10 µm PM_{10}	1-hour	µg/m^3	<50	50–100	100–200	200–600	600 and above
Particulate matter < 2.5 µm $PM_{2.5}$	1-hour	µg/m^3	<25	25–50	50–100	100–300	300 and above

Figure 3-1: Air quality categories

[4] https://www.environment.nsw.gov.au/topics/air/understanding-air-quality-data/air-quality-categories

The PM_{10}, $PM_{2.5}$, NO_2, Visibility and CO air quality data from the Liverpool[5] monitoring station is reviewed monthly and is summarised for the six-month reporting period in Table 3-3.

Table 3-3: Summary of AQC from the Liverpool monitoring station for the reporting period

Month	Average for Reporting Period	Comment for reporting period
NO_2 (ppm) maximum 1 hourly average	Good	Good every day
CO (ppm) maximum rolling 8 hourly averages	Good	Good every day
PM_{10} 24-hour average	Mostly good, with 1 day fair.	'Good' every day except for: • Saturday 1 March 2025 which had 'fair' PM10 (36.2µg/m^3).
$PM_{2.5}$ 24-hour average	Mostly good, with 1 day fair.	'Good' every day except for: • Saturday 12 April 2025 which had 'fair' PM2.5 (20.1 µg/m^3).
Visibility[6],	Mostly good, with 4 days fair.	• 'Good' every day except for: • Saturday 1 March 2025 which had 'fair' Visibility (1.57 $10^{-4}m^{-1}$). • Thursday 10 April 2025 which had 'fair' Visibility (1.82 $10^{-4}m^{-1}$). • Friday 11 April 2025 which had 'fair' Visibility (2.27 $10^{-4}m^{-1}$). • Saturday 12 April 2025 which had 'fair' Visibility (2.31 $10^{-4}m^{-1}$).

[5] Data download facility | NSW Dept of Planning, Industry and Environment

[6] In NSW, visibility (or NEPH) is reported in units of 10^{-4} m^{-1}. This means that a NEPH value of 1.5 should be read as $1.5x10^{-4}$ m^{-1}. NSW has adopted a 1-hour visibility standard of $2.1x10^{-4}$ m^{-1}, which corresponds to a visual distance of approximately 18.6 km. This means that NEPH > 2.1 will trigger 'POOR' (or worse) air quality due to reduced visual range (<18.6 km)

4 MONITORING RESULTS

4.1 Air quality criteria

4.1.1 Criteria for $PM_{2.5}$, PM_{10}, NO_2 and CO

The National Environment Protection Measure for Ambient Air (Air NEPM)[7] has established new national standards for assessment of air quality for NO_2 and CO, which came into effect 13 May 2021. These criteria are detailed in Table 4-1. The air quality data at MIP was assessed against the new criteria from June 2021.

Table 4-1: Monitoring criteria (January 2025 for $PM_{2.5}$ and the remaining criteria applied from June 2021)

Monitoring focus	Averaging period	Criteria / Trigger / Goal
$PM_{2.5}$*	24-hour average	20 µg/m^3
	Annual average	7 µg/m^3
PM_{10}	24-hour average	50 µg/m^3
	Annual average	25 µg/m^3
NO_2	1-hour average	0.12 ppm
	Annual average	0.03 ppm
CO	1-hour average	NA
	8 -hour average	9.0 ppm

*The criteria for $PM_{2.5}$ changed from 25 µg/m^3 to 20 µg/m^3 for the 24-hour averaging period and from 8 µg/m^3 to 7 µg/m^3 for the annual average on 1 January 2025. The standards for $PM_{2.5}$ have not changed, only the goal has changed

4.1.2 Dust deposition

Dust deposition data from ten DDGs located around MIP is provided by SERS. Seven DDGs have been operational since May 2021 and another three were added in November 2024 to provide representative dust deposition across the entire MIP.

NSW DCCEEW has set the criteria for dust deposition rates, and these are provided in Table 4-2.

Table 4-2: Dust deposition criteria

Averaging Period	Maximum increase in deposited dust* level	Maximum total deposited dust level
Annual	2 g/m^2/month (incremental)	4 g/m^2/month (cumulative)

* Deposited dust is assessed as insoluble solids. This is the mass of the insoluble portion of the deposited matter, as defined under AS 3580.10.1: 2016.

[7] https://www.environment.nsw.gov.au/topics/air/understanding-air-quality-data/standards-and-goals

4.2 Dust deposition gauge results

The results of the collection period 24 October 2024 to 29 April 2025 as provided by SERS is shown in Table 4-3.

Table 4-3: Dust deposition (insoluble solids g/m^2/month) results from 24 October 2024 to 29 April 2025

Date	Stage 1 DDG 1	Stage 2 DDG 1	Stage 2 DDG 2	Stage 2 DDG 3	Stage 2 DDG 4	Stage 2 DDG 5	Stage 2 DDG 6	MPW1	MPW2	MPW3	Average
November 2024	2.2	1.1	0.8	1.1	0.9	0.8	0.5	3.6	**9.7**	3.7	2.4
December 2024	3.0	1.3	1.1	2.0	1.6	0.7	**5.5**	**4.2**	**13.0**	3.4	3.6
January 2025	N/A*	0.2	1.3	3.2	0.7	0.8	2.0	1.8	1.3	0.9	1.4
February 2025	2.7	0.2	0.3	1.4	0.4	0.5	<0.1	2	**8.7**	1.3	1.8
March[#] 2025	N/A**	0.1	0.3	0.2	0.3	<0.1	0.2	1.5	**4.2**	1.1	0.9
April 2025	N/A**	1.6	0.9	0.8	0.3	<0.1	1.0	2.9	3.0	1.1	1.3

NOTE: Bold/grey indicates an exceedance of the criteria.

* Stage 1 DDG 1 was unable to be collected during the reporting period.

** Stage 1 DDG 1 was removed from site and is no longer providing data.

[#] Two reports were used to capture the entire month of March

As shown in Table 4-3, there were six individual gauge exceedances between November 2024 and April 2025. The majority of these occurred at MPW2, which is located adjacent to an area of the site that is still under construction. These results may have been impacted by construction activities.

4.3 Continuous monitor results

Monitoring data for $PM_{2.5}$, PM_{10}, NO_2 and CO for the reporting period have been summarised into tables and graphs and are provided in Appendix A. The following sections summarise the results for this 6-month reporting period.

4.3.1 Annual exceedances

Twelve months of air quality monitoring are provided graphically and in table form in Appendix A.

AQM04 only had 58% availability for $PM_{2.5}$ and PM_{10} in July 2024 and 85% availability for $PM_{2.5}$ and PM_{10} in August 2024, however, the monitor had 100% availability for NO_2 and CO during these months and high availability for the remaining 12 months. All other monitors had an average availability of 99% during the reporting period.

See Table 2-1 for the monitoring station availability (%) over a 12-month period.

4.3.1.1 $PM_{2.5}$ and PM_{10} Monitoring

The 12-month rolling annual average for the period May 2024 to April 2025 for all four monitors combined was below the annual average criteria (i.e. 7.0 µg/m^3 for $PM_{2.5}$ and 25.0 µg/m^3 for PM_{10}) for each month.

As of April 2025, the 12-month rolling annual average for all four monitors was 4.7 µg/m^3 for $PM_{2.5}$ and 12.3 µg/m^3 for PM_{10}.

See Appendix A.1 and Appendix A.2 for more details.

4.3.1.2 NO_2 Monitoring

The 12-month rolling annual average for all four monitors for the period May 2024 to April 2025 was below the annual average criteria (0.03 ppm) for each month.

As of April 2025, the 12-month rolling annual average for NO_2 for all four monitors is 0.007 ppm, well below the annual average criteria of 0.03 ppm.

4.3.1.3 CO

CO does not require annual reporting.

4.3.2 24-hour exceedances

4.3.2.1 $PM_{2.5}$ Monitoring

A review of the data for the reporting period (November 2024 to April 2025) did not identify any exceedance of the 24-hour average criteria (20 µg/m^3) for $PM_{2.5}$ for the 6-month reporting period.

4.3.2.2 PM_{10} Monitoring

A review of the data for the reporting period (November 2024 to April 2025) did not identify any exceedance of the 24-hour average criteria (50 µg/m^3) for PM_{10} for the 6-month reporting period.

4.3.3 NO_2 1-hour exceedances

No exceedance of NO_2 1-hour criteria (0.12 ppm / 120 ppb) were observed during the 6-month reporting period.

4.3.4 CO 8-hour exceedances

No 8-hour criteria exceedances for CO occurred during the 6-month reporting period.

4.4 Complaints

One complaint was made relating to air quality in December 2024. The complaint related to dust and an increase in the complainant's pool cleaning. No other formal complaints were received during the reporting period relating to air quality.

4.5 Ad-hoc monitoring

No ad-hoc monitoring was undertaken during this reporting period.

5 CONCLUSION

This six-monthly operational air quality report covers the period November 2024 to April 2025 (inclusive).

The following summarises the monitoring results for this reporting period:

Data summary

- The criteria for $PM_{2.5}$ changed from 25 µg/m^3 to 20 µg/m^3 for the 24-hour averaging period and from 8 µg/m^3 to 7 µg/m^3 for the annual average on 1 January 2025. It should be noted that the standards for $PM_{2.5}$ have not changed, only the goal has changed.
- The rolling annual average for all four monitors combined was below the annual average criteria (7.0 µg/m^3 for $PM_{2.5}$ and 25.0 µg/m^3 for PM_{10}) for each month during the reporting period.
- There were no exceedances of the $PM_{2.5}$ 24-hour average criteria (20 µg/m^3) during the 6-month reporting period.
- There were no exceedances of the PM_{10} 24-hour average criteria (50 µg/m^3) during the 6-month reporting period.
- There were no exceedances of NO_2 1-hour criteria (0.12 ppm / 120 ppb) during the 6-month reporting period.
- There were no exceedances of the CO criteria (9.0 ppm) during the 6-month reporting period.
- Seven DDGs were installed in May 2021 and another three DDG's were added in November 2024 to the MPW. However, Stage 1 DDG 1 was removed in the first quarter of 2025 resulting in nine DDGs across the MIP as of April 2025.

Exceedances

There were six individual gauge exceedances of the dust deposition (insoluble solids) 2 g/m^2/month (incremental) criteria between November 2024 to April 2025. The majority of these occurred at MPW2, which is located adjacent to an area of the site that is still under construction. These may have impacted by construction activities. To prevent further exceedances the following measures (but not limited to) could be applied, if not already:

- Reduce areas of exposed soil
- Use of water suppression if earthworks or dust generating activities are occurring e.g. watercarts, water misters
- Staging of works to be intermittent, particularly during periods of high wind and dry conditions.

Complaints

One complaint relating to air quality was received during the reporting period (December 2024). The complaint was addressed promptly and the matter closed. No other complaints relating to air quality were received during the reporting period.

Recommendation

It is recommended that monitors continue to be calibrated annually as per operational requirements and device specifications. The monitors were last calibrated in March 2024, over a year ago. Calibration should occur as soon as possible.

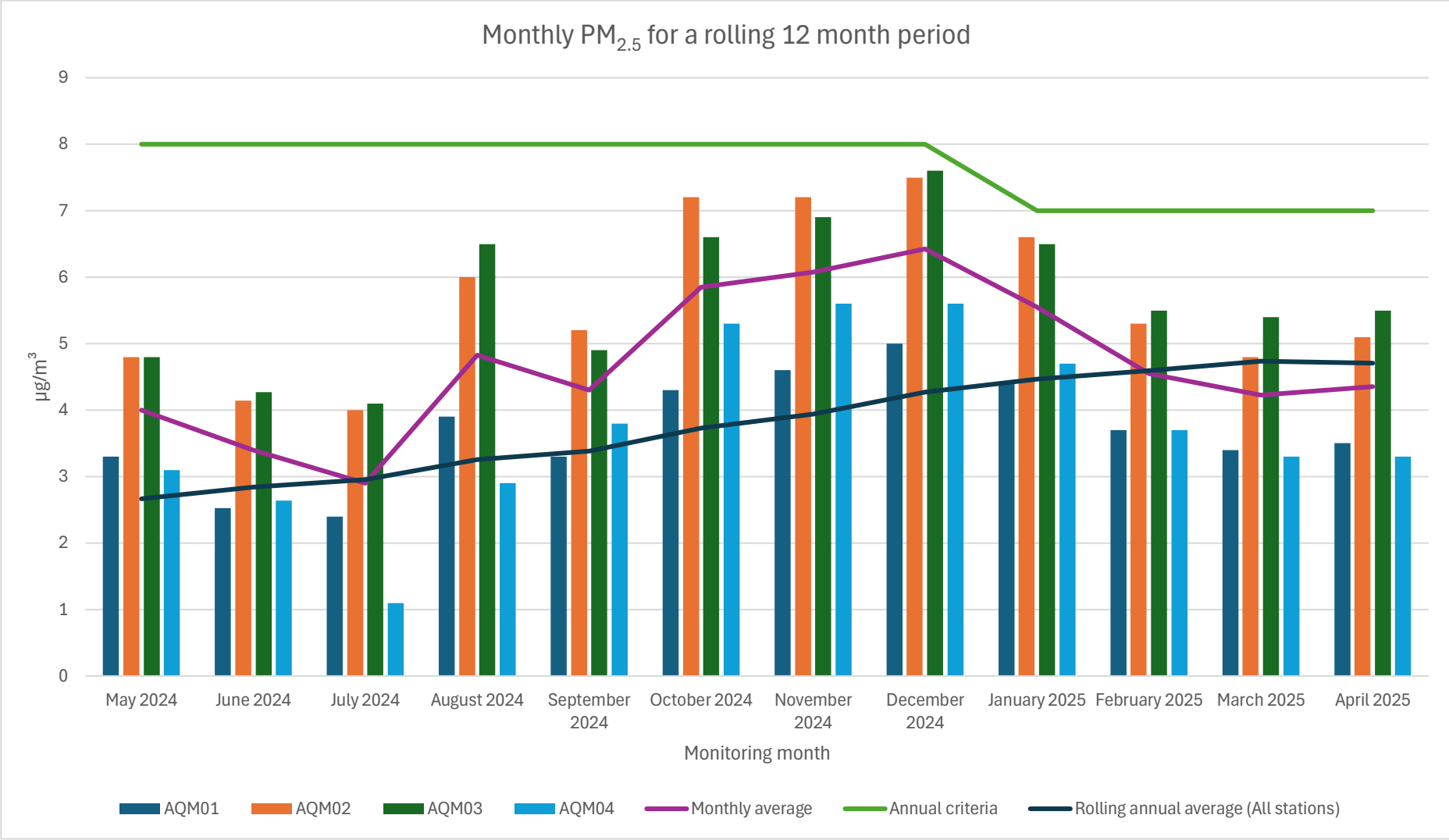
APPENDIX A MONITORING DATA

Appendix A.1: Rolling 12-month particulate data ($PM_{2.5}$)

Month	Average AQM01	Average AQM02	Average AQM03	Average AQM04	Months Average All stations	Rolling annual average All stations	Annual average criteria	Comments
	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	
May 2024	3.3	4.8	4.8	3.1	4.0	2.7	8.0	No exceedance of annual average criteria.
June 2024	2.5	4.1	4.3	2.6	3.4	2.8	8.0	No exceedance of annual average criteria.
July 2024	2.4	4.0	4.1	1.1	2.9	3.0	8.0	No exceedance of annual average criteria.
August 2024	3.9	6.0	6.5	2.9	4.8	3.3	8.0	No exceedance of annual average criteria.
September 2024	3.3	5.2	4.9	3.8	4.3	3.4	8.0	No exceedance of annual average criteria.
October 2024	4.3	7.2	6.6	5.3	5.9	3.7	8.0	No exceedance of annual average criteria.
November 2024	4.6	7.2	6.9	5.6	6.1	3.9	8.0	No exceedance of annual average criteria.
December 2024	5.0	7.5	7.6	5.6	6.4	4.3	8.0	No exceedance of annual average criteria.
January 2025	4.4	6.6	6.5	4.7	5.6	4.5	7.0	No exceedance of annual average criteria. The annual criteria/goal for $PM_{2.5}$ changed from 8 µg/m³ to 7 µg/m³ from 1 January 2025.
February 2025	3.7	5.3	5.5	3.7	4.6	4.6	7.0	No exceedance of annual average criteria.
March 2025	3.4	4.8	5.4	3.3	4.2	4.7	7.0	No exceedance of annual average criteria.
April 2025	3.5	5.1	5.5	3.3	4.4	4.7	7.0	No exceedance of annual average criteria.
Rolling 12 month average	3.7	5.7	5.7	3.8	-	-	8.0	No exceedance of annual average criteria.
All months^	1.3	3.6	6.6	2.9	3.5	-	8.0	No exceedance of annual average criteria.

Bold/grey indicates an exceedance of the criteria.

^ All months since May 2020

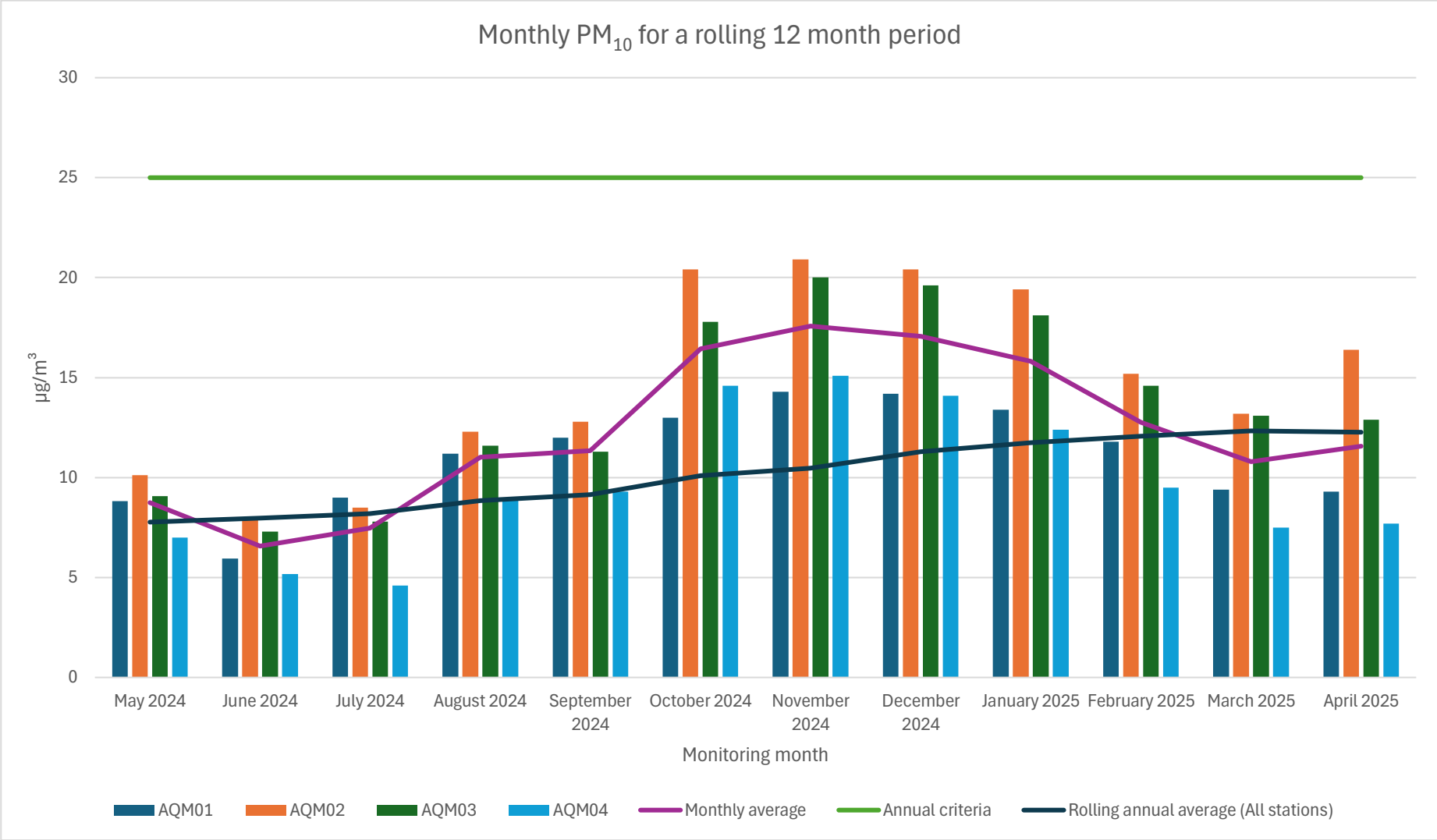


Monthly $PM_{2.5}$ over 12 months including the 6-months for this report

Appendix A.2: Rolling 12-month particulate data (PM_{10})

Month	Average AQM01	Average AQM02	Average AQM03	Average AQM04	Months Average All stations	Rolling annual average All stations	Annual average criteria	Comments
	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	
May 2024	8.8	10.1	9.1	7.0	8.7	7.8	25.0	No exceedance of annual average criteria.
June 2024	5.9	7.9	7.3	5.2	6.6	8.0	25.0	No exceedance of annual average criteria.
July 2024	9.0	8.5	7.8	4.6	7.5	8.2	25.0	No exceedance of annual average criteria.
August 2024	11.2	12.3	11.6	9.0	11.0	8.9	25.0	No exceedance of annual average criteria.
September 2024	12.0	12.8	11.3	9.3	11.4	9.1	25.0	No exceedance of annual average criteria.
October 2024	13.0	20.4	17.8	14.6	16.5	10.1	25.0	No exceedance of annual average criteria.
November 2024	14.3	20.9	20.0	15.1	17.6	10.5	25.0	No exceedance of annual average criteria.
December 2024	14.2	20.4	19.6	14.1	17.1	11.3	25.0	No exceedance of annual average criteria.
January 2025	13.4	19.4	18.1	12.4	15.8	11.7	25.0	No exceedance of annual average criteria.
February 2025	11.8	15.2	14.6	9.5	12.8	12.1	25.0	No exceedance of annual average criteria.
March 2025	9.4	13.2	13.1	7.5	10.8	12.3	25.0	No exceedance of annual average criteria.
April 2025	9.3	16.4	12.9	7.7	11.6	12.3	25.0	No exceedance of annual average criteria.
Rolling 12 month average	11.0	14.8	13.6	9.7	-	-	25.0	No exceedance of annual average criteria.
All months^	3.8	10.5	21.5	6.5	10.4	-	25.0	No exceedance of annual average criteria.

Bold/grey indicates an exceedance of the criteria, ^ All months since May 2020



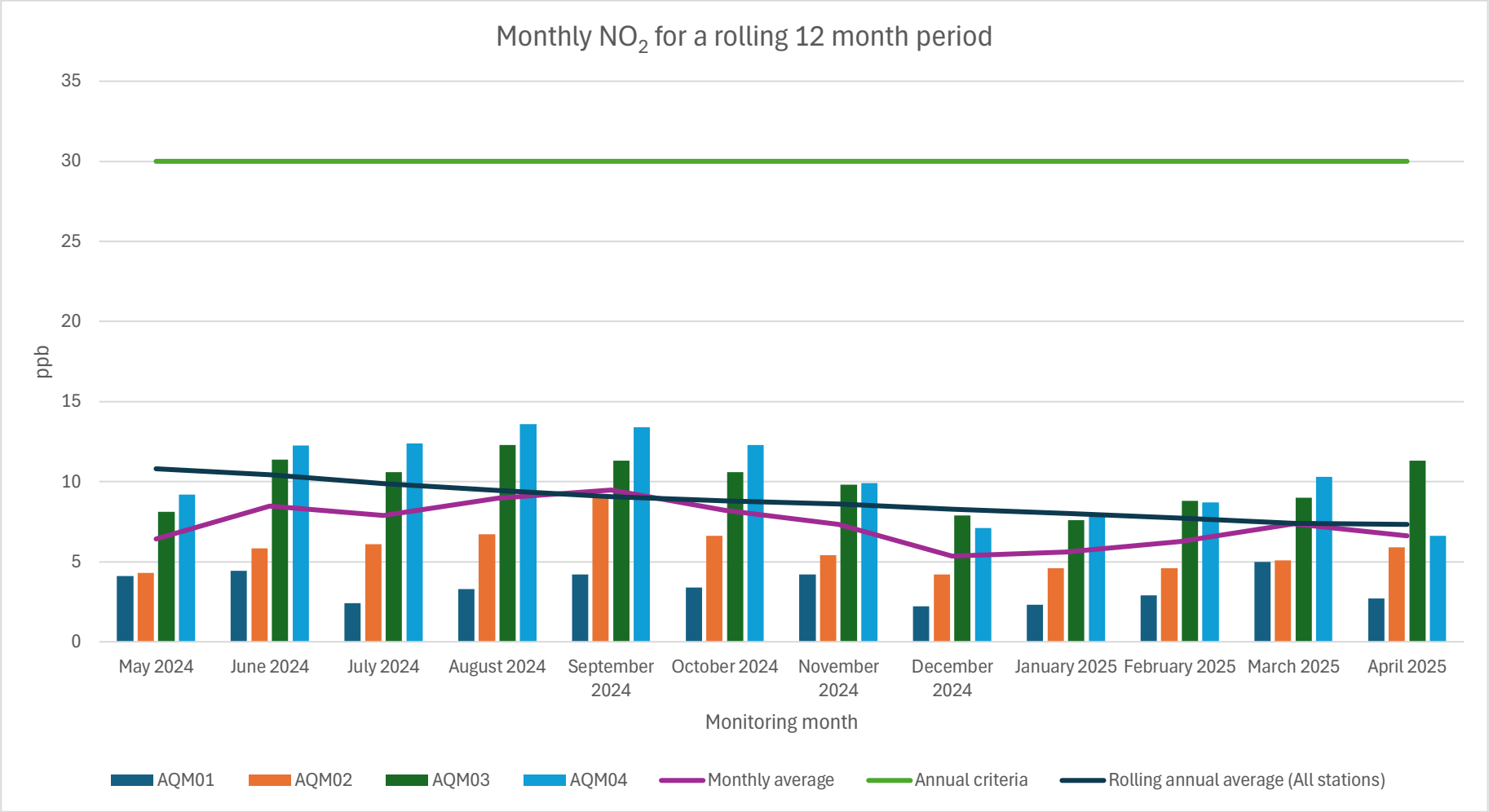
Monthly PM_{10} over 12 months including the 6-months for this report

Appendix A.3: Rolling monthly and annual particulate data (NO_2)

Month	Average AQM01	Average AQM02	Average AQM03	Average AQM04	Months Average All stations	Rolling annual average All stations	Annual average criteria	Comments
	ppb	ppb	ppb	ppb	ppb	ppb	ppm / ppb*	
May 2024	4.1	4.3	8.1	9.2	6.4	10.8	0.03 / 30.0	No exceedance of annual average criteria.
June 2024	4.4	5.8	11.4	12.2	8.5	10.4	0.03 / 30.0	No exceedance of annual average criteria.
July 2024	2.4	6.1	10.6	12.4	7.9	9.9	0.03 / 30.0	No exceedance of annual average criteria.
August 2024	3.3	6.7	12.3	13.6	9.0	9.5	0.03 / 30.0	No exceedance of annual average criteria.
September 2024	4.2	9.0	11.3	13.4	9.5	9.1	0.03 / 30.0	No exceedance of annual average criteria.
October 2024	3.4	6.6	10.6	12.3	8.2	8.8	0.03 / 30.0	No exceedance of annual average criteria.
November 2024	4.2	5.4	9.8	9.9	7.3	8.6	0.03 / 30.0	No exceedance of annual average criteria.
December 2024	2.2	4.2	7.9	7.1	5.4	8.3	0.03 / 30.0	No exceedance of annual average criteria.
January 2025	2.3	4.6	7.6	7.9	5.6	8.0	0.03 / 30.0	No exceedance of annual average criteria.
February 2025	2.9	4.6	8.8	8.7	6.3	7.7	0.03 / 30.0	No exceedance of annual average criteria.
March 2025	5.0	5.1	9.0	10.3	7.4	7.4	0.03 / 30.0	No exceedance of annual average criteria.
April 2025	2.7	5.9	11.3	6.6	6.6	7.3	0.03 / 30.0	No exceedance of annual average criteria.
Rolling 12 month average	0.003 ppm / 3.4 ppb	0.006 ppm / 5.7 ppb	0.010 ppm / 9.9 ppb	0.010 ppm / 10.3 ppb	-	-	0.03 / 30.0	No exceedance of annual average criteria.
All months^	0.007 ppm / 6.8 ppb	0.006 ppm / 5.9 ppb	**0.036 ppm / 36.3 ppb**	0.011 ppm / 10.9 ppb	0.014 ppm / 14.4 ppb	-	0.03 ppm / 30.0 ppb	No exceedance of average criteria for all sites for all months. However, AQM03 has exceeded the annual average for the period since monitoring began.

Bold/grey indicates an exceedance of the criteria.

*Results are shown in ppb due to reporting output, however the criteria is set in ppm and therefore the equivalent criteria in ppb is also shown. ^ All months since May 2020



Monthly NO_2 over 12 months including the 6-months for this report

ARCADIS Design & Consultancy for natural and built assets

ARCADIS Design & Consultancy for natural and built assets

MOOREBANK INTERMODAL PRECINCT – EAST AND WEST PRECINCTS

Operational Air Quality Six Monthly Compliance Report #11

May 2025 – October 2025

14 NOVEMBER 2025

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MOOREBANK INTERMODAL PRECINCT – EAST AND WEST PRECINCTS

Operational Air Quality Six Monthly Compliance Report #11

May 2025 – October 2025

Author Samuel Brown

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Report No PREC-ARC-EN-RPT-0015

Date 14/11/2025

Revision Text 001

This report has been prepared for Tactical Group in accordance with the terms and conditions of appointment for MIP (East and West Precincts) Operational Air Monitoring Program dated March 2024. Arcadis Australia Pacific Pty Limited (ABN 76 104 485 289) cannot accept any responsibility for any use of or reliance on the contents of this report by any third party.

REVISIONS

Revision	Date	Description	Prepared by	Approved by
001	14/11/2025	Submitted draft to client for review	SB	HT

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1 INTRODUCTION

1.1 Background

The Moorebank Logistics Park[1] – Precinct East Operational Air Quality Monitoring Programme Framework (OAQMPF - dated 19 March 2020) provided a framework to monitor air quality during operation of the Moorebank Intermodal Precinct (MIP) East Precinct and was developed to support the implementation of the monitoring and reporting requirements identified in the Operational Air Quality Management Plan (OAQMP - Revision 18 dated 20 January 2023). MIP East Precinct (MPE) commenced operation in May 2020.

Operation of the first warehouses at MIP West Precinct (MPW) commenced in April 2024. To support the commencement of operation at MPW, under SSD 7709 Condition of Consent (CoC) B47A a precinct wide OAQMP (POAQMP) that covers both MPE and MPW was prepared and initially approved by the Department on 20 December 2023, with the latest approved revision in November 2024.

The POAQMP now supersedes the OAQMPF (dated 19 March 2020) as per mitigation measure 2B of the Final Compilation of Mitigation Measures (MPE Stage 1) [FCMM]. This Operational Air Quality Six Monthly Compliance Report #11 (this report and Compliance Reports #9 and #10) cover the entire MIP (East and West Precincts). Compliance Reports #1 to #8 only covered MPE.

MIP (East and West Precincts) is managed in accordance with two Operational Environmental Management Plans (OEMP) and sub-plans:

- *Operational Environmental Management Plan Moorebank Logistics Park – East Precinct* (OEMP MPE) Revision 19 dated 20 November 2024 applies to MPE
- *OEMP Moorebank Intermodal Precinct - West Precinct Stage 2* (OEMP MPW) dated 6 May 2024 applies to MPW.

The POAQMP includes requirements from the following approvals:

- **EPBC Act Approval (2011/6229)** Condition of Approval (CoA) 8(f) which requires the implementation of a comprehensive air quality monitoring program (including locations, frequency, and duration)
- **Moorebank East Precinct Stage 1 (SSD 6766)**:
  - CoC F4(f)(iv) which requires measurement of air emissions generated by the Facility.
  - FCMM 2C which requires the implementation of an air quality monitoring programme during operation for nuisance dust and air emissions [PM_{10}[2] and nitrogen dioxide (NO_2)].
- **Moorebank East Precinct Stage 2 (SSD 7628**):
  - CoC C21(c)(iii) which requires the submission of six-monthly operational compliance reports for the life of the project.
  - CoC B59(d)(i), (ii), (iii), (iv) and (vii) which require the identification of air quality monitoring methods and implementation of compliance monitoring for all emissions associated with operations of the Facility.
  - FCMM 3C which requires real-time boundary monitoring be undertaken during operation of the Facility.

[1] With LOGOS purchasing the MLP, the MLP will now be referred to as Moorebank Intermodal Precinct (MIP).

[2] PM_{10} - Particles with a diameter of 10 micrometres or less, which are small enough to pass through the throat and nose and enter the lungs.

- **Moorebank West Precinct Stage 2 (SSD 7709)**:
  - CoC B47A requires the development of an OAQMP, that covers both MPE and MPW.

In 2022, LOGOS Property took over the management of the warehouse and distribution facilities, as well as the overall management of MPE and MPW. In July 2024, ESR Group acquired the remaining interest in LOGOS, and overall management of the MIP East and West Precinct, is now the responsibility of ESR Australia & NZ (ESR). Qube Logistics will continue to maintain responsibility for the IMEX (Import Export Rail Terminal) and the Rail Link for MPE. This change in ownership does not impact the current reporting period or the current reporting requirements.

1.2 MIP (East and West Precincts) Site operation

1.2.1 MPE

MPE operates 24 hours, 7 days a week (24/7). This currently includes operation of the IMEX terminal, Rail Link, Warehouse 1, Warehouse 3, Warehouse 4, Warehouse 5, Warehouse 6 and Warehouse 7a and 7b. No major construction related activities occurred during this reporting period. Warehouse 2 (Area 5) and the freight village (Area 6) are the last of the areas to be constructed. These are scheduled to be operational by Q4 2026. These activities would be undertaken during standard working hours, unless stated otherwise.

1.2.2 MPW

The MPW Stage 2 development is located west of Moorebank Avenue and involves the construction and operation of a multi-purpose Intermodal (freight) Terminal (IMT) facility, which includes:

- A rail link connection
- Warehousing
- Freight village
- Upgrades to the Moorebank Avenue and Anzac Road intersection and the subdivision of site including ancillary works.

Operation of the IMT facility includes:

- Operation of the rail link to the Southern Sydney Freight Line (SSFL) and container freight movement by truck to and from the MPE Site (included as part of MPE Stage 1 (SSD 6766)).
- A warehousing estate on the northern part of the site servicing the IMT facility, including:
  - six warehouses and associated infrastructure and amenities and
  - a freight village (operating from 7am to 6pm, 7 days/ week) including staff/ visitor amenities.

Currently Warehouses N1, N2, NDC and JN are operational, with the rest of the development still under construction.

MPW Stage 2 has been granted approval to receive imported material outside of standard construction hours, along with specific types of work.

1.2.3 Moorebank Realignment Works

Construction of the Moorebank Realignment (MARW) commenced in March 2025. The Moorebank Realignment works are occurring adjacent north, east and south of MPE, with construction activities including excavation, vegetation clearing and material importation. Thes activities have the potential to impact on the air quality in the localised area.

1.2.4 MIP Wide

There are also works and activities that occur outside of standard construction hours under specific approvals processes from time-to-time. These can include construction works and activities associated with MPE, MPW and MARW.

Table 1-1 summarises the works, activities and material importation undertaken outside of standard construction hours during the six-monthly reporting period.

Table 1-1: Summary of works outside of standard construction hours

Dates	Activities undertaken
1 April 2025 to 31 October 2025	Moorebank Avenue upgrade and Moorebank Avenue and Anzac Road intersection upgrade
From July 2025	Moorebank Avenue Realignment Works (MARW)
26 July 2025 and 27 July 2025	M5 closure at Moorebank Avenue
30 July 2025 to 17 October 2025	Southern end of Bushmaster Avenue works
October 2025	Works at Bushmaster Avenue south as part of MPW

1.1 Purpose of the report

This six-monthly air quality report has been prepared to meet reporting requirements of SSD 7709 CoC B47A and as detailed in Section 5 of the OAQMPF (March 2020) and Section 4.3 of the POAQMP (November 2024).

This six-monthly air quality report includes:

- A background to the air quality monitors and their locations (Section 2)
- Weather data and regional air quality (Section 3)
- Analysis of the raw data and comparison against identified criteria / trigger level, identification of exceedances, complaints or ad hoc monitoring undertaken (Section 4)
- An overview of any investigations undertaken to determine the cause of the exceedance or complaint (Sections 4.2, 4.3, 4.4 and 4.5).
- A high-level overview of the dust deposition data (Section 4.2).
- Conclusions and recommendations based on the 6-month's data (Section 5)
- Summarised data in graphs and tables (Appendix A).

1.2 Reporting period

MPE commenced operations on 13 May 2020 and MPW commenced operations in April 2024.

This six-monthly air quality report has been prepared to provide an overview of operational air quality results for the six-month operational period from 1 May 2025 to 31 October 2025 (inclusive) to inform the six-monthly operational compliance reports required for the life of the project.

This report will be the eleventh report since MPE operations began in May 2020. Reports #1- #8 were for MPE only, with Reports #9 onwards, including this report #11, combining the operations of MPE and MPW.

1.3 Limitations

All findings contained in this report are based on downloaded monitoring data at the time of writing the monthly reports and information relating to air quality provided by Tactical Group, Envirosuite (Omnis), NEON system (weather monitor), Bureau of Meteorology (BOM) and Site Environmental and Remediation Services (SERS) who manage the dust deposition gauges (DDG). Arcadis do not take responsibility for the accuracy or limitations of the downloaded and provided DDG data.

2 OVERVIEW OF AIR QUALITY MONITORING

2.1 Air quality monitors

The dust and air quality monitoring system installed across the MIP Precincts comprises four Kunak AIR Lite units integrated with Omnis™ software, which is hosted in the cloud.

The Kunak AIR Lite units measure the following dust and air quality parameters:

- NO_2 (range: 0-25 ppb)
- PM_{10} (particles with have a diameter less than 10 microns)
- $PM_{2.5}$ (range: 0-1000 µg/m^3)
- CO (installed since March 2020).

The original air quality monitors installed at the start of the MPE operations were replaced in mid-April 2024 with the Kunak AIR Lite sensors. The Kunak system also measures PM_1 i.e. particulates of less than one micron in size.

2.2 Dust deposition gauges

Seven DDGs were installed across the Precinct in May 2021. Another three DDG's were added to the Precinct in November 2024 and Stage 1 DDG 1 was removed in the first quarter of 2025 due to its location within the IMEX terminal. Therefore, as of April 2025 there are nine DDGs across the Precinct.

The DDG's are currently managed and monitored by Site Environmental and Remediation Services (SERS). SERS provide monthly to quarterly DDG reports which are used to inform the monthly Air Quality Reports.

The DDGs consist of 5-litre glass bottles with 150 mm diameter glass funnels and silicone bungs. The purpose of this sampling is to determine which particles settle from the ambient air over an approximate 31-day sampling period. This equipment is compliant with the Australian Standard AS/NZS 3580.10.1:2016.

2.3 Monitoring locations

The locations of the continuous air quality monitoring stations are identified on Figure 2-1 and the DDG locations are shown on Figure 2-2.

The site boundary is considered representative of the closest receptors (including the adjacent commercial premises). The locations of the continuous air quality monitors means that the construction and operation activities for both MPE and MPW Stage 2 have been captured.

DDG locations were also chosen so that a true representation of dust generated from operational activities at MPE could be established. The additional three DDGs capture construction activities occurring at MPW Stage 2 (see Figure 2-2).

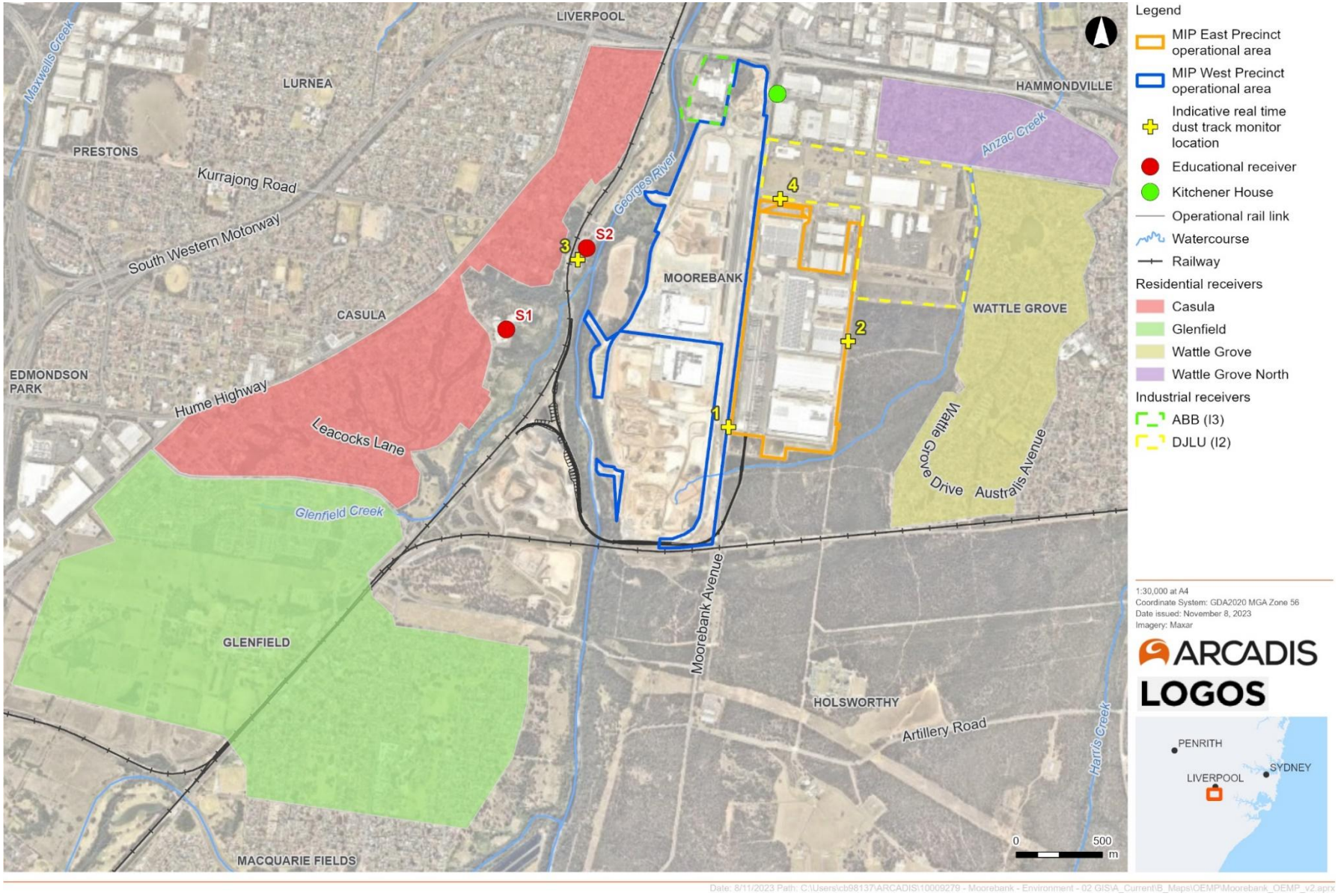


Figure 2-1: Continuous real-time air quality monitors (Source: Arcadis, 2023)

FIGURE 1 Dust Deposition Gauge- Sampling Location map (updated May 2025)

Figure 2-2: Location of Dust Deposition Gauges (Source: SERS, November 2025).

Stage 1 (STG 1) refers to MPE Stage 1 and Stage 2 (STG 2) refers to MPE Stage 2

2.4 Air quality monitoring station availability

A summary of availability (time of operation) of the continuous air quality monitoring stations for this reporting period is summarised in Table 2-1, with the most recent calibration date also stated.

Table 2-1: Monitoring station availability (%)

Monitoring station	May 2025	Jun 2025	Jul 2025	Aug 2025	Sep 2025	Oct 2025	Average %	Latest calibration date
	% availability each month							
AQM01	100	100	100	98	100	100	100	March 2024
AQM02	100	100	100	98	100	100	100	March 2024
AQM03	100	100	100	98	100	100	100	March 2024
AQM04	100	100	74	98	100	100	95	March 2024

All monitors, except for monitor AQM04, had an average of 100% availability throughout the reporting period.

Monitor AQM04 had 74% availability in July 2025 as it was moved to accommodate works for a period during the month.

3 WEATHER

3.1 Meteorological Conditions

3.1.1 Prevailing wind conditions

Prevailing winds influence the dispersion of dust, and other air emissions potentially generated by the Facility. A weather station is located adjacent to Moorebank Avenue at MPW to capture representative conditions at the site. The prevailing wind speed and direction is discussed in more detail below.

3.1.2 Observed wind data

3.1.2.1 Site weather station

The average wind speed and direction data from the site weather monitor from May 2025 to October 2025 is summarised below in Table 3-1.

Table 3-1: Site weather station average wind speed and direction for November 2024 to April 2025

Month	Wind speed (m/s)	Beaufort Wind scale category[3]	Wind direction
May 2025	1.2	Light air	Southwest (223°)
June 2025	0.9	Light air	West-southwest (241°)
July 2025	1.1	Light air	Southwest (232°)
August 2025	1.4	Light air	Southwest (235°)
September 2025	1.3	Light air	South-southwest (208°)
October 2025	1.5	Light air	Southwest (213°)

3.1.3 Ambient temperature and rainfall

Ambient temperature and rainfall are recorded at the Bankstown Airport AWS due to the availability of long-term averages for ambient temperature and rainfall which can compared to the reporting period data. Based on the AWS, the monthly mean temperatures (minimum and maximum) and rainfall (long-term monthly average and total) for the reporting period are summarised in Table 3-2.

Table 3-2: Temperature and rainfall recorded at the Bankstown Airport AWS for the reporting period

Month	Mean minimum temperature (°C)	Mean maximum temperature (°C)	Total rainfall (mm)	Long-term monthly average rainfall (mm)
May 2025	11.9	21.0	209.8	62.7
June 2025	5.2	18.2	7.2	77.0
July 2025	6.3	17.9	91.0	48.7
August 2025	8.4	18.5	242.6	52.3
September 2025	10.1	24.0	64.4	44.7
October 2025	13.6	27.9	16.2	61.0

Source: Bankstown, NSW - October 2025 - Daily Weather Observations

[3] Based on the Beaufort wind force scale which is an empirical measure that relates wind speed to observed conditions at sea or on land (https://en.wikipedia.org/wiki/Beaufort_scale)

Rainfall for the reporting period was mixed throughout the 6-month period. However, May 2025 and August 2025 were well above the long-term monthly average rainfall and June 2025 was well below the long-term monthly average.

3.2 Ambient Air Quality

The NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW) uses air quality categories (AQC) for NSW. These categories are based on air quality data readings which are taken continuously from the various monitoring sites throughout NSW and are averaged to give hourly and daily air quality information. NSW DCCEEW use minute data, and report concentrations as hourly and daily averages. All averages are arithmetic means. Air quality data is updated hourly, and a daily air quality forecast is made for the Greater Sydney Metropolitan Region at 4 pm each day.

The AQC is generally used by government agencies to communicate to the public how polluted the air currently is or how polluted it is forecast to become. The AQC ranges from 'Good' to 'Extremely Poor' and is summarised in Figure 3-1[4].

			Air quality categories (AQC)				
Air pollutant	Averaging period	Units	GOOD	FAIR	POOR	VERY POOR	EXTREMELY POOR
Ozone O_3	1-hour	pphm	<6.7	6.7–10.0	10.0–15.0	15.0–20.0	20.0 and above
	4-hour rolling	pphm	<5.4	5.4–8.0	8.0–12.0	12.0–16.0	16.0 and above
Nitrogen dioxide NO_2	1-hour	pphm	<8	8–12	12–18	18–24	24 and above
Visibility Neph	1-hour	bsp	<1.5	1.5–3.0	3.0–6.0	6.0–18.0	18.0 and above
Carbon monoxide CO	8-hour rolling	ppm	<6.0	6.0–9.0	9.0–13.5	13.5–18.0	18.0 and above
Sulfur dioxide SO_2	1-hour	pphm	<13.3	13.3–20.0	20.0–30.0	30.0–40.0	40.0 and above
Particulate matter < 10 µm PM_{10}	1-hour	µg/m^3	<50	50–100	100–200	200–600	600 and above
Particulate matter < 2.5 µm $PM_{2.5}$	1-hour	µg/m^3	<25	25–50	50–100	100–300	300 and above

Figure 3-1: Air quality categories

The PM_{10}, $PM_{2.5}$, NO_2, Visibility and CO air quality data from the Liverpool[5] monitoring station is reviewed monthly and is summarised for the six-month reporting period in Table 3-3.

[4] https://www.environment.nsw.gov.au/topics/air/understanding-air-quality-data/air-quality-categories

[5] Data download facility | NSW Dept of Planning, Industry and Environment

Table 3-3: Summary of AQC from the Liverpool monitoring station for the reporting period

Month	Average for Reporting Period	Comment for reporting period
NO_2 (ppm) maximum 1 hourly average	Good	'Good' every day
CO (ppm) maximum rolling 8 hourly averages	Good	'Good' every day
PM_{10} 24-hour average	Mostly good, with 6 days fair.	'Good' every day except for: • Monday 2 June 2025, which had a 'fair' reading for PM_{10} (33.5 µg/m^3). • Wednesday 3 September 2025, which had a 'fair' reading for PM_{10} (47.9 µg/m^3). • Monday 8 September 2025, which had a 'fair' reading for PM_{10} (37.0 µg/m^3). • Tuesday 21 October 2025, which had a 'fair' reading for PM_{10} (34.2 µg/m^3). • Wednesday 22 October 2025, which had a 'fair' reading for PM_{10} (42.2 µg/m^3). • Thursday 23 October 2025, which had a 'fair' reading for PM_{10} (34.5 µg/m^3).
$PM_{2.5}$ 24-hour average	Mostly good, with 2 days fair.	'Good' every day except for: • Saturday 21 June 2025, which had a 'fair' reading for $PM_{2.5}$ (18.5 µg/m^3). • Sunday 22 June 2025, which had a 'fair' reading for $PM_{2.5}$ (20.7 µg/m^3).
Visibility[6],	Mostly good, with 4 days fair.	'Good' every day except for: • Saturday 21 June 2025, which had a 'fair' reading for Visibility (1.94 $10^{-4}m^{-1}$). • Saturday 12 July 2025, which had a 'fair' reading for Visibility (1.50 $10^{-4}m^{-1}$). • Saturday 19 July 2025, which had a 'fair' reading for Visibility (2.24 $10^{-4}m^{-1}$). • Tuesday 22 July 2025, which had a 'fair' reading for Visibility (1.64 $10^{-4}m^{-1}$).

[6] In NSW, visibility (or NEPH) is reported in units of 10^{-4} m^{-1}. This means that a NEPH value of 1.5 should be read as $1.5x10^{-4}$ m^{-1}. NSW has adopted a 1-hour visibility standard of $2.1x10^{-4}$ m^{-1}, which corresponds to a visual distance of approximately 18.6 km. This means that NEPH > 2.1 will trigger 'POOR' (or worse) air quality due to reduced visual range (<18.6 km)

4 MONITORING RESULTS

4.1 Air quality criteria

4.1.1 Criteria for $PM_{2.5}$, PM_{10}, NO_2 and CO

The National Environment Protection Measure for Ambient Air (Air NEPM)[7] has established new national standards for assessment of air quality for NO_2 and CO, which came into effect 13 May 2021. These criteria are detailed in Table 4-1. The air quality data at MIP was assessed against the new criteria from June 2021.

Table 4-1: Monitoring criteria (January 2025 for $PM_{2.5}$ and the remaining criteria applied from June 2021)

Monitoring focus	Averaging period	Criteria / Trigger / Goal
$PM_{2.5}$	24-hour average	20 µg/m^3
	Annual average	7 µg/m^3
PM_{10}	24-hour average	50 µg/m^3
	Annual average	25 µg/m^3
NO_2	1-hour average	0.12 ppm
	Annual average	0.03 ppm
CO	1-hour average	NA
	8 -hour average	9.0 ppm

4.1.2 Dust deposition

Dust deposition data from DDGs located around MIP is provided by SERS. Seven DDGs have been operational since May 2021 and another three were added in November 2024 and Stage 1 DDG 1 was removed in the first quarter of 2025 due to its location within the IMEX terminal. As of April 2025, nine DDGs provide representative dust deposition across the Precinct

NSW DCCEEW has set the criteria for dust deposition rates, and these are provided in Table 4-2.

Table 4-2: Dust deposition criteria

Averaging Period	Maximum increase in deposited dust* level	Maximum total deposited dust level
Annual	2 g/m^2/month (incremental)	4 g/m^2/month (cumulative)

* Deposited dust is assessed as insoluble solids. This is the mass of the insoluble portion of the deposited matter, as defined under AS 3580.10.1: 2016.

[7] https://www.environment.nsw.gov.au/topics/air/understanding-air-quality-data/standards-and-goals

4.2 Dust deposition gauge results

The results of the collection period 29 April 2025 to 8 October 2025 as provided by SERS is shown in Table 4-3.

Table 4-3: Dust deposition (insoluble solids g/m²/month) results from 29 April 2025 to 3 November 2025

Date	Stage 2 DDG 1	Stage 2 DDG 2	Stage 2 DDG 3	Stage 2 DDG 4	Stage 2 DDG 5	Stage 2 DDG 6	MPW1	MPW2	MPW3	Average
May 2025	**6.0**	2.3	**4.8**	**7.2**	**7.1**	**5.9**	**8.5**	**8.2**	**7.8**	**6.4**
June 2025	0.9	N/A*	1.0	0.3	0.4	0.5	1.6	**4.7**	2.1	1.4
July 2025 #	1.8	0.1	1.6	1.5	0.5	**7.9**	1.6	**12.0**	2.6	3.3
August # 2025	0.7	0.1	0.6	0.7	0.8	0.7	1.3	**6.1**	3.9	1.7
September # 2025	0.2	**6.0**	**110.0**	**5.6**	1.1	1.6	0.9	**4.9**	2.8	**14.8**
October 2025	<0.1	**4.2**	2.0	N/A**	N/A**	2.7	1.8	**9.4**	2.2	3.2

NOTE: Bold/grey indicates an exceedance of the criteria.

* Stage 2 DDG 2 was damaged and unavailable for the reporting period.

** Stage 2 DDG4 and Stage 2 DDG5 were unable to be accessed for the reporting period due to construction activities

Two reports were used to capture the entire month

As shown in Table 4-3, there were eighteen (18) individual gauge exceedances between May 2025 and October 2025.

- May 2025 had the highest number of exceedances for the reporting period. Given the local ambient weather was generally good, and that the average $PM_{2.5}$ and PM_{10} data for the month (Appendix A) show the particulate data to be well below the criteria, indicate that these exceedances are likely to be attributed to fugitive dust from construction activities across MPW, Moorebank Avenue upgrade works and the commencement of MARW excavation works.
- MPW2 DDG showed the highest rate of exceedance for the reporting period. MPW2 is located adjacent west of an area of the MPW site that is still under construction.
- Exceedances at Stage 2 DDG1, Stage 2 DDG2, Stage 2 DDG4 and Stage 2 DDG6 are likely due to construction activities associated with MARW, where there has been extensive excavations and material importation activities during the reporting period.
- The SERS report for September 2025 notes that the elevated concentrations of insoluble solids at sample location STG 2 DDG 3 are likely attributable to the presence of sand particles within the dust gauge

4.3 Continuous monitor results

Monitoring data for $PM_{2.5}$, PM_{10}, NO_2 and CO for the reporting period have been summarised into tables and graphs and are provided in Appendix A. The following sections summarise the results for this 6-month reporting period.

4.3.1 Annual exceedances

Twelve months of air quality monitoring are provided graphically and in table form in Appendix A.

All monitors had an average availability of 100% during the reporting period, except for AQM04, which had 95% availability. The lower availability for this monitor was due to it being moved in July 2025 for a period during the month to accommodate works. Overall, there is adequate monitoring available for the reporting period.

See Table 2-1 for the monitoring station availability (%) over a 12-month period.

4.3.1.1 $PM_{2.5}$ and PM_{10} Monitoring

The 12-month rolling annual average for the period November 2024 to October 2025 for all four monitors combined was below the annual average criteria (i.e. 7.0 µg/m^3 for $PM_{2.5}$ and 25.0 µg/m^3 for PM_{10}) for each month.

As of October 2025, the 12-month rolling annual average for all four monitors was 4.3 µg/m^3 for $PM_{2.5}$ and 11.6 µg/m^3 for PM_{10}.

See Appendix A.1 and Appendix A.2 for more details.

4.3.1.2 NO_2 Monitoring

The 12-month rolling annual average for all four monitors for the period November 2024 to October 2025 was below the annual average criteria (0.03 ppm) for each month.

As of October 2025, the 12-month rolling annual average for NO_2 for all four monitors is 0.006 ppm, well below the annual average criteria of 0.03 ppm.

4.3.1.3 CO

CO does not require annual reporting.

4.3.2 24-hour exceedances

4.3.2.1 $PM_{2.5}$ Monitoring

A review of the data for the reporting period (May 2025 to October 2025) did not identify any exceedance of the 24-hour average criteria (20 µg/m^3) for $PM_{2.5}$ for the 6-month reporting period.

4.3.2.2 PM_{10} Monitoring

A review of the data for the reporting period (May 2025 to October 2025) identified three (3) exceedances of the 24-hour average criteria (50 µg/m^3) for PM_{10} for the 6-month reporting period.

- 5 August 2025 (24-hour average of 62.5 µg/m^3) at monitor AQM03, mainly between 4am and 10am.
- 5 August 2025 (24-hour average of 68.5 µg/m^3) at monitor AQM04, mainly between 4am and 10am.
- 18 September 2025 (24-hour average of 55.4 µg/m^3) at monitor AQM02, mainly between 11am and 3pm.

Overview

- The exceedance at AQM03 could be attributed to the ongoing construction activities associated with MPW
- Exceedances at AQM04, could be related to the construction activities for MARW at the intersection of Moorebank Avenue adjacent north of Piccolo Me.

- The exceedance at AQM02 is likely to be related to the construction of MARW due to the proximity of works to the monitor (approximately <50 metres).

4.3.3 NO_2 1-hour exceedances

No exceedance of NO_2 1-hour criteria (0.12 ppm / 120 ppb) were observed during the 6-month reporting period.

4.3.4 CO 8-hour exceedances

No 8-hour criteria exceedances for CO occurred during the 6-month reporting period.

4.4 Complaints

One complaint was made relating to air quality in September 2025. The complaint was from tenants at MPE and related to dust generated from MARW. No other formal complaints were received during the reporting period relating to air quality.

4.5 Ad-hoc monitoring

No ad-hoc monitoring was undertaken during this reporting period.

5 CONCLUSION

This six-monthly operational air quality report covers the period May 2025 to October 2025 (inclusive).

The following summarises the monitoring results for this reporting period:

Data summary

- The rolling annual average for all four monitors combined was below the annual average criteria (7.0 µg/m^3 for $PM_{2.5}$ and 25.0 µg/m^3 for PM_{10}) for each month during the reporting period.
- There were no exceedances of the $PM_{2.5}$ 24-hour average criteria (20 µg/m^3) during the 6-month reporting period.
- There were three (3) exceedances of the PM_{10} 24-hour average criteria (50 µg/m^3) during the 6-month reporting period.
- There were no exceedances of NO_2 1-hour criteria (0.12 ppm / 120 ppb) during the 6-month reporting period.
- There were no exceedances of the CO criteria (9.0 ppm) during the 6-month reporting period.
- Seven DDGs were installed in May 2021. A further three DDG's were added in November 2024 and Stage 1 DDG 1 was removed in the first quarter of 2025. As of April 2025, there are nine DDGs across the Precinct.
- Adequate data availability was provided throughout the reporting period.

Exceedances

There were eighteen (18) individual gauge exceedances of the dust deposition (insoluble solids) 2 g/m^2/month (incremental) criteria between May 2025 to October 2025. Analysis of these exceedances revealed that:

- May 2025 had the highest number of exceedances for the reporting period. Given the local ambient weather was generally good, and that the average $PM_{2.5}$ and PM_{10} data for the month (Appendix A) show the particulate data to be well below the criteria, indicate that these exceedances are likely to be attributed to fugitive dust from construction activities across MPW, Moorebank Avenue upgrade works and the commencement of MARW excavation works.
- MPW2 DDG showed the highest rate of exceedance for the reporting period. MPW2 is located adjacent west of an area of the MPW site that is still under construction.
- Exceedances at Stage 2 DDG1, Stage 2 DDG2, Stage 2 DDG4 and Stage 2 DDG6 are likely due to construction activities associated with MARW, where there has been extensive excavations and material importation activities during the reporting period.
- The SERS report for September 2025 notes that the elevated concentrations of insoluble solids at sample location STG 2 DDG 3 are likely attributable to the presence of sand particles within the dust gauge.

Analysis of the three (3) PM_{10} exceedances revealed that:

- The exceedance at AQM03 could be attributed to the ongoing construction activities associated with MPW
- Exceedances at AQM04, could be related to the construction activities for MARW at the intersection of Moorebank Avenue adjacent north of Piccolo Me.
- The exceedance at AQM02 is likely to be related to the construction of MARW due to the proximity of works to the monitor (approximately <50 metres).

- Out of hours works may have been occurring during times of exceedance.
- Trains were arriving/departing the terminal during times of exceedance on two occasions. However, monitors where exceedances occurred were over 700 metres away from train locations.
- No exceedance dates and times aligned with exceedances at the governments air quality monitoring station at Liverpool, suggesting that exceedances were more likely the result of localised emissions.

Complaints

One complaint relating to air quality was received during the reporting period (September 2025) from the tenants on MPE. The complaint was addressed promptly and the matter closed. No other complaints relating to air quality were received during the reporting period.

Recommendation

To prevent further exceedances the following measures (but not limited to) could be applied, if not already:

- Reduce areas of exposed soil
- Use of water suppression if earthworks or dust generating activities are occurring e.g. watercarts, water misters
- Staging of works to be intermittent, particularly during periods of high wind and dry conditions.

It is recommended that monitors continue to be calibrated every two years as per operational requirements and device specifications. The monitors were last calibrated in March 2024.

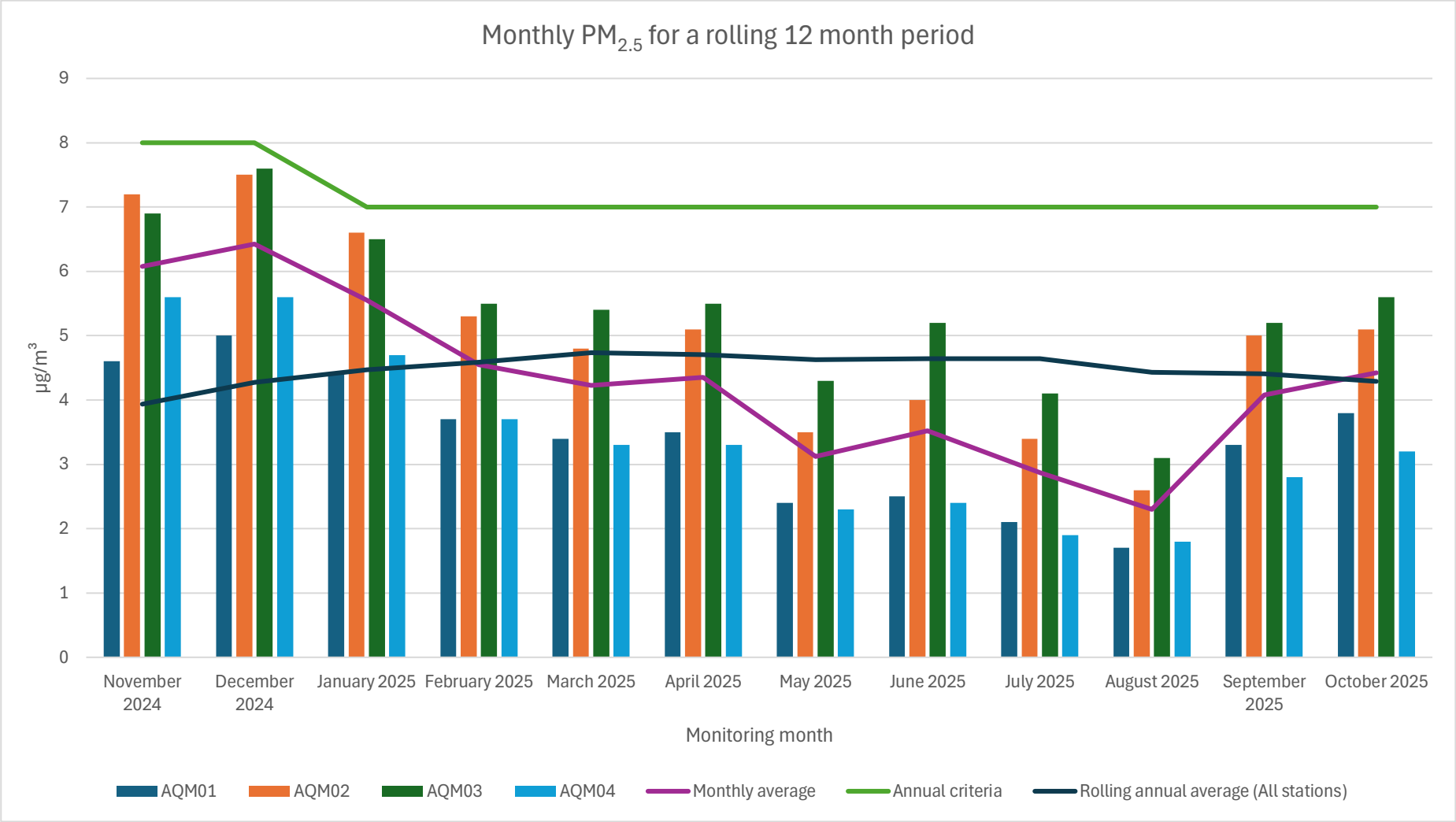
APPENDIX A MONITORING DATA

Appendix A.1: Rolling 12-month particulate data ($PM_{2.5}$)

Month	Average AQM01	Average AQM02	Average AQM03	Average AQM04	Months Average All stations	Rolling annual average All stations	Annual average criteria	Comments
	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	
November 2024	4.6	7.2	6.9	5.6	6.1	3.9	8.0	No exceedance of annual average criteria.
December 2024	5.0	7.5	7.6	5.6	6.4	4.3	8.0	No exceedance of annual average criteria.
January 2025	4.4	6.6	6.5	4.7	5.6	4.5	7.0	No exceedance of annual average criteria. The annual criteria/goal for $PM_{2.5}$ has changed from 8 µg/m³ to 7 µg/m³ from 1 January 2025.
February 2025	3.7	5.3	5.5	3.7	4.6	4.6	7.0	No exceedance of annual average criteria.
March 2025	3.4	4.8	5.4	3.3	4.2	4.7	7.0	No exceedance of annual average criteria.
April 2025	3.5	5.1	5.5	3.3	4.4	4.7	7.0	No exceedance of annual average criteria.
May 2025	2.4	3.5	4.3	2.3	3.1	4.6	7.0	No exceedance of annual average criteria.
June 2025	2.5	4.0	5.2	2.4	3.5	4.6	7.0	No exceedance of annual average criteria.
July 2025	2.1	3.4	4.1	1.9	2.9	4.6	7.0	No exceedance of annual average criteria.
August 2025	1.7	2.6	3.1	1.8	2.3	4.4	7.0	No exceedance of annual average criteria.
September 2025	3.3	5.0	5.2	2.8	4.1	4.4	7.0	No exceedance of annual average criteria.
October 2025	3.8	5.1	5.6	3.2	4.4	4.3	7.0	No exceedance of annual average criteria.
Rolling 12-month average	3.4	5.0	5.4	3.4	-	-	8.0	No exceedance of annual average criteria.
All months^	1.4	3.6	6.4	2.9	3.5	-	8.0	No exceedance of annual average criteria.

Bold/grey indicates an exceedance of the criteria.

^ All months since May 2020

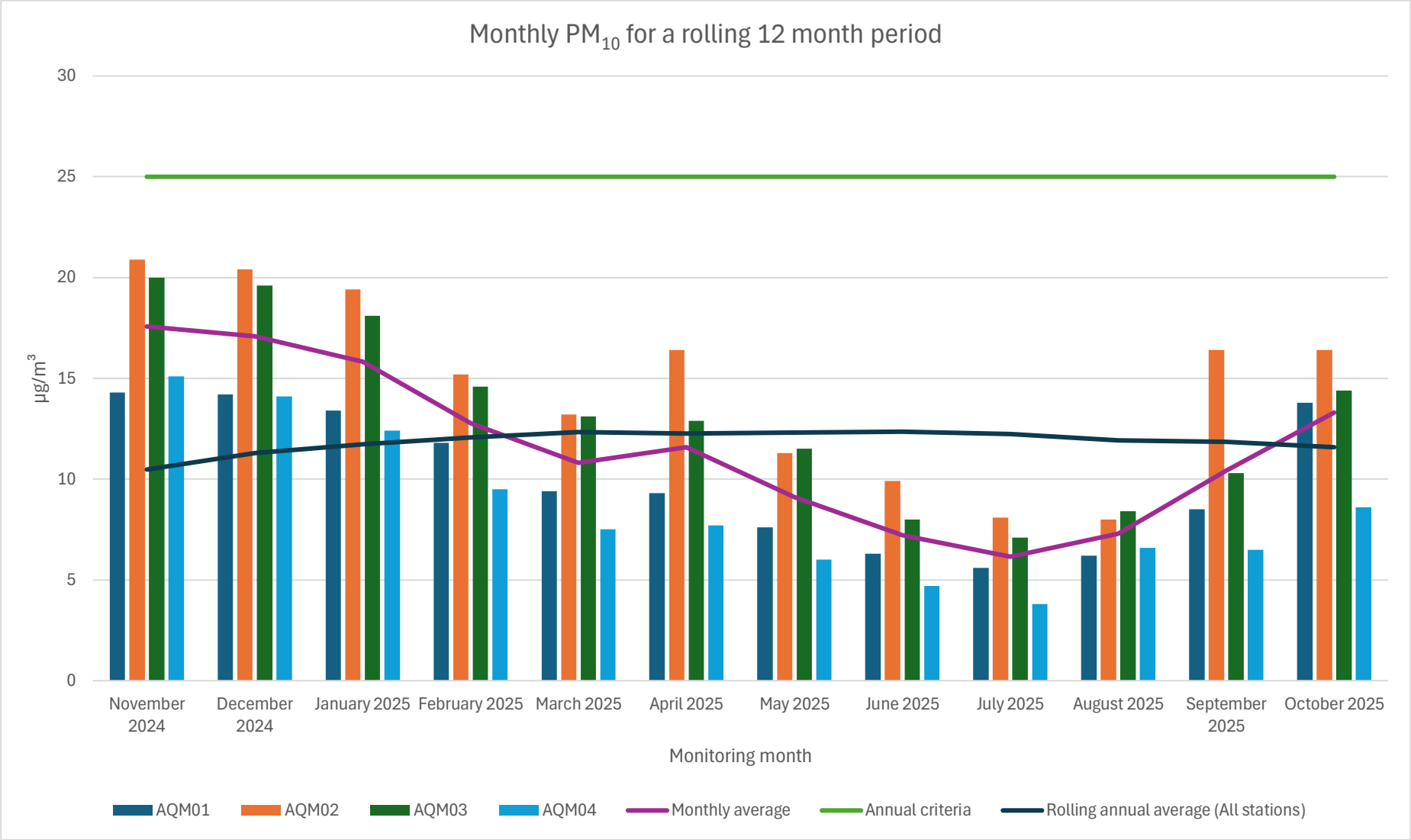


Monthly $PM_{2.5}$ over 12 months including the 6-months for this report

Appendix A.2: Rolling 12-month particulate data (PM_{10})

Month	Average AQM01	Average AQM02	Average AQM03	Average AQM04	Months Average All stations	Rolling annual average All stations	Annual average criteria	Comments
	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	
November 2024	14.3	20.9	20.0	15.1	17.6	10.5	25.0	No exceedance of annual average criteria.
December 2024	14.2	20.4	19.6	14.1	17.1	11.3	25.0	No exceedance of annual average criteria.
January 2025	13.4	19.4	18.1	12.4	15.8	11.7	25.0	No exceedance of annual average criteria.
February 2025	11.8	15.2	14.6	9.5	12.8	12.1	25.0	No exceedance of annual average criteria.
March 2025	9.4	13.2	13.1	7.5	10.8	12.3	25.0	No exceedance of annual average criteria.
April 2025	9.3	16.4	12.9	7.7	11.6	12.3	25.0	No exceedance of annual average criteria.
May 2025	7.6	11.3	11.5	6.0	9.1	12.3	25.0	No exceedance of annual average criteria.
June 2025	6.3	9.9	8.0	4.7	7.2	12.4	25.0	No exceedance of annual average criteria.
July 2025	5.6	8.1	7.1	3.8	6.2	12.2	25.0	No exceedance of annual average criteria.
August 2025	6.2	8.0	8.4	6.6	7.3	11.9	25.0	No exceedance of annual average criteria.
September 2025	8.5	16.4	10.3	6.5	10.4	11.9	25.0	No exceedance of annual average criteria.
October 2025	13.8	16.4	14.4	8.6	13.3	11.6	25.0	No exceedance of annual average criteria.
Rolling 12-month average	10.0	14.6	13.2	8.5	-	-	25.0	No exceedance of annual average criteria.
All months^	4.2	10.6	20.3	6.5	10.2	-	25.0	No exceedance of annual average criteria.

Bold/grey indicates an exceedance of the criteria, ^ All months since May 2020



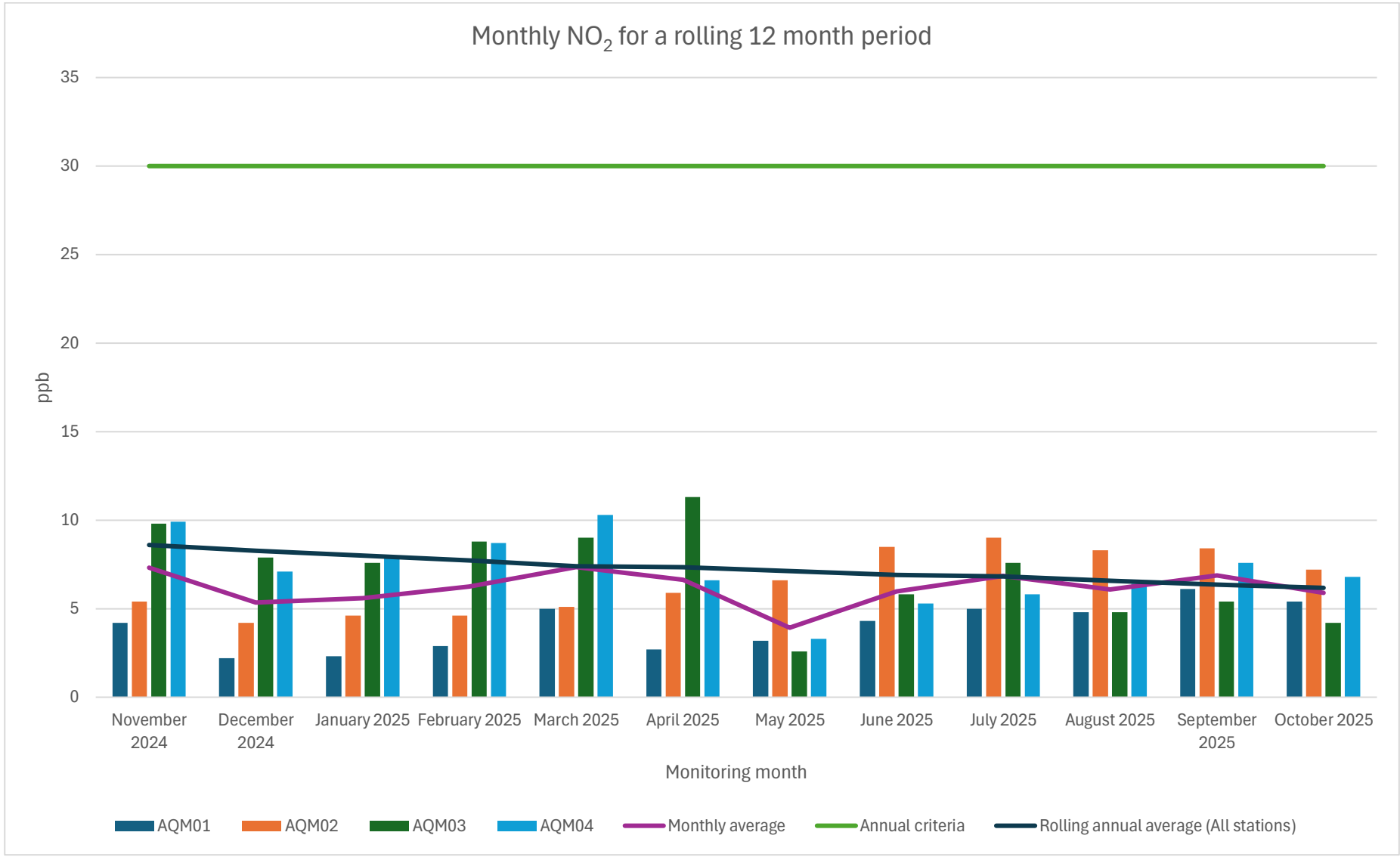
Monthly PM_{10} over 12 months including the 6-months for this report

Appendix A.3: Rolling monthly and annual particulate data (NO_2)

Month	Average AQM01	Average AQM02	Average AQM03	Average AQM04	Months Average All stations	Rolling annual average All stations	Annual average criteria	Comments
	ppb	ppb	ppb	ppb	ppb	ppb	ppm / ppb*	
November 2024	4.2	5.4	9.8	9.9	7.3	8.6	0.03 / 30.0	No exceedance of annual average criteria.
December 2024	2.2	4.2	7.9	7.1	5.4	8.3	0.03 / 30.0	No exceedance of annual average criteria.
January 2025	2.3	4.6	7.6	7.9	5.6	8.0	0.03 / 30.0	No exceedance of annual average criteria.
February 2025	2.9	4.6	8.8	8.7	6.3	7.7	0.03 / 30.0	No exceedance of annual average criteria.
March 2025	5.0	5.1	9.0	10.3	7.4	7.4	0.03 / 30.0	No exceedance of annual average criteria.
April 2025	2.7	5.9	11.3	6.6	6.6	7.3	0.03 / 30.0	No exceedance of annual average criteria.
May 2025	3.2	6.6	2.6	3.3	3.9	7.1	0.03 / 30.0	No exceedance of annual average criteria.
June 2025	4.3	8.5	5.8	5.3	6.0	6.9	0.03 / 30.0	No exceedance of annual average criteria.
July 2025	5.0	9.0	7.6	5.8	6.9	6.8	0.03 / 30.0	No exceedance of annual average criteria.
August 2025	4.8	8.3	4.8	6.4	6.1	6.6	0.03 / 30.0	No exceedance of annual average criteria.
September 2025	6.1	8.4	5.4	7.6	6.9	6.4	0.03 / 30.0	No exceedance of annual average criteria.
October 2025	5.4	7.2	4.2	6.8	5.9	6.2	0.03 / 30.0	No exceedance of annual average criteria.
Rolling 12-month average	0.004 ppm / 4.0 ppb	0.006 ppm / 6.5 ppb	0.007 ppm / 7.1 ppb	0.007 ppm / 7.1 ppb	-	-	0.03 / 30.0	No exceedance of annual average criteria.
All months^	0.007 ppm / 6.7 ppb	0.006 ppm / 6.1 ppb	**0.033 ppm / 33.0 ppb**	0.010 ppm / 10.3 ppb	0.014 ppm / 13.5 ppb	-	0.03 ppm / 30.0 ppb	No exceedance of average criteria for all sites for all rolling 12-month averages. However, AQM03 has exceeded the average for the period since monitoring began.

Bold/grey indicates an exceedance of the criteria.

*Results are shown in ppb due to reporting output, however the criteria is set in ppm and therefore the equivalent criteria in ppb is also shown. ^ All months since May 2020



Monthly NO_2 over 12 months including the 6-months for this report

ARCADIS Design & Consultancy for natural and built assets

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APPENDIX E – NOISE MONITORING REPORTS

RENZO TONIN & ASSOCIATES
inspired to achieve

Acoustics
Vibration
Structural Dynamics

MOOREBANK PRECINCT WEST (SSD 7709)

B140A Noise monitoring (Year 1)

25 March 2025

The Trust Company (Australia) Limited (ACN 000 000 993) As Trustee of The Moorebank Industrial Warehouse Trust (ABN 51 402 161 047) c/- ESR Developments (Australia) Pty Ltd

TM306-22-05F01 MPW B140A Noise monitoring (r2).docx

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Attention:	Mark Howley (Tactical Group)

Document control

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We have prepared this report in accordance with the usual care and thoroughness of the consulting profession, for the sole purpose described above and by reference to applicable standards, guidelines, procedures and practices at the date of issue of this report. For the reasons outlined above, however, no other warranty or guarantee, whether expressed or implied, is made as to the data, observations and findings expressed in this report, to the extent permitted by law.

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1 Introduction

1.1 Monitoring report purpose

Renzo Tonin & Associates was engaged by ESR Developments (Australia) Pty Ltd on behalf of The Trust Company (Australia) Limited (ACN 000 000 993) As Trustee Of The Moorebank Industrial Warehouse Trust (ABN 51 402 161 047) to conduct noise impact monitoring to satisfy the (State Significant Development (SSD) 7709 B140A consent condition (CoC) for the Moorebank Precinct West (MPW), which forms part of the Moorebank Intermodal Precinct (MIP) at Moorebank, NSW.

The purpose of this report is to undertake noise monitoring to assess operational noise levels from the Moorebank Intermodal Precinct (MIP) at No. 9 Casula Road, Casula, to determine the typical operational noise levels at this receiver location, and assess these noise levels against the noise limits in the SSD 7709 Conditions of Consent (CoC) in accordance with the MPW Stage 2 Operational Noise Management Plan[1] (MPW S2 ONMP).

Noise monitoring included both attended and unattended noise monitoring. The attended noise monitoring was undertaken on 3 separate periods, each for 4 hours, during each of the day, evening and night periods. The unattended noise monitoring was required for a period of 7 contiguous days where valid data was measured and not adversely affected by weather, and so unattended monitoring was conducted over a 10 day period.

The following sections detail the applicable noise requirements, measurement methodology, a summary of the key measurement results, and a discussion of the measurements and outcomes and recommendations.

This report has been prepared by a suitably qualified and experienced acoustic engineer. The engineers involved in the monitoring and preparation of the report are of member grade of the Australian Acoustical Society (AAS), are appropriately experienced acoustic engineers employed by a firm being a member of the Association of Australasian Acoustic Consultants (AAAC) and have extensive experience in environmental acoustics.

This report is technical in nature and uses acoustic terminology throughout. APPENDIX A contains a glossary of acoustic terms used in this report.

1.2 Location and project overview

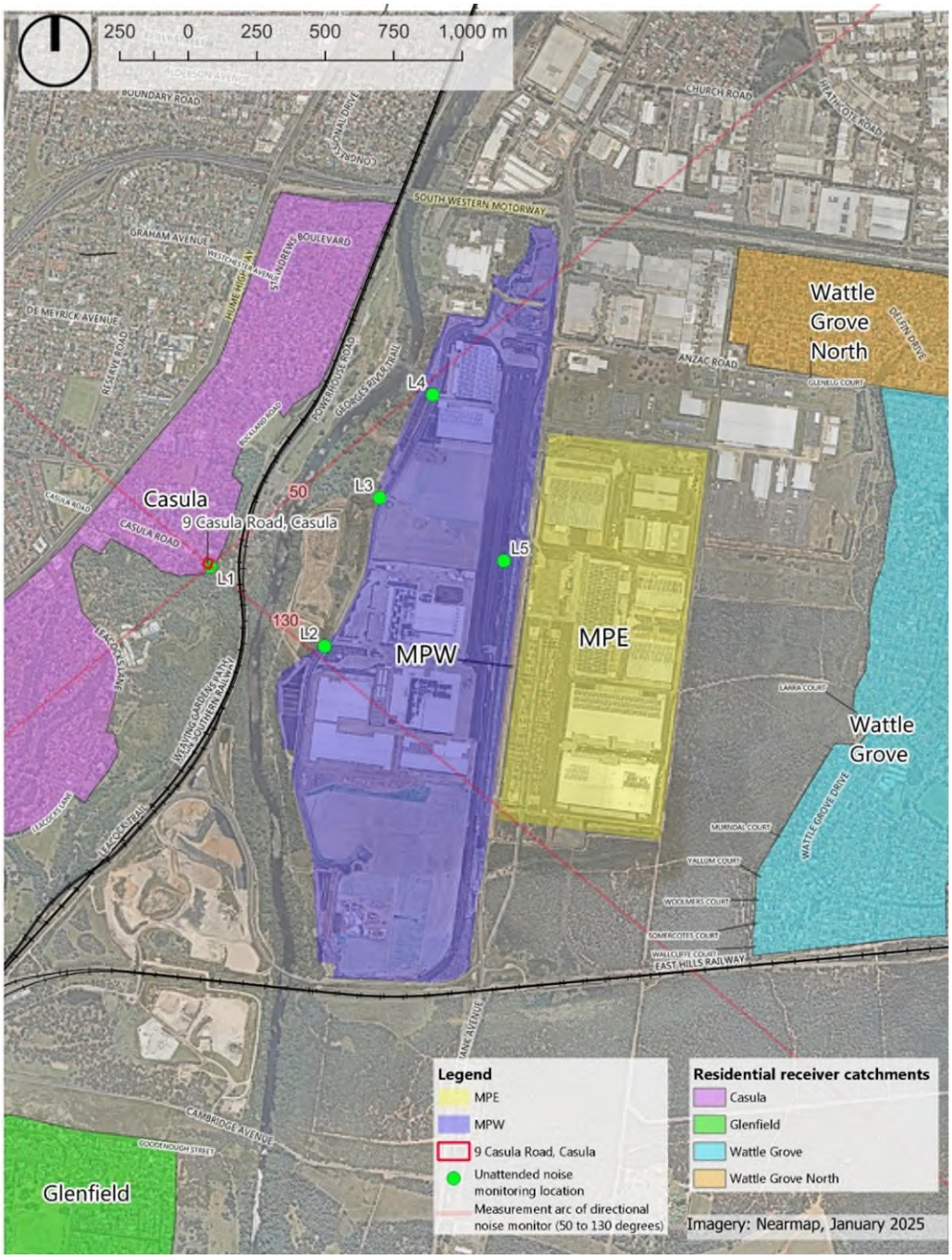
The MIP is located approximately 27 kilometres south-west of the Sydney Central Business District and approximately 26 kilometres west of Port Botany, within the Liverpool Local Government Area. The MIP is divided into two precincts, Moorebank Precinct East (MPE) and Moorebank Precinct West (MPW), located east and west of Moorebank Avenue respectively, as shown in Figure 1. The Sydney Intermodal

1. 1 Logos, Operational Noise Management Plan Moorebank Logistics Park - West Precinct Stage 2, Report No. J1883240215.4, Revision 4, dated 15/2/2024, available https://moorebankintermodalprecinct.com.au/wp-content/uploads/2024/04/SSD7709-MPW2-ONMP_Rev4_redacted.pdf, accessed 15/10/2024

Terminal Alliance (SIMTA) received approval for the construction and operation of Stage 2 of the MPW development (State Significant Development (SSD) 7709), which comprises the second stage of development under the MPW Concept Approval (SSD 5066).

The location of the Moorebank Intermodal Precinct (MIP) in relation to the nearest residential receivers is shown in Figure 1. The MIP is surrounded by residential areas with receivers in the suburbs of Casula, Glenfield, Wattle Grove and Wattle Grove North, as shown in Figure 1.

Figure 1 - MIP, MPW and MPE precincts and residential receiver catchments



2 Noise monitoring objectives

2.1 CoC B140A requirements

This report has been prepared to address the requirements in SSD 7709 CoC B140A. These requirements state:

B140A. The Applicant is to conduct noise impact monitoring and residual noise impact mitigation in accordance with the following requirements:

(a) the Applicant is to engage a Suitably Qualified and Experienced Acoustic Engineer to undertake a noise survey at R1 No. 9 Casula Road, Casula (or an equivalent location if access is denied). Evidence of access being sought and access being denied must be provided to the Planning Secretary before surveying is undertaken at an equivalent location;

(b) the noise survey must be undertaken not less than three months and not more than six months from commencement of operation;

(c) the noise survey is to be conducted in accordance with the Noise Policy for Industry ((NPfI) EPA 2017) to determine:

i. the LAeq, 15min noise level arising from use of the Precinct in the EPA-defined day, evening and night-time periods (excluding rail operations on the rail link); and

ii. the LAFmax noise level arising from use of the Precinct in the EPA-defined night-time period;

(d) the noise survey must be both attended and unattended. The attended survey must be for a period of 4 contiguous hours in a single day, evening and night-time period conducted on days when the Precinct is likely to be operating at maximum capacity at the time. The unattended survey must be conducted for a period of 7 contiguous days not adversely affected by weather and must include the days of the attended surveys;

(e) a copy of the results of the noise survey must be provided to the Planning Secretary for information within one month of completion of the survey;

(f) if the noise survey identifies an exceedance arising from use of the Precinct of the LAeq, 15min and the LAFmax noise limits specified in condition B140A (the residual noise impacts), the Applicant is to conduct an assessment as follows:

i. outlining and justifying the application of the approach to "sustained" exceedance having regard to the number of observed exceedances;

ii. the identification of the likely source(s) of the residual noise impact;

iii. an assessment of the significance of the LAFmax noise level events in accordance with Section 2.5 of the NPfI;

iv. an assessment of the significance of the residual noise impacts in accordance with Table 4.1 of Section 4 of the NPfI;

v. the feasible and reasonable source and pathway noise mitigation measures that have been implemented in respect of the source(s) of the residual noise impacts;

vi. any further feasible and reasonable transmission pathway noise mitigation measures which are capable of being adopted to reduce residual noise impacts; vii. feasible and reasonable receiver based treatments which can be offered to affected property owners in accordance with Table 4.2 of Section 4 of the NPfI;

viii. an assessment of whether there are additional residential properties in Casula other than R1 which are considered to also be affected by residual noise impacts and the preparation of a list of property addresses of those properties likely to be affected;

ix. within 3 months of the attended noise survey, the preparation of a Preliminary Residual Noise Impact Report summarising the findings including a draft Proposal for At Property Noise Mitigation Plan for R1 and submit a copy of the report to the Planning Secretary for information;

CoC B140A also includes clauses (g) to (k) which are applicable in the case that the noise levels measured from the precinct operations are above both the $L_{Aeq,\ 15min}$ and the L_{AFmax} noise limits. As this is not the case from the outcomes presented in Section 4 these requirements have not been included.

2.2 Operational noise limits

CoC B140A requires noise monitoring at 9 Casula Road, Casula, which is located within the noise catchment of Casula. The operational noise limits applicable for CoC B140A are presented in Table 4 of SSD 7709 CoC B131 and are reproduced in Table 1.

SSD 7709 CoC B131 details that these noise limits are applicable to noise generated by the overall precinct operations, defined as all activities approved for MPW and MPE.

The $L_{Aeq(15\ minute)}$ criteria are applicable during the NSW Environmental Protection Authority (EPA) defined day, evening and night-time periods and the L_{Amax} sleep disturbance noise limits are applicable during the night-time period. The CoC B131 noise limits are applicable under prevailing meteorological conditions of wind speeds of up to 3 m/s at 10 metres above ground level or atmospheric stability category 'F' temperature inversion conditions with no wind.

Table 1 SSD 7709 CoC B131 operational noise limits[3,4], dB(A)

Sensitive receiver	Day[2] $L_{Aeq,\ 15\ minute}$	Evening[2] $L_{Aeq,\ 15\ minute}$	Night[2] $L_{Aeq,\ 15\ minute}$	Night[2] L_{AFmax}[5], Sleep Arousal Screening Level
Wattle Grove (NCA 1)	44	42	42	52
Wattle Grove North (NCA 2)	41	41	41	52
Casula (NCA 3)	**46**	**44**	**39**	**52**
Glenfield (NCA 4)	49	46	42	52

Notes:

1. The time periods are defined as 7:00am to 6:00pm Monday to Saturday, and 8:00am to 6:00pm on Sundays and Public Holidays; Evening 6.00 pm to 10.00 pm; Night-time 10:00pm to 7:00am Monday to Saturday, and 10:00pm to 8:00am on Sundays and Public Holidays.
2. To determine compliance with the LAeq,15-minute noise limits, noise from the development is to be measured at the most affected point within the residential boundary, or at the most affected point within 30 m of a dwelling where the dwelling is more than 30 m from the boundary. Where it can be demonstrated that direct measurement of noise from the project is impractical, the EPA may accept alternative means of determining compliance (see Chapter 7 of the NPfI). The modification factors in Fact Sheet C of NPfI must also be applied to the measured noise levels where applicable.

   To determine compliance with the Night LAFmax Sleep Arousal Screening Level in B131 Table 4 above, noise from the project is to be measured at 1 m from the dwelling façade. Where it can be demonstrated that direct measurement of noise from the project is impractical, the EPA may accept alternative means of determining compliance (see Chapter 7 of the NPfI).

   Noise limits apply under the following meteorological conditions:

   a. wind speeds up to 3m/s at 10 meters above ground level; or
   b. atmospheric stability category F (with no wind).
3. B131 notes "The noise generated by the development must not exceed the noise limits in Table 4 which are generated by the overall precinct operations (defined as all activities approved for MPW and MPE)."
4. As per CoC B140, the noise limits apply for noise arising from use of the approved Precinct (MPW and MPE) (excluding rail operations on the rail link).
5. Condition B131 indicates $L_{A1,\ 1minute}$ as the relevant descriptor of the noise limit, which is inconsistent with the B140A requirements. For consistency with the B140A wording L_{AFmax} has been used for the sleep arousal screening assessment.

2.3 Noise monitoring timing

DPHI was notified that MPW commenced operations late May 2024, following the first warehouse (N2) receiving its occupation certificate 22 May 2024. However, warehouse operations did not commence operations until August 2024. Furthermore, additional warehouse commissioning works were required to be undertaken during early September 2024, and as such typical operations commenced mid-September 2024.

The monitoring is required to quantify the noise from the MIP operations and not the general ambient noise levels. Considering the high traffic level on the nearby roads (M5, Hume Highway) which make it difficult to measure and quantify MIP noise emissions, non-typical operations and ambient noise levels during the December/January holiday period, and high winds and rain forecasts during mid/late January 2025, resulted in the noise monitoring being undertaken early February 2025 to meet the condition timing requirement of monitoring not within 3 months and not more than 6 months from the commencement of operations.

3 Measurement methodology

3.1 Noise monitoring approach

As required by CoC B140A, the noise survey is to be conducted in accordance with the NSW Environment Protection Authority's (EPA) *Noise Policy for Industry* (EPA 2017) (NPfI).

The NPfI provides guidance in Chapter 7 for monitoring the performance of a noise-generating industrial facility. NPfI Section 7.1.1 provides guidance as to how to review noise emissions, which includes direct measurement at a receiver location, direct measurement at alternative or intermediate location/s, unattended monitoring and modelling, in order or preferred to least preferred. It notes that this range of compliance assessment techniques may be used individually, or in combination, to provide a means of determining compliance with a noise limit. At times, the best available compliance assessment methodology will only allow for a balance-of-probabilities type determination of compliance, and repeat assessment may be needed. It also makes clear that "*A noise limit applies to the noise from a particular development/activity and not to general ambient noise. Therefore it is often necessary to use techniques to attempt to separate the noise from a facility versus noise from other sources*."

For the CoC B140A noise monitoring, the following points were considered for the monitoring methodology:

- In the vicinity of Casula residences, previously monitored noise levels (long term noise monitoring stations and noise monitoring surveys) from ambient and background noise sources outside of the MIP, were often found to be at or greater than the noise limits. Such non-MIP noise sources include road traffic from nearby arterial roads (ie. M5 and Hume Highway), freight train and passenger train movements on the adjacent rail line, and other ambient sources (ie. car passbys, birds, etc).
- Background noise levels are controlled by road traffic noise from nearby arterial roads (ie. M5 and Hume Highway), in particular to the north-east of Casula.
- The MIP and its associated noise sources covers a very large area, which is approximately 2km north to south ,and 1km east to west, with 9 Casula Road, Casula being offset from the MIP by approximately 500 metres west.
- Moorebank Avenue runs down the middle of the MIP, dividing MPW and MPE and contributing to noise levels at Casula residences. Road traffic noise on this public road is not related to the site and should be excluded from the assessed noise levels when comparing them to the noise limits.

As such, the CoC B140A noise monitoring has used a combination of on-site and at-receiver attended noise measurements including the use of a directional noise monitor, combined with unattended intermediate and receiver noise monitoring locations, to quantify the noise emission performance of the MIP operations.

3.2 Compliance measurement methodology

Consistent with the requirements of SSD 7709 B140A all noise monitoring was performed using the methods and practices outlined in the NPfI.

As the noise limits apply to the noise emissions from the MIP operations only and not to general ambient noise, a range of post processing analysis methods were undertaken to identify sources of noise which were likely MIP operations or non-site operations, so that only sources of noise which likely MIP from the operations could be assessed.

The monitored data was post-processed to determine MIP noise emission levels, through correlation of noise monitoring data, on-site activity logs, cameras and engineers field notes were used to verify periods of on-site activity, and correlate this with audible noise events at 9 Casula Road, Casula.

3.2.1 Methodology

3.2.1.1 Attended monitoring

Attended noise monitoring was undertaken for three separate monitoring periods, each over a period of 4 contiguous hours during each of the day, evening and night periods.

As required by CoC B140A, periods were selected during the week that would likely have MIP operations occurring at the maximum capacity at the time. These periods occurred during the unattended noise monitoring period detailed in Section 3.2.1.2.

All attended measurements were undertaken at 1.5 metres above the local ground level and in the free field. All sound level meters were time-synchronised to allow the on-site and receiver noise measurements to be correlated. A sound recording was made at all measurement locations to allow post-processing of the noise measurement results and to confirm the audibility of on-site noise at residential receivers.

During the attended monitoring, noise observation notes were made concurrently detailing the source or likely source of noise events or periods of noise, typical measured noise levels, and in particular whether likely on-site activities were audible or not, along with the prevailing meteorological conditions. The notes included direction of the audible noise source, approximate level and potential source contribution level in the ambient noise environment. These notes were combined with identification markers being recorded in the monitored data for key types of noise events (ie. site, trains, or periods of dominant non-site noise).

Intermediate noise monitoring was all undertaken supported by time-lapse picture recording and/or video of on-site activities to assist with the analysis. These noise monitors were deployed in the locations shown in Figure 1 with the purpose and installation details included in Table 2.

During periods of audible noise events from the direction of site at the receiver, noise levels were identified. These noise events were then either verified with roaming on-site personnel to confirm if they

correlated with onsite activities at the time, or audibly and visually confirmed as part of post-processing with the onsite noise monitors and cameras, and then further analysed to confirm the at-receiver contribution levels.

The assessment process for the attended noise survey was to firstly identify periods where on-site noise was audible at residential receivers and correlated with observed on-site activities. These periods were marked in the post-processing noise software to assist in quantifying the $L_{Aeq(15minute)}$ noise contribution and L_{Amax} noise event levels from MIP activities. The existing background noise levels were also taken into account, which were periods with no noise generating activities onsite. Periods where local road traffic noise, frog noise, bird noise, aircraft noise or other extraneous noise was influencing the measurement results were excluded from the site noise emission analysis. The periods of audible site noise were then combined and assessed over the 15-minute assessment period, to estimate the $L_{Aeq(15minute)}$ site noise contribution in a conservative manner, with consideration of the various durations of different site activity noise emissions and existing ambient noise levels.

For the night period L_{Amax} assessment, audible site noise events that were identified during the survey were reviewed in the post-processing noise software to confirm the event noise level.

3.2.1.2 Unattended monitoring

The unattended noise monitoring was undertaken for the period between 4th February and 14th February 2025, over a 10 day contiguous period.

The prevailing weather conditions throughout the monitoring period were monitored as per Section 3.4, to determine the prevailing meteorological conditions and periods adversely affected by weather.

Noise monitors were deployed in the locations shown in Figure 1 with the purpose and installation details included in Table 2.

Based upon the results of the attended noise monitoring, in particular the directional noise monitoring, it was concluded that the steady state noise source contribution from MIP operations was negligible at 9 Casula Road, Casula, and so only short term audible noise events should be the focus of any analysis.

The analysis process used the intermediate noise monitoring locations along Bushmaster Avenue, to determine onsite noise events, as this was a closer location to these sources where there was reduced extraneous noise sources (ie. birds, trains and Moorebank Avenue traffic) with improved signal to noise ratio.

For the night periods, the short term noise events were then transferred across from the intermediate monitoring location to the noise monitoring at 9 Casula Road, Casula, to determine if the noise events were audible at this receiver location and to then quantify the noise level at the receiver from this event. Where these events could then be above any noise limits, the audio and onsite video data were reviewed to confirm it they were onsite noise or extraneous noise.

This process was used for the night period to identify in the post-processing noise software to assist in quantifying the $L_{Aeq(15minute)}$ noise contribution from MIP activities. Due to the high existing ambient noise levels during the day and evening periods, a different method was used to estimate the site contribution. A combination of analysis of the monitored noise levels at the intermediate monitoring locations and noise modelling, was used to determine with confidence that the worst case 15-minute period for each day and evening was not above the relevant noise limit in a conservative manner.

3.2.2 Noise monitoring

The following noise monitoring was undertaken, with locations identified in Figure 1.

Table 2 Noise monitors and purpose

Loc. ID	Location	Purpose of noise monitor
	Unattended noise monitor	
L1	Receiver (9 Casula Road, Casula)	Continuous noise monitoring throughout 10 day period, to determine at receiver noise levels.
L2	Bushmaster Ave noise wall monitor (north)	Continuous noise monitoring throughout 10 day period, to provide intermediate monitoring point near northern MPW warehouses, to assist with at receiver noise level correlation. Mounted on top of the 5m noise wall to allow for free-field measurements, and recording of noise levels that would be in the path between the receiver and the source.
L3	Bushmaster Ave noise wall monitor (central)	Continuous noise monitoring throughout 10 day period, to provide intermediate monitoring point between MPE and Moorebank Ave to assist with at receiver noise level correlation. Mounted on top of the 5m noise wall to allow for free-field measurements, and recording of noise levels that would be in the path between the receiver and the source.
L3	Bushmaster Ave noise wall monitor (south)	Continuous noise monitoring throughout 10 day period, to provide intermediate monitoring point near southern MPW warehouses, to assist with at receiver noise level correlation. Mounted on top of the 5m noise wall to allow for free-field measurements, and recording of noise levels that would be in the path between the receiver and the source.
L5	Adjacent to Moorebank Avenue	Continuous noise monitoring throughout 10 day period, to assist with removing the contribution from public road traffic noise on Moorebank Avenue from receiver noise levels.
	Attended noise monitoring	
L1	Receiver (9 Casula Road, Casula)	Attended noise monitoring using the following equipment: • Omni-directional sound level meter • Directional noise monitor ('Barn Owl') Coupled with attended observations during the attended monitoring periods (day, evening and night)
-	Multiple locations	Attended noise monitoring using a hand-held sound level meter to quantify noise emission levels of onsite operations nearby to the source and correlate onsite noise events during the attended noise monitoring period with the receiver engineer.

3.3 Instrumentation

A range of noise monitoring equipment was used to undertake the compliance noise monitoring. A summary of measurement equipment, monitoring periods and instrument details is provided in Table 3.

All of the noise monitoring equipment are Class 1 instruments. Before and after each series of attended measurements, the calibration of the sound level meters was verified using a reference calibration of 94 dB at 1 kHz. The difference between pre- and post-calibration levels was within 0.5 dB for all measurements.

Table 3 Noise measurement equipment

Monitoring location/ purpose	Monitoring period used (2025)	Equipment (RTA ref.)	Serial number	Last date calibrated
At-receiver attended noise measurements	4/2 & 6/2	NTi XL2 (XL2-C)	A2A-19156-E0	28/02/2024
	4/2 & 6/2	SoundScience 'Barn Owl'	170723002	10/01/2025
On-site attended noise measurements	4/2 & 6/2	NTi XL2 (XL2-A)	A2A-12270-E0	9/12/2024
Unattended noise monitor (9 Casula Road)	3/2 to 14/2	NTi XL2 (RTA07-044)	A2A-19157-E0	8/03/2024
Unattended noise monitor (Bushmaster Ave, north)	3/2 to 14/2	NTi XL2 (RTA07-049)	A2A-17502-E0	29/03/2023
Unattended noise monitor (Bushmaster Ave, central)	4/2 to 14/2	NTi XL2 (RTA07-046)	A2A-20264-E0	3/04/2024
Unattended noise monitor (Bushmaster Ave, south)	3/2 to 14/2	NTi XL2 (RTA07-047)	A2A-20297-E0	10/04/2024
Unattended noise monitor (Moorebank Avenue)	4/2 to 14/2	NTi XL2 (RTA07-045)	A2A-20397-E0	14/03/2024
Field calibration	3/2, 4/2, 6/2 & 14/2	B&K 4231 (XL2 BOX 2)	2545601	6/01/2025
Field calibration	4/2, 6/2 & 14/2	B&K 4231 (XL2 A)	2677710	6/01/2025

3.4 Meteorological conditions

Meteorological conditions during the period of noise measurement surveys were reviewed to determine the prevailing wind and temperature inversion conditions were appropriate. For a period of the monitoring, data from the MIP meteorological data monitoring station adjacent to Bushmaster Avenue, established in accordance with SSD 7709 (MPW Stage 2) CoC A54, was sourced and reviewed for the prevailing wind and temperature inversion conditions, and rain data sourced from the Bureau of Meteorology (BOM) automatic weather station (AWS) (Holsworthy Aerodrome) (Station 95761), located approximately 5 km south-east from the MIP.

This rain and wind data was used to exclude weather affected data (wind greater than 5m/s or rain) in the unattended noise monitoring presented in APPENDIX D, in accordance with the NPfI.

The noise limits in SSD 7709 are applicable for wind speeds up to 3 m/s (10.8 km/h) at 10 metres above ground level or up to atmospheric stability category F. The monitored wind and sigma-theta data was

used to determine temperature inversion conditions, to determine the periods when the noise limits were applicable during the monitoring period.

3.5 On-site activities during the monitoring period

B140A requires the attended noise monitoring to take place on days when the Precinct is likely to be operating at maximum capacity at the time. It was confirmed with ESR, the operator of MIP, that the operations were typical across MPE and MPW, following the resumption of operations after reduced activities associated with the Christmas/New Year break period.

For the monitoring week and attended noise surveys, historical weekly truck numbers were reviewed, along with the container train schedule, and day, evening and night periods were identified that would correlate with an associated container train arrival and loading period, and periods when there were likely high truck numbers, so to capture when the MIP was likely to be operating at maximum capacity. The status of the various elements of the MIP during the monitoring period are detailed in Table 4.

Table 4 On-site activities during the monitoring period

MIP area/component	Operations during the monitoring period
Interstate terminal (MPW)	Currently no scheduled commercial train operations at INTS. Container truck deliveries to the two northern warehouses, and associated warehouse container deliveries.
IMEX terminal (MPE)	Scheduled commercial train operations occurring, along with associated terminal crane operations. Container truck operations occurring.
MPW South (MPWS)	Under construction, no operations
Woolworths (JR)	In commissioning phase. Not yet operational.
Woolworths (JN)	Operations have just commenced and are at early operational stages. Operational levels low and ramping up.
MPW warehouses - N1 & N2	Typical operations were occurring.
MPE warehouses – E1, E3A/E3B/E4A/E4B/E5/E6/E7	Typical operations were occurring.

Traffic movements associated with the MIP during the monitoring period, with a comparison to previous months are shown in Table 5, demonstrating the monitoring occurred during a period when the MIP was operating at typical maximum capacity at the time.

Table 5 MIP truck movements during the monitoring period compared to recent historical data (average weekday truck movements)

MIP area/ component	Period	Truck movements (average daily movement)		
		November 2024	December 2024	Monitoring period (4/2/25 to 14/2/25)
MPE	Day	867	992	867
	Evening	116	145	116
	Night	272	368	272
MPW	Day	171	213	171
	Evening	8	17	8
	Night	20	28	20

Included in APPENDIX B along with the monitored noise information are the details of the observed activities within the MIP area taking place during the attended monitoring period.

4 Operational noise monitoring survey

4.1 Attended noise monitoring survey

4.1.1 Overview

A summary of the measured energy average (L_{Aeq}) and background (L_{A90}) noise levels at the monitored residential receivers during the attended noise survey are summarised in this section with further detail provided in APPENDIX B.

The noise limits apply to the noise emissions from the MIP operations only and not to general ambient noise. Receiver measured noise levels contain contributions from all noise sources at the receiver, and not only that from the site. In order to assess the noise emissions from the subject site against the appropriate noise limits, the contribution from the site operations in isolation from other noise sources needs to be determined.

Due to the existing levels of non-Project ambient noise (ie. distant road and rail traffic noise and other natural sources (ie. birds)) at the residential receiver, it was necessary to use multiple techniques to separate the noise from Project sources from other noise sources. Section 7 of the NPfI notes that determining the $L_{Aeq(15minute)}$ site noise contribution in situations where the noise environment is influenced by many noise sources] can be a complex process, requiring the use of techniques to separate facility noise from other ambient sources. Professional judgement and multiple techniques have been used to give the necessary level of confidence in the results.

The analysis process detailed in Section 3.2.1.1 was implemented to undertake the assessment against the noise limits.

4.1.2 Measurement locations and time periods

A summary of the attended measurement locations and time periods is provided in Table 6.

Table 6 - Attended noise measurement periods

	Assessment period	Measurement period	
Location		Date	Time period
9 Casula Road, Casula	Day	Thursday 6th February 2025	8:30am to 12:30pm
	Evening	Tuesday 4th February 2025	6:00pm to 10:00pm
	Night	Thursday 6th February 2025	3:00am to 7:00am

4.1.3 Attended measurement noise levels

4.1.3.1 $L_{Aeq(15minute)}$ measured noise levels

Table 7 presents a summary of the measured noise levels during the attended noise monitoring survey, with the full details for each of the noise measurements are included in APPENDIX B. These results present the energy average ($L_{Aeq, 15minute}$) noise level contribution from the site activities based upon the analysis process detailed in Section 4.1.1 and Section 3.2.1.1. The noise measurements results are grouped into approximate 15-minute measurement durations in accordance with the requirements of the approval conditions.

Table 7 - Summary of attended $L_{Aeq(15minute)}$ measured noise levels

Time (Date)	Measured MIP noise contribution, $L_{Aeq, 15minute}$ dB(A)	$L_{Aeq, 15minute}$ noise limit, dB(A)[1]	MIP Noise levels Comply? (Yes/No)
Day (Thursday 6 February 2025)			
8:30 AM to 8:45 AM	≤ 39	46	Yes
8:45 AM to 9:00 AM	≤ 40	46	Yes
9:00 AM to 9:15 AM	≤ 39	46	Yes
9:15 AM to 9:30 AM	≤ 40	46	Yes
9:30 AM to 9:45 AM	≤ 40	46	Yes
9:45 AM to 10:00 AM	≤ 40	46	Yes
10:00 AM to 10:15 AM	≤ 41	46	Yes
10:15 AM to 10:30 AM	≤ 41	46	Yes
10:30 AM to 10:45 AM	≤ 41	46	Yes
10:45 AM to 11:00 AM	≤ 40	46	Yes
11:00 AM to 11:15 AM	≤ 40	46	Yes
11:15 AM to 11:30 AM	≤ 42	46	Yes
11:30 AM to 11:45 AM	≤ 39	46	Yes
11:45 AM to 12:00 PM	≤ 39	46	Yes
12:00 PM to 12:15 PM	≤ 40	46	Yes
12:15 PM to 12:30 PM	≤ 39	46	Yes
Evening (Tuesday 4 February 2025)			
6:00 PM to 6:15 PM	≤ 35	44	Yes
6:15 PM to 6:30 PM	≤ 36	44	Yes
6:30 PM to 6:45 PM	≤ 37	44	Yes
6:45 PM to 7:00 PM	≤ 36	44	Yes
7:00 PM to 7:15 PM	≤ 37	44	Yes
7:15 PM to 7:30 PM	≤ 36	44	Yes
7:30 PM to 7:45 PM	≤ 37	44	Yes
7:45 PM to 8:00 PM	≤ 34	44	Yes
8:00 PM to 8:15 PM	≤ 36	44	Yes

Time (Date)	Measured MIP noise contribution, $L_{Aeq, 15minute}$ dB(A)	$L_{Aeq, 15minute}$ noise limit, dB(A)[1]	MIP Noise levels Comply? (Yes/No)
8:15 PM to 8:30 PM	≤ 40	44	Yes
8:30 PM to 8:45 PM	≤ 37	44	Yes
8:45 PM to 9:00 PM	≤ 36	44	Yes
9:00 PM to 9:15 PM	≤ 34	44	Yes
9:15 PM to 9:30 PM	≤ 35	44	Yes
9:30 PM to 9:45 PM	≤ 34	44	Yes
9:45 PM to 10:00 PM	≤ 35	44	Yes
Night (Thursday 6 February 2025)			
3:00 am to 3:15 am	≤ 25	39	Yes
3:15 am to 3:30 am	≤ 26	39	Yes
3:30 am to 3:45 am	≤ 26	39	Yes
3:45 am to 4:00 am	≤ 25	39	Yes
4:00 am to 4:15 am	≤ 25	39	Yes
4:15 am to 4:30 am	-[1]	39	Yes
4:30 am to 4:45 am	-[1]	39	Yes
4:45 am to 5:00 am	≤ 27	39	Yes
5:00 am to 5:15 am	≤ 28	39	Yes
5:15 am to 5:30 am	≤ 29	39	Yes
5:30 am to 5:45 am	≤ 31	39	Yes
5:45 am to 6:00 am	≤ 32	39	Yes
6:00 am to 6:15 am	≤ 33	39	Yes
6:15 am to 6:30 am	≤ 33	39	Yes
6:30 am to 6:45 am	≤ 33	39	Yes
6:45 am to 7:00 am	≤ 33	39	Yes

Notes: 1. Monitoring paused due to rain
2. Conservatively estimated as per Section 3.2.1.1.

Additionally, during the attended noise monitoring a directional noise monitor was used to determine the contribution only from the direction of the MIP.

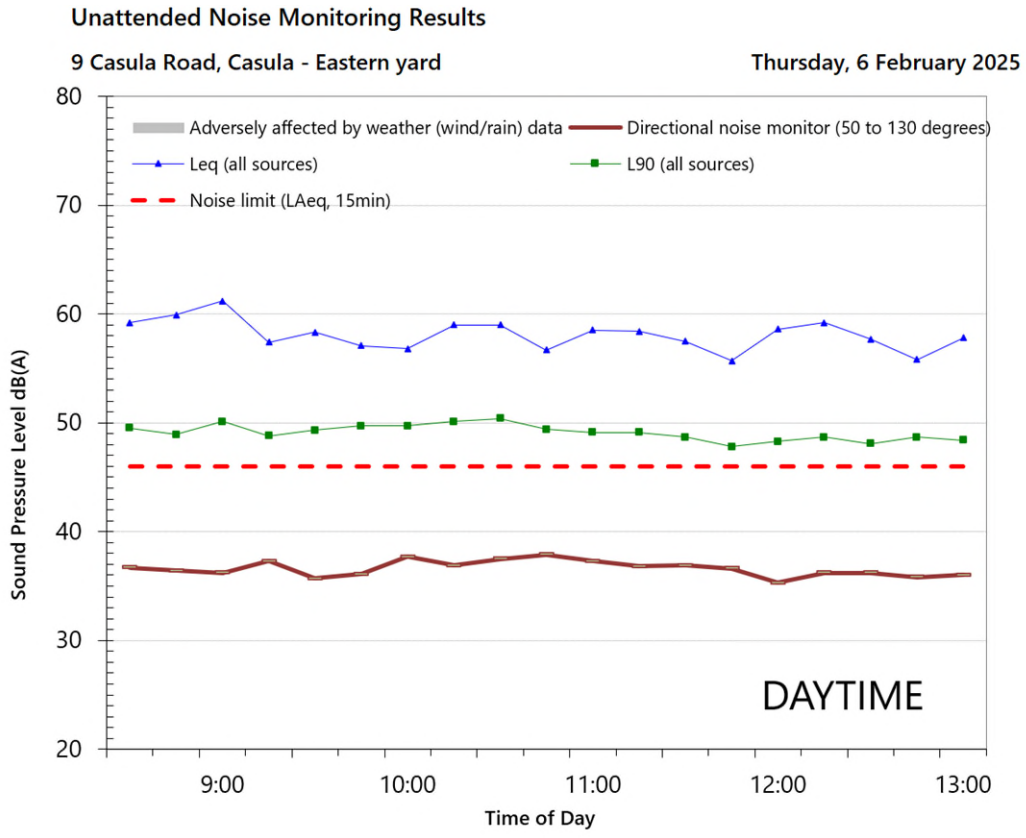
Due to elevated noise levels from short-term and intermittent noise from non-MIP sources in the direction of MIP, including train passbys, birds, and local car passbys, only the steady state noise contribution (ie. noise sources such as mechanical services plant/equipment) could be determined with confidence using the directional noise monitor.

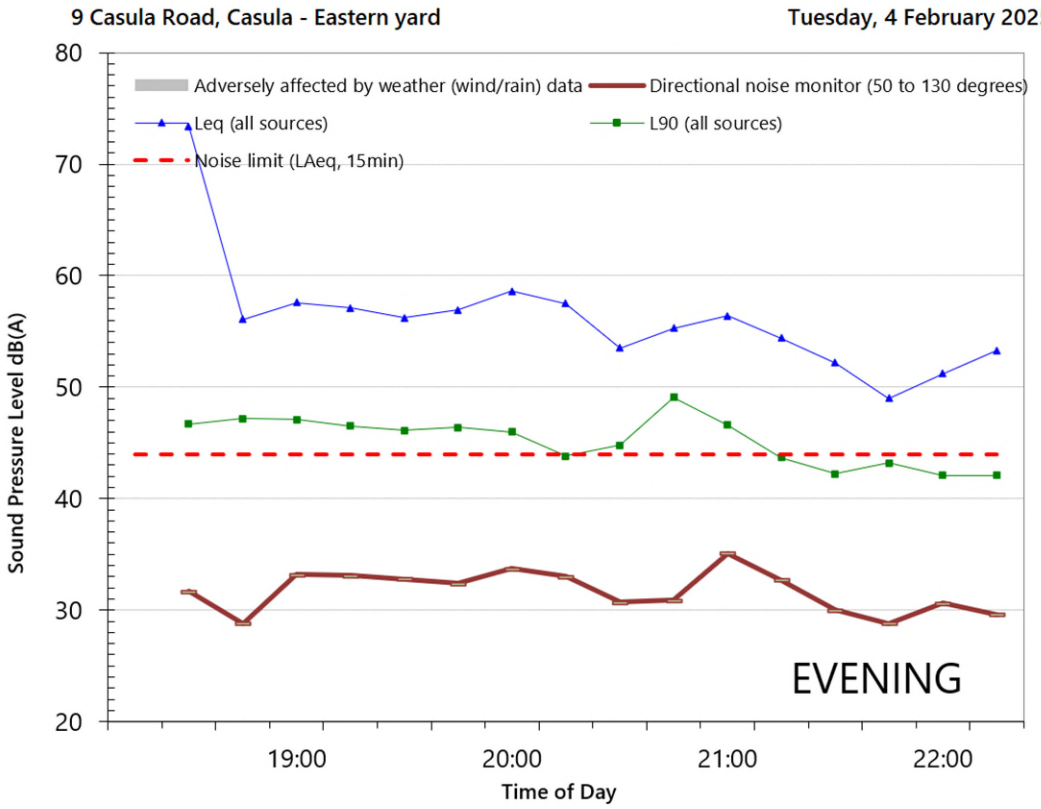
Presented in Figure 2 are the measured L_{Aeq} and L_{A90} noise level contributions from the direction of the MIP, which was between 50 and 130 degrees from the monitoring location, as shown in Figure 1.

Figure 2 shows that the steady-state noise levels (ie. noise sources such as mechanical services plant/equipment) measured over each of the 4 hour periods from the direction of the MIP were substantially below the SSD 7709 noise limits.

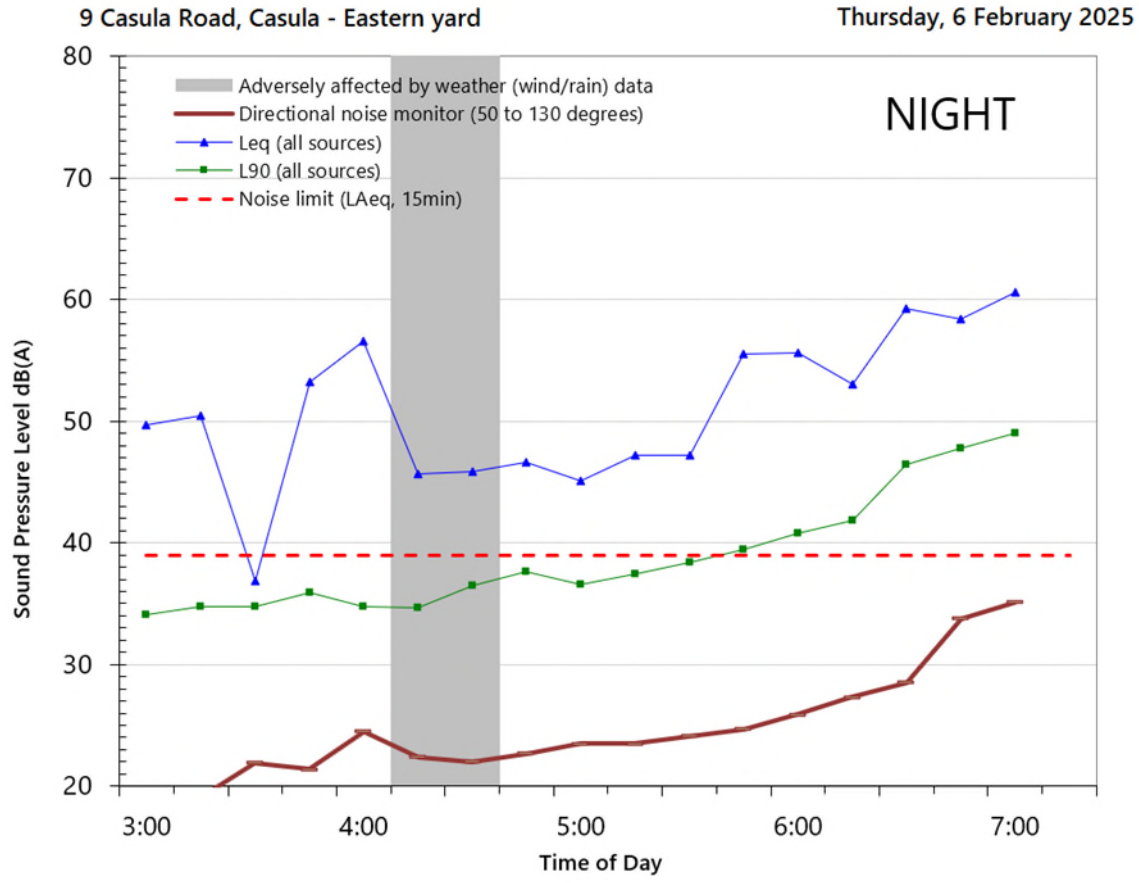
The directional noise monitor has a limit of distinguishing the direction of noise sources when their contribution is more than approximately 10 dB(A) below the noise level from all sources. For each of the day, evening and night graphs shown in Figure 2, the L_{A90} noise level from the direction of the MIP is at or lower than 10 dB(A) below the existing L_{A90} noise level, so potentially the steady state noise contribution in this direction is even lower than the values shown here.

Figure 2 – Directional noise monitor measured $L_{A90, (15\ minute)}$ noise levels (MIP direction, 50 to 130 degrees) at 9 Casula Road, Casula - Eastern yard, Thursday 6 February 2025 *a) Day, b) Evening, c) Night*





Unattended Noise Monitoring Results



4.1.3.2 L_{Amax} noise levels

For the night period the sleep arousal screening level noise limit is also applicable. Table 8 presents the measured L_{Amax} noise levels from MIP operations (not general ambient noise levels) for comparison against the sleep arousal screening level noise limits.

Table 8 - Summary of attended L_{Amax} measured noise levels (Thursday 6 February 2025)

Time	Measured MIP noise contribution, L_{Amax} dB(A)	L_{Amax} noise limit, dB(A)[1]	MIP Noise levels Comply? (Yes/No)
Night			
3:00 am to 3:15 am	≤ 25	52	Yes
3:15 am to 3:30 am	≤ 26	52	Yes
3:30 am to 3:45 am	≤ 26	52	Yes
3:45 am to 4:00 am	≤ 35	52	Yes
4:00 am to 4:15 am	≤ 43	52	Yes
4:15 am to 4:30 am	-[1]	52	Yes
4:30 am to 4:45 am	-[1]	52	Yes
4:45 am to 5:00 am	≤ 39	52	Yes
5:00 am to 5:15 am	≤ 45	52	Yes
5:15 am to 5:30 am	≤ 47	52	Yes
5:30 am to 5:45 am	≤ 50	52	Yes
5:45 am to 6:00 am	≤ 50	52	Yes
6:00 am to 6:15 am	≤ 45	52	Yes
6:15 am to 6:30 am	≤ 48	52	Yes
6:30 am to 6:45 am	≤ 40	52	Yes
6:45 am to 7:00 am	≤ 20	52	Yes

Notes: 1. Monitoring paused due to rain

4.2 Unattended noise monitoring survey

4.2.1 Overview

A summary of the measured noise levels at residential receivers are provided for the survey period. The noise measurement results are shown in the 15-minute measurement periods required by the approval conditions.

The noise limits apply to the noise emissions from the MIP operations only and not to general ambient noise. Receiver measured noise levels contain contributions from all noise sources at the receiver, and not only that from the site.

Like the attended measurement survey, in order to assess the noise emissions from the subject site against the appropriate noise limits, the contribution from the site operations in isolation from other noise sources

needs to be determined. As such, the process detailed in Section 3.2.1.2 was undertaken to determine the likely contribution from the MIP operations during the monitoring period.

Due to the existing levels of non-MIP noise (ie. distant road and rail traffic noise and other natural sources (ie. birds)) at the residential receivers, it was necessary to use multiple techniques to separate the noise from MIP sources from other noise sources. However, unlike the attended noise monitoring period, there is an increased level of uncertainty in estimating the noise level contribution. As such, the analysis focused on whether the site was likely above the applicable noise limits. Where the analysis process determined it was likely that the noise levels were below the applicable noise limits, the level of accuracy of the specific noise levels contribution is reduced.

To determine the measured noise levels' potential to result in sleep disturbance the investigation analysed the maximum noise levels (L_{Amax}) to be assessed against the noise limits. The analysis process identified events that were likely from site using the intermediate monitoring locations.

These were then further investigated for correlation between noise loggers and camera data to provide confidence that these were from site operations and to determine if the L_{Amax} noise levels were above the L_{Amax} noise limits at the residence. These events were also confirmed through listening to recorded noise events.

The $L_{Aeq,\ 15minute}$ noise level focused on combining audible short term noise events, as this process was deemed appropriate based upon the attended noise survey.

The overall measured noise levels during the monitoring period are presented in APPENDIX C, which includes both site noise and all other noise sources.

4.2.2 Measurement locations and time periods

Unattended noise monitoring was undertaken between Tuesday 4th February 2025 to Friday 14th February 2025 at 9 Casula Road, Casula.

Concurrently additional unattended noise monitoring was undertaken to assist with data correlation at the locations presented in Table 2 and Figure 1.

4.2.3 Unattended monitoring noise levels

4.2.3.1 $L_{Aeq(15minute)}$ measured noise levels

The analysis of $L_{Aeq,\ 15minute}$ noise emissions was based upon the process detailed in in Section 3.2.1.2. A different process was used during the day and evening period due to the high existing ambient noise levels, compared to the night period.

Table 9 presents a summary of the worst case 15-minute period measured noise levels during the unattended noise monitoring survey. These results present the $L_{Aeq,\ 15minute}$ noise level contribution from the site activities based upon the analysis process detailed in Section 3.2.1.2. Due to the high range of

noise emission variables and high existing ambient noise levels, especially during the day and evening periods, these noise levels were determined with a focus on if the worst case measured periods were above the appropriate noise levels or not.

As shown in Table 9 all monitored periods were less than the relevant $L_{Aeq,\ 15minute}$ noise limits.

Table 9 - Summary of unattended worst case $L_{Aeq,\ 15minute}$ measured noise levels noise contribution estimations

Date	Estimated worst case 15-minute MIP noise contribution, $L_{Aeq,\ 15minute}$ dB(A)[3]			$L_{Aeq,\ 15minute}$ noise limit, dB(A)			MIP noise levels comply? (Y/N)		
	Day	Evening	Night[2]	Day	Evening	Night	Day	Evening	Night
Tuesday, 4 February 2025	-	≤ 40	< 20	46	44	39	Y	Y	Y
Wednesday, 5 February 2025	< 41	< 35	< 28	46	44	39	Y	Y	Y
Thursday, 6 February 2025	< 42	< 37	< 33	46	44	39	Y	Y	Y
Friday, 7 February 2025	< 42	< 34	< 38	46	44	39	Y	Y	Y
Saturday, 8 February 2025	< 36	-[1]	< 29	46	44	39	Y	Y	Y
Sunday, 9 February 2025	< 34	< 35	< 27	46	44	39	Y	Y	Y
Monday, 10 February 2025	< 41	< 39	< 26	46	44	39	Y	Y	Y
Tuesday, 11 February 2025	< 41	< 37	< 32	46	44	39	Y	Y	Y
Wednesday, 12 February 2025	< 40	< 35	< 36	46	44	39	Y	Y	Y
Thursday, 13 February 2025	< 39	< 36	< 30	46	44	39	Y	Y	Y
Friday, 14 February 2025	-	-	< 25	46	44	39	Y	Y	Y

Notes:
1. Evening period was rain affected period
2. For periods that occurred during the night (10pm to 7am) on that date.
3. Levels are based upon the process detailed in in Section 3.2.1.2.

4.2.3.2 L_{Amax} noise levels

For the night period the sleep arousal screening level noise limit is also applicable. As per the other assessments, the measured L_{Amax} noise levels from MIP operations (not general ambient noise levels) were then compared against the sleep arousal screening level noise limit.

APPENDIX C presents each of the night periods, showing both valid site L_{Amax} noise events, and the other identified L_{Amax} events that were either from extraneous sources, unclassified events below the noise limits, or were outside of the applicable meteorological conditions.

Identified noise events are based upon the process detailed in in Section 3.2.1.2, to flag events that may be similar to short term noise events from site. Each valid measured level represents a L_{Amax} noise level where onsite maximum noise events were identified and correlated with receiver noise levels under the applicable meteorological conditions. Noise events were audible at times at the 9 Casula Road, Casula monitoring location.

Table 10 presents each of the nights, and the total number of identified events, and the number of identified valid events that occurred over each 9 hour night period that were above the noise limit. The graphs of each of the night periods are shown in APPENDIX C. The overall measured noise levels during the monitoring period are presented in APPENDIX C, which includes both site noise and all other noise sources.

Table 10 - Summary of unattended L_{Amax} measured noise levels and associated identified events

Time	Total number of identified L_{Amax} noise events[1]	Number of identified valid L_{Amax} noise events above the 52 dB(A) L_{Amax} noise limit, dB(A)[1]
Night (10:00pm to 7:00am)		
Tuesday, 4 February 2025	13	0
Wednesday, 5 February 2025	73	3
Thursday, 6 February 2025	140	5
Friday, 7 February 2025	136	16
Saturday, 8 February 2025	104	5
Sunday, 9 February 2025	168	0
Monday, 10 February 2025	59	0
Tuesday, 11 February 2025	92	5
Wednesday, 12 February 2025	44	7
Thursday, 13 February 2025	44	5
Friday, 14 February 2025	34	1
Total	**907**	**47**

Notes: 1. For periods that occurred during the night (10pm to 7am) on that date.

The majority of valid L_{Amax} noise events were found to comply with the sleep arousal screening level noise limits, except for during periods where loud onsite container handling and associated truck activities were occurring in non-acoustically shielded locations with worst-case meteorological conditions present (inversion or easterly wind components). Of the 907 identified events, only 47 events (5%) were above the noise limit.

As a result of the outcomes of the unattended noise monitoring, mitigation and management measures are recommended in Section 5 to address the identified exceedances.

5 Discussion and recommendations

5.1 Discussion of findings

During the at-receiver monitoring (attended and unattended), there was at times a significant contribution from non-MIP noise sources, such as distant and local road traffic, mainline rail movement noise, other extraneous sources (ie. aircraft) and natural sources (ie. frogs, crickets, birds, etc.). As such, standard industry practices and methods consistent with the NPfI were used to further analyse the noise monitoring data to separate out the MIP operational noise emissions from the general ambient noise.

The measured noise data was analysed with the assistance of onsite intermediate noise monitoring, onsite and receiver observations, onsite cameras and audio monitoring data. This data was used to correlate between onsite noise generating activities and receiver noise levels, to estimate site noise emission levels and identify and confirm onsite noise events in the post-monitoring analysis, so that MIP operational noise emissions could be assessed against the noise limits independent of these extraneous noise sources.

The noise monitoring surveys determined that the noise emissions from MIP operations were less than the SSD 7709 Conditions of Consent (CoC) $L_{Aeq15min}$ noise limits at all surrounding receiver locations for all monitoring periods.

Typically, the maximum noise levels from MIP operations were generally compliant with the L_{Amax} noise limits, however, a number of periods were identified where the L_{Amax} noise levels were above the L_{Amax} noise limit for residences in Casula.

These periods were further investigated, and it was identified that onsite activity generating the noise events were as follows:

- Reach stackers handling containers at the north end of IMEX.
- Truck horn events associated with container handling.
- Reach stacker handling of containers at a MPW warehouse.

As the noise survey found exceedances from the L_{AFmax} noise events, but not the $L_{Aeq15minute}$ noise levels, then the further actions and reporting in B140A(f) to (k) are not required.

However, as exceedances were measured the response process detailed in MPW S2 ONMP Section 4.3, as per MPW S2 ONMP Table 4-1 should be followed.

5.2 Review of residual impacts

As per MPW S2 ONMP Table 4-1, and consistent with the L_{Amax} related items of B140A(f) the residual noise impacts were investigated. The investigation included detailed assessment information covering the maximum noise levels, the extent to which the maximum noise level exceeds the rating background

noise level, the number of times this happens during the night-time period, and consideration of relevant guidance research.

The identified residual noise events were short-term noise events, and did not occur throughout the monitoring period but only at times of worst-case activity noise events and under worst-case meteorological conditions. As such, with appropriate noise management measures implemented these residual noise levels would not be considered a sustained exceedance.

As per the assessment process in NPfI Section 2.5, Table 10 presents the number of noise events that were identified while APPENDIX C shows the distribution of noise events over the various night periods and when they occurred during the week. APPENDIX C and APPENDIX D show the context of the existing noise levels and events that occurred, giving context to the identified noise events within the existing ambient noise environment. A range of existing high noise event levels typically occurred at night not from site operations, but instead from train pass-by events (passenger and freight), loud vehicles (truck, car and motorbike) on nearby major arterial roads (M5 and Hume Highway), and neighbourhood and natural noises (ie. birds). As per observations made during the attended measurements detailed in APPENDIX B, typical train pass-by event noise levels ranged from 63 to 71 dB(A) considering that both freight and passenger trains operate along the rail line adjacent to the Casula residential receivers. The typical $L_{Aeq,\ 15minute}$ levels at night range was between 52 to 54 dB(A). As such average typical night period ambient (non-MIP) noise levels are greater than 52 dB(A).

The measured background noise levels show a clear shoulder period is apparent in the noise monitoring data, starting from around 3:00am, but with a more rapid increase from 5:00am/6:00am. The exceedances were identified during a range of different time periods, however, for periods where a number of events were identified such as on 7 February 2025, instead of the night background noise level being 37 dB(A) $L_{A90,\ 15minute}$, which occurred around 1:00am, the background noise level at approximately 5:00am when the majority of noise events occurred, was 45 dB(A) $L_{A90,\ 15minute}$,. This would result in an NPfI sleep disturbance screening level of 60 dB(A) L_{Amax}, of which many identified events were below this level and this would also result in the noise events being less apparent due to this increased background noise.

The NPfI points to the NSW *Road Noise Policy* (RNP) for some guidance on possible impacts. The RNP concludes the following:

From the research on sleep disturbance to date it can be concluded that:

- *maximum internal noise levels below 50–55 dB(A) are unlikely to awaken people from sleep*
- *one or two noise events per night, with maximum internal noise levels of 65–70 dB(A), are not likely to affect health and wellbeing significantly.*

Although this information is provided with the focus on traffic noise levels, it provides guidance to consider the nature and impact of the monitored noise levels as referenced in the NPfI. On the assumption that there is a 10 dB(A) outside-to-inside noise sound transmission loss through an open window (see NSW RNP, p17), the related references indicate that external traffic noise levels of L_{Amax}

60 to 65 dB(A) are unlikely to cause awakening reactions. The identified valid events were below 65 dB(A) L_{Amax}.

The measurements were undertaken as part of implementing the MPW S2 ONMP. As exceedances from the L_{AFmax} noise limits have been measured, the response process detailed in MPW S2 ONMP Section 4.3 should be followed. This includes identifying the relevant operational personnel to be notified, reviewing the nature of the exceedance and the potential of existing operations for further impacts, further investigating the exceedances, for which a preliminary review has been done in Section 5.1, and determining feasible and reasonable mitigation and management measures to reduce these noise levels and minimise impacts on receivers.

Recommendations to mitigate and manage these identified noise impacts are detailed in Section 5.3.

5.3 Recommendations

As a result of the B140A noise monitoring, the following mitigation and management measures are recommended to mitigate identified exceedances.

Recommended management controls to mitigate identified exceedances

IMEX operations

- Avoid the use of horns from trucks and reach stackers, where practicable and safe, within the IMEX terminal during the night period (10pm to 7am).
- For container handling in the area north of the IMEX terminal, ensure that when container handling and truck loading operations are taking place at night using reach stackers, that there are containers to the west of the container handling operations. These containers are to sufficiently break the line-of-sight between the container handling locations and the residences in Casula. These shielding containers are to be stacked minimum of 2 containers high, and extend either side of the container handling location for a minimum 4 containers in length, considering ground level handling of containers. Operations should also not be at height but rather only ground level handling of containers.

MPW warehouse operations

- Container warehouse transfers at night should be undertaken using combilifts or straddle carriers, instead of reach stackers, unless alternative container handling methodologies are implemented which sufficiently reduce noise levels from these activities.

These control measures should be further investigated to determine the method of implementation, and as part of this implementation process, determine the likely effectiveness of the final approach to confirm that it is expected they appropriately mitigate the identified noise event exceedances.

As per MPW S2 ONMP, following the implementation of these control measures additional monitoring is to be undertaken to verify the effectiveness of the implemented controls and confirm operational noise emissions are achieving the relevant noise limits.

6 Conclusion

Renzo Tonin & Associates was engaged by ESR Developments (Australia) Pty Ltd on behalf of The Trust Company (Australia) Limited (ACN 000 000 993) As Trustee Of The Moorebank Industrial Warehouse Trust (ABN 51 402 161 047) to conduct noise impact monitoring to satisfy the (State Significant Development (SSD) 7709 B140A consent condition (CoC) for the Moorebank Precinct West (MPW), which forms part of the Moorebank Intermodal Precinct (MIP) at Moorebank, NSW.

The purpose of this exercise was to undertake noise monitoring to assess operational noise levels from the Moorebank Intermodal Precinct (MIP) at No. 9 Casula Road, Casula, to determine the typical operational noise levels at this receiver location, and assess their compliance with the noise limits in the SSD 7709 Conditions of Consent (CoC) and consistent with the MPW Stage 2 Operational Noise Management Plan[2] (MPW S2 ONMP).

The noise monitoring undertaken included both attended and unattended noise monitoring. The attended noise monitoring was undertaken on three separate periods, each for 4 hours during each of the day, evening and night periods. The unattended noise monitoring was for a period of 7 contiguous days where valid data was measured not adversely affected by weather.

During the at-receiver monitoring (attended and unattended), there was at times a significant contribution from non-MIP noise sources, such as distant and local road traffic, mainline rail movement noise, other extraneous sources (ie. aircraft) and natural sources (ie. frogs, crickets, birds, etc.). As such, standard industry practices and methods consistent with the NPfI were used to further analyse the noise monitoring data to separate out the MIP operational noise emissions from the general ambient noise.

The measured noise files were analysed with the assistance of onsite intermediate noise monitoring, onsite and receiver observations, onsite cameras and audio monitoring data. This data was used to correlate between onsite noise generating activities and receiver noise levels, to estimate site noise emission levels and identify and confirm onsite noise events in the post-monitoring analysis, so that MIP operational noise emissions could be assessed against the noise limits independent of these extraneous noise sources.

The noise monitoring surveys determined that the noise emissions from MIP operations were less than the SSD 7709 Conditions of Consent (CoC) $L_{Aeq15min}$ noise limits at all surrounding receiver locations for all monitoring periods.

Typically, the maximum noise levels from MIP operations were generally compliant with the L_{Amax} noise limits, however, a number of periods were identified where the L_{Amax} noise levels were above the L_{Amax} noise limit for residences in Casula.

2. 2 Logos, Operational Noise Management Plan Moorebank Logistics Park - West Precinct Stage 2, Report No. J1883240215.4, Revision 4, dated 15/2/2024, available https://moorebankintermodalprecinct.com.au/wp-content/uploads/2024/04/SSD7709-MPW2-ONMP_Rev4_redacted.pdf, accessed 15/10/2024

As exceedances were measured a further investigation of the identified noise events was undertaken, and recommendations for feasible and reasonable mitigation and management measures included to reduce these noise levels at receivers as required by Section 4.3 of the MPW S2 ONMP.

These control measures should be further investigated to determine the method of implementation, and as part of this implementation process, determine the likely effectiveness of the final approach to confirm that it is expected to appropriately mitigate the identified noise event exceedances. Following the implementation of these control measures additional monitoring is to be undertaken to verify the effectiveness of the implemented controls and confirm operational noise emissions are achieving the relevant noise limits.

APPENDIX A Glossary of terminology

The following is a brief description of the technical terms used to describe noise to assist in understanding the technical issues presented.

Adverse weather	Weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).
Ambient noise	The all-encompassing noise associated within a given environment at a given time, usually composed of sound from all sources near and far.
Assessment period	The period in a day over which assessments are made.
Assessment Point	A point at which noise measurements are taken or estimated. A point at which noise measurements are taken or estimated.
Background noise	Background noise is the term used to describe the underlying level of noise present in the ambient noise, measured in the absence of the noise under investigation, when extraneous noise is removed. It is described as the average of the minimum noise levels measured on a sound level meter and is measured statistically as the A-weighted noise level exceeded for ninety percent of a sample period. This is represented as the L90 noise level (see below).
Decibel [dB]	The units that sound is measured in. The following are examples of the decibel readings of common sounds in our daytime environment:
dB(A)	A-weighted decibels. The A- weighting noise filter simulates the response of the human ear at relatively low levels, where the ear is not as effective in hearing low frequency sounds as it is in hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the "A" filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is measured using the A filter.
dB(C)	C-weighted decibels. The C-weighting noise filter simulates the response of the human ear at relatively high levels, where the human ear is nearly equally effective at hearing from mid-low frequency (63Hz) to mid-high frequency (4kHz), but is less effective outside these frequencies.

threshold of hearing	0 dB	The faintest sound we can hear
	10 dB	Human breathing
almost silent	20 dB	
	30 dB	Quiet bedroom or in a quiet national park location
generally quiet	40 dB	Library
	50 dB	Typical office space or ambience in the city at night
moderately loud	60 dB	CBD mall at lunch time
	70 dB	The sound of a car passing on the street
loud	80 dB	Loud music played at home
	90 dB	The sound of a truck passing on the street
very loud	100 dB	Indoor rock band concert
	110 dB	Operating a chainsaw or jackhammer
extremely loud	120 dB	Jet plane take-off at 100m away
threshold of pain	130 dB	
	140 dB	Military jet take-off at 25m away

Frequency	Frequency is synonymous to pitch. Sounds have a pitch which is peculiar to the nature of the sound generator. For example, the sound of a tiny bell has a high pitch and the sound of a bass drum has a low pitch. Frequency or pitch can be measured on a scale in units of Hertz or Hz.
Impulsive noise	Having a high peak of short duration or a sequence of such peaks. A sequence of impulses in rapid succession is termed repetitive impulsive noise.
Intermittent noise	The level suddenly drops to that of the background noise several times during the period of observation. The time during which the noise remains at levels different from that of the ambient is one second or more.
L_{Max}	The maximum sound pressure level measured over a given period.
L_{Min}	The minimum sound pressure level measured over a given period.
L_1	The sound pressure level that is exceeded for 1% of the time for which the given sound is measured.
L_{10}	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
L_{90}	The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L90 noise level expressed in units of dB(A).
L_{eq}	The "equivalent noise level" is the summation of noise events and integrated over a selected period of time.
Reflection	Sound wave changed in direction of propagation due to a solid object obscuring its path.
SEL	Sound Exposure Level (SEL) is the constant sound level which, if maintained for a period of 1 second would have the same acoustic energy as the measured noise event. SEL noise measurements are useful as they can be converted to obtain Leq sound levels over any period of time and can be used for predicting noise at various locations.
Sound	A fluctuation of air pressure which is propagated as a wave through air.
Sound absorption	The ability of a material to absorb sound energy through its conversion into thermal energy.
Sound level meter	An instrument consisting of a microphone, amplifier and indicating device, having a declared performance and designed to measure sound pressure levels.
Sound pressure level	The level of noise, usually expressed in decibels, as measured by a standard sound level meter with a microphone.
Sound power level	Ten times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power.
Tonal noise	Containing a prominent frequency and characterised by a definite pitch.

APPENDIX B Attended noise monitoring details (9 Casula Road, Casula)

Table 11 - Attended noise measurement results – 9 Casula Road, Casula

ID	Period	Measurement assessment period[1]	Measured noise level (15-minute) (all sources), dB(A)[2]			Estimated MIP noise contribution, dB(A)[3]		Weather conditions	Comments	$L_{Aeq,\ 15minute}$ noise limit, dB(A)	MIP Noise levels Comply ?
			L_{Amax}	L_{Aeq}	L_{A90}	L_{Amax}	$L_{Aeq,15-min}$				Yes or No
Day (Thursday 6 February 2025)											
D1	Day	8:30 AM to 8:45 AM	77	61	49	n/a	≤ 39	Wind speed: still Wind Dir: - Temp: 26C Cloud: 0/8 Rain: nil	Ambient noise levels: Birds dominate (~58-63dB(A)), distant road traffic (motorbikes), local traffic (cars), train passby (freight), plane flyover, construction noise (MPWS) Background noise levels : Distant traffic (Moorebank Ave + M5), insect noise (cicadas) and almost constant birds. Site noise: Site noise (container handling) just audible on one occasion.	46	Yes
D2	Day	8:45 AM to 9:00 AM	77	60	50	n/a	≤ 39	Wind speed: still Wind Dir: - Temp: 27C Cloud: 0/8 Rain: nil	Ambient noise levels: Birds dominate (~60-63dB(A)), train passbys (passenger) and station noise, local traffic (cars), construction noise (MPWS) Background noise levels : Distant traffic (Moorebank Ave + M5), insect noise (cicadas) Site noise: Site noise was not audible.	46	Yes
D3	Day	9:00 AM to 9:15 AM	75	58	49	n/a	≤ 39	Wind speed: still Wind Dir: - Temp: 28C Cloud: 0/8 Rain: nil	Ambient noise levels: Birds dominate, train passbys (passenger) and station noise, local traffic (cars), plane flyover Background noise levels : Distant traffic (Moorebank Ave + M5), insect noise (cicadas) Site noise: Site noise was not audible.	46	Yes
D4	Day	9:15 AM to 9:30 AM	74	59	50	n/a	≤ 40	Wind speed: still Wind Dir: - Temp: 30C Cloud: 0/8 Rain: nil	Ambient noise levels: Birds dominate (58-60), train passbys (passenger) and station noise, local traffic (cars), helicopter flyover, construction (MPWS) Background noise levels : Distant traffic (Moorebank Ave + M5), insect noise (cicadas) (45-46dB(A)) Site noise: Site noise (container handling) audible on four occasions.	46	Yes
D5	Day	9:30 AM to 9:45 AM	78	58	50	n/a	≤ 40	Wind speed: still Wind Dir: - Temp: 34C Cloud: 0/8 Rain: nil	Ambient noise levels: Birds dominate (55-68), train passbys (passenger) and station noise, local traffic (cars), plane flyover, neighbourhood noise (mower) Background noise levels : Distant traffic (Moorebank Ave + M5), insect noise (cicadas) (45-46dB(A)),neighbourhood noise (pressure washer) Site noise: Site noise was not audible.	46	Yes

ID	Period	Measurement assessment period[1]	Measured noise level (15-minute) (all sources), dB(A)[2]			Estimated MIP noise contribution, dB(A)[3]		Weather conditions	Comments	$L_{Aeq,\ 15minute}$ noise limit, dB(A)	MIP Noise levels Comply ?
			L_{Amax}	L_{Aeq}	L_{A90}	L_{Amax}	$L_{Aeq,15-min}$				Yes or No
D6	Day	9:45 AM to 10:00 AM	73	57	50	n/a	≤ 40	Wind speed: < 0.5 m/s Wind Dir: E Temp: 34C Cloud: 0/8 Rain: nil	Ambient noise levels: Birds dominate (60-73), train passbys (passenger) and station noise, local traffic (cars), neighbourhood noise (pressure washer) Background noise levels: Distant traffic (Moorebank Ave + M5), insect noise (cicadas) (48dB(A)),neighbourhood noise (pressure washer) Site noise: Site noise was not audible.	46	Yes
D7	Day	10:00 AM to 10:15 AM	73	60	50	n/a	≤ 41	Wind speed: < 0.5 m/s Wind Dir: NE Temp: 34C Cloud: 0/8 Rain: nil	Ambient noise levels: Birds dominate (56-70), train passbys (freight/passenger) and station noise, local traffic (cars), neighbourhood noise (pressure washer) Background noise levels: Distant traffic (Moorebank Ave + M5), insect noise (cicadas) (49/50dB(A)), neighbourhood noise (pressure washer) Site noise: Site noise (container handling and truck noise) audible on occasion.	46	Yes
D8	Day	10:15 AM to 10:30 AM	71	59	51	n/a	≤ 41	Wind speed: ~1 m/s Wind Dir: NE Temp: 32C Cloud: 0/8 Rain: nil	Ambient noise levels: Birds dominate (60-70), train passbys (freight/passenger) and station noise, local traffic (cars), neighbourhood noise (pressure washer) Background noise levels: Distant traffic (Moorebank Ave + M5), insect noise (cicadas) (49 dB(A)), neighbourhood noise (pressure washer 48-52 dB(A)) Site noise: Site noise (container handling and truck noise) audible on occasion.	46	Yes
D9	Day	10:30 AM to 10:45 AM	73	57	50	n/a	≤ 41	Wind speed: < 0.7 m/s Wind Dir: NE Wind Dir: - Temp: 34C Cloud: 0/8 Rain: nil	Ambient noise levels: Birds dominate (58-69), train passbys (freight/passenger) and station noise, local traffic (cars), helicopter flyover, neighbourhood noise (pressure washer, 52-55 dB(A)), construction (south) Background noise levels: Distant traffic (Moorebank Ave + M5), insect noise (cicadas) (49 dB(A)) Site noise: Site noise (container handling) audible on occasion.	46	Yes
D10	Day	10:45 AM to 11:00 AM	75	59	49	n/a	≤ 40	Wind speed: < 0.5 m/s Wind Dir: NE Temp: 34C Cloud: 3/8 Rain: nil	Ambient noise levels: Birds dominate (58-73), train passbys (passenger) and station noise, local traffic (cars), helicopter flyover, neighbourhood noise (pressure washer 51/52), construction (MPWS) Background noise levels: Distant traffic (Moorebank Ave + M5), insect noise (cicadas) (45dB(A)), neighbourhood noise (pressure washer 51/52) Site noise: Site noise (container handling) audible on multiple occasions.	46	Yes

ID	Period	Measurement assessment period[1]	Measured noise level (15-minute) (all sources), dB(A)[2]			Estimated MIP noise contribution, dB(A)[3]		Weather conditions	Comments	$L_{Aeq,\ 15minute}$ noise limit, dB(A)	MIP Noise levels Comply ?
			L_{Amax}	L_{Aeq}	L_{A90}	L_{Amax}	$L_{Aeq,15-min}$				Yes or No
D11	Day	11:00 AM to 11:15 AM	72	58	49	n/a	≤ 40	Wind speed: 1-1.5 m/s Wind Dir: NE Temp: 33C Cloud: 4/8 Rain: nil	Ambient noise levels: Birds dominate (58-67), train passbys (passenger) (~66dB(A)) and station noise, local traffic (cars), helicopter flyover, neighbourhood noise (pressure washer and mower 48dB(A)), construction (MPWS) Background noise levels: Distant traffic (Moorebank Ave + M5), insect noise (cicadas) (45dB(A)), neighbourhood noise (pressure washer and mower 48dB(A)) Site noise: Site noise (container handling) audible on multiple occasions.	46	Yes
D12	Day	11:15 AM to 11:30 AM	74	58	49	n/a	≤ 42	Wind speed: 1 to 2 m/s Wind Dir: NE Temp: 33C Cloud: 4/8 Rain: nil	Ambient noise levels: Birds dominate (58-67), train passbys (passenger) (~66dB(A)) and station noise, local traffic (cars), helicopter flyover, construction (MPWS) Background noise levels: Distant traffic (Moorebank Ave + M5), insect noise (cicadas) (48dB(A)) Site noise: Site noise (container handling and trucks/truck horns) audible on occasions.	46	Yes
D13	Day	11:30 AM to 11:45 AM	74	56	48	n/a	≤ 39	Wind speed: ~1 m/s Wind Dir: NE Temp: 31C Cloud: 4/8 Rain: nil	Ambient noise levels: Birds dominate (58-65), train passbys (passenger) (~63dB(A)) and station noise, helicopter flyover Background noise levels: Distant traffic (Moorebank Ave + M5), insect noise (cicadas) (45-50dB(A)) Site noise: Site noise (container handling and trucks/truck horns) audible on occasions.	46	Yes
D14	Day	11:45 AM to 12:00 PM	71	59	48	n/a	≤ 39	Wind speed: still Wind Dir: - Temp: 30C Cloud: 4/8 Rain: nil	Ambient noise levels: Birds dominate (58-65), train passbys (passenger/freight) (~65/66dB(A)) and station noise, construction (MPWS) Background noise levels: Distant traffic (Moorebank Ave + M5), insect noise (cicadas) Site noise: Site noise (container handling and trucks/truck horns) audible on occasions.	46	Yes
D15	Day	12:00 PM to 12:15 PM	75	60	50	n/a	≤ 40	Wind speed: 0.5 to 1 m/s Wind Dir: - Temp: 32C Cloud: 3/8 Rain: nil	Ambient noise levels: Birds dominate (60-70), train passbys (passenger) (~64dB(A)) and station noise, construction (MPWS) Background noise levels: Distant traffic (Moorebank Ave + M5), insect noise (cicadas) (~47dB(A)) Site noise: Site noise (container handling and trucks/truck horns) audible on occasions.	46	Yes

ID	Period	Measurement assessment period[1]	Measured noise level (15-minute) (all sources), dB(A)[2]			Estimated MIP noise contribution, dB(A)[3]		Weather conditions	Comments	$L_{Aeq,\ 15minute}$ noise limit, dB(A)	MIP Noise levels Comply ?
			L_{Amax}	L_{Aeq}	L_{A90}	L_{Amax}	$L_{Aeq,15-min}$				Yes or No
D16	Day	12:15 PM to 12:30 PM	75	59	49	n/a	≤ 39	Wind speed: still Wind Dir: - Temp: 29C Cloud: 4/8 Rain: nil	Ambient noise levels: Birds dominate (58-62), train passbys (passenger/freight) (~63-68dB(A)) and station noise Background noise levels: Distant traffic (Moorebank Ave + M5), insect noise (cicadas) (~47dB(A)) Site noise: Site noise (container handling and trucks/truck horns) audible on occasions.	46	Yes
Evening (Tuesday 4 February 2025)											
E1	Evening	6:00 PM to 6:15 PM	94	72	45	n/a	≤ 35	Wind speed: <1 m/s Wind Dir: N Temp: 30C Cloud: 0/8 Rain: nil	Ambient noise levels: Birds dominate, train passby (passenger) noise, local traffic movements Background noise levels: Distant traffic (M5) Site noise: Site noise was not audible.	44	Yes
E2	Evening	6:15 PM to 6:30 PM	78	56	46	n/a	≤ 36	Wind speed: <1 m/s Wind Dir: N Temp: 30C Cloud: 0/8 Rain: nil	Ambient noise levels: Birds dominate, train passby (passenger) noise, local traffic movements Background noise levels: Distant traffic (M5) Site noise: Site noise was not audible.	44	Yes
E3	Evening	6:30 PM to 6:45 PM	72	58	47	n/a	≤ 37	Wind speed: <1 m/s Wind Dir: N Temp: 30C Cloud: 0/8 Rain: nil	Ambient noise levels: Birds (~58dB(A)), train passby (passenger/freight) noise (~62-65dB(A)), local traffic movements, plane flyover Background noise levels: Distant traffic (M5) Site noise: Site noise (container handling) audible on one occasion.	44	Yes
E4	Evening	6:45 PM to 7:00 PM	87	58	46	n/a	≤ 36	Wind speed: <1 m/s Wind Dir: N Temp: 30C Cloud: 0/8 Rain: nil	Ambient noise levels: Birds dominate, train passbys (passenger/freight) (~63-68dB(A)) and station noise, helicopter flyover Background noise levels: Distant traffic (M5) (46-50dB(A)) Site noise: Site noise (container handling and trucks/truck horn) audible on a number of occasions.	44	Yes
E5	Evening	7:00 PM to 7:15 PM	72	56	46	n/a	≤ 37	Wind speed: <1.5 m/s Wind Dir: N Temp: 30C Cloud: 0/8 Rain: nil	Ambient noise levels: Birds dominate (58-70dB(A)), train passbys (passenger) (~63-65dB(A)) and station noise, local traffic, plane flyover Background noise levels: Distant traffic (M5) (46dB(A)), crickets (52-56dB(A)) Site noise: Site noise (container handling and trucks/truck horn) audible on a number of occasions.	44	Yes

ID	Period	Measurement assessment period[1]	Measured noise level (15-minute) (all sources), dB(A)[2]			Estimated MIP noise contribution, dB(A)[3]		Weather conditions	Comments	$L_{Aeq,\ 15minute}$ noise limit, dB(A)	MIP Noise levels Comply ?
			L_{Amax}	L_{Aeq}	L_{A90}	L_{Amax}	$L_{Aeq,15-min}$				Yes or No
E6	Evening	7:15 PM to 7:30 PM	72	57	46	n/a	≤ 36	Wind speed: <2 m/s Wind Dir: N Temp: 30C Cloud: 0/8 Rain: nil	Ambient noise levels: Birds dominate (58-72dB(A)), train passbys (passenger) (~68/69dB(A)) and station noise, local traffic, plane flyover Background noise levels: Distant traffic (M5) (43-45dB(A)) Site noise: Site noise (container handling and trucks/truck horn) audible on a number of occasions.	44	Yes
E7	Evening	7:30 PM to 7:45 PM	76	59	46	n/a	≤ 37	Wind speed: 1 to 2 m/s Wind Dir: NE Temp: 29C Cloud: 0/8 Rain: nil	Ambient noise levels: Birds dominate (60dB(A)), train passbys (passenger/freight) (~63/70dB(A)) and station noise, local traffic, plane flyover Background noise levels: Distant traffic (M5) (44-46dB(A)) Site noise: Site noise (container handling and trucks/truck horn) audible on a number of occasions.	44	Yes
E8	Evening	7:45 PM to 8:00 PM	77	58	44	n/a	≤ 34	Wind speed: ~1 m/s Wind Dir: NE Temp: 29C Cloud: 0/8 Rain: nil	Ambient noise levels: Birds, train passbys (passenger/freight) (~63-69dB(A)) and station noise, local traffic Background noise levels: Distant traffic (M5) (41-45dB(A)), cicadas (~51dB(A)) Site noise: Site noise (container handling) just audible on one occasion.	44	Yes
E9	Evening	8:00 PM to 8:15 PM	68	54	46	n/a	≤ 36	Wind speed: <2.5 m/s Wind Dir: N Temp: 28C Cloud: 0/8 Rain: nil	Ambient noise levels: Birds, train passbys (passenger) (~63dB(A)) and station noise, loud vehicles on M5, local traffic Background noise levels: Distant traffic (M5) and cicadas (~44-47dB(A)) Site noise: Site noise (truck horns) audible on one occasion.	44	Yes
E10	Evening	8:15 PM to 8:30 PM	70	56	50	n/a	≤ 37	Wind speed: still Wind Dir: - Temp: 28C Cloud: 0/8 Rain: nil	Ambient noise levels: Train passbys (passenger) (~63dB(A)) and station noise, distant freight train, local traffic Background noise levels: Distant traffic (M5) and cicadas (~49-50dB(A)) Site noise: Site noise was not audible.	44	Yes
E11	Evening	8:30 PM to 8:45 PM	73	58	47	n/a	≤ 37	Wind speed: still Wind Dir: - Temp: 27C Cloud: 0/8 Rain: nil	Ambient noise levels: Train passbys (passenger) (~63-64dB(A)) and station noise, local traffic Background noise levels: Distant traffic (M5) and frogs/crickets (~47dB(A)) Site noise: Site noise was not audible.	44	Yes

ID	Period	Measurement assessment period[1]	Measured noise level (15-minute) (all sources), dB(A)[2]			Estimated MIP noise contribution, dB(A)[3]		Weather conditions	Comments	$L_{Aeq,\ 15minute}$ noise limit, dB(A)	MIP Noise levels Comply ?
			L_{Amax}	L_{Aeq}	L_{A90}	L_{Amax}	$L_{Aeq,15-min}$				Yes or No
E12	Evening	8:45 PM to 9:00 PM	70	54	44	n/a	≤ 36	Wind speed: still Wind Dir: - Temp: 27C Cloud: 0/8 Rain: nil	Ambient noise levels: Train passbys (passenger/freight) (~67/68dB(A)) and station noise, loud M5 vehicles, local traffic Background noise levels: Distant traffic (M5) and frogs/crickets (~44-46dB(A)) Site noise: Site noise (container handling and truck horn) audible on one occasion.	44	Yes
E13	Evening	9:00 PM to 9:15 PM	66	53	43	n/a	≤ 34	Wind speed: still Wind Dir: - Temp: 27C Cloud: 0/8 Rain: nil	Ambient noise levels: Train passbys (passenger (~67/68dB(A)) and station noise, distant freight train, loud M5 vehicles, local traffic Background noise levels: Distant traffic (M5) and crickets (~43dB(A)) Site noise: Site noise (container handling and truck horns) audible on occasion.	44	Yes
E14	Evening	9:15 PM to 9:30 PM	66	51	43	n/a	≤ 35	Wind speed: still Wind Dir: - Temp: 27C Cloud: 0/8 Rain: nil	Ambient noise levels: Train passbys (passenger (~61-65dB(A)) and station noise, local traffic Background noise levels: Distant traffic (M5) and crickets (~43-46dB(A)) Site noise: Site noise (container handling, towards MPW warehouses and IMEX) audible on occasions.	44	Yes
E15	Evening	9:30 PM to 9:45 PM	69	53	43	n/a	≤ 34	Wind speed: still Wind Dir: - Temp: 27C Cloud: 0/8 Rain: nil	Ambient noise levels: Train passbys (passenger (~64-65dB(A)) and station noise, local traffic, plane flyover, loud M5 vehicles (motorbike) Background noise levels: Distant traffic (M5) and crickets (~45-46dB(A)) Site noise: Site noise (container handling, towards MPW warehouses and IMEX) audible on occasions.	44	Yes
E16	Evening	9:45 PM to 10:00 PM	68	54	42	n/a	≤ 35	Wind speed: still Wind Dir: - Temp: 26C Cloud: 0/8 Rain: nil	Ambient noise levels: Train passbys (passenger (~65-68dB(A)) and station noise (motorbike), local traffic, plane flyover, loud M5 vehicles (motorbike) Background noise levels: Distant traffic (M5) and crickets (~44/45dB(A)) Site noise: Site noise (container handling and truck horn) audible on occasions.	44	Yes

ID	Period	Measurement assessment period[1]	Measured noise level (15-minute) (all sources), dB(A)[2]			Estimated MIP noise contribution, dB(A)[3]		Weather conditions	Comments	$L_{Aeq,\ 15minute}$ noise limit, dB(A)	MIP Noise levels Comply ?
			L_{Amax}	L_{Aeq}	L_{A90}	L_{Amax}	$L_{Aeq,15-min}$				Yes or No
Night (Thursday 6 February 2025)											
N1	Night	3:00 am to 3:15 am	67	52	35	< 25	≤ 25	Wind speed: still Wind Dir: - Temp: 24C Cloud: 8/8 Rain: nil	Ambient noise levels: Construction noise on railway line, train passby. Background noise levels: Mechanical equipment at Casula Station and insect noise (~35/36dB(A)) Site noise: Site noise was not audible.	39	Yes
N2	Night	3:15 am to 3:30 am	56	38	36	< 26	≤ 26	Wind speed: still Wind Dir: - Temp: 23C Cloud: 8/8 Rain: nil	Ambient noise levels: Distant road traffic (motorbike), construction noise on railway line, train passby. Background noise levels: Mechanical equipment at Casula Station and insect noise (~35/36dB(A)) Site noise: Site noise was not audible.	39	Yes
N3	Night	3:30 am to 3:45 am	71	54	36	< 26	≤ 26	Wind speed: still Wind Dir: - Temp: 23C Cloud: 8/8 Rain: nil	Ambient noise levels: Helicopter, distant road traffic (loud cars), neighbourhood noise (dog barking, local car), train passby (2xpassenger and freight) (~68-70dB(A)), train at station noises Background noise levels: Mechanical equipment at Casula Station and insect noise (~36/40dB(A)) Site noise: Site noise was not audible.	39	Yes
N4	Night	3:45 am to 4:00 am	77	58	35	< 35	≤ 25	Wind speed: still Wind Dir: - Temp: 23C Cloud: 8/8 Rain: nil	Ambient noise levels: Distant road traffic (loud cars/trucks), train passby (passenger) (~68-70dB(A)), train at station noises Background noise levels: Mechanical equipment at Casula Station and insect noise (~35/36dB(A)) Site noise: Site noise (container handling) just audible on one occasion.	39	Yes
N5	Night	4:00 am to 4:15 am	65	47	35	< 43	≤ 25	Wind speed: still Wind Dir: - Temp: 23C Cloud: 8/8 Rain: nil	Ambient noise levels: Local car and station carpark activities, train passby (passenger) (~62/63dB(A)) and train at station noises Background noise levels: Mechanical equipment at Casula Station and insect noise (~35/36dB(A)) Site noise: Site noise (container handling) audible on occasion.	39	Yes
N6	Night	4:15 AM to 4:30 AM	Excluded due to periods of rain								
N7	Night	4:30 AM to 4:45 AM	Excluded due to periods of rain								

ID	Period	Measurement assessment period[1]	Measured noise level (15-minute) (all sources), dB(A)[2]			Estimated MIP noise contribution, dB(A)[3]		Weather conditions	Comments	$L_{Aeq,\ 15minute}$ noise limit, dB(A)	MIP Noise levels Comply ?
			L_{Amax}	L_{Aeq}	L_{A90}	L_{Amax}	$L_{Aeq,15-min}$				Yes or No
N8	Night	4:45 am to 5:00 am	53	42	37	< 39	≤ 27	Wind speed: still Wind Dir: - Temp: 22C Cloud: 8/8 Rain: yes	Ambient noise levels: Local cars and station carpark activities Background noise levels: Mechanical equipment at Casula Station (~35/36dB(A)) and frog and insect noise (~45/46dB(A)) Site noise: Truck movement within MIP just audible, site noise (container handling) audible on one occasion. *Paused due to rain at prior to 4:48am and after 4:56am*	39	Yes
N9	Night	5:00 am to 5:15 am	65	48	38	< 45	≤ 28	Wind speed: still Wind Dir: - Temp: 22C Cloud: 8/8 Rain: nil	Ambient noise levels: Distant road traffic (motorbike), local traffic (car) and station carpark activities, train passby (passenger) (~64dB(A)) and train at station noises Background noise levels: Mechanical equipment at Casula Station and frog and insect noise (~45/46dB(A)) Site noise: Truck movement within MIP just audible, site noise (container handling and truck horn) audible on occasion.	39	Yes
N10	Night	5:15 am to 5:30 am	67	48	39	< 47	≤ 29	Wind speed: still Wind Dir: - Temp: 21C Cloud: 8/8 Rain: nil	Ambient noise levels: Local traffic (cars), train passby (passenger) (~64dB(A)) and train at station noises, distant road traffic (Hume Highway & M5, motorbike & loud trucks) Background noise levels: Mechanical equipment at Casula Station, distant traffic (Moorebank Ave + M5) (~40dB(A)), and frog and insect noise (~45/46dB(A)) Site noise: Vehicle movements within MIP just audible, site noise (truck horn) audible on one occasion.	39	Yes
N11	Night	5:30 am to 5:45 am	78	59	41	< 50	≤ 31	Wind speed: still Wind Dir: - Temp: 21C Cloud: 8/8 Rain: nil	Ambient noise levels: Birds (kookaburras/crows)(~70-75dB(A)), local traffic (cars) (~49-51dB(A)), train passby (3xpassenger) (~64-65dB(A)), and train at station noises, distant road traffic (Hume Highway & M5, motorbike & loud trucks) Background noise levels: Mechanical equipment at Casula Station, distant traffic (Moorebank Ave + M5) (~40dB(A)), and frog and insect noise (~45/46dB(A)) Site noise: Vehicle movements within MIP just audible, site noise (container handling) just audible on occasions.	39	Yes

ID	Period	Measurement assessment period[1]	Measured noise level (15-minute) (all sources), dB(A)[2]			Estimated MIP noise contribution, dB(A)[3]		Weather conditions	Comments	$L_{Aeq,\ 15minute}$ noise limit, dB(A)	MIP Noise levels Comply ?
			L_{Amax}	L_{Aeq}	L_{A90}	L_{Amax}	$L_{Aeq,15-min}$				Yes or No
N12	Night	5:45 am to 6:00 am	71	54	42	< 50	≤ 32	Wind speed: still Wind Dir: - Temp: 21C Cloud: 7/8 Rain: nil	Ambient noise levels: Birds(~45-47dB(A)), local traffic (cars) (~49-54dB(A)), distant aircraft, train passby (3xpassenger) (~69-70dB(A)), and train at station noises, distant road traffic (Hume Highway & M5, motorbike & loud trucks) Background noise levels: Mechanical equipment and music at Casula Station, distant traffic (Moorebank Ave + M5) (~40dB(A)) Site noise: Vehicle movements within MIP just audible, site noise (container handling) faint/just audible on occasions.	39	Yes
N13	Night	6:00 am to 6:15 am	70	53	43	< 45	≤ 33	Wind speed: still Wind Dir: - Temp: 21C Cloud: 6/8 Rain: nil	Ambient noise levels: Birds(~49-63dB(A)), local traffic (cars) (~52dB(A)), train passby (2xpassenger) (~68dB(A)), and train at station noises, distant road traffic (Hume Highway & M5) Background noise levels:Distant traffic (Moorebank Ave + M5) (~42-44dB(A)), almost constant birds Site noise: Vehicle movements within MIP just audible towards MIP south, site noise (container handling) faint/just audible on one occasion.	39	Yes
N14	Night	6:15 am to 6:30 am	82	61	47	< 48	≤ 33	Wind speed: still Wind Dir: - Temp: 21C Cloud: 5/8 Rain: nil	Ambient noise levels: Birds(~50-82dB(A)), local traffic (cars) (~52dB(A)), train passby (4xpassenger and freight) (~68-72dB(A)) and train at station noises, distant road traffic (Hume Highway & M5) Background noise levels: Distant traffic (Moorebank Ave + M5) (~42-44dB(A)) and almost constant birds (~50-55dB(A)) Site noise: Vehicle movements within MIP just audible towards MIP south on one occasion.	39	Yes
N15	Night	6:30 am to 6:45 am	81	59	48	< 40	≤ 33	Wind speed: still Wind Dir: - Temp: 21C Cloud: 4/8 Rain: nil	Ambient noise levels: Birds dominate (~52-70dB(A)), many local cars (~51dB(A)), train passby (7xpassenger) (~62-64dB(A)) and train at station noises, construction noise to south (outside of MIP). Background noise levels: Distant traffic (Moorebank Ave + M5) (~43-45dB(A)) and almost constant birds (~50-55 dB(A)) Site noise: Site noise (truck horn) audible on one occasion.	39	Yes

ID	Period	Measurement assessment period[1]	Measured noise level (15-minute) (all sources), dB(A)[2]			Estimated MIP noise contribution, dB(A)[3]		Weather conditions	Comments	$L_{Aeq,\ 15minute}$ noise limit, dB(A)	MIP Noise levels Comply ?
			L_{Amax}	L_{Aeq}	L_{A90}	L_{Amax}	$L_{Aeq,15-min}$				Yes or No
N16	Night	6:45 am to 7:00 am	77	59	49	< 20	≤ 33	Wind speed: still Wind Dir: - Temp: 21C Cloud: 1/8 Rain: nil	Ambient noise levels: Birds dominate (~58-68dB(A)), distant road traffic (motorbikes), local traffic (cars) (~51dB(A)), train passby (2xpassenger) (~63-66dB(A)) and train at station noises Background noise levels: Distant traffic (Moorebank Ave + M5) (~42-44dB(A)) and almost constant birds (~50-55dB(A)) Site noise: Site noise was not audible.	39	Yes

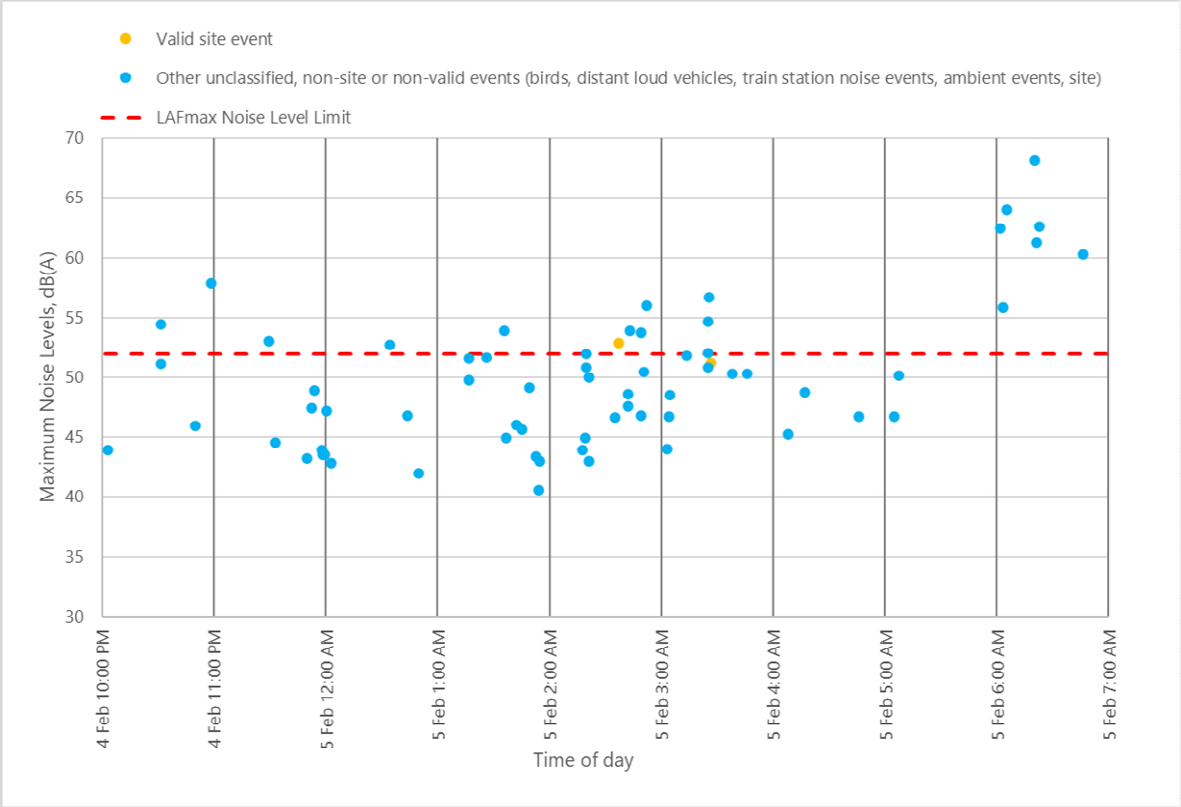
Notes:
1. 4:15 am to 4:45 am period was excluded due to rain conditions during the measurement
2. This represents the measured LAeq noise level associated with all noise sources (including road/rail traffic, natural sources and site noise)
3. Estimated contribution as per Section 3.2.1.1

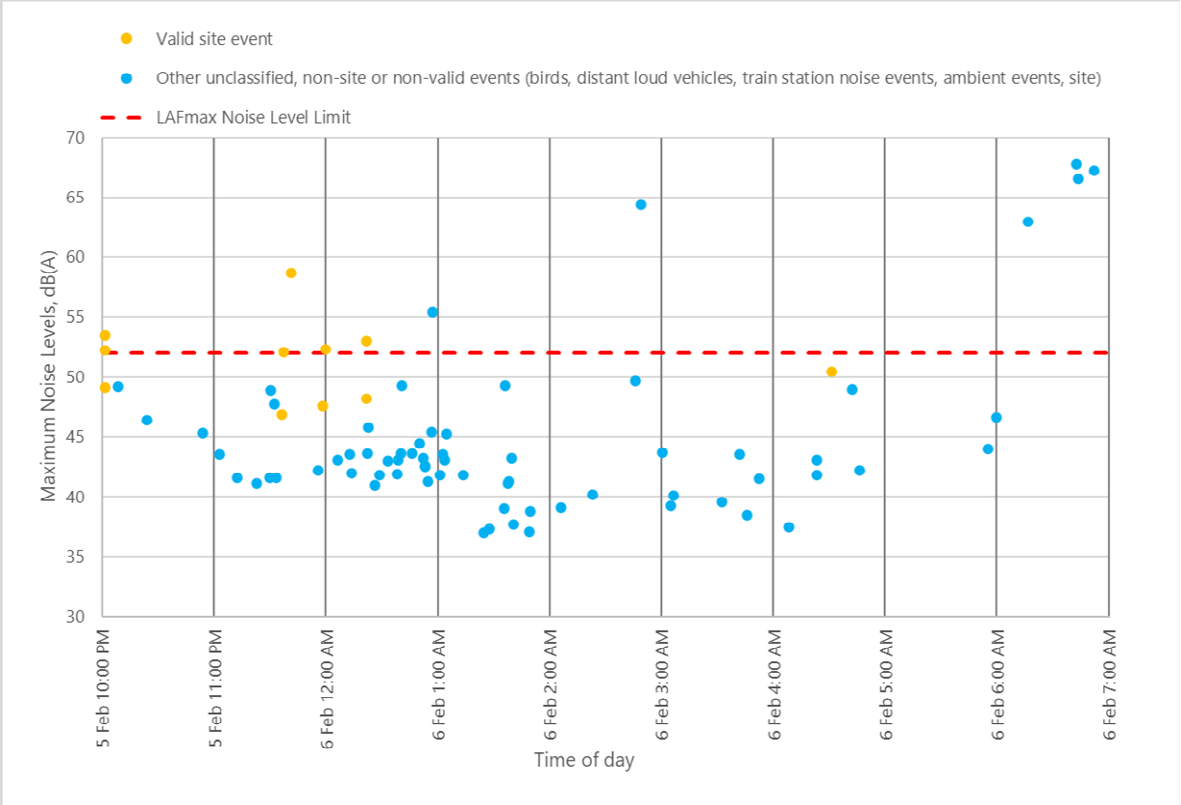
Table 12 - Key observed onsite noise generating site activities during the attended noise monitoring periods

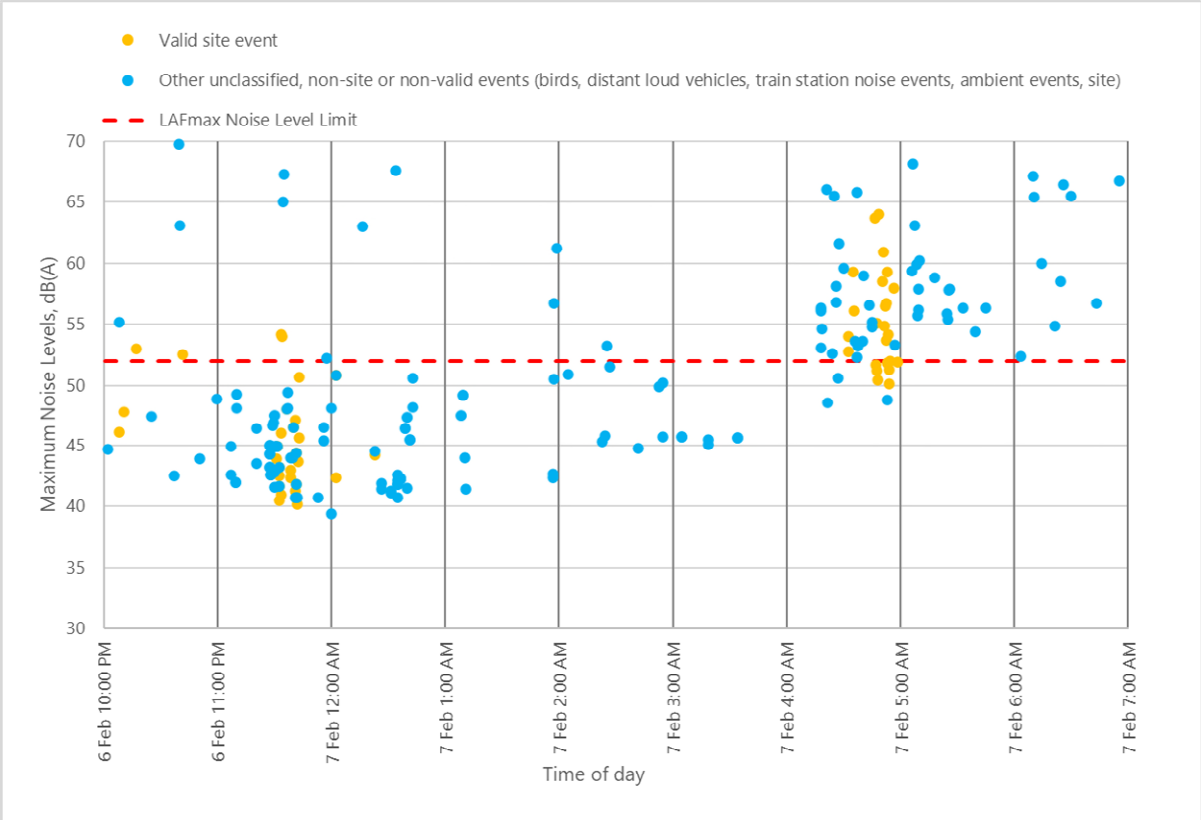
Time (Date)	Key observed onsite noise generating site activities
Day (Thursday 6 February 2025)	
8:30 AM to 8:45 AM	Reach stacker activity at north end of IMEX. Truck activities, and loading and unloading (east IMEX)
8:45 AM to 9:00 AM	Reach stacker activity at north end of IMEX. Truck activities, and loading and unloading (east IMEX)
9:00 AM to 9:15 AM	Truck activities MPE.
9:15 AM to 9:30 AM	Construction west precinct. Intermittent trucks entering JN/JR warehouses. Intermittent reach stacker activity at North IMEX. Truck activities and loading and unloading (east IMEX).
9:30 AM to 9:45 AM	Construction west precinct. Intermittent trucks entering JN/JR warehouses. Intermittent reach stacker activity at North IMEX. Truck activities and loading and unloading (east IMEX).
9:45 AM to 10:00 AM	Construction west precinct. Intermittent trucks entering JN/JR warehouses. Intermittent reach stacker activity at North IMEX. Truck activities and loading and unloading (east IMEX).
10:00 AM to 10:15 AM	MPW warehouse activities. N1/N2 truck loading and unloading via forklifts. Intermittent reach stacker activity related to MPW warehouses.
10:15 AM to 10:30 AM	MPW warehouse activities. N1/N2 truck loading and unloading via forklifts. Intermittent reach stacker activity related to MPW warehouses.
10:30 AM to 10:45 AM	MPW warehouse activities. N1/N2 truck loading and unloading via forklifts. Intermittent reach stacker activity related to MPW warehouses.
10:45 AM to 11:00 AM	Intermittent reach stacker activity related to MPW warehouses. Construction works at MPWS
11:00 AM to 11:15 AM	Intermittent reach stacker activity related to MPW warehouses. Construction works at MPWS
11:15 AM to 11:30 AM	Intermittent reach stacker activity related to MPW warehouses. Construction works at MPWS
11:30 AM to 11:45 AM	Intermittent reach stacker activity at North IMEX. Loading and unloading trucks at northern IMEX. Container handling movements by Reach stacker activity.
11:45 AM to 12:00 PM	Reach stacker activity at North IMEX. Loading and unloading trucks at northern IMEX. Container handling movements by Reach stacker activity.
12:00 PM to 12:15 PM	Reach stacker activity at North IMEX. Loading and unloading trucks at northern IMEX. Container handling movements by Reach stacker activity.
12:15 PM to 12:30 PM	Reach stacker activity at North IMEX. Loading and unloading trucks at northern IMEX. Container handling movements by Reach stacker activity.
Evening (Tuesday 4 February 2025)	
6:00 PM to 6:15 PM	Reach stacker activity at north end of IMEX. Truck activities MPE.
6:15 PM to 6:30 PM	Reach stacker activity at north end of IMEX. Truck activities MPE.
6:30 PM to 6:45 PM	Truck activities MPE.
6:45 PM to 7:00 PM	Reach stacker activity at north end of IMEX.
7:00 PM to 7:15 PM	Reach stacker activity at north end of IMEX. Loading and unloading trucks at northern IMEX. Container handling movements by reach stacker.
7:15 PM to 7:30 PM	Reach stacker activity at north end of IMEX. Loading and unloading trucks at northern IMEX. Container handling movements by reach stacker.
7:30 PM to 7:45 PM	Reach stacker activity at north end of IMEX. Loading and unloading trucks at northern IMEX. Container handling movements by reach stacker.
7:45 PM to 8:00 PM	Reach stacker activity at north end of IMEX. Loading and unloading trucks at northern IMEX. Container handling movements by reach stacker.
8:00 PM to 8:15 PM	Intermittent reach stacker activity at north end of IMEX. Container handling movements by reach stacker activity.
8:15 PM to 8:30 PM	Intermittent reach stacker activity at north end of IMEX. Container handling movements by reach stacker activity.

Time (Date)	Key observed onsite noise generating site activities
8:30 PM to 8:45 PM	Intermittent reach stacker activity at north end of IMEX. Container handling movements by reach stacker activity.
8:45 PM to 9:00 PM	Intermittent reach stacker activity at north end of IMEX. Container handling movements by reach stacker activity.
9:00 PM to 9:15 PM	Intermittent reach stacker activity at north end of IMEX. Container handling movements by reach stacker activity.
9:15 PM to 9:30 PM	Intermittent reach stacker activity at north end of IMEX. Container handling movements by reach stacker activity.
9:30 PM to 9:45 PM	Reach stacker activity at north end of IMEX. Container handling movements by reach stacker activity.
9:45 PM to 10:00 PM	Reach stacker activity at north end of IMEX. Container handling movements by reach stacker activity.
Night (Thursday 6 February 2025)	
3:00 am to 3:15 am	Occasional truck activities MPE. Reach stacker activity in IMEX. IMEX Automatic crane activities.
3:15 am to 3:30 am	Occasional truck activities MPE. Reach stacker activity in IMEX. IMEX Automatic crane activities.
3:30 am to 3:45 am	Occasional truck activities MPE. Reach stacker activity in IMEX. IMEX Automatic crane activities.
3:45 am to 4:00 am	Truck activities and container loading and unloading (east side of IMEX).
4:00 am to 4:15 am	Truck activities and container loading and unloading (east side of IMEX).
4:15 am to 4:30 am	Truck activities and container loading and unloading (east side of IMEX).
4:30 am to 4:45 am	Truck activities and loading and unloading (east side of IMEX). Intermittent reach stacker container handling at north end of IMEX.
4:45 am to 5:00 am	Truck activities and loading and unloading (east side of IMEX). Intermittent reach stacker container handling at north end of IMEX.
5:00 am to 5:15 am	Truck activities and loading and unloading (east side of IMEX). Intermittent reach stacker container handling at north end of IMEX.
5:15 am to 5:30 am	Truck activities and loading and unloading (east side of IMEX). Intermittent reach stacker container handling at north end of IMEX.
5:30 am to 5:45 am	Truck activities and loading and unloading (east IMEX). Intermittent reach stacker container handling at North IMEX.
5:45 am to 6:00 am	Truck activities and loading and unloading (east IMEX). Reach stacker container handling at North IMEX.
6:00 am to 6:15 am	No MPW warehouse activities. Confirmed no N1/N2 activity. Truck activities, and loading and unloading (east IMEX)
6:15 am to 6:30 am	No MPW warehouse activities. Confirmed no N1/N2 activity. Truck activities, and loading and unloading (east IMEX)
6:30 am to 6:45 am	Trucks entering JN/JR warehouses. No N1/N2 activities. Intermittent Reach stacker container handling at north end of IMEX. Construction works at MPWS.
6:45 am to 7:00 am	Trucks entering JN/JR warehouses. No N1/N2 activities. Intermittent Reach stacker container handling at north end of IMEX. Construction works at MPWS.

APPENDIX C Unattended noise monitoring data (9 Casula Road, Casula) – noise event identification






Valid site event
Other unclassified, non-site or non-valid events (birds, distant loud vehicles, train station noise events, ambient events, site)
LAFmax Noise Level Limit
Maximum Noise Levels, dB(A)
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65
60
55
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45
40
35
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6 Feb 10:00 PM
6 Feb 11:00 PM
7 Feb 12:00 AM
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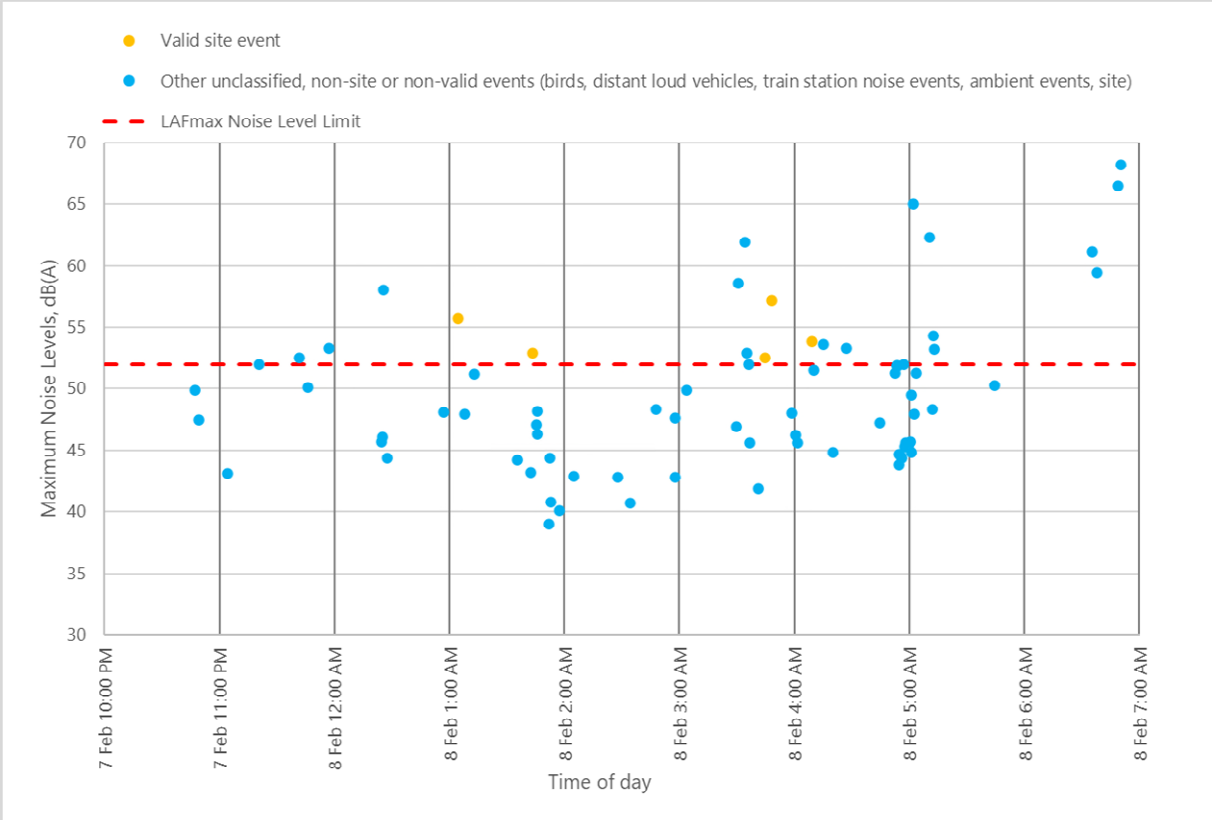
7 Feb 7:00 AM
Time of day


Valid site event
Other unclassified, non-site or non-valid events (birds, distant loud vehicles, train station noise events, ambient events, site)
LAFmax Noise Level Limit
Maximum Noise Levels, dB(A)
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7 Feb 10:00 PM
7 Feb 11:00 PM
8 Feb 12:00 AM
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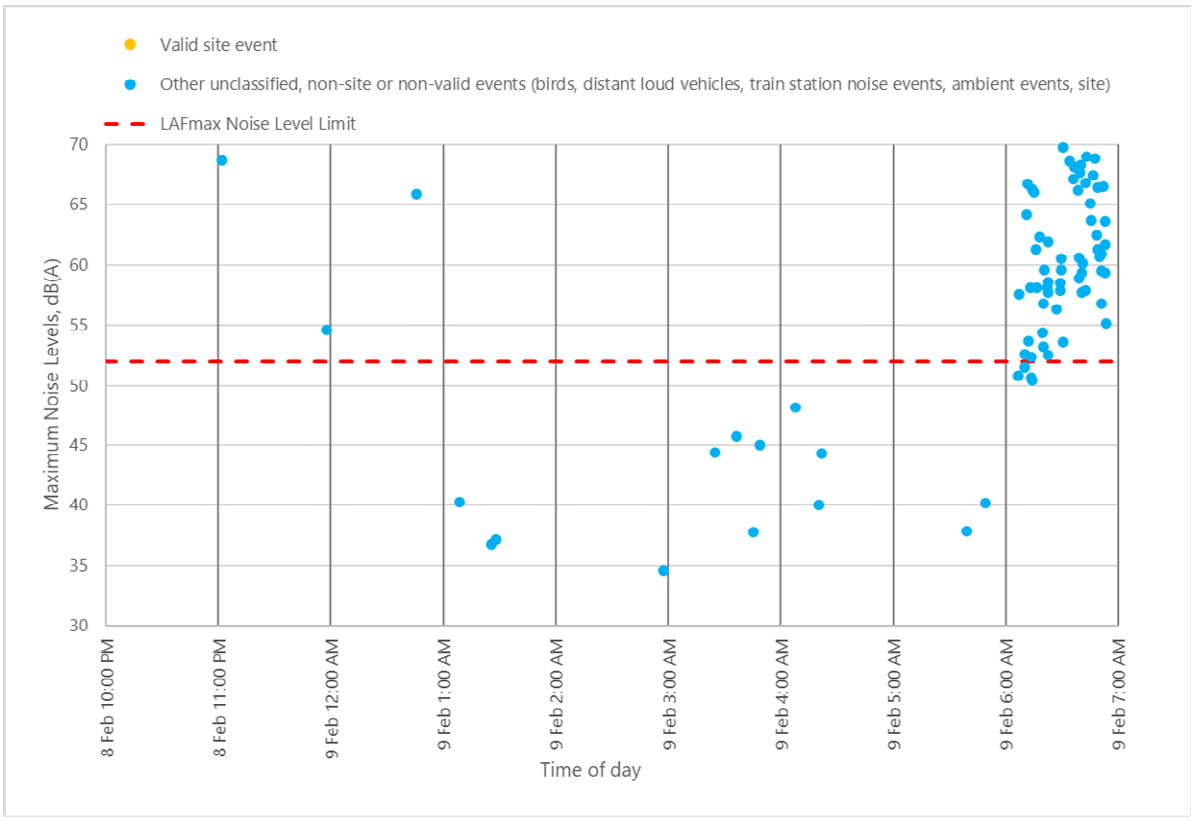
8 Feb 7:00 AM
Time of day


Valid site event
Other unclassified, non-site or non-valid events (birds, distant loud vehicles, train station noise events, ambient events, site)
LAFmax Noise Level Limit
Maximum Noise Levels, dB(A)
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8 Feb 10:00 PM
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9 Feb 12:00 AM
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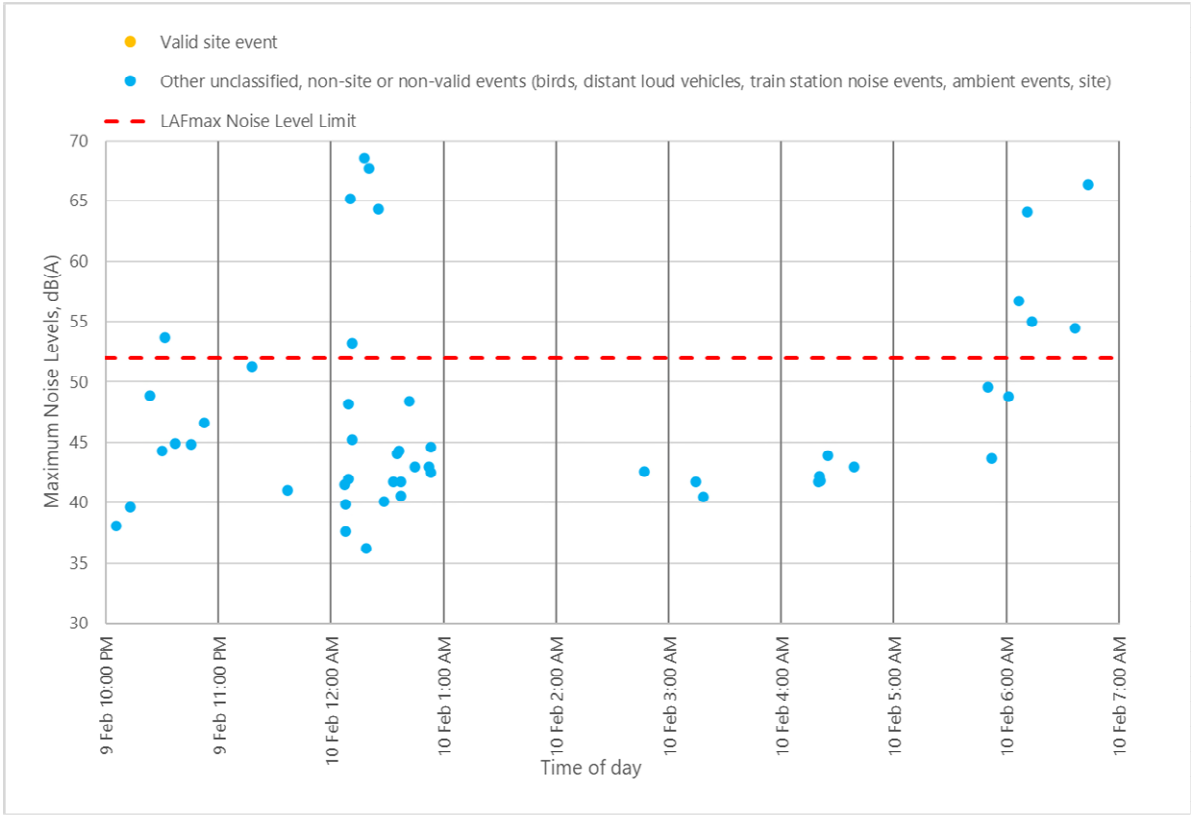
Time of day


Valid site event
Other unclassified, non-site or non-valid events (birds, distant loud vehicles, train station noise events, ambient events, site)
LAFmax Noise Level Limit
Maximum Noise Levels, dB(A)
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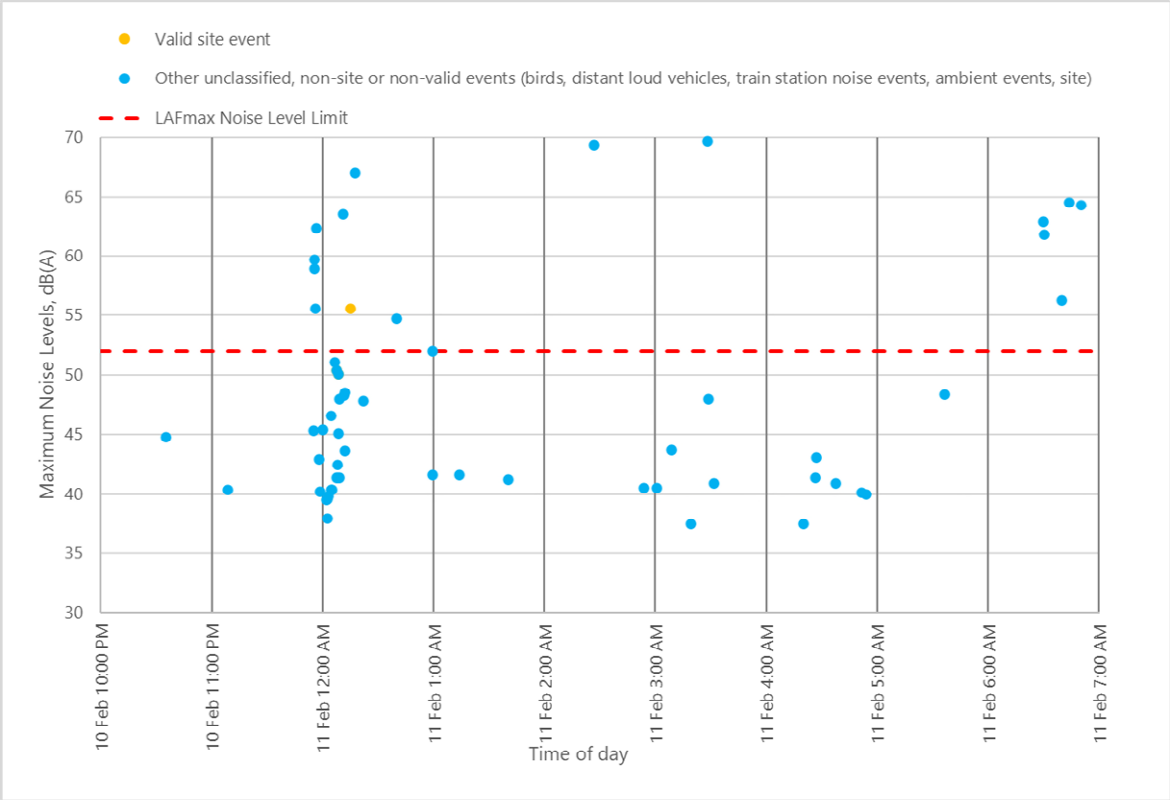
Time of day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Other unclassified, non-site or non-valid events (birds, distant loud vehicles, train station noise events, ambient events, site)
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Maximum Noise Levels, dB(A)
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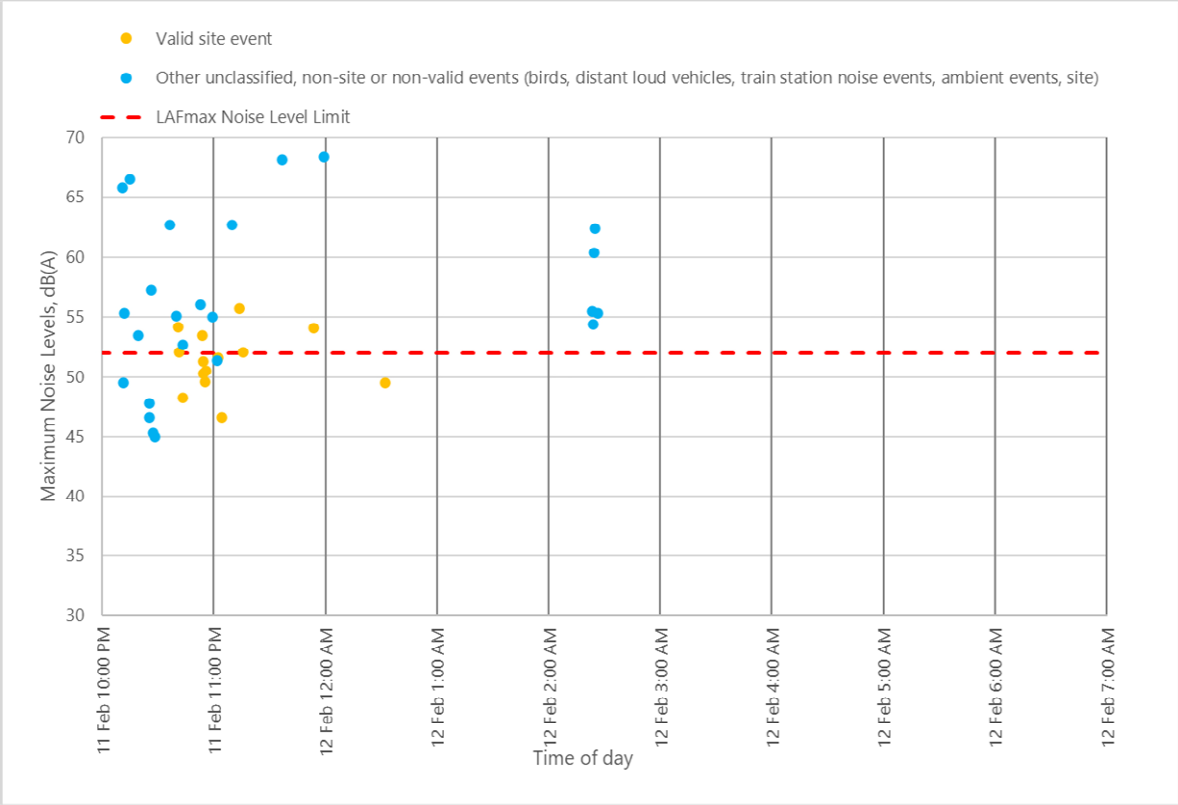
Time of day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Other unclassified, non-site or non-valid events (birds, distant loud vehicles, train station noise events, ambient events, site)
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Maximum Noise Levels, dB(A)
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11 Feb 10:00 PM
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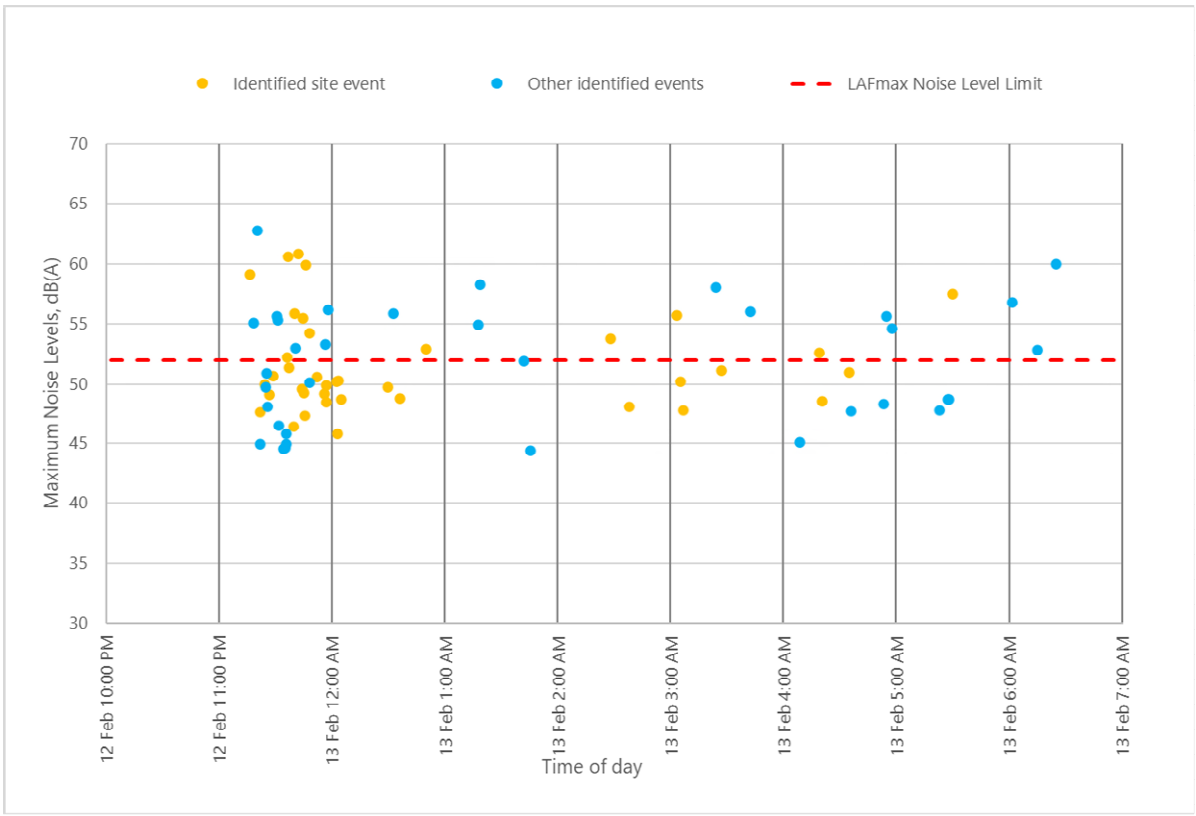
Time of day


Identified site event
Other identified events
LAFmax Noise Level Limit
Maximum Noise Levels, dB(A)
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13 Feb 12:00 AM
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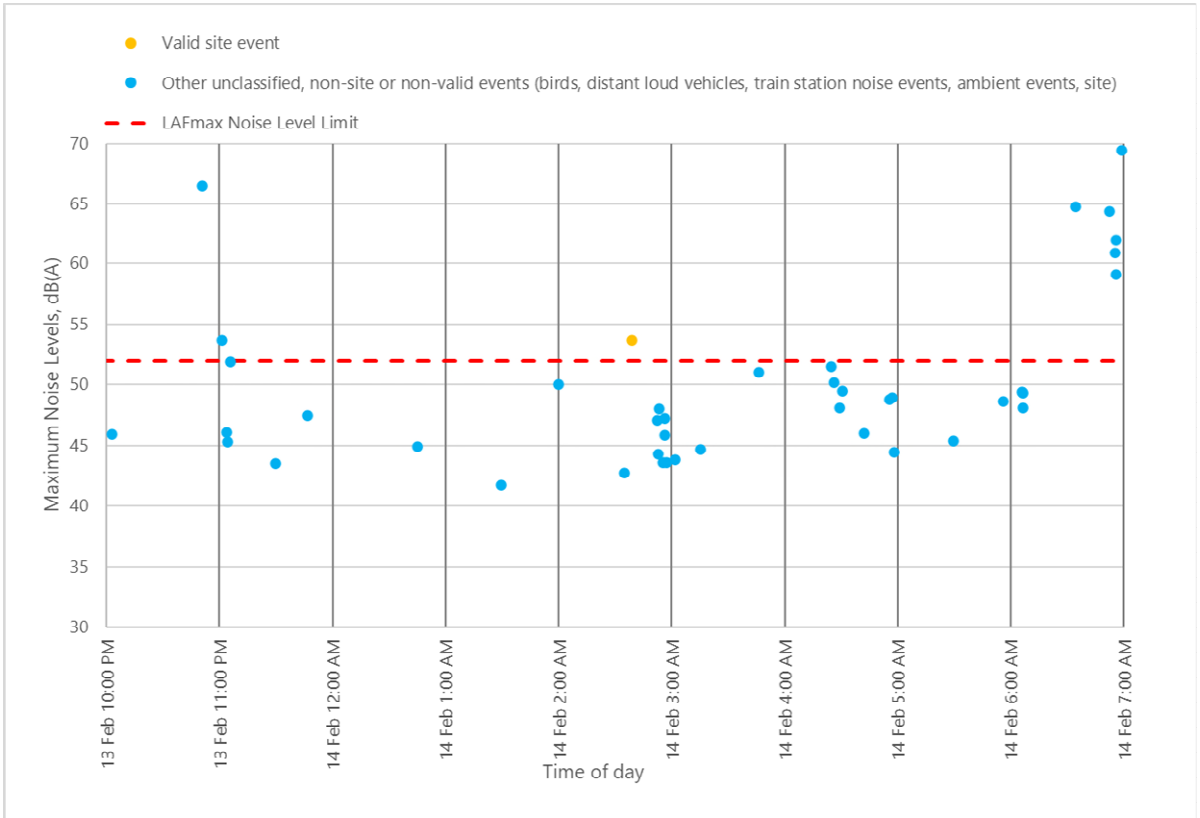
13 Feb 7:00 AM
Time of day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Other unclassified, non-site or non-valid events (birds, distant loud vehicles, train station noise events, ambient events, site)
LAFmax Noise Level Limit
Maximum Noise Levels, dB(A)
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13 Feb 10:00 PM
13 Feb 11:00 PM
14 Feb 12:00 AM
14 Feb 1:00 AM
14 Feb 2:00 AM
14 Feb 3:00 AM
14 Feb 4:00 AM
14 Feb 5:00 AM
14 Feb 6:00 AM
14 Feb 7:00 AM
Time of day

APPENDIX D Unattended noise monitoring data (9 Casula Road, Casula) – noise monitoring graphs

RENZO TONIN & ASSOCIATES
inspired to achieve

Acoustics
Vibration
Structural Dynamics

sydney@renzotonin.com.au
www.renzotonin.com.au

Dates of Survey: 04/02/2025 - 14/02/2025
Monitoring ID: L1
Address: 9 Casula Road, Casula
Description: Eastern yard

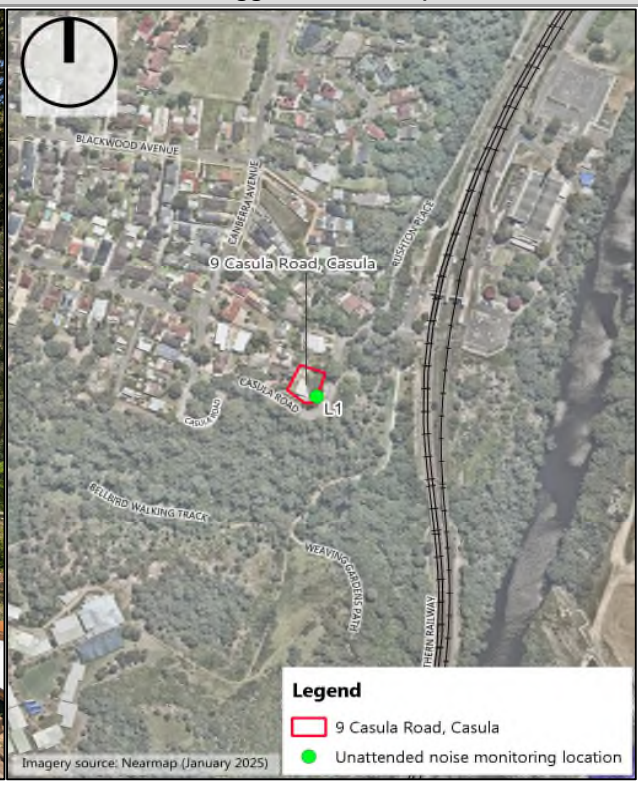
Background & Ambient Noise Monitoring Results						
	L_{A90} Background Noise Levels			L_{Aeq} Ambient Noise Levels		
	Day[1]	Evening[2]	Night[3]	Day[1]	Evening[2]	Night[3]
Representative Week[4]	**47**	**42**	**38**	**58**	**57**	**53**

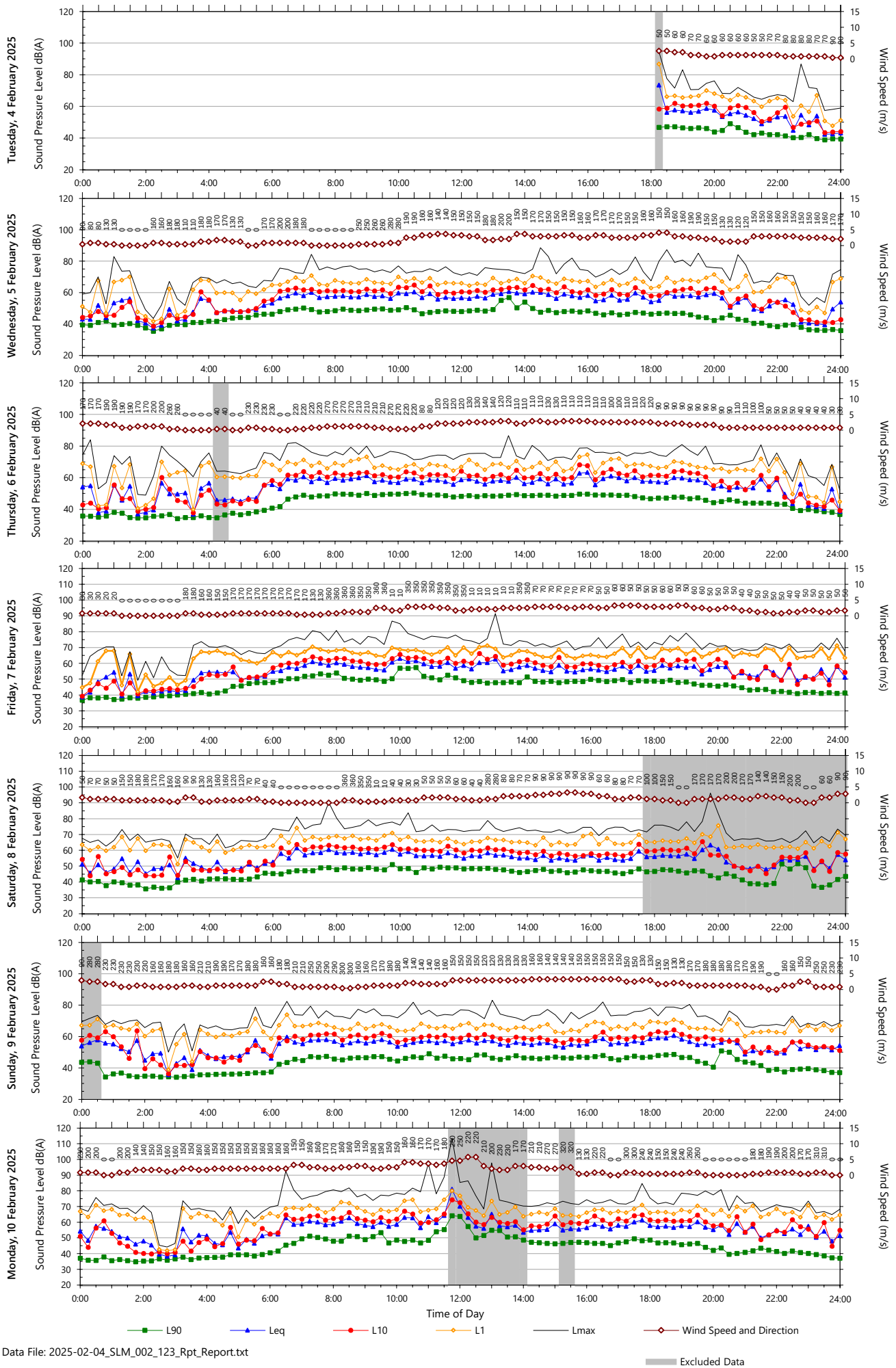
Notes:

1. Day: 7.00am to 6.00pm Monday to Saturday and 8.00am to 6.00pm Sundays & Public Holidays
2. Evening: 6.00pm to 10.00pm Monday to Sunday & Public Holidays
3. Night: 10.00pm to 7.00am Monday to Sunday & Public Holidays
4. Rating Background Level (RBL) for LA90 and logarithmic average for LAeq

Logger location photograph

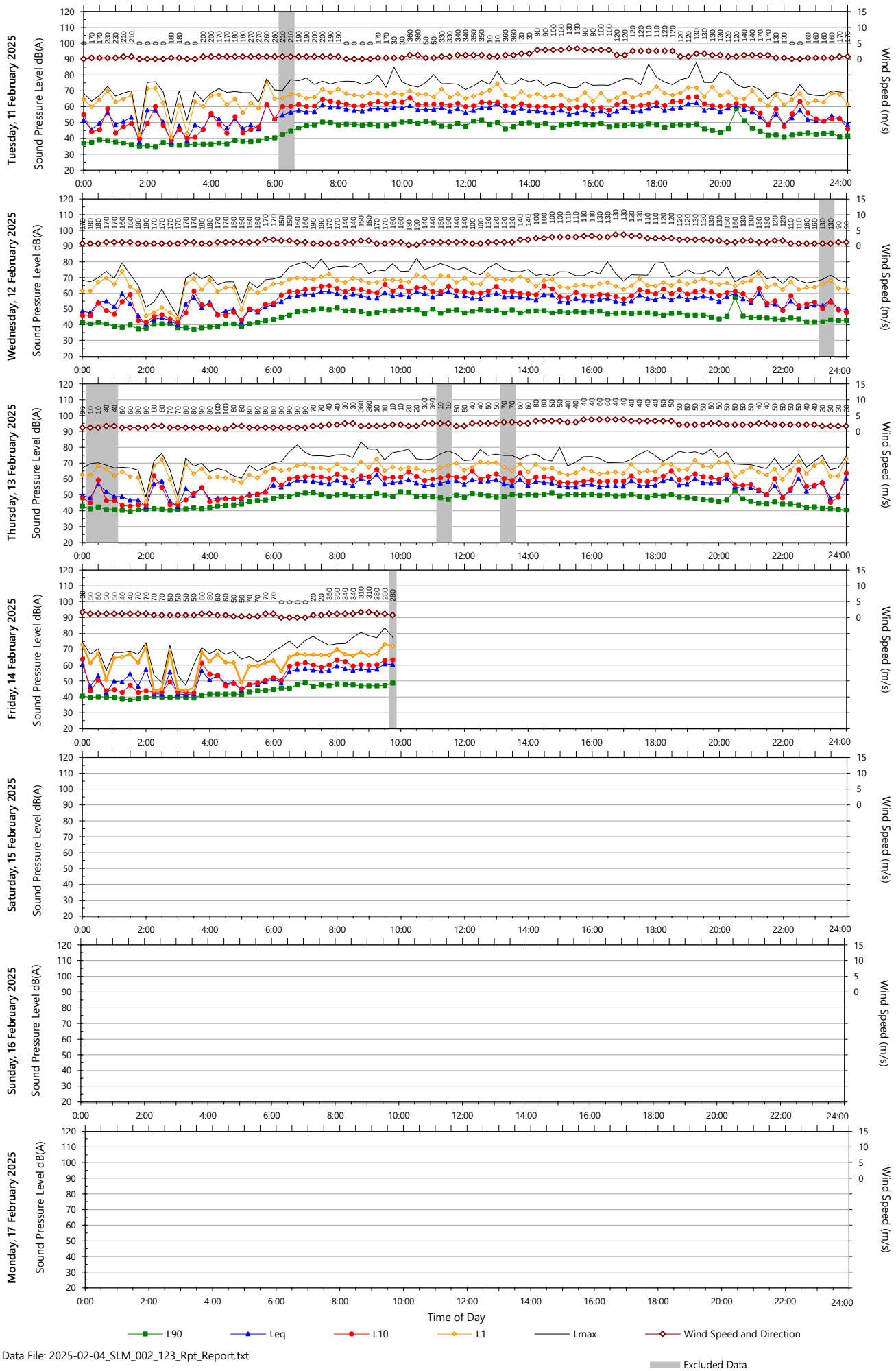
Logger location map





Data File: 2025-02-04_SLM_002_123_Rpt_Report.txt

Template: QTE-26 Logger Graphs Program (r47)



Data File: 2025-02-04_SLM_002_123_Rpt_Report.txt

Template: QTE-26 Logger Graphs Program (r47)

Moorebank Intermodal Precinct

APPENDIX F – WATER QUALITY MONITORING REPORTS

Moorebank Logistics Park West Precinct

Basin 5 Location

Stormwater Network Water Quality Monitoring Data & Reporting Spring 2024

Site image: Outlet retention basin 5 MPW (Apical image 09th October 2024)

Prepared for: MID Plumbing P/L SIOMP Moorebank Precinct West

Prepared by: Daniel Anderson *(BEnvSc, MEnvSc)*

Romy Brien *(BSc NRM)*

E-mail: daniel@apical-bushfire.com.au
Phone: 0415617771
PO Box 9 Kiama NSW 2533
ABN: 656 420 10 400

Consulted Documents / database.

Australia and New Zealand Guidelines for fresh and Marine Water Quality (2000)
NATIONAL WATER QUALITY MANAGEMENT STRATEGY - Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000) - Volume 2 - Aquatic ecosystems

Bureau of Meteorology – Australian Government Australia's official weather forecasts & weather radar - Bureau of Meteorology (bom.gov.au)

Moorebank Intermodal Precinct West – Stage 3 (SSD 10431) | Assessment Report March 2021
https://moorebankintermodalprecinct.com.au/wp-content/uploads/2023/04/MPW-S3-DPIE-assessment-report-to-IPC.pdf

WQM Report Western Precinct _Basin 5_Autumn 2024 – Apical Bushfire and Planning - April 2024

Development Consent - Section 4.38 of the Environmental Planning and Assessment Act 1979 - Application Number: SSD 7709 Applicant: Sydney Intermodal Terminal Alliance (SIMTA) as Qube Holdings Limited Consent Authority: The Independent Planning Commission Site: Moorebank Avenue, Moorebank Lot 1 DP 1197707 Lot 100 DP 1049508 Lot 101 DP 1049508 Lot 2 DP 1197707 Part Lot 3 DP 1197707 Part Anzac Road and Moorebank Avenue public road reserves Development: Moorebank Precinct West Stage 2 (MPW Stage 2)

Development Consent - Section 4.38 of the Environmental Planning and Assessment Act 1979 - Application Number: SSD 10431 Applicant: Sydney Intermodal Terminal Alliance (SIMTA) as Qube Holdings Limited Consent Authority: The Independent Planning Commission Site: Moorebank Avenue, Moorebank Lot 1 DP 1197707 Lot 100 DP 1049508 Lot 101 DP 1049508 Moorebank Precinct West Stage 3 (MPW Stage 3)

Australian Laboratory Services (ALS) Work Order EW2402561 Certificate of Analysis Water Sample Data 8th Oct 2024.

Liverpool DCP
Liverpool's Development Control Plans | Liverpool City Council (nsw.gov.au)

DEE 2016. Commonwealth Environmental Management Guidance on Perfluorooctane Sulfonic Acid (PFOS) and Perfluorooctanoic Acid (PFOA). Department of the Environment and Energy.
https://environment.gov.au/system/files/pages/dfb876c5-581e-48b7-868c-242fe69dad68/files/draft-environmental-mgt-guidance-pfos-pfoa.pdf

Development Consent SSD 7709 - Section 4.38 of the Environmental Planning and Assessment Act 1979
https://www.ipcn.nsw.gov.au/resources/pac/media/files/pac/projects/2019/05/moorebank-intermodal-precinct-west-stage-2/referral-from-department-of-planning-and-environment/revised-recommended-conditions/mpw-stage-2-recommended-conditions-inclusive-of-edits-191105.pdf

Glossary

The following definitions apply to terms used in this report. Many of these definitions are consistent with relevant national literature and cited where appropriate.

Current status trigger value
Concentrations of water quality indicators that reflect existing ecosystem condition, and therefore provide a target for ecosystem maintenance and a benchmark against which future water quality trends may be monitored.

Environmental value
Particular values or uses of the environment important for a healthy ecosystem or for public benefit, welfare, safety or health and requiring protection from the effects of pollution or degradation (Environment Australia 2002).

Indicator
A parameter (biological, physical or chemical) used to provide a measure of the quality of water or the condition of an ecosystem (Environment Australia 2002).

Low-risk trigger value
Concentrations (or loads) of key performance indicators [of water quality] at which if not exceeded, there is a low risk that adverse biological effects will occur (ANZECC 2000a).

Median
The middle reading, or 50th percentile, of all readings taken. i.e. of the readings 10, 13, 9, 16 and 11 (re-ordering these to read 9, 10, 11, 13 and 16), the median is 11. The mean (or average), is the sum of all values divided by the total number of readings (which in this case equals 11.8).

Reference condition
Refers to a site which is unmodified or minimally modified from 'natural' condition. Most commonly, reference sites are subject to limited disturbance from human activity. The reference condition then serves as a standard or target against which environmental change in other similar sites can be assessed.

Trigger value
A concentration that, if exceeded, would indicate a potential environmental problem, and so 'trigger' a management response, such as further investigation and/or remedial actions (ANZECC 2000a).

Water quality guideline
A numerical concentration level (e.g. of a contaminant) or narrative statement (e.g. visual appearance of a water body) recommended to support and maintain a designated water use (ANZECC 2000a)

1.1 Background

The Sydney Intermodal Terminal Alliance (SIMTA) received approval for the construction and operation of Stage 3 (the Project) of Moorebank Precinct West (MPW), which comprises the third stage of development within the Moorebank Precinct West under Development Approval SSD-10431.

The proposal is SSD under clause 19 of Schedule 1 of the State Environmental Planning Policy (State and Regional Development) 2011, as it is development for the purpose of rail and related transport facilities.

The MPW site is located on the western side of Moorebank Avenue and forms the western section of the Moorebank Intermodal Precinct (Map Image 2).

The MPW site is approximately 2.5 kilometres (km) from the Liverpool city centre, 27 km south-west of the Sydney Central Business District (CBD) and 26 km west of Port Botany.

The MPW site is irregular in shape, approximately 3 km from north to south and 960 m from east to west at its widest point and covers an area of approximately 220 ha. It is situated between the Georges River to the west (with the SSFL running north-south to the west of the river); and Moorebank Avenue to the east.

Works on the MPW site to date have commenced under two current and active development consents:

• MPW Stage 1 early works, which provides demolition, rehabilitation, remediation of contaminated land, and the establishment of construction facilities and access including site security (as part of the SSD 5066 consent)

• MPW Stage 2, which provides for the construction and 24/7 operation of an intermodal facility and associated warehousing (SSD 7709).

This water quality monitoring program is guided by the Stormwater Infrastructure Operation and Maintenance Plan (SIOMP) and is provided to site management on behalf of MID Plumbing.

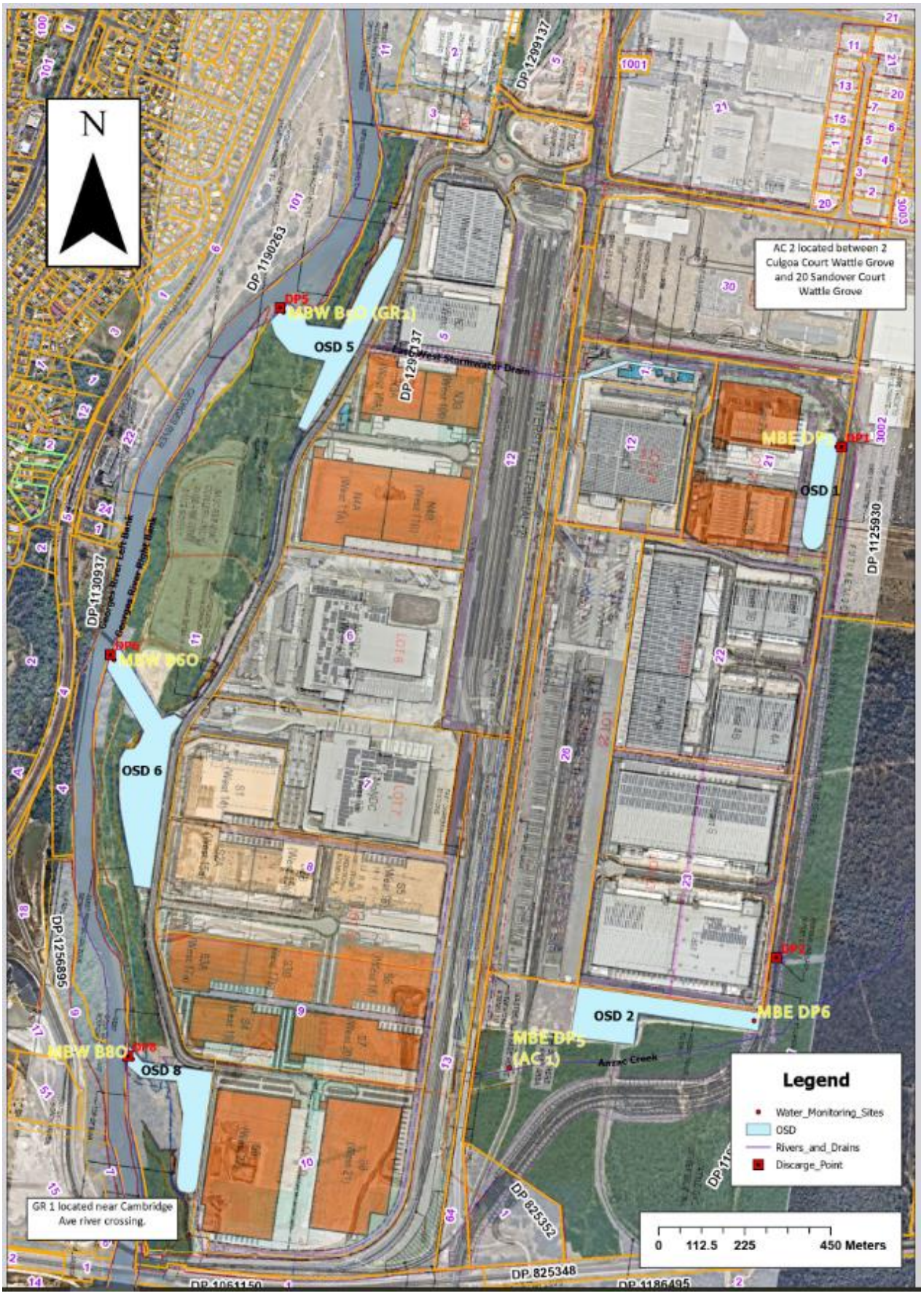
Three onsite bio-retention basins are present within Moorebank Precinct West. This report is in reference to baseline water quality condition reporting for Basin 5 (MPW – north).

Development Consent - Section 4.38 of the Environmental Planning and Assessment Act 1979 - Application Number: SSD 7709 Moorebank Precinct West Stage 2 (MPW Stage 2)

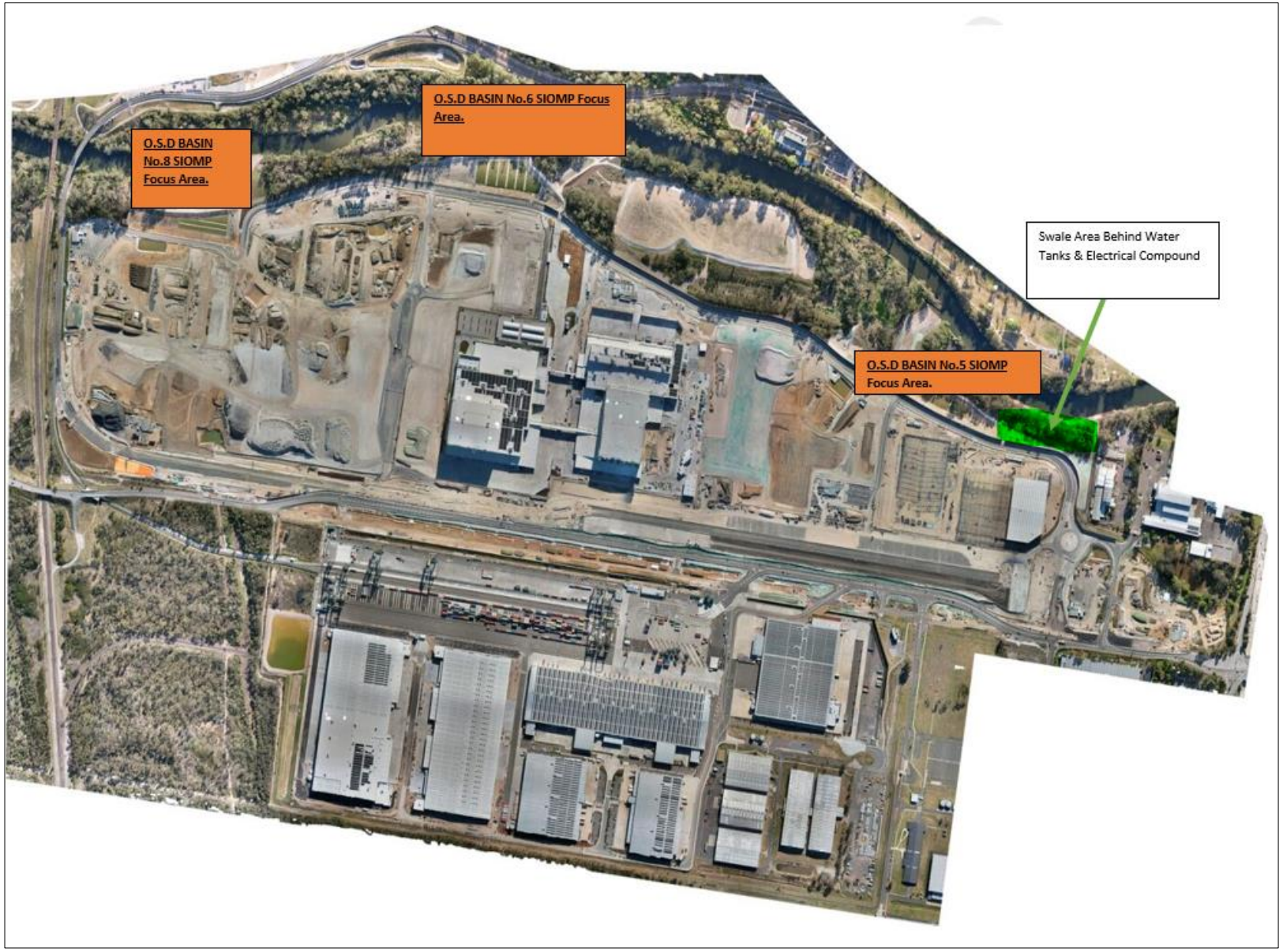
CoC	Requirement
Stormwater Quality Monitoring	
B38.	Stormwater Quality Monitoring Program - Prior to commencement of operation Part of the Operational Environmental Management Plan

The Stormwater Infrastructure Operation and Maintenance Plan (SIOMP) Moorebank Logistics Park – West Precinct was developed to address the requirements of MPE stage 3 CoCs (SSD 7709). The management plan (SIOMP) identifies the operational drainage and environmental management measures within the stormwater management system that will be applied to activities undertaken across the MLP west Precinct to manage improved water quality objectives and overall functionality of the stormwater detention and drainage network associated with stormwater infrastructure upon the site under the SIOMP.

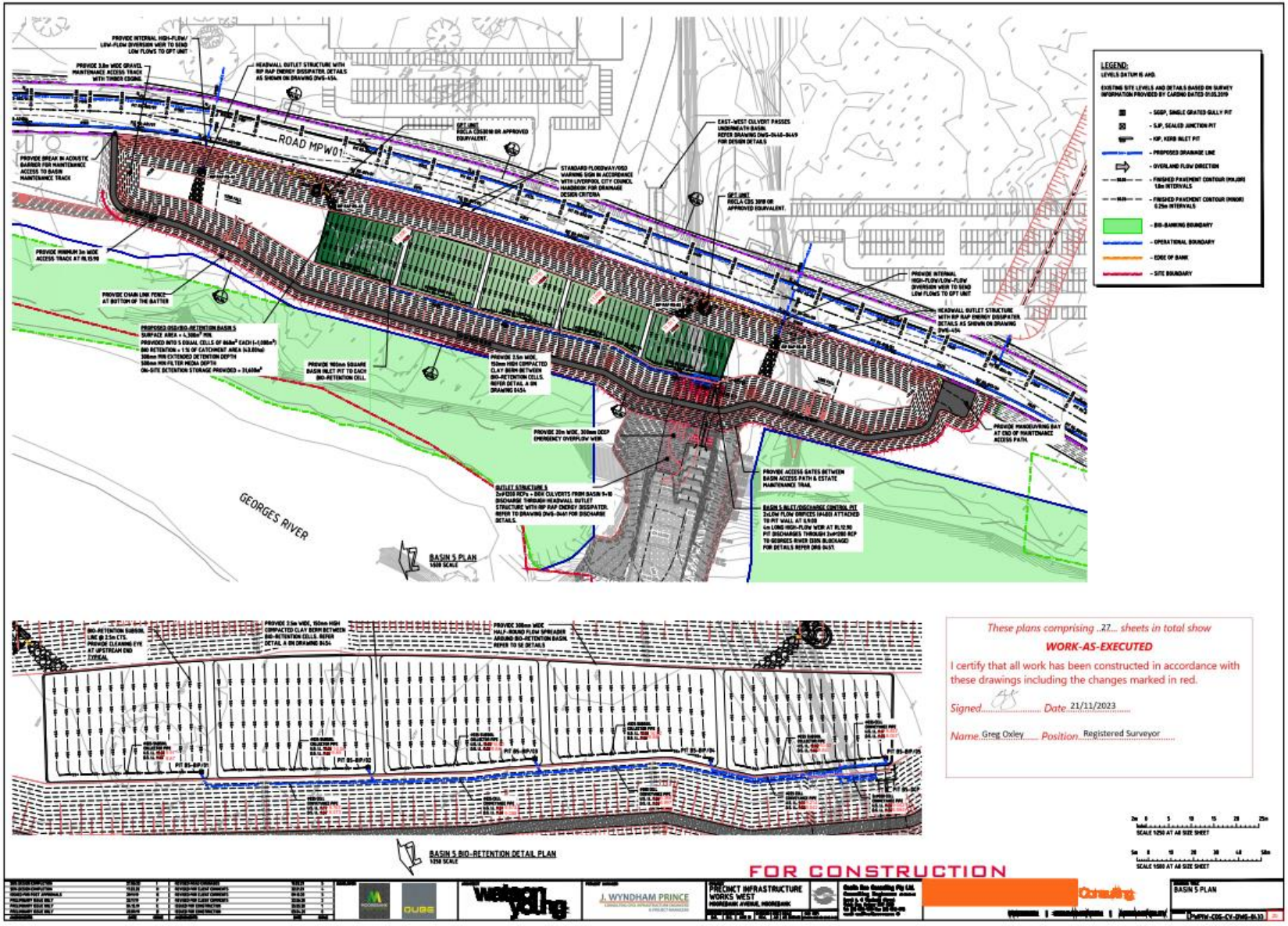
Map image 1. Overview subject site (MPW) provided by Arcadis



Map Image 2. Moorebank Precinct West Detention Basins (provided by MID Plumbing)

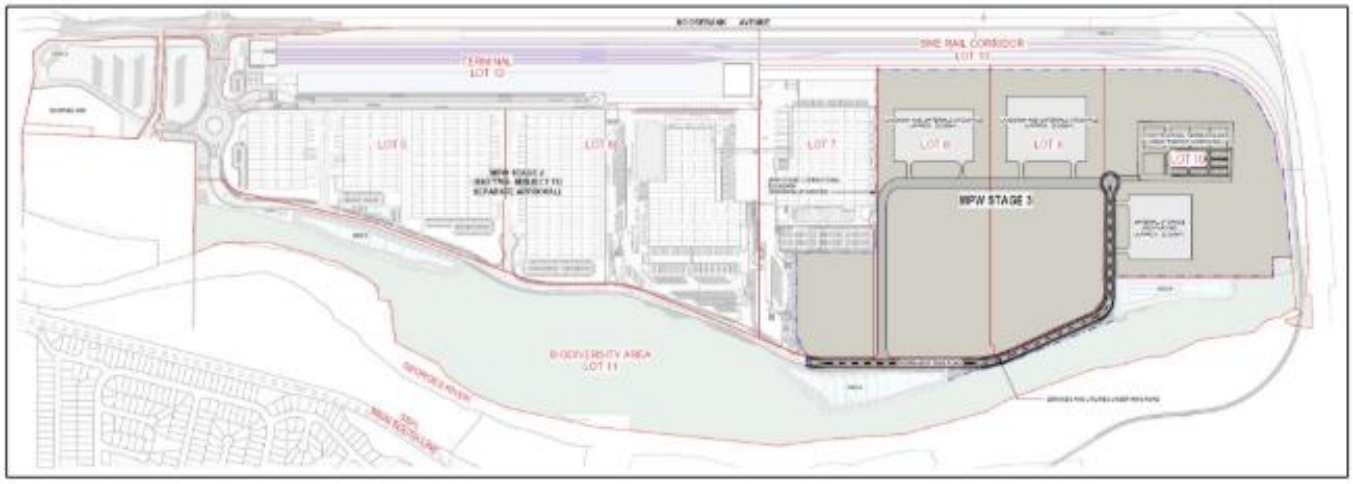


Map image 3. Detention Basin 5 MPW (north)



1.2 Reference information

Map image 4. Moorebank Intermodal Precinct West – Stage 3 State Significant Development Assessment (SSD-10431) March 2021



20. Stormwater Management System or Works	That untreated stormwater is not disposed of into the Georges River or its tributaries.	Detailed stormwater assessments were undertaken as part of MPW Stage 2, and remain applicable to the Stage 3 proposal. The Department has recommended conditions that would enforce these requirements, by ensuring that appropriate measures are implemented to manage stormwater impacts during construction. In regard to management of stormwater during operation of the MPW site, the MPW Stage 2 proposal incorporates a robust set of conditions to manage the release of stormwater via six onsite detention basins (OSD), a major east-west covered culvert and associated drainage infrastructure.
	The likely impact of stormwater disposal on the quality of any receiving waters.	
	That the levels of nutrients and sediments entering the waterway are not increased by the proposed development.	
	Whether any proposals to manage stormwater are in accordance with the local council's stormwater management plans and the Managing Urban Stormwater series of documents and meet the local council's stormwater management objectives.	
	Whether the principles outlined in the *Managing Urban Stormwater Soils and Construction Handbook* (1998) prepared by and available from Landcom and the Department of Housing are followed during each stage of a development (including subdivision).	

2. Monitoring Program Methodology

2.1 Monitoring Sites

To support stormwater and drainage management of the facility the MLP West precinct has established a vast stormwater infrastructure system consisting of several Water Sensitive Urban Design (WSUD) functions including raingardens detention basins and bio-swales. These networks are designed to minimise the velocity and peak discharge of stormwater draining from the site and act as onsite detention basins to harvest and sequester potential pollutants generated at the site through designed biological processes.

The stormwater infrastructure system discharges water into the natural drainage system via three outlets:

- Basin 5 detains water from the northern section of MPW before discharging into Georges River
- Basin 6 detains water from the mid-section of MPW before discharging into Georges River
- Basin 8 detains water from the southern section of MPW before discharging into Georges River

Monitoring of the discharge points has been established via our ongoing program with MID Plumbing under the SIOMP program (MPE) to collect qualitative data and analyse the performance of the WSUD provisions and to establish any potential trends in water quality readings from the stormwater network discharge points prior to release of water into the natural hydrological systems of Anzac Creek and the Georges River.

This report constitutes the baseline data set for Basin 5 Moorebank Precinct West (MPW).

Table 1. Type of outlet MPW

Discharge Point (see figure 2)	Associated Outlet (see figure 1)	Type of outlet/detention basin
Basin 5	Inlet	Bio retention basin (holding)
	Outlet	Outlet point – rock ramp
	Georges River	River – natural drainage conveyance
Basin 6	Inlet	Bio retention basin (holding)
	Outlet	Outlet point – rock ramp
Basin 8	Inlet	Bio retention basin (holding)
	Outlet	Outlet point – rock ramp

2.2 Water Quality Assessment

Surface water quality data collected at the discharge points is assessed with reference to ANZECC Guidelines (2000) and correlated with baseline Water Quality monitoring results provided by previous condition assessment reports.

By comparing water test data under the program across the testing timeline we can identify and report upon trends, identify exceedances and exclude potential anomalies for datasets.

Table. ANZECC Low Risk Trigger Values

Ecosystem type	Turbidity NTU	EC µS/cm	pH*	DO	TN mg/L	NO_x - N mg/L	NH_4^+ - N mg/L	TP mg/L	DRP - P mg/L
Upland river	2-25	30-350	6.5-7.5	90-110	0.480	0.190	0.013	0.013	0.005
Lowland river	6-50	125-2200	6.5-8.0	85-110	0.500	0.190	0.020	0.050	0.020

Values for Low Land River Systems as insert above are used as the reference guide to water quality parameter values and overall health and safety statements regarding the quality of discharged water from the SIOMP drainage network.

Annual spring and autumn water quality data presented from Anzac Creek and Georges River testing programs by other scientific consultants may also be cross referenced to the data prepared by Apical under the SIOMP program to establish potential trends in results and identify increases in accumulated pollutants from the site under operational condition, which may appear present within adjacent natural waterways.

Site data was collected in the form of water samples and in field data recordings at the prescribed monitoring points, water samples and water probe readings are undertaken following Australia and New Zealand guidelines for fresh and marine water quality – 2000 (ANZECC Guidelines), In situ water quality parameters relevant to stream health and aquatic assessment profiling were collected in field with a multiparameter hand-held water quality monitoring probe (Aquatroll 600).

Water data is collected, analysed and collated under the same methodologies and process under each testing period, the ensure consistency in the process.

Measures tested and samples taken:

- pH
- Dissolved Oxygen
- Electrical Conductivity
- Water Temperature and
- Turbidity

Water samples are collected at inlet and discharge points (Basin 5, Basin 6 & Basin 8) then sent to Australian Laboratory Services (ALS) for quality testing analysis Surface water (alsglobal.com).

Water analytical suites / testing parameters are provided to obtain overall water condition results and chemical sampling of collected water is undertaken for a range of nutrients, metals, and hydrocarbons relevant to stream health and aquatic assessment protocol, key nutrients, metals, and pollutants included in the assessment to reflect an overall suite of water quality condition guides which are listed below:

- Total phosphorous
- Total Nitrogen
- Kjeldahl Nitrogen
- Dissolved Metals
- PFAS
- Total Suspended Solids
- Total Hydrocarbons

The raw data results from the lab analysis provided to us by ALS Laboratory Services are presented within this report (see Appendix A).

Key water quality data attributes are recorded, tables and compared against; previous condition baseline data, Liverpool Development Control Plan (DCP) water quality targets, Conditions of Consent B40 and ANZECC Guideline (2000) trigger limits under the condition category -(90% protection criteria for freshwater natural systems).

The water quality guidelines are applied to ensure adjacent natural waterways George River and Anzac creek are not adversely affected by poor water quality discharge from the Moorebank logistics park site and operations.

Trends observed in our datasets are analysed on a temporal scale with any trigger values for specific water quality measures highlighted and presented within the results chapter of each seasonal report. This report provides baseline data for Basin 5 (MPW) from which trend analysis will compound over future reporting periods.

2.3 Data Analysis

The water quality measurements collected are used to assess water quality at each site in terms of health of aquatic ecosystems by comparison with guideline values recommended by the ANZECC and ARMCANZ (2000) guidelines for the protection of lowland streams (i.e. systems at < 150 m altitude) in south-east Australia. This categorisation for stream health is deemed relevant for the description of Anzac Creek, the recipient natural way due to the location in the geomorphic landscape and correlations of expected biophysical health and habitat profiles for similar stream environments.

2.4 Survey dates and personnel

On the 9th October2024, ecologists from Apical Bushfire and Planning attended Moorebank Precinct West (MPW) to collect water quality data across the testing sites which are located within selected inlet points and discharge points within the stormwater drainage and management system (SIOMP) located within the Moorebank Logistics Park site West (See map image 2).

Inlet and outlet points within the network are representative of variant sites where stormwater will enter a node of the system (as a point source) and then release from the that node of the system at a discharge point. By recording inlet and discharge data water quality can be tracked along the continuum within the system to determine condition changes and overall trends in measured quality at given sites.

This data was collected on behalf of MID plumbing in accordance with 'The Stormwater Infrastructure Operation and Maintenance Plan Moorebank Logistics Park – West Precinct 2020' and in compliance with Condition of Consent B40 (Liverpool City) for the subject site. The results of such monitoring data collection are presented within this report.

2.5 Rainfall

Between the 1st of September and the 30th of September 2024 Moorebank received approximately 36.6mm of rainfall (http://www.bom.gov.au/climate/dwo/202409/html/IDCJDW2161.202409.shtml). Between the 1st of October and the 8th of October 2024 Moorebank received approximately 8mm of rainfall.

Figure 1. Bureau of Meteorology Daily Weather Observation Holsworthy September 2024

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9 am						3 pm					
		Min	Max				Dir	Spd	Time	Temp	RH	Cld	Dir	Spd	MSLP	Temp	RH	Cld	Dir	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	8th		km/h	hPa	°C	%	8th		km/h	hPa
1	Su	7.3	26.5	0			NW	37	14:12	18.2	41		N	6	1012.6	26.2	18		NW	20	1008.3
2	Mo	13.4	24.3	0			WNW	74	10:34	23.0	22		NW	20	1008.1	19.5	23		WSW	35	1013.0
3	Tu	7.9	18.8	0			WSW	48	02:09	12.8	44		WSW	19	1029.5	17.6	32		ESE	13	1028.3
4	We	2.3	22.9	0			N	37	11:25	10.5	69		W	9	1029.7	21.9	30		NE	15	1023.3
5	Th	5.5	27.2	0			N	28	10:46	13.9	66	8		Calm	1024.6	27.0	28	7	N	15	1019.3
6	Fr	10.7	29.4	0			NW	48	14:37	20.5	53		NNW	9	1022.5	29.0	25		NW	22	1017.3
7	Sa	14.0	24.7	0			SE	43	13:08	23.9	46	6	ESE	11	1021.5	20.1	70	6	ESE	20	1021.2
8	Su	14.5	20.8	0			SSW	22	07:01	14.9	54	8	WSW	13	1021.3	18.9	44	7	N	9	1016.3
9	Mo	8.1	24.3	0			WSW	41	11:19	17.4	45		NW	13	1017.8	23.9	31		WSW	19	1014.8
10	Tu	8.5	22.1	0			ENE	26	14:15	16.6	58		WNW	9	1025.7	20.6	58		E	15	1023.8
11	We	6.7	26.1	0			S	33	19:53	16.5	75			Calm	1024.7	25.2	35		NNE	9	1019.6
12	Th	15.2	20.1	0			S	57	15:21	16.9	70	8	S	22	1021.7	17.8	61	1	S	28	1021.8
13	Fr	10.2	19.3	0			SW	30	09:33	12.9	58	8	WSW	13	1028.4	17.5	48	8	ESE	13	1025.1
14	Sa	4.8	24.0	0			S	54	21:08	13.8	70		WNW	7	1023.6	23.0	28		W	13	1017.7
15	Su	6.4	17.0	0			SSW	61	12:36	12.6	46	1	SSW	20	1026.8	15.7	37	7	S	30	1026.0
16	Mo	3.5	19.9	0			E	31	13:14	11.3	51		WNW	9	1026.6	17.8	38		ESE	17	1022.6
17	Tu	5.8	22.2	0			SE	30	15:39	14.5	51		W	11	1026.4	21.3	32		NW	13	1020.6
18	We	4.2	26.1	0			WNW	44	15:12	16.5	37		W	17	1018.0	25.9	12		WNW	20	1011.9
19	Th	7.9	26.7	0			W	59	15:34	17.3	37		WNW	6	1009.8	25.2	13		W	33	1005.1
20	Fr	11.3	24.8	0			W	41	08:37	16.5	38		W	22	1010.9	24.4	18		W	17	1006.5
21	Sa	8.3	24.2	0			WSW	39	16:26	18.6	41		WSW	11	1010.7	23.1	21		WNW	22	1008.5
22	Su	8.2	25.7	0			WNW	33	13:50	18.8	41		NNW	11	1016.0	25.2	23		WNW	15	1013.1
23	Mo	6.6	28.7	0			SW	33	16:37	18.6	51		NNW	9	1019.4	28.4	21		WNW	15	1015.0
24	Tu	11.6	26.7	0			SSE	28	00:13	17.8	65	1		Calm	1021.6	23.0	53	5	E	17	1016.0
25	We	13.9	26.8	0			W	31	16:29	18.3	64	8		Calm	1014.7	25.3	37	8	W	9	1009.2
26	Th	10.5	13.5	8.6			S	54	02:38	10.8	91	8	SW	19	1019.2	10.9	89	8	SSW	19	1020.2
27	Fr	10.2	17.2	12.2			SSE	41	05:24	13.1	83	8	S	15	1027.9	14.6	77	6	S	17	1026.9
28	Sa	9.8	19.1	7.8			E	35	12:47	17.0	61	8	ESE	20	1029.4	17.4	63	8	ESE	19	1025.8
29	Su	10.0	21.4	0.6			ENE	26	15:07	17.1	78	3	WSW	9	1023.7	19.7	74	8	NE	9	1019.0
30	Mo	14.1	20.3	7.4			S	48	11:20	17.5	74	8	SW	17	1019.7	18.4	61	1	SSE	28	1020.2
Statistics for September 2024																					
Mean		9.0	23.0							16.3	56	6		11	1021.1	21.5	40	6		18	1017.9
Lowest		2.3	13.5	0						10.5	22	1		Calm	1008.1	10.9	12	1	#	9	1005.1
Highest		15.2	29.4	12.2			WNW	74		23.9	91	8	#	22	1029.7	29.0	89	8	WSW	35	1028.3
Total				36.6																	

IDCJDW2161.202409 Prepared at 13:00 UTC on Monday 14 October 2024

Figure 2. Bureau of Meteorology Daily Weather Observation Holsworthy October 2024

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9 am						3 pm					
		Min	Max				Dir	Spd	Time	Temp	RH	Cld	Dir	Spd	MSLP	Temp	RH	Cld	Dir	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	8th		km/h	hPa	°C	%	8th		km/h	hPa
1	Tu	7.6	23.0	0.2			E	37	15:50	17.0	65			Calm	1023.5	19.9	59		E	20	1020.9
2	We	12.9	19.2	5.2			SSE	37	11:23	14.4	94	8	SSE	11	1030.8	18.5	62	6	SSE	19	1029.5
3	Th	11.6	20.9	0.4			E	31	15:08	18.3	60	8	ENE	9	1031.0	18.9	54	1	E	20	1026.6
4	Fr	6.3	24.7	0.2			ENE	24	14:37	16.1	68		NNW	9	1020.8	23.6	46	7	ENE	13	1013.3
5	Sa	13.3	25.9	2.0			WNW	43	10:00	21.8	66	2	WNW	13	1007.6	24.8	30	5	W	19	1005.2
6	Su	10.3	27.4	0			W	46	15:01	18.6	56		NNW	9	1011.1	27.1	27		W	17	1009.9
7	Mo	10.2	29.1	0			SSE	50	22:52	18.5	61	1	NNW	7	1017.9	28.4	28		WNW	19	1014.3
8	Tu	13.9	15.4	0			SSE	54	23:16	14.2	80	8	SSE	19	1023.2	14.3	62	8	SSE	26	1023.0
9	We	11.9	16.8	0			SSE	31	11:14	15.3	60	8	S	17	1026.8	16.6	53	8	SSE	19	1025.4
10	Th	10.4	24.9	0			N	33	11:23	15.9	74		NW	9	1023.8	23.9	45		NNW	11	1018.9
11	Fr	12.5	24.9	0			SSE	31	22:37	18.6	74		WSW	6	1024.3	23.3	59	3	ESE	17	1019.9
12	Sa	14.4	18.8	5.0			SSE	57	00:35	16.0	66	8	SSE	17	1026.6	17.1	49	7	SSE	22	1026.8
13	Su	8.7	21.4	0			E	30	16:00	13.3	76	8	WSW	7	1027.6	20.6	48	8	ENE	15	1022.8
14	Mo	9.0		0						16.2	71	8	W	9	1019.4	15.6	87	8	S	28	1017.4
Statistics for the first 14 days of October 2024																					
Mean		10.9	22.5							16.7	69	6		10	1022.5	20.9	50	6		18	1019.6
Lowest		6.3	15.4	0						13.3	56	1		Calm	1007.6	14.3	27	1	NNW	11	1005.2
Highest		14.4	29.1	5.2			SSE	57		21.8	94	8	SSE	19	1031.0	28.4	87	8	S	28	1029.5
Total				13.0																	

3. Results

Data results captured by our water quality sampling are presented herein and are representative of baseline water quality results for Moorebank Precinct West Basin 5. Threshold guideline quantitative values for the water quality parameter themes are compared and correlated to ANZECC/ARMCANZ (2000) guidelines under the categorisation thresholds – Waterway benchmark group: 'The protection of slightly disturbed lowland river ecosystems in southeast Australia'.

As these are the first samples results collected under our scope for the SIOMP-MPW sites, the sampling results presented in this report will be considered for future analysis against subsequent results for use as baseline data for the drainage network SIOMP function.

Triggers Exceedances from both the In-Situ Data and the Laboratory Samples October 2024

Location Basin 5

Dissolved Oxygen (DO %) is at 114.29% which is above the threshold of between 85-110% for lowland rivers. This is considered a positive attribute for stream health as increased oxygen levels are a general surrogate for healthy stream conditions for aquatic organisms and biota.

pH is 6.21 which is below the threshold of 6.5-8.5 % for lowland rivers.

This reading is considered only a slight acidic reading below the neutral range.

pH readings at the discharge must be monitored overtime to observe any negative trend for this attribute

Total phosphorous is at 30 µg/L which is above the threshold of 25 µg/L for rivers flowing to the coast.

This is considered only a slight exceedance for the value and reflects the general site condition as a non-natural environ, and not a natural low land river – which is the benchmarking for the results.

Total nitrogen is at 400 µg/L which is above the threshold of 350 µg/L for rivers flowing to the coast.

This is considered only a slight exceedance for the value and reflects the general site condition as a non-natural environ, and not a natural low land river – which is the benchmarking for the results.

Zinc is at 0.008mg/L which is at the threshold for lowland rivers.

Continue to monitor for trends under future readings.

Literature Review
Peak Nitrogen Values
Nitrogen

Nitrogen has spiked to a level approximately 3 times the ANZECC trigger value for rivers flowing to the coast at this collection point.

https://www.dcceew.gov.au/environment/protection/npi/resource/student/total-nitrogen-0

Literature:

In a 1996 paper reported in the Journal of Hydrology B. Arheimer a, L. Andersson a, A. Lepistö b suggest that; Intensively drained catchments showed the quantitatively largest difference between growing and dormant seasons for NH4 • N concentrations retained within the creek – stream system.

In general, links between nitrogen concentrations and flow/seasons could be related to annual mean temperature, annual mean concentrations and the water regime of the catchments. The geographical heterogeneity of detected links and the still rather low explanation level for the concentration variation, show the importance of a more dynamic approach to nitrogen monitoring and inclusion of reportable weather and flow conditions within the monitoring process.

It is advised that nitrogen levels recorded within the nearby Anzac Creek and potentially extend to nearby River WQ test results be quantified / evaluated and cross referenced with this data, to identify the existence of broader trends in the associated drainage network and recipient natural creek and river systems. Any longer-term trends and general pattern for increased nitrogen will continue to be assessed across future reporting periods. Testing at increased water depth at the source and after activation of the network after rainfall events will help calibrate this result against previous trends of much lower values.

observations suggest that nitrogen and phosphorus loads were driven primarily by surface runoff rather than groundwater discharge to natural streams.

Praktan D. Wadnerkar a, Luke Andrews a, Wei Wen Wong b, Xiaogang Chen a c, Rogger E. Correa a, Shane White a, Perran L.M. Cook b, Christian J. Sanders a d, Isaac R. Santos a e
Paper reported in Science of the Total Environmental March 2021 suggest

'Overall, intensive agricultural land use and episodic rainfall events were the major spatial and temporal drivers of nitrogen loads within a natural water body.'

J. S. Baron, E. K. Hall, B. T. Nolan, J. C. Finlay, E. S. Bernhardt, J. A. Harrison, F. Chan & E. W. Boyer; 2012 Article The interactive effects of excess reactive nitrogen and climate change on aquatic ecosystems and water resources of the United States, suggest

'Alterations in precipitation amount and dynamics will alter runoff quality, thereby influencing both rates of Nr inputs to aquatic ecosystems and groundwater and the water residence times that affect Nr removal within aquatic systems.
Both infrastructure within the catchment and climate change alter the landscape connectivity and hydrologic residence time that are essential to denitrification process within a drainage system.

While Nr inputs to and removal rates from aquatic systems are influenced by climate and management, reduction of N inputs from their source will be the most effective means to prevent or to minimize environmental and economic impacts of excess Nr.

Of relevance to the subject site could be the accumulation of nitrates from oxides distributed by exhaust fumes from trucks and heavy combustion equipment as Oxides of nitrogen are contained in the exhaust fumes emitted into the atmosphere by cars, aeroplanes, trains and boats. These emissions are dissolved by rain and then enter

streams, lakes and other water bodies.

https://www.dcceew.gov.au/sites/default/files/documents/factsheet-totalnitrogen_0.pdf

What effect does total nitrogen have on the environment?

Total nitrogen can have damaging effects on the environment and particularly on aquatic life (the fish, shellfish and other creatures in our rivers, lakes and oceans) because most nitrogen is leaked into waterways.
Total nitrogen can also lead to toxic blue-green algal blooms. Blue-green algae can harm humans and can make both humans and animals very sick. Do you see how important it is to help keep our waterways clean?

https://nitrogen-generators.com/what-is-the-main-industrial-use-of-nitrogen/#:~:text=Food%20Packaging%3A%20It%20is%20common,snack%20foods%20can%20be%20extended.

Five (5) Industrial Applications of Nitrogen
While the main industrial use of nitrogen is to create ammonia that is required for fertilizer, explosives, and other materials, it uses go far beyond these applications. From food packaging to pharmaceuticals, nitrogen gas can be found in more places and used for more purposes than you may have realized.

Food Packaging: It is common practice for food processing companies to use compressed nitrogen to displace oxygen in the packaging of perishable foods. Without oxygen, the shelf life of foods such as meats, fruits, vegetables, and various snack foods can be extended. Nitrogen can also add a cushion around food to keep it safe during transport.

Chemical Blanketing: Nitrogen is typically used to prevent fires and explosions in dangerous atmospheres like chemical plants or manufacturing facilities, by lowering the oxygen level below explosive limits.

Electronics: In the process of assembling electronics, nitrogen gas is used when two electronic components are forming a permanent connection, also known as soldering. The gas is used to reduce surface tension so there is a cleaner break away from the site of the electrical bond. Nitrogen gas is also used in a computer's main processing system to prevent it from overheating.

Laboratory: Laboratories require a very specific environment to ensure that tests and results are carried out accurately. Nitrogen gas is used to control oxygen levels, humidity and temperature, and maintain an appropriate atmosphere for highly sensitive procedures and equipment. Additionally, there are various pieces of laboratory equipment that require nitrogen for purging.

Laser Cutting: The application of nitrogen as a purging gas in the steel industry is extremely important. It is used as an assist gas to blow away molten material and achieve a stronger stainless or aluminized steel product that is also more resistant to corrosion.

https://nigen.com/industries-that-benefit-from-on-site-nitrogen-systems/

Industries That Benefit from On-Site Nitrogen Systems
Gaseous nitrogen is very useful in large-scale manufacturing and industrial applications. The large volumes of nitrogen gas required for these operations are either sourced from vendors in gas cylinders or generated on-site. In this article, we will highlight critical industrial processes that benefit from on-site nitrogen systems.

Elevation pH values recorded from location Discharge point 6

pH – Acidity, Alkalinity

https://www.umass.edu/mwwp/protocols/rivers/ph_alkalinity_river.html

Alkalinity is a measure of a river's "buffering capacity," or its ability to neutralize acids. Alkaline compounds in the water such as bicarbonates (baking soda is one type), carbonates, and hydroxides remove H+ ions and lower the acidity of the water (which means increased pH). They do this usually by combining with the H+ ions to make new compounds. Without this acid neutralizing capacity, any acid added to a river would cause an immediate change in the pH.

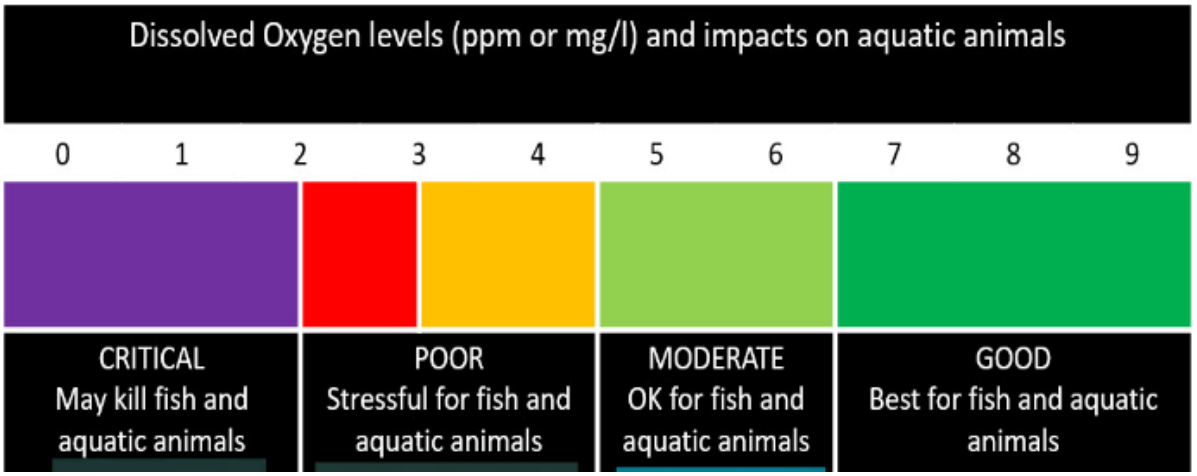
Measuring alkalinity is important to determining a river's ability to neutralize acidic pollution (as measured by pH) from rainfall or snowmelt. It's one of the best measures of the sensitivity of the river to acid inputs.

Alkalinity comes from rocks and soils, salts, certain plant activities, and certain industrial wastewater discharges. Total alkalinity is measured by collecting a water sample, and measuring the amount of acid needed to bring the sample to a pH of 4.2. At this pH all the alkaline compounds in the sample are "used up." The result is reported as milligrams per liter (mg/l) of calcium carbonate.

3.2 Interpreting Results

Dissolved Oxygen – Measures:

Dissolved oxygen (DO) is oxygen held (dissolved) in the water and available to aquatic organisms.
The amount of dissolved oxygen in a river or stream can tell us a lot about its water quality.
Water will naturally contain a certain amount of dissolved oxygen that is absorbed from the air and produced by plants and algae living in the water.
Temperature has a large effect on the amount of oxygen dissolved in water; cold water can hold higher levels of oxygen than warmer water. Higher water temperatures over summer will cause oxygen levels to drop.
Other factors such as river flow, wind, nutrients and bacterial activity can also affect the amount of dissolved oxygen in waterways.
Dissolved oxygen levels typically range between 5 and 14 mg/L (or ppm).
Example:



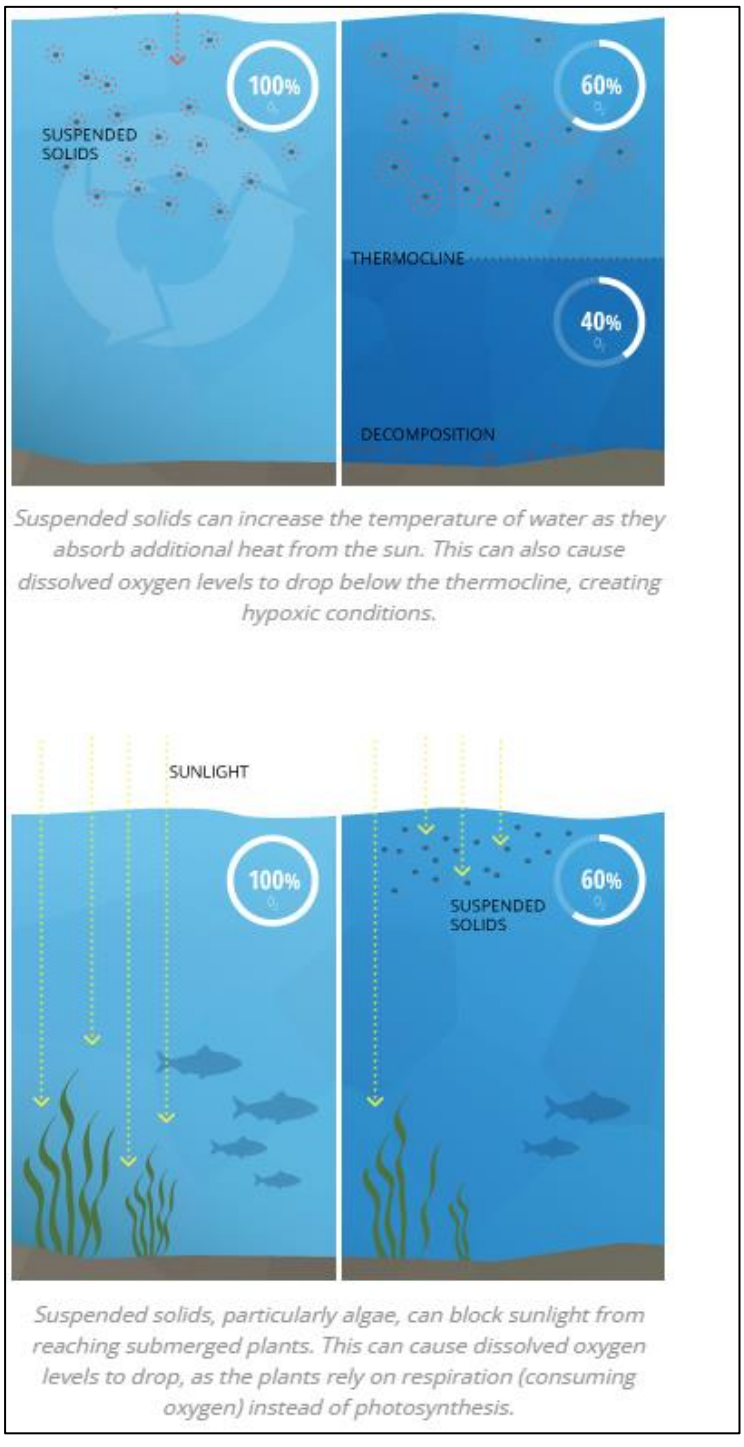
Salinity – Measures:

Electrical conductivity is a measure of the saltiness of the water and is measured on a scale from 0 to 50,000 uS/cm. Electrical conductivity is measured in microsiemens per centimeter (uS/cm). Freshwater is usually between 0 and 1,500 uS/cm and typical sea water has a conductivity value of about 50,000 uS/cm. Examples:

µS/cm	Use
0 - 800	• Good drinking water for humans (provided there is no organic pollution and not too much suspended clay material) • Generally good for irrigation, though above 300µS/cm some care must be, particularly with overhead sprinklers, which may cause leaf, scorch on some salt sensitive plants. • Suitable for all livestock
800 - 2500	• Can be consumed by humans, although most would prefer water in the lower half of this range if available • When used for irrigation, requires special management including suitable soils, good drainage and consideration of salt tolerance of plants • Suitable for all livestock
2500 -10,000	• Not recommended for human consumption, although water up to 3000 µS/cm can be consumed • Not normally suitable for irrigation, although water up to 6000 µS/cm can be used on very salt tolerant crops with very special management techniques. Over 6000 µS/cm, occasional emergency may be possible with care • When used for drinking water by poultry and pigs, the salinity should be limited to about 6000 µS/cm. Most other livestock can use water up to 10000 µS/cm

Total Dissolve Solids (TDS) – Measures

Dissolved solids, smaller than 2 microns, refer to any minerals, salts, metals, in the form of molecules, atoms, cations or anions dissolved in water. Total dissolved solids (TDS) comprise inorganic salts (principally calcium, magnesium, potassium, sodium, bicarbonates, chlorides and sulfates) and some small amounts of organic matter that dissolve in water.
The TDS concentration is the sum of all filterable substances in water that can be determined gravimetrically. However, in most cases, TDS is primarily comprised of ions.
High levels of total suspended solids can affect turbidity, increase water temperatures and decrease dissolved oxygen (DO) levels. This can cause the water to heat up more rapidly because the suspended particles absorb more heat and deplete oxygen, which can adversely affect aquatic life.

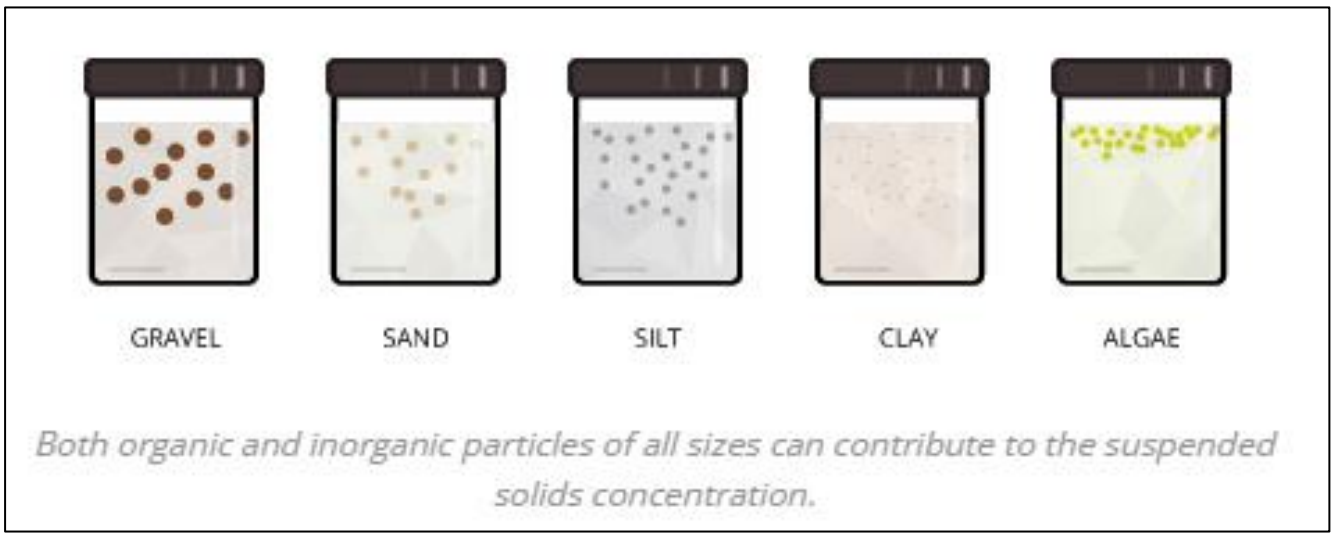


Suspended solids can increase the temperature of water as they absorb additional heat from the sun. This can also cause dissolved oxygen levels to drop below the thermocline, creating hypoxic conditions.

Suspended solids, particularly algae, can block sunlight from reaching submerged plants. This can cause dissolved oxygen levels to drop, as the plants rely on respiration (consuming oxygen) instead of photosynthesis.

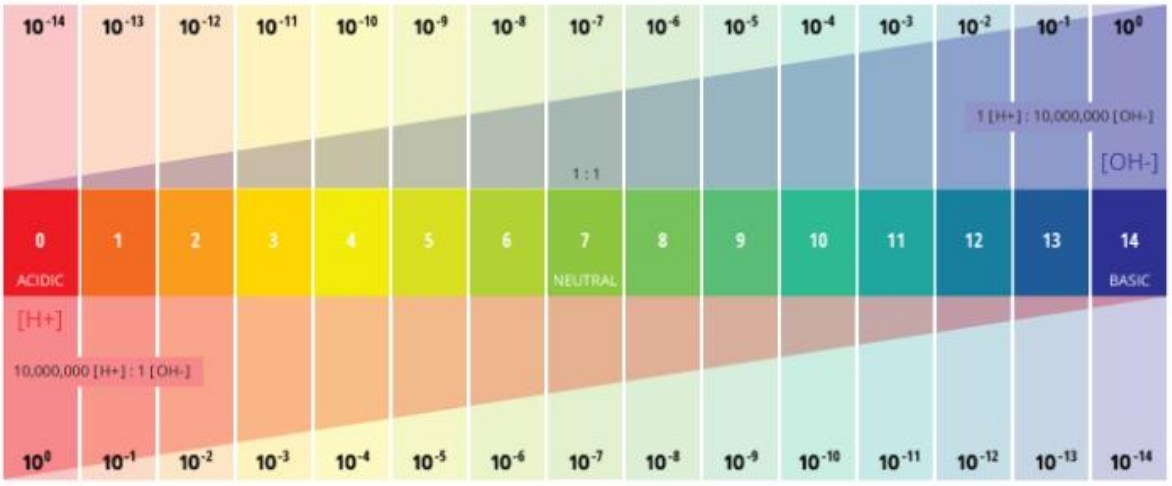
Turbidity – Total Suspended Solids (TSS)

Turbidity data are reported in Nephelometric Turbidity Units (NTU). To provide a sense of scale, water with a turbidity of 1 NTU is crystal clear, water at 5 NTU has a tiny trace of discolouration, and water at 100 NTU is brown and opaque. The standard is less than 10 NTU for rural streams and rivers and less than 30 NTU for urban lakes and ponds.
Total suspended solids (TSS) are particles that are larger than 2 microns found in the water column. Anything smaller than 2 microns (average filter size) is considered a dissolved solid. Most suspended solids are made up of inorganic materials, though bacteria and algae can also contribute to the total solids concentration.



pH – Acidity / Alkalinity – Measures

The pH refers to the degree of acidity or alkalinity of a substance. A pH of 7 is neutral. A value above 7 indicates that the water is more alkaline and a pH below 7 indicates acidic conditions.
A pH of 7 is considered neutral. The logarithmic scale means that each number below 7 is 10 times more acidic than the previous number when counting down. Likewise, when counting up above 7, each number is 10 times more basic than the previous number pH stands for the “power of hydrogen” [3]. The numerical value of pH is determined by the molar concentration of hydrogen ions (H+) [3]. This is done by taking the negative logarithm of the H+ concentration (-log(H+)).
Standard values for pH readings are expected, pH 6.5–9 for rural streams and rivers and pH 6–9 for urban lakes and ponds.
In freshwater systems pH sets up the conditions for how easy it is for nutrients to be available and how easily things like heavy metals (toxicity for aquatic life) can dissolve in the water. Rivers and lakes generally range between 5 (acidic) and 9 (basic) on the pH scale.



The logarithmic scale of pH means that as pH increases, the H+ concentration will decrease by a power of 10. Thus at a pH of 0, H+ has a concentration of 1 M. At a pH of 7, this decreases to 0.0000001 M. At a pH of 14, there is only 0.00000000000001 M

Summary of Results

Aquatic ecosystems	
Indicator	**Numerical criteria (trigger values)**
Total phosphorus	• Upland rivers: 20 µg/L • Lowland rivers: 25 µg/L for rivers flowing to the coast; • Lakes & reservoirs: 10 µg/L • Estuaries: 30 µg/L
Total nitrogen	• Upland rivers: 250 µg/L • Lowland rivers: 350 µg/L for rivers flowing to the coast; • Lakes & reservoirs: 350 µg/L • Estuaries: 300µg/L
Chlorophyll-a	• Upland rivers: not applicable • Lowland rivers: 5 µg/L • Lakes & reservoirs: 5 µg/L. • Estuaries: 4 µg/L.
Turbidity	• Upland rivers: 2–25 NTU (see supporting information) • Lowland rivers: 6–50 NTU (see supporting information) • Lakes & reservoirs: 1–20 NTU • Estuaries: 0.5–10 NTU
Salinity (electrical conductivity)	• Upland rivers: 30–350 µS/cm • Lowland rivers: 125–2200 µS/cm supporting information
Dissolved oxygen	• Upland rivers: 90–110% • Lowland rivers: 85–110% • Freshwater lakes & reservoirs: 90–110% • Estuaries: 80–110% Note: Dissolved oxygen values were derived from daytime measurements. Dissolved oxygen concentrations may vary diurnally and with depth. Monitoring programs should assess this potential variability.
pH	• Upland rivers: 6.5–8.0 • Lowland rivers: 6.5–8.5 • Freshwater lakes & reservoirs: 6.5–8.0 • Estuaries: 7.0–8.5 Changes of more than 0.5 pH units from the natural seasonal maximum or minimum should be investigated.

3.1 Key Summary of Results Spring (October) 2024

Dissolved Oxygen (DO %) is at 114.29% which is above the threshold of between 85-110% for lowland rivers. This is considered a positive attribute for stream health as increased oxygen levels are a general surrogate for healthy stream conditions for aquatic organisms and biota.

pH is 6.21 which is below the threshold of 6.5-8.5 % for lowland rivers.

This reading is considered only a slight acidic reading below the neutral range.

pH readings at the discharge must be monitored overtime to observe any negative trend for this attribute

Total phosphorous is at 30 µg/L which is above the threshold of 25 µg/L for rivers flowing to the coast.

This is considered only a slight exceedance for the value and reflects the general site condition as a non-natural environ, and not a natural low land river – which is the benchmarking for the results.

Total nitrogen is at 400 µg/L which is above the threshold of 350 µg/L for rivers flowing to the coast.

This is considered only a slight exceedance for the value and reflects the general site condition as a non-natural environ, and not a natural low land river – which is the benchmarking for the results.

Zinc is at 0.008mg/L which is at the threshold for lowland rivers, however marginally higher in value than the other basin records for this period.

Continue to monitor for trends under future readings.

All other tested attributes are considered to meet the ANZECC guidelines for natural low land rivers – which is applied within the report as a general benchmarking standard.

3.2 Recommendations

There are no water quality management recommendation provided under this reporting period.

STORMWATER DISCHARGE TESTING SITE

BASIN 5 – OUTFLOW

Site image 1. Testing site Basin 5 - Outflow

Table. In-situ data and observations Retention Basin 5 outflow

Moorebank West Precinct - Retention Basin 5 Outflow (MPW 5.2 outflow)			
Date: 09/10/2024	**Time:** 12:06am	**Temp:** 26.6°C	**Humidity:** 53%
Operator: Marco Perry		**Coordinates:** -33.947085, 150.917653	
Equipment used: Aquatroll 500			
Parameter	**Recording**	**ANZECC** ANZECC 2000 Guidelines *Lowland rivers	**Triggered?** Y/N
Temperature (Celcius)	19.5	Abnormal to seasonal variation	N
Dissolved Oxygen (DO %)	114.29%	*Lowland rivers Lower limit: 85% Upper Limit: 110%	Y – improved quality resultant
Dissolved Oxygen (DO ppm)	10.5ppm	*Lowland rivers Lower limit: 85% Upper Limit: 110%	N
Electrical Conductivity (uS/cm)	7.3 µS/cm	125–2200 µS/cm	N
pH	6.21	Min 6.5 Max 8.5	Y – slight
NTU	6.62	6-50	N

(a) Total phosphorus

MPW 5.2 outflow - Total phosphorous – Qube Logistics, Moorebank, NSW		Trigger Trigger Value - ANZECC 2000 Guidelines	Triggered
Lab results - Total phosphorous:	30 µg/L	25 µg/L for rivers flowing to the coast	Y
Notes: • Channel Culvert • µg/L + microseimens per cm • Trigger value 50 µg/L for lowland rivers, trigger value 25 µg/L for rivers flowing to the coast Anzecc Guidelines 2000. Equipment used: - Sample bottles collected from monitoring site ALS Environmental Laboratory Testing Report			

(b) Total nitrogen Total Nitrogen as N (TKN + NOx) by Discrete Analyser

MPW 5.2 outflow - Total nitrogen – Qube Logistics, Moorebank, NSW		Trigger Value - ANZECC 2000 Guidelines	Triggered
Lab results -Total nitrogen:	400 µg/L	350 µg/L for rivers flowing to the coast	Y
Notes: • Total Nitrogen as N (TKN + NOx) by Discrete Analyser • Trigger values are based on a low-lying river			

(c) Kjeldahl nitrogen Total Kjeldahl Nitrogen as N

MPW 5.2 outflow - Kjeldahl nitrogen – Qube Logistics, Moorebank, NSW		Trigger Value - ANZECC 2000 Guidelines	Triggered
Lab results – kjeldahl nitrogen:	400 µg/L	-	-
Notes: Total Kjeldahl Nitrogen as N			

d) Dissolved metals;

MPW 5.2 outflow - Dissolved metals – Qube Logistics, Moorebank, NSW			
Equipment used: - Sample bottles collected from monitoring site ALS Environmental Laboratory Testing Report			
Lab results – Dissolved metals:	**Measures mg/L**	**Trigger value ANZECC Guidelines 2000 95% protection criteria**	**Triggered**
Arsenic	<0.001	0.013 mg/L	N
Cadmium	<0.0001	0.0002 mg/L	N
Chromium	<0.001	0.001 mg/L	N
Copper	<0.017	0.0014mg/L	N
Nickel	<0.001	0.011 mg/L	N
Lead	<0.001	0.0034 mg/L	N
Zinc	0.008	0.008 mg/L	Y at trigger value
Mercury	<0.0001	0.0006 mg/L	N
Notes: - ANZECC Guidelines 90% protection criteria.			

(e) PFAS;

MPW 5.2 outflow - PFAS – Qube Logistics, Moorebank, NSW			
PFAS Surrogate	**Measure %**	**95% species protection (DEE 2016)**	**Exceedance?**
Perfluorooctane sulfonic acid (PFOS) µg/L	0.04 µg/L /103%	.13 (µg/L)	N
Perfluorooctanoic acid (PFOA)	0.04 µg/L /101%	220 (µg/L)	N
Notes: This Guidance focuses on PFOS and PFOA as potential indicators of wider contamination by related PFASs. The reasons for this approach include: • Most research undertaken on PFASs internationally and in Australia has focused on PFOS and PFOA due to their frequent occurrence in the environment, persistence, and bioaccumulation. • PFOS and PFOA can also be the breakdown endpoint of other precursor products. • PFOS and PFOA are the most commonly encountered PFAS in the environment and wildlife. • Information on other PFASs, of which there are several hundred known, is more limited. • Effective management of PFOS and PFOA may help address potential contamination where other PFASs may also be present.			

(f) Total suspended solids.

MPW 5.2 outflow - Total suspended solids – Qube Logistics, Moorebank, NSW		EPA exceedance value	Trigger
Lab results – Total suspended solids: mg/L	<5 mg/L	50 mg/L	N
Notes: Total Suspended Solids dried at 104 ± 2°C Total Suspended Solids (TSS)			

(g) Total hydrocarbons

Lab results - Total hydrocarbons:	October Measure ug/L	Baseline monitoring May 2024	Trigger value ANZECC Guidelines 2000 – slightly disturbed lowland river ecosystem	Triggered
Benzene µg/L	<1	<1	1300 µg/L	N
Toluene µg/L	<2	<2	-	N
Ethylbenzene µg/L	<2	<2	-	N
meta-& para-Xylene µg/L	<2	<2	200 µg/L	N
Ortho-Xylene µg/L	<2	<2	470 µg/L	N
Total Xylenes µg/L	<2	<2	-	-
Sum of BTEX µg/L	<1	<1	-	-
Naphthalene µg/L	<5	<5	85 µg/L	N

Notes:

- The data were compared to the default trigger values (DTVs) recommended by ANZECC/ARMCANZ (2000) for the protection of slightly disturbed lowland river ecosystems in southeast Australia.
- A commonly encountered example of additive toxicity of mixtures is the simple aromatic hydrocarbons commonly associated with contaminated petroleum sites, benzene, toluene, ethyl benzene and xylenes, collectively known as BTEX

Water Quality Monitoring Comparative Table (Temporal)

Retention Basin 5 MPW. Testing Site MPW 5.2 Outflow

Testing Site MPW 5.2 Outflow	May 2024 baseline	October 2024
pH	6.39	6.21
Dissolved Oxygen - %/L	4.11mg/L	10.5
Actual Electronic Conductivity	0.054945	0.008
Temperature - ℃	18.12	19.5
Turbidity	0.03 NTU	6.62
Total phosphorous - mg/L	0.04 mg/L	0.03mg/L
Total nitrogen - mg/L	1.7 mg/L	0.4mg/L
Kjeldahl nitrogen mg/L	1.0 mg/L	0.4mg/L
Dissolved metals		
Arsenic	<0.001	<0.001
Cadmium	<0.0001	<0.0001
Chromium	<0.001	<0.001
Copper	<0.01	0.017
Nickel	<0.001	0.001
Lead	<0.001	<0.001
Zinc	<0.005	0.008
PFAS		
Lab results – SUM of PFAS Micrograms/L	0.13	0.04
SUM of PFHxS & PFOS Microgrms/L	0.04	0.04
Total suspended solids mg/L	6	<5
Total hydrocarbons		
Benzene	<1	<1
Toluene	<2	<2
Ethylbenzene	<2	<2
meta-& para-Xylene	<2	<2
Ortho-Xylene	<2	<2
Total Xylenes	<2	<2
Sum of BTEX	<1	<1
Naphthalene	<5	<5

Appendix A. Raw data tables; source - Australian Laboratory Services

Basin 5: Outflow

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	GR1	MBW B80	MBW B60	MBW B50 (GR2)	MBE DP1
				Sampling date / time	09-Oct-2024 12:30	09-Oct-2024 11:45	09-Oct-2024 11:30	09-Oct-2024 12:00	09-Oct-2024 10:00
Compound	CAS Number	LOR	Unit		EW2404631-001	EW2404631-002	EW2404631-003	EW2404631-004	EW2404631-005
					Result	Result	Result	Result	Result
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		<5	<5	24	<5	1440
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	0.001	<0.001	<0.001
Nickel	7440-02-0	0.001	mg/L		<0.001	0.001	0.002	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	0.008	<0.005
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		0.06	0.05	0.11	0.03	0.90
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		0.5	0.7	1.0	0.4	2.1
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		0.6	0.8	1.1	0.4	3.0
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		0.03	0.05	0.16	0.03	0.25
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	GR1	MBW B80	MBW B60	MBW B50 (GR2)	MBE DP1
				Sampling date / time	09-Oct-2024 12:30	09-Oct-2024 11:45	09-Oct-2024 11:30	09-Oct-2024 12:00	09-Oct-2024 10:00
Compound	CAS Number	LOR	Unit		EW2404631-001	EW2404631-002	EW2404631-003	EW2404631-004	EW2404631-005
					Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	0.03	0.06	<0.02	<0.02
Perfluoropropane sulfonic acid (PFPrS)	423-41-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	0.04	0.06	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	0.32	0.52	0.02	0.03
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorononane sulfonic acid (PFNS)	68259-12-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	0.24	0.56	0.02	0.02

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	GR1	MBW B80	MBW B60	MBW B50 (GR2)	MBE DP1
				Sampling date / time	09-Oct-2024 12:30	09-Oct-2024 11:45	09-Oct-2024 11:30	09-Oct-2024 12:00	09-Oct-2024 10:00
Compound	CAS Number	LOR	Unit		EW2404631-001	EW2404631-002	EW2404631-003	EW2404631-004	EW2404631-005
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	0.10	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	0.05	0.20	<0.02	0.03
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	0.01	0.03	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
Perfluorohexadecanoic acid (PFHxDA)	67905-19-5	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	GR1	MBW B80	MBW B60	MBW B50 (GR2)	MBE DP1
			Sampling date / time	09-Oct-2024 12:30	09-Oct-2024 11:45	09-Oct-2024 11:30	09-Oct-2024 12:00	09-Oct-2024 10:00
Compound	CAS Number	LOR	Unit	EW2404631-001	EW2404631-002	EW2404631-003	EW2404631-004	EW2404631-005
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	<0.01	0.69	1.55	0.04	0.08
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	0.56	1.08	0.04	0.05
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	0.65	1.49	0.04	0.08
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	99.8	99.2	98.1	102	103
Toluene-D8	2037-26-5	2	%	101	98.3	97.7	102	99.9
4-Bromofluorobenzene	460-00-4	2	%	96.2	94.6	92.3	94.0	93.6
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	98.2	96.9	101	103	103
13C8-PFOA	----	0.02	%	98.7	97.9	101	101	101

Appendix B. ANZECC & ARMCANZ (2000) water quality guidelines

Table 3.4.1 Trigger values for toxicants at alternative levels of protection. Values in grey shading are the trigger values applying to typical *slightly–moderately disturbed systems*; see table 3.4.2 and Section 3.4.2.4 for guidance on applying these levels to different ecosystem conditions.

Chemical		Trigger values for freshwater (µgL^{-1})				Trigger values for marine water (µgL^{-1})			
		Level of protection (% species)				Level of protection (% species)			
		99%	95%	90%	80%	99%	95%	90%	80%
METALS & METALLOIDS									
Aluminium	pH >6.5	27	55	80	150	ID	ID	ID	ID
Aluminium	pH <6.5	ID	ID	ID	ID	ID	ID	ID	ID
Antimony		ID	ID	ID	ID	ID	ID	ID	ID
Arsenic (As III)		1	24	94 [C]	360 [C]	ID	ID	ID	ID
Arsenic (AsV)		0.8	13	42	140 [C]	ID	ID	ID	ID
Beryllium		ID	ID	ID	ID	ID	ID	ID	ID
Bismuth		ID	ID	ID	ID	ID	ID	ID	ID
Boron		90	370 [C]	680 [C]	1300 [C]	ID	ID	ID	ID
Cadmium	H	0.06	0.2	0.4	0.8 [C]	0.7 [B]	5.5 [B, C]	14 [B, C]	36 [B, A]
Chromium (Cr III)	H	ID	ID	ID	ID	7.7	27.4	48.6	90.6
Chromium (CrVI)		0.01	1.0 [C]	6 [A]	40 [A]	0.14	4.4	20 [C]	85 [C]
Cobalt		ID	ID	ID	ID	0.005	1	14	150 [C]
Copper	H	1.0	1.4	1.8 [C]	2.5 [C]	0.3	1.3	3 [C]	8 [A]
Gallium		ID	ID	ID	ID	ID	ID	ID	ID
Iron		ID	ID	ID	ID	ID	ID	ID	ID
Lanthanum		ID	ID	ID	ID	ID	ID	ID	ID
Lead	H	1.0	3.4	5.6	9.4 [C]	2.2	4.4	6.6 [C]	12 [C]
Manganese		1200	1900 [C]	2500 [C]	3600 [C]	ID	ID	ID	ID
Mercury (inorganic)	B	0.06	0.6	1.9 [C]	5.4 [A]	0.1	0.4 [C]	0.7 [C]	1.4 [C]
Mercury (methyl)		ID	ID	ID	ID	ID	ID	ID	ID
Molybdenum		ID	ID	ID	ID	ID	ID	ID	ID
Nickel	H	8	11	13	17 [C]	7	70 [C]	200 [A]	560 [A]
Selenium (Total)	B	5	11	18	34	ID	ID	ID	ID
Selenium (SeIV)	B	ID	ID	ID	ID	ID	ID	ID	ID
Silver		0.02	0.05	0.1	0.2 [C]	0.8	1.4	1.8	2.6 [C]
Thallium		ID	ID	ID	ID	ID	ID	ID	ID
Tin (inorganic, SnIV)		ID	ID	ID	ID	ID	ID	ID	ID
Tributyltin (as µg/L Sn)		ID	ID	ID	ID	0.0004	0.006 [C]	0.02 [C]	0.05 [C]
Uranium		ID	ID	ID	ID	ID	ID	ID	ID
Vanadium		ID	ID	ID	ID	50	100	160	280
Zinc	H	2.4	8.0 [C]	15 [C]	31 [C]	7	15 [C]	23 [C]	43 [C]
NON-METALLIC INORGANICS									
Ammonia	D	320	900 [C]	1430 [C]	2300 [A]	500	910	1200	1700
Chlorine	E	0.4	3	6 [A]	13 [A]	ID	ID	ID	ID
Cyanide	F	4	7	11	18	2	4	7	14
Nitrate	J	17	700	3400 [C]	17000 [A]	ID	ID	ID	ID
Hydrogen sulfide	G	0.5	1.0	1.5	2.6	ID	ID	ID	ID
ORGANIC ALCOHOLS									
Ethanol		400	1400	2400 [C]	4000 [C]	ID	ID	ID	ID
Ethylene glycol		ID	ID	ID	ID	ID	ID	ID	ID
Isopropyl alcohol		ID	ID	ID	ID	ID	ID	ID	ID
CHLORINATED ALKANES									
Chloromethanes									
Dichloromethane		ID	ID	ID	ID	ID	ID	ID	ID
Chloroform		ID	ID	ID	ID	ID	ID	ID	ID
Carbon tetrachloride		ID	ID	ID	ID	ID	ID	ID	ID
Chloroethanes									
1,2-dichloroethane		ID	ID	ID	ID	ID	ID	ID	ID
1,1,1-trichloroethane		ID	ID	ID	ID	ID	ID	ID	ID

Chemical	Trigger values for freshwater (µgL^{-1})				Trigger values for marine water (µgL^{-1})			
	Level of protection (% species)				Level of protection (% species)			
	99%	95%	90%	80%	99%	95%	90%	80%
1,1,2-trichloroethane	5400	6500	7300	8400	140	1900	5800 [C]	18000 [C]
1,1,2,2-tetrachloroethane	ID	ID	ID	ID	ID	ID	ID	ID
Pentachloroethane	ID	ID	ID	ID	ID	ID	ID	ID
Hexachloroethane B	290	360	420	500	ID	ID	ID	ID
Chloropropanes								
1,1-dichloropropane	ID	ID	ID	ID	ID	ID	ID	ID
1,2-dichloropropane	ID	ID	ID	ID	ID	ID	ID	ID
1,3-dichloropropane	ID	ID	ID	ID	ID	ID	ID	ID
CHLORINATED ALKENES								
Chloroethylene	ID	ID	ID	ID	ID	ID	ID	ID
1,1-dichloroethylene	ID	ID	ID	ID	ID	ID	ID	ID
1,1,2-trichloroethylene	ID	ID	ID	ID	ID	ID	ID	ID
1,1,2,2-tetrachloroethylene	ID	ID	ID	ID	ID	ID	ID	ID
3-chloropropene	ID	ID	ID	ID	ID	ID	ID	ID
1,3-dichloropropene	ID	ID	ID	ID	ID	ID	ID	ID
ANILINES								
Aniline	8	250 [A]	1100 [A]	4800 [A]	ID	ID	ID	ID
2,4-dichloroaniline	0.6	7	20	60 [C]	ID	ID	ID	ID
2,5-dichloroaniline	ID	ID	ID	ID	ID	ID	ID	ID
3,4-dichloroaniline	1.3	3	6 [C]	13 [C]	85	150	190	260
3,5-dichloroaniline	ID	ID	ID	ID	ID	ID	ID	ID
Benzidine	ID	ID	ID	ID	ID	ID	ID	ID
Dichlorobenzidine	ID	ID	ID	ID	ID	ID	ID	ID
AROMATIC HYDROCARBONS								
Benzene	600	950	1300	2000	500 [C]	700 [C]	900 [C]	1300 [C]
Toluene	ID	ID	ID	ID	ID	ID	ID	ID
Ethylbenzene	ID	ID	ID	ID	ID	ID	ID	ID
o-xylene	200	350	470	640	ID	ID	ID	ID
m-xylene	ID	ID	ID	ID	ID	ID	ID	ID
p-xylene	140	200	250	340	ID	ID	ID	ID
m+*p*-xylene	ID	ID	ID	ID	ID	ID	ID	ID
Cumene	ID	ID	ID	ID	ID	ID	ID	ID
Polycyclic Aromatic Hydrocarbons								
Naphthalene	2.5	16	37	85	50 [C]	70 [C]	90 [C]	120 [C]
Anthracene B	ID	ID	ID	ID	ID	ID	ID	ID
Phenanthrene B	ID	ID	ID	ID	ID	ID	ID	ID
Fluoranthene B	ID	ID	ID	ID	ID	ID	ID	ID
Benzo(a)pyrene B	ID	ID	ID	ID	ID	ID	ID	ID
Nitrobenzenes								
Nitrobenzene	230	550	820	1300	ID	ID	ID	ID
1,2-dinitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,3-dinitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,4-dinitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,3,5-trinitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-methoxy-2-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-methoxy-4-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-chloro-2-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-chloro-3-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-chloro-4-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-chloro-2,4-dinitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,2-dichloro-3-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,3-dichloro-5-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,4-dichloro-2-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
2,4-dichloro-2-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID

Chemical	Trigger values for freshwater (µgL^{-1})				Trigger values for marine water (µgL^{-1})			
	Level of protection (% species)				Level of protection (% species)			
	99%	95%	90%	80%	99%	95%	90%	80%
Hexazinone	ID	ID	ID	ID	ID	ID	ID	ID
Simazine	0.2	3.2	11	35	ID	ID	ID	ID
Urea herbicides								
Diuron	ID	ID	ID	ID	ID	ID	ID	ID
Tebuthiuron	0.02	2.2	20	160 [C]	ID	ID	ID	ID
Miscellaneous herbicides								
Acrolein	ID	ID	ID	ID	ID	ID	ID	ID
Bromacil	ID	ID	ID	ID	ID	ID	ID	ID
Glyphosate	370	1200	2000	3600 [A]	ID	ID	ID	ID
Imazethapyr	ID	ID	ID	ID	ID	ID	ID	ID
Ioxynil	ID	ID	ID	ID	ID	ID	ID	ID
Metolachlor	ID	ID	ID	ID	ID	ID	ID	ID
Sethoxydim	ID	ID	ID	ID	ID	ID	ID	ID
Trifluralin B	2.6	4.4	6	9 [A]	ID	ID	ID	ID
GENERIC GROUPS OF CHEMICALS								
Surfactants								
Linear alkylbenzene sulfonates (LAS)	65	280	520 [C]	1000 [C]	ID	ID	ID	ID
Alcohol ethoxyolated sulfate (AES)	340	650	850 [C]	1100 [C]	ID	ID	ID	ID
Alcohol ethoxylated surfactants (AE)	50	140	220	360 [C]	ID	ID	ID	ID
Oils & Petroleum Hydrocarbons	ID	ID	ID	ID	ID	ID	ID	ID
Oil Spill Dispersants								
BP 1100X	ID	ID	ID	ID	ID	ID	ID	ID
Corexit 7664	ID	ID	ID	ID	ID	ID	ID	ID
Corexit 8667		ID	ID	ID	ID	ID	ID	ID
Corexit 9527	ID	ID	ID	ID	230	1100	2200	4400 [A]
Corexit 9550	ID	ID	ID	ID	ID	ID	ID	ID

Notes: Where the final water quality guideline to be applied to a site is below current analytical practical quantitation limits, see Section 3.4.3.3 for guidance.

Most trigger values listed here for metals and metalloids are *High reliability* figures, derived from field or chronic NOEC data (see 3.4.2.3 for reference to Volume 2). The exceptions are *Moderate reliability* for freshwater aluminium (pH >6.5), manganese and marine chromium (III).

Most trigger values listed here for non-metallic inorganics and organic chemicals are *Moderate reliability* figures, derived from acute LC_{50} data (see 3.4.2.3 for reference to Volume 2). The exceptions are *High reliability* for freshwater ammonia, 3,4-DCA, endosulfan, chlorpyrifos, esfenvalerate, tebuthiuron, three surfactants and marine for 1,1,2-TCE and chlorpyrifos.

* = *High reliability* figure for esfenvalerate derived from mesocosm NOEC data (no alternative protection levels available).

A = Figure may not protect key test species from acute toxicity (and chronic) — check Section 8.3.7 for spread of data and its significance. 'A' indicates that trigger value > acute toxicity figure; note that trigger value should be <1/3 of acute figure (Section 8.3.4.4).

B = Chemicals for which possible bioaccumulation and secondary poisoning effects should be considered (see Sections 8.3.3.4 and 8.3.5.7).

C = Figure may not protect key test species from chronic toxicity (this refers to experimental chronic figures or geometric mean for species) — check Section 8.3.7 for spread of data and its significance. Where grey shading and 'C' coincide, refer to text in Section 8.3.7.

D = Ammonia as TOTAL ammonia as [NH_3-N] at pH 8. For changes in trigger value with pH refer to Section 8.3.7.2.

E = Chlorine as total chlorine, as [Cl]; see Section 8.3.7.2.

F = Cyanide as un-ionised HCN, measured as [CN]; see Section 8.3.7.2.

G = Sulfide as un-ionised H_2S, measured as [S]; see Section 8.3.7.2.

H = Chemicals for which algorithms have been provided in table 3.4.3 to account for the effects of hardness. The values have been calculated using a hardness of 30 mg/L $CaCO_3$. These should be adjusted to the site-specific hardness (see Section 3.4.3).

J = Figures protect against toxicity and do not relate to eutrophication issues. Refer to Section 3.3 if eutrophication is the issue of concern.

ID = Insufficient data to derive a reliable trigger value. Users advised to check if a low reliability value or an ECL is given in Section 8.3.7.

T = Tainting or flavour impairment of fish flesh may possibly occur at concentrations below the trigger value. See Sections 4.4.5.3/3 and 8.3.7.

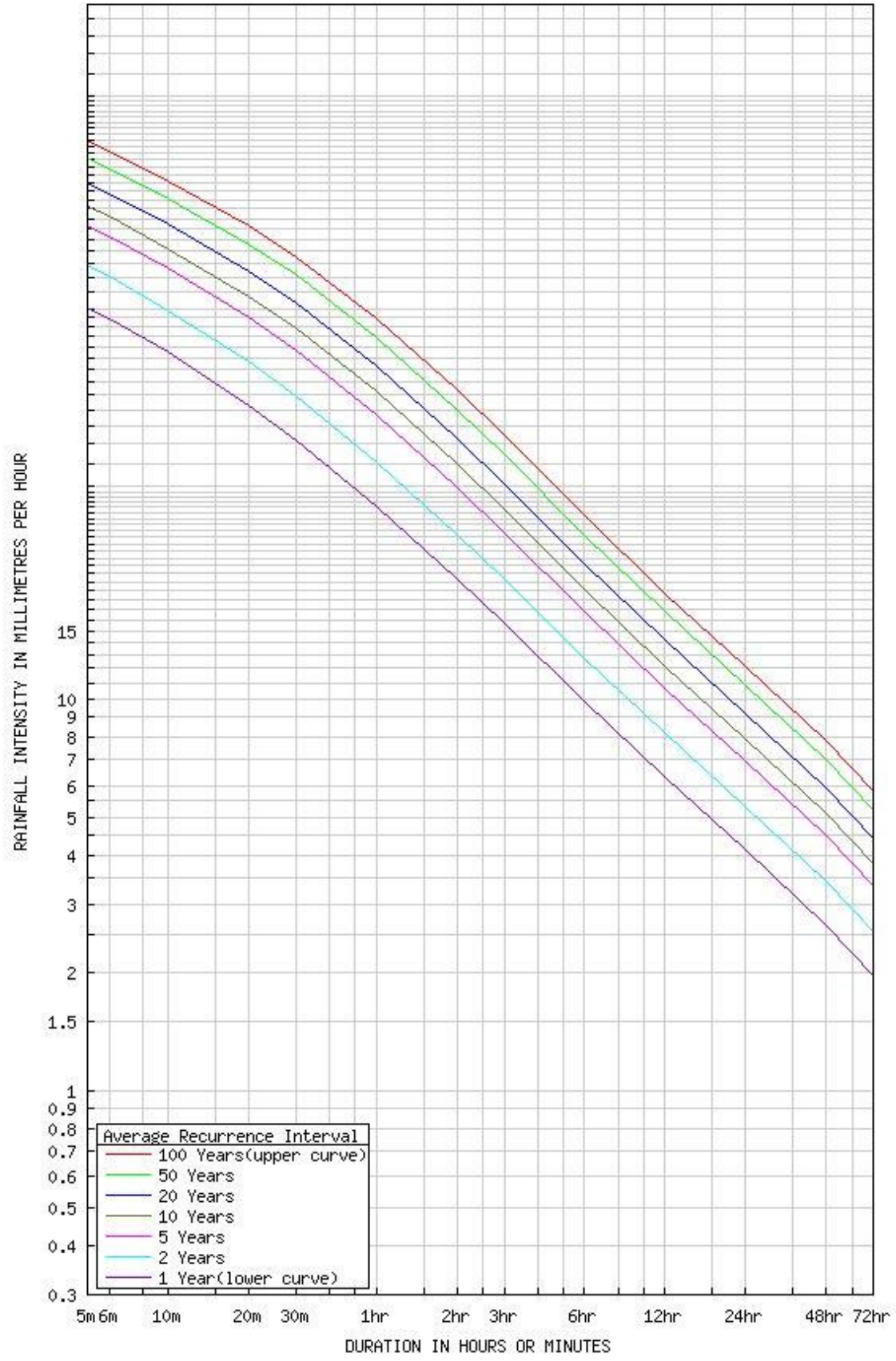
Table 5. Ecological water quality guideline values developed by water regulators

Exposure scenario	PFOS	PFOA	Exposure scenario	Comments and source
Freshwater	0.00023 µg/L	19 µg/L	99% species protection - high conservation value systems	Australian and New Zealand Guidelines for Fresh and Marine Water Quality - technical draft default guideline values for PFOS and PFOA. Note 1: The 99% species protection level for PFOS is close to the level of detection. Agencies may wish to apply a 'detect' threshold in such circumstances rather than a quantified measurement. Note 2: The draft guidelines do not account for effects which result from the biomagnification of toxicants in air-breathing animals or in animals which prey on aquatic organisms. Note 3: The WQGs advise[41] that the 99% level of protection be used for slightly to moderately disturbed systems. This approach is generally adopted for chemicals that bioaccumulate and biomagnify in wildlife. Regulators may specify or environmental legislation may prescribe the level of species protection required, rather than allowing for case-by-case assessments.
	0.13 µg/L	220 µg/L	95% species protection - slightly to moderately disturbed systems	
	2 µg/L	632 µg/L	90% species protection - highly disturbed systems	
	31 µg/L	1824 µg/L	80% species protection - highly disturbed systems	
Interim marine	0.00023 µg/L	19 µg/L	99% species protection - high conservation value systems	As above. Freshwater values are to be used on an interim basis until final marine guideline values can be set using the nationally-agreed process under the Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Note 1: The WQG advise that in the case of estuaries, the most stringent of freshwater and marine criteria apply, taking account of any available salinity correction. Note 2: Marine guideline values developed by CRC CARE are under consideration through the nationally-agreed water quality guideline development process.
	0.13 µg/L	220 µg/L	95% species protection - slightly to moderately disturbed systems	
	2 µg/L	632 µg/L	90% species protection - highly disturbed systems	
	31 µg/L	1824 µg/L	80% species protection - highly disturbed systems	

https://www.waterquality.gov.au/sites/default/files/documents/ANZECC-1992-guidelines.pdf

Type of indicator	Indicator	Units	Fresh waters	Marine waters
	Dissolved oxygen[2]	mg/L	> 6 (> 80–90% saturation)	> 6 (> 80–90% saturation)
	Nutrients/nuisance growths	–	(Section 2.3.3)	(Section 2.3.3)
	pH	–	6.5–9.0	< 0.2 pH unit change
	Salinity	mg/L	< 1000 (about 1,500 µS/cm)	–
	Suspended particulate matter/turbidity	–	< 10% change seasonal mean concentration (see also colour & clarity)	< 10% change seasonal mean concentration (see also colour & clarity)
	Temperature[3]	–	< 2°C increase	< 2°C increase
Toxicants				
Inorganic toxicants	Aluminium	µg/L	< 5.0 (if pH < = 6.5)	NR
	Aluminium	µg/L	< 100.0 (if pH > 6.5)	–
	Ammonia	µg/L	20.0–30.0 (Table 2.3)	NR
	Antimony	µg/L	30.0	500.0
	Arsenic	µg/L	50.0	50.0
	Beryllium	µg/L	4.0[4]	NR
	Cadmium	µg/L	0.2–2.0[5]	2.0
	Chromium	µg/L	10.0	50.0
	Copper	µg/L	2.0–5.0[5]	5.0
	Cyanide	µg/L	5.0	5.0
	Iron	µg/L	1,000.0[6]	NR
	Lead	µg/L	1.0–5.0[5]	5.0
	Mercury	µg/L	0.1	0.1
	Nickel	µg/L	15.0–150.0[5]	15.0
	Selenium	µg/L	5.0	70.0
	Silver	µg/L	0.1	1.0
	Sulfide	µg/L	2.0	2.0
	Thallium	µg/L	4.0	20.0
	Tin (tributyltin)	µg/L	0.008	0.002
	Zinc	µg/L	5.0–50.0[6]	50.0
Organic toxicants	Acrylonitrile	µg/L	NR	NR
	Benzidine	µg/L	NR	NR
	Dichlorobenzidine	µg/L	NR	NR
	Diphenylhydrazine	µg/L	NR	NR
Halogenated aliphatic compounds	Hexachlorobutadiene	µg/L	0.1	0.3
	Halogenated ethers	µg/L	NR	NR
	Isophorone	µg/L	NR	NR
Monocyclic aromatic compounds	Benzene	µg/L	300.0	300.0
	Chlorinated benzenes	µg/L	(Table 2.8)	NR

Appendix C. Intensity Frequency Duration – Average Recurrence Interval Indicator
Intensity-Frequency-Duration (bom.gov.au)



Moorebank Logistics Park West Precinct

Basin 6

Spring Stormwater Network Water Quality Monitoring Data & Reporting October 2024

Site image: retention basin 6 MPW (Apical image October 2024)

Prepared for: MID Plumbing P/L

Prepared by: Daniel Anderson (BEnvSc, MEnvSc)

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Phone: 0415617771
Office: PO Box 149 Kiama NSW 2533
ABN: 656 420 10 400

Consulted Documents / database.

Australia and New Zealand Guidelines for fresh and Marine Water Quality (2000)
NATIONAL WATER QUALITY MANAGEMENT STRATEGY - Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000) - Volume 2 - Aquatic ecosystems

Bureau of Meteorology – Australian Government Australia's official weather forecasts & weather radar - Bureau of Meteorology (bom.gov.au)

Moorebank Intermodal Precinct West – Stage 3 (SSD 10431) | Assessment Report March 2021
https://moorebankintermodalprecinct.com.au/wp-content/uploads/2023/04/MPW-S3-DPIE-assessment-report-to-IPC.pdf

WQM Report Western Precinct _Basin 6_Autumn 2024 – Apical Bushfire and Planning - April 2024

Development Consent - Section 4.38 of the Environmental Planning and Assessment Act 1979 - Application Number: SSD 7709 Applicant: Sydney Intermodal Terminal Alliance (SIMTA) as Qube Holdings Limited Consent Authority: The Independent Planning Commission Site: Moorebank Avenue, Moorebank Lot 1 DP 1197707 Lot 100 DP 1049508 Lot 101 DP 1049508 Lot 2 DP 1197707 Part Lot 3 DP 1197707 Part Anzac Road and Moorebank Avenue public road reserves Development: Moorebank Precinct West Stage 2 (MPW Stage 2)

Development Consent - Section 4.38 of the Environmental Planning and Assessment Act 1979 - Application Number: SSD 10431 Applicant: Sydney Intermodal Terminal Alliance (SIMTA) as Qube Holdings Limited Consent Authority: The Independent Planning Commission Site: Moorebank Avenue, Moorebank Lot 1 DP 1197707 Lot 100 DP 1049508 Lot 101 DP 1049508 Moorebank Precinct West Stage 3 (MPW Stage 3)

Australian Laboratory Services (ALS) Work Order EW2402561 Certificate of Analysis Water Sample Data 8th Oct 2024.

Liverpool DCPLiverpool's Development Control Plans | Liverpool City Council (nsw.gov.au)

DEE 2016. Commonwealth Environmental Management Guidance on Perfluorooctane Sulfonic Acid (PFOS) and Perfluorooctanoic Acid (PFOA). Department of the Environment and Energy.

https://environment.gov.au/system/files/pages/dfb876c5-581e-48b7-868c-242fe69dad68/files/draft-environmental-mgt-guidance-pfos-pfoa.pdf

Development Consent SSD 7709 - Section 4.38 of the Environmental Planning and Assessment Act 1979

https://www.ipcn.nsw.gov.au/resources/pac/media/files/pac/projects/2019/05/moorebank-intermodal-precinct-west-stage-2/referral-from-department-of-planning-and-environment/revised-recommended-conditions/mpw-stage-2-recommended-conditions-inclusive-of-edits-191105.pdf

Glossary

The following definitions apply to terms used in this report. Many of these definitions are consistent with relevant national literature and cited where appropriate.

Current status trigger value
Concentrations of water quality indicators that reflect existing ecosystem condition, and therefore provide a target for ecosystem maintenance and a benchmark against which future water quality trends may be monitored.

Environmental value
Particular values or uses of the environment important for a healthy ecosystem or for public benefit, welfare, safety or health and requiring protection from the effects of pollution or degradation (Environment Australia 2002).

Indicator
A parameter (biological, physical or chemical) used to provide a measure of the quality of water or the condition of an ecosystem (Environment Australia 2002).

Low-risk trigger value
Concentrations (or loads) of key performance indicators [of water quality] at which if not exceeded, there is a low risk that adverse biological effects will occur (ANZECC 2000a).

Median
The middle reading, or 50th percentile, of all readings taken. i.e. of the readings 10, 13, 9, 16 and 11 (re-ordering these to read 9, 10, 11, 13 and 16), the median is 11. The mean (or average), is the sum of all values divided by the total number of readings (which in this case equals 11.8).

Reference condition
Refers to a site which is unmodified or minimally modified from 'natural' condition. Most commonly, reference sites are subject to limited disturbance from human activity. The reference condition then serves as a standard or target against which environmental change in other similar sites can be assessed.

Trigger value
A concentration that, if exceeded, would indicate a potential environmental problem, and so 'trigger' a management response, such as further investigation and/or remedial actions (ANZECC 2000a).

Water quality guideline
A numerical concentration level (e.g. of a contaminant) or narrative statement (e.g. visual appearance of a water body) recommended to support and maintain a designated water use (ANZECC 2000a)

1.1 Background

The Sydney Intermodal Terminal Alliance (SIMTA) received approval for the construction and operation of Stage 3 (the Project) of Moorebank Precinct West (MPW), which comprises the third stage of development within the Moorebank Precinct West under Development Approval SSD-10431.

The proposal is SSD under clause 19 of Schedule 1 of the State Environmental Planning Policy (State and Regional Development) 2011, as it is development for the purpose of rail and related transport facilities.

The MPW site is located on the western side of Moorebank Avenue and forms the western section of the Moorebank Intermodal Precinct (Figure 2). The MPW site is approximately 2.5 kilometres (km) from the Liverpool city centre, 27 km south-west of the Sydney Central Business District (CBD) and 26 km west of Port Botany.

The MPW site is irregular in shape, approximately 3 km from north to south and 960 m from east to west at its widest point and covers an area of approximately 220 ha. It is situated between the Georges River to the west (with the SSFL running north-south to the west of the river); and Moorebank Avenue to the east.

Works on the MPW site to date have commenced under two current and active development consents:

• MPW Stage 1 early works, which provides demolition, rehabilitation, remediation of contaminated land, and the establishment of construction facilities and access including site security (as part of the SSD 5066 consent)

• MPW Stage 2, which provides for the construction and 24/7 operation of an intermodal facility and associated warehousing (SSD 7709).

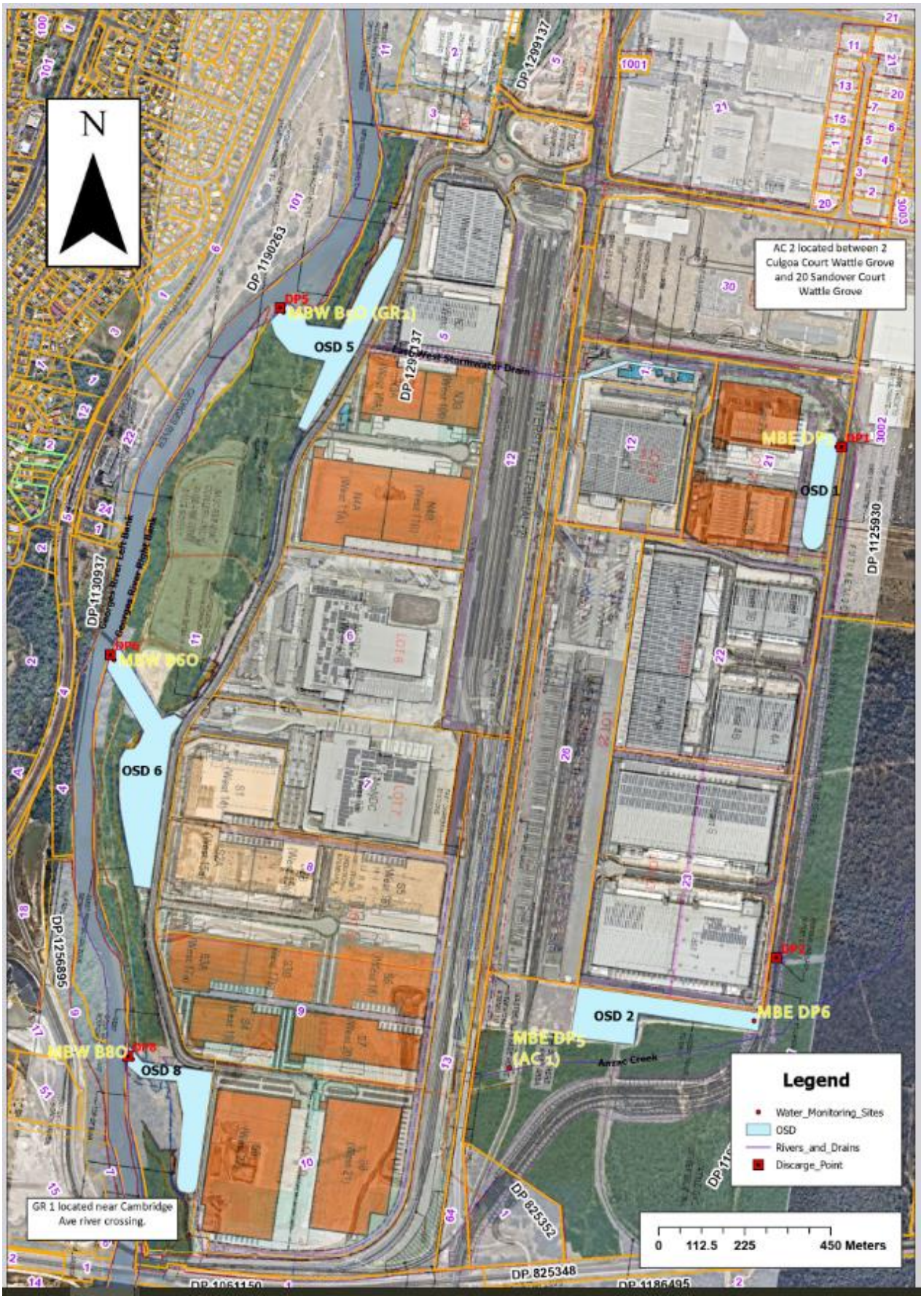
Across the entire precinct there are six onsite detention basins. Bioretention/biofiltration systems also make up the stormwater management infrastructure within the site.

This water quality monitoring program is guided by the Stormwater Infrastructure Operation and Maintenance Plan (SIOPM) and is provided to Qube Holdings Limited (the Applicant) on behalf of MID Plumbing. Three onsite bio-retention basins are present within Moorebank Precinct West. This report is in reference to Basin 6 (MPW – west).

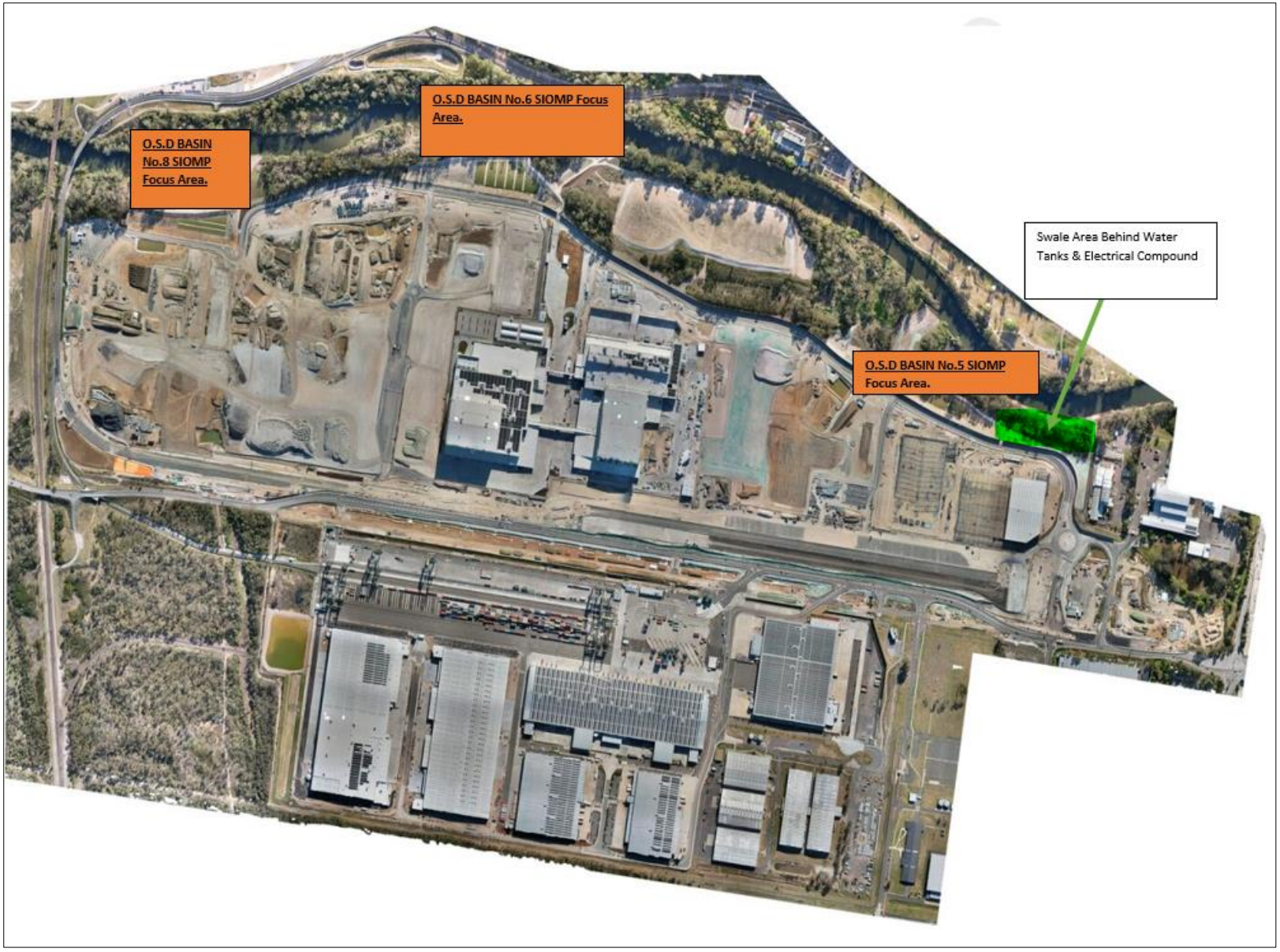
Development Consent - Section 4.38 of the Environmental Planning and Assessment Act 1979 - Application Number: SSD 7709 Moorebank Precinct West Stage 2 (MPW Stage 2)

CoC	Requirement
Stormwater Quality Monitoring	
B38.	Stormwater Quality Monitoring Program - Prior to commencement of operation Part of the Operational Environmental Management Plan

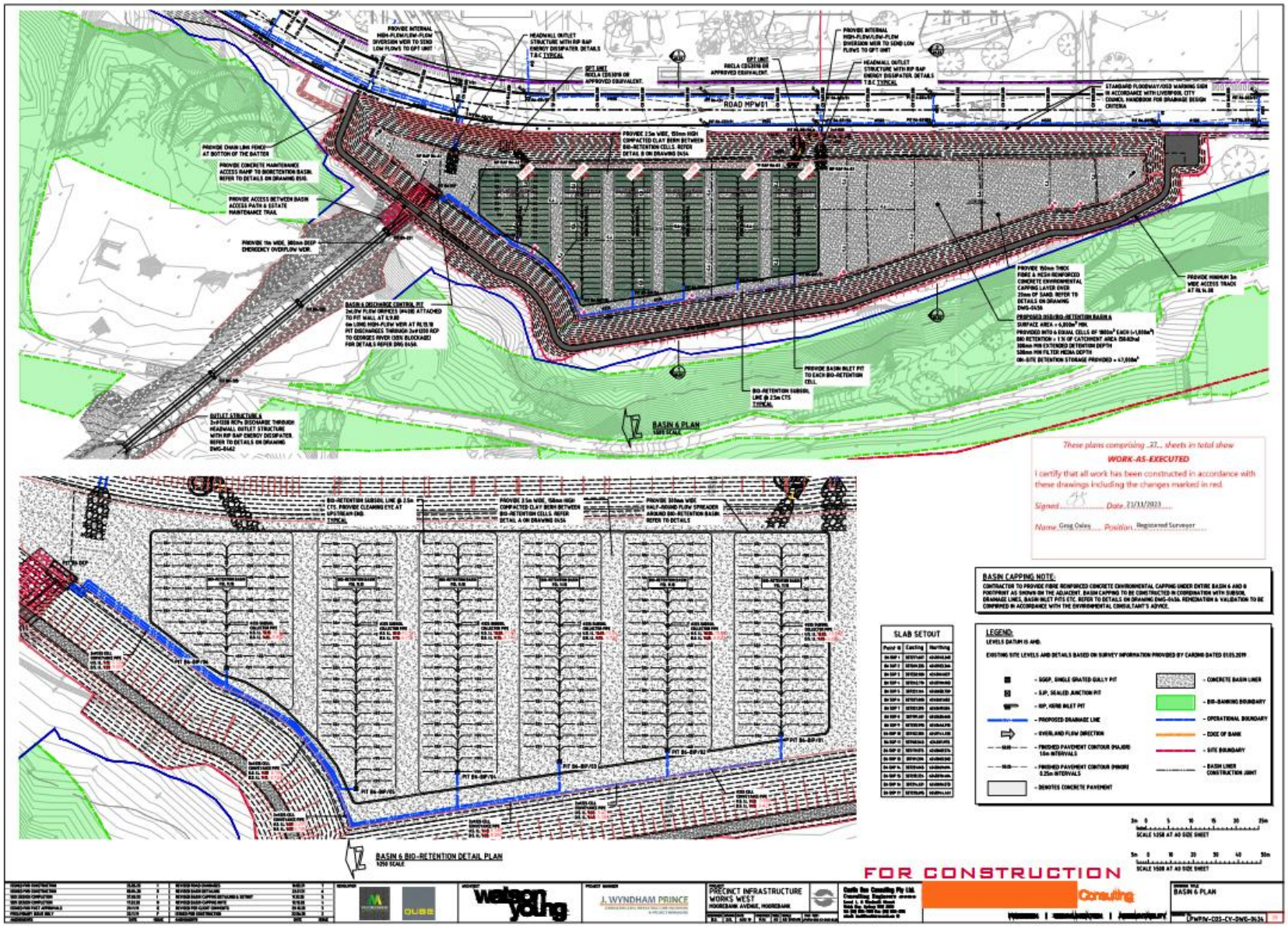
Map image 1. Overview subject site (MPW) provided by Arcadis



Map Image 2. Moorebank Precinct West Detention Basins (provided by MID Plumbing)

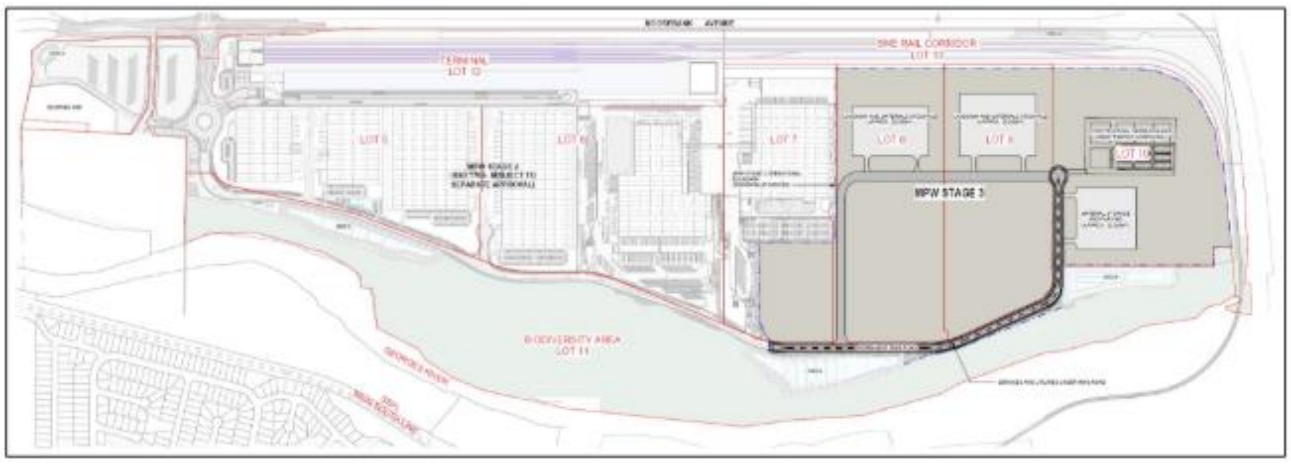


Map image 3. Detention Basin 6 MPW (west)



1.2 Reference information

Map image 4. Moorebank Intermodal Precinct West – Stage 3 State Significant Development Assessment (SSD-10431) March 2021



20. Stormwater Management System or Works	That untreated stormwater is not disposed of into the Georges River or its tributaries. The likely impact of stormwater disposal on the quality of any receiving waters. That the levels of nutrients and sediments entering the waterway are not increased by the proposed development. Whether any proposals to manage stormwater are in accordance with the local council's stormwater management plans and the Managing Urban Stormwater series of documents and meet the local council's stormwater management objectives. Whether the principles outlined in the *Managing Urban Stormwater Soils and Construction Handbook* (1998) prepared by and available from Landcom and the Department of Housing are followed during each stage of a development (including subdivision).	Detailed stormwater assessments were undertaken as part of MPW Stage 2, and remain applicable to the Stage 3 proposal. The Department has recommended conditions that would enforce these requirements, by ensuring that appropriate measures are implemented to manage stormwater impacts during construction. In regard to management of stormwater during operation of the MPW site, the MPW Stage 2 proposal incorporates a robust set of conditions to manage the release of stormwater via six onsite detention basins (OSD), a major east-west covered culvert and associated drainage infrastructure.

2. Monitoring Program Methodology

2.1 Monitoring Sites

To support stormwater and drainage management of the facility the MLP West precinct has established a vast stormwater infrastructure system consisting of several Water Sensitive Urban Design (WSUD) functions including raingardens detention basins and bio-swales. These networks are designed to minimise the velocity and peak discharge of stormwater draining from the site and act as onsite detention basins to harvest and sequester potential pollutants generated at the site through designed biological processes.

The stormwater infrastructure system discharges water into the natural drainage system via three outlets:

- Basin 5 detains water from the northern section of MPW before discharging into Georges River
- Basin 6 detains water from the mid-section of MPW before discharging into Georges River
- Basin 8 detains water from the southern section of MPW before discharging into Georges River

Monitoring of the discharge points has been established via our ongoing program with MID Plumbing under the SIOMP program to collect qualitative data and analyse the performance of the WSUD provisions and to establish any potential trends in water quality readings from the stormwater network discharge points prior to release of water into the natural hydrological systems of Anzac Creek and the Georges River.

Table 1. Type of outlet MPW

Discharge Point (see figure 2)	Associated Outlet (see figure 1)	Type of outlet/detention basin
Basin 5	Inlet	Bio retention
	Outlet	Outlet point
	Georges River	River
Basin 6	Inlet	Bio retention
	Outlet	Outlet point
Basin 8	Inlet	Bio retention
	Outlet	Outlet structure

2.2 Water Quality Assessment

Surface water quality data collected at the discharge points is assessed with reference to ANZECC Guidelines (2000) and correlated with baseline Water Quality monitoring results provided by previous condition assessment reports.

By comparing water test data under the program across the testing timeline we can identify and report upon trends, identify exceedances and exclude potential anomalies for datasets.

ANZECC Low Risk Trigger Values

Ecosystem type	Turbidity NTU	EC µS/cm	pH*	DO	TN mg/L	NO_x - N mg/L	NH_4^+ - N mg/L	TP mg/L	DRP - P mg/L
Upland river	2-25	30-350	6.5-7.5	90-110	0.480	0.190	0.013	0.013	0.005
Lowland river	6-50	125-2200	6.5-8.0	85-110	0.500	0.190	0.020	0.050	0.020

Values for Low Land River Systems as insert above are used as the reference guide to water quality parameter values and overall health and safety statements regarding the quality of discharged water from the SIOMP drainage network.

Annual spring and autumn water quality data presented from Anzac Creek and Georges River testing programs by other scientific consultants may also be cross referenced to the data prepared by Apical under the SIOMP program to establish potential trends in results and identify increases in accumulated pollutants from the site under operational condition, which may appear present within adjacent natural waterways.

Site data was collected in the form of water samples and in field data recordings at the prescribed monitoring points, water samples and water probe readings are undertaken following Australia and New Zealand guidelines for fresh and marine water quality – 2000 (ANZECC Guidelines), In situ water quality parameters relevant to stream health and aquatic assessment profiling were collected in field with a multiparameter hand-held water quality monitoring probe (Aquatroll 600).

Water data is collected, analysed and collated under the same methodologies and process under each testing period, the ensure consistency in the process.

Measures tested and samples taken:

- pH
- Dissolved Oxygen
- Electrical Conductivity
- Water Temperature and
- Turbidity

Water samples are collected at inlet and discharge points (Basin 5, Basin 6 & Basin 8) then sent to Australian Laboratory Services (ALS) for quality testing analysis Surface water (alsglobal.com).

Water analytical suites / testing parameters are provided to obtain overall water condition results and chemical sampling of collected water is undertaken for a range of nutrients, metals, and hydrocarbons relevant to stream health and aquatic assessment protocol, key nutrients, metals, and pollutants included in the assessment to reflect an overall suite of water quality condition guides which are listed below:

- Total phosphorous
- Total Nitrogen
- Kjeldahl Nitrogen
- Dissolved Metals
- PFAS
- Total Suspended Solids
- Total Hydrocarbons

The raw data results from the lab analysis provided to us by ALS Laboratory Services are presented within this report (see Appendix A).

Key water quality data attributes are recorded, tables and compared against; previous condition baseline data, Liverpool Development Control Plan (DCP) water quality targets, Conditions of Consent B40 and ANZECC Guideline (2000) trigger limits under the condition category -(90% protection criteria for freshwater natural systems). The water quality guidelines are applied to ensure adjacent natural waterways George River and Anzac creek are not adversely affected by poor water quality discharge from the Moorebank logistics park site and operations.

Trends observed in our datasets are analysed on a temporal scale with any trigger values for specific water quality measures highlighted and presented within the results chapter of each seasonal report.

2.3 Data Analysis

The water quality measurements collected are used to assess water quality at each site in terms of health of aquatic ecosystems by comparison with guideline values recommended by the ANZECC and ARMCANZ (2000) guidelines for the protection of lowland streams (i.e. systems at < 150 m altitude) in south-east Australia. This categorisation for stream health is deemed relevant for the description of Anzac Creek, the recipient natural way due to the location in the geomorphic landscape and correlations of expected biophysical health and habitat profiles for similar stream environments.

2.4 Survey dates and personnel

On October 8th 2024, ecologists from Apical Bushfire and Planning attended Moorebank Precinct West (MPW) to collect water quality data across the testing sites which are located within selected inlet points and discharge points within the stormwater drainage and management system (SIOMP) located within the Moorebank Logistics Park site West (See map image 2.).

Inlet and outlet points within the network are representative of variant sites where stormwater will enter a node of the system (as a point source) and then release from the that node of the system at a discharge point. By recording inlet and discharge data water quality can be tracked along the continuum within the system to determine condition changes and overall trends in measured quality at given sites.

This data was collected on behalf of MID plumbing in accordance with 'The Stormwater Infrastructure Operation and Maintenance Plan Moorebank Logistics Park – West Precinct 2020' and in compliance with Condition of Consent B40 (Liverpool City) for the subject site. The results of such monitoring data collection are presented within this report.

2.5 Rainfall

Between the 1st of September and the 30th of September 2024 Moorebank received approximately 36.6mm of rainfall (http://www.bom.gov.au/climate/dwo/202409/html/IDCJDW2161.202409.shtml). Between the 1st of October and the 8th of October 2024 Moorebank received approximately 8mm of rainfall.

Figure 1. Bureau of Meteorology Daily Weather Observation Holsworthy September 2024

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9 am						3 pm					
		Min	Max				Dir	Spd	Time	Temp	RH	Cld	Dir	Spd	MSLP	Temp	RH	Cld	Dir	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	8th		km/h	hPa	°C	%	8th		km/h	hPa
1	Su	7.3	26.5	0			NW	37	14:12	18.2	41		N	6	1012.6	26.2	18		NW	20	1008.3
2	Mo	13.4	24.3	0			WNW	74	10:34	23.0	22		NW	20	1008.1	19.5	23		WSW	35	1013.0
3	Tu	7.9	18.8	0			WSW	48	02:09	12.8	44		WSW	19	1029.5	17.6	32		ESE	13	1028.3
4	We	2.3	22.9	0			N	37	11:25	10.5	69		W	9	1029.7	21.9	30		NE	15	1023.3
5	Th	5.5	27.2	0			N	28	10:46	13.9	66	8		Calm	1024.6	27.0	28	7	N	15	1019.3
6	Fr	10.7	29.4	0			NW	48	14:37	20.5	53		NNW	9	1022.5	29.0	25		NW	22	1017.3
7	Sa	14.0	24.7	0			SE	43	13:08	23.9	46	6	ESE	11	1021.5	20.1	70	6	ESE	20	1021.2
8	Su	14.5	20.8	0			SSW	22	07:01	14.9	54	8	WSW	13	1021.3	18.9	44	7	N	9	1016.3
9	Mo	8.1	24.3	0			WSW	41	11:19	17.4	45		NW	13	1017.8	23.9	31		WSW	19	1014.8
10	Tu	8.5	22.1	0			ENE	26	14:15	16.6	58		WNW	9	1025.7	20.6	58		E	15	1023.8
11	We	6.7	26.1	0			S	33	19:53	16.5	75			Calm	1024.7	25.2	35		NNE	9	1019.6
12	Th	15.2	20.1	0			S	57	15:21	16.9	70	8	S	22	1021.7	17.8	61	1	S	28	1021.8
13	Fr	10.2	19.3	0			SW	30	09:33	12.9	58	8	WSW	13	1028.4	17.5	48	8	ESE	13	1025.1
14	Sa	4.8	24.0	0			S	54	21:08	13.8	70		WNW	7	1023.6	23.0	28		W	13	1017.7
15	Su	6.4	17.0	0			SSW	61	12:36	12.6	46	1	SSW	20	1026.8	15.7	37	7	S	30	1026.0
16	Mo	3.5	19.9	0			E	31	13:14	11.3	51		WNW	9	1026.6	17.8	38		ESE	17	1022.6
17	Tu	5.8	22.2	0			SE	30	15:39	14.5	51		W	11	1026.4	21.3	32		NW	13	1020.6
18	We	4.2	26.1	0			WNW	44	15:12	16.5	37		W	17	1018.0	25.9	12		WNW	20	1011.9
19	Th	7.9	26.7	0			W	59	15:34	17.3	37		WNW	6	1009.8	25.2	13		W	33	1005.1
20	Fr	11.3	24.8	0			W	41	08:37	16.5	38		W	22	1010.9	24.4	18		W	17	1006.5
21	Sa	8.3	24.2	0			WSW	39	16:26	18.6	41		WSW	11	1010.7	23.1	21		WNW	22	1008.5
22	Su	8.2	25.7	0			WNW	33	13:50	18.8	41		NNW	11	1016.0	25.2	23		WNW	15	1013.1
23	Mo	6.6	28.7	0			SW	33	16:37	18.6	51		NNW	9	1019.4	28.4	21		WNW	15	1015.0
24	Tu	11.6	26.7	0			SSE	28	00:13	17.8	65	1		Calm	1021.6	23.0	53	5	E	17	1016.0
25	We	13.9	26.8	0			W	31	16:29	18.3	64	8		Calm	1014.7	25.3	37	8	W	9	1009.2
26	Th	10.5	13.5	8.6			S	54	02:38	10.8	91	8	SW	19	1019.2	10.9	89	8	SSW	19	1020.2
27	Fr	10.2	17.2	12.2			SSE	41	05:24	13.1	83	8	S	15	1027.9	14.6	77	6	S	17	1026.9
28	Sa	9.8	19.1	7.8			E	35	12:47	17.0	61	8	ESE	20	1029.4	17.4	63	8	ESE	19	1025.8
29	Su	10.0	21.4	0.6			ENE	26	15:07	17.1	78	3	WSW	9	1023.7	19.7	74	8	NE	9	1019.0
30	Mo	14.1	20.3	7.4			S	48	11:20	17.5	74	8	SW	17	1019.7	18.4	61	1	SSE	28	1020.2
Statistics for September 2024																					
Mean		9.0	23.0							16.3	56	6		11	1021.1	21.5	40	6		18	1017.9
Lowest		2.3	13.5	0						10.5	22	1		Calm	1008.1	10.9	12	1	#	9	1005.1
Highest		15.2	29.4	12.2			WNW	74		23.9	91	8	#	22	1029.7	29.0	89	8	WSW	35	1028.3
Total				36.6																	

IDCJDW2161.202409 Prepared at 13:00 UTC on Monday 14 October 2024

Figure 2. Bureau of Meteorology Daily Weather Observation Holsworthy October 2024

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9 am						3 pm					
		Min	Max				Dir	Spd	Time	Temp	RH	Cld	Dir	Spd	MSLP	Temp	RH	Cld	Dir	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	8th		km/h	hPa	°C	%	8th		km/h	hPa
1	Tu	7.6	23.0	0.2			E	37	15:50	17.0	65			Calm	1023.5	19.9	59		E	20	1020.9
2	We	12.9	19.2	5.2			SSE	37	11:23	14.4	94	8	SSE	11	1030.8	18.5	62	6	SSE	19	1029.5
3	Th	11.6	20.9	0.4			E	31	15:08	18.3	60	8	ENE	9	1031.0	18.9	54	1	E	20	1026.6
4	Fr	6.3	24.7	0.2			ENE	24	14:37	16.1	68		NNW	9	1020.8	23.6	46	7	ENE	13	1013.3
5	Sa	13.3	25.9	2.0			WNW	43	10:00	21.8	66	2	WNW	13	1007.6	24.8	30	5	W	19	1005.2
6	Su	10.3	27.4	0			W	46	15:01	18.6	56		NNW	9	1011.1	27.1	27		W	17	1009.9
7	Mo	10.2	29.1	0			SSE	50	22:52	18.5	61	1	NNW	7	1017.9	28.4	28		WNW	19	1014.3
8	Tu	13.9	15.4	0			SSE	54	23:16	14.2	80	8	SSE	19	1023.2	14.3	62	8	SSE	26	1023.0
9	We	11.9	16.8	0			SSE	31	11:14	15.3	60	8	S	17	1026.8	16.6	53	8	SSE	19	1025.4
10	Th	10.4	24.9	0			N	33	11:23	15.9	74		NW	9	1023.8	23.9	45		NNW	11	1018.9
11	Fr	12.5	24.9	0			SSE	31	22:37	18.6	74		WSW	6	1024.3	23.3	59	3	ESE	17	1019.9
12	Sa	14.4	18.8	5.0			SSE	57	00:35	16.0	66	8	SSE	17	1026.6	17.1	49	7	SSE	22	1026.8
13	Su	8.7	21.4	0			E	30	16:00	13.3	76	8	WSW	7	1027.6	20.6	48	8	ENE	15	1022.8
14	Mo	9.0		0						16.2	71	8	W	9	1019.4	15.6	87	8	S	28	1017.4
Statistics for the first 14 days of October 2024																					
Mean		10.9	22.5							16.7	69	6		10	1022.5	20.9	50	6		18	1019.6
Lowest		6.3	15.4	0						13.3	56	1		Calm	1007.6	14.3	27	1	NNW	11	1005.2
Highest		14.4	29.1	5.2			SSE	57		21.8	94	8	SSE	19	1031.0	28.4	87	8	S	28	1029.5
Total				13.0																	

3. Results

Data results captured by our water quality sampling are presented herein and are representative of baseline water quality results for Moorebank Precinct West Basin 5. Threshold guideline quantitative values for the water quality parameter themes are compared and correlated to ANZECC/ARMCANZ (2000) guidelines under the categorisation thresholds – Waterway benchmark group: 'The protection of slightly disturbed lowland river ecosystems in southeast Australia'.

As these are the first samples results collected under our scope for the SIOMP-MPW sites, the sampling results presented in this report will be considered for future analysis against subsequent results for use as baseline data for the drainage network SIOMP function.

Triggers Exceedances from both the In-Situ Data and the Laboratory Samples October 2024

Location Basin 6 Outflow 5.2

Dissolved Oxygen (DO %) is at 113.21% which is above the threshold of between 85-110% for lowland rivers. This is considered a positive attribute for stream health as increased oxygen levels are a general surrogate for healthy stream conditions for aquatic organisms and biota.

Total phosphorous was at 160 µg/L which is above the threshold of 25 50 µg/L for rivers flowing to the coast.

Total nitrogen was at 1,100 µg/L which is above the threshold of 350 µg/L for rivers flowing to the coast.

This reading for nitrogen is considered high against the benchmark, function of the bioretention basins is not at optimal design given that the filtration profiling and vegetation design to absorb and process nitrogen and nitrates is not at a complete stage, the expectation that readings for nitrogen will improve in future as the basins are completed and function in accordance with final design which is current not the case for the site.

pH is 6.21 which is below the threshold of 6.5-8.5 % for lowland rivers.

pH readings at the discharge must be monitored overtime to observe any negative trend for this attribute

This reading is considered only a slight acidic reading below the neutral range.

pH readings at the discharge must be monitored overtime to observe any negative trend for this attribute

Total phosphorous is at 30 µg/L which is above the threshold of 25 µg/L for rivers flowing to the coast.

This is considered only a slight exceedance for the value and reflects the general site condition as a non-natural environ, and not a natural low land river – which is the benchmarking for the results.

Total nitrogen is at 400 µg/L which is above the threshold of 350 µg/L for rivers flowing to the coast.

This is considered only a slight exceedance for the value and reflects the general site condition as a non-natural environ, and not a natural low land river – which is the benchmarking for the results.

All other tested attributes are considered to meet the ANZECC guidelines for natural low land rivers – which is applied within the report as a general benchmarking standard.

Literature Review

Peak Nitrogen Values

Nitrogen

Nitrogen has spiked to a level approximately 3 times the ANZECC trigger value for rivers flowing to the coast at this collection point.

https://www.dcceew.gov.au/environment/protection/npi/resource/student/total-nitrogen-0

Literature:

In a 1996 paper reported in the Journal of Hydrology B. Arheimer a, L. Andersson a, A. Lepistö b suggest that; Intensively drained catchments showed the quantitatively largest difference between growing and dormant seasons for NH4 • N concentrations retained within the creek – stream system.

In general, links between nitrogen concentrations and flow/seasons could be related to annual mean temperature, annual mean concentrations and the water regime of the catchments. The geographical heterogeneity of detected links and the still rather low explanation level for the concentration variation, show the importance of a more dynamic approach to nitrogen monitoring and inclusion of reportable weather and flow conditions within the monitoring process.

It is advised that nitrogen levels recorded within the nearby Anzac Creek and potentially extend to nearby River WQ test results be quantified / evaluated and cross referenced with this data, to identify the existence of broader trends in the associated drainage network and recipient natural creek and river systems. Any longer-term trends and general pattern for increased nitrogen will continue to be assessed across future reporting periods. Testing at increased water depth at the source and after activation of the network after rainfall events will help calibrate this result against previous trends of much lower values.

observations suggest that nitrogen and phosphorus loads were driven primarily by surface runoff rather than groundwater discharge to natural streams.

Praktan D. Wadnerkar a, Luke Andrews a, Wei Wen Wong b, Xiaogang Chen a c, Rogger E. Correa a, Shane White a, Perran L.M. Cook b, Christian J. Sanders a d, Isaac R. Santos a e
Paper reported in Science of the Total Environmental March 2021 suggest

'Overall, intensive agricultural land use and episodic rainfall events were the major spatial and temporal drivers of nitrogen loads within a natural water body.'

J. S. Baron, E. K. Hall, B. T. Nolan, J. C. Finlay, E. S. Bernhardt, J. A. Harrison, F. Chan & E. W. Boyer; 2012 Article The interactive effects of excess reactive nitrogen and climate change on aquatic ecosystems and water resources of the United States, suggest

'Alterations in precipitation amount and dynamics will alter runoff quality, thereby influencing both rates of Nr inputs to aquatic ecosystems and groundwater and the water residence times that affect Nr removal within aquatic systems.
Both infrastructure within the catchment and climate change alter the landscape connectivity and hydrologic residence time that are essential to denitrification process within a drainage system.

While Nr inputs to and removal rates from aquatic systems are influenced by climate and management, reduction of N inputs from their source will be the most effective means to prevent or to minimize environmental and economic impacts of excess Nr.

Of relevance to the subject site could be the accumulation of nitrates from oxides distributed by exhaust fumes from trucks and heavy combustion equipment as Oxides of nitrogen are contained in the exhaust fumes emitted

into the atmosphere by cars, aeroplanes, trains and boats. These emissions are dissolved by rain and then enter streams, lakes and other water bodies.

https://www.dcceew.gov.au/sites/default/files/documents/factsheet-totalnitrogen_0.pdf

What effect does total nitrogen have on the environment?

Total nitrogen can have damaging effects on the environment and particularly on aquatic life (the fish, shellfish and other creatures in our rivers, lakes and oceans) because most nitrogen is leaked into waterways.
Total nitrogen can also lead to toxic blue-green algal blooms. Blue-green algae can harm humans and can make both humans and animals very sick. Do you see how important it is to help keep our waterways clean?

https://nitrogen-generators.com/what-is-the-main-industrial-use-of-nitrogen/#:~:text=Food%20Packaging%3A%20It%20is%20common,snack%20foods%20can%20be%20extended.

Five (5) Industrial Applications of Nitrogen
While the main industrial use of nitrogen is to create ammonia that is required for fertilizer, explosives, and other materials, it uses go far beyond these applications. From food packaging to pharmaceuticals, nitrogen gas can be found in more places and used for more purposes than you may have realized.

Food Packaging: It is common practice for food processing companies to use compressed nitrogen to displace oxygen in the packaging of perishable foods. Without oxygen, the shelf life of foods such as meats, fruits, vegetables, and various snack foods can be extended. Nitrogen can also add a cushion around food to keep it safe during transport.

Chemical Blanketing: Nitrogen is typically used to prevent fires and explosions in dangerous atmospheres like chemical plants or manufacturing facilities, by lowering the oxygen level below explosive limits.

Electronics: In the process of assembling electronics, nitrogen gas is used when two electronic components are forming a permanent connection, also known as soldering. The gas is used to reduce surface tension so there is a cleaner break away from the site of the electrical bond. Nitrogen gas is also used in a computer's main processing system to prevent it from overheating.

Laboratory: Laboratories require a very specific environment to ensure that tests and results are carried out accurately. Nitrogen gas is used to control oxygen levels, humidity and temperature, and maintain an appropriate atmosphere for highly sensitive procedures and equipment. Additionally, there are various pieces of laboratory equipment that require nitrogen for purging.

Laser Cutting: The application of nitrogen as a purging gas in the steel industry is extremely important. It is used as an assist gas to blow away molten material and achieve a stronger stainless or aluminized steel product that is also more resistant to corrosion.

https://nigen.com/industries-that-benefit-from-on-site-nitrogen-systems/

Industries That Benefit from On-Site Nitrogen Systems
Gaseous nitrogen is very useful in large-scale manufacturing and industrial applications. The large volumes of nitrogen gas required for these operations are either sourced from vendors in gas cylinders or generated on-site. In this article, we will highlight critical industrial processes that benefit from on-site nitrogen systems.

Elevation pH values recorded from location Discharge point 6

pH – Acidity, Alkalinity

https://www.umass.edu/mwwp/protocols/rivers/ph_alkalinity_river.html

Alkalinity is a measure of a river's "buffering capacity," or its ability to neutralize acids. Alkaline compounds in the water such as bicarbonates (baking soda is one type), carbonates, and hydroxides remove H+ ions and lower the acidity of the water (which means increased pH). They do this usually by combining with the H+ ions to make new compounds. Without this acid neutralizing capacity, any acid added to a river would cause an immediate change in the pH.

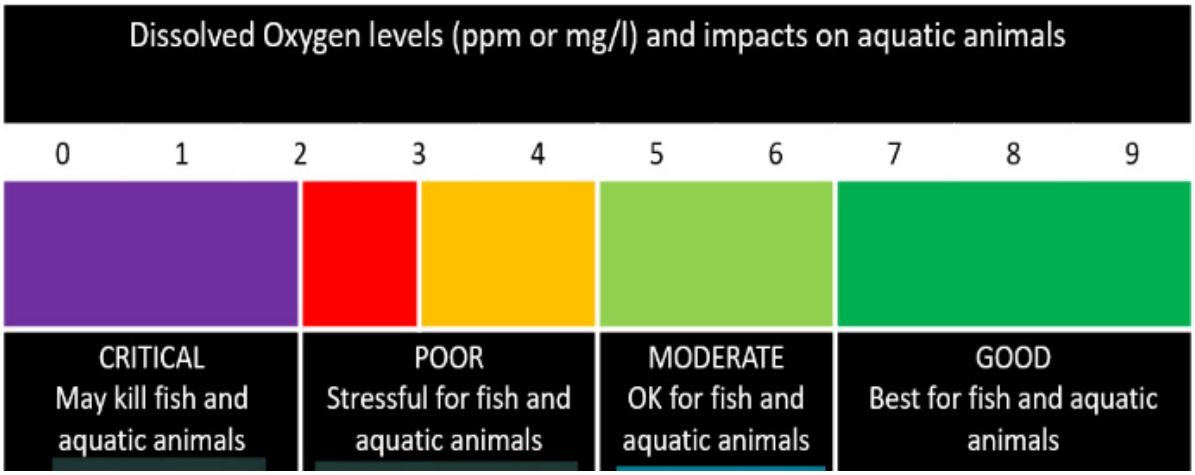
Measuring alkalinity is important to determining a river's ability to neutralize acidic pollution (as measured by pH) from rainfall or snowmelt. It's one of the best measures of the sensitivity of the river to acid inputs.

Alkalinity comes from rocks and soils, salts, certain plant activities, and certain industrial wastewater discharges. Total alkalinity is measured by collecting a water sample, and measuring the amount of acid needed to bring the sample to a pH of 4.2. At this pH all the alkaline compounds in the sample are "used up." The result is reported as milligrams per liter (mg/l) of calcium carbonate.

3.2 Interpreting Results

Dissolved Oxygen – Measures:

Dissolved oxygen (DO) is oxygen held (dissolved) in the water and available to aquatic organisms.
The amount of dissolved oxygen in a river or stream can tell us a lot about its water quality.
Water will naturally contain a certain amount of dissolved oxygen that is absorbed from the air and produced by plants and algae living in the water.
Temperature has a large effect on the amount of oxygen dissolved in water; cold water can hold higher levels of oxygen than warmer water. Higher water temperatures over summer will cause oxygen levels to drop.
Other factors such as river flow, wind, nutrients and bacterial activity can also affect the amount of dissolved oxygen in waterways.
Dissolved oxygen levels typically range between 5 and 14 mg/L (or ppm).
Example:



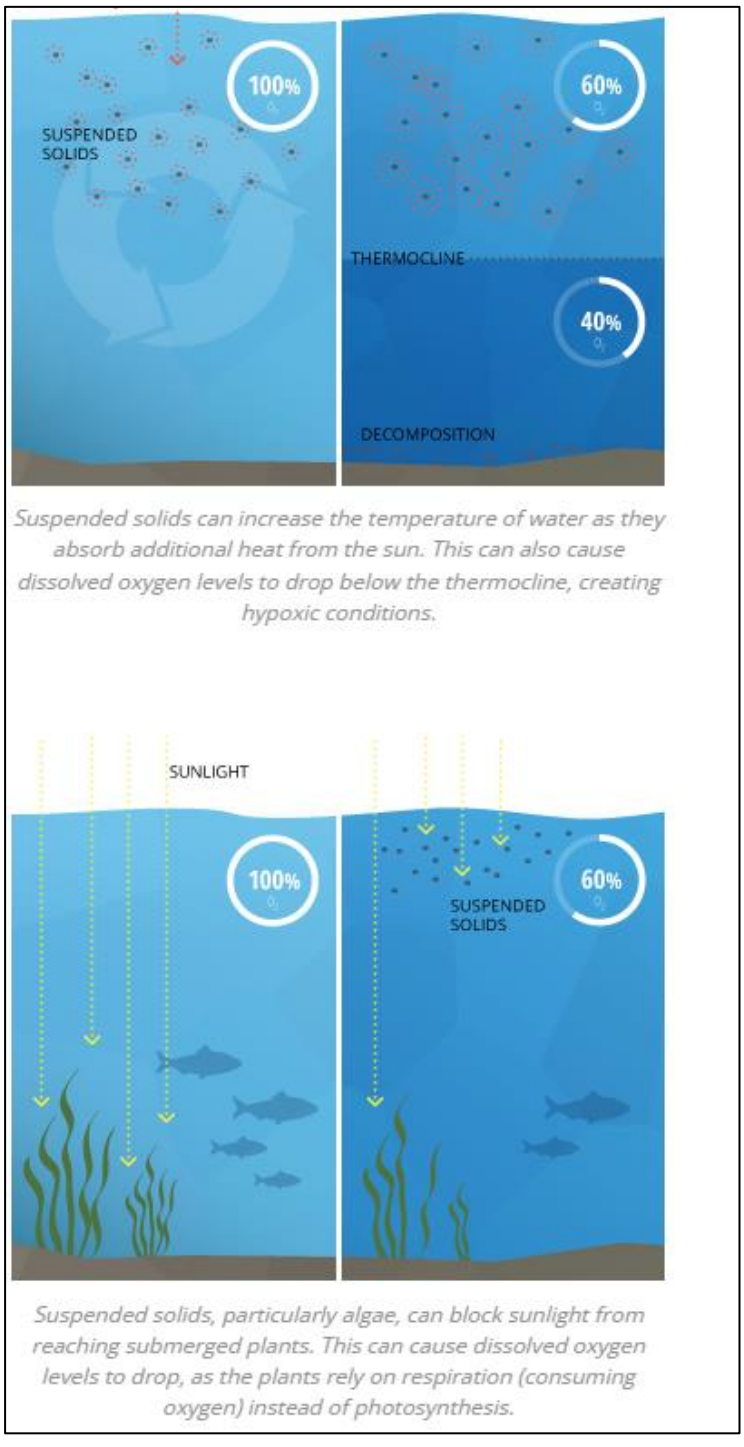
Salinity – Measures:

Electrical conductivity is a measure of the saltiness of the water and is measured on a scale from 0 to 50,000 uS/cm. Electrical conductivity is measured in microsiemens per centimeter (uS/cm). Freshwater is usually between 0 and 1,500 uS/cm and typical sea water has a conductivity value of about 50,000 uS/cm. Examples:

µS/cm	Use
0 - 800	• Good drinking water for humans (provided there is no organic pollution and not too much suspended clay material) • Generally good for irrigation, though above 300µS/cm some care must be, particularly with overhead sprinklers, which may cause leaf, scorch on some salt sensitive plants. • Suitable for all livestock
800 - 2500	• Can be consumed by humans, although most would prefer water in the lower half of this range if available • When used for irrigation, requires special management including suitable soils, good drainage and consideration of salt tolerance of plants • Suitable for all livestock
2500 -10,000	• Not recommended for human consumption, although water up to 3000 µS/cm can be consumed • Not normally suitable for irrigation, although water up to 6000 µS/cm can be used on very salt tolerant crops with very special management techniques. Over 6000 µS/cm, occasional emergency may be possible with care • When used for drinking water by poultry and pigs, the salinity should be limited to about 6000 µS/cm. Most other livestock can use water up to 10000 µS/cm

Total Dissolve Solids (TDS) – Measures

Dissolved solids, smaller than 2 microns, refer to any minerals, salts, metals, in the form of molecules, atoms, cations or anions dissolved in water. Total dissolved solids (TDS) comprise inorganic salts (principally calcium, magnesium, potassium, sodium, bicarbonates, chlorides and sulfates) and some small amounts of organic matter that dissolve in water.
The TDS concentration is the sum of all filterable substances in water that can be determined gravimetrically. However, in most cases, TDS is primarily comprised of ions.
High levels of total suspended solids can affect turbidity, increase water temperatures and decrease dissolved oxygen (DO) levels. This can cause the water to heat up more rapidly because the suspended particles absorb more heat and deplete oxygen, which can adversely affect aquatic life.

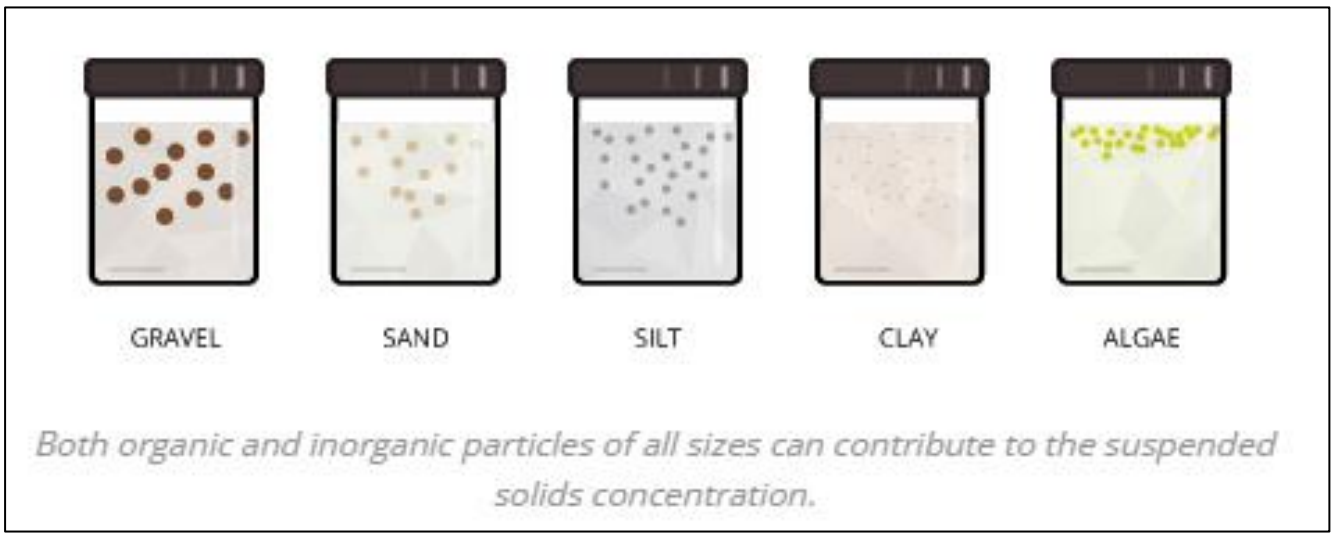


Suspended solids can increase the temperature of water as they absorb additional heat from the sun. This can also cause dissolved oxygen levels to drop below the thermocline, creating hypoxic conditions.

Suspended solids, particularly algae, can block sunlight from reaching submerged plants. This can cause dissolved oxygen levels to drop, as the plants rely on respiration (consuming oxygen) instead of photosynthesis.

Turbidity – Total Suspended Solids (TSS)

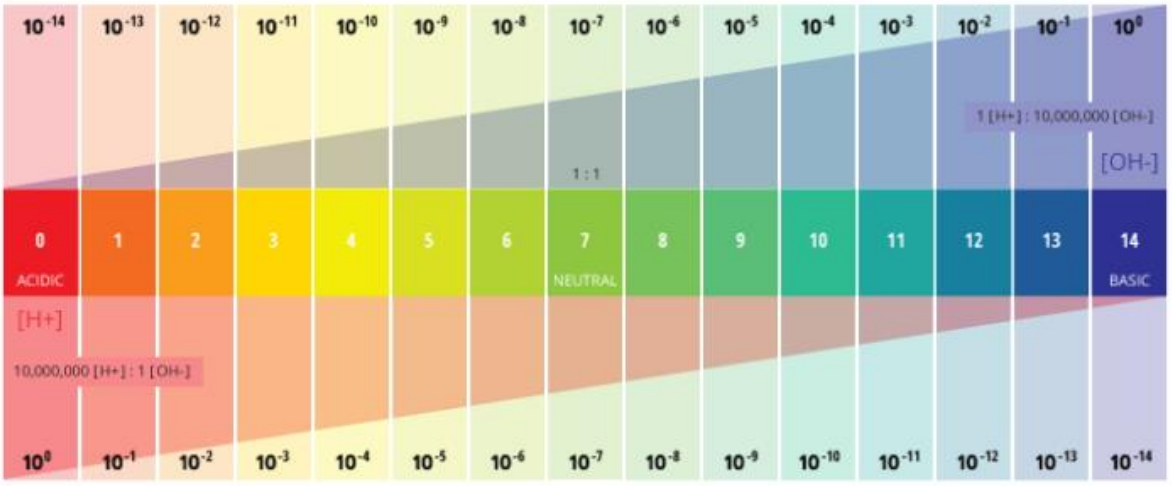
Turbidity data are reported in Nephelometric Turbidity Units (NTU). To provide a sense of scale, water with a turbidity of 1 NTU is crystal clear, water at 5 NTU has a tiny trace of discolouration, and water at 100 NTU is brown and opaque. The standard is less than 10 NTU for rural streams and rivers and less than 30 NTU for urban lakes and ponds.
Total suspended solids (TSS) are particles that are larger than 2 microns found in the water column. Anything smaller than 2 microns (average filter size) is considered a dissolved solid. Most suspended solids are made up of inorganic materials, though bacteria and algae can also contribute to the total solids concentration.



Both organic and inorganic particles of all sizes can contribute to the suspended solids concentration.

pH – Acidity / Alkalinity – Measures

The pH refers to the degree of acidity or alkalinity of a substance. A pH of 7 is neutral. A value above 7 indicates that the water is more alkaline and a pH below 7 indicates acidic conditions.
A pH of 7 is considered neutral. The logarithmic scale means that each number below 7 is 10 times more acidic than the previous number when counting down. Likewise, when counting up above 7, each number is 10 times more basic than the previous number pH stands for the "power of hydrogen" [3]. The numerical value of pH is determined by the molar concentration of hydrogen ions (H+) [3]. This is done by taking the negative logarithm of the H+ concentration (-log(H+)).
Standard values for pH readings are expected, pH 6.5–9 for rural streams and rivers and pH 6–9 for urban lakes and ponds.
In freshwater systems pH sets up the conditions for how easy it is for nutrients to be available and how easily things like heavy metals (toxicity for aquatic life) can dissolve in the water. Rivers and lakes generally range between 5 (acidic) and 9 (basic) on the pH scale.



The logarithmic scale of pH means that as pH increases, the H+ concentration will decrease by a power of 10. Thus at a pH of 0, H+ has a concentration of 1 M. At a pH of 7, this decreases to 0.0000001 M. At a pH of 14, there is only 0.00000000000001 M

Summary of results

Aquatic ecosystems	
Indicator	**Numerical criteria (trigger values)**
Total phosphorus	• Upland rivers: 20 µg/L • Lowland rivers: 25 µg/L for rivers flowing to the coast; • Lakes & reservoirs: 10 µg/L • Estuaries: 30 µg/L
Total nitrogen	• Upland rivers: 250 µg/L • Lowland rivers: 350 µg/L for rivers flowing to the coast; • Lakes & reservoirs: 350 µg/L • Estuaries: 300µg/L
Chlorophyll-a	• Upland rivers: not applicable • Lowland rivers: 5 µg/L • Lakes & reservoirs: 5 µg/L. • Estuaries: 4 µg/L.
Turbidity	• Upland rivers: 2–25 NTU (see supporting information) • Lowland rivers: 6–50 NTU (see supporting information) • Lakes & reservoirs: 1–20 NTU • Estuaries: 0.5–10 NTU
Salinity (electrical conductivity)	• Upland rivers: 30–350 µS/cm • Lowland rivers: 125–2200 µS/cm supporting information
Dissolved oxygen	• Upland rivers: 90–110% • Lowland rivers: 85–110% • Freshwater lakes & reservoirs: 90–110% • Estuaries: 80–110% Note: Dissolved oxygen values were derived from daytime measurements. Dissolved oxygen concentrations may vary diurnally and with depth. Monitoring programs should assess this potential variability.
pH	• Upland rivers: 6.5–8.0 • Lowland rivers: 6.5–8.5 • Freshwater lakes & reservoirs: 6.5–8.0 • Estuaries: 7.0–8.5 Changes of more than 0.5 pH units from the natural seasonal maximum or minimum should be investigated.

3.1 Key Summary of Results Spring (October) 2024

Dissolved Oxygen (DO %) is at 114.29% which is above the threshold of between 85-110% for lowland rivers. This is considered a positive attribute for stream health as increased oxygen levels are a general surrogate for healthy stream conditions for aquatic organisms and biota.

pH is 6.21 which is below the threshold of 6.5-8.5 % for lowland rivers.

This reading is considered only a slight acidic reading below the neutral range.

pH readings at the discharge must be monitored overtime to observe any negative trend for this attribute

Total phosphorous is at 30 µg/L which is above the threshold of 25 µg/L for rivers flowing to the coast.

This is considered only a slight exceedance for the value and reflects the general site condition as a non-natural environ, and not a natural low land river – which is the benchmarking for the results.

Total nitrogen is at 400 µg/L which is above the threshold of 350 µg/L for rivers flowing to the coast.

This is considered only a slight exceedance for the value and reflects the general site condition as a non-natural environ, and not a natural low land river – which is the benchmarking for the results.

Zinc is at 0.008mg/L which is at the threshold for lowland rivers, however marginally higher in value than the other basin records for this period.

Continue to monitor for trends under future readings.

All other tested attributes are considered to meet the ANZECC guidelines for natural low land rivers – which is applied within the report as a general benchmarking standard.

3.2 Recommendations

There are no water quality management recommendations provided under this reporting period.

STORMWATER DISCHARGE TESTING SITE

Site image 1. Testing site Basin 6 - Outflow

Table. In-situ data and observations Retention Basin 6 outflow

Moorebank West Precinct - Retention Basin 6 Outflow (MPW 5.2 outflow)			
Date: 09/10/2024	**Time:** 11:25am	**Temp:** 15.3°C	**Humidity:** 60%
Operator: Marco Perry		**Coordinates:** -33.947085, 150.917653	
Equipment used: Aquatroll 500			
Parameter	Recording	**ANZECC** ANZECC 2000 Guidelines *Lowland rivers	Triggered? Y/N
Temperature (Celcius)	20.1	Abnormal to seasonal variation	N
Dissolved Oxygen (DO %)	113.21%	*Lowland rivers Lower limit: 85% Upper Limit: 110%	Y
Dissolved Oxygen (DO ppm)	10.4 ppm	*Lowland rivers Lower limit: 85% Upper Limit: 110%	
Electrical Conductivity (C- $^{um/cm}$)	7.3 C- $^{um/cm}$	125–2200 µS/cm	N
pH	6.51	Min 6.5 Max 8.5	N
NTU	6.73	6-50	N

(a) Total phosphorus

Basin 6.1 inflow - Total phosphorous – Qube Logistics, Moorebank, NSW		Trigger Trigger Value - ANZECC 2000 Guidelines	Triggered
Lab results - Total phosphorous:	160 µg/L	25 µg/L - 50 µg/L	Y
Notes: • Channel Culvert • Trigger value 50 µg/L for lowland rivers, trigger value 25 µg/L for rivers flowing to the coast Anzecc Guidelines 2000.			

(b) Total Nitrogen as N (TKN + NOx) by Discrete Analyser

Basin 6.1 inflow - Total nitrogen – Qube Logistics, Moorebank, NSW		Trigger Value - ANZECC 2000 Guidelines	Triggered
Lab results -Total nitrogen:	1,100 µg/L	350 µg/L for rivers flowing to the coast	Y
Notes: • Total Nitrogen as N (TKN + NOx) by Discrete Analyser • Trigger values are based on a low-lying river			

(c) Kjeldahl nitrogen Total Kjeldahl Nitrogen as N

Basin 6.1 inflow - Kjeldahl nitrogen – Qube Logistics, Moorebank, NSW		Trigger Value - ANZECC 2000 Guidelines	Triggered
Lab results – kjeldahl nitrogen:	1,000 µg/L	-	-
Notes: • Total Kjeldahl Nitrogen as N			

(d) Dissolved metals;

Basin 6.1 inflow - Dissolved metals – Qube Logistics, Moorebank, NSW			
Equipment used: - Sample bottles collected from monitoring site ALS Environmental Laboratory Testing Report			
Lab results – Dissolved metals:	**Measures mg/L**	**Trigger value ANZECC Guidelines 2000 95% protection criteria**	**Triggered**
Arsenic	<0.001	0.013 mg/L	N
Cadmium	<0.0001	0.0002 mg/L	N
Chromium	<0.001	0.001 mg/L	N
Copper	0.001	0.0014mg/L	N
Nickel	0.002	0.011 mg/L	N
Lead	<0.001	0.0034 mg/L	N
Zinc	<0.005	0.008 mg/L	N
Mercury	<0.0001	0.0006 mg/L	N
Notes: - ANZECC Guidelines (2000) suggest 0.002 mg/L is considered appropriate for slightly-moderately disturbed systems. - Copper and Zinc exceed ANZECC Guidelines			

(e) PFAS;

Basin 6.1 inflow - PFAS – Qube Logistics, Moorebank, NSW			
PFAS Surrogate	**Measure** µg/L	**95% species protection (DEE 2016)**	**Triggered**
Perfluorooctane sulfonic acid (PFOS) µg/L	101%	.13 (µg/L)	
Perfluorooctanoic acid (PFOA)	101%	220 (µg/L)	
Notes: This Guidance focuses on PFOS and PFOA as potential indicators of wider contamination by related PFASs. The reasons for this approach include: • Most research undertaken on PFASs internationally and in Australia has focused on PFOS and PFOA due to their frequent occurrence in the environment, persistence, and bioaccumulation. • PFOS and PFOA can also be the breakdown endpoint of other precursor products. • PFOS and PFOA are the most commonly encountered PFAS in the environment and wildlife. • Information on other PFASs, of which there are several hundred known, is more limited. • Effective management of PFOS and PFOA may help address potential contamination where other PFASs may also be present. * DEE 2016. Commonwealth Environmental Management Guidance on Perfluorooctane Sulfonic Acid (PFOS) and Perfluorooctanoic Acid (PFOA). Department of the Environment and Energy.			

(f) Total suspended solids.

Basin 6.1 inflow - Total suspended solids – Qube Logistics, Moorebank, NSW		EPA exceedance value	Trigger
Lab results – Total suspended solids: mg/L	24 mg/L	50 mg/L	N
Notes: • Total Suspended Solids dried at 104 ± 2°C			

(g) Total hydrocarbons

Basin 6.1 inflow - Total hydrocarbons – Qube Logistics, Moorebank, NSW							
Lab results -Total hydrocarbons:	Trigger value ANZECC Guidelines 2000 – slightly disturbed lowland river ecosystem	Triggered	Baseline monitoring May 2024 (Apical)	Monitoring discharge points October 2024 (Apical)	Monitoring discharge points Month Year (Apical)	Monitoring discharge points Month Year (Apical)	Trend
Benzene µg/L	1300 µg/L	N	<1	<1			
Toluene µg/L	-	N	<2	<2			
Ethylbenzene µg/L	-	N	<2	<2			
meta-& para-Xylene µg/L	200 µg/L	N	<2	<2			
Ortho-Xylene µg/L	470 µg/L	N	<2	<2			
Total Xylenes µg/L	-	-	<2	<2			
Sum of BTEX µg/L	-	-	<1	<1			
Naphthalene µg/L	85 µg/L	N	<5	<5			
Notes: • The data were compared to the default trigger values (DTVs) recommended by ANZECC/ARMCANZ (2000) for the protection of slightly disturbed lowland river ecosystems in southeast Australia. • A commonly encountered example of additive toxicity of mixtures is the simple aromatic hydrocarbons commonly associated with contaminated petroleum sites, benzene, toluene, ethyl benzene and xylenes, collectively known as BTEX							

Water Quality Monitoring Comparative Table (Temporal)

Retention Basin 6 MPW. Testing Site MPW 6 outflo

Testing Site 6 MPW Inflow	May 2024	Oct 2024	
pH	8.54	6.51	
Dissolved Oxygen - %/L	5.5 DO mg/L	10.4mg/L	
Actual Electronic Conductivity - ms/cm	0.627 SPC - ms/cm	7.3 <0.0001 (C-um/cm)	
Temperature - ℃	14.4	20.1	
Turbidity	6.13 NTU	6.73 NTU	
Total phosphorous - mg/L	0.42 mg/L	0.16 mg/L	
Total nitrogen - mg/L	3.7 mg/L	1.1 mg/L	
Kjeldahl nitrogen mg/L	1.8 mg/L	1.0 mg/L	
Dissolved metals			
Arsenic	0.003	<0.001	
Cadmium	<0.0001	<0.0001	
Chromium	0.001	<0.001	
Copper	0.005	0.001	
Nickel	0.002	0.002	
Lead	<0.001	<0.001	
Zinc	0.021	<0.005	
Mercury	<0.0001	<0.0001	
PFAS			
Lab results – SUM of PFAS Micrograms/L	0.10	1.55	
SUM of PFHxS & PFOS Microgrms/L	0.03	1.08	
Total suspended solids mg/L	<5	24	
Total hydrocarbons			
Benzene	<1	<1	
Toluene	<2	<2	
Ethylbenzene	<2	<2	
meta-& para-Xylene	<2	<2	
Ortho-Xylene	<2	<2	
Total Xylenes	<2	<2	
Sum of BTEX	<1	<1	
Naphthalene	<5	<5	-

Appendix A. Raw data tables; source - Australian Laboratory Services

Basin 6: Outflow

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	GR1	MBW B80	MBW B60	MBW B50 (GR2)	MBE DP1
			Sampling date / time	09-Oct-2024 12:30	09-Oct-2024 11:45	09-Oct-2024 11:30	09-Oct-2024 12:00	09-Oct-2024 10:00
Compound	CAS Number	LOR	Unit	EW2404631-001	EW2404631-002	EW2404631-003	EW2404631-004	EW2404631-005
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	<0.01	0.69	1.55	0.04	0.08
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	0.56	1.08	0.04	0.05
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	0.65	1.49	0.04	0.08
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	2	%	99.8	99.2	98.1	102	103
Toluene-D8	2037-26-5	2	%	101	98.3	97.7	102	99.9
4-Bromofluorobenzene	460-00-4	2	%	96.2	94.6	92.3	94.0	93.6
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	98.2	96.9	101	103	103
13C8-PFOA	----	0.02	%	98.7	97.9	101	101	101

Appendix B. ANZECC & ARMCANZ (2000) water quality guidelines

Table 3.4.1 Trigger values for toxicants at alternative levels of protection. Values in grey shading are the trigger values applying to typical *slightly–moderately disturbed systems*; see table 3.4.2 and Section 3.4.2.4 for guidance on applying these levels to different ecosystem conditions.

Chemical		Trigger values for freshwater (µgL^{-1})				Trigger values for marine water (µgL^{-1})			
		Level of protection (% species)				Level of protection (% species)			
		99%	95%	90%	80%	99%	95%	90%	80%
METALS & METALLOIDS									
Aluminium	pH >6.5	27	55	80	150	ID	ID	ID	ID
Aluminium	pH <6.5	ID	ID	ID	ID	ID	ID	ID	ID
Antimony		ID	ID	ID	ID	ID	ID	ID	ID
Arsenic (As III)		1	24	94 [C]	360 [C]	ID	ID	ID	ID
Arsenic (AsV)		0.8	13	42	140 [C]	ID	ID	ID	ID
Beryllium		ID	ID	ID	ID	ID	ID	ID	ID
Bismuth		ID	ID	ID	ID	ID	ID	ID	ID
Boron		90	370 [C]	680 [C]	1300 [C]	ID	ID	ID	ID
Cadmium	H	0.06	0.2	0.4	0.8 [C]	0.7 [B]	5.5 [B, C]	14 [B, C]	36 [B, A]
Chromium (Cr III)	H	ID	ID	ID	ID	7.7	27.4	48.6	90.6
Chromium (CrVI)		0.01	1.0 [C]	6 [A]	40 [A]	0.14	4.4	20 [C]	85 [C]
Cobalt		ID	ID	ID	ID	0.005	1	14	150 [C]
Copper	H	1.0	1.4	1.8 [C]	2.5 [C]	0.3	1.3	3 [C]	8 [A]
Gallium		ID	ID	ID	ID	ID	ID	ID	ID
Iron		ID	ID	ID	ID	ID	ID	ID	ID
Lanthanum		ID	ID	ID	ID	ID	ID	ID	ID
Lead	H	1.0	3.4	5.6	9.4 [C]	2.2	4.4	6.6 [C]	12 [C]
Manganese		1200	1900 [C]	2500 [C]	3600 [C]	ID	ID	ID	ID
Mercury (inorganic)	B	0.06	0.6	1.9 [C]	5.4 [A]	0.1	0.4 [C]	0.7 [C]	1.4 [C]
Mercury (methyl)		ID	ID	ID	ID	ID	ID	ID	ID
Molybdenum		ID	ID	ID	ID	ID	ID	ID	ID
Nickel	H	8	11	13	17 [C]	7	70 [C]	200 [A]	560 [A]
Selenium (Total)	B	5	11	18	34	ID	ID	ID	ID
Selenium (SeIV)	B	ID	ID	ID	ID	ID	ID	ID	ID
Silver		0.02	0.05	0.1	0.2 [C]	0.8	1.4	1.8	2.6 [C]
Thallium		ID	ID	ID	ID	ID	ID	ID	ID
Tin (inorganic, SnIV)		ID	ID	ID	ID	ID	ID	ID	ID
Tributyltin (as µg/L Sn)		ID	ID	ID	ID	0.0004	0.006 [C]	0.02 [C]	0.05 [C]
Uranium		ID	ID	ID	ID	ID	ID	ID	ID
Vanadium		ID	ID	ID	ID	50	100	160	280
Zinc	H	2.4	8.0 [C]	15 [C]	31 [C]	7	15 [C]	23 [C]	43 [C]
NON-METALLIC INORGANICS									
Ammonia	D	320	900 [C]	1430 [C]	2300 [A]	500	910	1200	1700
Chlorine	E	0.4	3	6 [A]	13 [A]	ID	ID	ID	ID
Cyanide	F	4	7	11	18	2	4	7	14
Nitrate	J	17	700	3400 [C]	17000 [A]	ID	ID	ID	ID
Hydrogen sulfide	G	0.5	1.0	1.5	2.6	ID	ID	ID	ID
ORGANIC ALCOHOLS									
Ethanol		400	1400	2400 [C]	4000 [C]	ID	ID	ID	ID
Ethylene glycol		ID	ID	ID	ID	ID	ID	ID	ID
Isopropyl alcohol		ID	ID	ID	ID	ID	ID	ID	ID
CHLORINATED ALKANES									
Chloromethanes									
Dichloromethane		ID	ID	ID	ID	ID	ID	ID	ID
Chloroform		ID	ID	ID	ID	ID	ID	ID	ID
Carbon tetrachloride		ID	ID	ID	ID	ID	ID	ID	ID
Chloroethanes									
1,2-dichloroethane		ID	ID	ID	ID	ID	ID	ID	ID
1,1,1-trichloroethane		ID	ID	ID	ID	ID	ID	ID	ID

Chemical	Trigger values for freshwater (µgL^{-1})				Trigger values for marine water (µgL^{-1})			
	Level of protection (% species)				Level of protection (% species)			
	99%	95%	90%	80%	99%	95%	90%	80%
1,1,2-trichloroethane	5400	6500	7300	8400	140	1900	5800 [C]	18000 [C]
1,1,2,2-tetrachloroethane	ID	ID	ID	ID	ID	ID	ID	ID
Pentachloroethane	ID	ID	ID	ID	ID	ID	ID	ID
Hexachloroethane B	290	360	420	500	ID	ID	ID	ID
Chloropropanes								
1,1-dichloropropane	ID	ID	ID	ID	ID	ID	ID	ID
1,2-dichloropropane	ID	ID	ID	ID	ID	ID	ID	ID
1,3-dichloropropane	ID	ID	ID	ID	ID	ID	ID	ID
CHLORINATED ALKENES								
Chloroethylene	ID	ID	ID	ID	ID	ID	ID	ID
1,1-dichloroethylene	ID	ID	ID	ID	ID	ID	ID	ID
1,1,2-trichloroethylene	ID	ID	ID	ID	ID	ID	ID	ID
1,1,2,2-tetrachloroethylene	ID	ID	ID	ID	ID	ID	ID	ID
3-chloropropene	ID	ID	ID	ID	ID	ID	ID	ID
1,3-dichloropropene	ID	ID	ID	ID	ID	ID	ID	ID
ANILINES								
Aniline	8	250 [A]	1100 [A]	4800 [A]	ID	ID	ID	ID
2,4-dichloroaniline	0.6	7	20	60 [C]	ID	ID	ID	ID
2,5-dichloroaniline	ID	ID	ID	ID	ID	ID	ID	ID
3,4-dichloroaniline	1.3	3	6 [C]	13 [C]	85	150	190	260
3,5-dichloroaniline	ID	ID	ID	ID	ID	ID	ID	ID
Benzidine	ID	ID	ID	ID	ID	ID	ID	ID
Dichlorobenzidine	ID	ID	ID	ID	ID	ID	ID	ID
AROMATIC HYDROCARBONS								
Benzene	600	950	1300	2000	500 [C]	700 [C]	900 [C]	1300 [C]
Toluene	ID	ID	ID	ID	ID	ID	ID	ID
Ethylbenzene	ID	ID	ID	ID	ID	ID	ID	ID
o-xylene	200	350	470	640	ID	ID	ID	ID
m-xylene	ID	ID	ID	ID	ID	ID	ID	ID
p-xylene	140	200	250	340	ID	ID	ID	ID
m+*p*-xylene	ID	ID	ID	ID	ID	ID	ID	ID
Cumene	ID	ID	ID	ID	ID	ID	ID	ID
Polycyclic Aromatic Hydrocarbons								
Naphthalene	2.5	16	37	85	50 [C]	70 [C]	90 [C]	120 [C]
Anthracene B	ID	ID	ID	ID	ID	ID	ID	ID
Phenanthrene B	ID	ID	ID	ID	ID	ID	ID	ID
Fluoranthene B	ID	ID	ID	ID	ID	ID	ID	ID
Benzo(a)pyrene B	ID	ID	ID	ID	ID	ID	ID	ID
Nitrobenzenes								
Nitrobenzene	230	550	820	1300	ID	ID	ID	ID
1,2-dinitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,3-dinitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,4-dinitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,3,5-trinitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-methoxy-2-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-methoxy-4-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-chloro-2-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-chloro-3-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-chloro-4-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-chloro-2,4-dinitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,2-dichloro-3-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,3-dichloro-5-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,4-dichloro-2-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
2,4-dichloro-2-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID

Chemical	Trigger values for freshwater (µgL^{-1})				Trigger values for marine water (µgL^{-1})			
	Level of protection (% species)				Level of protection (% species)			
	99%	95%	90%	80%	99%	95%	90%	80%
Hexazinone	ID	ID	ID	ID	ID	ID	ID	ID
Simazine	0.2	3.2	11	35	ID	ID	ID	ID
Urea herbicides								
Diuron	ID	ID	ID	ID	ID	ID	ID	ID
Tebuthiuron	0.02	2.2	20	160 [C]	ID	ID	ID	ID
Miscellaneous herbicides								
Acrolein	ID	ID	ID	ID	ID	ID	ID	ID
Bromacil	ID	ID	ID	ID	ID	ID	ID	ID
Glyphosate	370	1200	2000	3600 [A]	ID	ID	ID	ID
Imazethapyr	ID	ID	ID	ID	ID	ID	ID	ID
Ioxynil	ID	ID	ID	ID	ID	ID	ID	ID
Metolachlor	ID	ID	ID	ID	ID	ID	ID	ID
Sethoxydim	ID	ID	ID	ID	ID	ID	ID	ID
Trifluralin B	2.6	4.4	6	9 [A]	ID	ID	ID	ID
GENERIC GROUPS OF CHEMICALS								
Surfactants								
Linear alkylbenzene sulfonates (LAS)	65	280	520 [C]	1000 [C]	ID	ID	ID	ID
Alcohol ethoxyolated sulfate (AES)	340	650	850 [C]	1100 [C]	ID	ID	ID	ID
Alcohol ethoxylated surfactants (AE)	50	140	220	360 [C]	ID	ID	ID	ID
Oils & Petroleum Hydrocarbons	ID	ID	ID	ID	ID	ID	ID	ID
Oil Spill Dispersants								
BP 1100X	ID	ID	ID	ID	ID	ID	ID	ID
Corexit 7664	ID	ID	ID	ID	ID	ID	ID	ID
Corexit 8667		ID	ID	ID	ID	ID	ID	ID
Corexit 9527	ID	ID	ID	ID	230	1100	2200	4400 [A]
Corexit 9550	ID	ID	ID	ID	ID	ID	ID	ID

Notes: Where the final water quality guideline to be applied to a site is below current analytical practical quantitation limits, see Section 3.4.3.3 for guidance.

Most trigger values listed here for metals and metalloids are *High reliability* figures, derived from field or chronic NOEC data (see 3.4.2.3 for reference to Volume 2). The exceptions are *Moderate reliability* for freshwater aluminium (pH >6.5), manganese and marine chromium (III).

Most trigger values listed here for non-metallic inorganics and organic chemicals are *Moderate reliability* figures, derived from acute LC_{50} data (see 3.4.2.3 for reference to Volume 2). The exceptions are *High reliability* for freshwater ammonia, 3,4-DCA, endosulfan, chlorpyrifos, esfenvalerate, tebuthiuron, three surfactants and marine for 1,1,2-TCE and chlorpyrifos.

* = *High reliability* figure for esfenvalerate derived from mesocosm NOEC data (no alternative protection levels available).

A = Figure may not protect key test species from acute toxicity (and chronic) — check Section 8.3.7 for spread of data and its significance. 'A' indicates that trigger value > acute toxicity figure; note that trigger value should be <1/3 of acute figure (Section 8.3.4.4).

B = Chemicals for which possible bioaccumulation and secondary poisoning effects should be considered (see Sections 8.3.3.4 and 8.3.5.7).

C = Figure may not protect key test species from chronic toxicity (this refers to experimental chronic figures or geometric mean for species) — check Section 8.3.7 for spread of data and its significance. Where grey shading and 'C' coincide, refer to text in Section 8.3.7.

D = Ammonia as TOTAL ammonia as [NH_3-N] at pH 8. For changes in trigger value with pH refer to Section 8.3.7.2.

E = Chlorine as total chlorine, as [Cl]; see Section 8.3.7.2.

F = Cyanide as un-ionised HCN, measured as [CN]; see Section 8.3.7.2.

G = Sulfide as un-ionised H_2S, measured as [S]; see Section 8.3.7.2.

H = Chemicals for which algorithms have been provided in table 3.4.3 to account for the effects of hardness. The values have been calculated using a hardness of 30 mg/L $CaCO_3$. These should be adjusted to the site-specific hardness (see Section 3.4.3).

J = Figures protect against toxicity and do not relate to eutrophication issues. Refer to Section 3.3 if eutrophication is the issue of concern.

ID = Insufficient data to derive a reliable trigger value. Users advised to check if a low reliability value or an ECL is given in Section 8.3.7.

T = Tainting or flavour impairment of fish flesh may possibly occur at concentrations below the trigger value. See Sections 4.4.5.3/3 and 8.3.7.

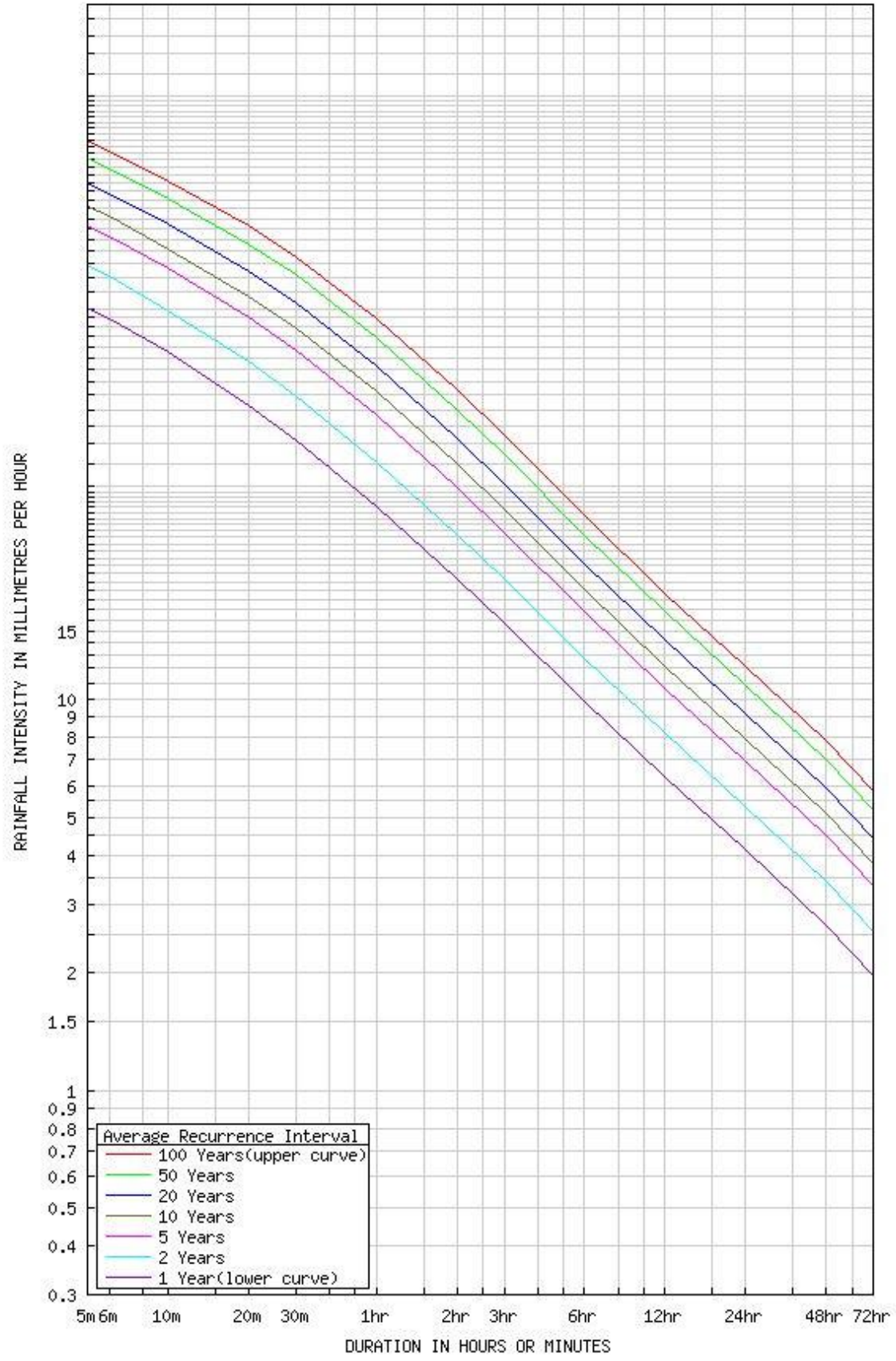
Table 5. Ecological water quality guideline values developed by water regulators

Exposure scenario	PFOS	PFOA	Exposure scenario	Comments and source
Freshwater	0.00023 µg/L	19 µg/L	99% species protection - high conservation value systems	Australian and New Zealand Guidelines for Fresh and Marine Water Quality - technical draft default guideline values for PFOS and PFOA. Note 1: The 99% species protection level for PFOS is close to the level of detection. Agencies may wish to apply a 'detect' threshold in such circumstances rather than a quantified measurement. Note 2: The draft guidelines do not account for effects which result from the biomagnification of toxicants in air-breathing animals or in animals which prey on aquatic organisms. Note 3: The WQGs advise[41] that the 99% level of protection be used for slightly to moderately disturbed systems. This approach is generally adopted for chemicals that bioaccumulate and biomagnify in wildlife. Regulators may specify or environmental legislation may prescribe the level of species protection required, rather than allowing for case-by-case assessments.
	0.13 µg/L	220 µg/L	95% species protection - slightly to moderately disturbed systems	
	2 µg/L	632 µg/L	90% species protection - highly disturbed systems	
	31 µg/L	1824 µg/L	80% species protection - highly disturbed systems	
Interim marine	0.00023 µg/L	19 µg/L	99% species protection - high conservation value systems	As above. Freshwater values are to be used on an interim basis until final marine guideline values can be set using the nationally-agreed process under the Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Note 1: The WQG advise that in the case of estuaries, the most stringent of freshwater and marine criteria apply, taking account of any available salinity correction. Note 2: Marine guideline values developed by CRC CARE are under consideration through the nationally-agreed water quality guideline development process.
	0.13 µg/L	220 µg/L	95% species protection - slightly to moderately disturbed systems	
	2 µg/L	632 µg/L	90% species protection - highly disturbed systems	
	31 µg/L	1824 µg/L	80% species protection - highly disturbed systems	

https://www.waterquality.gov.au/sites/default/files/documents/ANZECC-1992-guidelines.pdf

Type of indicator	Indicator	Units	Fresh waters	Marine waters
	Dissolved oxygen[2]	mg/L	> 6 (> 80–90% saturation)	> 6 (> 80–90% saturation)
	Nutrients/nuisance growths	–	(Section 2.3.3)	(Section 2.3.3)
	pH	–	6.5–9.0	< 0.2 pH unit change
	Salinity	mg/L	< 1000 (about 1,500 µS/cm)	–
	Suspended particulate matter/turbidity	–	< 10% change seasonal mean concentration (see also colour & clarity)	< 10% change seasonal mean concentration (see also colour & clarity)
	Temperature[3]	–	< 2°C increase	< 2°C increase
Toxicants				
Inorganic toxicants	Aluminium	µg/L	< 5.0 (if pH < = 6.5)	NR
	Aluminium	µg/L	< 100.0 (if pH > 6.5)	–
	Ammonia	µg/L	20.0–30.0 (Table 2.3)	NR
	Antimony	µg/L	30.0	500.0
	Arsenic	µg/L	50.0	50.0
	Beryllium	µg/L	4.0[4]	NR
	Cadmium	µg/L	0.2–2.0[5]	2.0
	Chromium	µg/L	10.0	50.0
	Copper	µg/L	2.0–5.0[5]	5.0
	Cyanide	µg/L	5.0	5.0
	Iron	µg/L	1,000.0[6]	NR
	Lead	µg/L	1.0–5.0[5]	5.0
	Mercury	µg/L	0.1	0.1
	Nickel	µg/L	15.0–150.0[5]	15.0
	Selenium	µg/L	5.0	70.0
	Silver	µg/L	0.1	1.0
	Sulfide	µg/L	2.0	2.0
	Thallium	µg/L	4.0	20.0
	Tin (tributyltin)	µg/L	0.008	0.002
	Zinc	µg/L	5.0–50.0[6]	50.0
Organic toxicants	Acrylonitrile	µg/L	NR	NR
	Benzidine	µg/L	NR	NR
	Dichlorobenzidine	µg/L	NR	NR
	Diphenylhydrazine	µg/L	NR	NR
Halogenated aliphatic compounds	Hexachlorobutadiene	µg/L	0.1	0.3
	Halogenated ethers	µg/L	NR	NR
	Isophorone	µg/L	NR	NR
Monocyclic aromatic compounds	Benzene	µg/L	300.0	300.0
	Chlorinated benzenes	µg/L	(Table 2.8)	NR

Appendix C. Intensity Frequency Duration – Average Recurrence Interval Indicator
Intensity-Frequency-Duration (bom.gov.au)



Moorebank Logistics Park West Precinct

Basin 8

Spring Stormwater Network Water Quality Monitoring Data & Reporting October 2024

Site image: retention basin 8 MPW (Apical image October 2024)

Prepared for: MID Plumbing P/L

Prepared by: Daniel Anderson (BEnvSc, MEnvSc)

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Phone: 0415617771
Office: PO Box 149 Kiama NSW 2533
ABN: 656 420 10 400

Consulted Documents / database.

Australia and New Zealand Guidelines for fresh and Marine Water Quality (2000)
NATIONAL WATER QUALITY MANAGEMENT STRATEGY - Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000) - Volume 2 - Aquatic ecosystems

Bureau of Meteorology – Australian Government Australia's official weather forecasts & weather radar - Bureau of Meteorology (bom.gov.au)

Moorebank Intermodal Precinct West – Stage 3 (SSD 10431) | Assessment Report March 2021
https://moorebankintermodalprecinct.com.au/wp-content/uploads/2023/04/MPW-S3-DPIE-assessment-report-to-IPC.pdf

WQM Report Western Precinct _Basin 8_Autumn 2024 – Apical Bushfire and Planning - April 2024

Development Consent - Section 4.38 of the Environmental Planning and Assessment Act 1979 - Application Number: SSD 7709 Applicant: Sydney Intermodal Terminal Alliance (SIMTA) as Qube Holdings Limited Consent Authority: The Independent Planning Commission Site: Moorebank Avenue, Moorebank Lot 1 DP 1197707 Lot 100 DP 1049508 Lot 101 DP 1049508 Lot 2 DP 1197707 Part Lot 3 DP 1197707 Part Anzac Road and Moorebank Avenue public road reserves Development: Moorebank Precinct West Stage 2 (MPW Stage 2)

Development Consent - Section 4.38 of the Environmental Planning and Assessment Act 1979 - Application Number: SSD 10431 Applicant: Sydney Intermodal Terminal Alliance (SIMTA) as Qube Holdings Limited Consent Authority: The Independent Planning Commission Site: Moorebank Avenue, Moorebank Lot 1 DP 1197707 Lot 100 DP 1049508 Lot 101 DP 1049508 Moorebank Precinct West Stage 3 (MPW Stage 3)

Australian Laboratory Services (ALS) Work Order EW2402561 Certificate of Analysis Water Sample Data 31st May 2024.

Liverpool DCP
Liverpool's Development Control Plans | Liverpool City Council (nsw.gov.au)

DEE 2016. Commonwealth Environmental Management Guidance on Perfluorooctane Sulfonic Acid (PFOS) and Perfluorooctanoic Acid (PFOA). Department of the Environment and Energy.
https://environment.gov.au/system/files/pages/dfb876c5-581e-48b7-868c-242fe69dad68/files/draft-environmental-mgt-guidance-pfos-pfoa.pdf

Development Consent SSD 7709 - Section 4.38 of the Environmental Planning and Assessment Act 1979
https://www.ipcn.nsw.gov.au/resources/pac/media/files/pac/projects/2019/05/moorebank-intermodal-precinct-west-stage-2/referral-from-department-of-planning-and-environment/revised-recommended-conditions/mpw-stage-2-recommended-conditions-inclusive-of-edits-191105.pdf

Glossary

The following definitions apply to terms used in this report. Many of these definitions are consistent with relevant national literature and cited where appropriate.

Current status trigger value
Concentrations of water quality indicators that reflect existing ecosystem condition, and therefore provide a target for ecosystem maintenance and a benchmark against which future water quality trends may be monitored.

Environmental value
Particular values or uses of the environment important for a healthy ecosystem or for public benefit, welfare, safety or health and requiring protection from the effects of pollution or degradation (Environment Australia 2002).

Indicator
A parameter (biological, physical or chemical) used to provide a measure of the quality of water or the condition of an ecosystem (Environment Australia 2002).

Low-risk trigger value
Concentrations (or loads) of key performance indicators [of water quality] at which if not exceeded, there is a low risk that adverse biological effects will occur (ANZECC 2000a).

Median
The middle reading, or 50th percentile, of all readings taken. i.e. of the readings 10, 13, 9, 16 and 11 (re-ordering these to read 9, 10, 11, 13 and 16), the median is 11. The mean (or average), is the sum of all values divided by the total number of readings (which in this case equals 11.8).

Reference condition
Refers to a site which is unmodified or minimally modified from 'natural' condition. Most commonly, reference sites are subject to limited disturbance from human activity. The reference condition then serves as a standard or target against which environmental change in other similar sites can be assessed.

Trigger value
A concentration that, if exceeded, would indicate a potential environmental problem, and so 'trigger' a management response, such as further investigation and/or remedial actions (ANZECC 2000a).

Water quality guideline
A numerical concentration level (e.g. of a contaminant) or narrative statement (e.g. visual appearance of a water body) recommended to support and maintain a designated water use (ANZECC 2000a)

1.1 Background

The Sydney Intermodal Terminal Alliance (SIMTA) received approval for the construction and operation of Stage 3 (the Project) of Moorebank Precinct West (MPW), which comprises the third stage of development within the Moorebank Precinct West under Development Approval SSD-10431.

The proposal is SSD under clause 19 of Schedule 1 of the State Environmental Planning Policy (State and Regional Development) 2011, as it is development for the purpose of rail and related transport facilities.

The MPW site is located on the western side of Moorebank Avenue and forms the western section of the Moorebank Intermodal Precinct (Map image 1 & 2). The MPW site is approximately 2.5 kilometres (km) from the Liverpool city centre, 27 km south-west of the Sydney Central Business District (CBD) and 26 km west of Port Botany.

The MPW site is irregular in shape, approximately 3 km from north to south and 960 m from east to west at its widest point and covers an area of approximately 220 ha. It is situated between the Georges River to the west (with the SSFL running north-south to the west of the river); and Moorebank Avenue to the east.

Works on the MPW site to date have commenced under two current and active development consents:

• MPW Stage 1 early works, which provides demolition, rehabilitation, remediation of contaminated land, and the establishment of construction facilities and access including site security (as part of the SSD 5066 consent)

• MPW Stage 2, which provides for the construction and 24/7 operation of an intermodal facility and associated warehousing (SSD 7709).

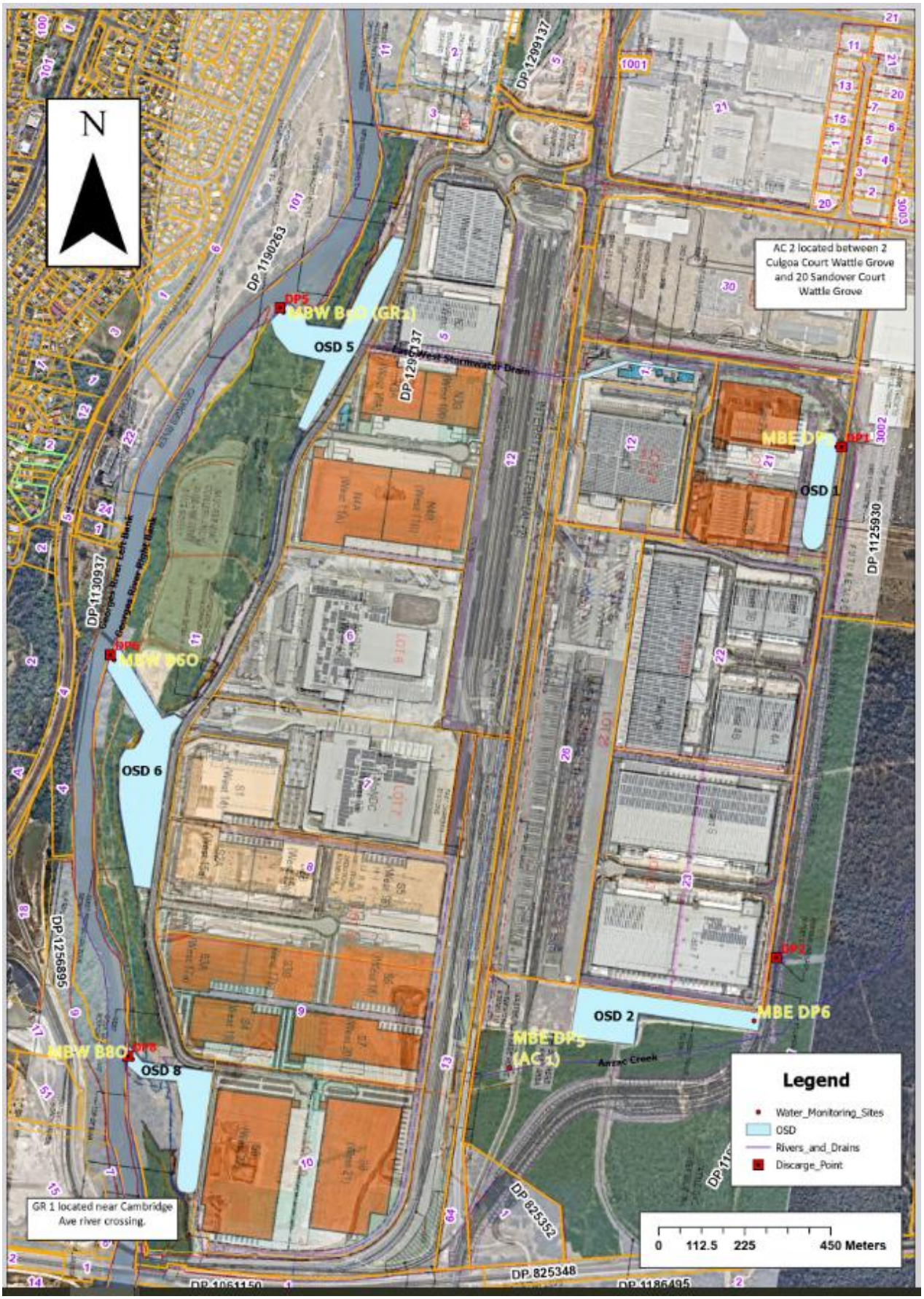
Across the entire precinct there are six onsite detention basins. Bioretention/biofiltration systems also make up the stormwater management infrastructure within the site.

This water quality monitoring program is guided by the Stormwater Infrastructure Operation and Maintenance Plan (SIOPM) and is provided to Qube Holdings Limited (the Applicant) on behalf of MID Plumbing. Three onsite bio-retention basins are present within Moorebank Precinct West. This report is in reference to Basin 8 (MPW – south).

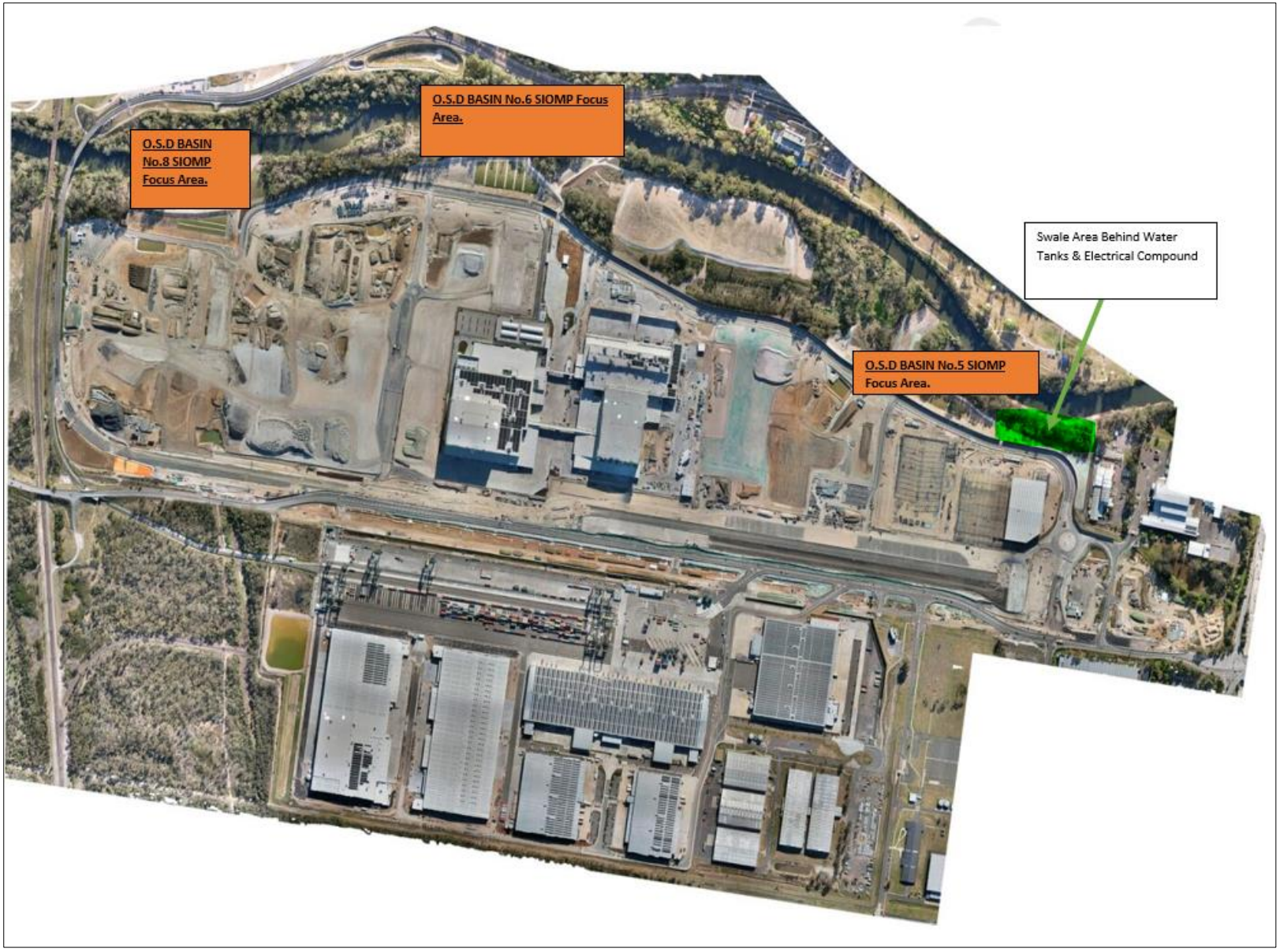
Development Consent - Section 4.38 of the Environmental Planning and Assessment Act 1979 - Application Number: SSD 7709 Moorebank Precinct West Stage 2 (MPW Stage 2)

CoC	Requirement
Stormwater Quality Monitoring	
B38.	Stormwater Quality Monitoring Program - Prior to commencement of operation Part of the Operational Environmental Management Plan

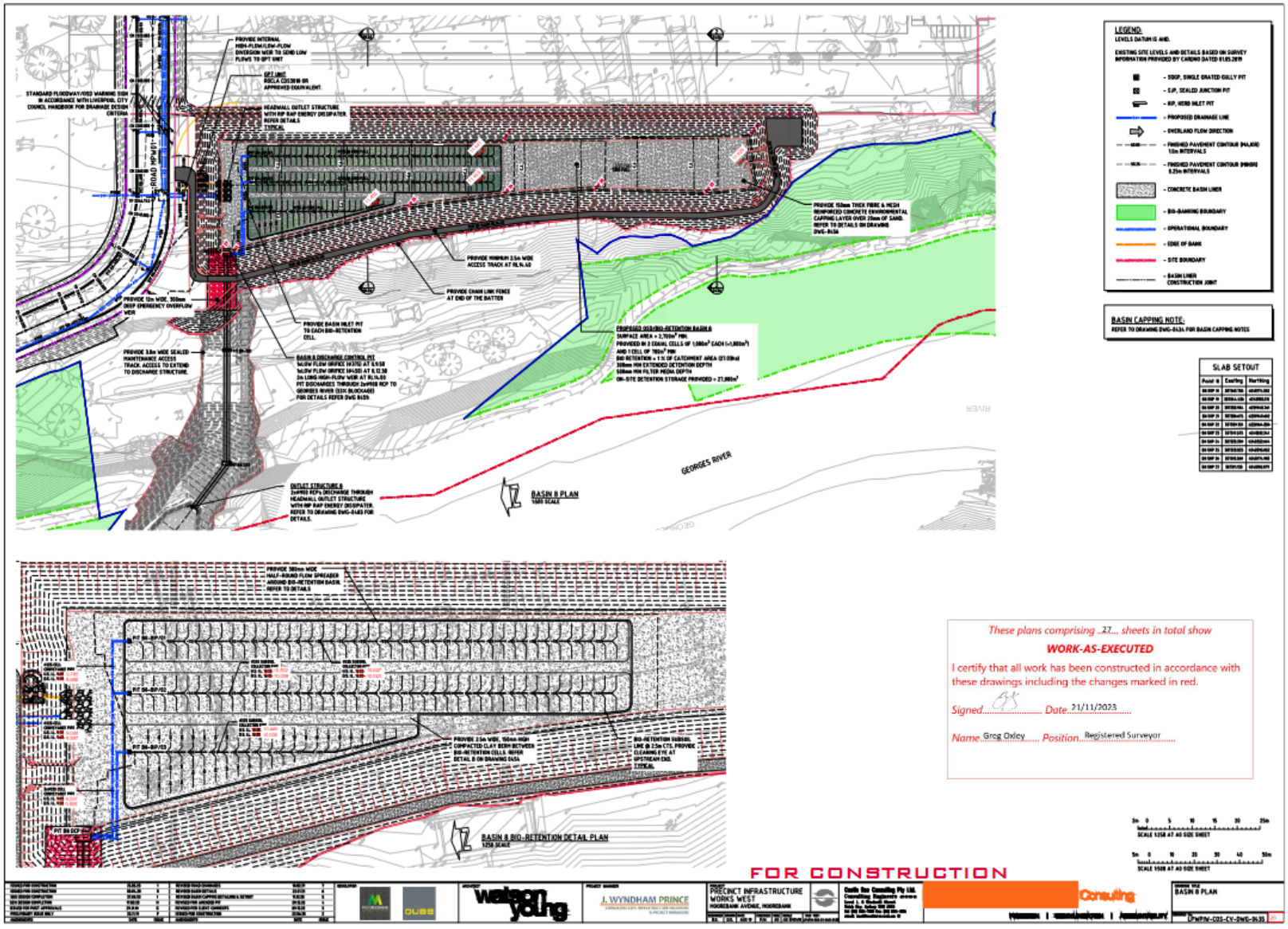
Map image 1. Overview subject site (MPW) provided by Arcadis



Map Image 2. Moorebank Precinct West Detention Basins (provided by MID Plumbing)

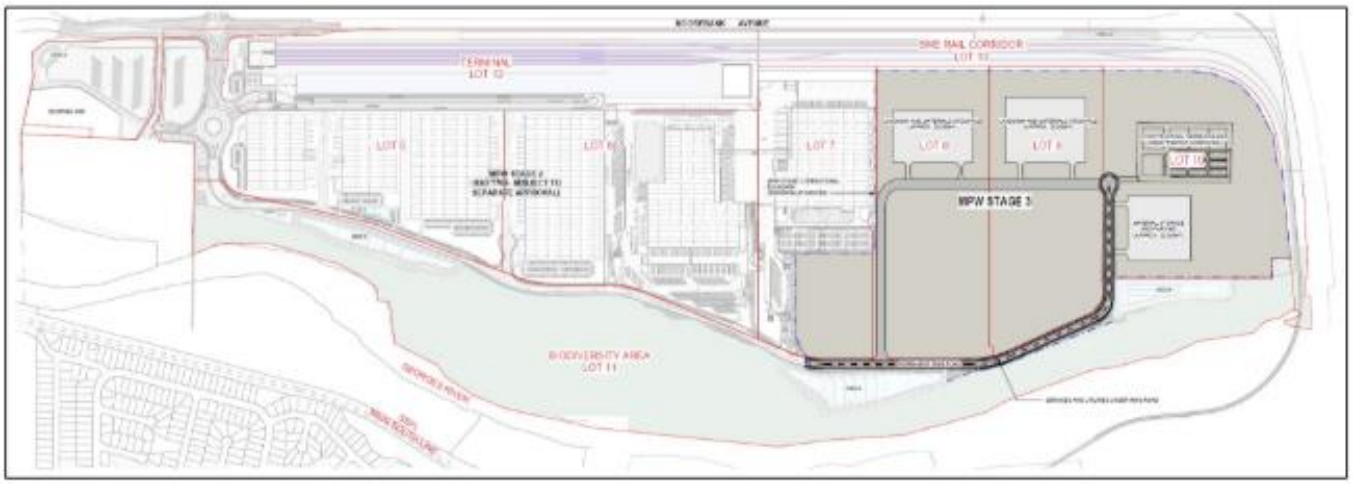


Map image 3. Detention Basin 8 MPW (south)



Reference information

Map image 4. Moorebank Intermodal Precinct West – Stage 3 State Significant Development Assessment (SSD-10431) March 2021



20. Stormwater Management System or Works	That untreated stormwater is not disposed of into the Georges River or its tributaries. The likely impact of stormwater disposal on the quality of any receiving waters. That the levels of nutrients and sediments entering the waterway are not increased by the proposed development. Whether any proposals to manage stormwater are in accordance with the local council's stormwater management plans and the Managing Urban Stormwater series of documents and meet the local council's stormwater management objectives. Whether the principles outlined in the *Managing Urban Stormwater Soils and Construction Handbook* (1998) prepared by and available from Landcom and the Department of Housing are followed during each stage of a development (including subdivision).	Detailed stormwater assessments were undertaken as part of MPW Stage 2, and remain applicable to the Stage 3 proposal. The Department has recommended conditions that would enforce these requirements, by ensuring that appropriate measures are implemented to manage stormwater impacts during construction. In regard to management of stormwater during operation of the MPW site, the MPW Stage 2 proposal incorporates a robust set of conditions to manage the release of stormwater via six onsite detention basins (OSD), a major east-west covered culvert and associated drainage infrastructure.

2. Monitoring Program Methodology

2.1 Monitoring Sites

To support stormwater and drainage management of the facility the MLP West precinct has established a vast stormwater infrastructure system consisting of several Water Sensitive Urban Design (WSUD) functions including raingardens detention basins and bio-swales. These networks are designed to minimise the velocity and peak discharge of stormwater draining from the site and act as onsite detention basins to harvest and sequester potential pollutants generated at the site through designed biological processes.

The stormwater infrastructure system discharges water into the natural drainage system via three outlets:

- Basin 5 detains water from the northern section of MPW before discharging into Georges River
- Basin 6 detains water from the mid-section of MPW before discharging into Georges River
- Basin 8 detains water from the southern section of MPW before discharging into Georges River

Monitoring of the discharge points has been established via our ongoing program with MID Plumbing under the SIOMP program to collect qualitative data and analyse the performance of the WSUD provisions and to establish any potential trends in water quality readings from the stormwater network discharge points prior to release of water into the natural hydrological systems of Anzac Creek and the Georges River.

Table 1. Type of outlet MPW

Discharge Point (see figure 2)	Associated Outlet (see figure 1)	Type of outlet/detention basin
Basin 5	Inlet	Bio retention
	Outlet	Outlet point
	Georges River	River
Basin 6	Inlet	Bio retention
	Outlet	Outlet point
Basin 8	Inlet	Bio retention
	Outlet	Outlet structure

2.2 Water Quality Assessment

Surface water quality data collected at the discharge points is assessed with reference to ANZECC Guidelines (2000) and correlated with baseline Water Quality monitoring results provided by previous condition assessment reports.

By comparing water test data under the program across the testing timeline we can identify and report upon trends, identify exceedances and exclude potential anomalies for datasets.

Table. ANZECC Low Risk Trigger Values

Ecosystem type	Turbidity NTU	EC µS/cm	pH*	DO	TN mg/L	NO_x - N mg/L	NH_4^+ - N mg/L	TP mg/L	DRP - P mg/L
Upland river	2-25	30-350	6.5-7.5	90-110	0.480	0.190	0.013	0.013	0.005
Lowland river	6-50	125-2200	6.5-8.0	85-110	0.500	0.190	0.020	0.050	0.020

Values for Low Land River Systems as insert above are used as the reference guide to water quality parameter values and overall health and safety statements regarding the quality of discharged water from the SIOMP drainage network.

Annual spring and autumn water quality data presented from Anzac Creek and Georges River testing programs by other scientific consultants may also be cross referenced to the data prepared by Apical under the SIOMP program to establish potential trends in results and identify increases in accumulated pollutants from the site under operational condition, which may appear present within adjacent natural waterways.

Site data was collected in the form of water samples and in field data recordings at the prescribed monitoring points, water samples and water probe readings are undertaken following Australia and New Zealand guidelines for fresh and marine water quality – 2000 (ANZECC Guidelines), In situ water quality parameters relevant to stream health and aquatic assessment profiling were collected in field with a multiparameter hand-held water quality monitoring probe (Aquatroll 600).

Water data is collected, analysed and collated under the same methodologies and process under each testing period, the ensure consistency in the process.

Measures tested and samples taken:

- pH
- Dissolved Oxygen
- Electrical Conductivity
- Water Temperature and
- Turbidity

Water samples are collected at inlet and discharge points (Basin 5, Basin 6 & Basin 8) then sent to Australian Laboratory Services (ALS) for quality testing analysis Surface water (alsglobal.com).

Water analytical suites / testing parameters are provided to obtain overall water condition results and chemical sampling of collected water is undertaken for a range of nutrients, metals, and hydrocarbons relevant to stream health and aquatic assessment protocol, key nutrients, metals, and pollutants included in the assessment to reflect an overall suite of water quality condition guides which are listed below:

- Total phosphorous
- Total Nitrogen
- Kjeldahl Nitrogen
- Dissolved Metals
- PFAS
- Total Suspended Solids
- Total Hydrocarbons

The raw data results from the lab analysis provided to us by ALS Laboratory Services are presented within this report (see Appendix A).

Key water quality data attributes are recorded, tables and compared against; previous condition baseline data, Liverpool Development Control Plan (DCP) water quality targets, Conditions of Consent B40 and ANZECC Guideline (2000) trigger limits under the condition category -(90% protection criteria for freshwater natural systems).

The water quality guidelines are applied to ensure adjacent natural waterways George River and Anzac creek are not adversely affected by poor water quality discharge from the Moorebank logistics park site and operations.

Trends observed in our datasets are analysed on a temporal scale with any trigger values for specific water quality measures highlighted and presented within the results chapter of each seasonal report. This report provides baseline data for Basin 5 (MPW) from which trend analysis will compound over future reporting periods.

2.3 Data Analysis

The water quality measurements collected are used to assess water quality at each site in terms of health of aquatic ecosystems by comparison with guideline values recommended by the ANZECC and ARMCANZ (2000) guidelines for the protection of lowland streams (i.e. systems at < 150 m altitude) in south-east Australia. This categorisation for stream health is deemed relevant for the description of Anzac Creek, the recipient natural way due to the location in the geomorphic landscape and correlations of expected biophysical health and habitat profiles for similar stream environments.

2.4 Survey dates and personnel

On the 9th October2024, ecologists from Apical Bushfire and Planning attended Moorebank Precinct West (MPW) to collect water quality data across the testing sites which are located within selected inlet points and discharge points within the stormwater drainage and management system (SIOMP) located within the Moorebank Logistics Park site West (See map image 2).

Inlet and outlet points within the network are representative of variant sites where stormwater will enter a node of the system (as a point source) and then release from the that node of the system at a discharge point. By recording inlet and discharge data water quality can be tracked along the continuum within the system to determine condition changes and overall trends in measured quality at given sites.

This data was collected on behalf of MID plumbing in accordance with 'The Stormwater Infrastructure Operation and Maintenance Plan Moorebank Logistics Park – West Precinct 2020' and in compliance with Condition of Consent B40 (Liverpool City) for the subject site. The results of such monitoring data collection are presented within this report.

2.5 Rainfall

Between the 1st of September and the 30th of September 2024 Moorebank received approximately 36.6mm of rainfall (http://www.bom.gov.au/climate/dwo/202409/html/IDCJDW2161.202409.shtml). Between the 1st of October and the 8th of October 2024 Moorebank received approximately 8mm of rainfall.

Figure 1. Bureau of Meteorology Daily Weather Observation Holsworthy September 2024

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9 am						3 pm					
		Min	Max				Dir	Spd	Time	Temp	RH	Cld	Dir	Spd	MSLP	Temp	RH	Cld	Dir	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	8th		km/h	hPa	°C	%	8th		km/h	hPa
1	Su	7.3	26.5	0			NW	37	14:12	18.2	41		N	6	1012.6	26.2	18		NW	20	1008.3
2	Mo	13.4	24.3	0			WNW	74	10:34	23.0	22		NW	20	1008.1	19.5	23		WSW	35	1013.0
3	Tu	7.9	18.8	0			WSW	48	02:09	12.8	44		WSW	19	1029.5	17.6	32		ESE	13	1028.3
4	We	2.3	22.9	0			N	37	11:25	10.5	69		W	9	1029.7	21.9	30		NE	15	1023.3
5	Th	5.5	27.2	0			N	28	10:46	13.9	66	8		Calm	1024.6	27.0	28	7	N	15	1019.3
6	Fr	10.7	29.4	0			NW	48	14:37	20.5	53		NNW	9	1022.5	29.0	25		NW	22	1017.3
7	Sa	14.0	24.7	0			SE	43	13:08	23.9	46	6	ESE	11	1021.5	20.1	70	6	ESE	20	1021.2
8	Su	14.5	20.8	0			SSW	22	07:01	14.9	54	8	WSW	13	1021.3	18.9	44	7	N	9	1016.3
9	Mo	8.1	24.3	0			WSW	41	11:19	17.4	45		NW	13	1017.8	23.9	31		WSW	19	1014.8
10	Tu	8.5	22.1	0			ENE	26	14:15	16.6	58		WNW	9	1025.7	20.6	58		E	15	1023.8
11	We	6.7	26.1	0			S	33	19:53	16.5	75			Calm	1024.7	25.2	35		NNE	9	1019.6
12	Th	15.2	20.1	0			S	57	15:21	16.9	70	8	S	22	1021.7	17.8	61	1	S	28	1021.8
13	Fr	10.2	19.3	0			SW	30	09:33	12.9	58	8	WSW	13	1028.4	17.5	48	8	ESE	13	1025.1
14	Sa	4.8	24.0	0			S	54	21:08	13.8	70		WNW	7	1023.6	23.0	28		W	13	1017.7
15	Su	6.4	17.0	0			SSW	61	12:36	12.6	46	1	SSW	20	1026.8	15.7	37	7	S	30	1026.0
16	Mo	3.5	19.9	0			E	31	13:14	11.3	51		WNW	9	1026.6	17.8	38		ESE	17	1022.6
17	Tu	5.8	22.2	0			SE	30	15:39	14.5	51		W	11	1026.4	21.3	32		NW	13	1020.6
18	We	4.2	26.1	0			WNW	44	15:12	16.5	37		W	17	1018.0	25.9	12		WNW	20	1011.9
19	Th	7.9	26.7	0			W	59	15:34	17.3	37		WNW	6	1009.8	25.2	13		W	33	1005.1
20	Fr	11.3	24.8	0			W	41	08:37	16.5	38		W	22	1010.9	24.4	18		W	17	1006.5
21	Sa	8.3	24.2	0			WSW	39	16:26	18.6	41		WSW	11	1010.7	23.1	21		WNW	22	1008.5
22	Su	8.2	25.7	0			WNW	33	13:50	18.8	41		NNW	11	1016.0	25.2	23		WNW	15	1013.1
23	Mo	6.6	28.7	0			SW	33	16:37	18.6	51		NNW	9	1019.4	28.4	21		WNW	15	1015.0
24	Tu	11.6	26.7	0			SSE	28	00:13	17.8	65	1		Calm	1021.6	23.0	53	5	E	17	1016.0
25	We	13.9	26.8	0			W	31	16:29	18.3	64	8		Calm	1014.7	25.3	37	8	W	9	1009.2
26	Th	10.5	13.5	8.6			S	54	02:38	10.8	91	8	SW	19	1019.2	10.9	89	8	SSW	19	1020.2
27	Fr	10.2	17.2	12.2			SSE	41	05:24	13.1	83	8	S	15	1027.9	14.6	77	6	S	17	1026.9
28	Sa	9.8	19.1	7.8			E	35	12:47	17.0	61	8	ESE	20	1029.4	17.4	63	8	ESE	19	1025.8
29	Su	10.0	21.4	0.6			ENE	26	15:07	17.1	78	3	WSW	9	1023.7	19.7	74	8	NE	9	1019.0
30	Mo	14.1	20.3	7.4			S	48	11:20	17.5	74	8	SW	17	1019.7	18.4	61	1	SSE	28	1020.2
Statistics for September 2024																					
Mean		9.0	23.0							16.3	56	6		11	1021.1	21.5	40	6		18	1017.9
Lowest		2.3	13.5	0						10.5	22	1		Calm	1008.1	10.9	12	1	#	9	1005.1
Highest		15.2	29.4	12.2			WNW	74		23.9	91	8	#	22	1029.7	29.0	89	8	WSW	35	1028.3
Total				36.6																	

IDCJDW2161.202409 Prepared at 13:00 UTC on Monday 14 October 2024

Figure 2. Bureau of Meteorology Daily Weather Observation Holsworthy October 2024

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9 am						3 pm					
		Min	Max				Dir	Spd	Time	Temp	RH	Cld	Dir	Spd	MSLP	Temp	RH	Cld	Dir	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	8th		km/h	hPa	°C	%	8th		km/h	hPa
1	Tu	7.6	23.0	0.2			E	37	15:50	17.0	65			Calm	1023.5	19.9	59		E	20	1020.9
2	We	12.9	19.2	5.2			SSE	37	11:23	14.4	94	8	SSE	11	1030.8	18.5	62	6	SSE	19	1029.5
3	Th	11.6	20.9	0.4			E	31	15:08	18.3	60	8	ENE	9	1031.0	18.9	54	1	E	20	1026.6
4	Fr	6.3	24.7	0.2			ENE	24	14:37	16.1	68		NNW	9	1020.8	23.6	46	7	ENE	13	1013.3
5	Sa	13.3	25.9	2.0			WNW	43	10:00	21.8	66	2	WNW	13	1007.6	24.8	30	5	W	19	1005.2
6	Su	10.3	27.4	0			W	46	15:01	18.6	56		NNW	9	1011.1	27.1	27		W	17	1009.9
7	Mo	10.2	29.1	0			SSE	50	22:52	18.5	61	1	NNW	7	1017.9	28.4	28		WNW	19	1014.3
8	Tu	13.9	15.4	0			SSE	54	23:16	14.2	80	8	SSE	19	1023.2	14.3	62	8	SSE	26	1023.0
9	We	11.9	16.8	0			SSE	31	11:14	15.3	60	8	S	17	1026.8	16.6	53	8	SSE	19	1025.4
10	Th	10.4	24.9	0			N	33	11:23	15.9	74		NW	9	1023.8	23.9	45		NNW	11	1018.9
11	Fr	12.5	24.9	0			SSE	31	22:37	18.6	74		WSW	6	1024.3	23.3	59	3	ESE	17	1019.9
12	Sa	14.4	18.8	5.0			SSE	57	00:35	16.0	66	8	SSE	17	1026.6	17.1	49	7	SSE	22	1026.8
13	Su	8.7	21.4	0			E	30	16:00	13.3	76	8	WSW	7	1027.6	20.6	48	8	ENE	15	1022.8
14	Mo	9.0		0						16.2	71	8	W	9	1019.4	15.6	87	8	S	28	1017.4
Statistics for the first 14 days of October 2024																					
Mean		10.9	22.5							16.7	69	6		10	1022.5	20.9	50	6		18	1019.6
Lowest		6.3	15.4	0						13.3	56	1		Calm	1007.6	14.3	27	1	NNW	11	1005.2
Highest		14.4	29.1	5.2			SSE	57		21.8	94	8	SSE	19	1031.0	28.4	87	8	S	28	1029.5
Total				13.0																	

3. Results

Data results captured by our water quality sampling are presented herein and are representative of baseline water quality results for Moorebank Precinct West Basin 8. Threshold guideline quantitative values for the water quality parameter themes are compared and correlated to ANZECC/ARMCANZ (2000) guidelines under the categorisation thresholds – Waterway benchmark group: 'The protection of slightly disturbed lowland river ecosystems in southeast Australia'.

As these are the first samples results collected under our scope for the SIOMP-MPW sites, the sampling results presented in this report will be considered for future analysis against subsequent results for use as baseline data for the drainage network SIOMP function.

Triggers Exceedances from both the In-Situ Data and the Laboratory Samples October 2024

Location Basin 8 Outflow 5.2

Dissolved Oxygen (DO %) is at 114.29% which is above the threshold of between 85-110% for lowland rivers. This is considered a positive attribute for stream health as increased oxygen levels are a general surrogate for healthy stream conditions for aquatic organisms and biota.

Total phosphorous was at 50 µg/L which is above the threshold of 25- 50 µg/L for rivers flowing to the coast.

Total nitrogen was at 800 µg/L which is above the threshold of 350 µg/L for rivers flowing to the coast.

This reading for nitrogen is considered high against the benchmark, function of the bioretention basins is not at optimal design given that the filtration profiling and vegetation design to absorb and process nitrogen and nitrates is not at a complete stage, the expectation that readings for nitrogen will improve in future as the basins are completed and function in accordance with final design which is current not the case for the site.

pH is 6.21 which is below the threshold of 6.5-8.5 % for lowland rivers.

pH readings at the discharge must be monitored overtime to observe any negative trend for this attribute

This reading is considered only a slight acidic reading below the neutral range.

pH readings at the discharge must be monitored overtime to observe any negative trend for this attribute

Total phosphorous is at 30 µg/L which is above the threshold of 25 µg/L for rivers flowing to the coast.

This is considered only a slight exceedance for the value and reflects the general site condition as a non-natural environ, and not a natural low land river – which is the benchmarking for the results.

Total nitrogen is at 400 µg/L which is above the threshold of 350 µg/L for rivers flowing to the coast.

This is considered only a slight exceedance for the value and reflects the general site condition as a non-natural environ, and not a natural low land river – which is the benchmarking for the results.

All other tested attributes are considered to meet the ANZECC guidelines for natural low land rivers – which is applied within the report as a general benchmarking standard.

Literature Review
Peak Nitrogen Values
Nitrogen

Nitrogen has spiked to a level approximately 3 times the ANZECC trigger value for rivers flowing to the coast at this collection point.

https://www.dcceew.gov.au/environment/protection/npi/resource/student/total-nitrogen-0

Literature:

In a 1996 paper reported in the Journal of Hydrology B. Arheimer a, L. Andersson a, A. Lepistö b suggest that; Intensively drained catchments showed the quantitatively largest difference between growing and dormant seasons for NH_4 • N concentrations retained within the creek – stream system.

In general, links between nitrogen concentrations and flow/seasons could be related to annual mean temperature, annual mean concentrations and the water regime of the catchments. The geographical heterogeneity of detected links and the still rather low explanation level for the concentration variation, show the importance of a more dynamic approach to nitrogen monitoring and inclusion of reportable weather and flow conditions within the monitoring process.

It is advised that nitrogen levels recorded within the nearby Anzac Creek and potentially extend to nearby River WQ test results be quantified / evaluated and cross referenced with this data, to identify the existence of broader trends in the associated drainage network and recipient natural creek and river systems. Any longer-term trends and general pattern for increased nitrogen will continue to be assessed across future reporting periods. Testing at increased water depth at the source and after activation of the network after rainfall events will help calibrate this result against previous trends of much lower values.

observations suggest that nitrogen and phosphorus loads were driven primarily by surface runoff rather than groundwater discharge to natural streams.

Praktan D. Wadnerkar a, Luke Andrews a, Wei Wen Wong b, Xiaogang Chen a c, Rogger E. Correa a, Shane White a, Perran L.M. Cook b, Christian J. Sanders a d, Isaac R. Santos a e
Paper reported in Science of the Total Environmental March 2021 suggest

'Overall, intensive agricultural land use and episodic rainfall events were the major spatial and temporal drivers of nitrogen loads within a natural water body.'

J. S. Baron, E. K. Hall, B. T. Nolan, J. C. Finlay, E. S. Bernhardt, J. A. Harrison, F. Chan & E. W. Boyer; 2012 Article The interactive effects of excess reactive nitrogen and climate change on aquatic ecosystems and water resources of the United States, suggest

'Alterations in precipitation amount and dynamics will alter runoff quality, thereby influencing both rates of Nr inputs to aquatic ecosystems and groundwater and the water residence times that affect Nr removal within aquatic systems.
Both infrastructure within the catchment and climate change alter the landscape connectivity and hydrologic residence time that are essential to denitrification process within a drainage system.

While Nr inputs to and removal rates from aquatic systems are influenced by climate and management, reduction of N inputs from their source will be the most effective means to prevent or to minimize environmental and economic impacts of excess Nr.

Of relevance to the subject site could be the accumulation of nitrates from oxides distributed by exhaust fumes from trucks and heavy combustion equipment as Oxides of nitrogen are contained in the exhaust fumes emitted into the atmosphere by cars, aeroplanes, trains and boats. These emissions are dissolved by rain and then enter

streams, lakes and other water bodies.

https://www.dcceew.gov.au/sites/default/files/documents/factsheet-totalnitrogen_0.pdf

What effect does total nitrogen have on the environment?

Total nitrogen can have damaging effects on the environment and particularly on aquatic life (the fish, shellfish and other creatures in our rivers, lakes and oceans) because most nitrogen is leaked into waterways.
Total nitrogen can also lead to toxic blue-green algal blooms. Blue-green algae can harm humans and can make both humans and animals very sick. Do you see how important it is to help keep our waterways clean?

https://nitrogen-generators.com/what-is-the-main-industrial-use-of-nitrogen/#:~:text=Food%20Packaging%3A%20It%20is%20common,snack%20foods%20can%20be%20extended.

Five (5) Industrial Applications of Nitrogen
While the main industrial use of nitrogen is to create ammonia that is required for fertilizer, explosives, and other materials, it uses go far beyond these applications. From food packaging to pharmaceuticals, nitrogen gas can be found in more places and used for more purposes than you may have realized.

Food Packaging: It is common practice for food processing companies to use compressed nitrogen to displace oxygen in the packaging of perishable foods. Without oxygen, the shelf life of foods such as meats, fruits, vegetables, and various snack foods can be extended. Nitrogen can also add a cushion around food to keep it safe during transport.

Chemical Blanketing: Nitrogen is typically used to prevent fires and explosions in dangerous atmospheres like chemical plants or manufacturing facilities, by lowering the oxygen level below explosive limits.

Electronics: In the process of assembling electronics, nitrogen gas is used when two electronic components are forming a permanent connection, also known as soldering. The gas is used to reduce surface tension so there is a cleaner break away from the site of the electrical bond. Nitrogen gas is also used in a computer's main processing system to prevent it from overheating.

Laboratory: Laboratories require a very specific environment to ensure that tests and results are carried out accurately. Nitrogen gas is used to control oxygen levels, humidity and temperature, and maintain an appropriate atmosphere for highly sensitive procedures and equipment. Additionally, there are various pieces of laboratory equipment that require nitrogen for purging.

Laser Cutting: The application of nitrogen as a purging gas in the steel industry is extremely important. It is used as an assist gas to blow away molten material and achieve a stronger stainless or aluminized steel product that is also more resistant to corrosion.

https://nigen.com/industries-that-benefit-from-on-site-nitrogen-systems/

Industries That Benefit from On-Site Nitrogen Systems
Gaseous nitrogen is very useful in large-scale manufacturing and industrial applications. The large volumes of nitrogen gas required for these operations are either sourced from vendors in gas cylinders or generated on-site. In this article, we will highlight critical industrial processes that benefit from on-site nitrogen systems.

Elevation pH values recorded from location Discharge point 6

pH – Acidity, Alkalinity

https://www.umass.edu/mwwp/protocols/rivers/ph_alkalinity_river.html

Alkalinity is a measure of a river's "buffering capacity," or its ability to neutralize acids. Alkaline compounds in the water such as bicarbonates (baking soda is one type), carbonates, and hydroxides remove H+ ions and lower the acidity of the water (which means increased pH). They do this usually by combining with the H+ ions to make new compounds. Without this acid neutralizing capacity, any acid added to a river would cause an immediate change in the pH.

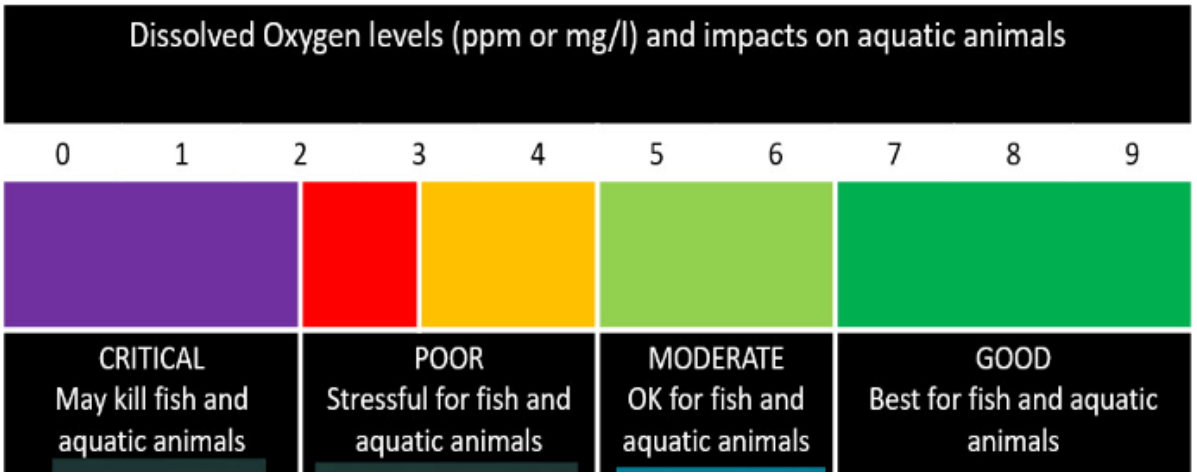
Measuring alkalinity is important to determining a river's ability to neutralize acidic pollution (as measured by pH) from rainfall or snowmelt. It's one of the best measures of the sensitivity of the river to acid inputs.

Alkalinity comes from rocks and soils, salts, certain plant activities, and certain industrial wastewater discharges. Total alkalinity is measured by collecting a water sample, and measuring the amount of acid needed to bring the sample to a pH of 4.2. At this pH all the alkaline compounds in the sample are "used up." The result is reported as milligrams per liter (mg/l) of calcium carbonate.

3.2 Interpreting Results

Dissolved Oxygen – Measures:

Dissolved oxygen (DO) is oxygen held (dissolved) in the water and available to aquatic organisms.
The amount of dissolved oxygen in a river or stream can tell us a lot about its water quality.
Water will naturally contain a certain amount of dissolved oxygen that is absorbed from the air and produced by plants and algae living in the water.
Temperature has a large effect on the amount of oxygen dissolved in water; cold water can hold higher levels of oxygen than warmer water. Higher water temperatures over summer will cause oxygen levels to drop.
Other factors such as river flow, wind, nutrients and bacterial activity can also affect the amount of dissolved oxygen in waterways.
Dissolved oxygen levels typically range between 5 and 14 mg/L (or ppm).
Example:



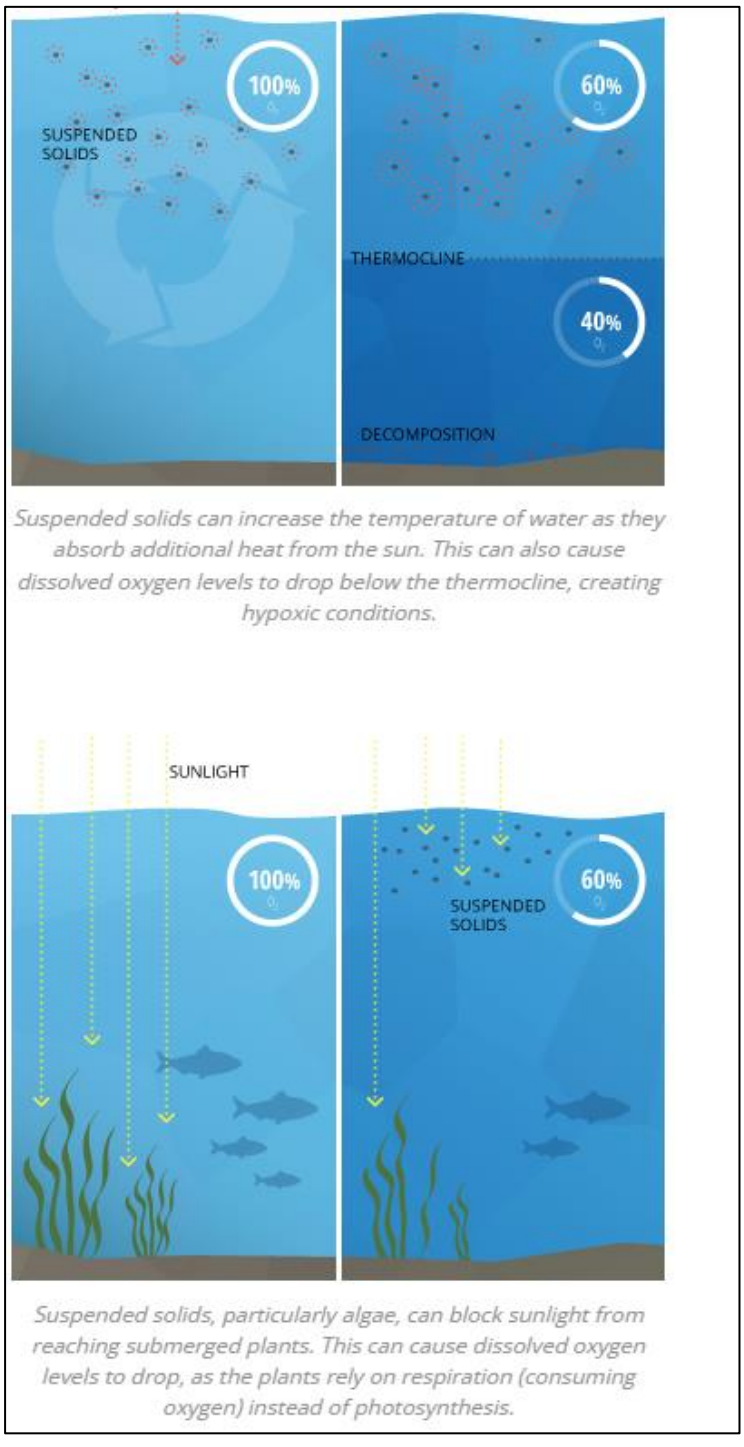
Salinity – Measures:

Electrical conductivity is a measure of the saltiness of the water and is measured on a scale from 0 to 50,000 uS/cm. Electrical conductivity is measured in microsiemens per centimeter (uS/cm). Freshwater is usually between 0 and 1,500 uS/cm and typical sea water has a conductivity value of about 50,000 uS/cm. Examples:

µS/cm	Use
0 - 800	• Good drinking water for humans (provided there is no organic pollution and not too much suspended clay material) • Generally good for irrigation, though above 300µS/cm some care must be, particularly with overhead sprinklers, which may cause leaf, scorch on some salt sensitive plants. • Suitable for all livestock
800 - 2500	• Can be consumed by humans, although most would prefer water in the lower half of this range if available • When used for irrigation, requires special management including suitable soils, good drainage and consideration of salt tolerance of plants • Suitable for all livestock
2500 -10,000	• Not recommended for human consumption, although water up to 3000 µS/cm can be consumed • Not normally suitable for irrigation, although water up to 6000 µS/cm can be used on very salt tolerant crops with very special management techniques. Over 6000 µS/cm, occasional emergency may be possible with care • When used for drinking water by poultry and pigs, the salinity should be limited to about 6000 µS/cm. Most other livestock can use water up to 10000 µS/cm

Total Dissolve Solids (TDS) – Measures

Dissolved solids, smaller than 2 microns, refer to any minerals, salts, metals, in the form of molecules, atoms, cations or anions dissolved in water. Total dissolved solids (TDS) comprise inorganic salts (principally calcium, magnesium, potassium, sodium, bicarbonates, chlorides and sulfates) and some small amounts of organic matter that dissolve in water.
The TDS concentration is the sum of all filterable substances in water that can be determined gravimetrically. However, in most cases, TDS is primarily comprised of ions.
High levels of total suspended solids can affect turbidity, increase water temperatures and decrease dissolved oxygen (DO) levels. This can cause the water to heat up more rapidly because the suspended particles absorb more heat and deplete oxygen, which can adversely affect aquatic life.

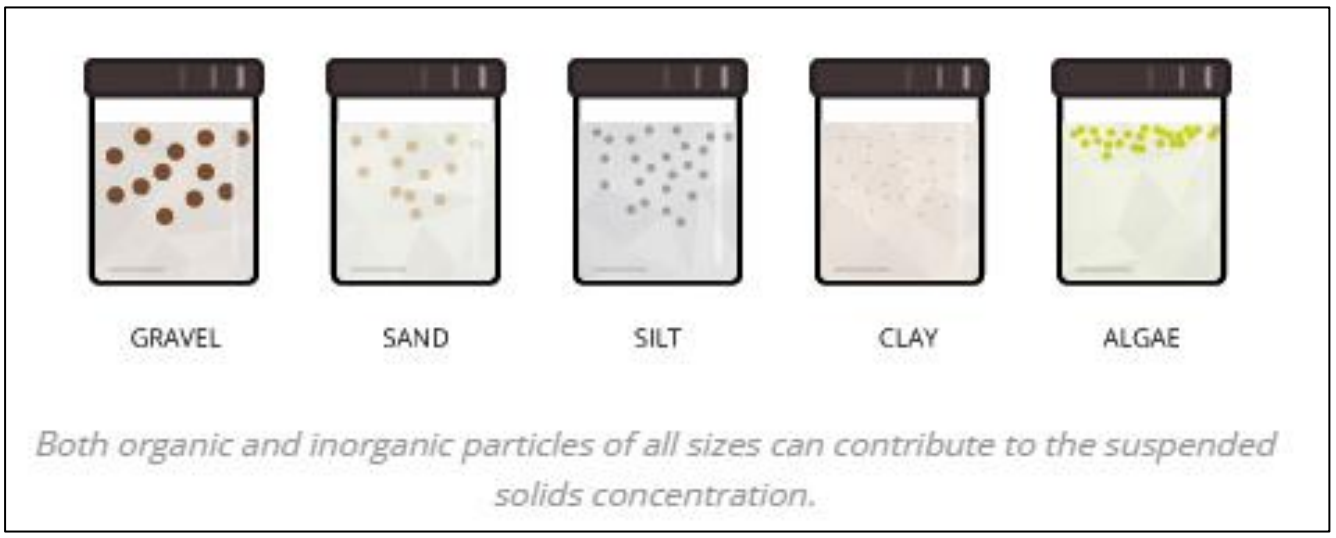


Suspended solids can increase the temperature of water as they absorb additional heat from the sun. This can also cause dissolved oxygen levels to drop below the thermocline, creating hypoxic conditions.

Suspended solids, particularly algae, can block sunlight from reaching submerged plants. This can cause dissolved oxygen levels to drop, as the plants rely on respiration (consuming oxygen) instead of photosynthesis.

Turbidity – Total Suspended Solids (TSS)

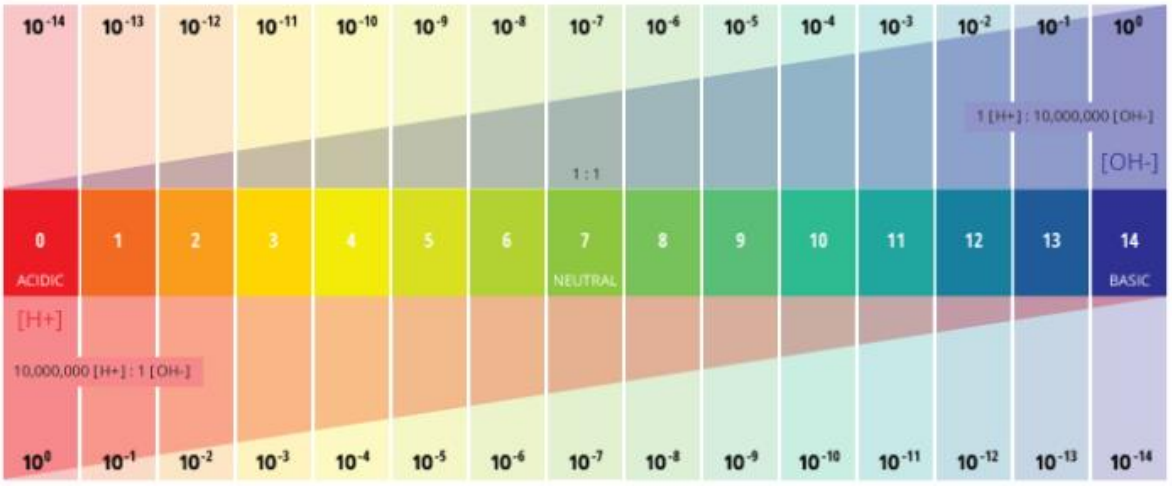
Turbidity data are reported in Nephelometric Turbidity Units (NTU). To provide a sense of scale, water with a turbidity of 1 NTU is crystal clear, water at 5 NTU has a tiny trace of discolouration, and water at 100 NTU is brown and opaque. The standard is less than 10 NTU for rural streams and rivers and less than 30 NTU for urban lakes and ponds.
Total suspended solids (TSS) are particles that are larger than 2 microns found in the water column. Anything smaller than 2 microns (average filter size) is considered a dissolved solid. Most suspended solids are made up of inorganic materials, though bacteria and algae can also contribute to the total solids concentration.



Both organic and inorganic particles of all sizes can contribute to the suspended solids concentration.

pH – Acidity / Alkalinity – Measures

The pH refers to the degree of acidity or alkalinity of a substance. A pH of 7 is neutral. A value above 7 indicates that the water is more alkaline and a pH below 7 indicates acidic conditions.
A pH of 7 is considered neutral. The logarithmic scale means that each number below 7 is 10 times more acidic than the previous number when counting down. Likewise, when counting up above 7, each number is 10 times more basic than the previous number pH stands for the “power of hydrogen” [3]. The numerical value of pH is determined by the molar concentration of hydrogen ions (H+) [3]. This is done by taking the negative logarithm of the H+ concentration (-log(H+)).
Standard values for pH readings are expected, pH 6.5–9 for rural streams and rivers and pH 6–9 for urban lakes and ponds.
In freshwater systems pH sets up the conditions for how easy it is for nutrients to be available and how easily things like heavy metals (toxicity for aquatic life) can dissolve in the water. Rivers and lakes generally range between 5 (acidic) and 9 (basic) on the pH scale.



The logarithmic scale of pH means that as pH increases, the H+ concentration will decrease by a power of 10. Thus at a pH of 0, H+ has a concentration of 1 M. At a pH of 7, this decreases to 0.0000001 M. At a pH of 14, there is only 0.00000000000001 M

Summary of Results

Aquatic ecosystems	
Indicator	**Numerical criteria (trigger values)**
Total phosphorus	• Upland rivers: 20 µg/L • Lowland rivers: 25 µg/L for rivers flowing to the coast; • Lakes & reservoirs: 10 µg/L • Estuaries: 30 µg/L
Total nitrogen	• Upland rivers: 250 µg/L • Lowland rivers: 350 µg/L for rivers flowing to the coast; • Lakes & reservoirs: 350 µg/L • Estuaries: 300µg/L
Chlorophyll-a	• Upland rivers: not applicable • Lowland rivers: 5 µg/L • Lakes & reservoirs: 5 µg/L. • Estuaries: 4 µg/L.
Turbidity	• Upland rivers: 2–25 NTU (see supporting information) • Lowland rivers: 6–50 NTU (see supporting information) • Lakes & reservoirs: 1–20 NTU • Estuaries: 0.5–10 NTU
Salinity (electrical conductivity)	• Upland rivers: 30–350 µS/cm • Lowland rivers: 125–2200 µS/cm supporting information
Dissolved oxygen	• Upland rivers: 90–110% • Lowland rivers: 85–110% • Freshwater lakes & reservoirs: 90–110% • Estuaries: 80–110% Note: Dissolved oxygen values were derived from daytime measurements. Dissolved oxygen concentrations may vary diurnally and with depth. Monitoring programs should assess this potential variability.
pH	• Upland rivers: 6.5–8.0 • Lowland rivers: 6.5–8.5 • Freshwater lakes & reservoirs: 6.5–8.0 • Estuaries: 7.0–8.5 Changes of more than 0.5 pH units from the natural seasonal maximum or minimum should be investigated.

3.1 Key Summary of Results Spring (October) 2024

Dissolved Oxygen (DO %) is at 114.29% which is above the threshold of between 85-110% for lowland rivers. This is considered a positive attribute for stream health as increased oxygen levels are a general surrogate for healthy stream conditions for aquatic organisms and biota.

Total phosphorous was at 50 µg/L which is above the threshold of 25- 50 µg/L for rivers flowing to the coast.

Total nitrogen was at 800 µg/L which is above the threshold of 350 µg/L for rivers flowing to the coast.

This reading for nitrogen is considered high against the benchmark, function of the bioretention basins is not at optimal design given that the filtration profiling and vegetation design to absorb and process nitrogen and nitrates is not at a complete stage, the expectation that readings for nitrogen will improve in future as the basins are completed and function in accordance with final design which is current not the case for the site.

pH is 6.21 which is below the threshold of 6.5-8.5 % for lowland rivers.

pH readings at the discharge must be monitored overtime to observe any negative trend for this attribute

This reading is considered only a slight acidic reading below the neutral range.

pH readings at the discharge must be monitored overtime to observe any negative trend for this attribute

Total phosphorous is at 30 µg/L which is above the threshold of 25 µg/L for rivers flowing to the coast.

This is considered only a slight exceedance for the value and reflects the general site condition as a non-natural environ, and not a natural low land river – which is the benchmarking for the results.

Total nitrogen is at 400 µg/L which is above the threshold of 350 µg/L for rivers flowing to the coast.

This is considered only a slight exceedance for the value and reflects the general site condition as a non-natural environ, and not a natural low land river – which is the benchmarking for the results.

All other tested attributes are considered to meet the ANZECC guidelines for natural low land rivers – which is applied within the report as a general benchmarking standard.

3.2 Recommendations

There are no recommendations provided for water quality results over this testing period.

STORMWATER DISCHARGE TESTING SITE

BASIN 8 – OUTFLOW

Site image 1. Testing site Basin 8 - Outflow

Table. In-situ data and observations Retention Basin 8 outflow

Moorebank West Precinct - Retention Basin 8 Outflow (MPW 5.2 outflow)			
Date: 09/10/2024	**Time:** 11:41am	**Temp:** 15.3°C	**Humidity:** 60%
Operator: Marco Perry		**Coordinates:** -33.947085, 150.917653	
Equipment used: Aquatroll 500			
Parameter	**Recording**	**ANZECC** ANZECC 2000 Guidelines *Lowland rivers	**Triggered?** Y/N
Temperature (Celcius)	19.3	Abnormal to seasonal variation	N
Dissolved Oxygen (DO %)	114.29%	*Lowland rivers Lower limit: 85% Upper Limit: 110%	Y
Dissolved Oxygen (DO ppm)	10.5ppm	*Lowland rivers Lower limit: 85% Upper Limit: 110%	N
Electrical Conductivity ($C^{-um/cm}$)	8.3 ($C^{-um/cm}$)	125–2200 µS/cm	N
pH	6.44	Min 6.5 Max 8.5	Y
NTU	6.80 NTU	6-50	N

(a) Total phosphorus

Basin 8.1 inflow - Total phosphorous – Qube Logistics, Moorebank, NSW		Trigger Trigger Value - ANZECC 2000 Guidelines	Triggered
Lab results - Total phosphorous:	50 µg/L	25 µg/L - 50 µg/L	Y
Notes: • Channel Culvert • Trigger value 50 µg/L for lowland rivers, trigger value 25 µg/L for rivers flowing to the coast Anzecc Guidelines 2000.			

(b) Total Nitrogen as N (TKN + NOx) by Discrete Analyser

Basin 8.1 inflow - Total nitrogen – Qube Logistics, Moorebank, NSW		Trigger Value - ANZECC 2000 Guidelines	Triggered
Lab results -Total nitrogen:	800 µg/L	350 µg/L for rivers flowing to the coast	Y
Notes: • Total Nitrogen as N (TKN + NOx) by Discrete Analyser • Trigger values are based on a low-lying river			

(c) Kjeldahl nitrogen Total Kjeldahl Nitrogen as N

Basin 8.1 inflow - Kjeldahl nitrogen – Qube Logistics, Moorebank, NSW		Trigger Value - ANZECC 2000 Guidelines	Triggered
Lab results – kjeldahl nitrogen:	700 µg/L	-	-
Notes: • Total Kjeldahl Nitrogen as N			

(d) Dissolved metals;

Basin 8.1 inflow - Dissolved metals – Qube Logistics, Moorebank, NSW			
Equipment used: - Sample bottles collected from monitoring site ALS Environmental Laboratory Testing Report			
Lab results – Dissolved metals:	**Measures mg/L**	**Trigger value ANZECC Guidelines 2000 95% protection criteria**	**Triggered**
Arsenic	<0.001	0.013 mg/L	N
Cadmium	<0.0001	0.0002 mg/L	N
Chromium	<0.001	0.001 mg/L	N
Copper	<0.001	0.0014mg/L	N
Nickel	0.001	0.011 mg/L	N
Lead	<0.001	0.0034 mg/L	N
Zinc	<0.005	0.008 mg/L	N
Mercury	<0.0001	0.0006 mg/L	N
Notes: - ANZECC Guidelines (2000) suggest 0.002 mg/L is considered appropriate for slightly-moderately disturbed systems. - A spike in cadmium and zinc observed from past WQM has decreased and no longer triggers ANZECC Guidelines 90% protection criteria.			

(e) PFAS;

Basin 8.1 inflow - PFAS – Qube Logistics, Moorebank, NSW			
PFAS Surrogate	**Measure** µg/L	**95% species protection (DEE 2016)**	**Triggered**
Perfluorooctane sulfonic acid (PFOS) µg/L	96.9% µg/L	.13 (µg/L)	
Perfluorooctanoic acid (PFOA)	97.9% µg/L	220 (µg/L)	
Notes: This Guidance focuses on PFOS and PFOA as potential indicators of wider contamination by related PFASs. The reasons for this approach include: • Most research undertaken on PFASs internationally and in Australia has focused on PFOS and PFOA due to their frequent occurrence in the environment, persistence, and bioaccumulation. • PFOS and PFOA can also be the breakdown endpoint of other precursor products. • PFOS and PFOA are the most commonly encountered PFAS in the environment and wildlife. • Information on other PFASs, of which there are several hundred known, is more limited. • Effective management of PFOS and PFOA may help address potential contamination where other PFASs may also be present. * DEE 2016. Commonwealth Environmental Management Guidance on Perfluorooctane Sulfonic Acid (PFOS) and Perfluorooctanoic Acid (PFOA). Department of the Environment and Energy.			

(f) Total suspended solids.

Basin 8.1 inflow - Total suspended solids – Qube Logistics, Moorebank, NSW		EPA exceedance value	Trigger
Lab results – Total suspended solids: mg/L	<5 mg/L	50 mg/L	N

Notes:

- Total Suspended Solids dried at 104 ± 2°C
- Total Suspended Solids (TSS)

(g) Total hydrocarbons

Basin 8.1 inflow - Total hydrocarbons – Qube Logistics, Moorebank, NSW

Total Hydrocarbons assessed alongside baseline data (2018) and Autumn monitoring (2019) for Aquatic Monitoring location 11&12 (AQ11 & AQ12 Anzac Creek).

Lab results -Total hydrocarbons:	Trigger value ANZECC Guidelines 2000 – slightly disturbed lowland river ecosystem	Triggered	Monitoring discharge points May 2024 (Apical)	Monitoring discharge points October 2024 (Apical)			Trend
Benzene µg/L	1300 µg/L	N	<1	<1			No trend
Toluene µg/L	-	N	<2	<2			No trend
Ethylbenzene µg/L	-	N	<2	<2			No trend
meta-& para-Xylene µg/L	200 µg/L	N	<2	<2			No trend
Ortho-Xylene µg/L	470 µg/L	N	<2	<2			No trend
Total Xylenes µg/L	-	-	<2	<2			No trend
Sum of BTEX µg/L	-	-	<1	<1			No trend
Naphthalene µg/L	85 µg/L	N	<5	<5			No trend

Notes:

- The data were compared to the default trigger values (DTVs) recommended by ANZECC/ARMCANZ (2000) for the protection of slightly disturbed lowland river ecosystems in southeast Australia.
- A commonly encountered example of additive toxicity of mixtures is the simple aromatic hydrocarbons commonly associated with contaminated petroleum sites, benzene, toluene, ethyl benzene and xylenes, collectively known as BTEX

Water Quality Monitoring Comparative Table (Temporal)

Retention Basin 8 MPW. Testing Site OP-8

Testing Site MPW 8.1 Inflow		May 2024	October 2024	
pH		8.51	6.44	-
Dissolved Oxygen - %/L		13.07 mg/L	10.5mg/L	-
Actual Electronic Conductivity (SPC -ms/cm)		0.558 SPC - ms/cm	8.3 (C-um/cm)	-
Temperature - ℃		15.5	19.3	-
Turbidity		5.39 NTU	6.80	-
Total phosphorous - mg/L		0.06 mg/L	0.05 mg/L	-
Total nitrogen - mg/L		0.07 mg/L	0.8 mg/L	-
Kjeldahl nitrogen mg/L		0.07 mg/L	0.7 mg/L	-
Dissolved metals				
Arsenic		<0.001	<0.001	
Cadmium		<0.0001	<0.0001	
Chromium		<0.001	<0.001	
Copper		0.002	<0.001	
Nickel		0.001	0.001	
Lead		<0.001	<0.001	
Zinc		<0.005	<0.005	
Mercury		<0.0001	<0.0001	
PFAS				
Lab results – SUM of PFAS Micrograms/L		0.04	0.69	
SUM of PFHxS & PFOS Microgrms/L		0.04	0.56	
Total suspended solids mg/L		<5	<5	-
Total hydrocarbons				
Benzene	<1	<1	<1	
Toluene	<2	<2	<2	-
Ethylbenzene	<2	<2	<2	-
meta-& para-Xylene	<2	<2	<2	-
Ortho-Xylene	<2	<2	<2	-
Total Xylenes	<2	<2	<2	
Sum of BTEX	<1	<1	<1	
Naphthalene	<5	<5	<5	-

Appendix A. Raw data tables; source - Australian Laboratory Services (MBW 8I is referred to as IP-8 & MBW 8O is referred to as OP-8)

Basin 8: Outflow

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	GR1	MBW B80	MBW B60	MBW B50 (GR2)	MBE DP1
				Sampling date / time	09-Oct-2024 12:30	09-Oct-2024 11:45	09-Oct-2024 11:30	09-Oct-2024 12:00	09-Oct-2024 10:00
Compound	CAS Number	LOR	Unit		EW2404631-001	EW2404631-002	EW2404631-003	EW2404631-004	EW2404631-005
					Result	Result	Result	Result	Result
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		<5	<5	24	<5	1440
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	0.001	<0.001	<0.001
Nickel	7440-02-0	0.001	mg/L		<0.001	0.001	0.002	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	0.008	<0.005
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		0.06	0.05	0.11	0.03	0.90
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		0.5	0.7	1.0	0.4	2.1
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		0.6	0.8	1.1	0.4	3.0
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		0.03	0.05	0.16	0.03	0.25
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	GR1	MBW B80	MBW B60	MBW B50 (GR2)	MBE DP1
				Sampling date / time	09-Oct-2024 12:30	09-Oct-2024 11:45	09-Oct-2024 11:30	09-Oct-2024 12:00	09-Oct-2024 10:00
Compound	CAS Number	LOR	Unit		EW2404631-001	EW2404631-002	EW2404631-003	EW2404631-004	EW2404631-005
					Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	0.03	0.06	<0.02	<0.02
Perfluoropropane sulfonic acid (PFPrS)	423-41-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	0.04	0.06	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	0.32	0.52	0.02	0.03
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorononane sulfonic acid (PFNS)	68259-12-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	0.24	0.56	0.02	0.02

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	GR1	MBW B80	MBW B60	MBW B50 (GR2)	MBE DP1
				Sampling date / time	09-Oct-2024 12:30	09-Oct-2024 11:45	09-Oct-2024 11:30	09-Oct-2024 12:00	09-Oct-2024 10:00
Compound	CAS Number	LOR	Unit		EW2404631-001	EW2404631-002	EW2404631-003	EW2404631-004	EW2404631-005
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	0.10	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	0.05	0.20	<0.02	0.03
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	0.01	0.03	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
Perfluorohexadecanoic acid (PFHxDA)	67905-19-5	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	GR1	MBW B80	MBW B60	MBW B50 (GR2)	MBE DP1
			Sampling date / time	09-Oct-2024 12:30	09-Oct-2024 11:45	09-Oct-2024 11:30	09-Oct-2024 12:00	09-Oct-2024 10:00
Compound	CAS Number	LOR	Unit	EW2404631-001	EW2404631-002	EW2404631-003	EW2404631-004	EW2404631-005
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	<0.01	0.69	1.55	0.04	0.08
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	0.56	1.08	0.04	0.05
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	0.65	1.49	0.04	0.08
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	99.8	99.2	98.1	102	103
Toluene-D8	2037-26-5	2	%	101	98.3	97.7	102	99.9
4-Bromofluorobenzene	460-00-4	2	%	96.2	94.6	92.3	94.0	93.6
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	98.2	96.9	101	103	103
13C8-PFOA	----	0.02	%	98.7	97.9	101	101	101

Appendix B. ANZECC & ARMCANZ (2000) water quality guidelines

Table 3.4.1 Trigger values for toxicants at alternative levels of protection. Values in grey shading are the trigger values applying to typical *slightly–moderately disturbed systems*; see table 3.4.2 and Section 3.4.2.4 for guidance on applying these levels to different ecosystem conditions.

Chemical		Trigger values for freshwater (µgL^{-1})				Trigger values for marine water (µgL^{-1})			
		Level of protection (% species)				Level of protection (% species)			
		99%	95%	90%	80%	99%	95%	90%	80%
METALS & METALLOIDS									
Aluminium	pH >6.5	27	55	80	150	ID	ID	ID	ID
Aluminium	pH <6.5	ID	ID	ID	ID	ID	ID	ID	ID
Antimony		ID	ID	ID	ID	ID	ID	ID	ID
Arsenic (As III)		1	24	94 [C]	360 [C]	ID	ID	ID	ID
Arsenic (AsV)		0.8	13	42	140 [C]	ID	ID	ID	ID
Beryllium		ID	ID	ID	ID	ID	ID	ID	ID
Bismuth		ID	ID	ID	ID	ID	ID	ID	ID
Boron		90	370 [C]	680 [C]	1300 [C]	ID	ID	ID	ID
Cadmium	H	0.06	0.2	0.4	0.8 [C]	0.7 [B]	5.5 [B, C]	14 [B, C]	36 [B, A]
Chromium (Cr III)	H	ID	ID	ID	ID	7.7	27.4	48.6	90.6
Chromium (CrVI)		0.01	1.0 [C]	6 [A]	40 [A]	0.14	4.4	20 [C]	85 [C]
Cobalt		ID	ID	ID	ID	0.005	1	14	150 [C]
Copper	H	1.0	1.4	1.8 [C]	2.5 [C]	0.3	1.3	3 [C]	8 [A]
Gallium		ID	ID	ID	ID	ID	ID	ID	ID
Iron		ID	ID	ID	ID	ID	ID	ID	ID
Lanthanum		ID	ID	ID	ID	ID	ID	ID	ID
Lead	H	1.0	3.4	5.6	9.4 [C]	2.2	4.4	6.6 [C]	12 [C]
Manganese		1200	1900 [C]	2500 [C]	3600 [C]	ID	ID	ID	ID
Mercury (inorganic)	B	0.06	0.6	1.9 [C]	5.4 [A]	0.1	0.4 [C]	0.7 [C]	1.4 [C]
Mercury (methyl)		ID	ID	ID	ID	ID	ID	ID	ID
Molybdenum		ID	ID	ID	ID	ID	ID	ID	ID
Nickel	H	8	11	13	17 [C]	7	70 [C]	200 [A]	560 [A]
Selenium (Total)	B	5	11	18	34	ID	ID	ID	ID
Selenium (SeIV)	B	ID	ID	ID	ID	ID	ID	ID	ID
Silver		0.02	0.05	0.1	0.2 [C]	0.8	1.4	1.8	2.6 [C]
Thallium		ID	ID	ID	ID	ID	ID	ID	ID
Tin (inorganic, SnIV)		ID	ID	ID	ID	ID	ID	ID	ID
Tributyltin (as µg/L Sn)		ID	ID	ID	ID	0.0004	0.006 [C]	0.02 [C]	0.05 [C]
Uranium		ID	ID	ID	ID	ID	ID	ID	ID
Vanadium		ID	ID	ID	ID	50	100	160	280
Zinc	H	2.4	8.0 [C]	15 [C]	31 [C]	7	15 [C]	23 [C]	43 [C]
NON-METALLIC INORGANICS									
Ammonia	D	320	900 [C]	1430 [C]	2300 [A]	500	910	1200	1700
Chlorine	E	0.4	3	6 [A]	13 [A]	ID	ID	ID	ID
Cyanide	F	4	7	11	18	2	4	7	14
Nitrate	J	17	700	3400 [C]	17000 [A]	ID	ID	ID	ID
Hydrogen sulfide	G	0.5	1.0	1.5	2.6	ID	ID	ID	ID
ORGANIC ALCOHOLS									
Ethanol		400	1400	2400 [C]	4000 [C]	ID	ID	ID	ID
Ethylene glycol		ID	ID	ID	ID	ID	ID	ID	ID
Isopropyl alcohol		ID	ID	ID	ID	ID	ID	ID	ID
CHLORINATED ALKANES									
Chloromethanes									
Dichloromethane		ID	ID	ID	ID	ID	ID	ID	ID
Chloroform		ID	ID	ID	ID	ID	ID	ID	ID
Carbon tetrachloride		ID	ID	ID	ID	ID	ID	ID	ID
Chloroethanes									
1,2-dichloroethane		ID	ID	ID	ID	ID	ID	ID	ID
1,1,1-trichloroethane		ID	ID	ID	ID	ID	ID	ID	ID

Chemical	Trigger values for freshwater (µgL^{-1})				Trigger values for marine water (µgL^{-1})			
	Level of protection (% species)				Level of protection (% species)			
	99%	95%	90%	80%	99%	95%	90%	80%
1,1,2-trichloroethane	5400	6500	7300	8400	140	1900	5800 [C]	18000 [C]
1,1,2,2-tetrachloroethane	ID	ID	ID	ID	ID	ID	ID	ID
Pentachloroethane	ID	ID	ID	ID	ID	ID	ID	ID
Hexachloroethane B	290	360	420	500	ID	ID	ID	ID
Chloropropanes								
1,1-dichloropropane	ID	ID	ID	ID	ID	ID	ID	ID
1,2-dichloropropane	ID	ID	ID	ID	ID	ID	ID	ID
1,3-dichloropropane	ID	ID	ID	ID	ID	ID	ID	ID
CHLORINATED ALKENES								
Chloroethylene	ID	ID	ID	ID	ID	ID	ID	ID
1,1-dichloroethylene	ID	ID	ID	ID	ID	ID	ID	ID
1,1,2-trichloroethylene	ID	ID	ID	ID	ID	ID	ID	ID
1,1,2,2-tetrachloroethylene	ID	ID	ID	ID	ID	ID	ID	ID
3-chloropropene	ID	ID	ID	ID	ID	ID	ID	ID
1,3-dichloropropene	ID	ID	ID	ID	ID	ID	ID	ID
ANILINES								
Aniline	8	250 [A]	1100 [A]	4800 [A]	ID	ID	ID	ID
2,4-dichloroaniline	0.6	7	20	60 [C]	ID	ID	ID	ID
2,5-dichloroaniline	ID	ID	ID	ID	ID	ID	ID	ID
3,4-dichloroaniline	1.3	3	6 [C]	13 [C]	85	150	190	260
3,5-dichloroaniline	ID	ID	ID	ID	ID	ID	ID	ID
Benzidine	ID	ID	ID	ID	ID	ID	ID	ID
Dichlorobenzidine	ID	ID	ID	ID	ID	ID	ID	ID
AROMATIC HYDROCARBONS								
Benzene	600	950	1300	2000	500 [C]	700 [C]	900 [C]	1300 [C]
Toluene	ID	ID	ID	ID	ID	ID	ID	ID
Ethylbenzene	ID	ID	ID	ID	ID	ID	ID	ID
o-xylene	200	350	470	640	ID	ID	ID	ID
m-xylene	ID	ID	ID	ID	ID	ID	ID	ID
p-xylene	140	200	250	340	ID	ID	ID	ID
m+*p*-xylene	ID	ID	ID	ID	ID	ID	ID	ID
Cumene	ID	ID	ID	ID	ID	ID	ID	ID
Polycyclic Aromatic Hydrocarbons								
Naphthalene	2.5	16	37	85	50 [C]	70 [C]	90 [C]	120 [C]
Anthracene B	ID	ID	ID	ID	ID	ID	ID	ID
Phenanthrene B	ID	ID	ID	ID	ID	ID	ID	ID
Fluoranthene B	ID	ID	ID	ID	ID	ID	ID	ID
Benzo(a)pyrene B	ID	ID	ID	ID	ID	ID	ID	ID
Nitrobenzenes								
Nitrobenzene	230	550	820	1300	ID	ID	ID	ID
1,2-dinitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,3-dinitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,4-dinitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,3,5-trinitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-methoxy-2-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-methoxy-4-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-chloro-2-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-chloro-3-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-chloro-4-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-chloro-2,4-dinitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,2-dichloro-3-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,3-dichloro-5-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,4-dichloro-2-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
2,4-dichloro-2-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID

Chemical	Trigger values for freshwater (µgL^{-1})				Trigger values for marine water (µgL^{-1})			
	Level of protection (% species)				Level of protection (% species)			
	99%	95%	90%	80%	99%	95%	90%	80%
Hexazinone	ID	ID	ID	ID	ID	ID	ID	ID
Simazine	0.2	3.2	11	35	ID	ID	ID	ID
Urea herbicides								
Diuron	ID	ID	ID	ID	ID	ID	ID	ID
Tebuthiuron	0.02	2.2	20	160 [C]	ID	ID	ID	ID
Miscellaneous herbicides								
Acrolein	ID	ID	ID	ID	ID	ID	ID	ID
Bromacil	ID	ID	ID	ID	ID	ID	ID	ID
Glyphosate	370	1200	2000	3600 [A]	ID	ID	ID	ID
Imazethapyr	ID	ID	ID	ID	ID	ID	ID	ID
Ioxynil	ID	ID	ID	ID	ID	ID	ID	ID
Metolachlor	ID	ID	ID	ID	ID	ID	ID	ID
Sethoxydim	ID	ID	ID	ID	ID	ID	ID	ID
Trifluralin B	2.6	4.4	6	9 [A]	ID	ID	ID	ID
GENERIC GROUPS OF CHEMICALS								
Surfactants								
Linear alkylbenzene sulfonates (LAS)	65	280	520 [C]	1000 [C]	ID	ID	ID	ID
Alcohol ethoxyolated sulfate (AES)	340	650	850 [C]	1100 [C]	ID	ID	ID	ID
Alcohol ethoxylated surfactants (AE)	50	140	220	360 [C]	ID	ID	ID	ID
Oils & Petroleum Hydrocarbons	ID	ID	ID	ID	ID	ID	ID	ID
Oil Spill Dispersants								
BP 1100X	ID	ID	ID	ID	ID	ID	ID	ID
Corexit 7664	ID	ID	ID	ID	ID	ID	ID	ID
Corexit 8667		ID	ID	ID	ID	ID	ID	ID
Corexit 9527	ID	ID	ID	ID	230	1100	2200	4400 [A]
Corexit 9550	ID	ID	ID	ID	ID	ID	ID	ID

Notes: Where the final water quality guideline to be applied to a site is below current analytical practical quantitation limits, see Section 3.4.3.3 for guidance.

Most trigger values listed here for metals and metalloids are *High reliability* figures, derived from field or chronic NOEC data (see 3.4.2.3 for reference to Volume 2). The exceptions are *Moderate reliability* for freshwater aluminium (pH >6.5), manganese and marine chromium (III).

Most trigger values listed here for non-metallic inorganics and organic chemicals are *Moderate reliability* figures, derived from acute LC_{50} data (see 3.4.2.3 for reference to Volume 2). The exceptions are *High reliability* for freshwater ammonia, 3,4-DCA, endosulfan, chlorpyrifos, esfenvalerate, tebuthiuron, three surfactants and marine for 1,1,2-TCE and chlorpyrifos.

* = *High reliability* figure for esfenvalerate derived from mesocosm NOEC data (no alternative protection levels available).

A = Figure may not protect key test species from acute toxicity (and chronic) — check Section 8.3.7 for spread of data and its significance. 'A' indicates that trigger value > acute toxicity figure; note that trigger value should be <1/3 of acute figure (Section 8.3.4.4).

B = Chemicals for which possible bioaccumulation and secondary poisoning effects should be considered (see Sections 8.3.3.4 and 8.3.5.7).

C = Figure may not protect key test species from chronic toxicity (this refers to experimental chronic figures or geometric mean for species) — check Section 8.3.7 for spread of data and its significance. Where grey shading and 'C' coincide, refer to text in Section 8.3.7.

D = Ammonia as TOTAL ammonia as [NH_3-N] at pH 8. For changes in trigger value with pH refer to Section 8.3.7.2.

E = Chlorine as total chlorine, as [Cl]; see Section 8.3.7.2.

F = Cyanide as un-ionised HCN, measured as [CN]; see Section 8.3.7.2.

G = Sulfide as un-ionised H_2S, measured as [S]; see Section 8.3.7.2.

H = Chemicals for which algorithms have been provided in table 3.4.3 to account for the effects of hardness. The values have been calculated using a hardness of 30 mg/L $CaCO_3$. These should be adjusted to the site-specific hardness (see Section 3.4.3).

J = Figures protect against toxicity and do not relate to eutrophication issues. Refer to Section 3.3 if eutrophication is the issue of concern.

ID = Insufficient data to derive a reliable trigger value. Users advised to check if a low reliability value or an ECL is given in Section 8.3.7.

T = Tainting or flavour impairment of fish flesh may possibly occur at concentrations below the trigger value. See Sections 4.4.5.3/3 and 8.3.7.

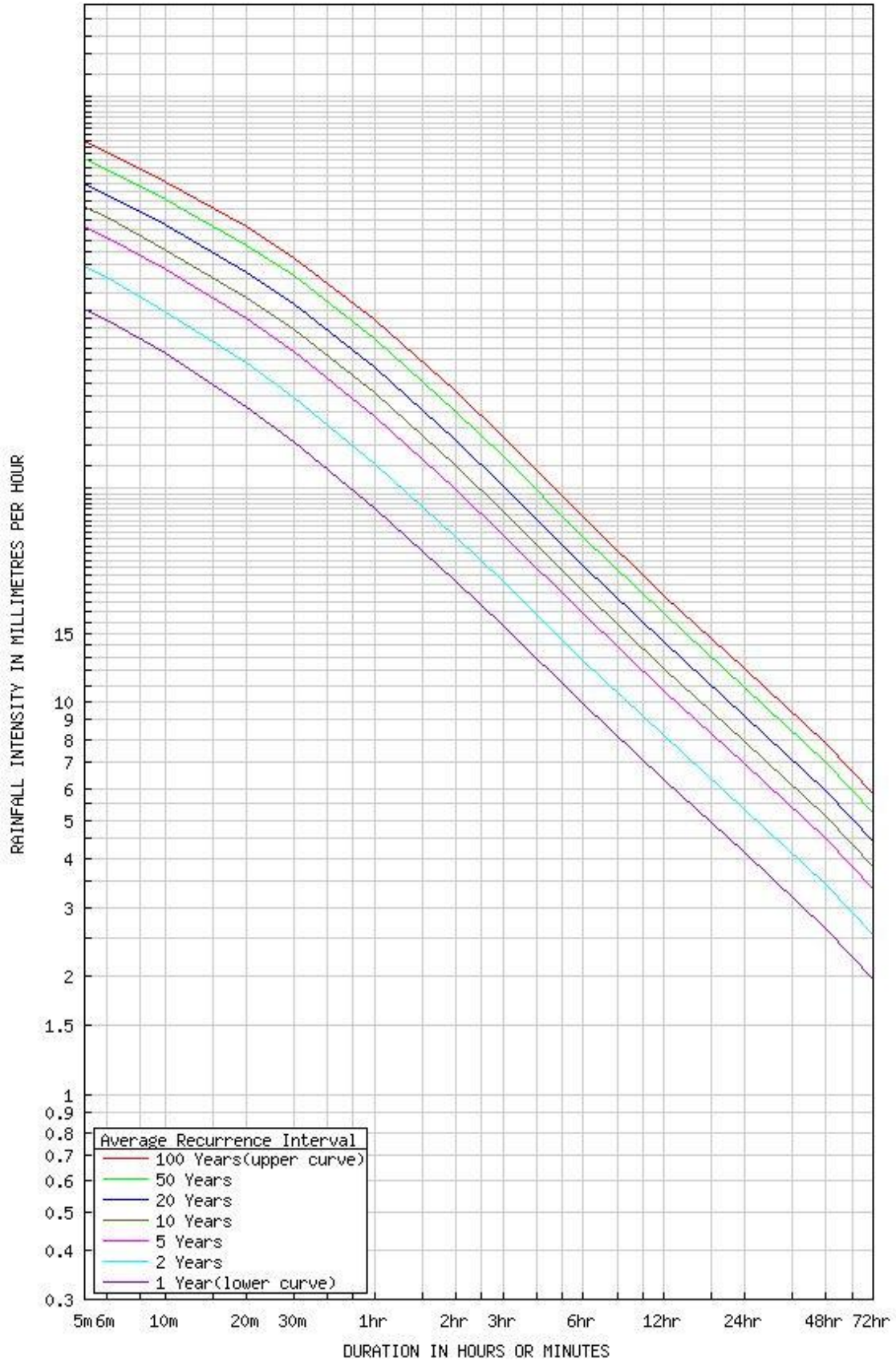
Table 5. Ecological water quality guideline values developed by water regulators

Exposure scenario	PFOS	PFOA	Exposure scenario	Comments and source
Freshwater	0.00023 µg/L	19 µg/L	99% species protection - high conservation value systems	Australian and New Zealand Guidelines for Fresh and Marine Water Quality - technical draft default guideline values for PFOS and PFOA. Note 1: The 99% species protection level for PFOS is close to the level of detection. Agencies may wish to apply a 'detect' threshold in such circumstances rather than a quantified measurement. Note 2: The draft guidelines do not account for effects which result from the biomagnification of toxicants in air-breathing animals or in animals which prey on aquatic organisms. Note 3: The WQGs advise[41] that the 99% level of protection be used for slightly to moderately disturbed systems. This approach is generally adopted for chemicals that bioaccumulate and biomagnify in wildlife. Regulators may specify or environmental legislation may prescribe the level of species protection required, rather than allowing for case-by-case assessments.
	0.13 µg/L	220 µg/L	95% species protection - slightly to moderately disturbed systems	
	2 µg/L	632 µg/L	90% species protection - highly disturbed systems	
	31 µg/L	1824 µg/L	80% species protection - highly disturbed systems	
Interim marine	0.00023 µg/L	19 µg/L	99% species protection - high conservation value systems	As above. Freshwater values are to be used on an interim basis until final marine guideline values can be set using the nationally-agreed process under the Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Note 1: The WQG advise that in the case of estuaries, the most stringent of freshwater and marine criteria apply, taking account of any available salinity correction. Note 2: Marine guideline values developed by CRC CARE are under consideration through the nationally-agreed water quality guideline development process.
	0.13 µg/L	220 µg/L	95% species protection - slightly to moderately disturbed systems	
	2 µg/L	632 µg/L	90% species protection - highly disturbed systems	
	31 µg/L	1824 µg/L	80% species protection - highly disturbed systems	

https://www.waterquality.gov.au/sites/default/files/documents/ANZECC-1992-guidelines.pdf

Type of indicator	Indicator	Units	Fresh waters	Marine waters
	Dissolved oxygen[2]	mg/L	> 6 (> 80–90% saturation)	> 6 (> 80–90% saturation)
	Nutrients/nuisance growths	–	(Section 2.3.3)	(Section 2.3.3)
	pH	–	6.5–9.0	< 0.2 pH unit change
	Salinity	mg/L	< 1000 (about 1,500 µS/cm)	–
	Suspended particulate matter/turbidity	–	< 10% change seasonal mean concentration (see also colour & clarity)	< 10% change seasonal mean concentration (see also colour & clarity)
	Temperature[3]	–	< 2°C increase	< 2°C increase
Toxicants				
Inorganic toxicants	Aluminium	µg/L	< 5.0 (if pH < = 6.5)	NR
	Aluminium	µg/L	< 100.0 (if pH > 6.5)	–
	Ammonia	µg/L	20.0–30.0 (Table 2.3)	NR
	Antimony	µg/L	30.0	500.0
	Arsenic	µg/L	50.0	50.0
	Beryllium	µg/L	4.0[4]	NR
	Cadmium	µg/L	0.2–2.0[5]	2.0
	Chromium	µg/L	10.0	50.0
	Copper	µg/L	2.0–5.0[5]	5.0
	Cyanide	µg/L	5.0	5.0
	Iron	µg/L	1,000.0[6]	NR
	Lead	µg/L	1.0–5.0[5]	5.0
	Mercury	µg/L	0.1	0.1
	Nickel	µg/L	15.0–150.0[5]	15.0
	Selenium	µg/L	5.0	70.0
	Silver	µg/L	0.1	1.0
	Sulfide	µg/L	2.0	2.0
	Thallium	µg/L	4.0	20.0
	Tin (tributyltin)	µg/L	0.008	0.002
	Zinc	µg/L	5.0–50.0[6]	50.0
Organic toxicants	Acrylonitrile	µg/L	NR	NR
	Benzidine	µg/L	NR	NR
	Dichlorobenzidine	µg/L	NR	NR
	Diphenylhydrazine	µg/L	NR	NR
Halogenated aliphatic compounds	Hexachlorobutadiene	µg/L	0.1	0.3
	Halogenated ethers	µg/L	NR	NR
	Isophorone	µg/L	NR	NR
Monocyclic aromatic compounds	Benzene	µg/L	300.0	300.0
	Chlorinated benzenes	µg/L	(Table 2.8)	NR

Appendix C. Intensity Frequency Duration – Average Recurrence Interval Indicator
Intensity-Frequency-Duration (bom.gov.au)



Moorebank Logistics Park West Precinct

Basin 5 Location

Stormwater Network Water Quality Monitoring Data & Reporting Autumn 2025

Site image: Outlet retention basin 5 MPW (Apical image 09th April 2025)

Prepared for: MID Plumbing P/L SIOMP Moorebank Precinct West

Prepared by: Daniel Anderson *(BEnvSc, MEnvSc)*

Romy Brien *(BSc NRM)*

E-mail: daniel@apical-bushfire.com.au
Phone: 0415617771
PO Box 149 Kiama NSW 2533
ABN: 656 420 10 400

Consulted Documents / database.

Australia and New Zealand Guidelines for fresh and Marine Water Quality (2000)
NATIONAL WATER QUALITY MANAGEMENT STRATEGY - Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000) - Volume 2 - Aquatic ecosystems

Bureau of Meteorology – Australian Government Australia's official weather forecasts & weather radar - Bureau of Meteorology (bom.gov.au)

Moorebank Intermodal Precinct West – Stage 3 (SSD 10431) | Assessment Report March 2021
https://moorebankintermodalprecinct.com.au/wp-content/uploads/2023/04/MPW-S3-DPIE-assessment-report-to-IPC.pdf

WQM Report Western Precinct _Basin 5_Autumn 2024 – Apical Bushfire and Planning - April 2024

WQM Report Western Precinct _Basin 8_Spring 2024 – Apical Bushfire and Planning - October 2024

Development Consent - Section 4.38 of the Environmental Planning and Assessment Act 1979 - Application Number: SSD 7709 Applicant: Sydney Intermodal Terminal Alliance (SIMTA) as Qube Holdings Limited Consent Authority: The Independent Planning Commission Site: Moorebank Avenue, Moorebank Lot 1 DP 1197707 Lot 100 DP 1049508 Lot 101 DP 1049508 Lot 2 DP 1197707 Part Lot 3 DP 1197707 Part Anzac Road and Moorebank Avenue public road reserves Development: Moorebank Precinct West Stage 2 (MPW Stage 2)

Development Consent - Section 4.38 of the Environmental Planning and Assessment Act 1979 - Application Number: SSD 10431 Applicant: Sydney Intermodal Terminal Alliance (SIMTA) as Qube Holdings Limited Consent Authority: The Independent Planning Commission Site: Moorebank Avenue, Moorebank Lot 1 DP 1197707 Lot 100 DP 1049508 Lot 101 DP 1049508 Moorebank Precinct West Stage 3 (MPW Stage 3)

Australian Laboratory Services (ALS) Work Order EW2402561 Certificate of Analysis Water Sample Data 9th April 2025.

Liverpool DCP
Liverpool's Development Control Plans | Liverpool City Council (nsw.gov.au)

DEE 2016. Commonwealth Environmental Management Guidance on Perfluorooctane Sulfonic Acid (PFOS) and Perfluorooctanoic Acid (PFOA). Department of the Environment and Energy.
https://environment.gov.au/system/files/pages/dfb876c5-581e-48b7-868c-242fe69dad68/files/draft-environmental-mgt-guidance-pfos-pfoa.pdf

Development Consent SSD 7709 - Section 4.38 of the Environmental Planning and Assessment Act 1979
https://www.ipcn.nsw.gov.au/resources/pac/media/files/pac/projects/2019/05/moorebank-intermodal-precinct-west-stage-2/referral-from-department-of-planning-and-environment/revised-recommended-conditions/mpw-stage-2-recommended-conditions-inclusive-of-edits-191105.pdf

Glossary

The following definitions apply to terms used in this report. Many of these definitions are consistent with relevant national literature and cited where appropriate.

Current status trigger value
Concentrations of water quality indicators that reflect existing ecosystem condition, and therefore provide a target for ecosystem maintenance and a benchmark against which future water quality trends may be monitored.

Environmental value
Particular values or uses of the environment important for a healthy ecosystem or for public benefit, welfare, safety or health and requiring protection from the effects of pollution or degradation (Environment Australia 2002).

Indicator
A parameter (biological, physical or chemical) used to provide a measure of the quality of water or the condition of an ecosystem (Environment Australia 2002).

Low-risk trigger value
Concentrations (or loads) of key performance indicators [of water quality] at which if not exceeded, there is a low risk that adverse biological effects will occur (ANZECC 2000a).

Median
The middle reading, or 50th percentile, of all readings taken. i.e. of the readings 10, 13, 9, 16 and 11 (re-ordering these to read 9, 10, 11, 13 and 16), the median is 11. The mean (or average), is the sum of all values divided by the total number of readings (which in this case equals 11.8).

Reference condition
Refers to a site which is unmodified or minimally modified from 'natural' condition. Most commonly, reference sites are subject to limited disturbance from human activity. The reference condition then serves as a standard or target against which environmental change in other similar sites can be assessed.

Trigger value
A concentration that, if exceeded, would indicate a potential environmental problem, and so 'trigger' a management response, such as further investigation and/or remedial actions (ANZECC 2000a).

Water quality guideline
A numerical concentration level (e.g. of a contaminant) or narrative statement (e.g. visual appearance of a water body) recommended to support and maintain a designated water use (ANZECC 2000a)

1.1 Background

The Sydney Intermodal Terminal Alliance (SIMTA) received approval for the construction and operation of Stage 3 (the Project) of Moorebank Precinct West (MPW), which comprises the third stage of development within the Moorebank Precinct West under Development Approval SSD-10431.

The proposal is SSD under clause 19 of Schedule 1 of the State Environmental Planning Policy (State and Regional Development) 2011, as it is development for the purpose of rail and related transport facilities.

The MPW site is located on the western side of Moorebank Avenue and forms the western section of the Moorebank Intermodal Precinct (Map Image 2).

The MPW site is approximately 2.5 kilometres (km) from the Liverpool city centre, 27 km south-west of the Sydney Central Business District (CBD) and 26 km west of Port Botany.

The MPW site is irregular in shape, approximately 3 km from north to south and 960 m from east to west at its widest point and covers an area of approximately 220 ha. It is situated between the Georges River to the west (with the SSFL running north-south to the west of the river); and Moorebank Avenue to the east.

Works on the MPW site to date have commenced under two current and active development consents:

• MPW Stage 1 early works, which provides demolition, rehabilitation, remediation of contaminated land, and the establishment of construction facilities and access including site security (as part of the SSD 5066 consent)

• MPW Stage 2, which provides for the construction and 24/7 operation of an intermodal facility and associated warehousing (SSD 7709).

This water quality monitoring program is guided by the Stormwater Infrastructure Operation and Maintenance Plan (SIOMP) and is provided to site management on behalf of MID Plumbing.

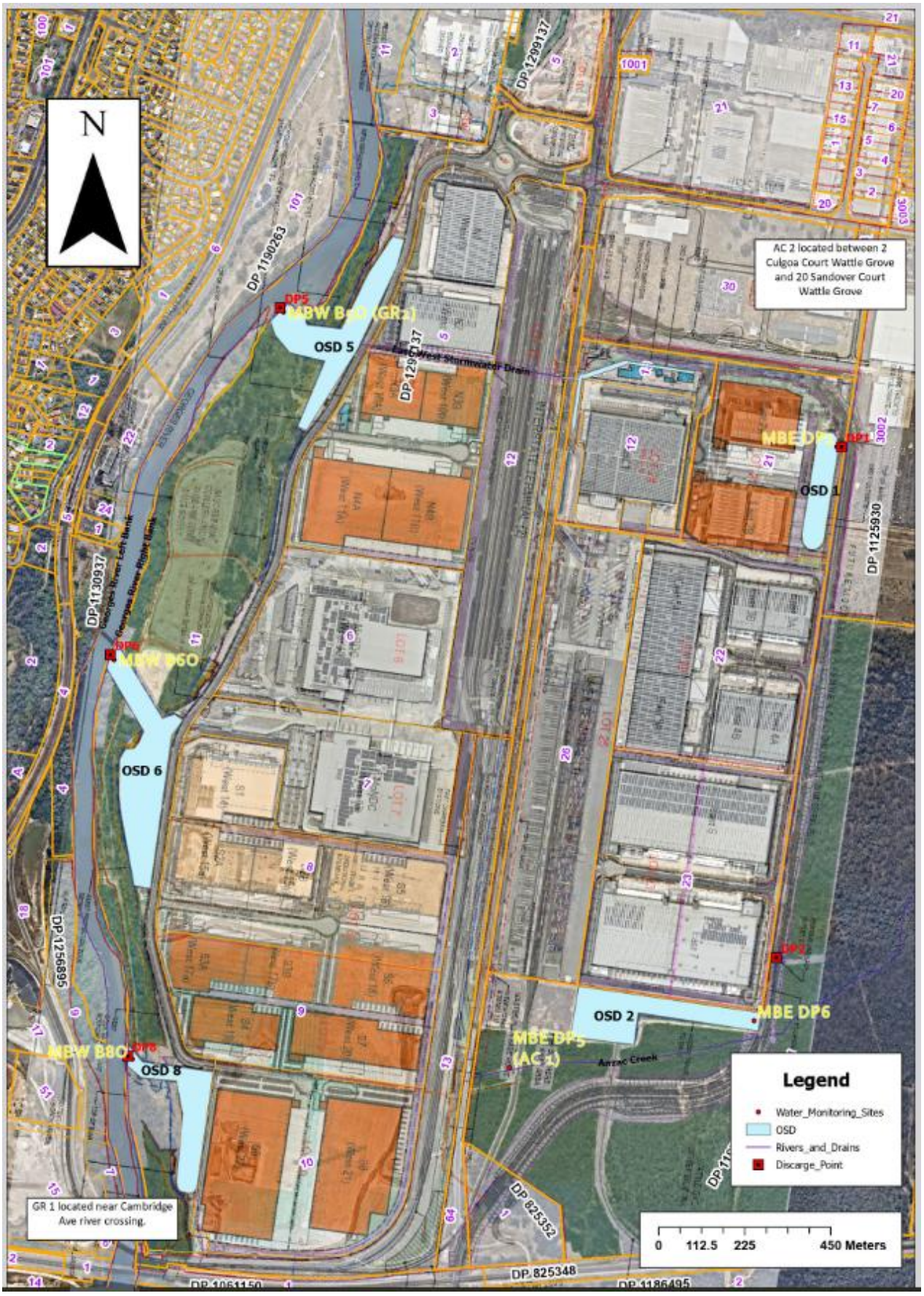
Three onsite bio-retention basins are present within Moorebank Precinct West. This report is in reference to baseline water quality condition reporting for Basin 5 (MPW – north).

Development Consent - Section 4.38 of the Environmental Planning and Assessment Act 1979 - Application Number: SSD 7709 Moorebank Precinct West Stage 2 (MPW Stage 2)

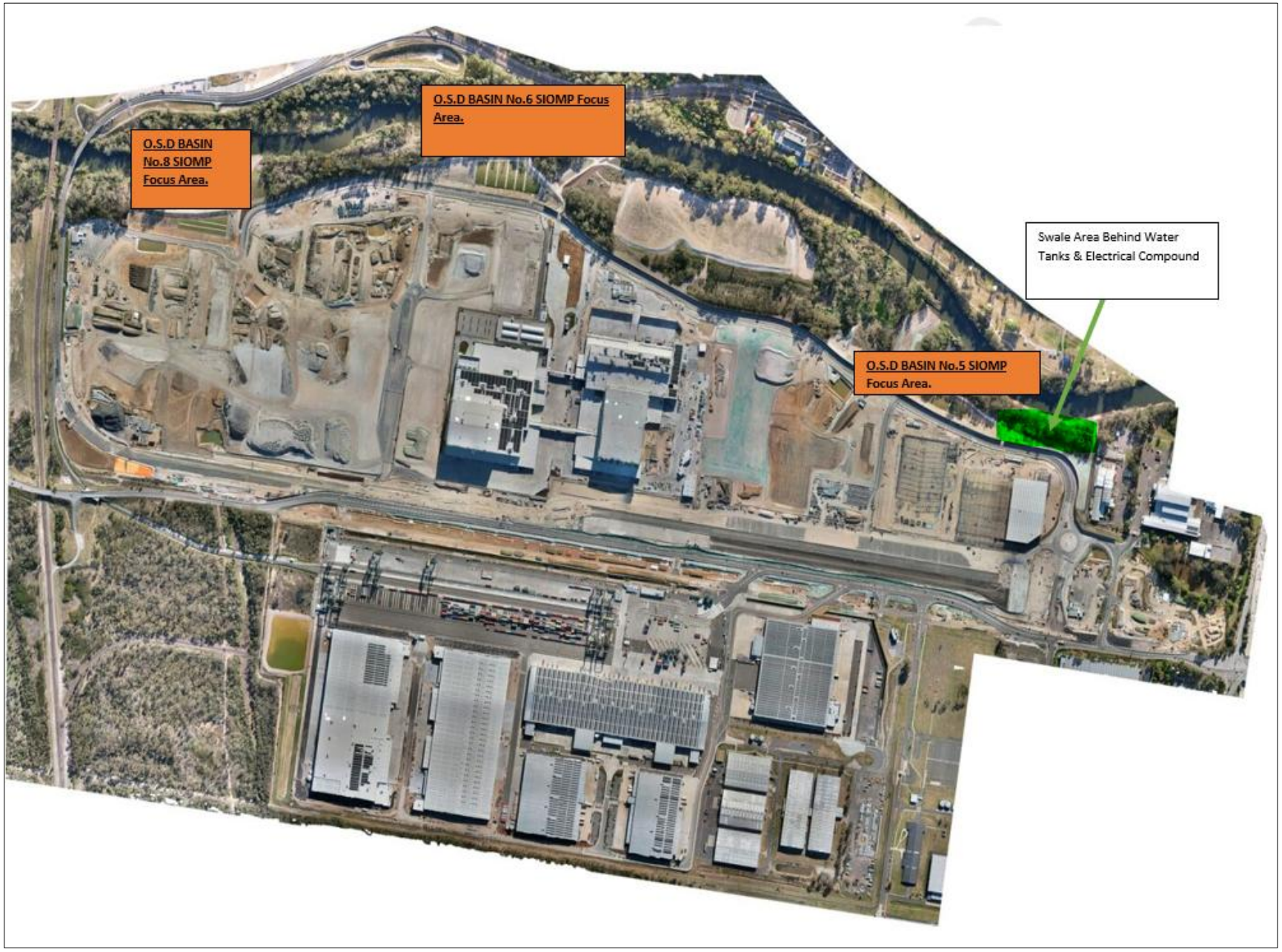
CoC	Requirement
Stormwater Quality Monitoring	
B38.	Stormwater Quality Monitoring Program - Prior to commencement of operation Part of the Operational Environmental Management Plan

The Stormwater Infrastructure Operation and Maintenance Plan (SIOMP) Moorebank Logistics Park – West Precinct was developed to address the requirements of MPE stage 3 CoCs (SSD 7709). The management plan (SIOMP) identifies the operational drainage and environmental management measures within the stormwater management system that will be applied to activities undertaken across the MLP west Precinct to manage improved water quality objectives and overall functionality of the stormwater detention and drainage network associated with stormwater infrastructure upon the site under the SIOMP.

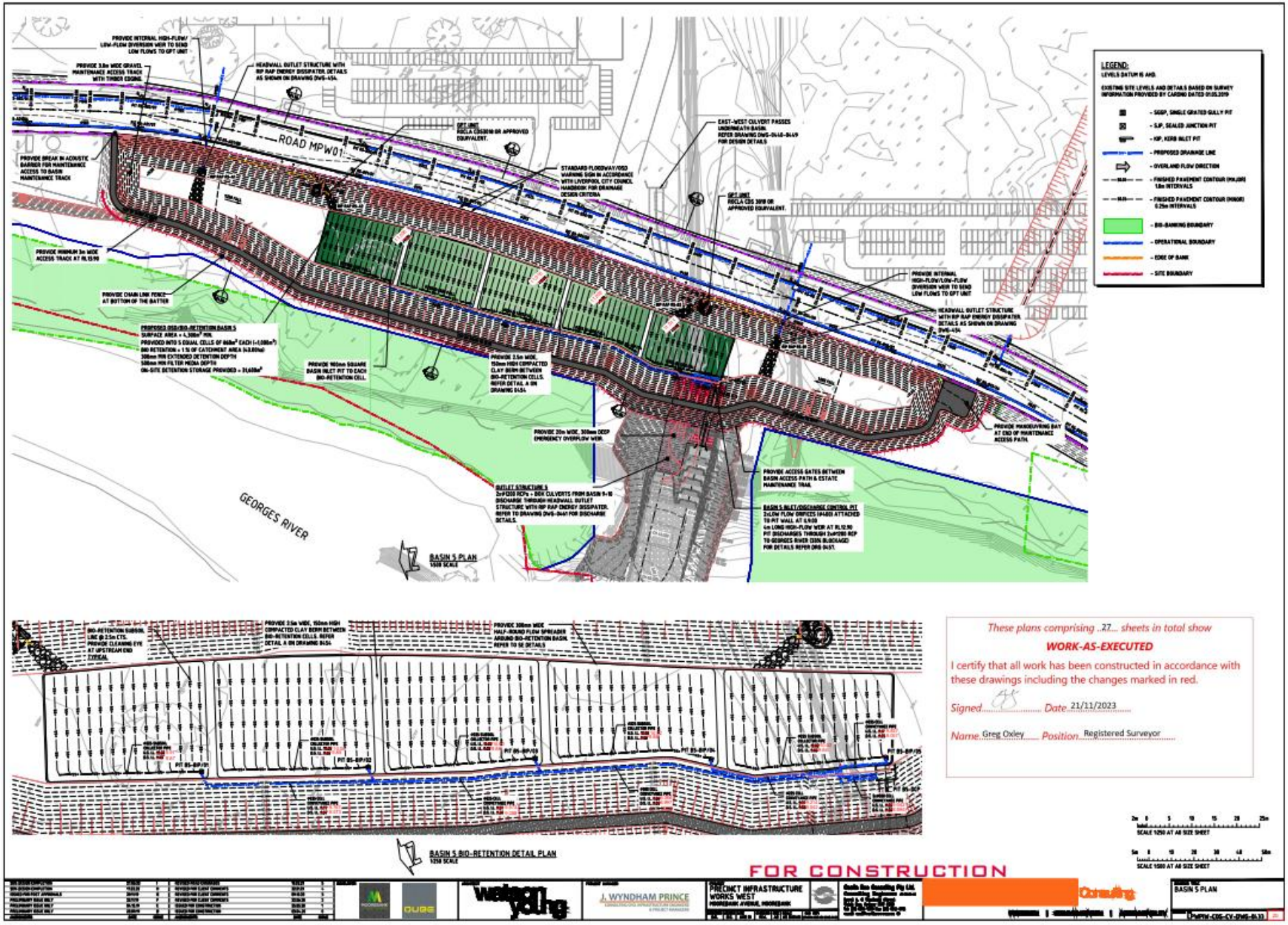
Map image 1. Overview subject site (MPW) provided by Arcadis



Map Image 2. Moorebank Precinct West Detention Basins (provided by MID Plumbing)

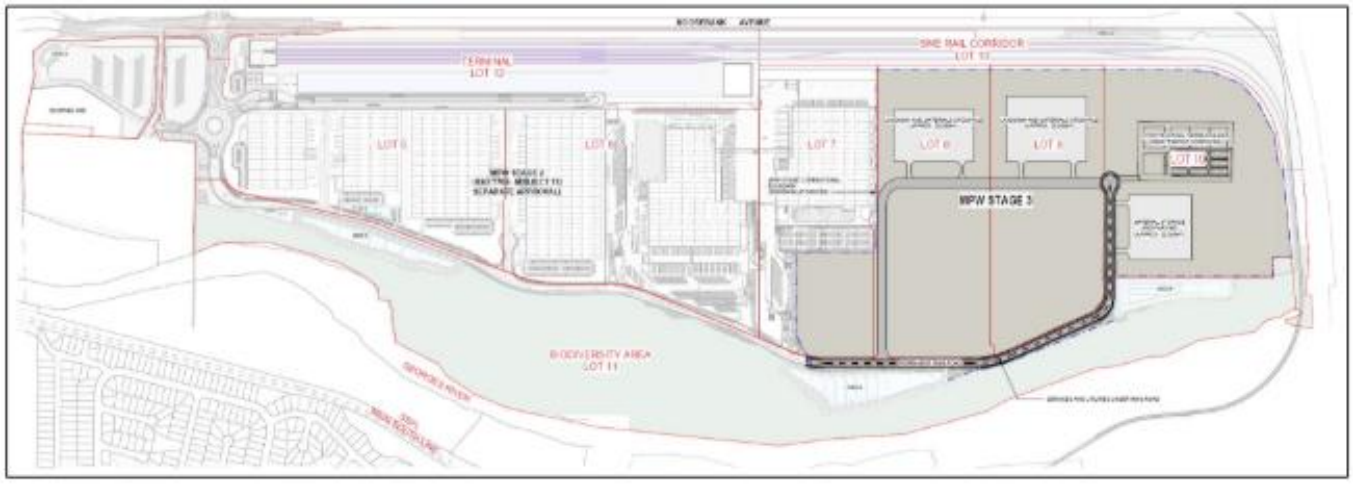


Map image 3. Detention Basin 5 MPW (north)



1.2 Reference information

Map image 4. Moorebank Intermodal Precinct West – Stage 3 State Significant Development Assessment (SSD-10431) March 2021



20. Stormwater Management System or Works	That untreated stormwater is not disposed of into the Georges River or its tributaries.	Detailed stormwater assessments were undertaken as part of MPW Stage 2, and remain applicable to the Stage 3 proposal. The Department has recommended conditions that would enforce these requirements, by ensuring that appropriate measures are implemented to manage stormwater impacts during construction. In regard to management of stormwater during operation of the MPW site, the MPW Stage 2 proposal incorporates a robust set of conditions to manage the release of stormwater via six onsite detention basins (OSD), a major east-west covered culvert and associated drainage infrastructure.
	The likely impact of stormwater disposal on the quality of any receiving waters.	
	That the levels of nutrients and sediments entering the waterway are not increased by the proposed development.	
	Whether any proposals to manage stormwater are in accordance with the local council's stormwater management plans and the Managing Urban Stormwater series of documents and meet the local council's stormwater management objectives.	
	Whether the principles outlined in the *Managing Urban Stormwater Soils and Construction Handbook* (1998) prepared by and available from Landcom and the Department of Housing are followed during each stage of a development (including subdivision).	

2. Monitoring Program Methodology

2.1 Monitoring Sites

To support stormwater and drainage management of the facility the MLP West precinct has established a vast stormwater infrastructure system consisting of several Water Sensitive Urban Design (WSUD) functions including raingardens detention basins and bio-swales. These networks are designed to minimise the velocity and peak discharge of stormwater draining from the site and act as onsite detention basins to harvest and sequester potential pollutants generated at the site through designed biological processes.

The stormwater infrastructure system discharges water into the natural drainage system via three outlets:

- Basin 5 detains water from the northern section of MPW before discharging into Georges River
- Basin 6 detains water from the mid-section of MPW before discharging into Georges River
- Basin 8 detains water from the southern section of MPW before discharging into Georges River

Monitoring of the discharge points has been established via our ongoing program with MID Plumbing under the SIOMP program (MPE) to collect qualitative data and analyse the performance of the WSUD provisions and to establish any potential trends in water quality readings from the stormwater network discharge points prior to release of water into the natural hydrological systems of Anzac Creek and the Georges River.

This report constitutes the Autumn water quality data alongside baseline data for Basin 5 Moorebank Precinct West (MPW).

Table 1. Type of outlet MPW

Discharge Point (see figure 2)	Associated Outlet (see figure 1)	Type of outlet/detention basin
Basin 5	Inlet	Bio retention basin (holding)
	Outlet	Outlet point – rock ramp
	Georges River	River – natural drainage conveyance
Basin 6	Inlet	Bio retention basin (holding)
	Outlet	Outlet point – rock ramp
Basin 8	Inlet	Bio retention basin (holding)
	Outlet	Outlet point – rock ramp

2.2 Water Quality Assessment

Surface water quality data collected at the discharge points is assessed with reference to ANZECC Guidelines (2000) and correlated with baseline & Spring 2025 Water Quality monitoring results provided by previous condition assessment reports.

By comparing water test data under the program across the testing timeline we can identify and report upon trends, identify exceedances and exclude potential anomalies for datasets.

Table 2. ANZECC Low Risk Trigger Values

Ecosystem type	Turbidity NTU	EC µS/cm	pH*	DO	TN mg/L	NO_x - N mg/L	NH_4^+ - N mg/L	TP mg/L	DRP - P mg/L
Upland river	2-25	30-350	6.5-7.5	90-110	0.480	0.190	0.013	0.013	0.005
Lowland river	6-50	125-2200	6.5-8.0	85-110	0.500	0.190	0.020	0.050	0.020

Values for Low Land River Systems as insert above are used as the reference guide to water quality parameter values and overall health and safety statements regarding the quality of discharged water from the SIOMP drainage network.

Annual spring and autumn water quality data presented from Anzac Creek and Georges River testing programs by other scientific consultants may also be cross referenced to the data prepared by Apical under the SIOMP program to establish potential trends in results and identify increases in accumulated pollutants from the site under operational condition, which may appear present within adjacent natural waterways.

Site data was collected in the form of water samples and in field data recordings at the prescribed monitoring points, water samples and water probe readings are undertaken following Australia and New Zealand guidelines for fresh and marine water quality – 2000 (ANZECC Guidelines), In situ water quality parameters relevant to stream health and aquatic assessment profiling were collected in field with a multiparameter hand-held water quality monitoring probe (Aquatroll 600).

Water data is collected, analysed and collated under the same methodologies and process under each testing period, the ensure consistency in the process.

Measures tested and samples taken:

- pH
- Dissolved Oxygen
- Electrical Conductivity
- Water Temperature and
- Turbidity

Water samples are collected at inlet and discharge points (Basin 5, Basin 6 & Basin 8) then sent to Australian Laboratory Services (ALS) for quality testing analysis Surface water (alsglobal.com).

Water analytical suites / testing parameters are provided to obtain overall water condition results and chemical sampling of collected water is undertaken for a range of nutrients, metals, and hydrocarbons relevant to stream health and aquatic assessment protocol, key nutrients, metals, and pollutants included in the assessment to reflect an overall suite of water quality condition guides which are listed below:

- Total phosphorous
- Total Nitrogen
- Kjeldahl Nitrogen
- Dissolved Metals
- PFAS
- Total Suspended Solids

- Total Hydrocarbons

The raw data results from the lab analysis provided to us by ALS Laboratory Services are presented within this report (see Appendix A).

Key water quality data attributes are recorded, tables and compared against; previous condition baseline data, Liverpool Development Control Plan (DCP) water quality targets, Conditions of Consent B40 and ANZECC Guideline (2000) trigger limits under the condition category 90% protection criteria for freshwater natural systems.

The water quality guidelines are applied to ensure adjacent natural waterways George River and Anzac creek are not adversely affected by poor water quality discharge from the Moorebank logistics park site and operations.

Trends observed in our datasets are analysed on a temporal scale with any trigger values for specific water quality measures highlighted and presented within the results chapter of each seasonal report. This report provides baseline & Spring 2024 data for Basin 5 (MPW) from which trend analysis will compound over future reporting periods.

2.3 Data Analysis

The water quality measurements collected are used to assess water quality at each site in terms of health of aquatic ecosystems by comparison with guideline values recommended by the ANZECC and ARMCANZ (2000) guidelines for the protection of lowland streams (i.e. systems at < 150 m altitude) in south-east Australia. This categorisation for stream health is deemed relevant for the description of Anzac Creek, the recipient natural way due to the location in the geomorphic landscape and correlations of expected biophysical health and habitat profiles for similar stream environments.

2.4 Survey dates and personnel

On the 9th April 2025, ecologists from Apical Bushfire and Planning attended Moorebank Precinct West (MPW) to collect water quality data across the testing sites which are located within selected inlet points and discharge points within the stormwater drainage and management system (SIOMP) located within the Moorebank Logistics Park site West (See map image 2).

Inlet and outlet points within the network are representative of variant sites where stormwater will enter a node of the system (as a point source) and then release from the that node of the system at a discharge point. By recording inlet and discharge data water quality can be tracked along the continuum within the system to determine condition changes and overall trends in measured quality at given sites.

This data was collected on behalf of MID plumbing in accordance with 'The Stormwater Infrastructure Operation and Maintenance Plan Moorebank Logistics Park – West Precinct 2020' and in compliance with Condition of Consent B40 (Liverpool City) for the subject site. The results of such monitoring data collection are presented within this report.

2.5 Rainfall

Between the 1st of March and the 31st of March 2025 Moorebank received 90.2mm of rainfall (http://www.bom.gov.au/climate/dwo/202409/html/IDCJDW2161.202409.shtml). Between the 1st of April and the 15h of April 2025 Moorebank received 3.4mm of rainfall.

Figure 1. Bureau of Meteorology Daily Weather Observation Holsworthy March 2025

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9 am						3 pm					
		Min	Max				Dir	Spd	Time	Temp	RH	Cld	Dir	Spd	MSLP	Temp	RH	Cld	Dir	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	8th		km/h	hPa	°C	%	8th		km/h	hPa
1	Sa	18.7	32.0	0			S	28	23:13	22.9	78		WSW	13	1016.7	31.2	53		ENE	15	1012.3
2	Su	19.8	25.7	0			S	52	16:16	23.5	85	8	SSE	19	1013.7	24.8	75	8	SE	30	1013.1
3	Mo	19.2	25.6	0			S	37	08:09	22.2	71	3	S	22	1018.7	24.3	63	8	S	22	1017.6
4	Tu	18.5	26.0	6.8			S	46	15:00	21.0	94	8	SE	9	1021.3	24.2	70	8	SSE	26	1021.6
5	We	18.5	26.7	3.2			SE	35	15:06	22.3	74		SSE	15	1021.8	25.3	55	6	SE	22	1019.5
6	Th	16.9	26.9	0			SSE	43	15:50	21.9	81	8	SSE	15	1020.4	25.4	62	7	SE	22	1019.9
7	Fr	17.9	26.5	2.4			ESE	44	12:59	19.9	92	8	SSE	15	1021.6	25.6	55	5	ESE	24	1020.5
8	Sa	17.4	24.5	2.6			SE	33	12:14	21.1	87	7	SSE	17	1022.8	23.2	70	8	ENE	15	1022.5
9	Su	19.8	28.5	1.4						21.8	94	8		Calm	1023.7	27.0	55	2	ENE	19	1020.7
10	Mo	18.5	27.1				NNE	24	13:12	22.9	79	8	NNE	7	1020.8	26.1	60	8	NNE	13	1018.6
11	Tu	19.4	22.3	9.0			SE	30	06:14	20.2	97	7	SSE	15	1020.5	21.4	93	8	ESE	17	1020.6
12	We	18.6	27.0	8.0			SE	22	13:50	20.4	94	6	W	9	1022.8	26.8	63	8	ENE	7	1019.8
13	Th	17.0	31.7	0			N	24	10:29	19.8	97	7	W	7	1020.1	30.5	48		NNW	9	1016.8
14	Fr	17.8	35.8	0			SSE	30	22:56	23.1	90			Calm	1019.5	34.3	36		NE	9	1016.3
15	Sa	22.0	34.7	0			SE	30	23:09	23.6	85	8	W	7	1019.9	34.5	45		NE	11	1014.5
16	Su	21.0	37.0	0			W	39	12:21	25.6	67		W	6	1011.6	36.4	26		WNW	20	1006.7
17	Mo	15.5	21.5	0			SSE	61	01:54	18.0	51		SSW	20	1018.9	20.5	39		SE	28	1020.8
18	Tu	10.9	24.4	0			E	28	10:42	16.0	71			Calm	1024.5	23.1	51	8	ESE	17	1022.4
19	We	15.6	28.6	0			E	31	14:05	19.3	80	1		Calm	1023.3	27.3	54		ESE	20	1019.0
20	Th	18.2	32.5	0			ENE	31	17:41	22.1	81	1		Calm	1020.3	31.3	47		E	17	1015.6
21	Fr	17.9	27.5	0			SSE	31	18:36	20.1	90	8	W	7	1014.5	25.9	68	3	N	13	1012.5
22	Sa	18.9	26.7	1.4			SE	31	16:27	19.8	87	7	W	6	1017.6	25.1	63	8	SE	17	1015.9
23	Su	19.7	22.1	4.0			S	26	12:46	20.4	92	8	S	13	1021.1	21.0	88	8	S	15	1019.8
24	Mo	18.8	25.8	3.6						20.3	97	8	S	2	1020.3	24.2	71	7	ESE	9	1018.9
25	Tu	19.6	26.2				SSE	31	12:01	22.6	82	4	S	13	1023.1	23.4	82	8	SSW	11	1021.2
26	We	18.4	27.5	1.0			E	33	16:13	19.8	97	1		Calm	1022.6	26.8	54		E	17	1020.5
27	Th	15.6	25.7	0			S	28	10:22	18.4	94	1		Calm	1023.4	24.6	74	8	SE	17	1022.1
28	Fr	16.7	24.2	1.4			E	30	13:28	19.9	96	8		Calm	1022.6	23.8	74	8	E	15	1019.7
29	Sa	18.0	22.0	19.0			SW	37	21:32	18.6	96	7	SSW	7	1012.6	20.0	95	7	WSW	11	1007.3
30	Su	18.4	24.2	11.8			S	50	14:42	19.4	91	8	WSW	13	1008.1	22.1	79	8	SSW	31	1008.1
31	Mo	17.4	24.3	14.6			SW	54	13:19	19.5	79	6	SW	17	1011.7	22.6	64	8	SSW	26	1011.7
Statistics for March 2025																					
Mean		18.1	27.1							20.9	85	6		8	1019.4	25.9	62	7		17	1017.3
Lowest		10.9	21.5	0						16.0	51	1		Calm	1008.1	20.0	26	2	ENE	7	1006.7
Highest		22.0	37.0	19.0			SSE	61		25.6	97	8	S	22	1024.5	36.4	95	8	SSW	31	1022.5
Total				90.2																	

IDCJDW2161.202503 Prepared at 13:00 UTC on Monday 14 April 2025

Figure 2. Bureau of Meteorology Daily Weather Observation Holsworthy April 2025

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9 am						3 pm					
		Min	Max				Dir	Spd	Time	Temp	RH	Cld	Dir	Spd	MSLP	Temp	RH	Cld	Dir	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	8th		km/h	hPa	°C	%	8th		km/h	hPa
1	Tu	15.6	23.2	0			S	37	10:56	19.2	73	5	WSW	9	1015.2	22.1	55	5	SSW	20	1013.3
2	We	13.0	24.6	0			E	28	16:07	14.3	82	7	WSW	9	1012.4	23.9	41		NE	11	1007.8
3	Th	10.1	26.7	0			WNW	39	11:44	14.1	94			Calm	1011.3	25.9	26		SW	9	1009.7
4	Fr	12.3	25.3	0			SE	31	15:50	16.9	86		WSW	7	1016.4	24.6	58	3	SE	15	1014.4
5	Sa	14.3	26.2	0			SE	39	16:24	18.5	47		WNW	9	1015.0	25.0	31		SE	19	1013.9
6	Su	9.2	25.3	0			W	26	11:47	17.1	75		NW	9	1018.8	23.6	31	8	S	6	1013.9
7	Mo	11.5	26.9	0			WSW	43	12:01	19.8	50		NW	11	1018.1	26.7	27		W	11	1015.9
8	Tu	12.3	22.2	0			SE	28	15:34	18.0	71	7	W	9	1025.2	21.4	60	8	SE	19	1023.1
9	We	15.5	24.0	1.2			E	28	13:17	19.7	80	5	ENE	7	1025.7	22.1	69	1	ENE	19	1021.4
10	Th	12.4	24.2	0			NNE	17	14:07	17.7	89	8		Calm	1023.2	23.7	59	8	ENE	7	1020.0
11	Fr	12.4	30.1	0			SE	37	14:37	20.0	76		WNW	9	1023.9	26.7	48	2	SE	20	1022.8
12	Sa	15.1	26.4	0			SSE	28	13:10	21.7	74		WNW	6	1030.8	24.9	64	1	E	17	1028.9
13	Su	13.2	26.8	0			ENE	28	16:05	20.5	85		W	7	1030.2	25.5	51		ENE	17	1025.9
14	Mo	12.4	28.8	0			S	57	14:47	18.8	86		WSW	9	1025.6	24.4	61		S	26	1023.6
15	Tu	16.2		2.2						19.4	75	8	SSW	15	1027.7	19.3	72	8	SSE	19	1025.5
Statistics for the first 15 days of April 2025																					
Mean		13.0	25.8							18.4	76	6		7	1021.3	24.0	50	4		15	1018.7
Lowest		9.2	22.2	0						14.1	47	5		Calm	1011.3	19.3	26	1	S	6	1007.8
Highest		16.2	30.1	2.2			S	57		21.7	94	8	SSW	15	1030.8	26.7	72	8	S	26	1028.9
Total				3.4																	

IDCJDW2161.202504 Prepared at 05:36 UTC on Tuesday 15 April 2025

3. Results

Data results captured by our water quality sampling are presented herein and are representative of baseline water quality results for Moorebank Precinct West Basin 5. Threshold guideline quantitative values for the water quality parameter themes are compared and correlated to ANZECC/ARMCANZ (2000) guidelines under the categorisation thresholds – Waterway benchmark group: 'The protection of slightly disturbed lowland river ecosystems in southeast Australia'.

As these are the first samples results collected under our scope for the SIOMP-MPW sites, the sampling results presented in this report will be considered for future analysis against subsequent results for use as baseline data for the drainage network SIOMP function.

Triggers Exceedances from both the In-Situ Data and the Laboratory Samples April 2025

Location Basin 5 Outflow

Nitrogen 400 µg/L (Guideline trigger 350)

Copper 0.005 mg/L (Guideline trigger 0.0014mg/L)

Literature Review

Nitrogen Values

Nitrogen

A previous spike in Nitrogen has decreased to almost meet the ANZECC trigger value for rivers flowing to the coast at this collection point. This may be due to increased vegetation within the system allowing for uptake of excess nitrogen being mobilised by the stormwater.

What effect does total nitrogen have on the environment?

Total nitrogen can have damaging effects on the environment and particularly on aquatic life (the fish, shellfish and other creatures in our rivers, lakes and oceans) because most nitrogen is leaked into waterways.

Total nitrogen can also lead to toxic blue-green algal blooms. Blue-green algae can harm humans and can make both humans and animals very sick. Do you see how important it is to help keep our waterways clean?

https://nitrogen-generators.com/what-is-the-main-industrial-use-of-nitrogen/#:~:text=Food%20Packaging%3A%20It%20is%20common,snack%20foods%20can%20be%20extended.

Five (5) Industrial Applications of Nitrogen

While the main industrial use of nitrogen is to create ammonia that is required for fertilizer, explosives, and other materials, it uses go far beyond these applications. From food packaging to pharmaceuticals, nitrogen gas can be found in more places and used for more purposes than you may have realized.

Food Packaging: It is common practice for food processing companies to use compressed nitrogen to displace oxygen in the packaging of perishable foods. Without oxygen, the shelf life of foods such as meats, fruits, vegetables, and various snack foods can be extended. Nitrogen can also add a cushion around food to keep it safe during transport.

Chemical Blanketing: Nitrogen is typically used to prevent fires and explosions in dangerous atmospheres like chemical plants or manufacturing facilities, by lowering the oxygen level below explosive limits.

Electronics: In the process of assembling electronics, nitrogen gas is used when two electronic components are forming a permanent connection, also known as soldering. The gas is used to reduce surface tension so there is a cleaner break away from the site of the electrical bond. Nitrogen gas is also used in a computer's main processing system to prevent it from overheating.

Laboratory: Laboratories require a very specific environment to ensure that tests and results are carried out accurately. Nitrogen gas is used to control oxygen levels, humidity and temperature, and maintain an appropriate atmosphere for highly sensitive procedures and equipment. Additionally, there are various pieces of laboratory equipment that require nitrogen for purging.

Laser Cutting: The application of nitrogen as a purging gas in the steel industry is extremely important. It is used as an assist gas to blow away molten material and achieve a stronger stainless or aluminized steel product that is also more resistant to corrosion.

https://nigen.com/industries-that-benefit-from-on-site-nitrogen-systems/

Industries That Benefit from On-Site Nitrogen Systems

Gaseous nitrogen is very useful in large-scale manufacturing and industrial applications. The large volumes of nitrogen gas required for these operations are either sourced from vendors in gas cylinders or generated on-site. In this article, we will highlight critical industrial processes that benefit from on-site nitrogen systems.

Copper Concentration Values

It is well-established that even low concentrations of dissolved copper can be toxic to many aquatic organisms. It is important to understand the variables controlling dissolved copper concentrations in point source stormwater runoff as a means of identifying characteristics of the most problematic sites and designing appropriate treatment strategies.
Studies of copper concentrations in stormwater have also derived that Increased dissolved copper concentrations can be highly correlated with both dissolved organic carbon (DOC) and alkalinity; refer(Jeffrey A. Nason jeff.nason@oregonstate.edu, Don J. Bloomquist, and Matthew S. Sprick). The strong positive relationship between DOC and copper has been observed in other systems (Martinez and McBride, 1999, Romkens and Dolfing, 1998) and highlights the ability of NOM to increase [Cu]d through complexation.

The sources of copper in stormwater runoff include engine oil, combustion of lubricating oils, roof/gutter runoff, building siding corrosion, fertilizers, pesticides, industrial releases, and wet and dry deposition (Davis, et al., 2001, Kim and Fergusson, 1994, Makepeace, et al., 1995, Rosselot, 2006b). However, the biggest single source of copper to stormwater runoff is use of heavy vehicles and contaminants such as brake pad dust and exhaust particles (Legret and Pagotto, 1999, Rosselot, 2006a).

Recent rainfall totals for the catchment area prior to the testing regimes may also impose a large factor bearing on the results for copper concentration values; Total rainfall volume, rainfall duration, and rainfall intensity have been correlated to decreased copper levels, likely due to dilution (Driscoll, et al., 1990, Kayhanian, et al., 2003). Factors likely to influence the presence of copper in runoff samples include AADT, urban site classification, ADP, the “first flush effect”, total rainfall, and rainfall intensity.

Results of our assessment may confirm other findings that urban (high traffic) catchment areas show the most potential for producing runoff that would expose aquatic species to elevated levels of [Cu]d (copper), increasing the possibility of copper toxicity. Additionally, first-flush samples displayed consistently higher [Cu]d than samples collected at later times during a storm. Therefore, best management practices (BMPs) aiming to ameliorate the effect of copper should focus on high traffic, urban areas, the first flush of storms, and point discharges to receiving waters.

3.2 Interpreting Results

Dissolved Oxygen – Measures:

Dissolved oxygen (DO) is oxygen held (dissolved) in the water and available to aquatic organisms.

The amount of dissolved oxygen in a river or stream can tell us a lot about its water quality.

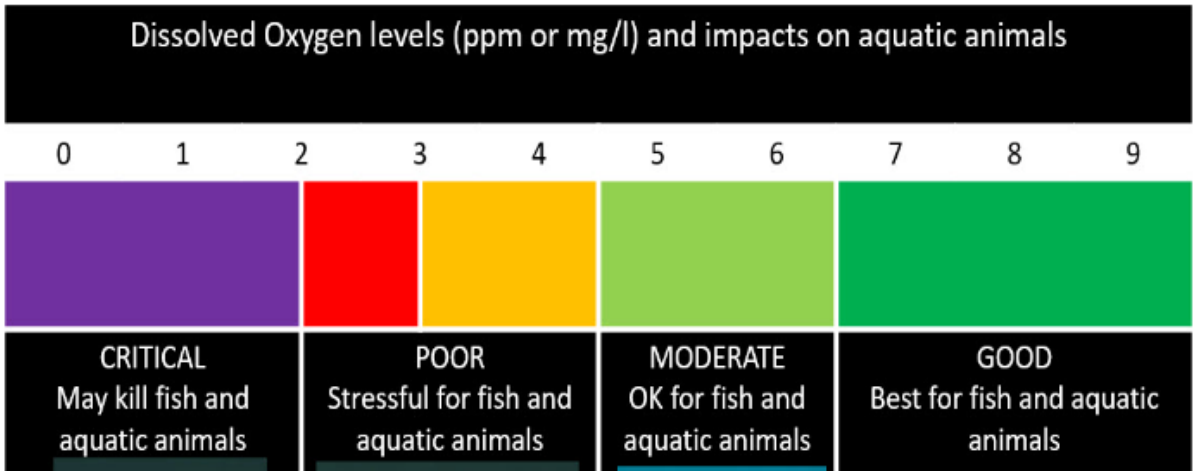
Water will naturally contain a certain amount of dissolved oxygen that is absorbed from the air and produced by plants and algae living in the water.

Temperature has a large effect on the amount of oxygen dissolved in water; cold water can hold higher levels of oxygen than warmer water. Higher water temperatures over summer will cause oxygen levels to drop.

Other factors such as river flow, wind, nutrients and bacterial activity can also affect the amount of dissolved oxygen in waterways.

Dissolved oxygen levels typically range between 5 and 14 mg/L (or ppm).

Example:



Salinity – Measures:

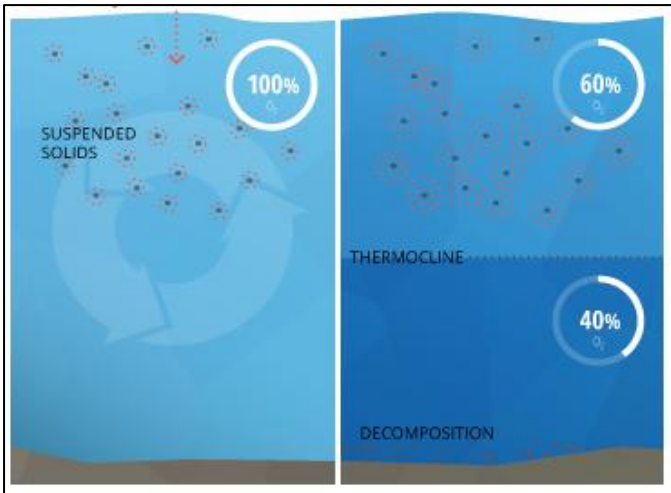
Electrical conductivity is a measure of the saltiness of the water and is measured on a scale from 0 to 50,000 uS/cm. Electrical conductivity is measured in microsiemens per centimeter (uS/cm). Freshwater is usually between 0 and 1,500 uS/cm and typical sea water has a conductivity value of about 50,000 uS/cm.

Examples:

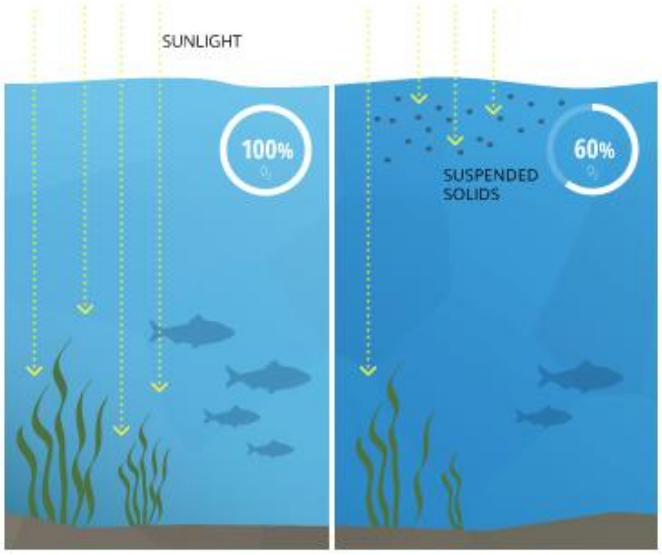
µS/cm	Use
0 - 800	• Good drinking water for humans (provided there is no organic pollution and not too much suspended clay material) • Generally good for irrigation, though above 300µS/cm some care must be, particularly with overhead sprinklers, which may cause leaf, scorch on some salt sensitive plants. • Suitable for all livestock
800 - 2500	• Can be consumed by humans, although most would prefer water in the lower half of this range if available • When used for irrigation, requires special management including suitable soils, good drainage and consideration of salt tolerance of plants • Suitable for all livestock
2500 -10,000	• Not recommended for human consumption, although water up to 3000 µS/cm can be consumed • Not normally suitable for irrigation, although water up to 6000 µS/cm can be used on very salt tolerant crops with very special management techniques. Over 6000 µS/cm, occasional emergency may be possible with care • When used for drinking water by poultry and pigs, the salinity should be limited to about 6000 µS/cm. Most other livestock can use water up to 10000 µS/cm

Total Dissolve Solids (TDS) – Measures

Dissolved solids, smaller than 2 microns, refer to any minerals, salts, metals, in the form of molecules, atoms, cations or anions dissolved in water. Total dissolved solids (TDS) comprise inorganic salts (principally calcium, magnesium, potassium, sodium, bicarbonates, chlorides and sulfates) and some small amounts of organic matter that dissolve in water.
The TDS concentration is the sum of all filterable substances in water that can be determined gravimetrically. However, in most cases, TDS is primarily comprised of ions.
High levels of total suspended solids can affect turbidity, increase water temperatures and decrease dissolved oxygen (DO) levels. This can cause the water to heat up more rapidly because the suspended particles absorb more heat and deplete oxygen, which can adversely affect aquatic life.



Suspended solids can increase the temperature of water as they absorb additional heat from the sun. This can also cause dissolved oxygen levels to drop below the thermocline, creating hypoxic conditions.

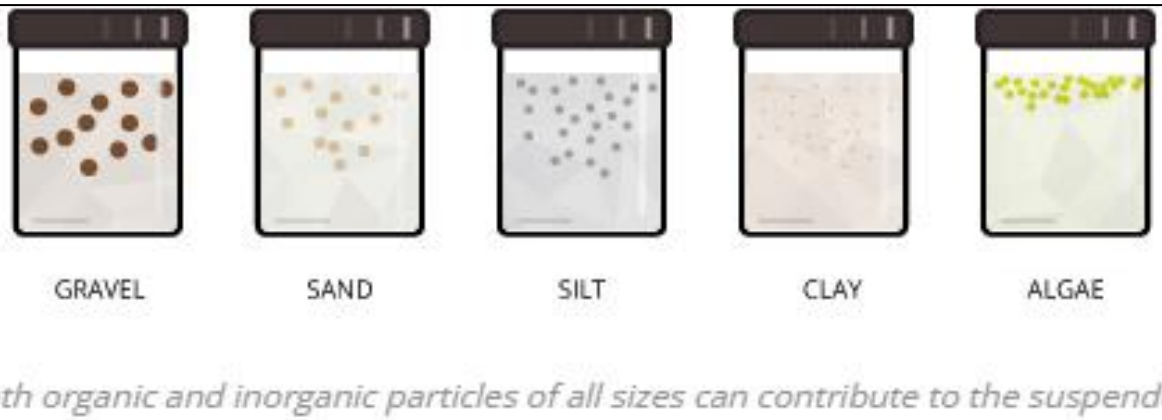


Suspended solids, particularly algae, can block sunlight from reaching submerged plants. This can cause dissolved oxygen levels to drop, as the plants rely on respiration (consuming oxygen) instead of photosynthesis.

Turbidity – Total Suspended Solids (TSS)

Turbidity data are reported in Nephelometric Turbidity Units (NTU). To provide a sense of scale, water with a turbidity of 1 NTU is crystal clear, water at 5 NTU has a tiny trace of discolouration, and water at 100 NTU is brown and opaque. The standard is less than 10 NTU for rural streams and rivers and less than 30 NTU for urban lakes and ponds.

Total suspended solids (TSS) are particles that are larger than 2 microns found in the water column. Anything smaller than 2 microns (average filter size) is considered a dissolved solid. Most suspended solids are made up of inorganic materials, though bacteria and algae can also contribute to the total solids concentration.



Both organic and inorganic particles of all sizes can contribute to the suspended solids concentration.

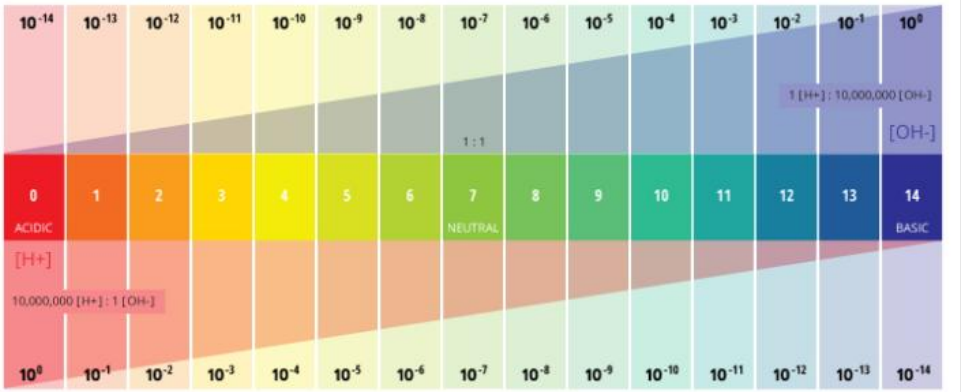
pH – Acidity / Alkalinity – Measures

The pH refers to the degree of acidity or alkalinity of a substance. A pH of 7 is neutral. A value above 7 indicates that the water is more alkaline and a pH below 7 indicates acidic conditions.

A pH of 7 is considered neutral. The logarithmic scale means that each number below 7 is 10 times more acidic than the previous number when counting down. Likewise, when counting up above 7, each number is 10 times more basic than the previous number pH stands for the "power of hydrogen" [3]. The numerical value of pH is determined by the molar concentration of hydrogen ions (H+) [3]. This is done by taking the negative logarithm of the H+ concentration (-log(H+)).

Standard values for pH readings are expected, pH 6.5–9 for rural streams and rivers and pH 6–9 for urban lakes and ponds.

In freshwater systems pH sets up the conditions for how easy it is for nutrients to be available and how easily things like heavy metals (toxicity for aquatic life) can dissolve in the water. Rivers and lakes generally range between 5 (acidic) and 9 (basic) on the pH scale.

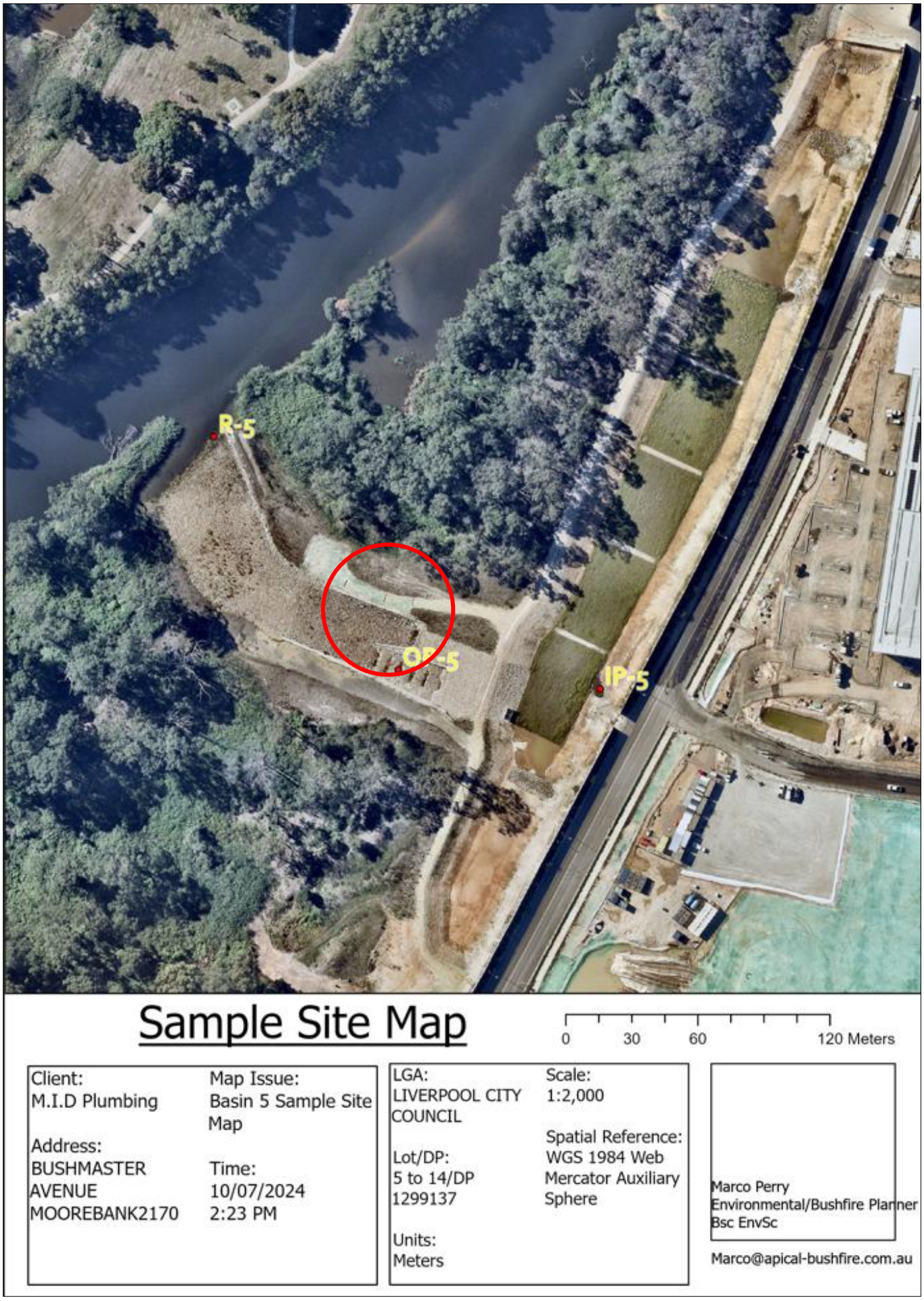


The logarithmic scale of pH means that as pH increases, the H+ concentration will decrease by a power of 10. Thus at a pH of 0, H+ has a concentration of 1 M. At a pH of 7, this decreases to 0.0000001 M. At a pH of 14, there is only 0.00000000000001 M

Summary of Results

Aquatic ecosystems	
Indicator	**Numerical criteria (trigger values)**
Total phosphorus 10 µg/L	• Upland rivers: 20 µg/L • Lowland rivers: 25 µg/L for rivers flowing to the coast; • Lakes & reservoirs: 10 µg/L • Estuaries: 30 µg/L
Total nitrogen 400 µg/L	• Upland rivers: 250 µg/L • Lowland rivers: 350 µg/L for rivers flowing to the coast; • Lakes & reservoirs: 350 µg/L • Estuaries: 300µg/L
Chlorophyll-a	• Upland rivers: not applicable • Lowland rivers: 5 µg/L • Lakes & reservoirs: 5 µg/L. • Estuaries: 4 µg/L.
Turbidity 17.53 NTU	• Upland rivers: 2–25 NTU (see supporting information) • Lowland rivers: 6–50 NTU (see supporting information) • Lakes & reservoirs: 1–20 NTU • Estuaries: 0.5–10 NTU
Salinity (electrical conductivity) 590 µS/cm	• Upland rivers: 30–350 µS/cm • Lowland rivers: 125–2200 µS/cm supporting information
Dissolved oxygen 10.19 ppm	• Upland rivers: 90–110% • Lowland rivers: 85–110% • Freshwater lakes & reservoirs: 90–110% • Estuaries: 80–110% Note: Dissolved oxygen values were derived from daytime measurements. Dissolved oxygen concentrations may vary diurnally and with depth. Monitoring programs should assess this potential variability.
pH 8.32	• Upland rivers: 6.5–8.0 • Lowland rivers: 6.5–8.5 • Freshwater lakes & reservoirs: 6.5–8.0 • Estuaries: 7.0–8.5 Changes of more than 0.5 pH units from the natural seasonal maximum or minimum should be investigated.

Map Image 5. Stormwater Testing Site OP-5 – Basin 5 – MPW



STORMWATER DISCHARGE TESTING SITE

BASIN 5 – OUTFLOW

Site image 1. Testing site Basin 5 - Outflow

Table 3. In-situ data and observations Retention Basin 5 outflow

Moorebank West Precinct - Retention Basin 5 Outflow (MPW outflow)			
Date: 09/04/2025	**Time:** 12.27pm	**Temp:** 20.1°C	**Humidity:** 80%
Operator: Marco Perry		**Coordinates:** -33.947085, 150.917653	
Equipment used: Aquatroll 500			
Parameter	**Recording**	**ANZECC** ANZECC 2000 Guidelines *Lowland rivers	Triggered? Y/N
Temperature (Celcius)	21.9°C	Abnormal to seasonal variation	N
Dissolved Oxygen (DO ppm)	10.19 DO ppm	*Lowland rivers Lower limit: 85% Upper Limit: 110%	N
Electrical Conductivity (SPC -ms/cm)	0.626 SPC -ms/cm	125–2200 µS/cm	N
Electrical Conductivity (ORP mV)	93.5 ORP mV	125–2200 µS/cm	N
pH	8.32	Min 6.5 Max 8.5	N
NTU	17.53	6-50	N

(a) Total phosphorus

MPW outflow - Total phosphorous – Qube Logistics, Moorebank, NSW		Trigger Trigger Value - ANZECC 2000 Guidelines	Triggered
Lab results - Total phosphorous:	<0.01 µg/L	25 µg/L for rivers flowing to the coast	N
Notes: • Channel Culvert • µg/L + microseimens per cm • Trigger value 50 µg/L for lowland rivers, trigger value 25 µg/L for rivers flowing to the coast Anzecc Guidelines 2000. Equipment used: - Sample bottles collected from monitoring site ALS Environmental Laboratory Testing Report			

(b) Total nitrogen Total Nitrogen as N (TKN + NOx) by Discrete Analyser

MPW outflow - Total nitrogen – Qube Logistics, Moorebank, NSW		Trigger Value - ANZECC 2000 Guidelines	Triggered
Lab results -Total nitrogen:	400 µg/L	350 µg/L for rivers flowing to the coast	Y - marginal
Notes: • Total Nitrogen as N (TKN + NOx) by Discrete Analyser • Trigger values are based on a low-lying river • Triiger may be due to concentrated sample			

(c) Kjeldahl nitrogen Total Kjeldahl Nitrogen as N

MPW outflow - Kjeldahl nitrogen – Qube Logistics, Moorebank, NSW		Trigger Value - ANZECC 2000 Guidelines	Triggered
Lab results – kjeldahl nitrogen:	300 µg/L	-	-
Notes: Total Kjeldahl Nitrogen as N			

d) Dissolved metals;

MPW outflow - Dissolved metals – Qube Logistics, Moorebank, NSW			
Equipment used: - Sample bottles collected from monitoring site ALS Environmental Laboratory Testing Report			
Lab results – Dissolved metals:	Measures mg/L	Trigger value ANZECC Guidelines 2000 95% protection criteria	Triggered
Arsenic	<0.001	0.013 mg/L	N
Cadmium	<0.0001	0.0002 mg/L	N
Chromium	<0.001	0.001 mg/L	N
Copper	0.005	0.0014mg/L	Y
Nickel	0.001	0.011 mg/L	N
Lead	<0.001	0.0034 mg/L	N
Zinc	<0.005	0.008 mg/L	N
Mercury	<0.0001	0.0006 mg/L	N
Notes: - ANZECC Guidelines 90% protection criteria.			

(e) PFAS;

MPW outflow - PFAS – Qube Logistics, Moorebank, NSW			
PFAS Surrogate	Measure %	95% species protection (DEE 2016)	Exceedance?
Perfluorooctane sulfonic acid (PFOS) µg/L	0.01 µg/L	.13 (µg/L)	N
Perfluorooctanoic acid (PFOA)	0.01 µg/L	220 (µg/L)	N
Notes: This Guidance focuses on PFOS and PFOA as potential indicators of wider contamination by related PFASs. The reasons for this approach include: • Most research undertaken on PFASs internationally and in Australia has focused on PFOS and PFOA due to their frequent occurrence in the environment, persistence, and bioaccumulation. • PFOS and PFOA can also be the breakdown endpoint of other precursor products. • PFOS and PFOA are the most commonly encountered PFAS in the environment and wildlife. • Information on other PFASs, of which there are several hundred known, is more limited. • Effective management of PFOS and PFOA may help address potential contamination where other PFASs may also be present.			

(f) Total suspended solids.

MPW outflow - Total suspended solids – Qube Logistics, Moorebank, NSW		EPA exceedance value	Trigger
Lab results – Total suspended solids: mg/L	10 mg/L	50 mg/L	N
Notes: Total Suspended Solids dried at 104 ± 2°C Total Suspended Solids (TSS)			

(g) Total hydrocarbons

Lab results - Total hydrocarbons :	Trigger value ANZECC Guidelines 2000 – slightly disturbed lowland river ecosystem	Triggered	Baseline monitoring May 2024	Monitoring Autumn (April) results
Benzene µg/L	1300 µg/L	N	<1	<1
Toluene µg/L	-	N	<2	<2
Ethylbenzene µg/L	-	N	<2	<2
meta-& para-Xylene µg/L	200 µg/L	N	<2	<2
Ortho-Xylene µg/L	470 µg/L	N	<2	<2
Total Xylenes µg/L	-	-	<2	<2
Sum of BTEX µg/L	-	-	<1	<1
Naphthalene µg/L	85 µg/L	N	<5	<5

Notes:

- The data were compared to the default trigger values (DTVs) recommended by ANZECC/ARMCANZ (2000) for the protection of slightly disturbed lowland river ecosystems in southeast Australia.
- A commonly encountered example of additive toxicity of mixtures is the simple aromatic hydrocarbons commonly associated with contaminated petroleum sites, benzene, toluene, ethyl benzene and xylenes, collectively known as BTEX

Water Quality Monitoring Comparative Table (Temporal)

Table 4. Retention Basin 5 MPW. Testing Site MPW 5 Outflow

Testing Site MPW Outflow	May 2024 baseline	October 2024	April 2025
pH	6.39	6.21	8.32
Dissolved Oxygen - %/L	4.11mg/L	10.5	10.19
Actual Electronic Conductivity	0.054945	0.008	93.5 ORP mV
Temperature - ℃	18.12	19.5	21.9
Turbidity	0.03 NTU	6.62	17.53
Total phosphorous - mg/L	0.04 mg/L	0.03	<0.01
Total nitrogen - mg/L	1.7 mg/L	0.4	0.4
Kjeldahl nitrogen mg/L	1.0 mg/L	0.4	0.3
Dissolved metals			
Arsenic	<0.001	<0.001	<0.001
Cadmium	<0.0001	<0.0001	<0.0001
Chromium	<0.001	<0.001	<0.001
Copper	0.017	<0.001	0.005
Nickel	0.001	<0.001	0.001
Lead	<0.001	<0.001	<0.001
Zinc	<0.005	0.008	<0.005
Mercury	<0.0001	<0.0001	<0.0001
PFAS			
Lab results – SUM of PFAS Micrograms/L	0.13	0.04	0.08
SUM of PFHxS & PFOS Microgrms/L	0.04	0.04	0.01
Total suspended solids mg/L	6	<5	10
Total hydrocarbons			
Benzene	<1	<1	<1
Toluene	<2	<2	<2
Ethylbenzene	<2	<2	<2
meta-& para-Xylene	<2	<2	<2
Ortho-Xylene	<2	<2	<2
Total Xylenes	<2	<2	<2
Sum of BTEX	<1	<1	<1
Naphthalene	<5	<5	<5

Appendix A. Raw data tables; source - Australian Laboratory Services

Basin 5: Outflow

Page : 8 of 11
Work Order : EW2501914
Client : Apical Bushfire and Planning
Project : Moorebank East + West

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	WMP8	WMP7	WMP5	----	----
				Sampling date / time	09-Apr-2025 13:10	09-Apr-2025 12:50	09-Apr-2025 12:30	----	----
Compound	CAS Number	LOR	Unit		EW2501914-006	EW2501914-007	EW2501914-008	--------	--------
					Result	Result	Result	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	----	----
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	----	----
Toluene	108-88-3	2	µg/L		<2	<2	<2	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	----	----
^ Total Xylenes	----	2	µg/L		<2	<2	<2	----	----
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	----	----
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoropropane sulfonic acid (PFPrS)	423-41-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	**0.11**	<0.02	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorononane sulfonic acid (PFNS)	68259-12-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.01**	**0.13**	**0.01**	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	WMP8	WMP7	WMP5	----	----
				Sampling date / time	09-Apr-2025 13:10	09-Apr-2025 12:50	09-Apr-2025 12:30	----	----
Compound	CAS Number	LOR	Unit		EW2501914-006	EW2501914-007	EW2501914-008	--------	--------
					Result	Result	Result	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	**0.04**	**0.03**	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	**0.04**	**0.03**	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	**0.01**	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	----	----
Perfluorohexadecanoic acid (PFHxDA)	67905-19-5	0.05	µg/L		<0.05	<0.05	<0.05	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	WMP8	WMP7	WMP5	----	----
				Sampling date / time	09-Apr-2025 13:10	09-Apr-2025 12:50	09-Apr-2025 12:30	----	----
Compound	CAS Number	LOR	Unit		EW2501914-006	EW2501914-007	EW2501914-008	--------	--------
					Result	Result	Result	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**0.01**	**0.32**	**0.08**	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.01**	**0.24**	**0.01**	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.01**	**0.32**	**0.08**	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**98.8**	**90.8**	**88.8**	----	----
Toluene-D8	2037-26-5	2	%		**93.6**	**85.2**	**81.0**	----	----
4-Bromofluorobenzene	460-00-4	2	%		**94.7**	**86.2**	**81.8**	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**102**	**102**	**100**	----	----
13C8-PFOA	----	0.02	%		**101**	**105**	**105**	----	----

Surrogate Control Limits

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	72	143
Toluene-D8	2037-26-5	75	131
4-Bromofluorobenzene	460-00-4	73	137
EP231S: PFAS Surrogate			
13C4-PFOS	---	60	120
13C8-PFOA	---	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry / Biology).

(WATER) EK067G: Total Phosphorus as P by Discrete Analyser
(WATER) EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser
(WATER) EK061G: Total Kjeldahl Nitrogen By Discrete Analyser
(WATER) EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser
(WATER) EG035F: Dissolved Mercury by FIMS
(WATER) EG020F: Dissolved Metals by ICP-MS
(WATER) EP080/071: Total Petroleum Hydrocarbons
(WATER) EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions
(WATER) EP080: BTEXN
(WATER) EP080S: TPH(V)/BTEX Surrogates
(WATER) EP231A: Perfluoroalkyl Sulfonic Acids
(WATER) EP231B: Perfluoroalkyl Carboxylic Acids
(WATER) EP231C: Perfluoroalkyl Sulfonamides
(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids
(WATER) EP231P: PFAS Sums
(WATER) EP231S: PFAS Surrogate
(WATER) EA025: Total Suspended Solids dried at 104 ± 2°C

Appendix B. ANZECC & ARMCANZ (2000) water quality guidelines

Table 3.4.1 Trigger values for toxicants at alternative levels of protection. Values in grey shading are the trigger values applying to typical *slightly–moderately disturbed systems*; see table 3.4.2 and Section 3.4.2.4 for guidance on applying these levels to different ecosystem conditions.

Chemical		Trigger values for freshwater (µgL^{-1})				Trigger values for marine water (µgL^{-1})			
		Level of protection (% species)				Level of protection (% species)			
		99%	95%	90%	80%	99%	95%	90%	80%
METALS & METALLOIDS									
Aluminium	pH >6.5	27	55	80	150	ID	ID	ID	ID
Aluminium	pH <6.5	ID	ID	ID	ID	ID	ID	ID	ID
Antimony		ID	ID	ID	ID	ID	ID	ID	ID
Arsenic (As III)		1	24	94 [C]	360 [C]	ID	ID	ID	ID
Arsenic (AsV)		0.8	13	42	140 [C]	ID	ID	ID	ID
Beryllium		ID	ID	ID	ID	ID	ID	ID	ID
Bismuth		ID	ID	ID	ID	ID	ID	ID	ID
Boron		90	370 [C]	680 [C]	1300 [C]	ID	ID	ID	ID
Cadmium	H	0.06	0.2	0.4	0.8 [C]	0.7 [B]	5.5 [B, C]	14 [B, C]	36 [B, A]
Chromium (Cr III)	H	ID	ID	ID	ID	7.7	27.4	48.6	90.6
Chromium (CrVI)		0.01	1.0 [C]	6 [A]	40 [A]	0.14	4.4	20 [C]	85 [C]
Cobalt		ID	ID	ID	ID	0.005	1	14	150 [C]
Copper	H	1.0	1.4	1.8 [C]	2.5 [C]	0.3	1.3	3 [C]	8 [A]
Gallium		ID	ID	ID	ID	ID	ID	ID	ID
Iron		ID	ID	ID	ID	ID	ID	ID	ID
Lanthanum		ID	ID	ID	ID	ID	ID	ID	ID
Lead	H	1.0	3.4	5.6	9.4 [C]	2.2	4.4	6.6 [C]	12 [C]
Manganese		1200	1900 [C]	2500 [C]	3600 [C]	ID	ID	ID	ID
Mercury (inorganic)	B	0.06	0.6	1.9 [C]	5.4 [A]	0.1	0.4 [C]	0.7 [C]	1.4 [C]
Mercury (methyl)		ID	ID	ID	ID	ID	ID	ID	ID
Molybdenum		ID	ID	ID	ID	ID	ID	ID	ID
Nickel	H	8	11	13	17 [C]	7	70 [C]	200 [A]	560 [A]
Selenium (Total)	B	5	11	18	34	ID	ID	ID	ID
Selenium (SeIV)	B	ID	ID	ID	ID	ID	ID	ID	ID
Silver		0.02	0.05	0.1	0.2 [C]	0.8	1.4	1.8	2.6 [C]
Thallium		ID	ID	ID	ID	ID	ID	ID	ID
Tin (inorganic, SnIV)		ID	ID	ID	ID	ID	ID	ID	ID
Tributyltin (as µg/L Sn)		ID	ID	ID	ID	0.0004	0.006 [C]	0.02 [C]	0.05 [C]
Uranium		ID	ID	ID	ID	ID	ID	ID	ID
Vanadium		ID	ID	ID	ID	50	100	160	280
Zinc	H	2.4	8.0 [C]	15 [C]	31 [C]	7	15 [C]	23 [C]	43 [C]
NON-METALLIC INORGANICS									
Ammonia	D	320	900 [C]	1430 [C]	2300 [A]	500	910	1200	1700
Chlorine	E	0.4	3	6 [A]	13 [A]	ID	ID	ID	ID
Cyanide	F	4	7	11	18	2	4	7	14
Nitrate	J	17	700	3400 [C]	17000 [A]	ID	ID	ID	ID
Hydrogen sulfide	G	0.5	1.0	1.5	2.6	ID	ID	ID	ID
ORGANIC ALCOHOLS									
Ethanol		400	1400	2400 [C]	4000 [C]	ID	ID	ID	ID
Ethylene glycol		ID	ID	ID	ID	ID	ID	ID	ID
Isopropyl alcohol		ID	ID	ID	ID	ID	ID	ID	ID
CHLORINATED ALKANES									
Chloromethanes									
Dichloromethane		ID	ID	ID	ID	ID	ID	ID	ID
Chloroform		ID	ID	ID	ID	ID	ID	ID	ID
Carbon tetrachloride		ID	ID	ID	ID	ID	ID	ID	ID
Chloroethanes									
1,2-dichloroethane		ID	ID	ID	ID	ID	ID	ID	ID
1,1,1-trichloroethane		ID	ID	ID	ID	ID	ID	ID	ID

Chemical	Trigger values for freshwater (µgL^{-1})				Trigger values for marine water (µgL^{-1})			
	Level of protection (% species)				Level of protection (% species)			
	99%	95%	90%	80%	99%	95%	90%	80%
1,1,2-trichloroethane	5400	6500	7300	8400	140	1900	5800 [C]	18000 [C]
1,1,2,2-tetrachloroethane	ID	ID	ID	ID	ID	ID	ID	ID
Pentachloroethane	ID	ID	ID	ID	ID	ID	ID	ID
Hexachloroethane B	290	360	420	500	ID	ID	ID	ID
Chloropropanes								
1,1-dichloropropane	ID	ID	ID	ID	ID	ID	ID	ID
1,2-dichloropropane	ID	ID	ID	ID	ID	ID	ID	ID
1,3-dichloropropane	ID	ID	ID	ID	ID	ID	ID	ID
CHLORINATED ALKENES								
Chloroethylene	ID	ID	ID	ID	ID	ID	ID	ID
1,1-dichloroethylene	ID	ID	ID	ID	ID	ID	ID	ID
1,1,2-trichloroethylene	ID	ID	ID	ID	ID	ID	ID	ID
1,1,2,2-tetrachloroethylene	ID	ID	ID	ID	ID	ID	ID	ID
3-chloropropene	ID	ID	ID	ID	ID	ID	ID	ID
1,3-dichloropropene	ID	ID	ID	ID	ID	ID	ID	ID
ANILINES								
Aniline	8	250 [A]	1100 [A]	4800 [A]	ID	ID	ID	ID
2,4-dichloroaniline	0.6	7	20	60 [C]	ID	ID	ID	ID
2,5-dichloroaniline	ID	ID	ID	ID	ID	ID	ID	ID
3,4-dichloroaniline	1.3	3	6 [C]	13 [C]	85	150	190	260
3,5-dichloroaniline	ID	ID	ID	ID	ID	ID	ID	ID
Benzidine	ID	ID	ID	ID	ID	ID	ID	ID
Dichlorobenzidine	ID	ID	ID	ID	ID	ID	ID	ID
AROMATIC HYDROCARBONS								
Benzene	600	950	1300	2000	500 [C]	700 [C]	900 [C]	1300 [C]
Toluene	ID	ID	ID	ID	ID	ID	ID	ID
Ethylbenzene	ID	ID	ID	ID	ID	ID	ID	ID
o-xylene	200	350	470	640	ID	ID	ID	ID
m-xylene	ID	ID	ID	ID	ID	ID	ID	ID
p-xylene	140	200	250	340	ID	ID	ID	ID
m+*p*-xylene	ID	ID	ID	ID	ID	ID	ID	ID
Cumene	ID	ID	ID	ID	ID	ID	ID	ID
Polycyclic Aromatic Hydrocarbons								
Naphthalene	2.5	16	37	85	50 [C]	70 [C]	90 [C]	120 [C]
Anthracene B	ID	ID	ID	ID	ID	ID	ID	ID
Phenanthrene B	ID	ID	ID	ID	ID	ID	ID	ID
Fluoranthene B	ID	ID	ID	ID	ID	ID	ID	ID
Benzo(a)pyrene B	ID	ID	ID	ID	ID	ID	ID	ID
Nitrobenzenes								
Nitrobenzene	230	550	820	1300	ID	ID	ID	ID
1,2-dinitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,3-dinitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,4-dinitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,3,5-trinitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-methoxy-2-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-methoxy-4-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-chloro-2-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-chloro-3-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-chloro-4-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-chloro-2,4-dinitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,2-dichloro-3-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,3-dichloro-5-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,4-dichloro-2-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
2,4-dichloro-2-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID

Chemical	Trigger values for freshwater (µgL^{-1})				Trigger values for marine water (µgL^{-1})			
	Level of protection (% species)				Level of protection (% species)			
	99%	95%	90%	80%	99%	95%	90%	80%
Hexazinone	ID	ID	ID	ID	ID	ID	ID	ID
Simazine	0.2	3.2	11	35	ID	ID	ID	ID
Urea herbicides								
Diuron	ID	ID	ID	ID	ID	ID	ID	ID
Tebuthiuron	0.02	2.2	20	160 [C]	ID	ID	ID	ID
Miscellaneous herbicides								
Acrolein	ID	ID	ID	ID	ID	ID	ID	ID
Bromacil	ID	ID	ID	ID	ID	ID	ID	ID
Glyphosate	370	1200	2000	3600 [A]	ID	ID	ID	ID
Imazethapyr	ID	ID	ID	ID	ID	ID	ID	ID
Ioxynil	ID	ID	ID	ID	ID	ID	ID	ID
Metolachlor	ID	ID	ID	ID	ID	ID	ID	ID
Sethoxydim	ID	ID	ID	ID	ID	ID	ID	ID
Trifluralin B	2.6	4.4	6	9 [A]	ID	ID	ID	ID
GENERIC GROUPS OF CHEMICALS								
Surfactants								
Linear alkylbenzene sulfonates (LAS)	65	280	520 [C]	1000 [C]	ID	ID	ID	ID
Alcohol ethoxyolated sulfate (AES)	340	650	850 [C]	1100 [C]	ID	ID	ID	ID
Alcohol ethoxylated surfactants (AE)	50	140	220	360 [C]	ID	ID	ID	ID
Oils & Petroleum Hydrocarbons	ID	ID	ID	ID	ID	ID	ID	ID
Oil Spill Dispersants								
BP 1100X	ID	ID	ID	ID	ID	ID	ID	ID
Corexit 7664	ID	ID	ID	ID	ID	ID	ID	ID
Corexit 8667		ID	ID	ID	ID	ID	ID	ID
Corexit 9527	ID	ID	ID	ID	230	1100	2200	4400 [A]
Corexit 9550	ID	ID	ID	ID	ID	ID	ID	ID

Notes: Where the final water quality guideline to be applied to a site is below current analytical practical quantitation limits, see Section 3.4.3.3 for guidance.

Most trigger values listed here for metals and metalloids are *High reliability* figures, derived from field or chronic NOEC data (see 3.4.2.3 for reference to Volume 2). The exceptions are *Moderate reliability* for freshwater aluminium (pH >6.5), manganese and marine chromium (III).

Most trigger values listed here for non-metallic inorganics and organic chemicals are *Moderate reliability* figures, derived from acute LC_{50} data (see 3.4.2.3 for reference to Volume 2). The exceptions are *High reliability* for freshwater ammonia, 3,4-DCA, endosulfan, chlorpyrifos, esfenvalerate, tebuthiuron, three surfactants and marine for 1,1,2-TCE and chlorpyrifos.

* = *High reliability* figure for esfenvalerate derived from mesocosm NOEC data (no alternative protection levels available).

A = Figure may not protect key test species from acute toxicity (and chronic) — check Section 8.3.7 for spread of data and its significance. 'A' indicates that trigger value > acute toxicity figure; note that trigger value should be <1/3 of acute figure (Section 8.3.4.4).

B = Chemicals for which possible bioaccumulation and secondary poisoning effects should be considered (see Sections 8.3.3.4 and 8.3.5.7).

C = Figure may not protect key test species from chronic toxicity (this refers to experimental chronic figures or geometric mean for species) — check Section 8.3.7 for spread of data and its significance. Where grey shading and 'C' coincide, refer to text in Section 8.3.7.

D = Ammonia as TOTAL ammonia as [NH_3-N] at pH 8. For changes in trigger value with pH refer to Section 8.3.7.2.

E = Chlorine as total chlorine, as [Cl]; see Section 8.3.7.2.

F = Cyanide as un-ionised HCN, measured as [CN]; see Section 8.3.7.2.

G = Sulfide as un-ionised H_2S, measured as [S]; see Section 8.3.7.2.

H = Chemicals for which algorithms have been provided in table 3.4.3 to account for the effects of hardness. The values have been calculated using a hardness of 30 mg/L $CaCO_3$. These should be adjusted to the site-specific hardness (see Section 3.4.3).

J = Figures protect against toxicity and do not relate to eutrophication issues. Refer to Section 3.3 if eutrophication is the issue of concern.

ID = Insufficient data to derive a reliable trigger value. Users advised to check if a low reliability value or an ECL is given in Section 8.3.7.

T = Tainting or flavour impairment of fish flesh may possibly occur at concentrations below the trigger value. See Sections 4.4.5.3/3 and 8.3.7.

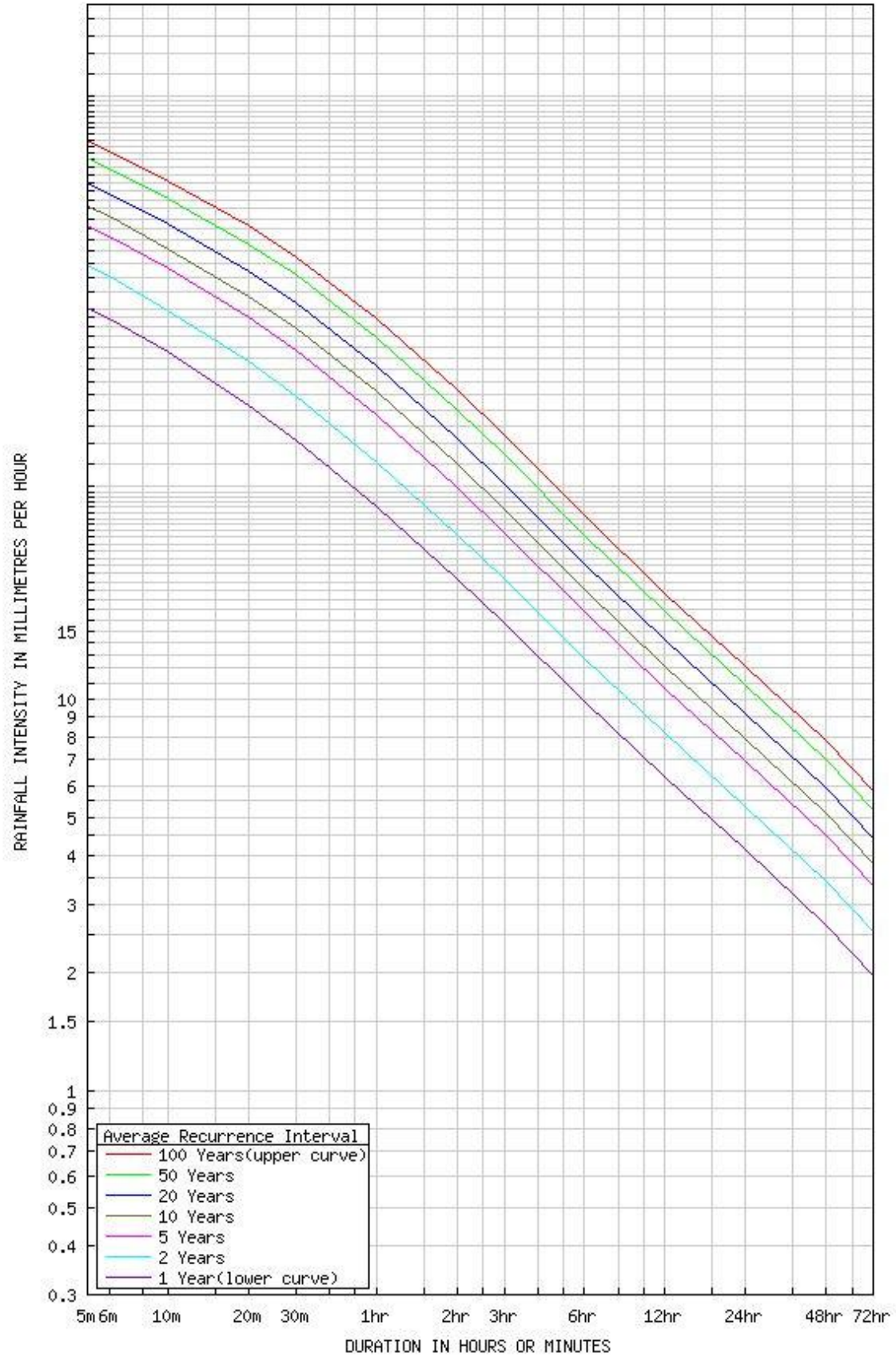
Table 5. Ecological water quality guideline values developed by water regulators

Exposure scenario	PFOS	PFOA	Exposure scenario	Comments and source
Freshwater	0.00023 µg/L	19 µg/L	99% species protection - high conservation value systems	Australian and New Zealand Guidelines for Fresh and Marine Water Quality - technical draft default guideline values for PFOS and PFOA. Note 1: The 99% species protection level for PFOS is close to the level of detection. Agencies may wish to apply a 'detect' threshold in such circumstances rather than a quantified measurement. Note 2: The draft guidelines do not account for effects which result from the biomagnification of toxicants in air-breathing animals or in animals which prey on aquatic organisms. Note 3: The WQGs advise[41] that the 99% level of protection be used for slightly to moderately disturbed systems. This approach is generally adopted for chemicals that bioaccumulate and biomagnify in wildlife. Regulators may specify or environmental legislation may prescribe the level of species protection required, rather than allowing for case-by-case assessments.
	0.13 µg/L	220 µg/L	95% species protection - slightly to moderately disturbed systems	
	2 µg/L	632 µg/L	90% species protection - highly disturbed systems	
	31 µg/L	1824 µg/L	80% species protection - highly disturbed systems	
Interim marine	0.00023 µg/L	19 µg/L	99% species protection - high conservation value systems	As above. Freshwater values are to be used on an interim basis until final marine guideline values can be set using the nationally-agreed process under the Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Note 1: The WQG advise that in the case of estuaries, the most stringent of freshwater and marine criteria apply, taking account of any available salinity correction. Note 2: Marine guideline values developed by CRC CARE are under consideration through the nationally-agreed water quality guideline development process.
	0.13 µg/L	220 µg/L	95% species protection - slightly to moderately disturbed systems	
	2 µg/L	632 µg/L	90% species protection - highly disturbed systems	
	31 µg/L	1824 µg/L	80% species protection - highly disturbed systems	

https://www.waterquality.gov.au/sites/default/files/documents/ANZECC-1992-guidelines.pdf

Type of indicator	Indicator	Units	Fresh waters	Marine waters
	Dissolved oxygen[2]	mg/L	> 6 (> 80–90% saturation)	> 6 (> 80–90% saturation)
	Nutrients/nuisance growths	–	(Section 2.3.3)	(Section 2.3.3)
	pH	–	6.5–9.0	< 0.2 pH unit change
	Salinity	mg/L	< 1000 (about 1,500 µS/cm)	–
	Suspended particulate matter/turbidity	–	< 10% change seasonal mean concentration (see also colour & clarity)	< 10% change seasonal mean concentration (see also colour & clarity)
	Temperature[3]	–	< 2°C increase	< 2°C increase
Toxicants				
Inorganic toxicants	Aluminium	µg/L	< 5.0 (if pH < = 6.5)	NR
	Aluminium	µg/L	< 100.0 (if pH > 6.5)	–
	Ammonia	µg/L	20.0–30.0 (Table 2.3)	NR
	Antimony	µg/L	30.0	500.0
	Arsenic	µg/L	50.0	50.0
	Beryllium	µg/L	4.0[4]	NR
	Cadmium	µg/L	0.2–2.0[5]	2.0
	Chromium	µg/L	10.0	50.0
	Copper	µg/L	2.0–5.0[5]	5.0
	Cyanide	µg/L	5.0	5.0
	Iron	µg/L	1,000.0[6]	NR
	Lead	µg/L	1.0–5.0[5]	5.0
	Mercury	µg/L	0.1	0.1
	Nickel	µg/L	15.0–150.0[5]	15.0
	Selenium	µg/L	5.0	70.0
	Silver	µg/L	0.1	1.0
	Sulfide	µg/L	2.0	2.0
	Thallium	µg/L	4.0	20.0
	Tin (tributyltin)	µg/L	0.008	0.002
	Zinc	µg/L	5.0–50.0[6]	50.0
Organic toxicants	Acrylonitrile	µg/L	NR	NR
	Benzidine	µg/L	NR	NR
	Dichlorobenzidine	µg/L	NR	NR
	Diphenylhydrazine	µg/L	NR	NR
Halogenated aliphatic compounds	Hexachlorobutadiene	µg/L	0.1	0.3
	Halogenated ethers	µg/L	NR	NR
	Isophorone	µg/L	NR	NR
Monocyclic aromatic compounds	Benzene	µg/L	300.0	300.0
	Chlorinated benzenes	µg/L	(Table 2.8)	NR

Appendix C. Intensity Frequency Duration – Average Recurrence Interval Indicator
Intensity-Frequency-Duration (bom.gov.au)



Moorebank Logistics Park West Precinct

Basin 6

Autumn Stormwater Network Water Quality Monitoring Data & Reporting April 2025

Site image: retention basin 6 MPW (Apical image April 2025)

Prepared for: MID Plumbing P/L

Prepared by: Daniel Anderson (BEnvSc, MEnvSc)

Romy Brien (BSc NRM)

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ABN: 656 420 10 400

Consulted Documents / database.

Australia and New Zealand Guidelines for fresh and Marine Water Quality (2000)
NATIONAL WATER QUALITY MANAGEMENT STRATEGY - Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000) - Volume 2 - Aquatic ecosystems

Bureau of Meteorology – Australian Government Australia's official weather forecasts & weather radar - Bureau of Meteorology (bom.gov.au)

Moorebank Intermodal Precinct West – Stage 3 (SSD 10431) | Assessment Report March 2021
https://moorebankintermodalprecinct.com.au/wp-content/uploads/2023/04/MPW-S3-DPIE-assessment-report-to-IPC.pdf

WQM Report Western Precinct _Basin 6_Autumn 2024 – Apical Bushfire and Planning - April 2024

WQM Report Western Precinct _Basin 8_Spring 2024 – Apical Bushfire and Planning - October 2024

Development Consent - Section 4.38 of the Environmental Planning and Assessment Act 1979 - Application Number: SSD 7709 Applicant: Sydney Intermodal Terminal Alliance (SIMTA) as Qube Holdings Limited Consent Authority: The Independent Planning Commission Site: Moorebank Avenue, Moorebank Lot 1 DP 1197707 Lot 100 DP 1049508 Lot 101 DP 1049508 Lot 2 DP 1197707 Part Lot 3 DP 1197707 Part Anzac Road and Moorebank Avenue public road reserves Development: Moorebank Precinct West Stage 2 (MPW Stage 2)

Development Consent - Section 4.38 of the Environmental Planning and Assessment Act 1979 - Application Number: SSD 10431 Applicant: Sydney Intermodal Terminal Alliance (SIMTA) as Qube Holdings Limited Consent Authority: The Independent Planning Commission Site: Moorebank Avenue, Moorebank Lot 1 DP 1197707 Lot 100 DP 1049508 Lot 101 DP 1049508 Moorebank Precinct West Stage 3 (MPW Stage 3)

Australian Laboratory Services (ALS) Work Order EW2402561 Certificate of Analysis Water Sample Data 09th April 2025.

Liverpool DCPLiverpool's Development Control Plans | Liverpool City Council (nsw.gov.au)

DEE 2016. Commonwealth Environmental Management Guidance on Perfluorooctane Sulfonic Acid (PFOS) and Perfluorooctanoic Acid (PFOA). Department of the Environment and Energy.

https://environment.gov.au/system/files/pages/dfb876c5-581e-48b7-868c-242fe69dad68/files/draft-environmental-mgt-guidance-pfos-pfoa.pdf

Development Consent SSD 7709 - Section 4.38 of the Environmental Planning and Assessment Act 1979

https://www.ipcn.nsw.gov.au/resources/pac/media/files/pac/projects/2019/05/moorebank-intermodal-precinct-west-stage-2/referral-from-department-of-planning-and-environment/revised-recommended-conditions/mpw-stage-2-recommended-conditions-inclusive-of-edits-191105.pdf

Glossary

The following definitions apply to terms used in this report. Many of these definitions are consistent with relevant national literature and cited where appropriate.

Current status trigger value
Concentrations of water quality indicators that reflect existing ecosystem condition, and therefore provide a target for ecosystem maintenance and a benchmark against which future water quality trends may be monitored.

Environmental value
Particular values or uses of the environment important for a healthy ecosystem or for public benefit, welfare, safety or health and requiring protection from the effects of pollution or degradation (Environment Australia 2002).

Indicator
A parameter (biological, physical or chemical) used to provide a measure of the quality of water or the condition of an ecosystem (Environment Australia 2002).

Low-risk trigger value
Concentrations (or loads) of key performance indicators [of water quality] at which if not exceeded, there is a low risk that adverse biological effects will occur (ANZECC 2000a).

Median
The middle reading, or 50th percentile, of all readings taken. i.e. of the readings 10, 13, 9, 16 and 11 (re-ordering these to read 9, 10, 11, 13 and 16), the median is 11. The mean (or average), is the sum of all values divided by the total number of readings (which in this case equals 11.8).

Reference condition
Refers to a site which is unmodified or minimally modified from 'natural' condition. Most commonly, reference sites are subject to limited disturbance from human activity. The reference condition then serves as a standard or target against which environmental change in other similar sites can be assessed.

Trigger value
A concentration that, if exceeded, would indicate a potential environmental problem, and so 'trigger' a management response, such as further investigation and/or remedial actions (ANZECC 2000a).

Water quality guideline
A numerical concentration level (e.g. of a contaminant) or narrative statement (e.g. visual appearance of a water body) recommended to support and maintain a designated water use (ANZECC 2000a)

1.1 Background

The Sydney Intermodal Terminal Alliance (SIMTA) received approval for the construction and operation of Stage 3 (the Project) of Moorebank Precinct West (MPW), which comprises the third stage of development within the Moorebank Precinct West under Development Approval SSD-10431.

The proposal is SSD under clause 19 of Schedule 1 of the State Environmental Planning Policy (State and Regional Development) 2011, as it is development for the purpose of rail and related transport facilities.

The MPW site is located on the western side of Moorebank Avenue and forms the western section of the Moorebank Intermodal Precinct (Figure 2). The MPW site is approximately 2.5 kilometres (km) from the Liverpool city centre, 27 km south-west of the Sydney Central Business District (CBD) and 26 km west of Port Botany.

The MPW site is irregular in shape, approximately 3 km from north to south and 960 m from east to west at its widest point and covers an area of approximately 220 ha. It is situated between the Georges River to the west (with the SSFL running north-south to the west of the river); and Moorebank Avenue to the east.

Works on the MPW site to date have commenced under two current and active development consents:

• MPW Stage 1 early works, which provides demolition, rehabilitation, remediation of contaminated land, and the establishment of construction facilities and access including site security (as part of the SSD 5066 consent)

• MPW Stage 2, which provides for the construction and 24/7 operation of an intermodal facility and associated warehousing (SSD 7709).

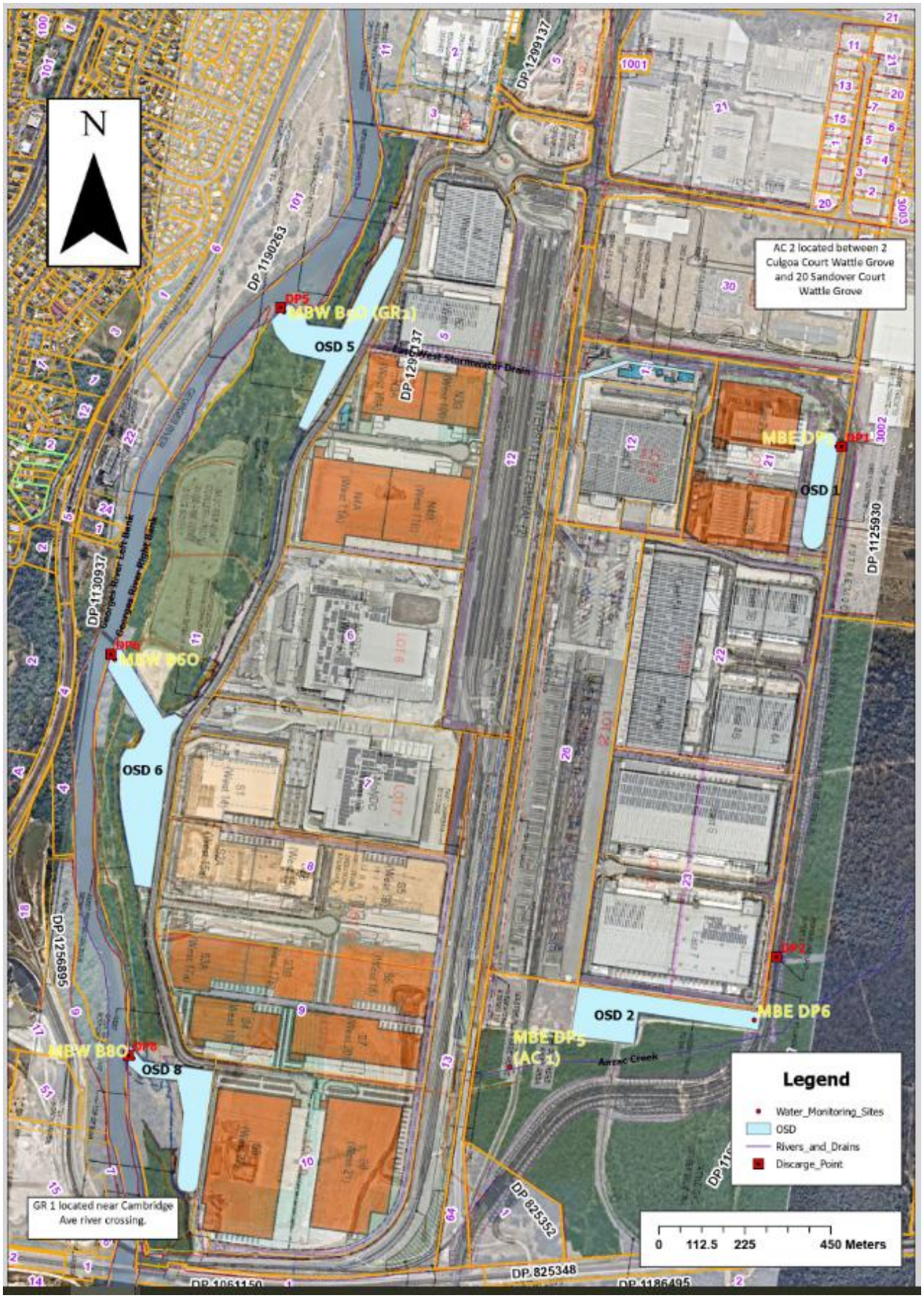
Across the entire precinct there are six onsite detention basins. Bioretention/biofiltration systems also make up the stormwater management infrastructure within the site.

This water quality monitoring program is guided by the Stormwater Infrastructure Operation and Maintenance Plan (SIOPM) and is provided to Qube Holdings Limited (the Applicant) on behalf of MID Plumbing. Three onsite bio-retention basins are present within Moorebank Precinct West. This report is in reference to Basin 6 (MPW – west).

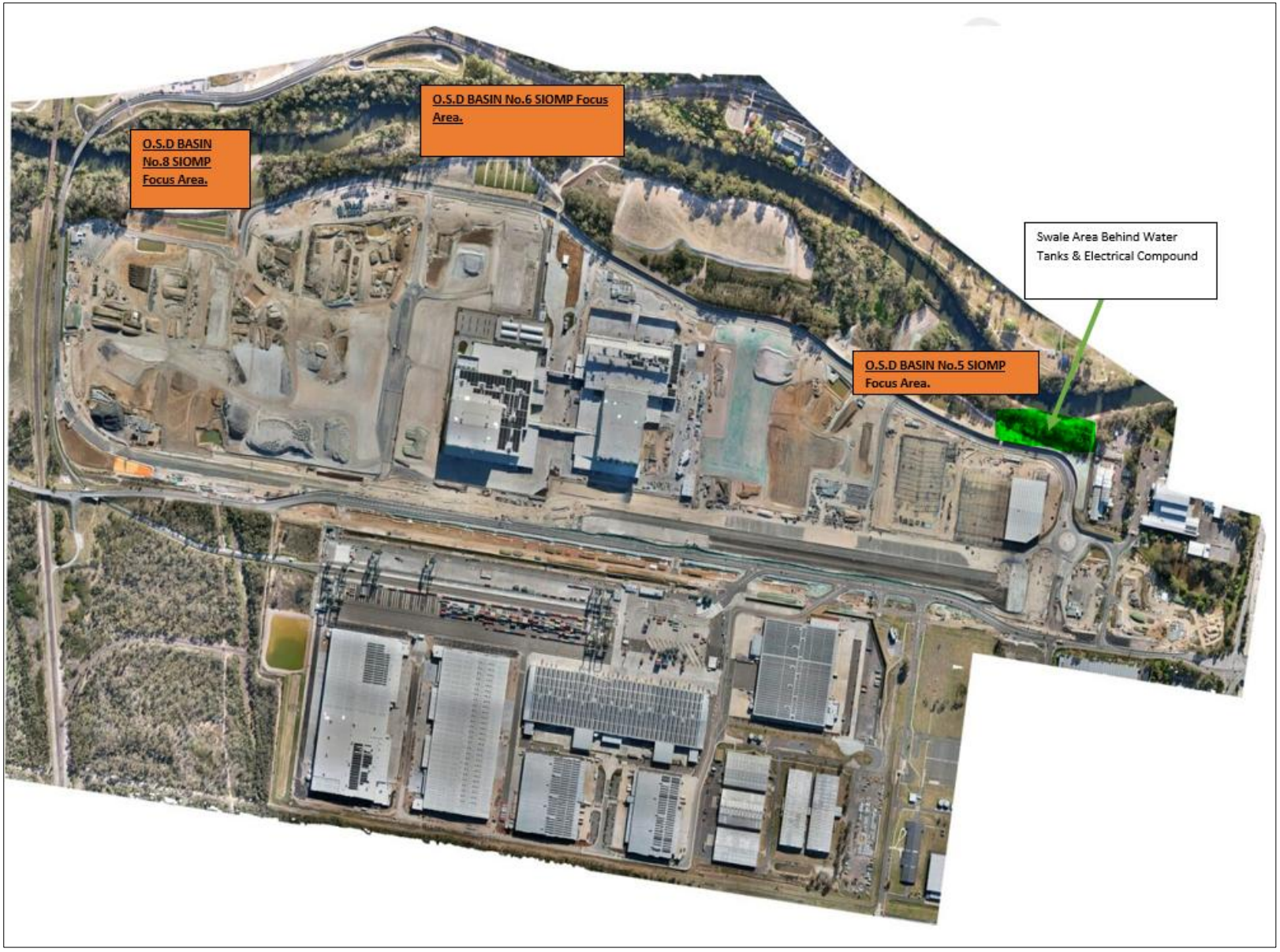
Development Consent - Section 4.38 of the Environmental Planning and Assessment Act 1979 - Application Number: SSD 7709 Moorebank Precinct West Stage 2 (MPW Stage 2)

CoC	Requirement
Stormwater Quality Monitoring	
B38.	Stormwater Quality Monitoring Program - Prior to commencement of operation Part of the Operational Environmental Management Plan

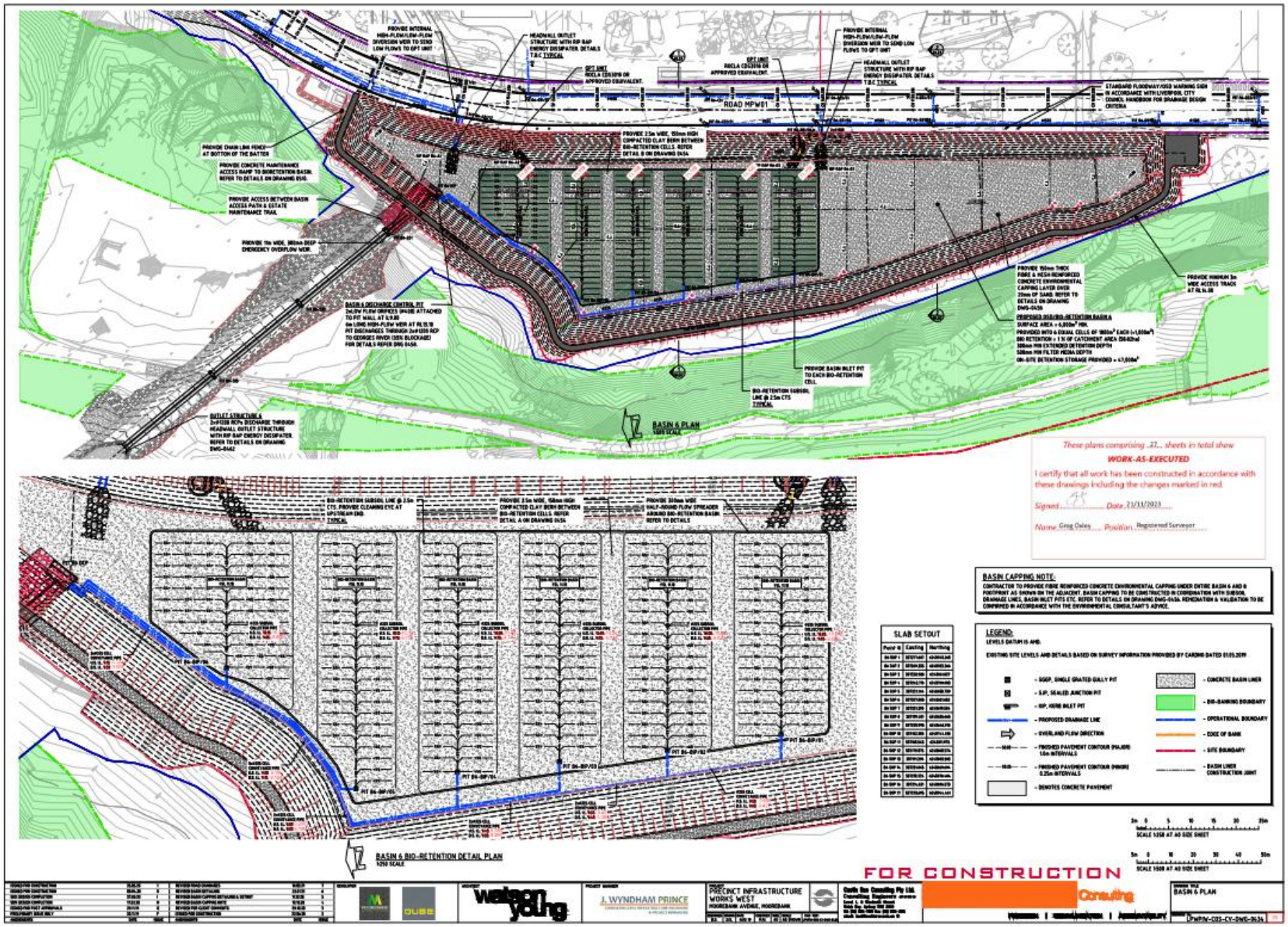
Map image 1. Overview subject site (MPW) provided by Arcadis



Map Image 2. Moorebank Precinct West Detention Basins (provided by MID Plumbing)

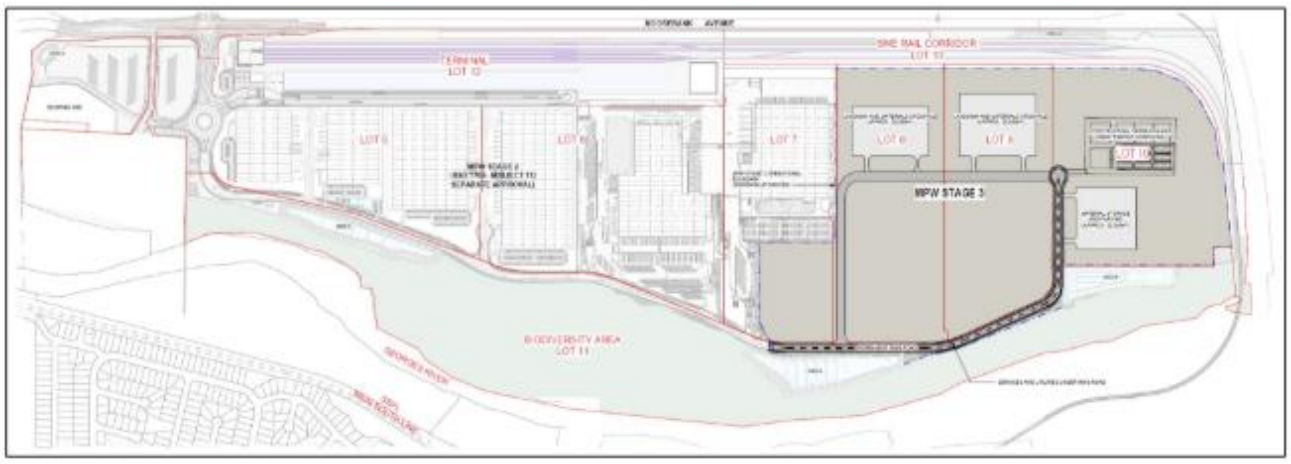


Map image 3. Detention Basin 6 MPW (west)



1.2 Reference information

Map image 4. Moorebank Intermodal Precinct West – Stage 3 State Significant Development Assessment (SSD-10431) March 2021



20. Stormwater Management System or Works	That untreated stormwater is not disposed of into the Georges River or its tributaries. The likely impact of stormwater disposal on the quality of any receiving waters. That the levels of nutrients and sediments entering the waterway are not increased by the proposed development. Whether any proposals to manage stormwater are in accordance with the local council's stormwater management plans and the Managing Urban Stormwater series of documents and meet the local council's stormwater management objectives. Whether the principles outlined in the *Managing Urban Stormwater Soils and Construction Handbook* (1998) prepared by and available from Landcom and the Department of Housing are followed during each stage of a development (including subdivision).	Detailed stormwater assessments were undertaken as part of MPW Stage 2, and remain applicable to the Stage 3 proposal. The Department has recommended conditions that would enforce these requirements, by ensuring that appropriate measures are implemented to manage stormwater impacts during construction. In regard to management of stormwater during operation of the MPW site, the MPW Stage 2 proposal incorporates a robust set of conditions to manage the release of stormwater via six onsite detention basins (OSD), a major east-west covered culvert and associated drainage infrastructure.

2. Monitoring Program Methodology

2.1 Monitoring Sites

To support stormwater and drainage management of the facility the MLP West precinct has established a vast stormwater infrastructure system consisting of several Water Sensitive Urban Design (WSUD) functions including raingardens detention basins and bio-swales. These networks are designed to minimise the velocity and peak discharge of stormwater draining from the site and act as onsite detention basins to harvest and sequester potential pollutants generated at the site through designed biological processes.

The stormwater infrastructure system discharges water into the natural drainage system via three outlets:

- Basin 5 detains water from the northern section of MPW before discharging into Georges River
- Basin 6 detains water from the mid-section of MPW before discharging into Georges River
- Basin 8 detains water from the southern section of MPW before discharging into Georges River

Monitoring of the discharge points has been established via our ongoing program with MID Plumbing under the SIOMP program to collect qualitative data and analyse the performance of the WSUD provisions and to establish any potential trends in water quality readings from the stormwater network discharge points prior to release of water into the natural hydrological systems of Anzac Creek and the Georges River.

Table 1. Type of outlet MPW

Discharge Point (see figure 2)	Associated Outlet (see figure 1)	Type of outlet/detention basin
Basin 5	Inlet	Bio retention
	Outlet	Outlet point
	Georges River	River
Basin 6	Inlet	Bio retention
	Outlet	Outlet point
Basin 8	Inlet	Bio retention
	Outlet	Outlet structure

2.2 Water Quality Assessment

Surface water quality data collected at the discharge points is assessed with reference to ANZECC Guidelines (2000) and correlated with baseline Water Quality monitoring results provided by previous condition assessment reports.

By comparing water test data under the program across the testing timeline we can identify and report upon trends, identify exceedances and exclude potential anomalies for datasets.

ANZECC Low Risk Trigger Values

Ecosystem type	Turbidity NTU	EC µS/cm	pH*	DO	TN mg/L	NO_x - N mg/L	NH_4^+ - N mg/L	TP mg/L	DRP - P mg/L
Upland river	2-25	30-350	6.5-7.5	90-110	0.480	0.190	0.013	0.013	0.005
Lowland river	6-50	125-2200	6.5-8.0	85-110	0.500	0.190	0.020	0.050	0.020

Values for Low Land River Systems as insert above are used as the reference guide to water quality parameter values and overall health and safety statements regarding the quality of discharged water from the SIOMP drainage network.

Annual spring and autumn water quality data presented from Anzac Creek and Georges River testing programs by other scientific consultants may also be cross referenced to the data prepared by Apical under the SIOMP program to establish potential trends in results and identify increases in accumulated pollutants from the site under operational condition, which may appear present within adjacent natural waterways.

Site data was collected in the form of water samples and in field data recordings at the prescribed monitoring points, water samples and water probe readings are undertaken following Australia and New Zealand guidelines for fresh and marine water quality – 2000 (ANZECC Guidelines), In situ water quality parameters relevant to stream health and aquatic assessment profiling were collected in field with a multiparameter hand-held water quality monitoring probe (Aquatroll 600).

Water data is collected, analysed and collated under the same methodologies and process under each testing period, the ensure consistency in the process.

Measures tested and samples taken:

- pH
- Dissolved Oxygen
- Electrical Conductivity
- Water Temperature and
- Turbidity

Water samples are collected at inlet and discharge points (Basin 5, Basin 6 & Basin 8) then sent to Australian Laboratory Services (ALS) for quality testing analysis Surface water (alsglobal.com).

Water analytical suites / testing parameters are provided to obtain overall water condition results and chemical sampling of collected water is undertaken for a range of nutrients, metals, and hydrocarbons relevant to stream health and aquatic assessment protocol, key nutrients, metals, and pollutants included in the assessment to reflect an overall suite of water quality condition guides which are listed below:

- Total phosphorous
- Total Nitrogen
- Kjeldahl Nitrogen
- Dissolved Metals
- PFAS
- Total Suspended Solids
- Total Hydrocarbons

The raw data results from the lab analysis provided to us by ALS Laboratory Services are presented within this report (see Appendix A).

Key water quality data attributes are recorded, tables and compared against; previous condition baseline data, Spring 2025 data, Liverpool Development Control Plan (DCP) water quality targets, Conditions of Consent B40 and ANZECC Guideline (2000) trigger limits under the condition category -(90% protection criteria for freshwater natural systems). The water quality guidelines are applied to ensure adjacent natural waterways George River and Anzac creek are not adversely affected by poor water quality discharge from the Moorebank logistics park site and operations.

Trends observed in our datasets are analysed on a temporal scale with any trigger values for specific water quality measures highlighted and presented within the results chapter of each seasonal report.

2.3 Data Analysis

The water quality measurements collected are used to assess water quality at each site in terms of health of aquatic ecosystems by comparison with guideline values recommended by the ANZECC and ARMCANZ (2000) guidelines for the protection of lowland streams (i.e. systems at < 150 m altitude) in south-east Australia. This categorisation for stream health is deemed relevant for the description of Anzac Creek, the recipient natural way due to the location in the geomorphic landscape and correlations of expected biophysical health and habitat profiles for similar stream environments.

2.4 Survey dates and personnel

On April 09th 2025, ecologists from Apical Bushfire and Planning attended Moorebank Precinct West (MPW) to collect water quality data across the testing sites which are located within selected inlet points and discharge points within the stormwater drainage and management system (SIOMP) located within the Moorebank Logistics Park site West (See map image 2.).

Inlet and outlet points within the network are representative of variant sites where stormwater will enter a node of the system (as a point source) and then release from the that node of the system at a discharge point. By recording inlet and discharge data water quality can be tracked along the continuum within the system to determine condition changes and overall trends in measured quality at given sites.

This data was collected on behalf of MID plumbing in accordance with 'The Stormwater Infrastructure Operation and Maintenance Plan Moorebank Logistics Park – West Precinct 2020' and in compliance with Condition of Consent B40 (Liverpool City) for the subject site. The results of such monitoring data collection are presented within this report.

2.5 Rainfall

Between the 1st of March and the 31st of March 2025 Moorebank received 90.2mm of rainfall (http://www.bom.gov.au/climate/dwo/202409/html/IDCJDW2161.202409.shtml). Between the 1st of April and the 15h of April 2025 Moorebank received 3.4mm of rainfall.

Figure 1. Bureau of Meteorology Daily Weather Observation Holsworthy March 2025

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9 am						3 pm					
		Min	Max				Dir	Spd	Time	Temp	RH	Cld	Dir	Spd	MSLP	Temp	RH	Cld	Dir	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	8th		km/h	hPa	°C	%	8th		km/h	hPa
1	Sa	18.7	32.0	0			S	28	23:13	22.9	78		WSW	13	1016.7	31.2	53		ENE	15	1012.3
2	Su	19.8	25.7	0			S	52	16:16	23.5	85	8	SSE	19	1013.7	24.8	75	8	SE	30	1013.1
3	Mo	19.2	25.6	0			S	37	08:09	22.2	71	3	S	22	1018.7	24.3	63	8	S	22	1017.6
4	Tu	18.5	26.0	6.8			S	46	15:00	21.0	94	8	SE	9	1021.3	24.2	70	8	SSE	26	1021.6
5	We	18.5	26.7	3.2			SE	35	15:06	22.3	74		SSE	15	1021.8	25.3	55	6	SE	22	1019.5
6	Th	16.9	26.9	0			SSE	43	15:50	21.9	81	8	SSE	15	1020.4	25.4	62	7	SE	22	1019.9
7	Fr	17.9	26.5	2.4			ESE	44	12:59	19.9	92	8	SSE	15	1021.6	25.6	55	5	ESE	24	1020.5
8	Sa	17.4	24.5	2.6			SE	33	12:14	21.1	87	7	SSE	17	1022.8	23.2	70	8	ENE	15	1022.5
9	Su	19.8	28.5	1.4						21.8	94	8		Calm	1023.7	27.0	55	2	ENE	19	1020.7
10	Mo	18.5	27.1				NNE	24	13:12	22.9	79	8	NNE	7	1020.8	26.1	60	8	NNE	13	1018.6
11	Tu	19.4	22.3	9.0			SE	30	06:14	20.2	97	7	SSE	15	1020.5	21.4	93	8	ESE	17	1020.6
12	We	18.6	27.0	8.0			SE	22	13:50	20.4	94	6	W	9	1022.8	26.8	63	8	ENE	7	1019.8
13	Th	17.0	31.7	0			N	24	10:29	19.8	97	7	W	7	1020.1	30.5	48		NNW	9	1016.8
14	Fr	17.8	35.8	0			SSE	30	22:56	23.1	90			Calm	1019.5	34.3	36		NE	9	1016.3
15	Sa	22.0	34.7	0			SE	30	23:09	23.6	85	8	W	7	1019.9	34.5	45		NE	11	1014.5
16	Su	21.0	37.0	0			W	39	12:21	25.6	67		W	6	1011.6	36.4	26		WNW	20	1006.7
17	Mo	15.5	21.5	0			SSE	61	01:54	18.0	51		SSW	20	1018.9	20.5	39		SE	28	1020.8
18	Tu	10.9	24.4	0			E	28	10:42	16.0	71			Calm	1024.5	23.1	51	8	ESE	17	1022.4
19	We	15.6	28.6	0			E	31	14:05	19.3	80	1		Calm	1023.3	27.3	54		ESE	20	1019.0
20	Th	18.2	32.5	0			ENE	31	17:41	22.1	81	1		Calm	1020.3	31.3	47		E	17	1015.6
21	Fr	17.9	27.5	0			SSE	31	18:36	20.1	90	8	W	7	1014.5	25.9	68	3	N	13	1012.5
22	Sa	18.9	26.7	1.4			SE	31	16:27	19.8	87	7	W	6	1017.6	25.1	63	8	SE	17	1015.9
23	Su	19.7	22.1	4.0			S	26	12:46	20.4	92	8	S	13	1021.1	21.0	88	8	S	15	1019.8
24	Mo	18.8	25.8	3.6						20.3	97	8	S	2	1020.3	24.2	71	7	ESE	9	1018.9
25	Tu	19.6	26.2				SSE	31	12:01	22.6	82	4	S	13	1023.1	23.4	82	8	SSW	11	1021.2
26	We	18.4	27.5	1.0			E	33	16:13	19.8	97	1		Calm	1022.6	26.8	54		E	17	1020.5
27	Th	15.6	25.7	0			S	28	10:22	18.4	94	1		Calm	1023.4	24.6	74	8	SE	17	1022.1
28	Fr	16.7	24.2	1.4			E	30	13:28	19.9	96	8		Calm	1022.6	23.8	74	8	E	15	1019.7
29	Sa	18.0	22.0	19.0			SW	37	21:32	18.6	96	7	SSW	7	1012.6	20.0	95	7	WSW	11	1007.3
30	Su	18.4	24.2	11.8			S	50	14:42	19.4	91	8	WSW	13	1008.1	22.1	79	8	SSW	31	1008.1
31	Mo	17.4	24.3	14.6			SW	54	13:19	19.5	79	6	SW	17	1011.7	22.6	64	8	SSW	26	1011.7
Statistics for March 2025																					
Mean		18.1	27.1							20.9	85	6		8	1019.4	25.9	62	7		17	1017.3
Lowest		10.9	21.5	0						16.0	51	1		Calm	1008.1	20.0	26	2	ENE	7	1006.7
Highest		22.0	37.0	19.0			SSE	61		25.6	97	8	S	22	1024.5	36.4	95	8	SSW	31	1022.5
Total				90.2																	

IDCJDW2161.202503 Prepared at 13:00 UTC on Monday 14 April 2025

Figure 2. Bureau of Meteorology Daily Weather Observation Holsworthy April 2025

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9 am						3 pm					
		Min	Max				Dir	Spd	Time	Temp	RH	Cld	Dir	Spd	MSLP	Temp	RH	Cld	Dir	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	8th		km/h	hPa	°C	%	8th		km/h	hPa
1	Tu	15.6	23.2	0			S	37	10:56	19.2	73	5	WSW	9	1015.2	22.1	55	5	SSW	20	1013.3
2	We	13.0	24.6	0			E	28	16:07	14.3	82	7	WSW	9	1012.4	23.9	41		NE	11	1007.8
3	Th	10.1	26.7	0			WNW	39	11:44	14.1	94			Calm	1011.3	25.9	26		SW	9	1009.7
4	Fr	12.3	25.3	0			SE	31	15:50	16.9	86		WSW	7	1016.4	24.6	58	3	SE	15	1014.4
5	Sa	14.3	26.2	0			SE	39	16:24	18.5	47		WNW	9	1015.0	25.0	31		SE	19	1013.9
6	Su	9.2	25.3	0			W	26	11:47	17.1	75		NW	9	1018.8	23.6	31	8	S	6	1013.9
7	Mo	11.5	26.9	0			WSW	43	12:01	19.8	50		NW	11	1018.1	26.7	27		W	11	1015.9
8	Tu	12.3	22.2	0			SE	28	15:34	18.0	71	7	W	9	1025.2	21.4	60	8	SE	19	1023.1
9	We	15.5	24.0	1.2			E	28	13:17	19.7	80	5	ENE	7	1025.7	22.1	69	1	ENE	19	1021.4
10	Th	12.4	24.2	0			NNE	17	14:07	17.7	89	8		Calm	1023.2	23.7	59	8	ENE	7	1020.0
11	Fr	12.4	30.1	0			SE	37	14:37	20.0	76		WNW	9	1023.9	26.7	48	2	SE	20	1022.8
12	Sa	15.1	26.4	0			SSE	28	13:10	21.7	74		WNW	6	1030.8	24.9	64	1	E	17	1028.9
13	Su	13.2	26.8	0			ENE	28	16:05	20.5	85		W	7	1030.2	25.5	51		ENE	17	1025.9
14	Mo	12.4	28.8	0			S	57	14:47	18.8	86		WSW	9	1025.6	24.4	61		S	26	1023.6
15	Tu	16.2		2.2						19.4	75	8	SSW	15	1027.7	19.3	72	8	SSE	19	1025.5
Statistics for the first 15 days of April 2025																					
Mean		13.0	25.8							18.4	76	6		7	1021.3	24.0	50	4		15	1018.7
Lowest		9.2	22.2	0						14.1	47	5		Calm	1011.3	19.3	26	1	S	6	1007.8
Highest		16.2	30.1	2.2			S	57		21.7	94	8	SSW	15	1030.8	26.7	72	8	S	26	1028.9
Total				3.4																	

IDCJDW2161.202504 Prepared at 05:36 UTC on Tuesday 15 April 2025

3. Results

Data results captured by our water quality sampling are presented herein and are compared with baseline & Spring 2025 water quality results for Moorebank Precinct West Basin 6. Threshold guideline quantitative values for the water quality parameter themes are compared and correlated to ANZECC/ARMCANZ (2000) guidelines under the categorisation thresholds – Waterway benchmark group: 'The protection of slightly disturbed lowland river ecosystems in southeast Australia'.

Triggers Exceedances from both the In-Situ Data and the Laboratory Samples April 2025

Location Basin 6 Outflow

Phosphorous 30 µg/L (Guideline trigger 25 µg/L)

Nitrogen 600 µg/L (Guideline trigger 350)

Copper 0.002 µg/L (Guideline trigger 0.0014mg/L)

Literature Review

Phosphorous Values

Phosphorus

Stormwater runoff is a major cause of physical, chemical (i.e. nutrients), and microbial degradation of receiving waters. Nitrogen (N) and phosphorus (P) are of particular concern and interest in urban stormwater runoff due to their role in eutrophication of water bodies, onset of harmful algal blooms, and fish kills. refer (Yun-Ya Yang & Gurpal S. Toor)

The linkages between urbanization and increased N and P export is well established; however, the contributions and dynamics of N and P are often site-specific, the synchronicity between N and P in aquatic environment has been widely used as an ecological indicator of biological growth and nutrient limitation.

Understanding P dynamics in stormwater runoff can help to implement and enhance the effectiveness of strategies to control P loss and transport to receiving waters.

P values from this testing period were slightly raised above the ANZECC guidelines, however are considered reasonable for the testing environment and sample pool.

Nitrogen Values

Nitrogen

A previous spike in Nitrogen has decreased to almost meet the ANZECC trigger value for rivers flowing to the coast at this collection point. This may be due to increased vegetation within the system allowing for uptake of excess nitrogen being mobilised by the stormwater.

Nitrogen values are above the guideline rates, however this is a reduction in concentration when compared to the samples of October 2024, which provides an improvement in nitrogen concentration.

Five (5) Industrial Applications of Nitrogen

While the main industrial use of nitrogen is to create ammonia that is required for fertilizer, explosives, and other materials, it uses go far beyond these applications. From food packaging to pharmaceuticals, nitrogen gas can be found in more places and used for more purposes than you may have realized.

Food Packaging: It is common practice for food processing companies to use compressed nitrogen to displace oxygen in the packaging of perishable foods. Without oxygen, the shelf life of foods such as meats, fruits, vegetables, and various snack foods can be extended. Nitrogen can also add a cushion around food to keep it safe during transport.

Chemical Blanketing: Nitrogen is typically used to prevent fires and explosions in dangerous atmospheres like chemical

plants or manufacturing facilities, by lowering the oxygen level below explosive limits.

Electronics: In the process of assembling electronics, nitrogen gas is used when two electronic components are forming a permanent connection, also known as soldering. The gas is used to reduce surface tension so there is a cleaner break away from the site of the electrical bond. Nitrogen gas is also used in a computer's main processing system to prevent it from overheating.

Laboratory: Laboratories require a very specific environment to ensure that tests and results are carried out accurately. Nitrogen gas is used to control oxygen levels, humidity and temperature, and maintain an appropriate atmosphere for highly sensitive procedures and equipment. Additionally, there are various pieces of laboratory equipment that require nitrogen for purging.

Laser Cutting: The application of nitrogen as a purging gas in the steel industry is extremely important. It is used as an assist gas to blow away molten material and achieve a stronger stainless or aluminized steel product that is also more resistant to corrosion.

https://nigen.com/industries-that-benefit-from-on-site-nitrogen-systems/

Industries That Benefit from On-Site Nitrogen Systems

Gaseous nitrogen is very useful in large-scale manufacturing and industrial applications. The large volumes of nitrogen gas required for these operations are either sourced from vendors in gas cylinders or generated on-site. In this article, we will highlight critical industrial processes that benefit from on-site nitrogen systems.

Elevation pH values recorded from location Discharge point 6

Copper Concentration Values

It is well-established that even low concentrations of dissolved copper can be toxic to many aquatic organisms. It is important to understand the variables controlling dissolved copper concentrations in point source stormwater runoff as a means of identifying characteristics of the most problematic sites and designing appropriate treatment strategies.
Studies of copper concentrations in stormwater have also derived that Increased dissolved copper concentrations can be highly correlated with both dissolved organic carbon (DOC) and alkalinity; refer(Jeffrey A. Nason jeff.nason@oregonstate.edu, Don J. Bloomquist, and Matthew S. Sprick). The strong positive relationship between DOC and copper has been observed in other systems (Martinez and McBride, 1999, Romkens and Dolfing, 1998) and highlights the ability of NOM to increase [Cu]d through complexation.

The sources of copper in stormwater runoff include engine oil, combustion of lubricating oils, roof/gutter runoff, building siding corrosion, fertilizers, pesticides, industrial releases, and wet and dry deposition (Davis, et al., 2001, Kim and Fergusson, 1994, Makepeace, et al., 1995, Rosselot, 2006b). However, the biggest single source of copper to stormwater runoff is use of heavy vehicles and contaminants such as brake pad dust and exhaust particles (Legret and Pagotto, 1999, Rosselot, 2006a).

Recent rainfall totals for the catchment area prior to the testing regimes may also impose a large factor bearing on the results for copper concentration values; Total rainfall volume, rainfall duration, and rainfall intensity have been correlated to decreased copper levels, likely due to dilution (Driscoll, et al., 1990, Kayhanian, et al., 2003). Factors likely to influence the presence of copper in runoff samples include AADT, urban site classification, ADP, the "first flush effect", total rainfall, and rainfall intensity.

Results of our assessment may confirm other findings that urban (high traffic) catchment areas show the most potential for producing runoff that would expose aquatic species to elevated levels of [Cu]d (copper), increasing the possibility of copper toxicity. Additionally, first-flush samples displayed consistently higher [Cu]d than samples collected at later times during a storm. Therefore, best management practices (BMPs) aiming to ameliorate the effect of copper should focus on high traffic, urban areas, the first flush of storms, and point discharges to receiving waters.

3.2 Interpreting Results

Dissolved Oxygen – Measures:

Dissolved oxygen (DO) is oxygen held (dissolved) in the water and available to aquatic organisms.

The amount of dissolved oxygen in a river or stream can tell us a lot about its water quality.

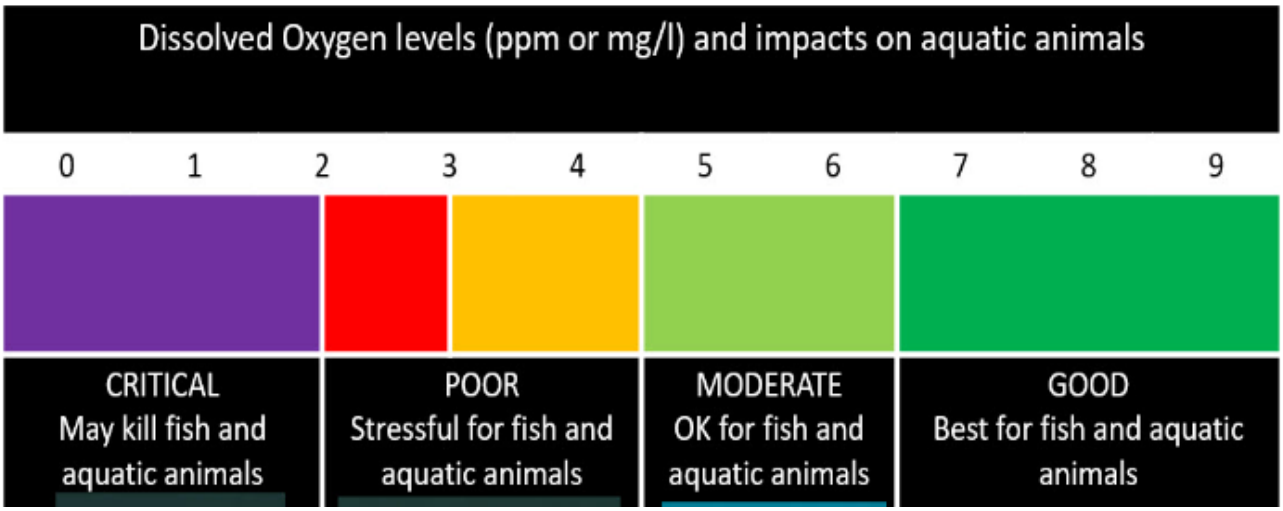
Water will naturally contain a certain amount of dissolved oxygen that is absorbed from the air and produced by plants and algae living in the water.

Temperature has a large effect on the amount of oxygen dissolved in water; cold water can hold higher levels of oxygen than warmer water. Higher water temperatures over summer will cause oxygen levels to drop.

Other factors such as river flow, wind, nutrients and bacterial activity can also affect the amount of dissolved oxygen in waterways.

Dissolved oxygen levels typically range between 5 and 14 mg/L (or ppm).

Example:



Salinity – Measures:

Electrical conductivity is a measure of the saltiness of the water and is measured on a scale from 0 to 50,000 uS/cm. Electrical conductivity is measured in microsiemens per centimeter (uS/cm). Freshwater is usually between 0 and 1,500 uS/cm and typical sea water has a conductivity value of about 50,000 uS/cm.

Examples:

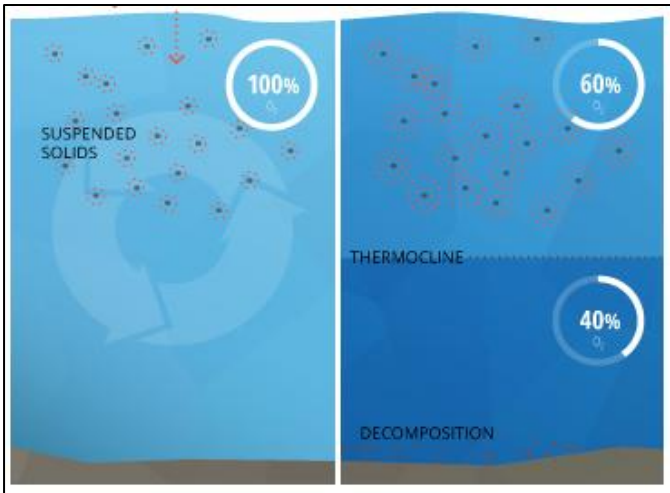
µS/cm	Use
0 - 800	• Good drinking water for humans (provided there is no organic pollution and not too much suspended clay material) • Generally good for irrigation, though above 300µS/cm some care must be, particularly with overhead sprinklers, which may cause leaf, scorch on some salt sensitive plants. • Suitable for all livestock
800 - 2500	• Can be consumed by humans, although most would prefer water in the lower half of this range if available • When used for irrigation, requires special management including suitable soils, good drainage and consideration of salt tolerance of plants • Suitable for all livestock
2500 -10,000	• Not recommended for human consumption, although water up to 3000 µS/cm can be consumed • Not normally suitable for irrigation, although water up to 6000 µS/cm can be used on very salt tolerant crops with very special management techniques. Over 6000 µS/cm, occasional emergency may be possible with care • When used for drinking water by poultry and pigs, the salinity should be limited to about 6000 µS/cm. Most other livestock can use water up to 10000 µS/cm

Total Dissolve Solids (TDS) – Measures

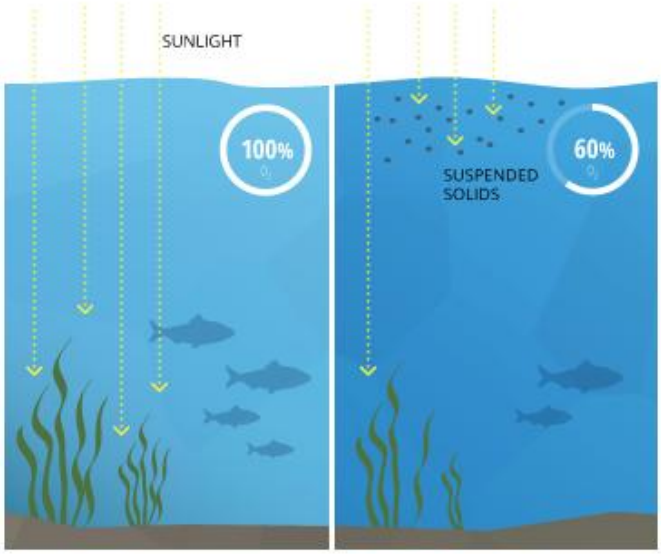
Dissolved solids, smaller than 2 microns, refer to any minerals, salts, metals, in the form of molecules, atoms, cations or anions dissolved in water. Total dissolved solids (TDS) comprise inorganic salts (principally calcium, magnesium, potassium, sodium, bicarbonates, chlorides and sulfates) and some small amounts of organic matter that dissolve in water.

The TDS concentration is the sum of all filterable substances in water that can be determined gravimetrically. However, in most cases, TDS is primarily comprised of ions.

High levels of total suspended solids can affect turbidity, increase water temperatures and decrease dissolved oxygen (DO) levels. This can cause the water to heat up more rapidly because the suspended particles absorb more heat and deplete oxygen, which can adversely affect aquatic life.



Suspended solids can increase the temperature of water as they absorb additional heat from the sun. This can also cause dissolved oxygen levels to drop below the thermocline, creating hypoxic conditions.



Suspended solids, particularly algae, can block sunlight from reaching submerged plants. This can cause dissolved oxygen levels to drop, as the plants rely on respiration (consuming oxygen) instead of photosynthesis.

Turbidity – Total Suspended Solids (TSS)

Turbidity data are reported in Nephelometric Turbidity Units (NTU). To provide a sense of scale, water with a turbidity of 1 NTU is crystal clear, water at 5 NTU has a tiny trace of discolouration, and water at 100 NTU is brown and opaque. The standard is less than 10 NTU for rural streams and rivers and less than 30 NTU for urban lakes and ponds.

Total suspended solids (TSS) are particles that are larger than 2 microns found in the water column. Anything smaller than 2 microns (average filter size) is considered a dissolved solid. Most suspended solids are made up of inorganic materials, though bacteria and algae can also contribute to the total solids concentration.

Both organic and inorganic particles of all sizes can contribute to the suspended solids concentration.

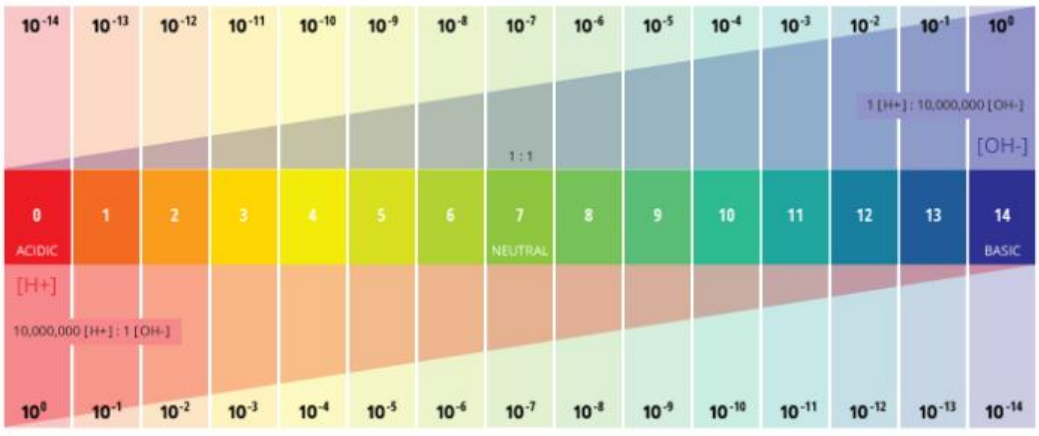
pH – Acidity / Alkalinity – Measures

The pH refers to the degree of acidity or alkalinity of a substance. A pH of 7 is neutral. A value above 7 indicates that the water is more alkaline and a pH below 7 indicates acidic conditions.

A pH of 7 is considered neutral. The logarithmic scale means that each number below 7 is 10 times more acidic than the previous number when counting down. Likewise, when counting up above 7, each number is 10 times more basic than the previous number pH stands for the "power of hydrogen" [3]. The numerical value of pH is determined by the molar concentration of hydrogen ions (H+) [3]. This is done by taking the negative logarithm of the H+ concentration (-log(H+)).

Standard values for pH readings are expected, pH 6.5–9 for rural streams and rivers and pH 6–9 for urban lakes and ponds.

In freshwater systems pH sets up the conditions for how easy it is for nutrients to be available and how easily things like heavy metals (toxicity for aquatic life) can dissolve in the water. Rivers and lakes generally range between 5 (acidic) and 9 (basic) on the pH scale.



The logarithmic scale of pH means that as pH increases, the H+ concentration will decrease by a power of 10. Thus at a pH of 0, H+ has a concentration of 1 M. At a pH of 7, this decreases to 0.0000001 M. At a pH of 14, there is only 0.00000000000001 M

Summary of results

Aquatic ecosystems	
Indicator	**Numerical criteria (trigger values)**
Total phosphorus 30 µg/L	• Upland rivers: 20 µg/L • Lowland rivers: 25 µg/L for rivers flowing to the coast; • Lakes & reservoirs: 10 µg/L • Estuaries: 30 µg/L
Total nitrogen 600 µg/L	• Upland rivers: 250 µg/L • Lowland rivers: 350 µg/L for rivers flowing to the coast; • Lakes & reservoirs: 350 µg/L • Estuaries: 300µg/L
Chlorophyll-a	• Upland rivers: not applicable • Lowland rivers: 5 µg/L • Lakes & reservoirs: 5 µg/L. • Estuaries: 4 µg/L.
Turbidity 2.87	• Upland rivers: 2–25 NTU (see supporting information) • Lowland rivers: 6–50 NTU (see supporting information) • Lakes & reservoirs: 1–20 NTU • Estuaries: 0.5–10 NTU
Salinity (electrical conductivity) 446.6 µs/cm	• Upland rivers: 30–350 µS/cm • Lowland rivers: 125–2200 µS/cm supporting information
Dissolved oxygen 10.47 ppm	• Upland rivers: 90–110% • Lowland rivers: 85–110% • Freshwater lakes & reservoirs: 90–110% • Estuaries: 80–110% Note: Dissolved oxygen values were derived from daytime measurements. Dissolved oxygen concentrations may vary diurnally and with depth. Monitoring programs should assess this potential variability.
pH 8.08	• Upland rivers: 6.5–8.0 • Lowland rivers: 6.5–8.5 • Freshwater lakes & reservoirs: 6.5–8.0 • Estuaries: 7.0–8.5 Changes of more than 0.5 pH units from the natural seasonal maximum or minimum should be investigated.

Map Image 1. Stormwater Testing Site – Moorebank Logistics Park

Sample Site Map

0 30 60 120 Meters

Client: M.I.D Plumbing	Map Issue: Basin 6 Sample Site Map
Address: BUSHMASTER AVENUE MOOREBANK2170	Time: 10/07/2024 2:24 PM

LGA: LIVERPOOL CITY COUNCIL	Scale: 1:2,000
Lot/DP: 5 to 14/DP 1299137	Spatial Reference: WGS 1984 Web Mercator Auxiliary Sphere
Units: Meters	

Marco Perry
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Bsc EnvSc

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STORMWATER DISCHARGE TESTING SITE

Site image 1. Testing site Basin 6 - Outflow

Table. In-situ data and observations Retention Basin 6 outflow

Moorebank West Precinct - Retention Basin 6 Outflow (MPW outflow)			
Date: 09/04/2025	**Time:** 12:50pm	**Temp:** 21°C	**Humidity:** 80%
Operator: Marco Perry		**Coordinates:** -33.947085, 150.917653	
Equipment used: Aquatroll 500			
Parameter	**Recording**	**ANZECC** ANZECC 2000 Guidelines *Lowland rivers	**Triggered?** Y/N
Temperature (Celcius)	21.1	Abnormal to seasonal variation	N
Dissolved Oxygen (DO %)	114%	*Lowland rivers Lower limit: 85% Upper Limit: 110%	
Dissolved Oxygen (DO ppm)	10.47 ppm	*Lowland rivers Lower limit: 85% Upper Limit: 110%	N
Electrical Conductivity (C- um/cm)	446.6 C- us/cm	125–2200 µS/cm	N
pH	8.08	Min 6.5 Max 8.5	N
NTU	2.87	6-50	Y

(a) Total phosphorus

Basin 6.1 inflow - Total phosphorous – Qube Logistics, Moorebank, NSW		Trigger Trigger Value - ANZECC 2000 Guidelines	Triggered
Lab results - Total phosphorous:	30 µg/L	25 µg/L - 50 µg/L	N
Notes: • Channel Culvert • Trigger value 50 µg/L for lowland rivers, trigger value 25 µg/L for rivers flowing to the coast Anzecc Guidelines 2000.			

(b) Total Nitrogen as N (TKN + NOx) by Discrete Analyser

Basin 6.1 inflow - Total nitrogen – Qube Logistics, Moorebank, NSW		Trigger Value - ANZECC 2000 Guidelines	Triggered
Lab results -Total nitrogen:	600 µg/L	350 µg/L for rivers flowing to the coast	Y
Notes: • Total Nitrogen as N (TKN + NOx) by Discrete Analyser • Trigger values are based on a low-lying river			

(c) Kjeldahl nitrogen Total Kjeldahl Nitrogen as N

Basin 6.1 inflow - Kjeldahl nitrogen – Qube Logistics, Moorebank, NSW		Trigger Value - ANZECC 2000 Guidelines	Triggered
Lab results – kjeldahl nitrogen:	500 µg/L	-	-
Notes: • Total Kjeldahl Nitrogen as N			

(d) Dissolved metals;

Basin 6.1 inflow - Dissolved metals – Qube Logistics, Moorebank, NSW			
Equipment used: - Sample bottles collected from monitoring site ALS Environmental Laboratory Testing Report			
Lab results – Dissolved metals:	**Measures mg/L**	**Trigger value ANZECC Guidelines 2000 95% protection criteria**	**Triggered**
Arsenic	<0.001	0.013 mg/L	N
Cadmium	<0.0001	0.0002 mg/L	N
Chromium	<0.001	0.001 mg/L	N
Copper	0.002	0.0014mg/L	Y
Nickel	<.001	0.011 mg/L	N
Lead	<0.001	0.0034 mg/L	N
Zinc	<0.005	0.008 mg/L	N
Mercury	<0.0001	0.0006 mg/L	N
Notes: - ANZECC Guidelines (2000) suggest 0.002 mg/L is considered appropriate for slightly-moderately disturbed systems. - Copper exceeds ANZECC Guidelines			

(e) PFAS;

Basin 6.1 inflow - PFAS – Qube Logistics, Moorebank, NSW			
PFAS Surrogate	**Measure** µg/L	**95% species protection (DEE 2016)**	**Triggered**
13C4-PFOS **Sum of PFAS µg/L**	102% 0.32µg/L	 .13 (µg/L)	
13C8-PFOA % **Sum of PFHxS and PFOS**	101% .24µg/L	 220 (µg/L)	
Notes: This Guidance focuses on PFOS and PFOA as potential indicators of wider contamination by related PFASs. The reasons for this approach include: • Most research undertaken on PFASs internationally and in Australia has focused on PFOS and PFOA due to their frequent occurrence in the environment, persistence, and bioaccumulation. • PFOS and PFOA can also be the breakdown endpoint of other precursor products. • PFOS and PFOA are the most commonly encountered PFAS in the environment and wildlife. • Information on other PFASs, of which there are several hundred known, is more limited. • Effective management of PFOS and PFOA may help address potential contamination where other PFASs may also be present. * DEE 2016. Commonwealth Environmental Management Guidance on Perfluorooctane Sulfonic Acid (PFOS) and Perfluorooctanoic Acid (PFOA). Department of the Environment and Energy.			

(f) Total suspended solids.

Basin 6.1 inflow - Total suspended solids – Qube Logistics, Moorebank, NSW		EPA exceedance value	Trigger
Lab results – Total suspended solids: mg/L	11 mg/L	50 mg/L	N
Notes: • Total Suspended Solids dried at 104 ± 2°C			

(g) Total hydrocarbons

Basin 6.1 inflow - Total hydrocarbons – Qube Logistics, Moorebank, NSW							
Lab results -Total hydrocarbons:	Trigger value ANZECC Guidelines 2000 – slightly disturbed lowland river ecosystem	Triggered	Baseline monitoring May 2024 (Apical)	Monitoring discharge points October 2024 (Apical)	Monitoring discharge points April 2025 (Apical)	Monitoring discharge points Month Year (Apical)	Trend
Benzene µg/L	1300 µg/L	N	<1	<1	<1		No change
Toluene µg/L	-	N	<2	<2	<2		No change
Ethylbenzene µg/L	-	N	<2	<2	<2		No change
meta-& para-Xylene µg/L	200 µg/L	N	<2	<2	<2		No change
Ortho-Xylene µg/L	470 µg/L	N	<2	<2	<2		No change
Total Xylenes µg/L	-	-	<2	<2	<2		No change
Sum of BTEX µg/L	-	-	<1	<1	<1		No change
Naphthalene µg/L	85 µg/L	N	<5	<5	<5		No change
Notes: • The data were compared to the default trigger values (DTVs) recommended by ANZECC/ARMCANZ (2000) for the protection of slightly disturbed lowland river ecosystems in southeast Australia. • A commonly encountered example of additive toxicity of mixtures is the simple aromatic hydrocarbons commonly associated with contaminated petroleum sites, benzene, toluene, ethyl benzene and xylenes, collectively known as BTEX							

Water Quality Monitoring Comparative Table (Temporal)

Retention Basin 6 MPW. Testing Site MPW 6 outflow

Testing Site 6 MPW Inflow	May 2024	Oct 2024	April 2025
pH	8.54	6.51	8.08
Dissolved Oxygen - %/L	5.5 DO mg/L	10.4ppm	10.47ppm
Actual Electronic Conductivity - ms/cm	0.627 SPC - ms/cm	7.3 <0.0001 (C-$^{um/cm}$)	0.482 (C-$^{um/cm}$)
Temperature - ℃	14.4	20.1	21.1
Turbidity	6.13 NTU	6.73 NTU	2.87
Total phosphorous - mg/L	0.42 mg/L	0.16 mg/L	0.03 mg/L
Total nitrogen - mg/L	3.7 mg/L	1.1 mg/L	0.6 mg/L
Kjeldahl nitrogen mg/L	1.8 mg/L	1.0 mg/L	0.5 mg/L
Dissolved metals			
Arsenic	0.003	<0.001	<0.001
Cadmium	<0.0001	<0.0001	<0.0001
Chromium	0.001	<0.001	<0.001
Copper	0.005	0.001	0.002
Nickel	0.002	0.002	<0.001
Lead	<0.001	<0.001	<0.001
Zinc	0.021	<0.005	<0.005
Mercury	<0.0001	<0.0001	<0.0001
PFAS			
Lab results – SUM of PFAS Micrograms/L	0.10	1.55	.32
SUM of PFHxS & PFOS Microgrms/L	0.03	1.08	.24
Total suspended solids mg/L	<5	24	13
Total hydrocarbons			
Benzene	<1	<1	<1
Toluene	<2	<2	<2
Ethylbenzene	<2	<2	<2
meta-& para-Xylene	<2	<2	<2
Ortho-Xylene	<2	<2	<2
Total Xylenes	<2	<2	<2
Sum of BTEX	<1	<1	<1
Naphthalene	<5	<5	<5

Appendix A. Raw data tables; source - Australian Laboratory Services (WMP 7 is reference to Basin 6)

Page	: 7 of 11
Work Order	: EW2501914
Client	: Apical Bushfire and Planning
Project	: Moorebank East + West

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	WMP8	WMP7	WMP5	----	----
				Sampling date / time	09-Apr-2025 13:10	09-Apr-2025 12:50	09-Apr-2025 12:30	----	----
Compound	CAS Number	LOR	Unit		EW2501914-006	EW2501914-007	EW2501914-008	--------	--------
					Result	Result	Result	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		**13**	**11**	**10**	----	----
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Copper	7440-50-8	0.001	mg/L		<0.001	**0.002**	**0.005**	----	----
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	**0.001**	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.01**	**0.09**	**0.05**	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.4**	**0.5**	**0.3**	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**0.4**	**0.6**	**0.4**	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.04**	**0.03**	<0.01	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	----	----
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	----	----
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	----	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	WMP8	WMP7	WMP5	----	----
			Sampling date / time	09-Apr-2025 13:10	09-Apr-2025 12:50	09-Apr-2025 12:30	----	----
Compound	CAS Number	LOR	Unit	EW2501914-006	EW2501914-007	EW2501914-008	--------	--------
				Result	Result	Result	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued								
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L	<20	<20	<20	----	----
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	----	----
>C16 - C34 Fraction	----	100	µg/L	<100	<100	<100	----	----
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	----	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L	<100	<100	<100	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L	<100	<100	<100	----	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	<1	----	----
Toluene	108-88-3	2	µg/L	<2	<2	<2	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	----	----
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	----	----
^ **Total Xylenes**	----	2	µg/L	<2	<2	<2	----	----
^ **Sum of BTEX**	----	1	µg/L	<1	<1	<1	----	----
Naphthalene	91-20-3	5	µg/L	<5	<5	<5	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoropropane sulfonic acid (PFPrS)	423-41-6	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	**0.11**	<0.02	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorononane sulfonic acid (PFNS)	68259-12-1	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	**0.01**	**0.13**	**0.01**	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	WMP8	WMP7	WMP5	----	----
				Sampling date / time	09-Apr-2025 13:10	09-Apr-2025 12:50	09-Apr-2025 12:30	----	----
Compound	CAS Number	LOR	Unit		EW2501914-006	EW2501914-007	EW2501914-008	--------	--------
					Result	Result	Result	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	**0.04**	**0.03**	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	**0.04**	**0.03**	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	**0.01**	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	----	----
Perfluorohexadecanoic acid (PFHxDA)	67905-19-5	0.05	µg/L		<0.05	<0.05	<0.05	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	WMP8	WMP7	WMP5	-----	-----
				Sampling date / time	09-Apr-2025 13:10	09-Apr-2025 12:50	09-Apr-2025 12:30	----	----
Compound	CAS Number	LOR	Unit		EW2501914-006	EW2501914-007	EW2501914-008	--------	--------
					Result	Result	Result	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**0.01**	**0.32**	**0.08**	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.01**	**0.24**	**0.01**	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.01**	**0.32**	**0.08**	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**98.8**	**90.8**	**88.8**	----	----
Toluene-D8	2037-26-5	2	%		**93.6**	**85.2**	**81.0**	----	----
4-Bromofluorobenzene	460-00-4	2	%		**94.7**	**86.2**	**81.8**	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**102**	**102**	**100**	----	----
13C8-PFOA	----	0.02	%		**101**	**105**	**105**	----	----

Surrogate Control Limits

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	72	143
Toluene-D8	2037-26-5	75	131
4-Bromofluorobenzene	460-00-4	73	137
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry / Biology).

(WATER) EK067G: Total Phosphorus as P by Discrete Analyser
(WATER) EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser
(WATER) EK061G: Total Kjeldahl Nitrogen By Discrete Analyser
(WATER) EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser
(WATER) EG035F: Dissolved Mercury by FIMS
(WATER) EG020F: Dissolved Metals by ICP-MS
(WATER) EP080/071: Total Petroleum Hydrocarbons
(WATER) EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions
(WATER) EP080: BTEXN
(WATER) EP080S: TPH(V)/BTEX Surrogates
(WATER) EP231A: Perfluoroalkyl Sulfonic Acids
(WATER) EP231B: Perfluoroalkyl Carboxylic Acids
(WATER) EP231C: Perfluoroalkyl Sulfonamides
(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids
(WATER) EP231P: PFAS Sums
(WATER) EP231S: PFAS Surrogate
(WATER) EA025: Total Suspended Solids dried at 104 ± 2°C

Appendix B. ANZECC & ARMCANZ (2000) water quality guidelines

Table 3.4.1 Trigger values for toxicants at alternative levels of protection. Values in grey shading are the trigger values applying to typical *slightly–moderately disturbed systems*; see table 3.4.2 and Section 3.4.2.4 for guidance on applying these levels to different ecosystem conditions.

Chemical		Trigger values for freshwater (µgL^{-1})				Trigger values for marine water (µgL^{-1})			
		Level of protection (% species)				Level of protection (% species)			
		99%	95%	90%	80%	99%	95%	90%	80%
METALS & METALLOIDS									
Aluminium	pH >6.5	27	55	80	150	ID	ID	ID	ID
Aluminium	pH <6.5	ID	ID	ID	ID	ID	ID	ID	ID
Antimony		ID	ID	ID	ID	ID	ID	ID	ID
Arsenic (As III)		1	24	94 [C]	360 [C]	ID	ID	ID	ID
Arsenic (AsV)		0.8	13	42	140 [C]	ID	ID	ID	ID
Beryllium		ID	ID	ID	ID	ID	ID	ID	ID
Bismuth		ID	ID	ID	ID	ID	ID	ID	ID
Boron		90	370 [C]	680 [C]	1300 [C]	ID	ID	ID	ID
Cadmium	H	0.06	0.2	0.4	0.8 [C]	0.7 [B]	5.5 [B, C]	14 [B, C]	36 [B, A]
Chromium (Cr III)	H	ID	ID	ID	ID	7.7	27.4	48.6	90.6
Chromium (CrVI)		0.01	1.0 [C]	6 [A]	40 [A]	0.14	4.4	20 [C]	85 [C]
Cobalt		ID	ID	ID	ID	0.005	1	14	150 [C]
Copper	H	1.0	1.4	1.8 [C]	2.5 [C]	0.3	1.3	3 [C]	8 [A]
Gallium		ID	ID	ID	ID	ID	ID	ID	ID
Iron		ID	ID	ID	ID	ID	ID	ID	ID
Lanthanum		ID	ID	ID	ID	ID	ID	ID	ID
Lead	H	1.0	3.4	5.6	9.4 [C]	2.2	4.4	6.6 [C]	12 [C]
Manganese		1200	1900 [C]	2500 [C]	3600 [C]	ID	ID	ID	ID
Mercury (inorganic)	B	0.06	0.6	1.9 [C]	5.4 [A]	0.1	0.4 [C]	0.7 [C]	1.4 [C]
Mercury (methyl)		ID	ID	ID	ID	ID	ID	ID	ID
Molybdenum		ID	ID	ID	ID	ID	ID	ID	ID
Nickel	H	8	11	13	17 [C]	7	70 [C]	200 [A]	560 [A]
Selenium (Total)	B	5	11	18	34	ID	ID	ID	ID
Selenium (SeIV)	B	ID	ID	ID	ID	ID	ID	ID	ID
Silver		0.02	0.05	0.1	0.2 [C]	0.8	1.4	1.8	2.6 [C]
Thallium		ID	ID	ID	ID	ID	ID	ID	ID
Tin (inorganic, SnIV)		ID	ID	ID	ID	ID	ID	ID	ID
Tributyltin (as µg/L Sn)		ID	ID	ID	ID	0.0004	0.006 [C]	0.02 [C]	0.05 [C]
Uranium		ID	ID	ID	ID	ID	ID	ID	ID
Vanadium		ID	ID	ID	ID	50	100	160	280
Zinc	H	2.4	8.0 [C]	15 [C]	31 [C]	7	15 [C]	23 [C]	43 [C]
NON-METALLIC INORGANICS									
Ammonia	D	320	900 [C]	1430 [C]	2300 [A]	500	910	1200	1700
Chlorine	E	0.4	3	6 [A]	13 [A]	ID	ID	ID	ID
Cyanide	F	4	7	11	18	2	4	7	14
Nitrate	J	17	700	3400 [C]	17000 [A]	ID	ID	ID	ID
Hydrogen sulfide	G	0.5	1.0	1.5	2.6	ID	ID	ID	ID
ORGANIC ALCOHOLS									
Ethanol		400	1400	2400 [C]	4000 [C]	ID	ID	ID	ID
Ethylene glycol		ID	ID	ID	ID	ID	ID	ID	ID
Isopropyl alcohol		ID	ID	ID	ID	ID	ID	ID	ID
CHLORINATED ALKANES									
Chloromethanes									
Dichloromethane		ID	ID	ID	ID	ID	ID	ID	ID
Chloroform		ID	ID	ID	ID	ID	ID	ID	ID
Carbon tetrachloride		ID	ID	ID	ID	ID	ID	ID	ID
Chloroethanes									
1,2-dichloroethane		ID	ID	ID	ID	ID	ID	ID	ID
1,1,1-trichloroethane		ID	ID	ID	ID	ID	ID	ID	ID

Chemical	Trigger values for freshwater (µgL^{-1})				Trigger values for marine water (µgL^{-1})			
	Level of protection (% species)				Level of protection (% species)			
	99%	95%	90%	80%	99%	95%	90%	80%
1,1,2-trichloroethane	5400	6500	7300	8400	140	1900	5800 [C]	18000 [C]
1,1,2,2-tetrachloroethane	ID	ID	ID	ID	ID	ID	ID	ID
Pentachloroethane	ID	ID	ID	ID	ID	ID	ID	ID
Hexachloroethane B	290	360	420	500	ID	ID	ID	ID
Chloropropanes								
1,1-dichloropropane	ID	ID	ID	ID	ID	ID	ID	ID
1,2-dichloropropane	ID	ID	ID	ID	ID	ID	ID	ID
1,3-dichloropropane	ID	ID	ID	ID	ID	ID	ID	ID
CHLORINATED ALKENES								
Chloroethylene	ID	ID	ID	ID	ID	ID	ID	ID
1,1-dichloroethylene	ID	ID	ID	ID	ID	ID	ID	ID
1,1,2-trichloroethylene	ID	ID	ID	ID	ID	ID	ID	ID
1,1,2,2-tetrachloroethylene	ID	ID	ID	ID	ID	ID	ID	ID
3-chloropropene	ID	ID	ID	ID	ID	ID	ID	ID
1,3-dichloropropene	ID	ID	ID	ID	ID	ID	ID	ID
ANILINES								
Aniline	8	250 [A]	1100 [A]	4800 [A]	ID	ID	ID	ID
2,4-dichloroaniline	0.6	7	20	60 [C]	ID	ID	ID	ID
2,5-dichloroaniline	ID	ID	ID	ID	ID	ID	ID	ID
3,4-dichloroaniline	1.3	3	6 [C]	13 [C]	85	150	190	260
3,5-dichloroaniline	ID	ID	ID	ID	ID	ID	ID	ID
Benzidine	ID	ID	ID	ID	ID	ID	ID	ID
Dichlorobenzidine	ID	ID	ID	ID	ID	ID	ID	ID
AROMATIC HYDROCARBONS								
Benzene	600	950	1300	2000	500 [C]	700 [C]	900 [C]	1300 [C]
Toluene	ID	ID	ID	ID	ID	ID	ID	ID
Ethylbenzene	ID	ID	ID	ID	ID	ID	ID	ID
o-xylene	200	350	470	640	ID	ID	ID	ID
m-xylene	ID	ID	ID	ID	ID	ID	ID	ID
p-xylene	140	200	250	340	ID	ID	ID	ID
m+*p*-xylene	ID	ID	ID	ID	ID	ID	ID	ID
Cumene	ID	ID	ID	ID	ID	ID	ID	ID
Polycyclic Aromatic Hydrocarbons								
Naphthalene	2.5	16	37	85	50 [C]	70 [C]	90 [C]	120 [C]
Anthracene B	ID	ID	ID	ID	ID	ID	ID	ID
Phenanthrene B	ID	ID	ID	ID	ID	ID	ID	ID
Fluoranthene B	ID	ID	ID	ID	ID	ID	ID	ID
Benzo(a)pyrene B	ID	ID	ID	ID	ID	ID	ID	ID
Nitrobenzenes								
Nitrobenzene	230	550	820	1300	ID	ID	ID	ID
1,2-dinitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,3-dinitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,4-dinitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,3,5-trinitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-methoxy-2-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-methoxy-4-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-chloro-2-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-chloro-3-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-chloro-4-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-chloro-2,4-dinitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,2-dichloro-3-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,3-dichloro-5-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,4-dichloro-2-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
2,4-dichloro-2-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID

Chemical	Trigger values for freshwater (µgL^{-1})				Trigger values for marine water (µgL^{-1})			
	Level of protection (% species)				Level of protection (% species)			
	99%	95%	90%	80%	99%	95%	90%	80%
Hexazinone	ID	ID	ID	ID	ID	ID	ID	ID
Simazine	0.2	3.2	11	35	ID	ID	ID	ID
Urea herbicides								
Diuron	ID	ID	ID	ID	ID	ID	ID	ID
Tebuthiuron	0.02	2.2	20	160 [C]	ID	ID	ID	ID
Miscellaneous herbicides								
Acrolein	ID	ID	ID	ID	ID	ID	ID	ID
Bromacil	ID	ID	ID	ID	ID	ID	ID	ID
Glyphosate	370	1200	2000	3600 [A]	ID	ID	ID	ID
Imazethapyr	ID	ID	ID	ID	ID	ID	ID	ID
Ioxynil	ID	ID	ID	ID	ID	ID	ID	ID
Metolachlor	ID	ID	ID	ID	ID	ID	ID	ID
Sethoxydim	ID	ID	ID	ID	ID	ID	ID	ID
Trifluralin B	2.6	4.4	6	9 [A]	ID	ID	ID	ID
GENERIC GROUPS OF CHEMICALS								
Surfactants								
Linear alkylbenzene sulfonates (LAS)	65	280	520 [C]	1000 [C]	ID	ID	ID	ID
Alcohol ethoxyolated sulfate (AES)	340	650	850 [C]	1100 [C]	ID	ID	ID	ID
Alcohol ethoxylated surfactants (AE)	50	140	220	360 [C]	ID	ID	ID	ID
Oils & Petroleum Hydrocarbons	ID	ID	ID	ID	ID	ID	ID	ID
Oil Spill Dispersants								
BP 1100X	ID	ID	ID	ID	ID	ID	ID	ID
Corexit 7664	ID	ID	ID	ID	ID	ID	ID	ID
Corexit 8667		ID	ID	ID	ID	ID	ID	ID
Corexit 9527	ID	ID	ID	ID	230	1100	2200	4400 [A]
Corexit 9550	ID	ID	ID	ID	ID	ID	ID	ID

Notes: Where the final water quality guideline to be applied to a site is below current analytical practical quantitation limits, see Section 3.4.3.3 for guidance.

Most trigger values listed here for metals and metalloids are *High reliability* figures, derived from field or chronic NOEC data (see 3.4.2.3 for reference to Volume 2). The exceptions are *Moderate reliability* for freshwater aluminium (pH >6.5), manganese and marine chromium (III).

Most trigger values listed here for non-metallic inorganics and organic chemicals are *Moderate reliability* figures, derived from acute LC_{50} data (see 3.4.2.3 for reference to Volume 2). The exceptions are *High reliability* for freshwater ammonia, 3,4-DCA, endosulfan, chlorpyrifos, esfenvalerate, tebuthiuron, three surfactants and marine for 1,1,2-TCE and chlorpyrifos.

* = *High reliability* figure for esfenvalerate derived from mesocosm NOEC data (no alternative protection levels available).

A = Figure may not protect key test species from acute toxicity (and chronic) — check Section 8.3.7 for spread of data and its significance. 'A' indicates that trigger value > acute toxicity figure; note that trigger value should be <1/3 of acute figure (Section 8.3.4.4).

B = Chemicals for which possible bioaccumulation and secondary poisoning effects should be considered (see Sections 8.3.3.4 and 8.3.5.7).

C = Figure may not protect key test species from chronic toxicity (this refers to experimental chronic figures or geometric mean for species) — check Section 8.3.7 for spread of data and its significance. Where grey shading and 'C' coincide, refer to text in Section 8.3.7.

D = Ammonia as TOTAL ammonia as [NH_3-N] at pH 8. For changes in trigger value with pH refer to Section 8.3.7.2.

E = Chlorine as total chlorine, as [Cl]; see Section 8.3.7.2.

F = Cyanide as un-ionised HCN, measured as [CN]; see Section 8.3.7.2.

G = Sulfide as un-ionised H_2S, measured as [S]; see Section 8.3.7.2.

H = Chemicals for which algorithms have been provided in table 3.4.3 to account for the effects of hardness. The values have been calculated using a hardness of 30 mg/L $CaCO_3$. These should be adjusted to the site-specific hardness (see Section 3.4.3).

J = Figures protect against toxicity and do not relate to eutrophication issues. Refer to Section 3.3 if eutrophication is the issue of concern.

ID = Insufficient data to derive a reliable trigger value. Users advised to check if a low reliability value or an ECL is given in Section 8.3.7.

T = Tainting or flavour impairment of fish flesh may possibly occur at concentrations below the trigger value. See Sections 4.4.5.3/3 and 8.3.7.

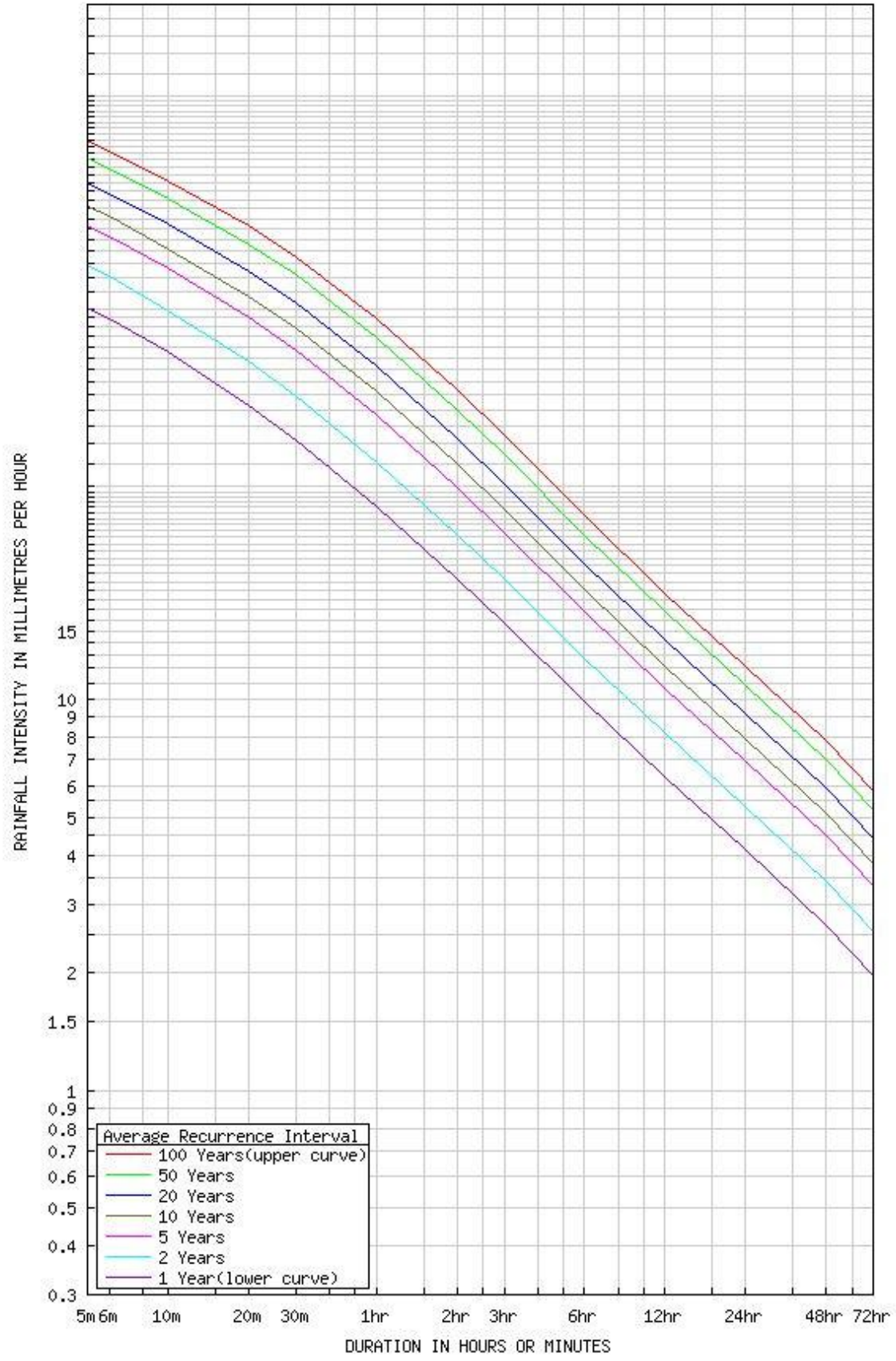
Table 5. Ecological water quality guideline values developed by water regulators

Exposure scenario	PFOS	PFOA	Exposure scenario	Comments and source
Freshwater	0.00023 µg/L	19 µg/L	99% species protection - high conservation value systems	Australian and New Zealand Guidelines for Fresh and Marine Water Quality - technical draft default guideline values for PFOS and PFOA. Note 1: The 99% species protection level for PFOS is close to the level of detection. Agencies may wish to apply a 'detect' threshold in such circumstances rather than a quantified measurement. Note 2: The draft guidelines do not account for effects which result from the biomagnification of toxicants in air-breathing animals or in animals which prey on aquatic organisms. Note 3: The WQGs advise[41] that the 99% level of protection be used for slightly to moderately disturbed systems. This approach is generally adopted for chemicals that bioaccumulate and biomagnify in wildlife. Regulators may specify or environmental legislation may prescribe the level of species protection required, rather than allowing for case-by-case assessments.
	0.13 µg/L	220 µg/L	95% species protection - slightly to moderately disturbed systems	
	2 µg/L	632 µg/L	90% species protection - highly disturbed systems	
	31 µg/L	1824 µg/L	80% species protection - highly disturbed systems	
Interim marine	0.00023 µg/L	19 µg/L	99% species protection - high conservation value systems	As above. Freshwater values are to be used on an interim basis until final marine guideline values can be set using the nationally-agreed process under the Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Note 1: The WQG advise that in the case of estuaries, the most stringent of freshwater and marine criteria apply, taking account of any available salinity correction. Note 2: Marine guideline values developed by CRC CARE are under consideration through the nationally-agreed water quality guideline development process.
	0.13 µg/L	220 µg/L	95% species protection - slightly to moderately disturbed systems	
	2 µg/L	632 µg/L	90% species protection - highly disturbed systems	
	31 µg/L	1824 µg/L	80% species protection - highly disturbed systems	

https://www.waterquality.gov.au/sites/default/files/documents/ANZECC-1992-guidelines.pdf

Type of indicator	Indicator	Units	Fresh waters	Marine waters
	Dissolved oxygen[2]	mg/L	> 6 (> 80–90% saturation)	> 6 (> 80–90% saturation)
	Nutrients/nuisance growths	–	(Section 2.3.3)	(Section 2.3.3)
	pH	–	6.5–9.0	< 0.2 pH unit change
	Salinity	mg/L	< 1000 (about 1,500 µS/cm)	–
	Suspended particulate matter/turbidity	–	< 10% change seasonal mean concentration (see also colour & clarity)	< 10% change seasonal mean concentration (see also colour & clarity)
	Temperature[3]	–	< 2°C increase	< 2°C increase
Toxicants				
Inorganic toxicants	Aluminium	µg/L	< 5.0 (if pH < = 6.5)	NR
	Aluminium	µg/L	< 100.0 (if pH > 6.5)	–
	Ammonia	µg/L	20.0–30.0 (Table 2.3)	NR
	Antimony	µg/L	30.0	500.0
	Arsenic	µg/L	50.0	50.0
	Beryllium	µg/L	4.0[4]	NR
	Cadmium	µg/L	0.2–2.0[5]	2.0
	Chromium	µg/L	10.0	50.0
	Copper	µg/L	2.0–5.0[5]	5.0
	Cyanide	µg/L	5.0	5.0
	Iron	µg/L	1,000.0[6]	NR
	Lead	µg/L	1.0–5.0[5]	5.0
	Mercury	µg/L	0.1	0.1
	Nickel	µg/L	15.0–150.0[5]	15.0
	Selenium	µg/L	5.0	70.0
	Silver	µg/L	0.1	1.0
	Sulfide	µg/L	2.0	2.0
	Thallium	µg/L	4.0	20.0
	Tin (tributyltin)	µg/L	0.008	0.002
	Zinc	µg/L	5.0–50.0[6]	50.0
Organic toxicants	Acrylonitrile	µg/L	NR	NR
	Benzidine	µg/L	NR	NR
	Dichlorobenzidine	µg/L	NR	NR
	Diphenylhydrazine	µg/L	NR	NR
Halogenated aliphatic compounds	Hexachlorobutadiene	µg/L	0.1	0.3
	Halogenated ethers	µg/L	NR	NR
	Isophorone	µg/L	NR	NR
Monocyclic aromatic compounds	Benzene	µg/L	300.0	300.0
	Chlorinated benzenes	µg/L	(Table 2.8)	NR

Appendix C. Intensity Frequency Duration – Average Recurrence Interval Indicator
Intensity-Frequency-Duration (bom.gov.au)



Moorebank Logistics Park West Precinct

Basin 8

Autumn Stormwater Network Water Quality Monitoring Data & Reporting April 2025

Site image: retention basin 8 MPW (Apical image April 2025)

Prepared for: MID Plumbing P/L

Prepared by: Daniel Anderson (BEnvSc, MEnvSc)

Romy Brien (BSc NRM)

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ABN: 656 420 10 400

Consulted Documents / database.

Australia and New Zealand Guidelines for fresh and Marine Water Quality (2000)
NATIONAL WATER QUALITY MANAGEMENT STRATEGY - Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000) - Volume 2 - Aquatic ecosystems

Bureau of Meteorology – Australian Government Australia's official weather forecasts & weather radar - Bureau of Meteorology (bom.gov.au)

Moorebank Intermodal Precinct West – Stage 3 (SSD 10431) | Assessment Report March 2021
https://moorebankintermodalprecinct.com.au/wp-content/uploads/2023/04/MPW-S3-DPIE-assessment-report-to-IPC.pdf

WQM Report Western Precinct _Basin 8_Autumn 2024 – Apical Bushfire and Planning - April 2024

WQM Report Western Precinct _Basin 8_Spring 2024 – Apical Bushfire and Planning - October 2024

Development Consent - Section 4.38 of the Environmental Planning and Assessment Act 1979 - Application Number: SSD 7709 Applicant: Sydney Intermodal Terminal Alliance (SIMTA) as Qube Holdings Limited Consent Authority: The Independent Planning Commission Site: Moorebank Avenue, Moorebank Lot 1 DP 1197707 Lot 100 DP 1049508 Lot 101 DP 1049508 Lot 2 DP 1197707 Part Lot 3 DP 1197707 Part Anzac Road and Moorebank Avenue public road reserves Development: Moorebank Precinct West Stage 2 (MPW Stage 2)

Development Consent - Section 4.38 of the Environmental Planning and Assessment Act 1979 - Application Number: SSD 10431 Applicant: Sydney Intermodal Terminal Alliance (SIMTA) as Qube Holdings Limited Consent Authority: The Independent Planning Commission Site: Moorebank Avenue, Moorebank Lot 1 DP 1197707 Lot 100 DP 1049508 Lot 101 DP 1049508 Moorebank Precinct West Stage 3 (MPW Stage 3)

Australian Laboratory Services (ALS) Work Order EW2402561 Certificate of Analysis Water Sample Data 09th April 2025.

Liverpool DCP
Liverpool's Development Control Plans | Liverpool City Council (nsw.gov.au)

DEE 2016. Commonwealth Environmental Management Guidance on Perfluorooctane Sulfonic Acid (PFOS) and Perfluorooctanoic Acid (PFOA). Department of the Environment and Energy.
https://environment.gov.au/system/files/pages/dfb876c5-581e-48b7-868c-242fe69dad68/files/draft-environmental-mgt-guidance-pfos-pfoa.pdf

Development Consent SSD 7709 - Section 4.38 of the Environmental Planning and Assessment Act 1979
https://www.ipcn.nsw.gov.au/resources/pac/media/files/pac/projects/2019/05/moorebank-intermodal-precinct-west-stage-2/referral-from-department-of-planning-and-environment/revised-recommended-conditions/mpw-stage-2-recommended-conditions-inclusive-of-edits-191105.pdf

Glossary

The following definitions apply to terms used in this report. Many of these definitions are consistent with relevant national literature and cited where appropriate.

Current status trigger value
Concentrations of water quality indicators that reflect existing ecosystem condition, and therefore provide a target for ecosystem maintenance and a benchmark against which future water quality trends may be monitored.

Environmental value
Particular values or uses of the environment important for a healthy ecosystem or for public benefit, welfare, safety or health and requiring protection from the effects of pollution or degradation (Environment Australia 2002).

Indicator
A parameter (biological, physical or chemical) used to provide a measure of the quality of water or the condition of an ecosystem (Environment Australia 2002).

Low-risk trigger value
Concentrations (or loads) of key performance indicators [of water quality] at which if not exceeded, there is a low risk that adverse biological effects will occur (ANZECC 2000a).

Median
The middle reading, or 50th percentile, of all readings taken. i.e. of the readings 10, 13, 9, 16 and 11 (re-ordering these to read 9, 10, 11, 13 and 16), the median is 11. The mean (or average), is the sum of all values divided by the total number of readings (which in this case equals 11.8).

Reference condition
Refers to a site which is unmodified or minimally modified from 'natural' condition. Most commonly, reference sites are subject to limited disturbance from human activity. The reference condition then serves as a standard or target against which environmental change in other similar sites can be assessed.

Trigger value
A concentration that, if exceeded, would indicate a potential environmental problem, and so 'trigger' a management response, such as further investigation and/or remedial actions (ANZECC 2000a).

Water quality guideline
A numerical concentration level (e.g. of a contaminant) or narrative statement (e.g. visual appearance of a water body) recommended to support and maintain a designated water use (ANZECC 2000a)

1.1 Background

The Sydney Intermodal Terminal Alliance (SIMTA) received approval for the construction and operation of Stage 3 (the Project) of Moorebank Precinct West (MPW), which comprises the third stage of development within the Moorebank Precinct West under Development Approval SSD-10431.

The proposal is SSD under clause 19 of Schedule 1 of the State Environmental Planning Policy (State and Regional Development) 2011, as it is development for the purpose of rail and related transport facilities.

The MPW site is located on the western side of Moorebank Avenue and forms the western section of the Moorebank Intermodal Precinct (Map image 1 & 2). The MPW site is approximately 2.5 kilometres (km) from the Liverpool city centre, 27 km south-west of the Sydney Central Business District (CBD) and 26 km west of Port Botany.

The MPW site is irregular in shape, approximately 3 km from north to south and 960 m from east to west at its widest point and covers an area of approximately 220 ha. It is situated between the Georges River to the west (with the SSFL running north-south to the west of the river); and Moorebank Avenue to the east.

Works on the MPW site to date have commenced under two current and active development consents:

• MPW Stage 1 early works, which provides demolition, rehabilitation, remediation of contaminated land, and the establishment of construction facilities and access including site security (as part of the SSD 5066 consent)

• MPW Stage 2, which provides for the construction and 24/7 operation of an intermodal facility and associated warehousing (SSD 7709).

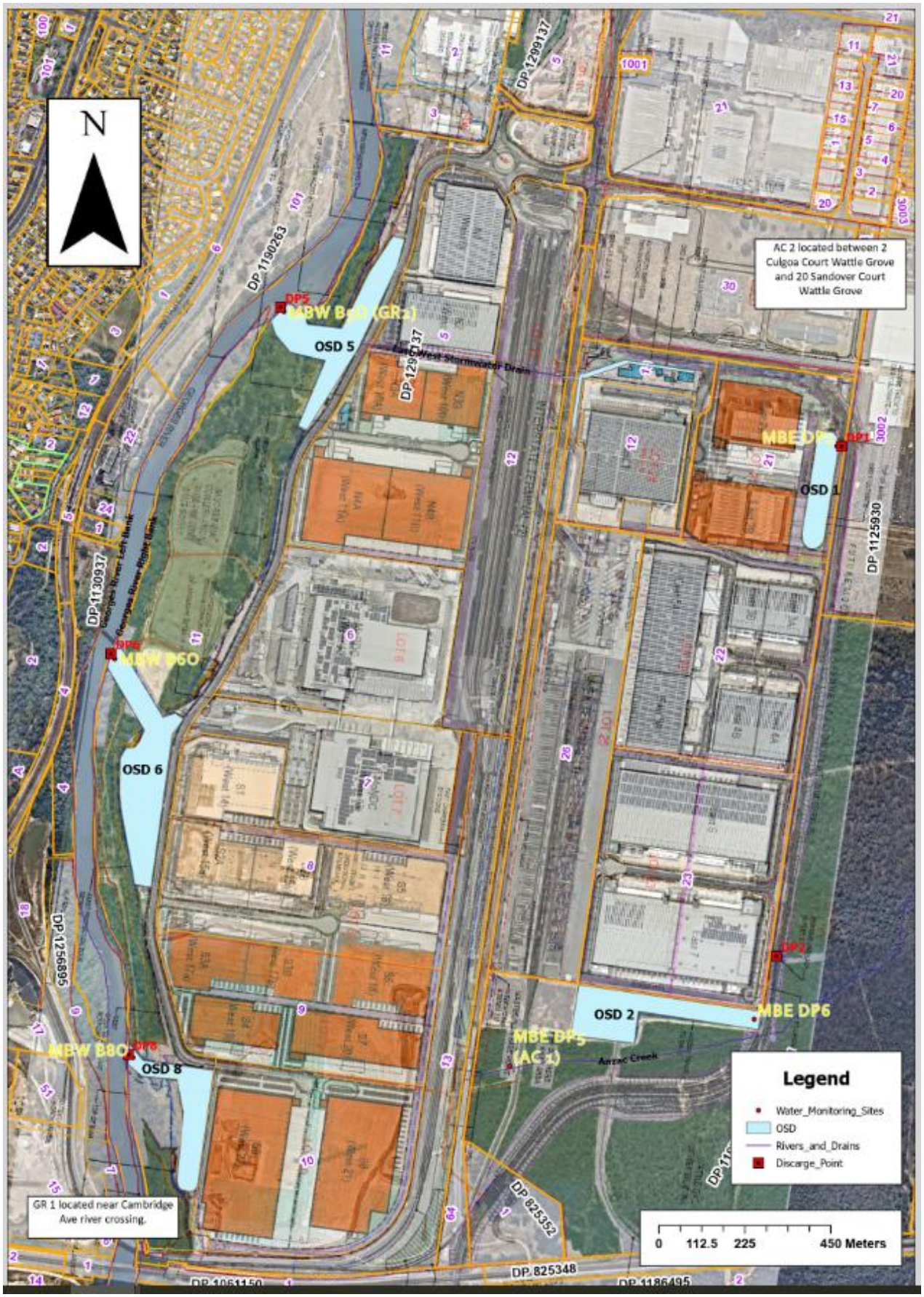
Across the entire precinct there are six onsite detention basins. Bioretention/biofiltration systems also make up the stormwater management infrastructure within the site.

This water quality monitoring program is guided by the Stormwater Infrastructure Operation and Maintenance Plan (SIOPM) and is provided to Qube Holdings Limited (the Applicant) on behalf of MID Plumbing. Three onsite bio-retention basins are present within Moorebank Precinct West. This report is in reference to Basin 8 (MPW – south).

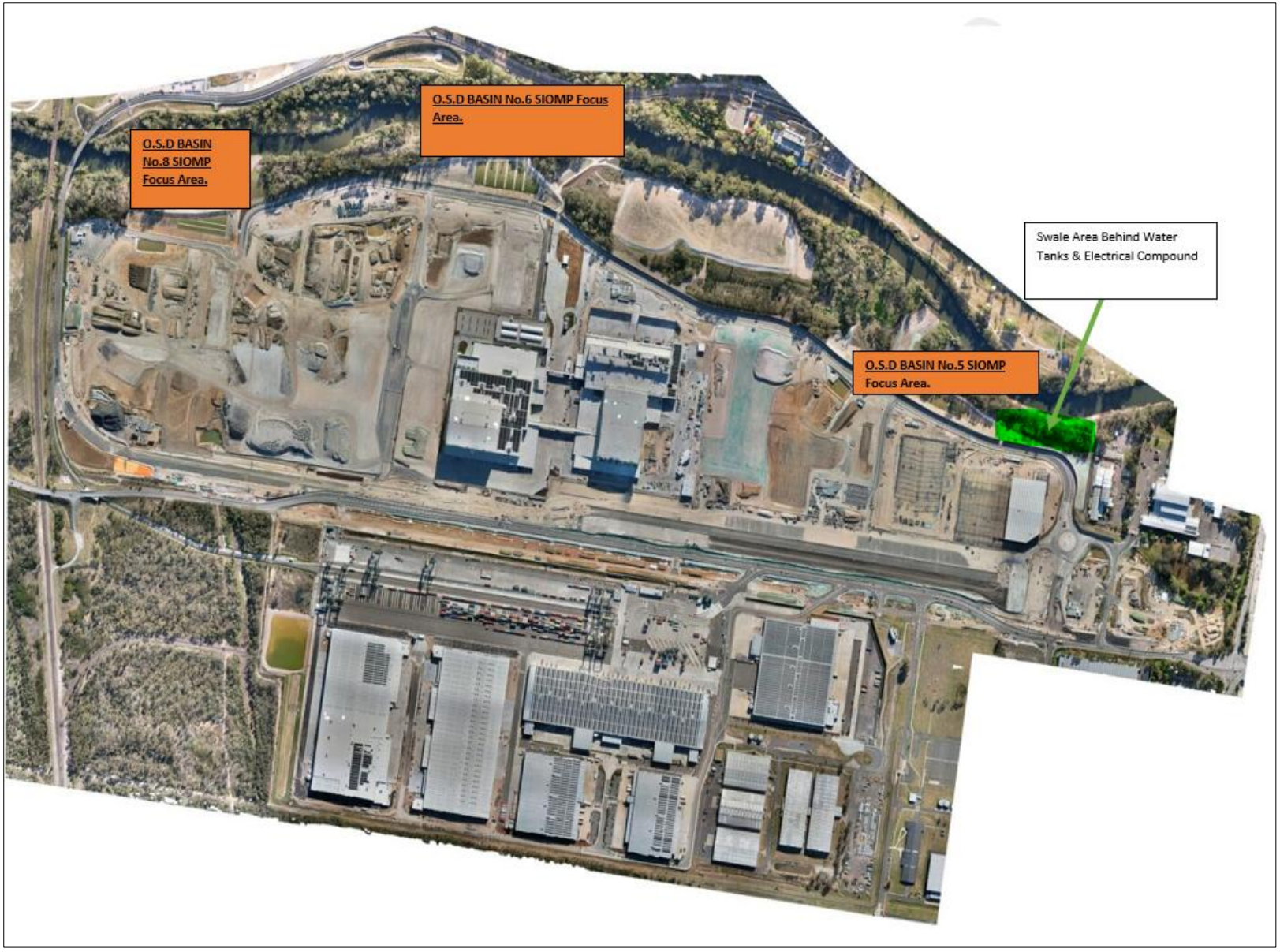
Development Consent - Section 4.38 of the Environmental Planning and Assessment Act 1979 - Application Number: SSD 7709 Moorebank Precinct West Stage 2 (MPW Stage 2)

CoC	Requirement
Stormwater Quality Monitoring	
B38.	Stormwater Quality Monitoring Program - Prior to commencement of operation Part of the Operational Environmental Management Plan

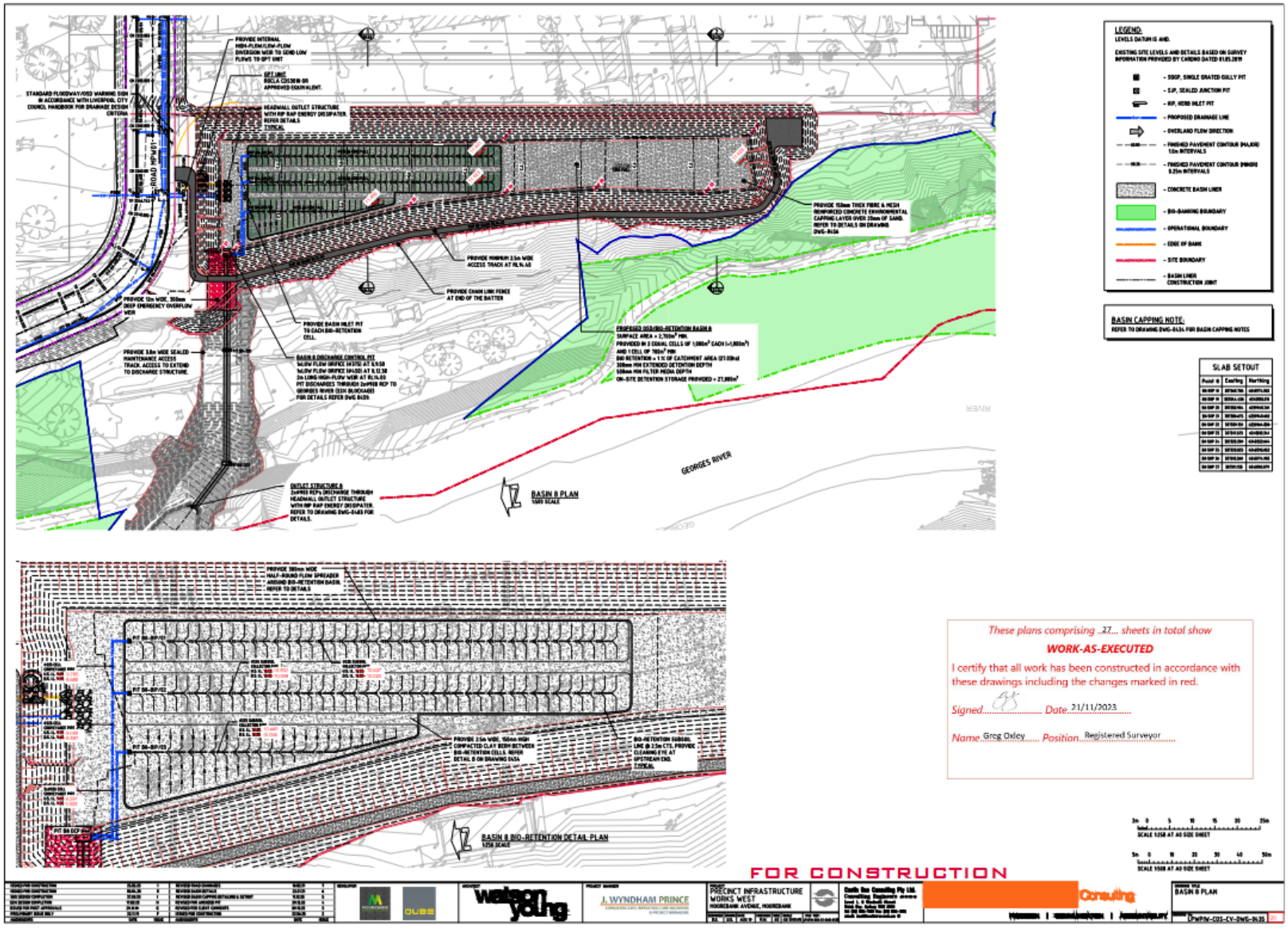
Map image 1. Overview subject site (MPW) provided by Arcadis



Map Image 2. Moorebank Precinct West Detention Basins (provided by MID Plumbing)

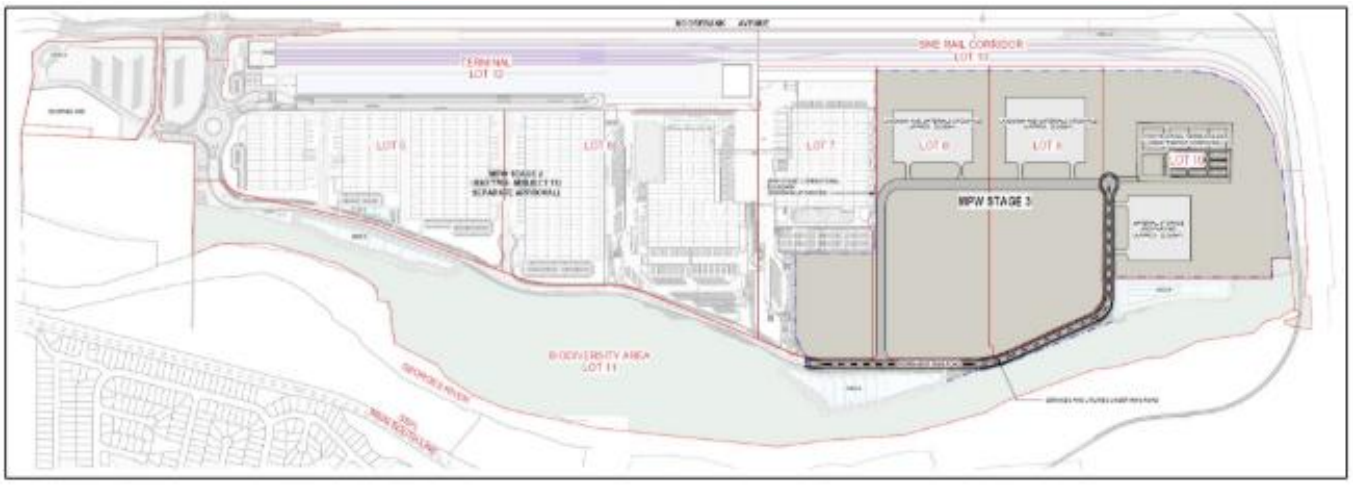


Map image 3. Detention Basin 8 MPW (south)



Reference information

Map image 4. Moorebank Intermodal Precinct West – Stage 3 State Significant Development Assessment (SSD-10431) March 2021



20. Stormwater Management System or Works	That untreated stormwater is not disposed of into the Georges River or its tributaries. The likely impact of stormwater disposal on the quality of any receiving waters. That the levels of nutrients and sediments entering the waterway are not increased by the proposed development. Whether any proposals to manage stormwater are in accordance with the local council's stormwater management plans and the Managing Urban Stormwater series of documents and meet the local council's stormwater management objectives. Whether the principles outlined in the *Managing Urban Stormwater Soils and Construction Handbook* (1998) prepared by and available from Landcom and the Department of Housing are followed during each stage of a development (including subdivision).	Detailed stormwater assessments were undertaken as part of MPW Stage 2, and remain applicable to the Stage 3 proposal. The Department has recommended conditions that would enforce these requirements, by ensuring that appropriate measures are implemented to manage stormwater impacts during construction. In regard to management of stormwater during operation of the MPW site, the MPW Stage 2 proposal incorporates a robust set of conditions to manage the release of stormwater via six onsite detention basins (OSD), a major east-west covered culvert and associated drainage infrastructure.

2. Monitoring Program Methodology

2.1 Monitoring Sites

To support stormwater and drainage management of the facility the MLP West precinct has established a vast stormwater infrastructure system consisting of several Water Sensitive Urban Design (WSUD) functions including raingardens detention basins and bio-swales. These networks are designed to minimise the velocity and peak discharge of stormwater draining from the site and act as onsite detention basins to harvest and sequester potential pollutants generated at the site through designed biological processes.

The stormwater infrastructure system discharges water into the natural drainage system via three outlets:

- Basin 5 detains water from the northern section of MPW before discharging into Georges River
- Basin 6 detains water from the mid-section of MPW before discharging into Georges River
- Basin 8 detains water from the southern section of MPW before discharging into Georges River

Monitoring of the discharge points has been established via our ongoing program with MID Plumbing under the SIOMP program to collect qualitative data and analyse the performance of the WSUD provisions and to establish any potential trends in water quality readings from the stormwater network discharge points prior to release of water into the natural hydrological systems of Anzac Creek and the Georges River.

Table 1. Type of outlet MPW

Discharge Point (see figure 2)	Associated Outlet (see figure 1)	Type of outlet/detention basin
Basin 5	Inlet	Bio retention
	Outlet	Outlet point
	Georges River	River
Basin 6	Inlet	Bio retention
	Outlet	Outlet point
Basin 8	Inlet	Bio retention
	Outlet	Outlet structure

2.2 Water Quality Assessment

Surface water quality data collected at the discharge points is assessed with reference to ANZECC Guidelines (2000) and correlated with baseline Water Quality monitoring results provided by previous condition assessment reports.

By comparing water test data under the program across the testing timeline we can identify and report upon trends, identify exceedances and exclude potential anomalies for datasets.

Table 2. ANZECC Low Risk Trigger Values

Ecosystem type	Turbidity NTU	EC µS/cm	pH*	DO	TN mg/L	NO_x - N mg/L	NH_4^+ - N mg/L	TP mg/L	DRP - P mg/L
Upland river	2-25	30-350	6.5-7.5	90-110	0.480	0.190	0.013	0.013	0.005
Lowland river	6-50	125-2200	6.5-8.0	85-110	0.500	0.190	0.020	0.050	0.020

Values for Low Land River Systems as insert above are used as the reference guide to water quality parameter values and overall health and safety statements regarding the quality of discharged water from the SIOMP drainage network.

Annual spring and autumn water quality data presented from Anzac Creek and Georges River testing programs by other scientific consultants may also be cross referenced to the data prepared by Apical under the SIOMP program to establish potential trends in results and identify increases in accumulated pollutants from the site under operational condition, which may appear present within adjacent natural waterways.

Site data was collected in the form of water samples and in field data recordings at the prescribed monitoring points, water samples and water probe readings are undertaken following Australia and New Zealand guidelines for fresh and marine water quality – 2000 (ANZECC Guidelines), In situ water quality parameters relevant to stream health and aquatic assessment profiling were collected in field with a multiparameter hand-held water quality monitoring probe (Aquatroll 600).

Water data is collected, analysed and collated under the same methodologies and process under each testing period, the ensure consistency in the process.

Measures tested and samples taken:

- pH
- Dissolved Oxygen
- Electrical Conductivity
- Water Temperature and
- Turbidity

Water samples are collected at inlet and discharge points (Basin 5, Basin 6 & Basin 8) then sent to Australian Laboratory Services (ALS) for quality testing analysis Surface water (alsglobal.com).

Water analytical suites / testing parameters are provided to obtain overall water condition results and chemical sampling of collected water is undertaken for a range of nutrients, metals, and hydrocarbons relevant to stream health and aquatic assessment protocol, key nutrients, metals, and pollutants included in the assessment to reflect an overall suite of water quality condition guides which are listed below:

- Total phosphorous
- Total Nitrogen
- Kjeldahl Nitrogen
- Dissolved Metals
- PFAS
- Total Suspended Solids
- Total Hydrocarbons

The raw data results from the lab analysis provided to us by ALS Laboratory Services are presented within this report (see Appendix A).

Key water quality data attributes are recorded, tables and compared against; previous condition baseline data, Liverpool Development Control Plan (DCP) water quality targets, Conditions of Consent B40 and ANZECC Guideline (2000) trigger limits under the condition category -(90% protection criteria for freshwater natural systems).

The water quality guidelines are applied to ensure adjacent natural waterways George River and Anzac creek are not adversely affected by poor water quality discharge from the Moorebank logistics park site and operations.

Trends observed in our datasets are analysed on a temporal scale with any trigger values for specific water quality measures highlighted and presented within the results chapter of each seasonal report. This report provides baseline data and Spring 2025 data for Basin 8 (MPW) from which trend analysis will compound over future reporting periods.

2.3 Data Analysis

The water quality measurements collected are used to assess water quality at each site in terms of health of aquatic ecosystems by comparison with guideline values recommended by the ANZECC and ARMCANZ (2000) guidelines for the protection of lowland streams (i.e. systems at < 150 m altitude) in south-east Australia. This categorisation for stream health is deemed relevant for the description of Anzac Creek, the recipient natural way due to the location in the geomorphic landscape and correlations of expected biophysical health and habitat profiles for similar stream environments.

2.4 Survey dates and personnel

On the 9th April 2025, ecologists from Apical Bushfire and Planning attended Moorebank Precinct West (MPW) to collect water quality data across the testing sites which are located within selected inlet points and discharge points within the stormwater drainage and management system (SIOMP) located within the Moorebank Logistics Park site West (See map image 2).

Inlet and outlet points within the network are representative of variant sites where stormwater will enter a node of the system (as a point source) and then release from the that node of the system at a discharge point. By recording inlet and discharge data water quality can be tracked along the continuum within the system to determine condition changes and overall trends in measured quality at given sites.

This data was collected on behalf of MID plumbing in accordance with 'The Stormwater Infrastructure Operation and Maintenance Plan Moorebank Logistics Park – West Precinct 2020' and in compliance with Condition of Consent B40 (Liverpool City) for the subject site. The results of such monitoring data collection are presented within this report.

2.5 Rainfall

Between the 1st of March and the 31st of March 2025 Moorebank received 90.2mm of rainfall (http://www.bom.gov.au/climate/dwo/202409/html/IDCJDW2161.202409.shtml). Between the 1st of April and the 15h of April 2025 Moorebank received 3.4mm of rainfall.

Figure 1. Bureau of Meteorology Daily Weather Observation Holsworthy March 2025

		Temps		Rain	Evap	Sun	Max wind gust			9 am						3 pm					
Date	Day	Min	Max				Dir	Spd	Time	Temp	RH	Cld	Dir	Spd	MSLP	Temp	RH	Cld	Dir	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	8th		km/h	hPa	°C	%	8th		km/h	hPa
1	Sa	18.7	32.0	0			S	28	23:13	22.9	78		WSW	13	1016.7	31.2	53		ENE	15	1012.3
2	Su	19.8	25.7	0			S	52	16:16	23.5	85	8	SSE	19	1013.7	24.8	75	8	SE	30	1013.1
3	Mo	19.2	25.6	0			S	37	08:09	22.2	71	3	S	22	1018.7	24.3	63	8	S	22	1017.6
4	Tu	18.5	26.0	6.8			S	46	15:00	21.0	94	8	SE	9	1021.3	24.2	70	8	SSE	26	1021.6
5	We	18.5	26.7	3.2			SE	35	15:06	22.3	74		SSE	15	1021.8	25.3	55	6	SE	22	1019.5
6	Th	16.9	26.9	0			SSE	43	15:50	21.9	81	8	SSE	15	1020.4	25.4	62	7	SE	22	1019.9
7	Fr	17.9	26.5	2.4			ESE	44	12:59	19.9	92	8	SSE	15	1021.6	25.6	55	5	ESE	24	1020.5
8	Sa	17.4	24.5	2.6			SE	33	12:14	21.1	87	7	SSE	17	1022.8	23.2	70	8	ENE	15	1022.5
9	Su	19.8	28.5	1.4						21.8	94	8		Calm	1023.7	27.0	55	2	ENE	19	1020.7
10	Mo	18.5	27.1				NNE	24	13:12	22.9	79	8	NNE	7	1020.8	26.1	60	8	NNE	13	1018.6
11	Tu	19.4	22.3	9.0			SE	30	06:14	20.2	97	7	SSE	15	1020.5	21.4	93	8	ESE	17	1020.6
12	We	18.6	27.0	8.0			SE	22	13:50	20.4	94	6	W	9	1022.8	26.8	63	8	ENE	7	1019.8
13	Th	17.0	31.7	0			N	24	10:29	19.8	97	7	W	7	1020.1	30.5	48		NNW	9	1016.8
14	Fr	17.8	35.8	0			SSE	30	22:56	23.1	90			Calm	1019.5	34.3	36		NE	9	1016.3
15	Sa	22.0	34.7	0			SE	30	23:09	23.6	85	8	W	7	1019.9	34.5	45		NE	11	1014.5
16	Su	21.0	37.0	0			W	39	12:21	25.6	67		W	6	1011.6	36.4	26		WNW	20	1006.7
17	Mo	15.5	21.5	0			SSE	61	01:54	18.0	51		SSW	20	1018.9	20.5	39		SE	28	1020.8
18	Tu	10.9	24.4	0			E	28	10:42	16.0	71			Calm	1024.5	23.1	51	8	ESE	17	1022.4
19	We	15.6	28.6	0			E	31	14:05	19.3	80	1		Calm	1023.3	27.3	54		ESE	20	1019.0
20	Th	18.2	32.5	0			ENE	31	17:41	22.1	81	1		Calm	1020.3	31.3	47		E	17	1015.6
21	Fr	17.9	27.5	0			SSE	31	18:36	20.1	90	8	W	7	1014.5	25.9	68	3	N	13	1012.5
22	Sa	18.9	26.7	1.4			SE	31	16:27	19.8	87	7	W	6	1017.6	25.1	63	8	SE	17	1015.9
23	Su	19.7	22.1	4.0			S	26	12:46	20.4	92	8	S	13	1021.1	21.0	88	8	S	15	1019.8
24	Mo	18.8	25.8	3.6						20.3	97	8	S	2	1020.3	24.2	71	7	ESE	9	1018.9
25	Tu	19.6	26.2				SSE	31	12:01	22.6	82	4	S	13	1023.1	23.4	82	8	SSW	11	1021.2
26	We	18.4	27.5	1.0			E	33	16:13	19.8	97	1		Calm	1022.6	26.8	54		E	17	1020.5
27	Th	15.6	25.7	0			S	28	10:22	18.4	94	1		Calm	1023.4	24.6	74	8	SE	17	1022.1
28	Fr	16.7	24.2	1.4			E	30	13:28	19.9	96	8		Calm	1022.6	23.8	74	8	E	15	1019.7
29	Sa	18.0	22.0	19.0			SW	37	21:32	18.6	96	7	SSW	7	1012.6	20.0	95	7	WSW	11	1007.3
30	Su	18.4	24.2	11.8			S	50	14:42	19.4	91	8	WSW	13	1008.1	22.1	79	8	SSW	31	1008.1
31	Mo	17.4	24.3	14.6			SW	54	13:19	19.5	79	6	SW	17	1011.7	22.6	64	8	SSW	26	1011.7
Statistics for March 2025																					
Mean		18.1	27.1							20.9	85	6		8	1019.4	25.9	62	7		17	1017.3
Lowest		10.9	21.5	0						16.0	51	1		Calm	1008.1	20.0	26	2	ENE	7	1006.7
Highest		22.0	37.0	19.0			SSE	61		25.6	97	8	S	22	1024.5	36.4	95	8	SSW	31	1022.5
Total				90.2																	

IDCJDW2161.202503 Prepared at 13:00 UTC on Monday 14 April 2025

Figure 2. Bureau of Meteorology Daily Weather Observation Holsworthy April 2025

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9 am						3 pm					
		Min	Max				Dir	Spd	Time	Temp	RH	Cld	Dir	Spd	MSLP	Temp	RH	Cld	Dir	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	8th		km/h	hPa	°C	%	8th		km/h	hPa
1	Tu	15.6	23.2	0			S	37	10:56	19.2	73	5	WSW	9	1015.2	22.1	55	5	SSW	20	1013.3
2	We	13.0	24.6	0			E	28	16:07	14.3	82	7	WSW	9	1012.4	23.9	41		NE	11	1007.8
3	Th	10.1	26.7	0			WNW	39	11:44	14.1	94		Calm		1011.3	25.9	26		SW	9	1009.7
4	Fr	12.3	25.3	0			SE	31	15:50	16.9	86		WSW	7	1016.4	24.6	58	3	SE	15	1014.4
5	Sa	14.3	26.2	0			SE	39	16:24	18.5	47		WNW	9	1015.0	25.0	31		SE	19	1013.9
6	Su	9.2	25.3	0			W	26	11:47	17.1	75		NW	9	1018.8	23.6	31	8	S	6	1013.9
7	Mo	11.5	26.9	0			WSW	43	12:01	19.8	50		NW	11	1018.1	26.7	27		W	11	1015.9
8	Tu	12.3	22.2	0			SE	28	15:34	18.0	71	7	W	9	1025.2	21.4	60	8	SE	19	1023.1
9	We	15.5	24.0	1.2			E	28	13:17	19.7	80	5	ENE	7	1025.7	22.1	69	1	ENE	19	1021.4
10	Th	12.4	24.2	0			NNE	17	14:07	17.7	89	8	Calm		1023.2	23.7	59	8	ENE	7	1020.0
11	Fr	12.4	30.1	0			SE	37	14:37	20.0	76		WNW	9	1023.9	26.7	48	2	SE	20	1022.8
12	Sa	15.1	26.4	0			SSE	28	13:10	21.7	74		WNW	6	1030.8	24.9	64	1	E	17	1028.9
13	Su	13.2	26.8	0			ENE	28	16:05	20.5	85		W	7	1030.2	25.5	51		ENE	17	1025.9
14	Mo	12.4	28.8	0			S	57	14:47	18.8	86		WSW	9	1025.6	24.4	61		S	26	1023.6
15	Tu	16.2		2.2						19.4	75	8	SSW	15	1027.7	19.3	72	8	SSE	19	1025.5
Statistics for the first 15 days of April 2025																					
Mean		13.0	25.8							18.4	76	6		7	1021.3	24.0	50	4		15	1018.7
Lowest		9.2	22.2	0						14.1	47	5	Calm		1011.3	19.3	26	1	S	6	1007.8
Highest		16.2	30.1	2.2			S	57		21.7	94	8	SSW	15	1030.8	26.7	72	8	S	26	1028.9
Total				3.4																	

IDCJDW2161.202504 Prepared at 05:36 UTC on Tuesday 15 April 2025

3. Results

Data results captured by our water quality sampling are presented herein and are representative of baseline & Spring (2024) water quality results for Moorebank Precinct West Basin 8. Threshold guideline quantitative values for the water quality parameter themes are compared and correlated to ANZECC/ARMCANZ (2000) guidelines under the categorisation thresholds – Waterway benchmark group: 'The protection of slightly disturbed lowland river ecosystems in southeast Australia'.

As these are the first samples results collected under our scope for the SIOMP-MPW sites, the sampling results presented in this report will be considered for future analysis against subsequent results for use as baseline data for the drainage network SIOMP function.

Triggers Exceedances from both the In-Situ Data and the Laboratory Samples April 2025

Location Basin 8 Outflow

Phosphorous 40 µg/L (Guideline trigger 25 µg/L)

Nitrogen 400 µg/L (Guideline trigger 350)

Literature Review

Phosphorous Values

Phosphorus

Stormwater runoff is a major cause of physical, chemical (i.e. nutrients), and microbial degradation of receiving waters. Nitrogen (N) and phosphorus (P) are of particular concern and interest in urban stormwater runoff due to their role in eutrophication of water bodies, onset of harmful algal blooms, and fish kills. refer (Yun-Ya Yang & Gurpal S. Toor)

The linkages between urbanization and increased N and P export is well established; however, the contributions and dynamics of N and P are often site-specific, the synchronicity between N and P in aquatic environment has been widely used as an ecological indicator of biological growth and nutrient limitation.

Understanding P dynamics in stormwater runoff can help to implement and enhance the effectiveness of strategies to control P loss and transport to receiving waters.

P values from this testing period were slightly raised above the ANZECC guidelines, however are considered reasonable for the testing environment and sample pool.

Nitrogen Values

Nitrogen

A previous spike in Nitrogen has decreased to almost meet the ANZECC trigger value for rivers flowing to the coast at this collection point. This may be due to increased vegetation within the system allowing for uptake of excess nitrogen being mobilised by the stormwater.

Nitrogen values are above the guideline rates, however this is a reduction in concentration when compared to the samples of October 2024, which provides an improvement in nitrogen concentration.

Five (5) Industrial Applications of Nitrogen

While the main industrial use of nitrogen is to create ammonia that is required for fertilizer, explosives, and other materials, it uses go far beyond these applications. From food packaging to pharmaceuticals, nitrogen gas can be found in more places and used for more purposes than you may have realized.

Food Packaging: It is common practice for food processing companies to use compressed nitrogen to displace oxygen in the packaging of perishable foods. Without oxygen, the shelf life of foods such as meats, fruits, vegetables, and various snack foods can be extended. Nitrogen can also add a cushion around food to keep it safe during transport.

Chemical Blanketing: Nitrogen is typically used to prevent fires and explosions in dangerous atmospheres like chemical plants or manufacturing facilities, by lowering the oxygen level below explosive limits.

Electronics: In the process of assembling electronics, nitrogen gas is used when two electronic components are forming a permanent connection, also known as soldering. The gas is used to reduce surface tension so there is a cleaner break away from the site of the electrical bond. Nitrogen gas is also used in a computer's main processing system to prevent it from overheating.

Laboratory: Laboratories require a very specific environment to ensure that tests and results are carried out accurately. Nitrogen gas is used to control oxygen levels, humidity and temperature, and maintain an appropriate atmosphere for highly sensitive procedures and equipment. Additionally, there are various pieces of laboratory equipment that require nitrogen for purging.

Laser Cutting: The application of nitrogen as a purging gas in the steel industry is extremely important. It is used as an assist gas to blow away molten material and achieve a stronger stainless or aluminized steel product that is also more resistant to corrosion.

https://nigen.com/industries-that-benefit-from-on-site-nitrogen-systems/

Industries That Benefit from On-Site Nitrogen Systems

Gaseous nitrogen is very useful in large-scale manufacturing and industrial applications. The large volumes of nitrogen gas required for these operations are either sourced from vendors in gas cylinders or generated on-site. In this article, we will highlight critical industrial processes that benefit from on-site nitrogen systems.

3.2 Interpreting Results

Dissolved Oxygen – Measures:

Dissolved oxygen (DO) is oxygen held (dissolved) in the water and available to aquatic organisms.

The amount of dissolved oxygen in a river or stream can tell us a lot about its water quality.

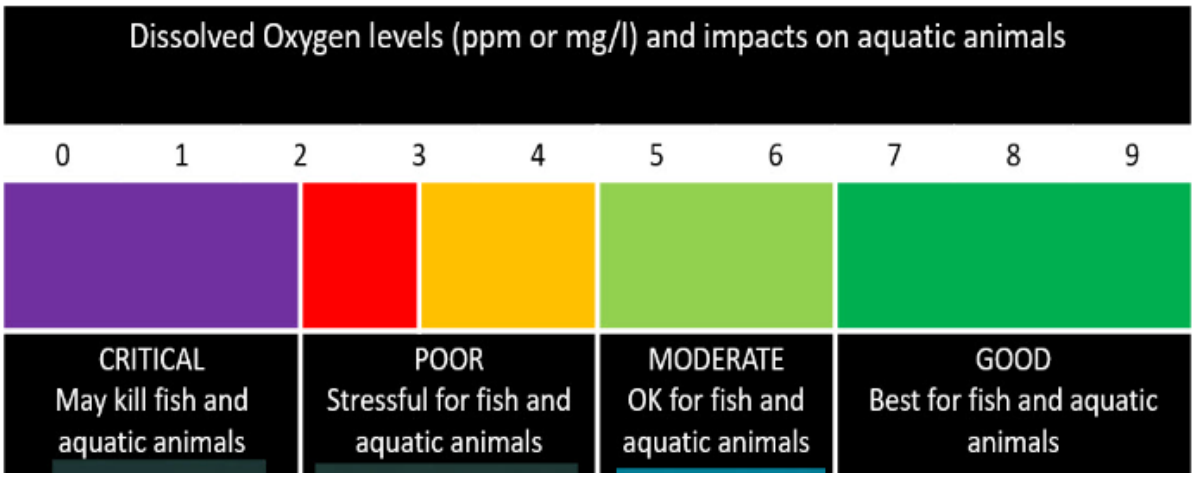
Water will naturally contain a certain amount of dissolved oxygen that is absorbed from the air and produced by plants and algae living in the water.

Temperature has a large effect on the amount of oxygen dissolved in water; cold water can hold higher levels of oxygen than warmer water. Higher water temperatures over summer will cause oxygen levels to drop.

Other factors such as river flow, wind, nutrients and bacterial activity can also affect the amount of dissolved oxygen in waterways.

Dissolved oxygen levels typically range between 5 and 14 mg/L (or ppm).

Example:



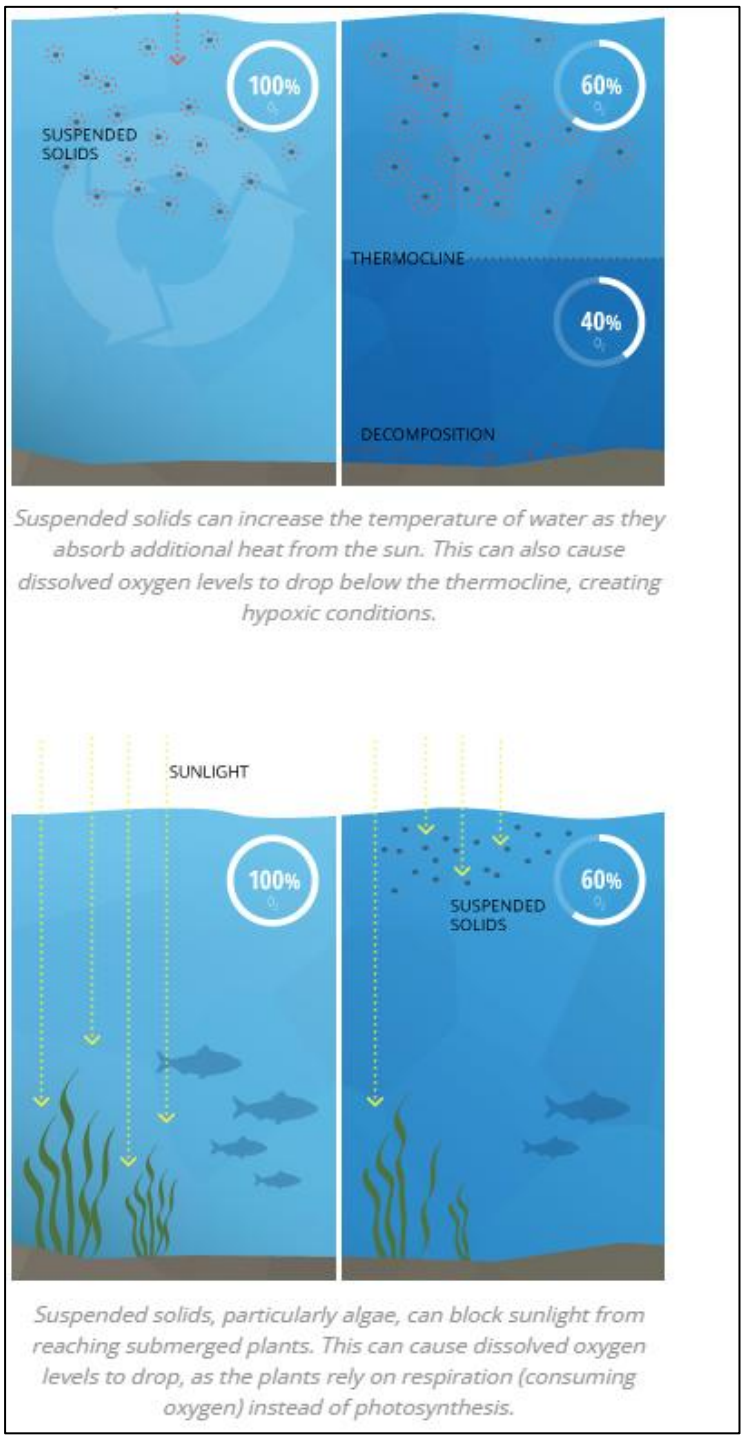
Salinity – Measures:

Electrical conductivity is a measure of the saltiness of the water and is measured on a scale from 0 to 50,000 uS/cm. Electrical conductivity is measured in microsiemens per centimeter (uS/cm). Freshwater is usually between 0 and 1,500 uS/cm and typical sea water has a conductivity value of about 50,000 uS/cm.
Examples:

µS/cm	Use
0 - 800	• Good drinking water for humans (provided there is no organic pollution and not too much suspended clay material) • Generally good for irrigation, though above 300µS/cm some care must be, particularly with overhead sprinklers, which may cause leaf, scorch on some salt sensitive plants. • Suitable for all livestock
800 - 2500	• Can be consumed by humans, although most would prefer water in the lower half of this range if available • When used for irrigation, requires special management including suitable soils, good drainage and consideration of salt tolerance of plants • Suitable for all livestock
2500 -10,000	• Not recommended for human consumption, although water up to 3000 µS/cm can be consumed • Not normally suitable for irrigation, although water up to 6000 µS/cm can be used on very salt tolerant crops with very special management techniques. Over 6000 µS/cm, occasional emergency may be possible with care • When used for drinking water by poultry and pigs, the salinity should be limited to about 6000 µS/cm. Most other livestock can use water up to 10000 µS/cm

Total Dissolve Solids (TDS) – Measures

Dissolved solids, smaller than 2 microns, refer to any minerals, salts, metals, in the form of molecules, atoms, cations or anions dissolved in water. Total dissolved solids (TDS) comprise inorganic salts (principally calcium, magnesium, potassium, sodium, bicarbonates, chlorides and sulfates) and some small amounts of organic matter that dissolve in water.
The TDS concentration is the sum of all filterable substances in water that can be determined gravimetrically. However, in most cases, TDS is primarily comprised of ions.
High levels of total suspended solids can affect turbidity, increase water temperatures and decrease dissolved oxygen (DO) levels. This can cause the water to heat up more rapidly because the suspended particles absorb more heat and deplete oxygen, which can adversely affect aquatic life.

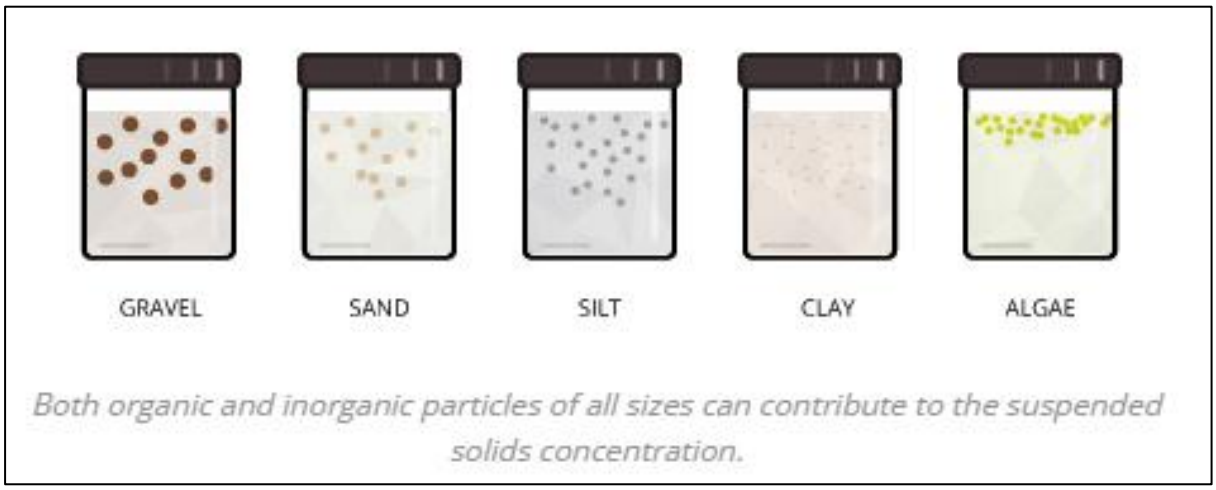


Suspended solids can increase the temperature of water as they absorb additional heat from the sun. This can also cause dissolved oxygen levels to drop below the thermocline, creating hypoxic conditions.

Suspended solids, particularly algae, can block sunlight from reaching submerged plants. This can cause dissolved oxygen levels to drop, as the plants rely on respiration (consuming oxygen) instead of photosynthesis.

Turbidity – Total Suspended Solids (TSS)

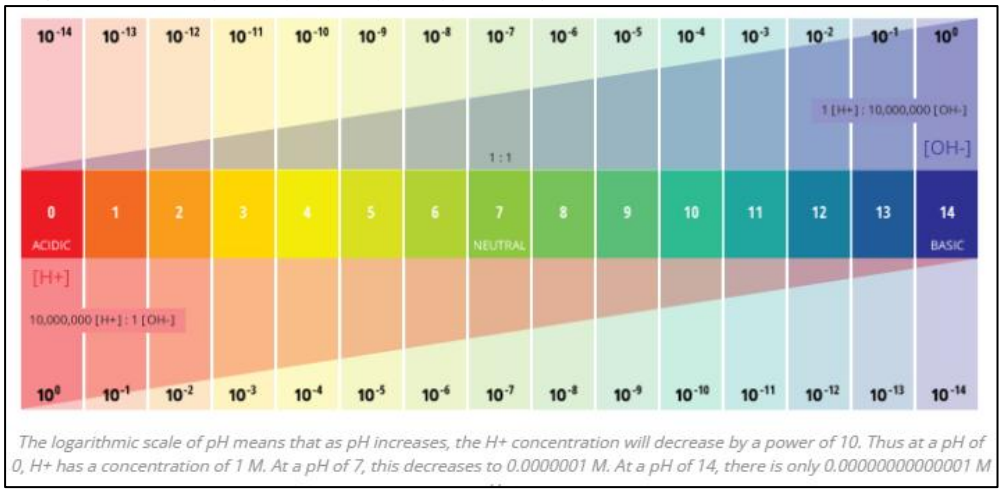
Turbidity data are reported in Nephelometric Turbidity Units (NTU). To provide a sense of scale, water with a turbidity of 1 NTU is crystal clear, water at 5 NTU has a tiny trace of discolouration, and water at 100 NTU is brown and opaque. The standard is less than 10 NTU for rural streams and rivers and less than 30 NTU for urban lakes and ponds.
Total suspended solids (TSS) are particles that are larger than 2 microns found in the water column. Anything smaller than 2 microns (average filter size) is considered a dissolved solid. Most suspended solids are made up of inorganic materials, though bacteria and algae can also contribute to the total solids concentration.



Both organic and inorganic particles of all sizes can contribute to the suspended solids concentration.

pH – Acidity / Alkalinity – Measures

The pH refers to the degree of acidity or alkalinity of a substance. A pH of 7 is neutral. A value above 7 indicates that the water is more alkaline and a pH below 7 indicates acidic conditions.
A pH of 7 is considered neutral. The logarithmic scale means that each number below 7 is 10 times more acidic than the previous number when counting down. Likewise, when counting up above 7, each number is 10 times more basic than the previous number pH stands for the "power of hydrogen" [3]. The numerical value of pH is determined by the molar concentration of hydrogen ions (H+) [3]. This is done by taking the negative logarithm of the H+ concentration (-log(H+)).
Standard values for pH readings are expected, pH 6.5–9 for rural streams and rivers and pH 6–9 for urban lakes and ponds.
In freshwater systems pH sets up the conditions for how easy it is for nutrients to be available and how easily things like heavy metals (toxicity for aquatic life) can dissolve in the water. Rivers and lakes generally range between 5 (acidic) and 9 (basic) on the pH scale.



The logarithmic scale of pH means that as pH increases, the H+ concentration will decrease by a power of 10. Thus at a pH of 0, H+ has a concentration of 1 M. At a pH of 7, this decreases to 0.0000001 M. At a pH of 14, there is only 0.00000000000001 M

Summary of Results

Aquatic ecosystems	
Indicator	**Numerical criteria (trigger values)**
Total phosphorus 40 µg/L	Upland rivers: 20 µg/L Lowland rivers: 25 µg/L for rivers flowing to the coast; Lakes & reservoirs: 10 µg/L Estuaries: 30 µg/L
Total nitrogen 400 µg/L	Upland rivers: 250 µg/L Lowland rivers: 350 µg/L for rivers flowing to the coast; Lakes & reservoirs: 350 µg/L Estuaries: 300µg/L
Chlorophyll-a	Upland rivers: not applicable Lowland rivers: 5 µg/L Lakes & reservoirs: 5 µg/L. Estuaries: 4 µg/L.
Turbidity 28.72 NTU	Upland rivers: 2–25 NTU (see supporting information) Lowland rivers: 6–50 NTU (see supporting information) Lakes & reservoirs: 1–20 NTU Estuaries: 0.5–10 NTU
Salinity (electrical conductivity) 282.3 µS/cm	Upland rivers: 30–350 µS/cm Lowland rivers: 125–2200 µS/cm supporting information
Dissolved oxygen 9.09 ppm	Upland rivers: 90–110% Lowland rivers: 85–110% Freshwater lakes & reservoirs: 90–110% Estuaries: 80–110% Note: Dissolved oxygen values were derived from daytime measurements. Dissolved oxygen concentrations may vary diurnally and with depth. Monitoring programs should assess this potential variability.
pH 8.12	Upland rivers: 6.5–8.0 Lowland rivers: 6.5–8.5 Freshwater lakes & reservoirs: 6.5–8.0 Estuaries: 7.0–8.5 Changes of more than 0.5 pH units from the natural seasonal maximum or minimum should be investigated.

3.1 Key Summary of Results Autumn 2025

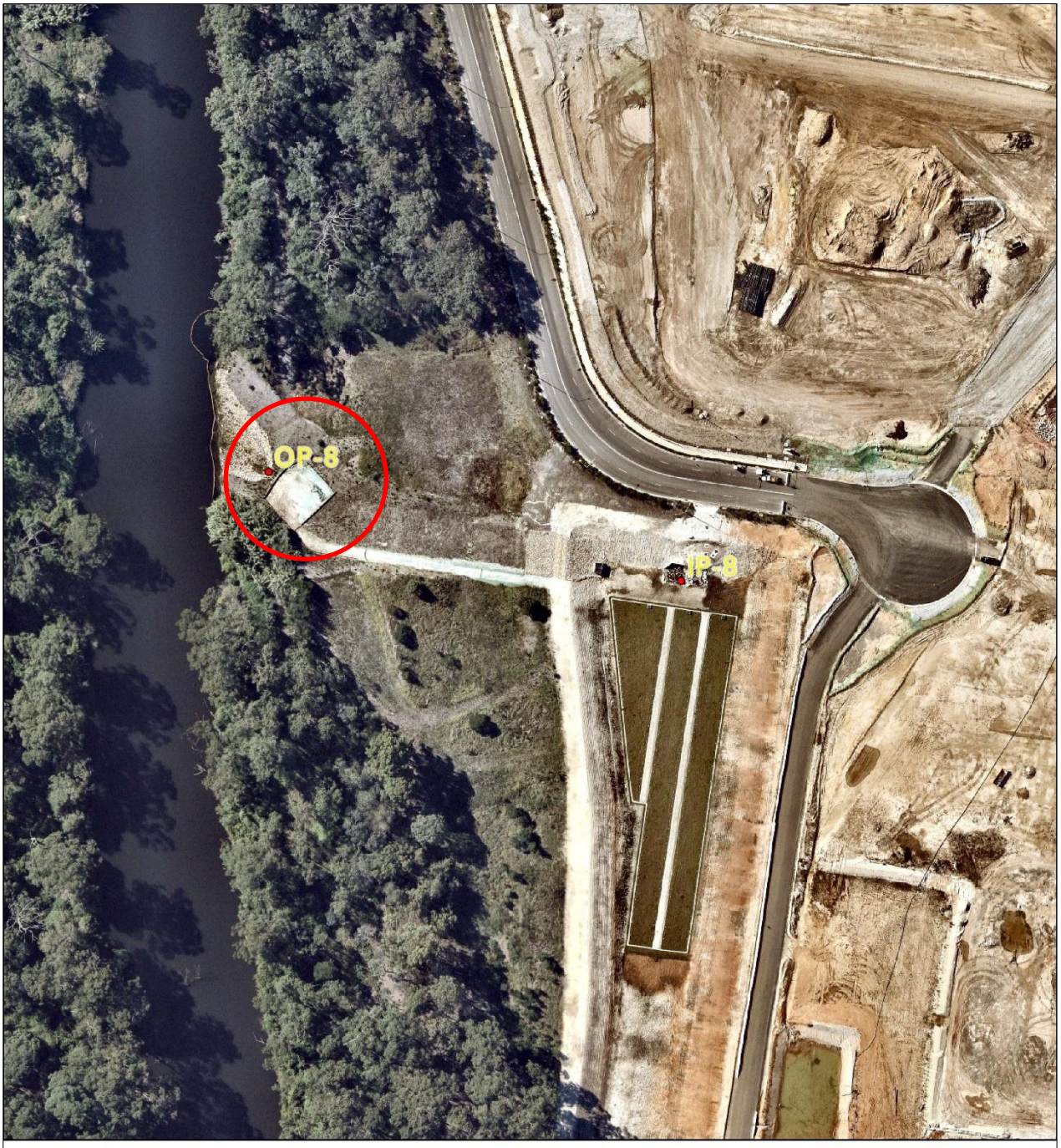
Both Nitrogen and phosphorous trigger the Anzecc guideline within the water samples from basin 8. These values are showing improvement from previous testing periods. This may be due to increased vegetation within the bio-swale.

pH has increase significantly at basin 8 (6.44 to 8.12). The pH values sit within a reasonable range for lowland rivers, however this value will continue to be monitored during future testing periods.

3.2 Recommendations

Nitrogen, phosphorous and pH will continue to be monitored across future testing periods.

Map Image 5. Stormwater Testing Site – Moorebank Logistics Park



Sample Site Map

0 30 60 120 Meters

Client: M.I.D Plumbing	Map Issue: Basin 8 Sample Site Map
Address: BUSHMASTER AVENUE MOOREBANK2170	Time: 10/07/2024 2:25 PM

LGA: LIVERPOOL CITY COUNCIL	Scale: 1:2,000
Lot/DP: 5 to 14/DP 1299137	Spatial Reference: WGS 1984 Web Mercator Auxiliary Sphere
Units: Meters	

Marco Perry
Environmental/Bushfire Planner
Bsc EnvSc

Marco@apical-bushfire.com.au

STORMWATER DISCHARGE TESTING SITE

BASIN 8 – OUTFLOW

Site image 1. Testing site Basin 8 - Outflow

Table 3. In-situ data and observations Retention Basin 8 outflow

Moorebank West Precinct - Retention Basin 8 Outflow (MPW 5 outflow)			
Date: 09/04/2025	**Time:** 01:13pm	**Temp:** 21°C	**Humidity**: 80%
Operator: Marco Perry		**Coordinates:** -33.947085, 150.917653	
Equipment used: Aquatroll 500			
Parameter	**Recording**	**ANZECC** ANZECC 2000 Guidelines *Lowland rivers	**Triggered?** Y/N
Temperature (Celcius)	21.5	Abnormal to seasonal variation	N
Dissolved Oxygen (DO ppm)	9.09ppm	*Lowland rivers Lower limit: 85% Upper Limit: 110%	N
Electrical Conductivity ($C^{-um/cm}$)	282.3 ($C^{-us/cm}$)	125–2200 µS/cm	N
pH	8.12	Min 6.5 Max 8.5	N
NTU	28.72 NTU	6-50	N

(a) Total phosphorus

Basin 8. - Total phosphorous – Qube Logistics, Moorebank, NSW		Trigger Trigger Value - ANZECC 2000 Guidelines	Triggered
Lab results - Total phosphorous:	40 µg/L	25 µg/L - 50 µg/L	N
Notes: • Channel Culvert • Trigger value 50 µg/L for lowland rivers, trigger value 25 µg/L for rivers flowing to the coast Anzecc Guidelines 2000.			

(b) Total Nitrogen as N (TKN + NOx) by Discrete Analyser

Basin 8.1 inflow - Total nitrogen – Qube Logistics, Moorebank, NSW		Trigger Value - ANZECC 2000 Guidelines	Triggered
Lab results -Total nitrogen:	400 µg/L	350 µg/L for rivers flowing to the coast	Y
Notes: • Total Nitrogen as N (TKN + NOx) by Discrete Analyser • Trigger values are based on a low-lying river			

(c) Kjeldahl nitrogen Total Kjeldahl Nitrogen as N

Basin 8.1 inflow - Kjeldahl nitrogen – Qube Logistics, Moorebank, NSW		Trigger Value - ANZECC 2000 Guidelines	Triggered
Lab results – kjeldahl nitrogen:	400 µg/L	-	-
Notes: • Total Kjeldahl Nitrogen as N			

(d) Dissolved metals;

Basin 8.1 inflow - Dissolved metals – Qube Logistics, Moorebank, NSW			
Equipment used: - Sample bottles collected from monitoring site ALS Environmental Laboratory Testing Report			
Lab results – Dissolved metals:	**Measures mg/L**	**Trigger value ANZECC Guidelines 2000 95% protection criteria**	**Triggered**
Arsenic	<0.001	0.013 mg/L	N
Cadmium	<0.0001	0.0002 mg/L	N
Chromium	<0.001	0.001 mg/L	N
Copper	<0.001	0.0014mg/L	N
Nickel	<0.001	0.011 mg/L	N
Lead	<0.001	0.0034 mg/L	N
Zinc	<0.005	0.008 mg/L	N
Mercury	<0.0001	0.0006 mg/L	N
Notes: - ANZECC Guidelines (2000) suggest 0.002 mg/L is considered appropriate for slightly-moderately disturbed systems. - A spike in cadmium and zinc observed from past WQM has decreased and no longer triggers ANZECC Guidelines 90% protection criteria.			

(e) PFAS;

Basin 8.1 inflow - PFAS – Qube Logistics, Moorebank, NSW			
PFAS Surrogate	**Measure** µg/L	**95% species protection (DEE 2016)**	**Triggered**
Sum of PFAS **13C4-PFOS**	0.01µg/L 102%	.13 (µg/L)	N
Sum of PFHxS and PFOS **13C8-PFOA**	0.01µg/L 101%	220 (µg/L)	N
Notes: This Guidance focuses on PFOS and PFOA as potential indicators of wider contamination by related PFASs. The reasons for this approach include: • Most research undertaken on PFASs internationally and in Australia has focused on PFOS and PFOA due to their frequent occurrence in the environment, persistence, and bioaccumulation. • PFOS and PFOA can also be the breakdown endpoint of other precursor products. • PFOS and PFOA are the most commonly encountered PFAS in the environment and wildlife. • Information on other PFASs, of which there are several hundred known, is more limited. • Effective management of PFOS and PFOA may help address potential contamination where other PFASs may also be present. * DEE 2016. Commonwealth Environmental Management Guidance on Perfluorooctane Sulfonic Acid (PFOS) and Perfluorooctanoic Acid (PFOA). Department of the Environment and Energy.			

(f) Total suspended solids.

Basin 8.1 inflow - Total suspended solids – Qube Logistics, Moorebank, NSW		EPA exceedance value	Trigger
Lab results – Total suspended solids: mg/L	13 mg/L	50 mg/L	N
Notes: • Total Suspended Solids dried at 104 ± 2°C • Total Suspended Solids (TSS)			

(g) Total hydrocarbons

Basin 8.1 inflow - Total hydrocarbons – Qube Logistics, Moorebank, NSW

Total Hydrocarbons assessed alongside baseline data (2018) and Autumn monitoring (2019) for Aquatic Monitoring location 11&12 (AQ11 & AQ12 Anzac Creek).

Lab results -Total hydrocarbons:	Trigger value ANZECC Guidelines 2000 – slightly disturbed lowland river ecosystem	Triggered	Monitoring discharge points May 2024 (Apical)	Monitoring discharge points October 2024 (Apical)	Monitoring discharge points April 2025 (Apical)		Trend
Benzene µg/L	1300 µg/L	N	<1	<1	<1		No trend
Toluene µg/L	-	N	<2	<2	<2		No trend
Ethylbenzene µg/L	-	N	<2	<2	<2		No trend
meta-& para-Xylene µg/L	200 µg/L	N	<2	<2	<2		No trend
Ortho-Xylene µg/L	470 µg/L	N	<2	<2	<2		No trend
Total Xylenes µg/L	-	-	<2	<2	<2		No trend
Sum of BTEX µg/L	-	-	<1	<1	<1		No trend
Naphthalene µg/L	85 µg/L	N	<5	<5	<5		No trend

Notes:

- The data were compared to the default trigger values (DTVs) recommended by ANZECC/ARMCANZ (2000) for the protection of slightly disturbed lowland river ecosystems in southeast Australia.
- A commonly encountered example of additive toxicity of mixtures is the simple aromatic hydrocarbons commonly associated with contaminated petroleum sites, benzene, toluene, ethyl benzene and xylenes, collectively known as BTEX

Water Quality Monitoring Comparative Table (Temporal)

Table 4. Retention Basin 8 MPW. Testing Site OP-8

Testing Site MPW 8.1 Inflow		May 2024	October 2024	April 2025
pH		8.51	6.44	8.12
Dissolved Oxygen - %/L		13.07 mg/L	10.5 ppm	9.09 ppm
Actual Electronic Conductivity (SPC -ms/cm)		0.558 SPC - ms/cm	8.3 (C-ms/cm)	282.3
Temperature - ℃		15.5	19.3	21.5
Turbidity		5.39 NTU	6.80 NTU	28.72 NTU
Total phosphorous - mg/L		0.06 mg/L	0.05 mg/L	0.04 mg/L
Total nitrogen - mg/L		0.07 mg/L	0.8 mg/L	0.4 mg/L
Kjeldahl nitrogen mg/L		0.07 mg/L	0.7 mg/L	0.4 mg/L
Dissolved metals				
Arsenic		<0.001	<0.001	<0.001
Cadmium		<0.0001	<0.0001	<0.0001
Chromium		<0.001	<0.001	<0.001
Copper		0.002	<0.001	<0.001
Nickel		0.001	0.001	<0.001
Lead		<0.001	<0.001	<0.001
Zinc		<0.005	<0.005	<0.005
Mercury		<0.0001	<0.0001	<0.0001
PFAS				
Lab results – SUM of PFAS Micrograms/L		0.04	0.69	0.01
SUM of PFHxS & PFOS Microgrms/L		0.04	0.56	0.01
Total suspended solids mg/L		<5	<5	13
Total hydrocarbons				
Benzene	<1	<1	<1	<1
Toluene	<2	<2	<2	<2
Ethylbenzene	<2	<2	<2	<2
meta-& para-Xylene	<2	<2	<2	<2
Ortho-Xylene	<2	<2	<2	<2
Total Xylenes	<2	<2	<2	<2
Sum of BTEX	<1	<1	<1	<1
Naphthalene	<5	<5	<5	<5

Appendix A. Raw data tables; source - Australian Laboratory Services

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	WMP8	WMP7	WMP5	----	----
				Sampling date / time	09-Apr-2025 13:10	09-Apr-2025 12:50	09-Apr-2025 12:30	----	----
Compound	CAS Number	LOR	Unit		EW2501914-006	EW2501914-007	EW2501914-008	--------	--------
					Result	Result	Result	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	----	----
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	----	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	<100	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	----	----
Toluene	108-88-3	2	µg/L		<2	<2	<2	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	----	----
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	----	----
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	----	----
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoropropane sulfonic acid (PFPrS)	423-41-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	**0.11**	<0.02	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorononane sulfonic acid (PFNS)	68259-12-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.01**	**0.13**	**0.01**	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	WMP8	WMP7	WMP5	----	----
				Sampling date / time	09-Apr-2025 13:10	09-Apr-2025 12:50	09-Apr-2025 12:30	----	----
Compound	CAS Number	LOR	Unit		EW2501914-006	EW2501914-007	EW2501914-008	--------	--------
					Result	Result	Result	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	**0.04**	**0.03**	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	**0.04**	**0.03**	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	**0.01**	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	----	----
Perfluorohexadecanoic acid (PFHxDA)	67905-19-5	0.05	µg/L		<0.05	<0.05	<0.05	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	WMP8	WMP7	WMP5	-----	-----
				Sampling date / time	09-Apr-2025 13:10	09-Apr-2025 12:50	09-Apr-2025 12:30	-----	-----
Compound	CAS Number	LOR	Unit		EW2501914-006	EW2501914-007	EW2501914-008	-----	-----
					Result	Result	Result	-----	-----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	-----	-----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	-----	-----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	-----	-----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	-----	-----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	-----	-----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	-----	-----
EP231P: PFAS Sums									
Sum of PFAS	-----	0.01	µg/L		**0.01**	**0.32**	**0.08**	-----	-----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.01**	**0.24**	**0.01**	-----	-----
Sum of PFAS (WA DER List)	-----	0.01	µg/L		**0.01**	**0.32**	**0.08**	-----	-----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**98.8**	**90.8**	**88.8**	-----	-----
Toluene-D8	2037-26-5	2	%		**93.6**	**85.2**	**81.0**	-----	-----
4-Bromofluorobenzene	460-00-4	2	%		**94.7**	**86.2**	**81.8**	-----	-----
EP231S: PFAS Surrogate									
13C4-PFOS	-----	0.02	%		**102**	**102**	**100**	-----	-----
13C8-PFOA	-----	0.02	%		**101**	**105**	**105**	-----	-----

Surrogate Control Limits

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	72	143
Toluene-D8	2037-26-5	75	131
4-Bromofluorobenzene	460-00-4	73	137
EP231S: PFAS Surrogate			
13C4-PFOS	---	60	120
13C8-PFOA	---	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry / Biology).

(WATER) EK067G: Total Phosphorus as P by Discrete Analyser
(WATER) EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser
(WATER) EK061G: Total Kjeldahl Nitrogen By Discrete Analyser
(WATER) EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser
(WATER) EG035F: Dissolved Mercury by FIMS
(WATER) EG020F: Dissolved Metals by ICP-MS
(WATER) EP080/071: Total Petroleum Hydrocarbons
(WATER) EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions
(WATER) EP080: BTEXN
(WATER) EP080S: TPH(V)/BTEX Surrogates
(WATER) EP231A: Perfluoroalkyl Sulfonic Acids
(WATER) EP231B: Perfluoroalkyl Carboxylic Acids
(WATER) EP231C: Perfluoroalkyl Sulfonamides
(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids
(WATER) EP231P: PFAS Sums
(WATER) EP231S: PFAS Surrogate
(WATER) EA025: Total Suspended Solids dried at 104 ± 2°C

Appendix B. ANZECC & ARMCANZ (2000) water quality guidelines

Table 3.4.1 Trigger values for toxicants at alternative levels of protection. Values in grey shading are the trigger values applying to typical *slightly–moderately disturbed systems*; see table 3.4.2 and Section 3.4.2.4 for guidance on applying these levels to different ecosystem conditions.

Chemical		Trigger values for freshwater (µgL^{-1})				Trigger values for marine water (µgL^{-1})			
		Level of protection (% species)				Level of protection (% species)			
		99%	95%	90%	80%	99%	95%	90%	80%
METALS & METALLOIDS									
Aluminium	pH >6.5	27	55	80	150	ID	ID	ID	ID
Aluminium	pH <6.5	ID	ID	ID	ID	ID	ID	ID	ID
Antimony		ID	ID	ID	ID	ID	ID	ID	ID
Arsenic (As III)		1	24	94 [C]	360 [C]	ID	ID	ID	ID
Arsenic (AsV)		0.8	13	42	140 [C]	ID	ID	ID	ID
Beryllium		ID	ID	ID	ID	ID	ID	ID	ID
Bismuth		ID	ID	ID	ID	ID	ID	ID	ID
Boron		90	370 [C]	680 [C]	1300 [C]	ID	ID	ID	ID
Cadmium	H	0.06	0.2	0.4	0.8 [C]	0.7 [B]	5.5 [B, C]	14 [B, C]	36 [B, A]
Chromium (Cr III)	H	ID	ID	ID	ID	7.7	27.4	48.6	90.6
Chromium (CrVI)		0.01	1.0 [C]	6 [A]	40 [A]	0.14	4.4	20 [C]	85 [C]
Cobalt		ID	ID	ID	ID	0.005	1	14	150 [C]
Copper	H	1.0	1.4	1.8 [C]	2.5 [C]	0.3	1.3	3 [C]	8 [A]
Gallium		ID	ID	ID	ID	ID	ID	ID	ID
Iron		ID	ID	ID	ID	ID	ID	ID	ID
Lanthanum		ID	ID	ID	ID	ID	ID	ID	ID
Lead	H	1.0	3.4	5.6	9.4 [C]	2.2	4.4	6.6 [C]	12 [C]
Manganese		1200	1900 [C]	2500 [C]	3600 [C]	ID	ID	ID	ID
Mercury (inorganic)	B	0.06	0.6	1.9 [C]	5.4 [A]	0.1	0.4 [C]	0.7 [C]	1.4 [C]
Mercury (methyl)		ID	ID	ID	ID	ID	ID	ID	ID
Molybdenum		ID	ID	ID	ID	ID	ID	ID	ID
Nickel	H	8	11	13	17 [C]	7	70 [C]	200 [A]	560 [A]
Selenium (Total)	B	5	11	18	34	ID	ID	ID	ID
Selenium (SeIV)	B	ID	ID	ID	ID	ID	ID	ID	ID
Silver		0.02	0.05	0.1	0.2 [C]	0.8	1.4	1.8	2.6 [C]
Thallium		ID	ID	ID	ID	ID	ID	ID	ID
Tin (inorganic, SnIV)		ID	ID	ID	ID	ID	ID	ID	ID
Tributyltin (as µg/L Sn)		ID	ID	ID	ID	0.0004	0.006 [C]	0.02 [C]	0.05 [C]
Uranium		ID	ID	ID	ID	ID	ID	ID	ID
Vanadium		ID	ID	ID	ID	50	100	160	280
Zinc	H	2.4	8.0 [C]	15 [C]	31 [C]	7	15 [C]	23 [C]	43 [C]
NON-METALLIC INORGANICS									
Ammonia	D	320	900 [C]	1430 [C]	2300 [A]	500	910	1200	1700
Chlorine	E	0.4	3	6 [A]	13 [A]	ID	ID	ID	ID
Cyanide	F	4	7	11	18	2	4	7	14
Nitrate	J	17	700	3400 [C]	17000 [A]	ID	ID	ID	ID
Hydrogen sulfide	G	0.5	1.0	1.5	2.6	ID	ID	ID	ID
ORGANIC ALCOHOLS									
Ethanol		400	1400	2400 [C]	4000 [C]	ID	ID	ID	ID
Ethylene glycol		ID	ID	ID	ID	ID	ID	ID	ID
Isopropyl alcohol		ID	ID	ID	ID	ID	ID	ID	ID
CHLORINATED ALKANES									
Chloromethanes									
Dichloromethane		ID	ID	ID	ID	ID	ID	ID	ID
Chloroform		ID	ID	ID	ID	ID	ID	ID	ID
Carbon tetrachloride		ID	ID	ID	ID	ID	ID	ID	ID
Chloroethanes									
1,2-dichloroethane		ID	ID	ID	ID	ID	ID	ID	ID
1,1,1-trichloroethane		ID	ID	ID	ID	ID	ID	ID	ID

Chemical	Trigger values for freshwater (µgL^{-1})				Trigger values for marine water (µgL^{-1})			
	Level of protection (% species)				Level of protection (% species)			
	99%	95%	90%	80%	99%	95%	90%	80%
1,1,2-trichloroethane	5400	6500	7300	8400	140	1900	5800 [C]	18000 [C]
1,1,2,2-tetrachloroethane	ID	ID	ID	ID	ID	ID	ID	ID
Pentachloroethane	ID	ID	ID	ID	ID	ID	ID	ID
Hexachloroethane B	290	360	420	500	ID	ID	ID	ID
Chloropropanes								
1,1-dichloropropane	ID	ID	ID	ID	ID	ID	ID	ID
1,2-dichloropropane	ID	ID	ID	ID	ID	ID	ID	ID
1,3-dichloropropane	ID	ID	ID	ID	ID	ID	ID	ID
CHLORINATED ALKENES								
Chloroethylene	ID	ID	ID	ID	ID	ID	ID	ID
1,1-dichloroethylene	ID	ID	ID	ID	ID	ID	ID	ID
1,1,2-trichloroethylene	ID	ID	ID	ID	ID	ID	ID	ID
1,1,2,2-tetrachloroethylene	ID	ID	ID	ID	ID	ID	ID	ID
3-chloropropene	ID	ID	ID	ID	ID	ID	ID	ID
1,3-dichloropropene	ID	ID	ID	ID	ID	ID	ID	ID
ANILINES								
Aniline	8	250 [A]	1100 [A]	4800 [A]	ID	ID	ID	ID
2,4-dichloroaniline	0.6	7	20	60 [C]	ID	ID	ID	ID
2,5-dichloroaniline	ID	ID	ID	ID	ID	ID	ID	ID
3,4-dichloroaniline	1.3	3	6 [C]	13 [C]	85	150	190	260
3,5-dichloroaniline	ID	ID	ID	ID	ID	ID	ID	ID
Benzidine	ID	ID	ID	ID	ID	ID	ID	ID
Dichlorobenzidine	ID	ID	ID	ID	ID	ID	ID	ID
AROMATIC HYDROCARBONS								
Benzene	600	950	1300	2000	500 [C]	700 [C]	900 [C]	1300 [C]
Toluene	ID	ID	ID	ID	ID	ID	ID	ID
Ethylbenzene	ID	ID	ID	ID	ID	ID	ID	ID
o-xylene	200	350	470	640	ID	ID	ID	ID
m-xylene	ID	ID	ID	ID	ID	ID	ID	ID
p-xylene	140	200	250	340	ID	ID	ID	ID
m+*p*-xylene	ID	ID	ID	ID	ID	ID	ID	ID
Cumene	ID	ID	ID	ID	ID	ID	ID	ID
Polycyclic Aromatic Hydrocarbons								
Naphthalene	2.5	16	37	85	50 [C]	70 [C]	90 [C]	120 [C]
Anthracene B	ID	ID	ID	ID	ID	ID	ID	ID
Phenanthrene B	ID	ID	ID	ID	ID	ID	ID	ID
Fluoranthene B	ID	ID	ID	ID	ID	ID	ID	ID
Benzo(a)pyrene B	ID	ID	ID	ID	ID	ID	ID	ID
Nitrobenzenes								
Nitrobenzene	230	550	820	1300	ID	ID	ID	ID
1,2-dinitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,3-dinitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,4-dinitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,3,5-trinitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-methoxy-2-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-methoxy-4-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-chloro-2-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-chloro-3-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-chloro-4-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-chloro-2,4-dinitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,2-dichloro-3-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,3-dichloro-5-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,4-dichloro-2-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
2,4-dichloro-2-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID

Chemical	Trigger values for freshwater (µgL^{-1})				Trigger values for marine water (µgL^{-1})			
	Level of protection (% species)				Level of protection (% species)			
	99%	95%	90%	80%	99%	95%	90%	80%
Hexazinone	ID	ID	ID	ID	ID	ID	ID	ID
Simazine	0.2	3.2	11	35	ID	ID	ID	ID
Urea herbicides								
Diuron	ID	ID	ID	ID	ID	ID	ID	ID
Tebuthiuron	0.02	2.2	20	160 [C]	ID	ID	ID	ID
Miscellaneous herbicides								
Acrolein	ID	ID	ID	ID	ID	ID	ID	ID
Bromacil	ID	ID	ID	ID	ID	ID	ID	ID
Glyphosate	370	1200	2000	3600 [A]	ID	ID	ID	ID
Imazethapyr	ID	ID	ID	ID	ID	ID	ID	ID
Ioxynil	ID	ID	ID	ID	ID	ID	ID	ID
Metolachlor	ID	ID	ID	ID	ID	ID	ID	ID
Sethoxydim	ID	ID	ID	ID	ID	ID	ID	ID
Trifluralin B	2.6	4.4	6	9 [A]	ID	ID	ID	ID
GENERIC GROUPS OF CHEMICALS								
Surfactants								
Linear alkylbenzene sulfonates (LAS)	65	280	520 [C]	1000 [C]	ID	ID	ID	ID
Alcohol ethoxyolated sulfate (AES)	340	650	850 [C]	1100 [C]	ID	ID	ID	ID
Alcohol ethoxylated surfactants (AE)	50	140	220	360 [C]	ID	ID	ID	ID
Oils & Petroleum Hydrocarbons	ID	ID	ID	ID	ID	ID	ID	ID
Oil Spill Dispersants								
BP 1100X	ID	ID	ID	ID	ID	ID	ID	ID
Corexit 7664	ID	ID	ID	ID	ID	ID	ID	ID
Corexit 8667		ID	ID	ID	ID	ID	ID	ID
Corexit 9527	ID	ID	ID	ID	230	1100	2200	4400 [A]
Corexit 9550	ID	ID	ID	ID	ID	ID	ID	ID

Notes: Where the final water quality guideline to be applied to a site is below current analytical practical quantitation limits, see Section 3.4.3.3 for guidance.

Most trigger values listed here for metals and metalloids are *High reliability* figures, derived from field or chronic NOEC data (see 3.4.2.3 for reference to Volume 2). The exceptions are *Moderate reliability* for freshwater aluminium (pH >6.5), manganese and marine chromium (III).

Most trigger values listed here for non-metallic inorganics and organic chemicals are *Moderate reliability* figures, derived from acute LC_{50} data (see 3.4.2.3 for reference to Volume 2). The exceptions are *High reliability* for freshwater ammonia, 3,4-DCA, endosulfan, chlorpyrifos, esfenvalerate, tebuthiuron, three surfactants and marine for 1,1,2-TCE and chlorpyrifos.

* = *High reliability* figure for esfenvalerate derived from mesocosm NOEC data (no alternative protection levels available).

A = Figure may not protect key test species from acute toxicity (and chronic) — check Section 8.3.7 for spread of data and its significance. 'A' indicates that trigger value > acute toxicity figure; note that trigger value should be <1/3 of acute figure (Section 8.3.4.4).

B = Chemicals for which possible bioaccumulation and secondary poisoning effects should be considered (see Sections 8.3.3.4 and 8.3.5.7).

C = Figure may not protect key test species from chronic toxicity (this refers to experimental chronic figures or geometric mean for species) — check Section 8.3.7 for spread of data and its significance. Where grey shading and 'C' coincide, refer to text in Section 8.3.7.

D = Ammonia as TOTAL ammonia as [NH_3-N] at pH 8. For changes in trigger value with pH refer to Section 8.3.7.2.

E = Chlorine as total chlorine, as [Cl]; see Section 8.3.7.2.

F = Cyanide as un-ionised HCN, measured as [CN]; see Section 8.3.7.2.

G = Sulfide as un-ionised H_2S, measured as [S]; see Section 8.3.7.2.

H = Chemicals for which algorithms have been provided in table 3.4.3 to account for the effects of hardness. The values have been calculated using a hardness of 30 mg/L $CaCO_3$. These should be adjusted to the site-specific hardness (see Section 3.4.3).

J = Figures protect against toxicity and do not relate to eutrophication issues. Refer to Section 3.3 if eutrophication is the issue of concern.

ID = Insufficient data to derive a reliable trigger value. Users advised to check if a low reliability value or an ECL is given in Section 8.3.7.

T = Tainting or flavour impairment of fish flesh may possibly occur at concentrations below the trigger value. See Sections 4.4.5.3/3 and 8.3.7.

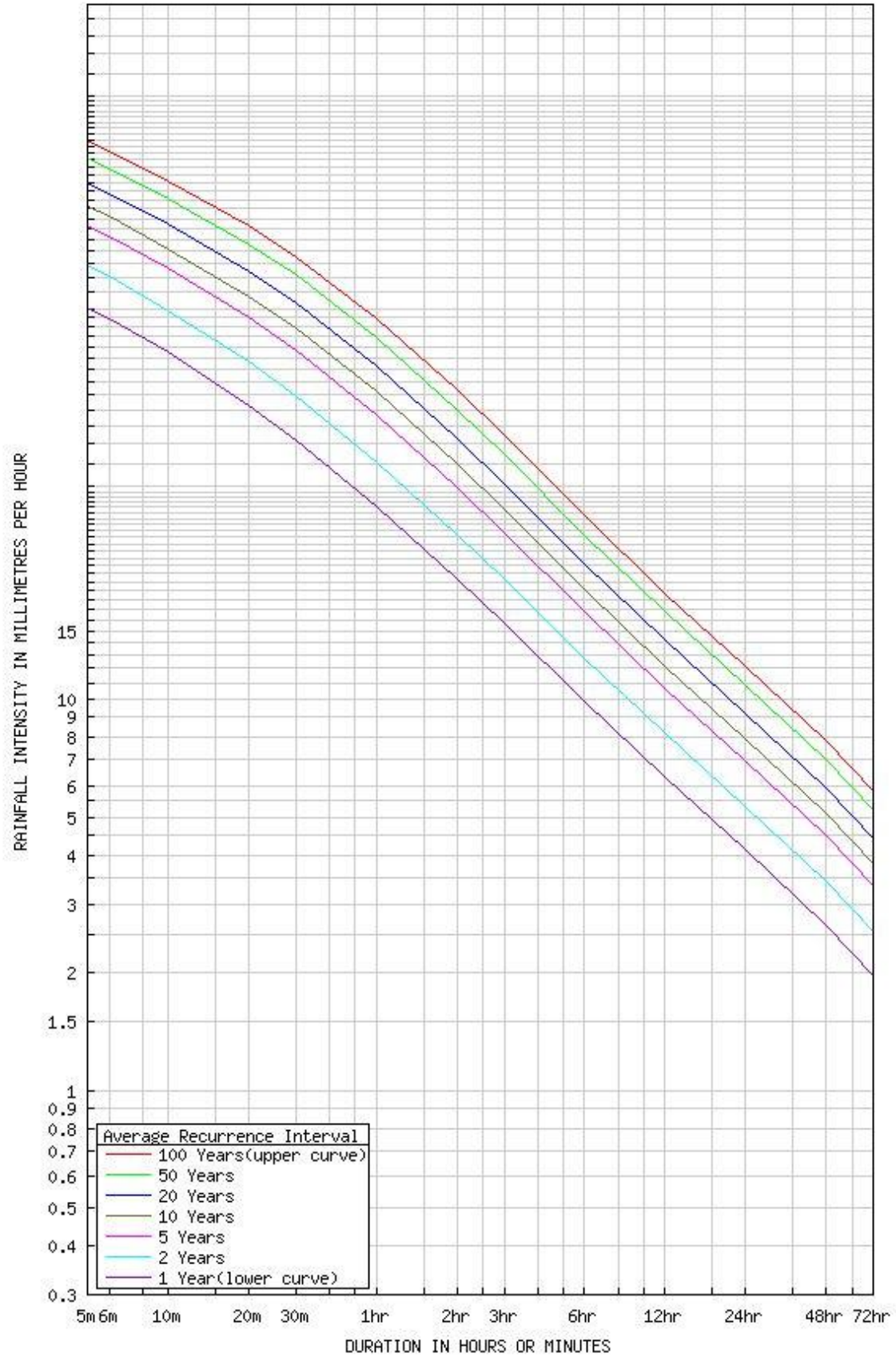
Table 5. Ecological water quality guideline values developed by water regulators

Exposure scenario	PFOS	PFOA	Exposure scenario	Comments and source
Freshwater	0.00023 µg/L	19 µg/L	99% species protection - high conservation value systems	Australian and New Zealand Guidelines for Fresh and Marine Water Quality - technical draft default guideline values for PFOS and PFOA. Note 1: The 99% species protection level for PFOS is close to the level of detection. Agencies may wish to apply a 'detect' threshold in such circumstances rather than a quantified measurement. Note 2: The draft guidelines do not account for effects which result from the biomagnification of toxicants in air-breathing animals or in animals which prey on aquatic organisms. Note 3: The WQGs advise[41] that the 99% level of protection be used for slightly to moderately disturbed systems. This approach is generally adopted for chemicals that bioaccumulate and biomagnify in wildlife. Regulators may specify or environmental legislation may prescribe the level of species protection required, rather than allowing for case-by-case assessments.
	0.13 µg/L	220 µg/L	95% species protection - slightly to moderately disturbed systems	
	2 µg/L	632 µg/L	90% species protection - highly disturbed systems	
	31 µg/L	1824 µg/L	80% species protection - highly disturbed systems	
Interim marine	0.00023 µg/L	19 µg/L	99% species protection - high conservation value systems	As above. Freshwater values are to be used on an interim basis until final marine guideline values can be set using the nationally-agreed process under the Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Note 1: The WQG advise that in the case of estuaries, the most stringent of freshwater and marine criteria apply, taking account of any available salinity correction. Note 2: Marine guideline values developed by CRC CARE are under consideration through the nationally-agreed water quality guideline development process.
	0.13 µg/L	220 µg/L	95% species protection - slightly to moderately disturbed systems	
	2 µg/L	632 µg/L	90% species protection - highly disturbed systems	
	31 µg/L	1824 µg/L	80% species protection - highly disturbed systems	

https://www.waterquality.gov.au/sites/default/files/documents/ANZECC-1992-guidelines.pdf

Type of indicator	Indicator	Units	Fresh waters	Marine waters
	Dissolved oxygen[2]	mg/L	> 6 (> 80–90% saturation)	> 6 (> 80–90% saturation)
	Nutrients/nuisance growths	–	(Section 2.3.3)	(Section 2.3.3)
	pH	–	6.5–9.0	< 0.2 pH unit change
	Salinity	mg/L	< 1000 (about 1,500 µS/cm)	–
	Suspended particulate matter/turbidity	–	< 10% change seasonal mean concentration (see also colour & clarity)	< 10% change seasonal mean concentration (see also colour & clarity)
	Temperature[3]	–	< 2°C increase	< 2°C increase
Toxicants				
Inorganic toxicants	Aluminium	µg/L	< 5.0 (if pH < = 6.5)	NR
	Aluminium	µg/L	< 100.0 (if pH > 6.5)	–
	Ammonia	µg/L	20.0–30.0 (Table 2.3)	NR
	Antimony	µg/L	30.0	500.0
	Arsenic	µg/L	50.0	50.0
	Beryllium	µg/L	4.0[4]	NR
	Cadmium	µg/L	0.2–2.0[5]	2.0
	Chromium	µg/L	10.0	50.0
	Copper	µg/L	2.0–5.0[5]	5.0
	Cyanide	µg/L	5.0	5.0
	Iron	µg/L	1,000.0[6]	NR
	Lead	µg/L	1.0–5.0[5]	5.0
	Mercury	µg/L	0.1	0.1
	Nickel	µg/L	15.0–150.0[5]	15.0
	Selenium	µg/L	5.0	70.0
	Silver	µg/L	0.1	1.0
	Sulfide	µg/L	2.0	2.0
	Thallium	µg/L	4.0	20.0
	Tin (tributyltin)	µg/L	0.008	0.002
	Zinc	µg/L	5.0–50.0[6]	50.0
Organic toxicants	Acrylonitrile	µg/L	NR	NR
	Benzidine	µg/L	NR	NR
	Dichlorobenzidine	µg/L	NR	NR
	Diphenylhydrazine	µg/L	NR	NR
Halogenated aliphatic compounds	Hexachlorobutadiene	µg/L	0.1	0.3
	Halogenated ethers	µg/L	NR	NR
	Isophorone	µg/L	NR	NR
Monocyclic aromatic compounds	Benzene	µg/L	300.0	300.0
	Chlorinated benzenes	µg/L	(Table 2.8)	NR

Appendix C. Intensity Frequency Duration – Average Recurrence Interval Indicator
Intensity-Frequency-Duration (bom.gov.au)



Apical
Bushfire and Planning

Moorebank Logistics Park West Precinct Basin (OSD-5) Location

Stormwater Network Water Quality Monitoring Data & Reporting November 2025

Site image: Outlet George River Basin 6 MPW (Apical image November 2025)

Prepared for: MID Plumbing P/L SIOMP Moorebank Precinct West (Spring 2025)

Prepared by: Daniel Anderson *(BEnvSc, MEnvSc)*

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Phone: 0415617771
PO Box 149 Kiama NSW 2533
ABN: 656 420 10 400

Consulted Documents / database.

Australia and New Zealand Guidelines for fresh and Marine Water Quality (2000)
NATIONAL WATER QUALITY MANAGEMENT STRATEGY - Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000) - Volume 2 - Aquatic ecosystems

Bureau of Meteorology – Australian Government Australia's official weather forecasts & weather radar - Bureau of Meteorology (bom.gov.au)

Moorebank Intermodal Precinct West – Stage 3 (SSD 10431) | Assessment Report March 2021
https://moorebankintermodalprecinct.com.au/wp-content/uploads/2023/04/MPW-S3-DPIE-assessment-report-to-IPC.pdf

WQM Report Western Precinct _Basin 5_Autumn 2024 – Apical Bushfire and Planning - April 2024

WQM Report Western Precinct _Basin 8_Spring 2024 – Apical Bushfire and Planning - October 2024

Development Consent - Section 4.38 of the Environmental Planning and Assessment Act 1979 - Application Number: SSD 7709 Applicant: Sydney Intermodal Terminal Alliance (SIMTA) as Qube Holdings Limited Consent Authority: The Independent Planning Commission Site: Moorebank Avenue, Moorebank Lot 1 DP 1197707 Lot 100 DP 1049508 Lot 101 DP 1049508 Lot 2 DP 1197707 Part Lot 3 DP 1197707 Part Anzac Road and Moorebank Avenue public road reserves Development: Moorebank Precinct West Stage 2 (MPW Stage 2)

Development Consent - Section 4.38 of the Environmental Planning and Assessment Act 1979 - Application Number: SSD 10431 Applicant: Sydney Intermodal Terminal Alliance (SIMTA) as Qube Holdings Limited Consent Authority: The Independent Planning Commission Site: Moorebank Avenue, Moorebank Lot 1 DP 1197707 Lot 100 DP 1049508 Lot 101 DP 1049508 Moorebank Precinct West Stage 3 (MPW Stage 3)

Australian Laboratory Services (ALS) Work Order EW2402561 Certificate of Analysis Water Sample Data 9th April 2025.

Liverpool DCP
Liverpool's Development Control Plans | Liverpool City Council (nsw.gov.au)

DEE 2016. Commonwealth Environmental Management Guidance on Perfluorooctane Sulfonic Acid (PFOS) and Perfluorooctanoic Acid (PFOA). Department of the Environment and Energy.
https://environment.gov.au/system/files/pages/dfb876c5-581e-48b7-868c-242fe69dad68/files/draft-environmental-mgt-guidance-pfos-pfoa.pdf

Development Consent SSD 7709 - Section 4.38 of the Environmental Planning and Assessment Act 1979
https://www.ipcn.nsw.gov.au/resources/pac/media/files/pac/projects/2019/05/moorebank-intermodal-precinct-west-stage-2/referral-from-department-of-planning-and-environment/revised-recommended-conditions/mpw-stage-2-recommended-conditions-inclusive-of-edits-191105.pdf

Glossary

The following definitions apply to terms used in this report. Many of these definitions are consistent with relevant national literature and cited where appropriate.

Current status trigger value
Concentrations of water quality indicators that reflect existing ecosystem condition, and therefore provide a target for ecosystem maintenance and a benchmark against which future water quality trends may be monitored.

Environmental value
Particular values or uses of the environment important for a healthy ecosystem or for public benefit, welfare, safety or health and requiring protection from the effects of pollution or degradation (Environment Australia 2002).

Indicator
A parameter (biological, physical or chemical) used to provide a measure of the quality of water or the condition of an ecosystem (Environment Australia 2002).

Low-risk trigger value
Concentrations (or loads) of key performance indicators [of water quality] at which if not exceeded, there is a low risk that adverse biological effects will occur (ANZECC 2000a).

Median
The middle reading, or 50th percentile, of all readings taken. i.e. of the readings 10, 13, 9, 16 and 11 (re-ordering these to read 9, 10, 11, 13 and 16), the median is 11. The mean (or average), is the sum of all values divided by the total number of readings (which in this case equals 11.8).

Reference condition
Refers to a site which is unmodified or minimally modified from 'natural' condition. Most commonly, reference sites are subject to limited disturbance from human activity. The reference condition then serves as a standard or target against which environmental change in other similar sites can be assessed.

Trigger value
A concentration that, if exceeded, would indicate a potential environmental problem, and so 'trigger' a management response, such as further investigation and/or remedial actions (ANZECC 2000a).

Water quality guideline
A numerical concentration level (e.g. of a contaminant) or narrative statement (e.g. visual appearance of a water body) recommended to support and maintain a designated water use (ANZECC 2000a)

1.1 Background

The Sydney Intermodal Terminal Alliance (SIMTA) received approval for the construction and operation of Stage 3 (the Project) of Moorebank Precinct West (MPW), which comprises the third stage of development within the Moorebank Precinct West under Development Approval SSD-10431.

The proposal is SSD under clause 19 of Schedule 1 of the State Environmental Planning Policy (State and Regional Development) 2011, as it is development for the purpose of rail and related transport facilities.

The MPW site is located on the western side of Moorebank Avenue and forms the western section of the Moorebank Intermodal Precinct (Map Image 2).

The MPW site is approximately 2.5 kilometres (km) from the Liverpool city centre, 27 km south-west of the Sydney Central Business District (CBD) and 26 km west of Port Botany.

The MPW site is irregular in shape, approximately 3 km from north to south and 960 m from east to west at its widest point and covers an area of approximately 220 ha. It is situated between the Georges River to the west (with the SSFL running north-south to the west of the river); and Moorebank Avenue to the east.

Works on the MPW site to date have commenced under two current and active development consents:

• MPW Stage 1 early works, which provides demolition, rehabilitation, remediation of contaminated land, and the establishment of construction facilities and access including site security (as part of the SSD 5066 consent)

• MPW Stage 2, which provides for the construction and 24/7 operation of an intermodal facility and associated warehousing (SSD 7709).

This WQM period refers to Stage 2 development and partial operation of the site with active tenancy across buildings located to the MPW zone.

This water quality monitoring program is guided by the Stormwater Infrastructure Operation and Maintenance Plan (SIOMP) and is provided to site management on behalf of MID Plumbing.

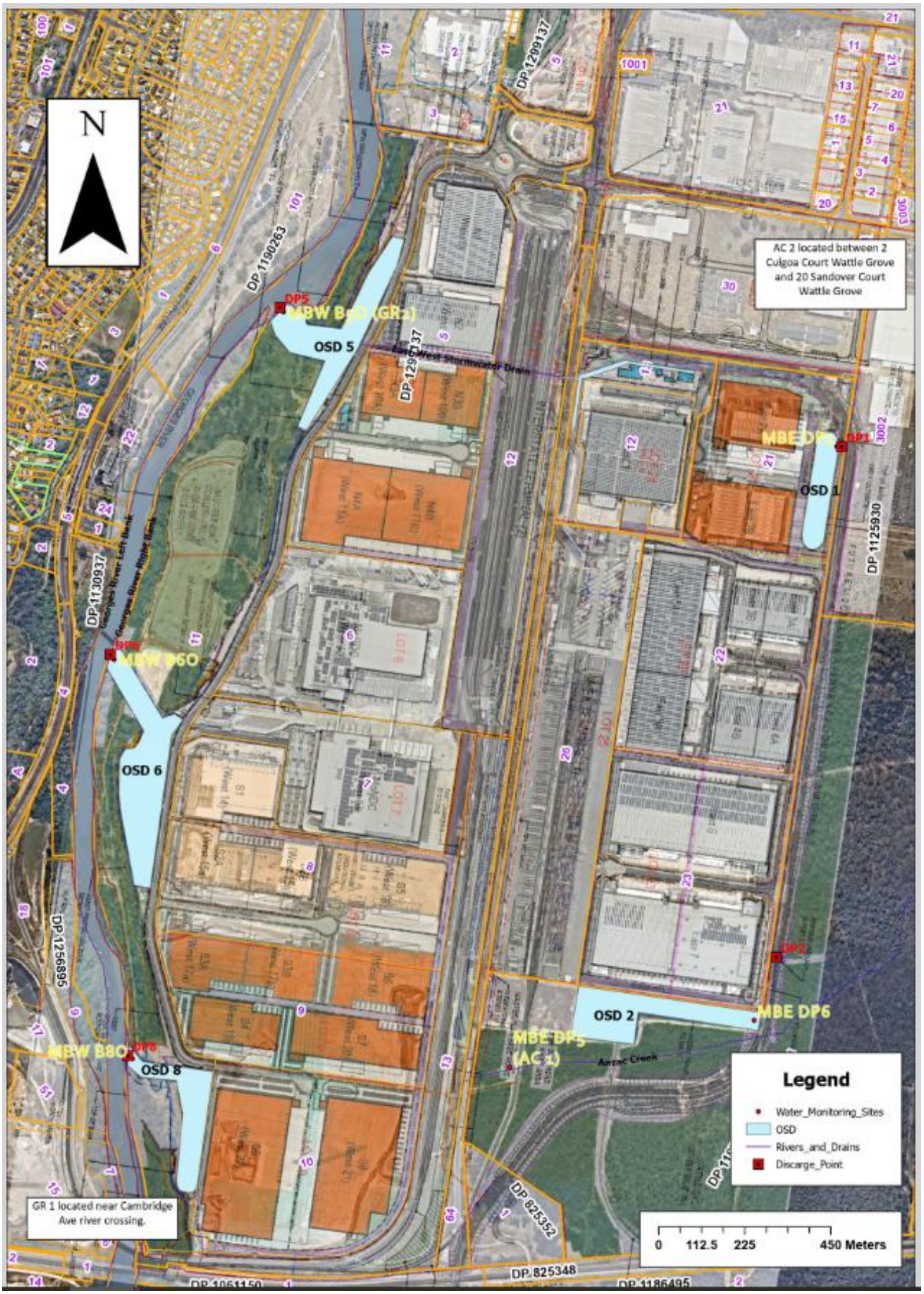
Three onsite bio-retention basins are present within Moorebank Precinct West. This report is in reference to baseline water quality condition reporting for Basin 5 (MPW – north).

Development Consent - Section 4.38 of the Environmental Planning and Assessment Act 1979 - Application Number: SSD 7709 Moorebank Precinct West Stage 2 (MPW Stage 2)

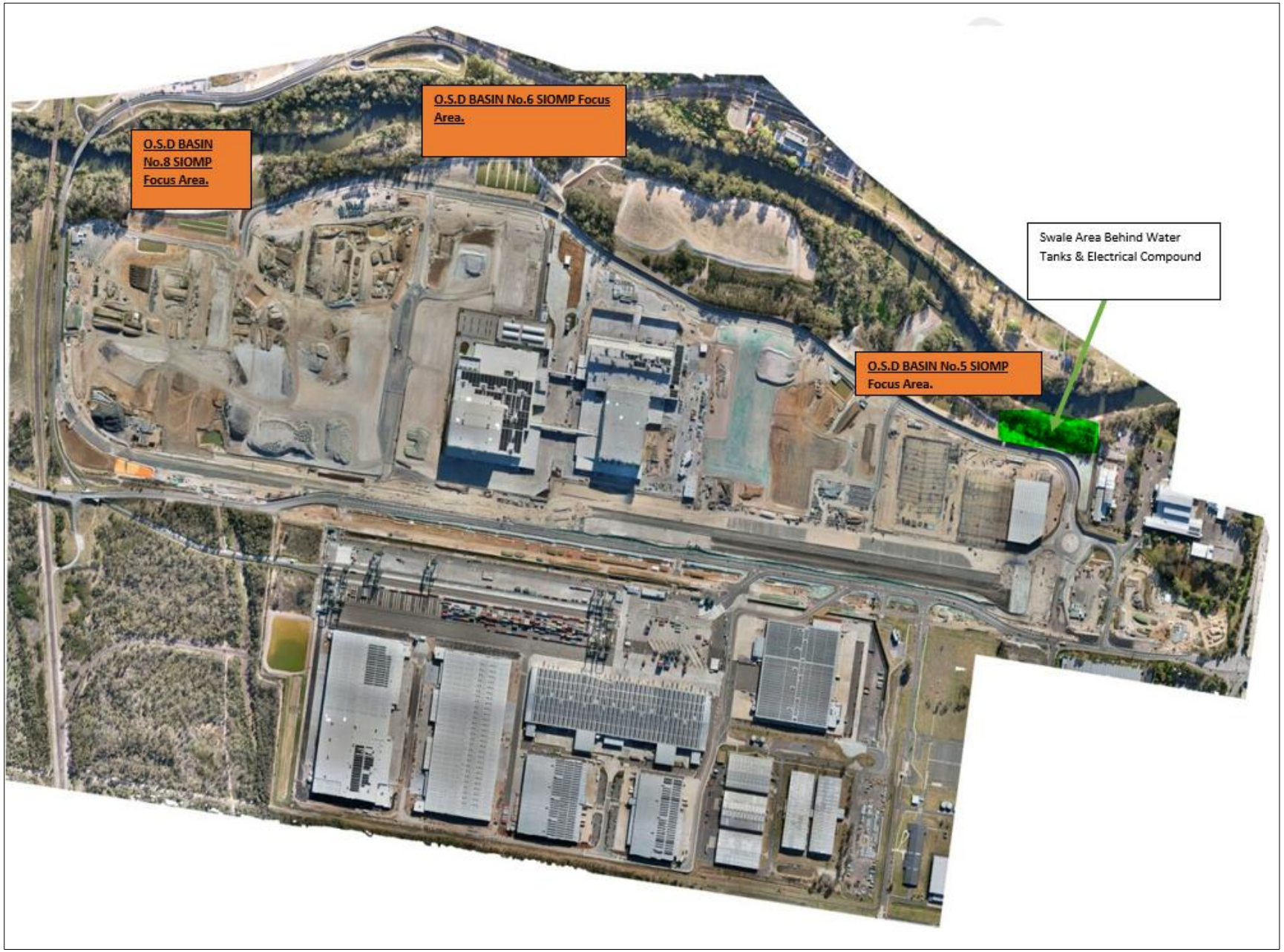
CoC	Requirement
Stormwater Quality Monitoring	
B38.	Stormwater Quality Monitoring Program - Prior to commencement of operation Part of the Operational Environmental Management Plan

The Stormwater Infrastructure Operation and Maintenance Plan (SIOMP) Moorebank Logistics Park – West Precinct was developed to address the requirements of MPE stage 3 CoCs (SSD 7709). The management plan (SIOMP) identifies the operational drainage and environmental management measures within the stormwater management system that will be applied to activities undertaken across the MLP west Precinct to manage improved water quality objectives and overall functionality of the stormwater detention and drainage network associated with stormwater infrastructure upon the site under the SIOMP.

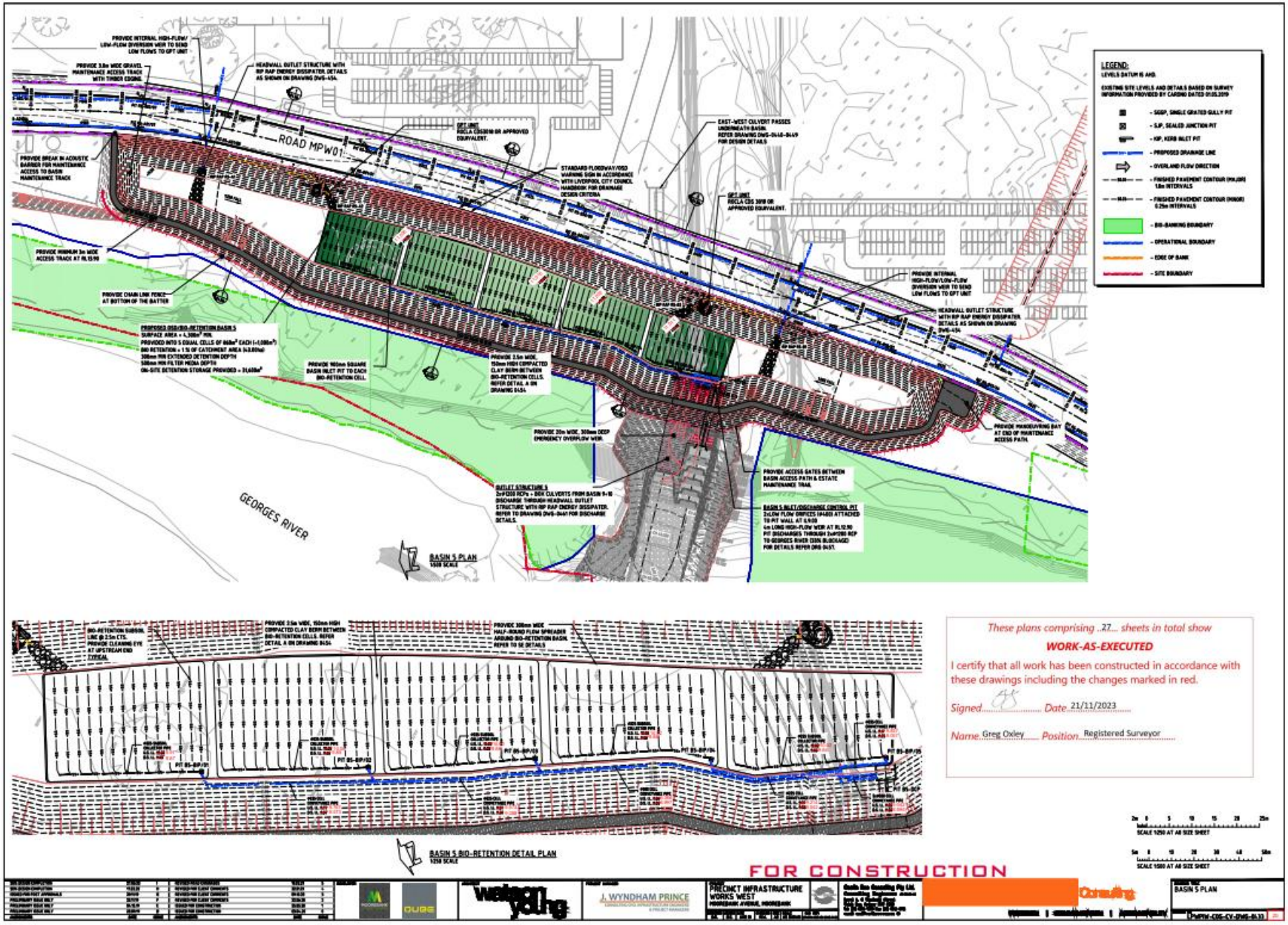
Map image 1. Overview subject site (MPW) provided by Arcadis



Map Image 2. Moorebank Precinct West Detention Basins (provided by MID Plumbing)

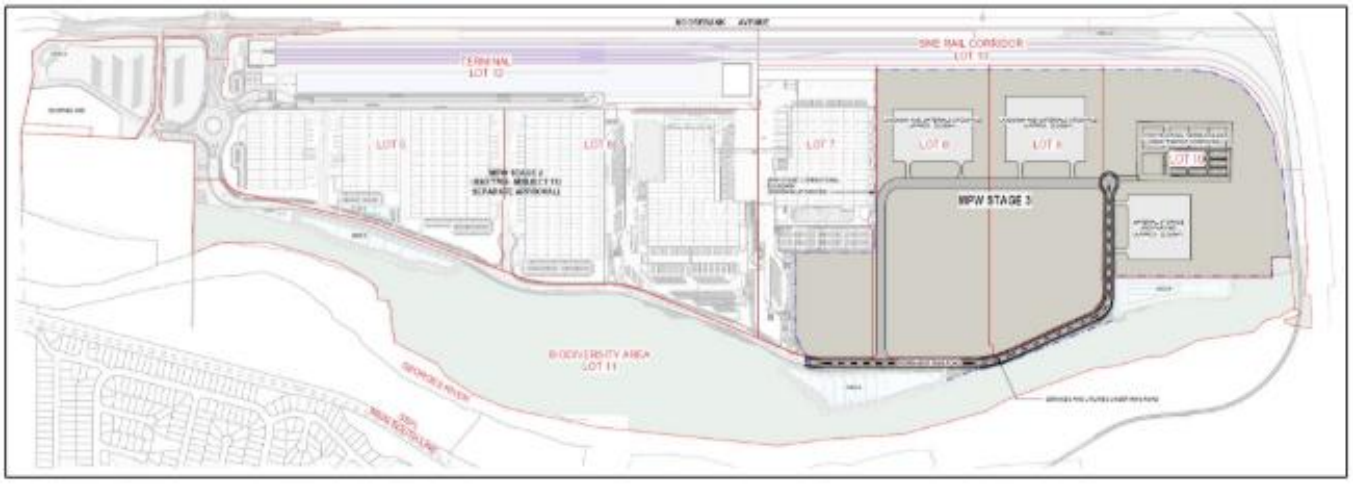


Map image 3. Detention Basin 5 MPW (north)



1.2 Reference information

Map image 4. Moorebank Intermodal Precinct West – Stage 3 State Significant Development Assessment (SSD-10431) March 2021



20. Stormwater Management System or Works	That untreated stormwater is not disposed of into the Georges River or its tributaries. The likely impact of stormwater disposal on the quality of any receiving waters. That the levels of nutrients and sediments entering the waterway are not increased by the proposed development. Whether any proposals to manage stormwater are in accordance with the local council's stormwater management plans and the Managing Urban Stormwater series of documents and meet the local council's stormwater management objectives. Whether the principles outlined in the *Managing Urban Stormwater Soils and Construction Handbook* (1998) prepared by and available from Landcom and the Department of Housing are followed during each stage of a development (including subdivision).	Detailed stormwater assessments were undertaken as part of MPW Stage 2, and remain applicable to the Stage 3 proposal. The Department has recommended conditions that would enforce these requirements, by ensuring that appropriate measures are implemented to manage stormwater impacts during construction. In regard to management of stormwater during operation of the MPW site, the MPW Stage 2 proposal incorporates a robust set of conditions to manage the release of stormwater via six onsite detention basins (OSD), a major east-west covered culvert and associated drainage infrastructure.

2. Monitoring Program Methodology

2.1 Monitoring Sites

To support stormwater and drainage management of the facility the MLP West precinct has established a vast stormwater infrastructure system consisting of several Water Sensitive Urban Design (WSUD) functions including raingardens detention basins and bio-swales. These networks are designed to minimise the velocity and peak discharge of stormwater draining from the site and act as onsite detention basins to harvest and sequester potential pollutants generated at the site through designed biological processes.

The stormwater infrastructure system discharges water into the natural drainage system via three outlets:

- Basin 5 detains water from the northern section of MPW before discharging into Georges River
- Basin 6 detains water from the mid-section of MPW before discharging into Georges River
- Basin 8 detains water from the southern section of MPW before discharging into Georges River

Monitoring of the discharge points has been established via our ongoing program with MID Plumbing under the SIOMP program (MPE) to collect qualitative data and analyse the performance of the WSUD provisions and to establish any potential trends in water quality readings from the stormwater network discharge points prior to release of water into the natural hydrological systems of Anzac Creek and the Georges River.

This report constitutes the Spring 2025 water quality data alongside baseline data for Basin 5 (OSD-5) Moorebank Precinct West (MPW).

Table 1. Type of outlet MPW

Discharge Point (see figure 2)	Associated Outlet (see figure 1)	Type of outlet/detention basin
Basin 5	Inlet	Bio retention basin (holding)
	Outlet	Outlet point – rock ramp
	Georges River	River – natural drainage conveyance
Basin 6	Inlet	Bio retention basin (holding)
	Outlet	Outlet point – rock ramp
Basin 8	Inlet	Bio retention basin (holding)
	Outlet	Outlet point – rock ramp

2.2 Water Quality Assessment

Surface water quality data collected at the discharge points is assessed with reference to ANZECC Guidelines (2000) and correlated with baseline & Spring 2025 Water Quality monitoring results provided by previous condition assessment reports.

By comparing water test data under the program across the testing timeline we can identify and report upon trends, identify exceedances and exclude potential anomalies for datasets.

Water from OSD-5 is released to the Georges River a natural riverine system located to the south west of the Sydney Basin.

Table 2. ANZECC Low Risk Trigger Values

Ecosystem type	Turbidity NTU	EC µS/cm	pH*	DO	TN mg/L	NO_x - N mg/L	NH_4^+ - N mg/L	TP mg/L	DRP - P mg/L
Upland river	2-25	30-350	6.5-7.5	90-110	0.480	0.190	0.013	0.013	0.005
Lowland river	6-50	125-2200	6.5-8.0	85-110	0.500	0.190	0.020	0.050	0.020

Values for Low Land River Systems as insert above are used as the reference guide to water quality parameter values and overall health and safety statements regarding the quality of discharged water from the SIOMP drainage network.

Annual spring and autumn water quality data presented from Anzac Creek and Georges River testing programs by other scientific consultants may also be cross referenced to the data prepared by Apical under the SIOMP program to establish potential trends in results and identify increases in accumulated pollutants from the site under operational condition, which may appear present within adjacent natural waterways.

Site data was collected in the form of water samples and in field data recordings at the prescribed monitoring points, water samples and water probe readings are undertaken following Australia and New Zealand guidelines for fresh and marine water quality – 2000 (ANZECC Guidelines), In situ water quality parameters relevant to stream health and aquatic assessment profiling were collected in field with a multiparameter hand-held water quality monitoring probe (Aquatroll 600).

Water data is collected, analysed and collated under the same methodologies and process under each testing period, the ensure consistency in the process.

Measures tested and samples taken:

- pH
- Dissolved Oxygen
- Electrical Conductivity
- Water Temperature and
- Turbidity

Water samples are collected at inlet and discharge points (Basin 5, Basin 6 & Basin 8) then sent to Australian Laboratory Services (ALS) for quality testing analysis Surface water (alsglobal.com).

Water analytical suites / testing parameters are provided to obtain overall water condition results and chemical sampling of collected water is undertaken for a range of nutrients, metals, and hydrocarbons relevant to stream health and aquatic assessment protocol, key nutrients, metals, and pollutants included in the assessment to reflect an overall suite of water quality condition guides which are listed below:

- Total phosphorous
- Total Nitrogen
- Kjeldahl Nitrogen
- Dissolved Metals
- PFAS
- Total Suspended Solids
- Total Hydrocarbons

The raw data results from the lab analysis provided to us by ALS Laboratory Services are presented within this report (see Appendix A).

Key water quality data attributes are recorded, tables and compared against; previous condition baseline

data, Liverpool Development Control Plan (DCP) water quality targets, Conditions of Consent B40 and ANZECC Guideline (2000) trigger limits under the condition category 90% protection criteria for freshwater natural systems.

The water quality guidelines are applied to ensure adjacent natural waterways George River and Anzac creek are not adversely affected by poor water quality discharge from the Moorebank logistics park site and operations.

Trends observed in our datasets are analysed on a temporal scale with any trigger values for specific water quality measures highlighted and presented within the results chapter of each seasonal report. This report provides baseline & Spring 2024 data for Basin 5 (MPW) from which trend analysis will compound over future reporting periods.

2.3 Data Analysis

The water quality measurements collected are used to assess water quality at each site in terms of health of aquatic ecosystems by comparison with guideline values recommended by the ANZECC and ARMCANZ (2000) guidelines for the protection of lowland streams (i.e. systems at < 150 m altitude) in south-east Australia. This categorisation for stream health is deemed relevant for the description of Anzac Creek, the recipient natural way due to the location in the geomorphic landscape and correlations of expected biophysical health and habitat profiles for similar stream environments.

2.4 Survey dates and personnel

On the 15th December 2025, ecologists from Apical Bushfire and Planning attended Moorebank Precinct West (MPW) to collect water quality data across the testing sites which are located within selected inlet points and discharge points within the stormwater drainage and management system (SIOMP) located within the Moorebank Logistics Park site West (See map image 2).

Inlet and outlet points within the network are representative of variant sites where stormwater will enter a node of the system (as a point source) and then release from the that node of the system at a discharge point. By recording inlet and discharge data water quality can be tracked along the continuum within the system to determine condition changes and overall trends in measured quality at given sites.

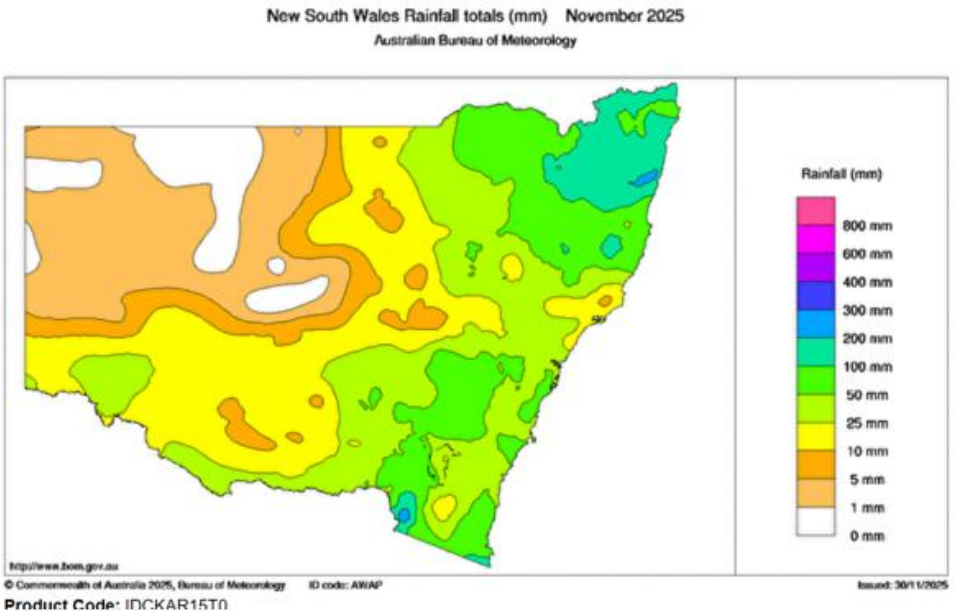
This data was collected on behalf of MID plumbing in accordance with 'The Stormwater Infrastructure Operation and Maintenance Plan Moorebank Logistics Park – West Precinct 2020' and in compliance with Condition of Consent B40 (Liverpool City) for the subject site. The results of such monitoring data collection are presented within this report.

2.5 Rainfall

Between the 1st of November and the 31st of November 2025 Moorebank received 61.6mm of rainfall.

NSW Monthly Rainfall November 2025

61.6 mm for the month in Holsworthy NSW.



3. Results

Data results captured by our water quality sampling are presented herein and are representative of baseline water quality results for Moorebank Precinct West Basin 5. Threshold guideline quantitative values for the water quality parameter themes are compared and correlated to ANZECC/ARMCANZ (2000) guidelines under the categorisation thresholds – Waterway benchmark group: 'The protection of slightly disturbed lowland river ecosystems in southeast Australia'.

As these are the first samples results collected under our scope for the SIOMP-MPW sites, the sampling results presented in this report will be considered for future analysis against subsequent results for use as baseline data for the drainage network SIOMP function.

B-5) OSD-5 outlet

Measures	Results (November 2025)		
Date & Time:	26/11/2025 – 10.14am		
Temperature	24.1		
Dissolved Oxygen %	63		
Dissolved Oxygen mg/L	5.3		
Salinity SPC ms/cm	0.423		
Salinity C-ms/cm	415.3		
TDS mg/L Total Dissolved Solids	275		
pH	7.48		
ORP mV Oxidation reduction potential	147.2		
NTU	8.04		

Collection Site (OSD-5) Basin Discharge to Georges River

B-5) 0utlet (OSD-5)

Measures	Results		
Date & Time:	26/11/2025 – 10.14am		
Temperature	24.1		
Dissolved Oxygen %	63		
Dissolved Oxygen mg/L	5.3		
Salinity SPC ms/cm	0.424		
Salinity C-ms/cm	416.5		
TDS mg/L Total Dissolved Solids	275		
pH	7.5		
ORP mV Oxidation reduction potential	146.8		
NTU	8.57		

Nitrogen

Reporting period	ANZECC Guideline*	April 2025	Nov 2025
Nitrogen µg/L	350 µg/L	400 µg/L	1,110 µg/L

***** ANZECC 2000 Guidelines 350 µg/L for rivers flowing to the coast

Phosphorus

Reporting period	ANZECC Guideline*	April 2025	Nov 2025
Phosphorous µg/L	50 µg/L	0.01 µg/L	210 µg/L

***** ANZECC 2000 Guidelines 50 µg/L for rivers flowing to the coast

Testing period	Trigger Value
Nitrogen µg/L	350 µg/L for rivers
Phosphorous µg/L	25 µg/L - 50 µg/L

Location Basin 5 Outflow

Nitrogen 1,110 µg/L (Guideline trigger 350 µg/L)

Phosphorus 210 µg/L (Guideline trigger 50 µg/L)

Metals

Testing period	Trigger value ANZECC	April 2025	Nov 2025	
Copper mg/L	0.0014 mg/L	0.005	0.007	
Zinc mg/L	0.008 mg/L	<0.005	<0.005	
Arsenic mg/L	0.03 mg/L	<0.001	<0.001	
Cadmium	0.05 µg/L	<0.0001	<0.0001	
Chromium	5 µg/L	<0.001	<0.001	
Nickle	0.1 µg/L	0.001	<0.001	
Lead	0.005 mg/L	<0.001	<0.001	

Concentrations for dissolved metals are under the ANZECC guidelines. Results for these parameters are considered positive for WQM discharges at the outlet.

Total Suspended Solids

TSS results appear stabilised over the April and November testing period, the levels are under the trigger values
Values are below the ANZECC guidelines and considered acceptable.

Testing period	EPA trigger value	April 2025	Nov 2025	
TSS mg/L	50 mg/L	10mg/L	13 mg/L	

pH

pH values fall within the desirable range at the discharge location

Testing	Trigger Value - ANZECC 2000 Guidelines *Lowland rivers	April 2025	Nov 2025
pH	Min 6.5 Max 8.5	8.32	6.5

PFAS;

OSD -5 - PFAS – Qube Logistics, Moorebank, NSW			
PFAS Surrogate	Measure µg/L	95% species protection (DEE 2016)	Triggered
13C4-PFOS % Sum of PFAS	84.6 % 0.02 (µg/L)	.13 (µg/L)	N
13C8-PFOA % Sum of PFHxS and PFOS	87.2 % 0.02 (µg/L)	220 (µg/L)	N

Notes:

This Guidance focuses on PFOS and PFOA as potential indicators of wider contamination by related PFASs. The reasons for this approach include:

- Most research undertaken on PFASs internationally and in Australia has focused on PFOS and PFOA due to their frequent occurrence in the environment, persistence, and bioaccumulation.
- PFOS and PFOA can also be the breakdown endpoint of other precursor products.
- PFOS and PFOA are the most commonly encountered PFAS in the environment and wildlife.
- Information on other PFASs, of which there are several hundred known, is more limited.
- Effective management of PFOS and PFOA may help address potential contamination where other PFASs may also be present.

* DEE 2016. Commonwealth Environmental Management Guidance on Perfluorooctane Sulfonic Acid (PFOS) and Perfluorooctanoic Acid (PFOA). Department of the Environment and Energy.

Total Hydrocarbons

OSD-5 - Total hydrocarbons – Qube Logistics, Moorebank, NSW

Total Hydrocarbons assessed alongside baseline data (2018) and Spring monitoring (2025) for Aquatic Monitoring location 11&12 (AQ11 & AQ12 Anzac Creek).

Lab results - Total hydrocarbons:	Trigger value ANZECC Guidelines 2000 – slightly disturbed lowland river ecosystem	Triggered	Baseline monitoring April 2018 (presented by Biosis)	November 2025					
Benzene µg/L	1300 µg/L	N	<1	<1					
Toluene µg/L	-	N	<2	<2					
Ethylbenzene µg/L	-	N	<2	<2					
meta-& para-Xylene µg/L	200 µg/L	N	-	<2					
Ortho-Xylene µg/L	470 µg/L	N	<2	<2					
Total Xylenes µg/L	-	N	-	<2					
Sum of BTEX µg/L	-	N	-	<1					
Naphthalene µg/L	85 µg/L	N	-	<5					

Notes:

- The data were compared to the default trigger values (DTVs) recommended by ANZECC/ARMCANZ (2000) for the protection of slightly disturbed lowland river ecosystems in southeast Australia.
- Moorebank Precinct East Stage 2: Biodiversity Monitoring in Anzac Creek Autumn 2019 Survey - Final Report, Bio-Analysis Pty Ltd (2019)

		• Moorebank Precinct East - Stage 2 B106 – Baseline Aquatic Ecological Monitoring Report and Biodiversity Monitoring Strategy (SSD 7628) Biosis (2018) • A commonly encountered example of additive toxicity of mixtures is the simple aromatic hydrocarbons commonly associated with contaminated petroleum sites, benzene, toluene, ethyl benzene and xylenes, collectively known as BTEX

B-5) 0utlet (OSD-5)

Measures	Results	Results	Results
Date & Time:	26/11/2025 – 10.14am		
Temperature	24.1		
Dissolved Oxygen %	63		
Dissolved Oxygen mg/L	5.3		
Salinity SPC ms/cm	0.424		
Salinity C-ms/cm	416.5		
TDS mg/L Total Dissolved Solids	275		
pH	7.5		
ORP mV Oxidation reduction potential	146.8		
NTU	8.57		

Collection Site (OSD-5) Basin Discharge to Georges River

B) 5-Inlet (OSD-5)

Measures	Results	Results	Results
Date & Time	26/11/2025 – 10.40am		
Temperature	24.4		
Dissolved Oxygen %	108		
Dissolved Oxygen mg/L	9.0		
Salinity SPC ms/cm	0.516		
Salinity C-ms/cm	510		
TDS mg/L Total Dissolved Solids	336		
pH	8.68		
ORP mV Oxidation reduction potential	166.3		
NTU	8.96		

Collection Site B) OSD- 5 Basin inlet

Water Quality Monitoring Comparative Table (Temporal)

Table 4. Retention Basin 5 MPW. Testing Site MPW 5 Outflow

Testing Site MPW Outflow	May 2024 baseline	October 2024	April 2025	Nov 2025
pH	6.39	6.21	8.32	7.5
Dissolved Oxygen - %/L	4.11mg/L	10.5	10.19	5.3mg/L
Actual Electronic Conductivity	0.054945	0.008	93.5 ORP mV	146.8 ORP mV
Temperature - ℃	18.12	19.5	21.9	24.1
Turbidity	0.03 NTU	6.62	17.53	8.57
Total phosphorous - mg/L	0.04 mg/L	0.03	<0.01	0.02mg/L
Total nitrogen - mg/L	1.7 mg/L	0.4	0.4	0.3mg/L
Kjeldahl nitrogen mg/L	1.0 mg/L	0.4	0.3	0.3mg/L
Dissolved metals				
Arsenic	<0.001	<0.001	<0.001	<0.001
Cadmium	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	<0.001	<0.001	<0.001	<0.001
Copper	0.017	<0.001	0.005	0.007
Nickel	0.001	<0.001	0.001	0.001
Lead	<0.001	<0.001	<0.001	<0.001
Zinc	<0.005	0.008	<0.005	<0.005
Mercury	<0.0001	<0.0001	<0.0001	<0.0001
PFAS				
Lab results – SUM of PFAS Micrograms/L	0.13	0.04	0.08	<0.01
SUM of PFHxS & PFOS Microgrms/L	0.04	0.04	0.01	<0.01
Total suspended solids mg/L	6	<5	10	<5
Total hydrocarbons				
Benzene	<1	<1	<1	<1
Toluene	<2	<2	<2	<2
Ethylbenzene	<2	<2	<2	<2
meta-& para-Xylene	<2	<2	<2	<2
Ortho-Xylene	<2	<2	<2	<2
Total Xylenes	<2	<2	<2	<2
Sum of BTEX	<1	<1	<1	<1
Naphthalene	<5	<5	<5	<5

3.2 Interpreting Results

Dissolved Oxygen – Measures:

Dissolved oxygen (DO) is oxygen held (dissolved) in the water and available to aquatic organisms.

The amount of dissolved oxygen in a river or stream can tell us a lot about its water quality.

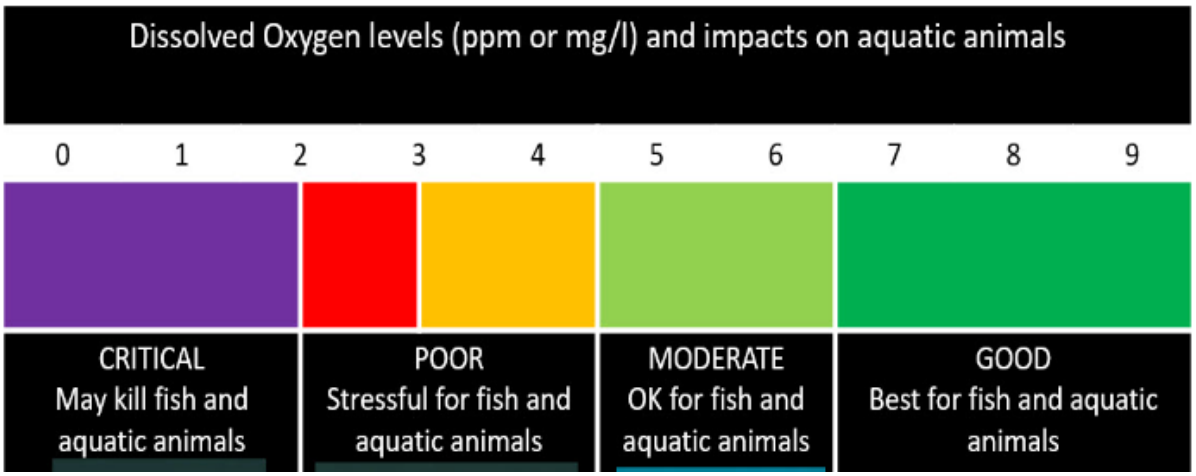
Water will naturally contain a certain amount of dissolved oxygen that is absorbed from the air and produced by plants and algae living in the water.

Temperature has a large effect on the amount of oxygen dissolved in water; cold water can hold higher levels of oxygen than warmer water. Higher water temperatures over summer will cause oxygen levels to drop.

Other factors such as river flow, wind, nutrients and bacterial activity can also affect the amount of dissolved oxygen in waterways.

Dissolved oxygen levels typically range between 5 and 14 mg/L (or ppm).

Example:



Salinity – Measures:

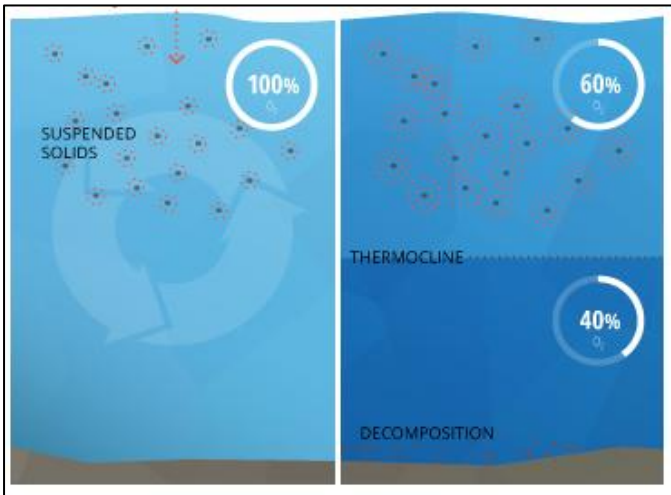
Electrical conductivity is a measure of the saltiness of the water and is measured on a scale from 0 to 50,000 uS/cm. Electrical conductivity is measured in microsiemens per centimeter (uS/cm). Freshwater is usually between 0 and 1,500 uS/cm and typical sea water has a conductivity value of about 50,000 uS/cm.

Examples:

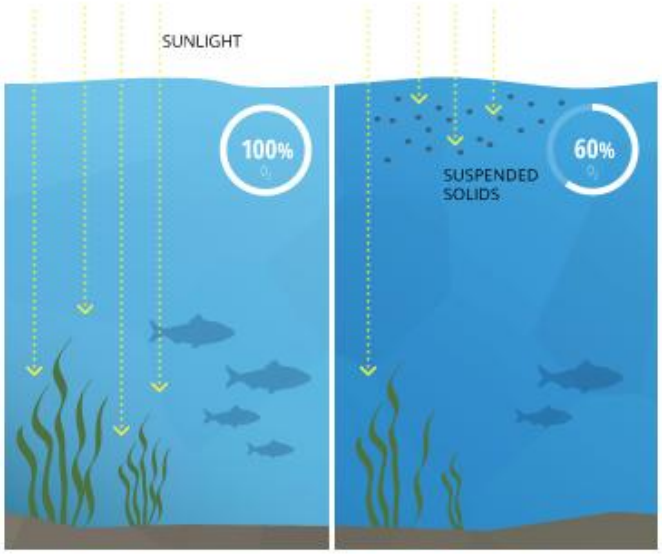
µS/cm	Use
0 - 800	• Good drinking water for humans (provided there is no organic pollution and not too much suspended clay material) • Generally good for irrigation, though above 300µS/cm some care must be, particularly with overhead sprinklers, which may cause leaf, scorch on some salt sensitive plants. • Suitable for all livestock
800 - 2500	• Can be consumed by humans, although most would prefer water in the lower half of this range if available • When used for irrigation, requires special management including suitable soils, good drainage and consideration of salt tolerance of plants • Suitable for all livestock
2500 -10,000	• Not recommended for human consumption, although water up to 3000 µS/cm can be consumed • Not normally suitable for irrigation, although water up to 6000 µS/cm can be used on very salt tolerant crops with very special management techniques. Over 6000 µS/cm, occasional emergency may be possible with care • When used for drinking water by poultry and pigs, the salinity should be limited to about 6000 µS/cm. Most other livestock can use water up to 10000 µS/cm

Total Dissolve Solids (TDS) – Measures

Dissolved solids, smaller than 2 microns, refer to any minerals, salts, metals, in the form of molecules, atoms, cations or anions dissolved in water. Total dissolved solids (TDS) comprise inorganic salts (principally calcium, magnesium, potassium, sodium, bicarbonates, chlorides and sulfates) and some small amounts of organic matter that dissolve in water.
The TDS concentration is the sum of all filterable substances in water that can be determined gravimetrically. However, in most cases, TDS is primarily comprised of ions.
High levels of total suspended solids can affect turbidity, increase water temperatures and decrease dissolved oxygen (DO) levels. This can cause the water to heat up more rapidly because the suspended particles absorb more heat and deplete oxygen, which can adversely affect aquatic life.



Suspended solids can increase the temperature of water as they absorb additional heat from the sun. This can also cause dissolved oxygen levels to drop below the thermocline, creating hypoxic conditions.



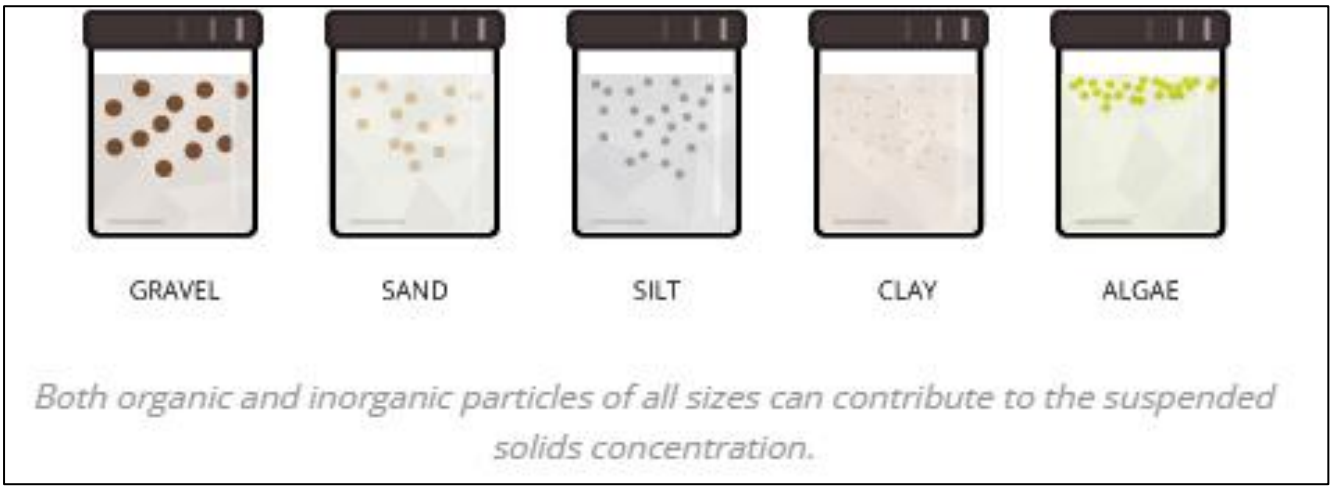
Suspended solids, particularly algae, can block sunlight from reaching submerged plants. This can cause dissolved oxygen levels to drop, as the plants rely on respiration (consuming oxygen) instead of photosynthesis.

Turbidity – Total Suspended Solids (TSS)

Turbidity data are reported in Nephelometric Turbidity Units (NTU). To provide a sense of scale, water with a turbidity

of 1 NTU is crystal clear, water at 5 NTU has a tiny trace of discolouration, and water at 100 NTU is brown and opaque. The standard is less than 10 NTU for rural streams and rivers and less than 30 NTU for urban lakes and ponds.

Total suspended solids (TSS) are particles that are larger than 2 microns found in the water column. Anything smaller than 2 microns (average filter size) is considered a dissolved solid. Most suspended solids are made up of inorganic materials, though bacteria and algae can also contribute to the total solids concentration.



Both organic and inorganic particles of all sizes can contribute to the suspended solids concentration.

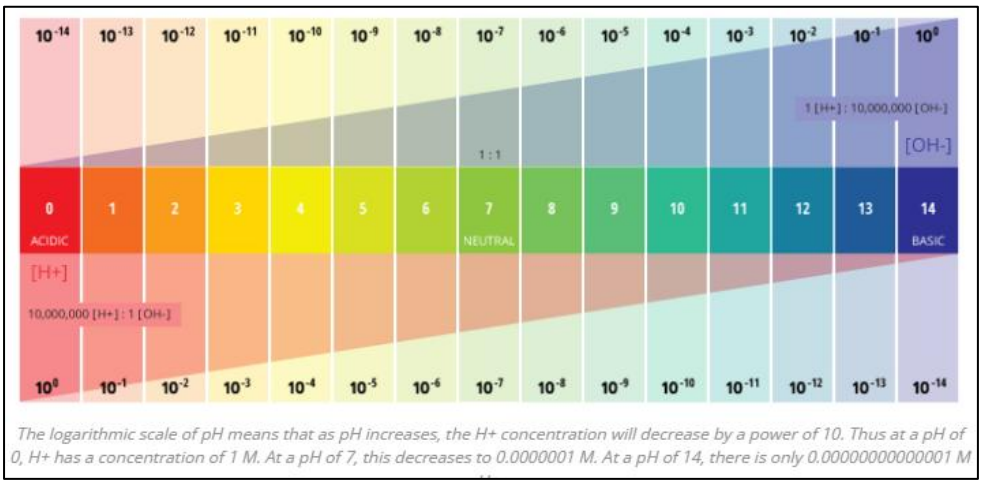
pH – Acidity / Alkalinity – Measures

The pH refers to the degree of acidity or alkalinity of a substance. A pH of 7 is neutral. A value above 7 indicates that the water is more alkaline and a pH below 7 indicates acidic conditions.

A pH of 7 is considered neutral. The logarithmic scale means that each number below 7 is 10 times more acidic than the previous number when counting down. Likewise, when counting up above 7, each number is 10 times more basic than the previous number pH stands for the "power of hydrogen" [3]. The numerical value of pH is determined by the molar concentration of hydrogen ions (H+) [3]. This is done by taking the negative logarithm of the H+ concentration (-log(H+)).

Standard values for pH readings are expected, pH 6.5–9 for rural streams and rivers and pH 6–9 for urban lakes and ponds.

In freshwater systems pH sets up the conditions for how easy it is for nutrients to be available and how easily things like heavy metals (toxicity for aquatic life) can dissolve in the water. Rivers and lakes generally range between 5 (acidic) and 9 (basic) on the pH scale.



The logarithmic scale of pH means that as pH increases, the H+ concentration will decrease by a power of 10. Thus at a pH of 0, H+ has a concentration of 1 M. At a pH of 7, this decreases to 0.0000001 M. At a pH of 14, there is only 0.00000000000001 M

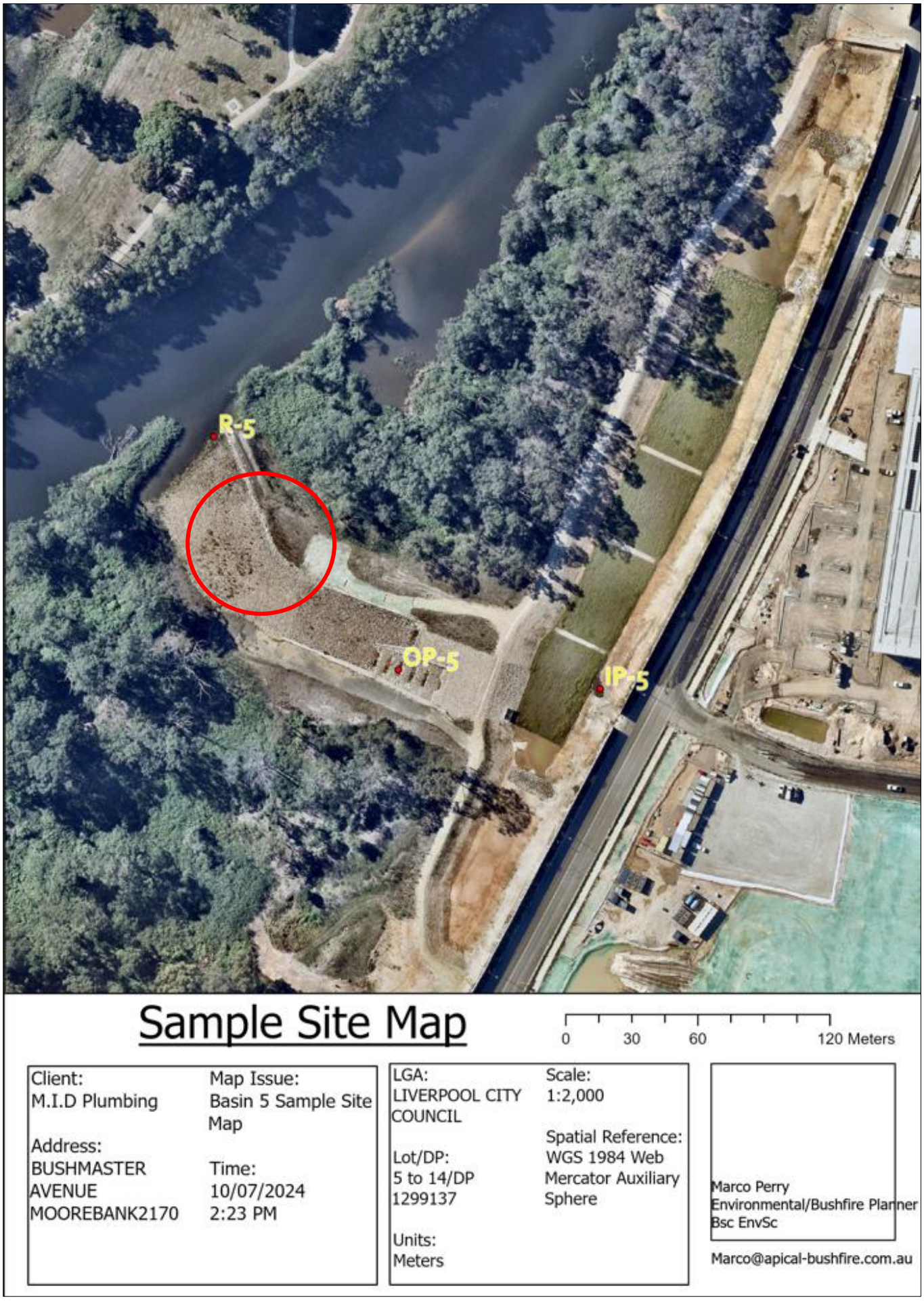
PFAS are per- and polyfluoroalkyl substances, In Australia, the historical use of PFAS in fire-fighting foams has resulted in increased levels being detected at sites like airports, Defence bases, and other sites where fire-fighting training has been conducted, or where fire suppression systems are installed for extinguishing liquid-fuel fires. Increased environmental levels of PFAS have also been found near some industrial areas, effluent outfalls and landfill sites refer

(Australian Government ; What are PFAS? | Australian Government PFAS Taskforce.)

PFAS chemicals can persist in the environment for decades, polluting waterways, soil and air, and build up in the bodies of animals and humans over time.
Two of the best-known types of PFAS are PFOS (perfluorooctane sulfonate), previously used in Scotchgard and firefighting foams, and PFOA (perfluorooctanoic acid), historically used to make Teflon cookware.
Today, both chemicals are recognised internationally as being toxic to humans and wildlife and have been discontinued (or are being progressively phased out) in many countries, including Australia.
Refer (ABC Health News PFAS 'forever chemicals' are all around us. What does it mean for our health? - ABC News)

Aquatic ecosystems	
Indicator	Numerical criteria (trigger values)
Total phosphorus 10 µg/L	• Upland rivers: 20 µg/L • Lowland rivers: 25 µg/L for rivers flowing to the coast; • Lakes & reservoirs: 10 µg/L • Estuaries: 30 µg/L
Total nitrogen 400 µg/L	• Upland rivers: 250 µg/L • Lowland rivers: 350 µg/L for rivers flowing to the coast; • Lakes & reservoirs: 350 µg/L • Estuaries: 300µg/L
Chlorophyll-a	• Upland rivers: not applicable • Lowland rivers: 5 µg/L • Lakes & reservoirs: 5 µg/L. • Estuaries: 4 µg/L.
Turbidity 17.53 NTU	• Upland rivers: 2–25 NTU (see supporting information) • Lowland rivers: 6–50 NTU (see supporting information) • Lakes & reservoirs: 1–20 NTU • Estuaries: 0.5–10 NTU
Salinity (electrical conductivity) 590 µS/cm	• Upland rivers: 30–350 µS/cm • Lowland rivers: 125–2200 µS/cm supporting information
Dissolved oxygen 10.19 ppm	• Upland rivers: 90–110% • Lowland rivers: 85–110% • Freshwater lakes & reservoirs: 90–110% • Estuaries: 80–110% Note: Dissolved oxygen values were derived from daytime measurements. Dissolved oxygen concentrations may vary diurnally and with depth. Monitoring programs should assess this potential variability.
pH 8.32	• Upland rivers: 6.5–8.0 • Lowland rivers: 6.5–8.5 • Freshwater lakes & reservoirs: 6.5–8.0 • Estuaries: 7.0–8.5 Changes of more than 0.5 pH units from the natural seasonal maximum or minimum should be investigated.

Map Image 5. Stormwater Testing Site OP-5 – Basin 5 – MPW



STORMWATER DISCHARGE TESTING SITE

BASIN 5 – OUTFLOW

Site image 1. Testing site Basin OSD-5 – Discharge to the Georges River

Water Quality Monitoring Comparative Table (Temporal)

Table 4. Retention Basin 5 MPW. Testing Site MPW 5 Outflow

Testing Site MPW Outflow	May 2024 baseline	October 2024	April 2025	Nov 2025
pH	6.39	6.21	8.32	7.48
Dissolved Oxygen - %/L	4.11mg/L	10.5	10.19	5.3mg/L
Actual Electronic Conductivity	0.054945	0.008	93.5 ORP mV	147.2 ORP mV
Temperature - ℃	18.12	19.5	21.9	24.1
Turbidity	0.03 NTU	6.62	17.53	8.04 NTU
Total phosphorous - mg/L	0.04 mg/L	0.03	<0.01	0.21mg/L
Total nitrogen - mg/L	1.7 mg/L	0.4	0.4	1.1mg/L
Kjeldahl nitrogen mg/L	1.0 mg/L	0.4	0.3	1.0 mg/L
Dissolved metals				
Arsenic	<0.001	<0.001	<0.001	<0.001
Cadmium	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	<0.001	<0.001	<0.001	<0.001
Copper	0.017	<0.001	0.005	0.007
Nickel	0.001	<0.001	0.001	0.001
Lead	<0.001	<0.001	<0.001	<0.001
Zinc	<0.005	0.008	<0.005	<0.005
Mercury	<0.0001	<0.0001	<0.0001	<0.0001
PFAS				
Lab results – SUM of PFAS Micrograms/L	0.13	0.04	0.08	<0.01
SUM of PFHxS & PFOS Microgrms/L	0.04	0.04	0.01	<0.01
Total suspended solids mg/L	6	<5	10	<5
Total hydrocarbons				
Benzene	<1	<1	<1	<1
Toluene	<2	<2	<2	<2
Ethylbenzene	<2	<2	<2	<2
meta-& para-Xylene	<2	<2	<2	<2
Ortho-Xylene	<2	<2	<2	<2
Total Xylenes	<2	<2	<2	<2
Sum of BTEX	<1	<1	<1	<1
Naphthalene	<5	<5	<5	<5

Results

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	B50	IP1	IP3	DP1	B60
				Sampling date / time	26-Nov-2025 00:00	26-Nov-2025 00:00	26-Nov-2025 00:00	26-Nov-2025 00:00	26-Nov-2025 00:00
Compound	CAS Number	LOR	Unit		ES2537469-001	ES2537469-002	ES2537469-003	ES2537469-004	ES2537469-005
					Result	Result	Result	Result	Result
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	---	5	mg/L		<5	5	48	<5	28
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	0.002	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L		0.007	<0.001	0.002	<0.001	<0.001
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L		<0.005	0.049	0.240	<0.005	<0.005
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	---	0.01	mg/L		0.03	0.12	<0.01	<0.01	0.09
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	---	0.1	mg/L		0.3	1.2	1.1	0.4	0.9
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	---	0.1	mg/L		0.3	1.3	1.1	0.4	1.0
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	---	0.01	mg/L		0.02	0.06	0.11	0.06	0.09
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	---	20	µg/L		<20	<20	<20	<20	<20
C10 - C14 Fraction	---	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	---	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	---	50	µg/L		<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	---	50	µg/L		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	B50	IP1	IP3	DP1	B60
				Sampling date / time	26-Nov-2025 00:00	26-Nov-2025 00:00	26-Nov-2025 00:00	26-Nov-2025 00:00	26-Nov-2025 00:00
Compound	CAS Number	LOR	Unit		ES2537469-001	ES2537469-002	ES2537469-003	ES2537469-004	ES2537469-005
					Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluoropropane sulfonic acid (PFPrS)	423-41-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	**0.04**	**0.03**	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	**0.04**	**0.03**	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L		<0.01	**0.16**	**0.10**	**0.03**	**0.15**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	**0.08**	**0.03**	**0.02**	**0.18**
Perfluorononane sulfonic acid (PFNS)	68259-12-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	B50	IP1	IP3	DP1	B60
				Sampling date / time	26-Nov-2025 00:00	26-Nov-2025 00:00	26-Nov-2025 00:00	26-Nov-2025 00:00	26-Nov-2025 00:00
Compound	CAS Number	LOR	Unit		ES2537469-001	ES2537469-002	ES2537469-003	ES2537469-004	ES2537469-005
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	**0.04**	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	**0.14**	**0.09**	**0.03**	**0.05**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	**0.03**	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	**0.05**	**0.03**	<0.01	**0.01**
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
Perfluorohexadecanoic acid (PFHxDA)	67905-19-5	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	B50	IP1	IP3	DP1	B60
				Sampling date / time	26-Nov-2025 00:00	26-Nov-2025 00:00	26-Nov-2025 00:00	26-Nov-2025 00:00	26-Nov-2025 00:00
Compound	CAS Number	LOR	Unit		ES2537469-001	ES2537469-002	ES2537469-003	ES2537469-004	ES2537469-005
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	---	0.01	µg/L		<0.01	0.58	0.31	0.08	0.39
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	0.24	0.13	0.05	0.33
Sum of PFAS (WA DER List)	---	0.01	µg/L		<0.01	0.54	0.28	0.08	0.39
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		77.5	80.0	88.1	80.2	117
Toluene-D8	2037-26-5	2	%		100	98.7	102	96.3	98.5
4-Bromofluorobenzene	460-00-4	2	%		112	111	109	100	123
EP231S: PFAS Surrogate									
13C4-PFOS	---	0.02	%		87.9	84.6	84.8	86.0	83.1
13C8-PFOA	---	0.02	%		89.5	88.1	87.5	87.9	87.1

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Work Order : ES2537469
Client : Apical Bushfire and Planning
Project : ----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	B6I	B5I	B8O	B8I	----
			Sampling date / time	26-Nov-2025 00:00	26-Nov-2025 00:00	26-Nov-2025 00:00	26-Nov-2025 00:00	---
Compound	CAS Number	LOR	Unit	ES2537469-006	ES2537469-007	ES2537469-008	ES2537469-009	-------
				Result	Result	Result	Result	---
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	<5	13	199	6	----
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	0.002	<0.001	0.003	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	0.002	----
Copper	7440-50-8	0.001	mg/L	0.003	<0.001	0.001	0.005	----
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.001	0.004	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Zinc	7440-66-6	0.005	mg/L	0.012	<0.005	0.006	<0.005	----
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	0.05	0.12	0.04	0.16	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.9	1.0	0.6	1.7	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	1.0	1.1	0.6	1.9	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	0.09	0.21	0.05	0.04	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	----
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	----
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	<100	----
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	<50	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	<20	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	B6I	B5I	B8O	B8I	----
				Sampling date / time	26-Nov-2025 00:00	26-Nov-2025 00:00	26-Nov-2025 00:00	26-Nov-2025 00:00	----
Compound	CAS Number	LOR	Unit		ES2537469-006	ES2537469-007	ES2537469-008	ES2537469-009	-------
					Result	Result	Result	Result	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	----
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	----
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	----
^ Total Xylenes	----	2	µg/L		<2	<2	<2	<2	----
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	----
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluoropropane sulfonic acid (PFPrS)	423-41-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L		<0.01	<0.01	**0.03**	**0.02**	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	**0.01**	**0.03**	**0.03**	----
Perfluorononane sulfonic acid (PFNS)	68259-12-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	B6I	B5I	B8O	B8I	----
				Sampling date / time	26-Nov-2025 00:00	26-Nov-2025 00:00	26-Nov-2025 00:00	26-Nov-2025 00:00	----
Compound	CAS Number	LOR	Unit		ES2537469-006	ES2537469-007	ES2537469-008	ES2537469-009	-------
					Result	Result	Result	Result	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	**0.03**	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	**0.02**	**0.07**	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	**0.01**	**0.01**	**0.03**	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
Perfluorohexadecanoic acid (PFHxDA)	67905-19-5	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	B6I	B5I	B8O	B8I	----
				Sampling date / time	26-Nov-2025 00:00	26-Nov-2025 00:00	26-Nov-2025 00:00	26-Nov-2025 00:00	----
Compound	CAS Number	LOR	Unit		ES2537469-006	ES2537469-007	ES2537469-008	ES2537469-009	-------
					Result	Result	Result	Result	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	0.02	0.09	0.18	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	0.01	0.06	0.05	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	0.02	0.09	0.18	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		79.7	106	81.4	80.5	----
Toluene-D8	2037-26-5	2	%		100	81.9	98.5	99.2	----
4-Bromofluorobenzene	460-00-4	2	%		113	106	111	104	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		83.2	84.6	83.4	84.7	----
13C8-PFOA	----	0.02	%		86.6	87.2	86.0	85.5	----

Surrogate Control Limits

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	72	143
Toluene-D8	2037-26-5	75	131
4-Bromofluorobenzene	460-00-4	73	137
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Appendix B. ANZECC & ARMCANZ (2000) water quality guidelines

Table 3.4.1 Trigger values for toxicants at alternative levels of protection. Values in grey shading are the trigger values applying to typical *slightly–moderately disturbed systems*; see table 3.4.2 and Section 3.4.2.4 for guidance on applying these levels to different ecosystem conditions.

Chemical		Trigger values for freshwater (µgL^{-1})				Trigger values for marine water (µgL^{-1})			
		Level of protection (% species)				Level of protection (% species)			
		99%	95%	90%	80%	99%	95%	90%	80%
METALS & METALLOIDS									
Aluminium	pH >6.5	27	55	80	150	ID	ID	ID	ID
Aluminium	pH <6.5	ID	ID	ID	ID	ID	ID	ID	ID
Antimony		ID	ID	ID	ID	ID	ID	ID	ID
Arsenic (As III)		1	24	94 [C]	360 [C]	ID	ID	ID	ID
Arsenic (AsV)		0.8	13	42	140 [C]	ID	ID	ID	ID
Beryllium		ID	ID	ID	ID	ID	ID	ID	ID
Bismuth		ID	ID	ID	ID	ID	ID	ID	ID
Boron		90	370 [C]	680 [C]	1300 [C]	ID	ID	ID	ID
Cadmium	H	0.06	0.2	0.4	0.8 [C]	0.7 [B]	5.5 [B, C]	14 [B, C]	36 [B, A]
Chromium (Cr III)	H	ID	ID	ID	ID	7.7	27.4	48.6	90.6
Chromium (CrVI)		0.01	1.0 [C]	6 [A]	40 [A]	0.14	4.4	20 [C]	85 [C]
Cobalt		ID	ID	ID	ID	0.005	1	14	150 [C]
Copper	H	1.0	1.4	1.8 [C]	2.5 [C]	0.3	1.3	3 [C]	8 [A]
Gallium		ID	ID	ID	ID	ID	ID	ID	ID
Iron		ID	ID	ID	ID	ID	ID	ID	ID
Lanthanum		ID	ID	ID	ID	ID	ID	ID	ID
Lead	H	1.0	3.4	5.6	9.4 [C]	2.2	4.4	6.6 [C]	12 [C]
Manganese		1200	1900 [C]	2500 [C]	3600 [C]	ID	ID	ID	ID
Mercury (inorganic)	B	0.06	0.6	1.9 [C]	5.4 [A]	0.1	0.4 [C]	0.7 [C]	1.4 [C]
Mercury (methyl)		ID	ID	ID	ID	ID	ID	ID	ID
Molybdenum		ID	ID	ID	ID	ID	ID	ID	ID
Nickel	H	8	11	13	17 [C]	7	70 [C]	200 [A]	560 [A]
Selenium (Total)	B	5	11	18	34	ID	ID	ID	ID
Selenium (SeIV)	B	ID	ID	ID	ID	ID	ID	ID	ID
Silver		0.02	0.05	0.1	0.2 [C]	0.8	1.4	1.8	2.6 [C]
Thallium		ID	ID	ID	ID	ID	ID	ID	ID
Tin (inorganic, SnIV)		ID	ID	ID	ID	ID	ID	ID	ID
Tributyltin (as µg/L Sn)		ID	ID	ID	ID	0.0004	0.006 [C]	0.02 [C]	0.05 [C]
Uranium		ID	ID	ID	ID	ID	ID	ID	ID
Vanadium		ID	ID	ID	ID	50	100	160	280
Zinc	H	2.4	8.0 [C]	15 [C]	31 [C]	7	15 [C]	23 [C]	43 [C]
NON-METALLIC INORGANICS									
Ammonia	D	320	900 [C]	1430 [C]	2300 [A]	500	910	1200	1700
Chlorine	E	0.4	3	6 [A]	13 [A]	ID	ID	ID	ID
Cyanide	F	4	7	11	18	2	4	7	14
Nitrate	J	17	700	3400 [C]	17000 [A]	ID	ID	ID	ID
Hydrogen sulfide	G	0.5	1.0	1.5	2.6	ID	ID	ID	ID
ORGANIC ALCOHOLS									
Ethanol		400	1400	2400 [C]	4000 [C]	ID	ID	ID	ID
Ethylene glycol		ID	ID	ID	ID	ID	ID	ID	ID
Isopropyl alcohol		ID	ID	ID	ID	ID	ID	ID	ID
CHLORINATED ALKANES									
Chloromethanes									
Dichloromethane		ID	ID	ID	ID	ID	ID	ID	ID
Chloroform		ID	ID	ID	ID	ID	ID	ID	ID
Carbon tetrachloride		ID	ID	ID	ID	ID	ID	ID	ID
Chloroethanes									
1,2-dichloroethane		ID	ID	ID	ID	ID	ID	ID	ID
1,1,1-trichloroethane		ID	ID	ID	ID	ID	ID	ID	ID

Chemical	Trigger values for freshwater (µgL^{-1})				Trigger values for marine water (µgL^{-1})			
	Level of protection (% species)				Level of protection (% species)			
	99%	95%	90%	80%	99%	95%	90%	80%
1,1,2-trichloroethane	5400	6500	7300	8400	140	1900	5800 [C]	18000 [C]
1,1,2,2-tetrachloroethane	ID	ID	ID	ID	ID	ID	ID	ID
Pentachloroethane	ID	ID	ID	ID	ID	ID	ID	ID
Hexachloroethane B	290	360	420	500	ID	ID	ID	ID
Chloropropanes								
1,1-dichloropropane	ID	ID	ID	ID	ID	ID	ID	ID
1,2-dichloropropane	ID	ID	ID	ID	ID	ID	ID	ID
1,3-dichloropropane	ID	ID	ID	ID	ID	ID	ID	ID
CHLORINATED ALKENES								
Chloroethylene	ID	ID	ID	ID	ID	ID	ID	ID
1,1-dichloroethylene	ID	ID	ID	ID	ID	ID	ID	ID
1,1,2-trichloroethylene	ID	ID	ID	ID	ID	ID	ID	ID
1,1,2,2-tetrachloroethylene	ID	ID	ID	ID	ID	ID	ID	ID
3-chloropropene	ID	ID	ID	ID	ID	ID	ID	ID
1,3-dichloropropene	ID	ID	ID	ID	ID	ID	ID	ID
ANILINES								
Aniline	8	250 [A]	1100 [A]	4800 [A]	ID	ID	ID	ID
2,4-dichloroaniline	0.6	7	20	60 [C]	ID	ID	ID	ID
2,5-dichloroaniline	ID	ID	ID	ID	ID	ID	ID	ID
3,4-dichloroaniline	1.3	3	6 [C]	13 [C]	85	150	190	260
3,5-dichloroaniline	ID	ID	ID	ID	ID	ID	ID	ID
Benzidine	ID	ID	ID	ID	ID	ID	ID	ID
Dichlorobenzidine	ID	ID	ID	ID	ID	ID	ID	ID
AROMATIC HYDROCARBONS								
Benzene	600	950	1300	2000	500 [C]	700 [C]	900 [C]	1300 [C]
Toluene	ID	ID	ID	ID	ID	ID	ID	ID
Ethylbenzene	ID	ID	ID	ID	ID	ID	ID	ID
o-xylene	200	350	470	640	ID	ID	ID	ID
m-xylene	ID	ID	ID	ID	ID	ID	ID	ID
p-xylene	140	200	250	340	ID	ID	ID	ID
m+*p*-xylene	ID	ID	ID	ID	ID	ID	ID	ID
Cumene	ID	ID	ID	ID	ID	ID	ID	ID
Polycyclic Aromatic Hydrocarbons								
Naphthalene	2.5	16	37	85	50 [C]	70 [C]	90 [C]	120 [C]
Anthracene B	ID	ID	ID	ID	ID	ID	ID	ID
Phenanthrene B	ID	ID	ID	ID	ID	ID	ID	ID
Fluoranthene B	ID	ID	ID	ID	ID	ID	ID	ID
Benzo(a)pyrene B	ID	ID	ID	ID	ID	ID	ID	ID
Nitrobenzenes								
Nitrobenzene	230	550	820	1300	ID	ID	ID	ID
1,2-dinitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,3-dinitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,4-dinitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,3,5-trinitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-methoxy-2-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-methoxy-4-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-chloro-2-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-chloro-3-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-chloro-4-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-chloro-2,4-dinitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,2-dichloro-3-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,3-dichloro-5-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,4-dichloro-2-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
2,4-dichloro-2-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID

Chemical	Trigger values for freshwater (µgL^{-1})				Trigger values for marine water (µgL^{-1})			
	Level of protection (% species)				Level of protection (% species)			
	99%	95%	90%	80%	99%	95%	90%	80%
Hexazinone	ID	ID	ID	ID	ID	ID	ID	ID
Simazine	0.2	3.2	11	35	ID	ID	ID	ID
Urea herbicides								
Diuron	ID	ID	ID	ID	ID	ID	ID	ID
Tebuthiuron	0.02	2.2	20	160 [C]	ID	ID	ID	ID
Miscellaneous herbicides								
Acrolein	ID	ID	ID	ID	ID	ID	ID	ID
Bromacil	ID	ID	ID	ID	ID	ID	ID	ID
Glyphosate	370	1200	2000	3600 [A]	ID	ID	ID	ID
Imazethapyr	ID	ID	ID	ID	ID	ID	ID	ID
Ioxynil	ID	ID	ID	ID	ID	ID	ID	ID
Metolachlor	ID	ID	ID	ID	ID	ID	ID	ID
Sethoxydim	ID	ID	ID	ID	ID	ID	ID	ID
Trifluralin B	2.6	4.4	6	9 [A]	ID	ID	ID	ID
GENERIC GROUPS OF CHEMICALS								
Surfactants								
Linear alkylbenzene sulfonates (LAS)	65	280	520 [C]	1000 [C]	ID	ID	ID	ID
Alcohol ethoxyolated sulfate (AES)	340	650	850 [C]	1100 [C]	ID	ID	ID	ID
Alcohol ethoxylated surfactants (AE)	50	140	220	360 [C]	ID	ID	ID	ID
Oils & Petroleum Hydrocarbons	ID	ID	ID	ID	ID	ID	ID	ID
Oil Spill Dispersants								
BP 1100X	ID	ID	ID	ID	ID	ID	ID	ID
Corexit 7664	ID	ID	ID	ID	ID	ID	ID	ID
Corexit 8667		ID	ID	ID	ID	ID	ID	ID
Corexit 9527	ID	ID	ID	ID	230	1100	2200	4400 [A]
Corexit 9550	ID	ID	ID	ID	ID	ID	ID	ID

Notes: Where the final water quality guideline to be applied to a site is below current analytical practical quantitation limits, see Section 3.4.3.3 for guidance.

Most trigger values listed here for metals and metalloids are *High reliability* figures, derived from field or chronic NOEC data (see 3.4.2.3 for reference to Volume 2). The exceptions are *Moderate reliability* for freshwater aluminium (pH >6.5), manganese and marine chromium (III).

Most trigger values listed here for non-metallic inorganics and organic chemicals are *Moderate reliability* figures, derived from acute LC_{50} data (see 3.4.2.3 for reference to Volume 2). The exceptions are *High reliability* for freshwater ammonia, 3,4-DCA, endosulfan, chlorpyrifos, esfenvalerate, tebuthiuron, three surfactants and marine for 1,1,2-TCE and chlorpyrifos.

* = *High reliability* figure for esfenvalerate derived from mesocosm NOEC data (no alternative protection levels available).

A = Figure may not protect key test species from acute toxicity (and chronic) — check Section 8.3.7 for spread of data and its significance. 'A' indicates that trigger value > acute toxicity figure; note that trigger value should be <1/3 of acute figure (Section 8.3.4.4).

B = Chemicals for which possible bioaccumulation and secondary poisoning effects should be considered (see Sections 8.3.3.4 and 8.3.5.7).

C = Figure may not protect key test species from chronic toxicity (this refers to experimental chronic figures or geometric mean for species) — check Section 8.3.7 for spread of data and its significance. Where grey shading and 'C' coincide, refer to text in Section 8.3.7.

D = Ammonia as TOTAL ammonia as [NH_3-N] at pH 8. For changes in trigger value with pH refer to Section 8.3.7.2.

E = Chlorine as total chlorine, as [Cl]; see Section 8.3.7.2.

F = Cyanide as un-ionised HCN, measured as [CN]; see Section 8.3.7.2.

G = Sulfide as un-ionised H_2S, measured as [S]; see Section 8.3.7.2.

H = Chemicals for which algorithms have been provided in table 3.4.3 to account for the effects of hardness. The values have been calculated using a hardness of 30 mg/L $CaCO_3$. These should be adjusted to the site-specific hardness (see Section 3.4.3).

J = Figures protect against toxicity and do not relate to eutrophication issues. Refer to Section 3.3 if eutrophication is the issue of concern.

ID = Insufficient data to derive a reliable trigger value. Users advised to check if a low reliability value or an ECL is given in Section 8.3.7.

T = Tainting or flavour impairment of fish flesh may possibly occur at concentrations below the trigger value. See Sections 4.4.5.3/3 and 8.3.7.

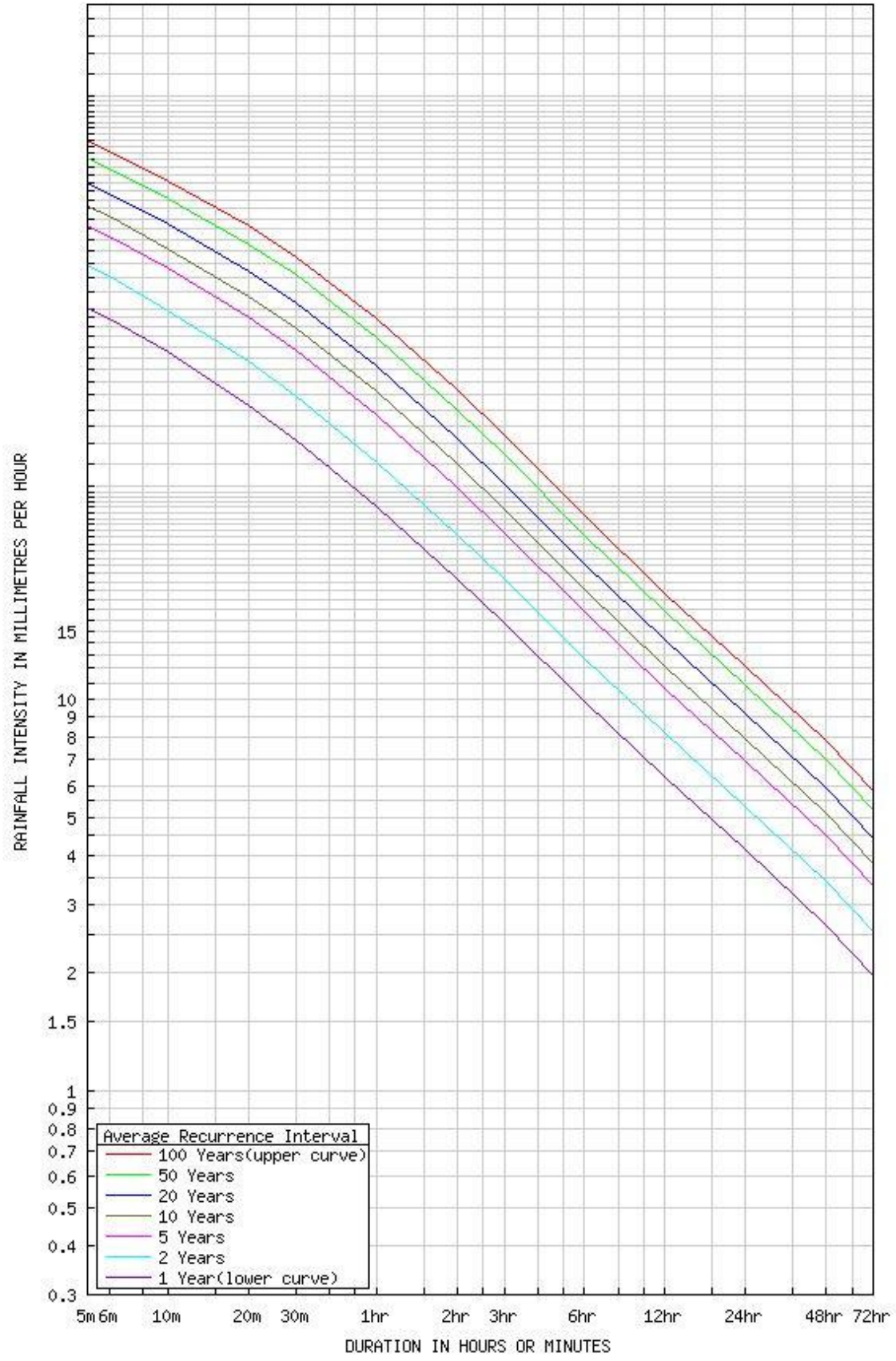
Table 5. Ecological water quality guideline values developed by water regulators

Exposure scenario	PFOS	PFOA	Exposure scenario	Comments and source
Freshwater	0.00023 µg/L	19 µg/L	99% species protection - high conservation value systems	Australian and New Zealand Guidelines for Fresh and Marine Water Quality - technical draft default guideline values for PFOS and PFOA. Note 1: The 99% species protection level for PFOS is close to the level of detection. Agencies may wish to apply a 'detect' threshold in such circumstances rather than a quantified measurement. Note 2: The draft guidelines do not account for effects which result from the biomagnification of toxicants in air-breathing animals or in animals which prey on aquatic organisms. Note 3: The WQGs advise[41] that the 99% level of protection be used for slightly to moderately disturbed systems. This approach is generally adopted for chemicals that bioaccumulate and biomagnify in wildlife. Regulators may specify or environmental legislation may prescribe the level of species protection required, rather than allowing for case-by-case assessments.
	0.13 µg/L	220 µg/L	95% species protection - slightly to moderately disturbed systems	
	2 µg/L	632 µg/L	90% species protection - highly disturbed systems	
	31 µg/L	1824 µg/L	80% species protection - highly disturbed systems	
Interim marine	0.00023 µg/L	19 µg/L	99% species protection - high conservation value systems	As above. Freshwater values are to be used on an interim basis until final marine guideline values can be set using the nationally-agreed process under the Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Note 1: The WQG advise that in the case of estuaries, the most stringent of freshwater and marine criteria apply, taking account of any available salinity correction. Note 2: Marine guideline values developed by CRC CARE are under consideration through the nationally-agreed water quality guideline development process.
	0.13 µg/L	220 µg/L	95% species protection - slightly to moderately disturbed systems	
	2 µg/L	632 µg/L	90% species protection - highly disturbed systems	
	31 µg/L	1824 µg/L	80% species protection - highly disturbed systems	

https://www.waterquality.gov.au/sites/default/files/documents/ANZECC-1992-guidelines.pdf

Type of indicator	Indicator	Units	Fresh waters	Marine waters
	Dissolved oxygen[2]	mg/L	> 6 (> 80–90% saturation)	> 6 (> 80–90% saturation)
	Nutrients/nuisance growths	–	(Section 2.3.3)	(Section 2.3.3)
	pH	–	6.5–9.0	< 0.2 pH unit change
	Salinity	mg/L	< 1000 (about 1,500 µS/cm)	–
	Suspended particulate matter/turbidity	–	< 10% change seasonal mean concentration (see also colour & clarity)	< 10% change seasonal mean concentration (see also colour & clarity)
	Temperature[3]	–	< 2°C increase	< 2°C increase
Toxicants				
Inorganic toxicants	Aluminium	µg/L	< 5.0 (if pH < = 6.5)	NR
	Aluminium	µg/L	< 100.0 (if pH > 6.5)	–
	Ammonia	µg/L	20.0–30.0 (Table 2.3)	NR
	Antimony	µg/L	30.0	500.0
	Arsenic	µg/L	50.0	50.0
	Beryllium	µg/L	4.0[4]	NR
	Cadmium	µg/L	0.2–2.0[5]	2.0
	Chromium	µg/L	10.0	50.0
	Copper	µg/L	2.0–5.0[5]	5.0
	Cyanide	µg/L	5.0	5.0
	Iron	µg/L	1,000.0[6]	NR
	Lead	µg/L	1.0–5.0[5]	5.0
	Mercury	µg/L	0.1	0.1
	Nickel	µg/L	15.0–150.0[5]	15.0
	Selenium	µg/L	5.0	70.0
	Silver	µg/L	0.1	1.0
	Sulfide	µg/L	2.0	2.0
	Thallium	µg/L	4.0	20.0
	Tin (tributyltin)	µg/L	0.008	0.002
	Zinc	µg/L	5.0–50.0[6]	50.0
Organic toxicants	Acrylonitrile	µg/L	NR	NR
	Benzidine	µg/L	NR	NR
	Dichlorobenzidine	µg/L	NR	NR
	Diphenylhydrazine	µg/L	NR	NR
Halogenated aliphatic compounds	Hexachlorobutadiene	µg/L	0.1	0.3
	Halogenated ethers	µg/L	NR	NR
	Isophorone	µg/L	NR	NR
Monocyclic aromatic compounds	Benzene	µg/L	300.0	300.0
	Chlorinated benzenes	µg/L	(Table 2.8)	NR

Appendix C. Intensity Frequency Duration – Average Recurrence Interval Indicator
Intensity-Frequency-Duration (bom.gov.au)



Moorebank Logistics Park West Precinct

Basin (OSD-6) Location

Stormwater Network Water Quality Monitoring Data & Reporting November 2025

Site image: SIOMP Inlet to Basin 6 (OSD-6) MPW (Apical image November 2025)

Prepared for: MID Plumbing P/L SIOMP Moorebank Precinct West (Spring 2025)

Prepared by: Daniel Anderson *(BEnvSc, MEnvSc)*

E-mail: daniel@apical-bushfire.com.au
Phone: 0415617771
PO Box 149 Kiama NSW 2533
ABN: 656 420 10 400

Consulted Documents / database.

Australia and New Zealand Guidelines for fresh and Marine Water Quality (2000)
NATIONAL WATER QUALITY MANAGEMENT STRATEGY - Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000) - Volume 2 - Aquatic ecosystems

Bureau of Meteorology – Australian Government Australia's official weather forecasts & weather radar - Bureau of Meteorology (bom.gov.au)

Moorebank Intermodal Precinct West – Stage 3 (SSD 10431) | Assessment Report March 2021
https://moorebankintermodalprecinct.com.au/wp-content/uploads/2023/04/MPW-S3-DPIE-assessment-report-to-IPC.pdf

WQM Report Western Precinct _Basin 5_Autumn 2024 – Apical Bushfire and Planning - April 2024

WQM Report Western Precinct _Basin 8_Spring 2024 – Apical Bushfire and Planning - October 2024

Development Consent - Section 4.38 of the Environmental Planning and Assessment Act 1979 - Application Number: SSD 7709 Applicant: Sydney Intermodal Terminal Alliance (SIMTA) as Qube Holdings Limited Consent Authority: The Independent Planning Commission Site: Moorebank Avenue, Moorebank Lot 1 DP 1197707 Lot 100 DP 1049508 Lot 101 DP 1049508 Lot 2 DP 1197707 Part Lot 3 DP 1197707 Part Anzac Road and Moorebank Avenue public road reserves Development: Moorebank Precinct West Stage 2 (MPW Stage 2)

Development Consent - Section 4.38 of the Environmental Planning and Assessment Act 1979 - Application Number: SSD 10431 Applicant: Sydney Intermodal Terminal Alliance (SIMTA) as Qube Holdings Limited Consent Authority: The Independent Planning Commission Site: Moorebank Avenue, Moorebank Lot 1 DP 1197707 Lot 100 DP 1049508 Lot 101 DP 1049508 Moorebank Precinct West Stage 3 (MPW Stage 3)

Australian Laboratory Services (ALS) Work Order EW2402561 Certificate of Analysis Water Sample Data 9th April 2025.

Liverpool DCP
Liverpool's Development Control Plans | Liverpool City Council (nsw.gov.au)

DEE 2016. Commonwealth Environmental Management Guidance on Perfluorooctane Sulfonic Acid (PFOS) and Perfluorooctanoic Acid (PFOA). Department of the Environment and Energy.
https://environment.gov.au/system/files/pages/dfb876c5-581e-48b7-868c-242fe69dad68/files/draft-environmental-mgt-guidance-pfos-pfoa.pdf

Development Consent SSD 7709 - Section 4.38 of the Environmental Planning and Assessment Act 1979
https://www.ipcn.nsw.gov.au/resources/pac/media/files/pac/projects/2019/05/moorebank-intermodal-precinct-west-stage-2/referral-from-department-of-planning-and-environment/revised-recommended-conditions/mpw-stage-2-recommended-conditions-inclusive-of-edits-191105.pdf

Glossary

The following definitions apply to terms used in this report. Many of these definitions are consistent with relevant national literature and cited where appropriate.

Current status trigger value
Concentrations of water quality indicators that reflect existing ecosystem condition, and therefore provide a target for ecosystem maintenance and a benchmark against which future water quality trends may be monitored.

Environmental value
Particular values or uses of the environment important for a healthy ecosystem or for public benefit, welfare, safety or health and requiring protection from the effects of pollution or degradation (Environment Australia 2002).

Indicator
A parameter (biological, physical or chemical) used to provide a measure of the quality of water or the condition of an ecosystem (Environment Australia 2002).

Low-risk trigger value
Concentrations (or loads) of key performance indicators [of water quality] at which if not exceeded, there is a low risk that adverse biological effects will occur (ANZECC 2000a).

Median
The middle reading, or 50th percentile, of all readings taken. i.e. of the readings 10, 13, 9, 16 and 11 (re-ordering these to read 9, 10, 11, 13 and 16), the median is 11. The mean (or average), is the sum of all values divided by the total number of readings (which in this case equals 11.8).

Reference condition
Refers to a site which is unmodified or minimally modified from 'natural' condition. Most commonly, reference sites are subject to limited disturbance from human activity. The reference condition then serves as a standard or target against which environmental change in other similar sites can be assessed.

Trigger value
A concentration that, if exceeded, would indicate a potential environmental problem, and so 'trigger' a management response, such as further investigation and/or remedial actions (ANZECC 2000a).

Water quality guideline
A numerical concentration level (e.g. of a contaminant) or narrative statement (e.g. visual appearance of a water body) recommended to support and maintain a designated water use (ANZECC 2000a)

1.1 Background

The Sydney Intermodal Terminal Alliance (SIMTA) received approval for the construction and operation of Stage 3 (the Project) of Moorebank Precinct West (MPW), which comprises the third stage of development within the Moorebank Precinct West under Development Approval SSD-10431.

The proposal is SSD under clause 19 of Schedule 1 of the State Environmental Planning Policy (State and Regional Development) 2011, as it is development for the purpose of rail and related transport facilities.

The MPW site is located on the western side of Moorebank Avenue and forms the western section of the Moorebank Intermodal Precinct (Map Image 2).

The MPW site is approximately 2.5 kilometres (km) from the Liverpool city centre, 27 km south-west of the Sydney Central Business District (CBD) and 26 km west of Port Botany.

The MPW site is irregular in shape, approximately 3 km from north to south and 960 m from east to west at its widest point and covers an area of approximately 220 ha. It is situated between the Georges River to the west (with the SSFL running north-south to the west of the river); and Moorebank Avenue to the east.

Works on the MPW site to date have commenced under two current and active development consents:

• MPW Stage 1 early works, which provides demolition, rehabilitation, remediation of contaminated land, and the establishment of construction facilities and access including site security (as part of the SSD 5066 consent)

• MPW Stage 2, which provides for the construction and 24/7 operation of an intermodal facility and associated warehousing (SSD 7709).

This WQM period refers to Stage 2 development and partial operation of the site with active tenancy across buildings located to the MPW zone.

This water quality monitoring program is guided by the Stormwater Infrastructure Operation and Maintenance Plan (SIOMP) and is provided to site management on behalf of MID Plumbing.

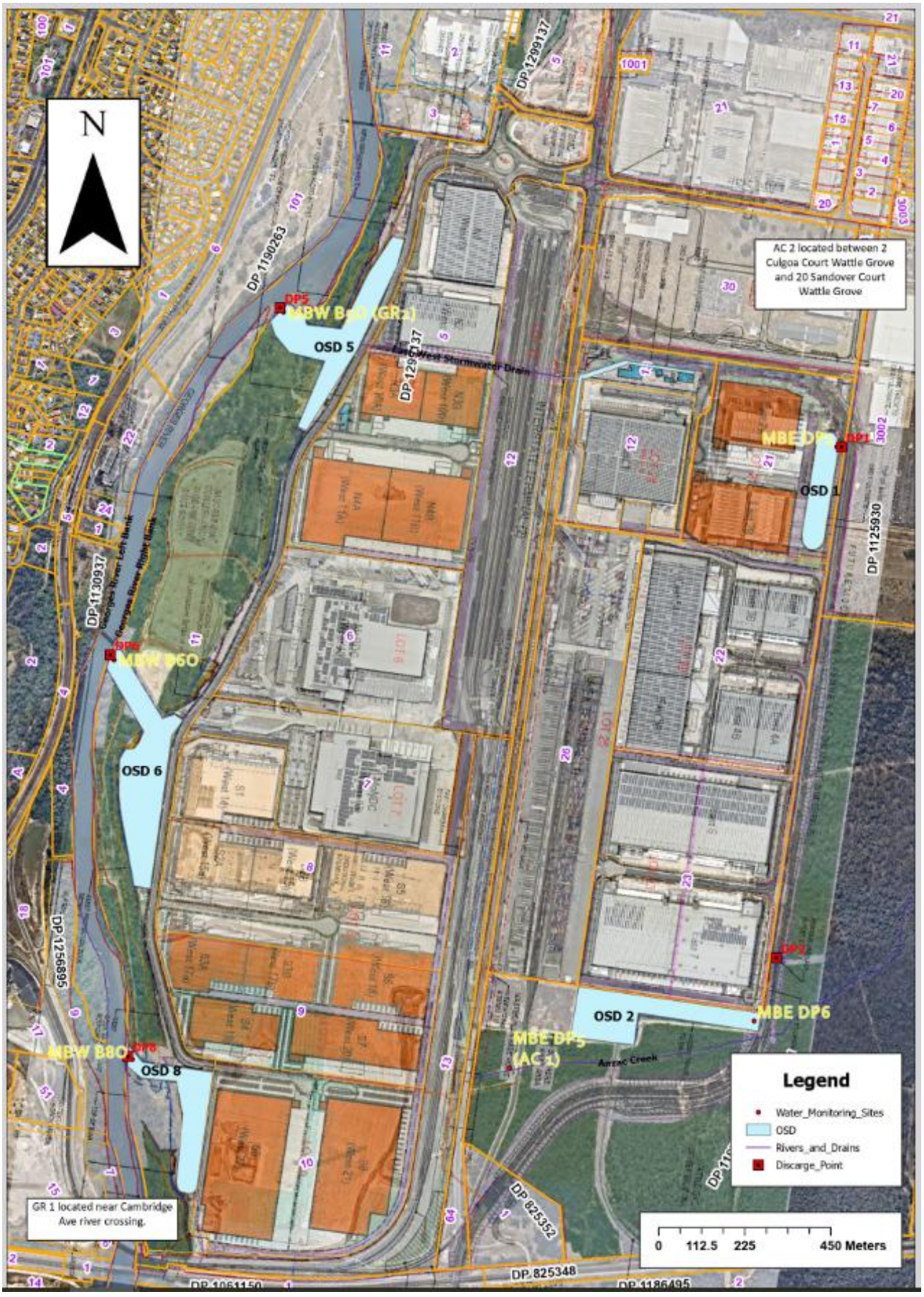
Three onsite bio-retention basins are present within Moorebank Precinct West. This report is in reference to baseline water quality condition reporting for Basin 5 (MPW – north).

Development Consent - Section 4.38 of the Environmental Planning and Assessment Act 1979 - Application Number: SSD 7709 Moorebank Precinct West Stage 2 (MPW Stage 2)

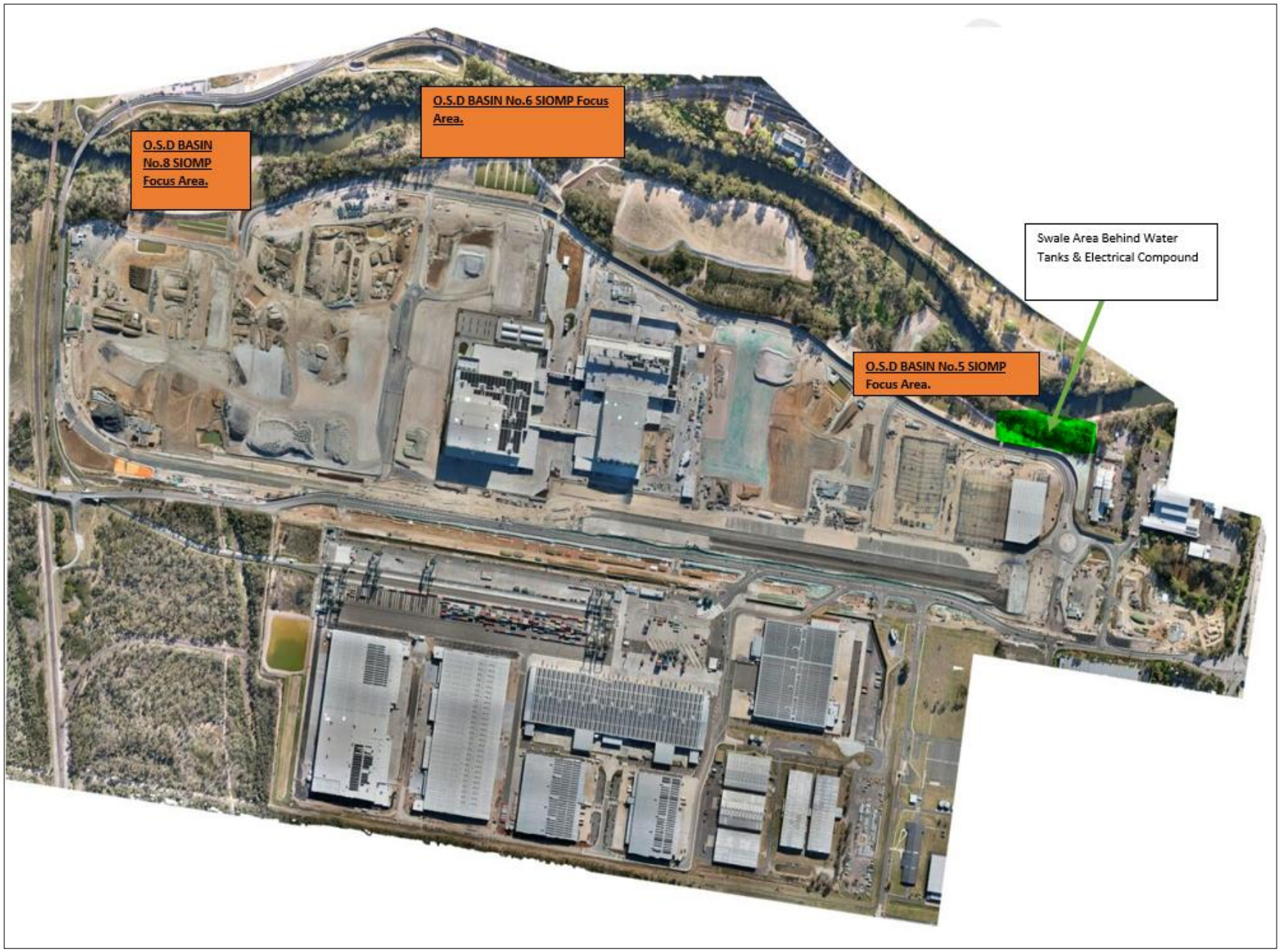
CoC	Requirement
Stormwater Quality Monitoring	
B38.	Stormwater Quality Monitoring Program - Prior to commencement of operation Part of the Operational Environmental Management Plan

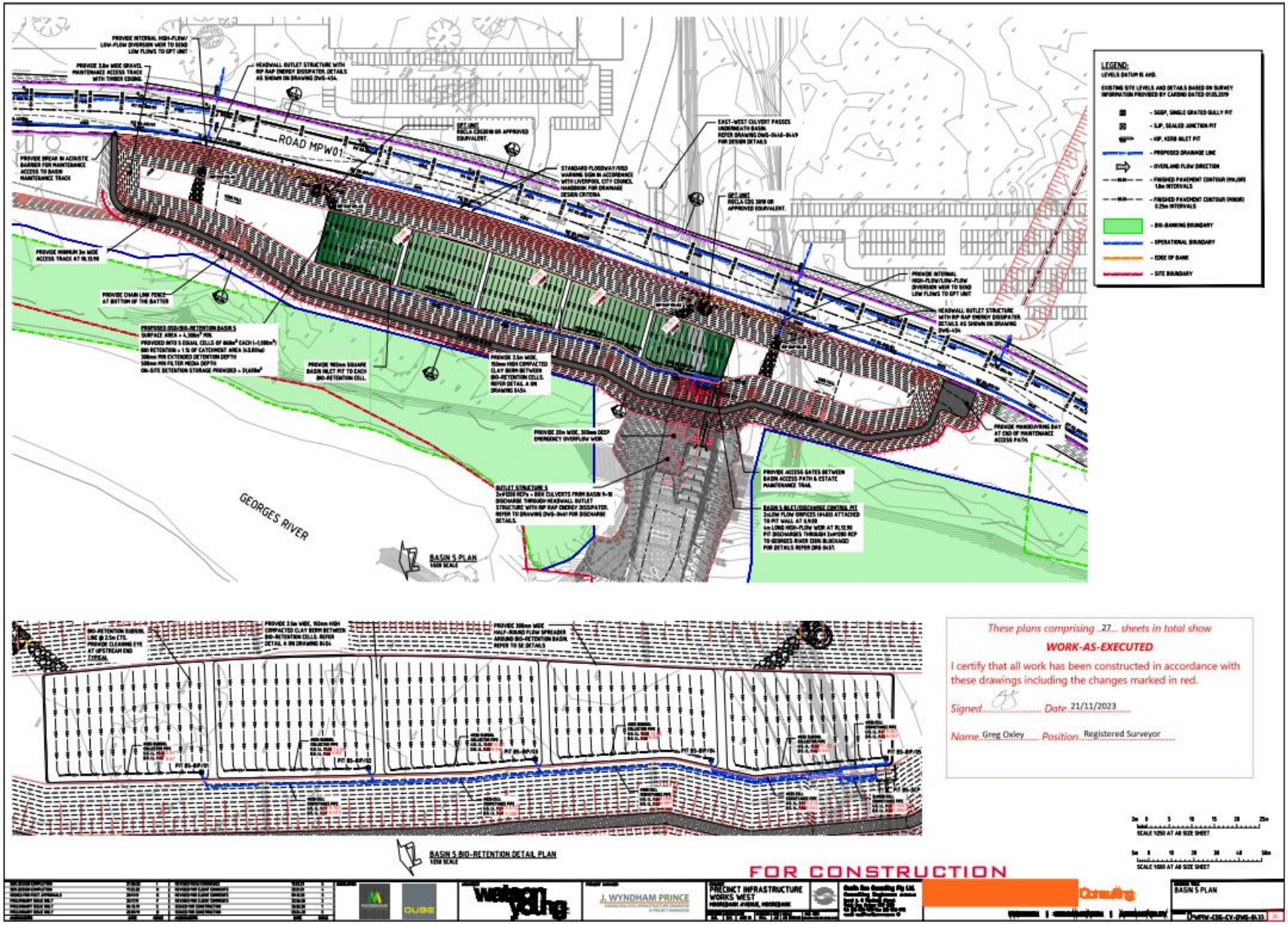
The Stormwater Infrastructure Operation and Maintenance Plan (SIOMP) Moorebank Logistics Park – West Precinct was developed to address the requirements of MPE stage 3 CoCs (SSD 7709). The management plan (SIOMP) identifies the operational drainage and environmental management measures within the stormwater management system that will be applied to activities undertaken across the MLP west Precinct to manage improved water quality objectives and overall functionality of the stormwater detention and drainage network associated with stormwater infrastructure upon the site under the SIOMP.

Map image 1. Overview subject site (MPW) provided by Arcadis



Map Image 2. Moorebank Precinct West Detention Basins (provided by MID Plumbing)

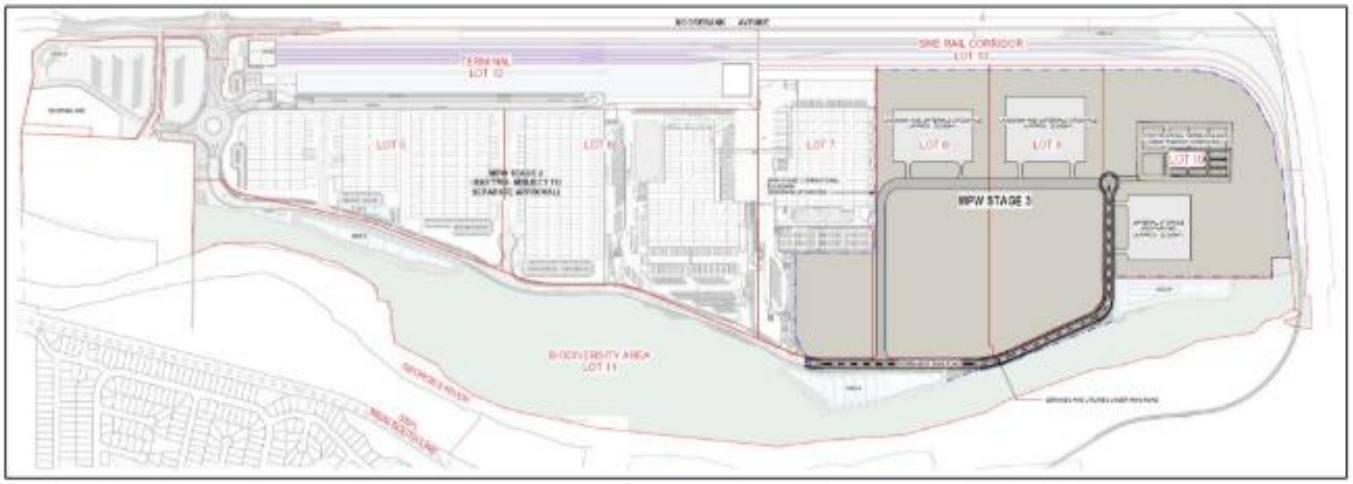




Map image 3. Detention Basin 5 MPW (north)

1.2 Reference information

Map image 4. Moorebank Intermodal Precinct West – Stage 3 State Significant Development



Assessment (SSD-10431) March 2021

20. Stormwater Management System or Works	That untreated stormwater is not disposed of into the Georges River or its tributaries. The likely impact of stormwater disposal on the quality of any receiving waters. That the levels of nutrients and sediments entering the waterway are not increased by the proposed development. Whether any proposals to manage stormwater are in accordance with the local council's stormwater management plans and the Managing Urban Stormwater series of documents and meet the local council's stormwater management objectives. Whether the principles outlined in the *Managing Urban Stormwater Soils and Construction Handbook* (1998) prepared by and available from Landcom and the Department of Housing are followed during each stage of a development (including subdivision).	Detailed stormwater assessments were undertaken as part of MPW Stage 2, and remain applicable to the Stage 3 proposal. The Department has recommended conditions that would enforce these requirements, by ensuring that appropriate measures are implemented to manage stormwater impacts during construction. In regard to management of stormwater during operation of the MPW site, the MPW Stage 2 proposal incorporates a robust set of conditions to manage the release of stormwater via six onsite detention basins (OSD), a major east-west covered culvert and associated drainage infrastructure.

2. Monitoring Program Methodology

2.1 Monitoring Sites

To support stormwater and drainage management of the facility the MLP West precinct has established a vast stormwater infrastructure system consisting of several Water Sensitive Urban Design (WSUD) functions including raingardens detention basins and bio-swales. These networks are designed to minimise the velocity and peak discharge of stormwater draining from the site and act as onsite detention basins to harvest and sequester potential pollutants generated at the site through designed biological processes.

The stormwater infrastructure system discharges water into the natural drainage system via three outlets:

- Basin 5 detains water from the northern section of MPW before discharging into Georges River
- Basin 6 detains water from the mid-section of MPW before discharging into Georges River
- Basin 8 detains water from the southern section of MPW before discharging into Georges River

Monitoring of the discharge points has been established via our ongoing program with MID Plumbing under the SIOMP program (MPE) to collect qualitative data and analyse the performance of the WSUD provisions and to establish any potential trends in water quality readings from the stormwater network discharge points prior to release of water into the natural hydrological systems of Anzac Creek and the Georges River.

This report constitutes the Spring 2025 water quality data alongside baseline data for Basin 5 (OSD-5) Moorebank Precinct West (MPW).

Table 1. Type of outlet MPW

Discharge Point (see figure 2)	Associated Outlet (see figure 1)	Type of outlet/detention basin
Basin 5	Inlet	Bio retention basin (holding)
	Outlet	Outlet point – rock ramp
	Georges River	River – natural drainage conveyance
Basin 6	Inlet	Bio retention basin (holding)
	Outlet	Outlet point – rock ramp
Basin 8	Inlet	Bio retention basin (holding)
	Outlet	Outlet point – rock ramp

2.2 Water Quality Assessment

Surface water quality data collected at the discharge points is assessed with reference to ANZECC Guidelines (2000) and correlated with baseline & Spring 2025 Water Quality monitoring results provided by previous condition assessment reports.

By comparing water test data under the program across the testing timeline we can identify and report upon trends, identify exceedances and exclude potential anomalies for datasets.

Water from OSD-5 is released to the Georges River a natural riverine system located to the southwest of the Sydney Basin.

Table 2. ANZECC Low Risk Trigger Values

Ecosystem type	Turbidity NTU	EC µS/cm	pH*	DO	TN mg/L	NO_x - N mg/L	NH_4^+ - N mg/L	TP mg/L	DRP - P mg/L
Upland river	2-25	30-350	6.5-7.5	90-110	0.480	0.190	0.013	0.013	0.005
Lowland river	6-50	125-2200	6.5-8.0	85-110	0.500	0.190	0.020	0.050	0.020

Values for Low Land River Systems as insert above are used as the reference guide to water quality parameter values and overall health and safety statements regarding the quality of discharged water from the SIOMP drainage network.

Annual spring and autumn water quality data presented from Anzac Creek and Georges River testing programs by other scientific consultants may also be cross referenced to the data prepared by Apical under the SIOMP program to establish potential trends in results and identify increases in accumulated pollutants from the site under operational condition, which may appear present within adjacent natural waterways.

Site data was collected in the form of water samples and in field data recordings at the prescribed monitoring points, water samples and water probe readings are undertaken following Australia and New Zealand guidelines for fresh and marine water quality – 2000 (ANZECC Guidelines), In situ water quality parameters relevant to stream health and aquatic assessment profiling were collected in field with a multiparameter hand-held water quality monitoring probe (Aquatroll 600).

Water data is collected, analysed and collated under the same methodologies and process under each testing period, the ensure consistency in the process.

Measures tested and samples taken:

- pH
- Dissolved Oxygen
- Electrical Conductivity
- Water Temperature and
- Turbidity

Water samples are collected at inlet and discharge points (Basin 5, Basin 6 & Basin 8) then sent to Australian Laboratory Services (ALS) for quality testing analysis Surface water (alsglobal.com).

Water analytical suites / testing parameters are provided to obtain overall water condition results and chemical sampling of collected water is undertaken for a range of nutrients, metals, and hydrocarbons relevant to stream health and aquatic assessment protocol, key nutrients, metals, and pollutants included in the assessment to reflect an overall suite of water quality condition guides which are listed below:

- Total phosphorous
- Total Nitrogen
- Kjeldahl Nitrogen
- Dissolved Metals
- PFAS
- Total Suspended Solids
- Total Hydrocarbons

The raw data results from the lab analysis provided to us by ALS Laboratory Services are presented within this report (see Appendix A).

Key water quality data attributes are recorded, tables and compared against; previous condition baseline data, Liverpool Development Control Plan (DCP) water quality targets, Conditions of Consent B40 and ANZECC Guideline (2000) trigger limits under the condition category 90% protection criteria for freshwater natural systems.

The water quality guidelines are applied to ensure adjacent natural waterways George River and Anzac creek are not adversely affected by poor water quality discharge from the Moorebank logistics park site and operations.

Trends observed in our datasets are analysed on a temporal scale with any trigger values for specific water quality measures highlighted and presented within the results chapter of each seasonal report. This report provides baseline & Spring 2024 data for Basin 5 (MPW) from which trend analysis will compound over

future reporting periods.

2.3 Data Analysis

The water quality measurements collected are used to assess water quality at each site in terms of health of aquatic ecosystems by comparison with guideline values recommended by the ANZECC and ARMCANZ (2000) guidelines for the protection of lowland streams (i.e. systems at < 150 m altitude) in south-east Australia. This categorisation for stream health is deemed relevant for the description of Anzac Creek, the recipient natural way due to the location in the geomorphic landscape and correlations of expected biophysical health and habitat profiles for similar stream environments.

2.4 Survey dates and personnel

On the 15th December 2025, ecologists from Apical Bushfire and Planning attended Moorebank Precinct West (MPW) to collect water quality data across the testing sites which are located within selected inlet points and discharge points within the stormwater drainage and management system (SIOMP) located within the Moorebank Logistics Park site West (See map image 2).

Inlet and outlet points within the network are representative of variant sites where stormwater will enter a node of the system (as a point source) and then release from the that node of the system at a discharge point. By recording inlet and discharge data water quality can be tracked along the continuum within the system to determine condition changes and overall trends in measured quality at given sites.

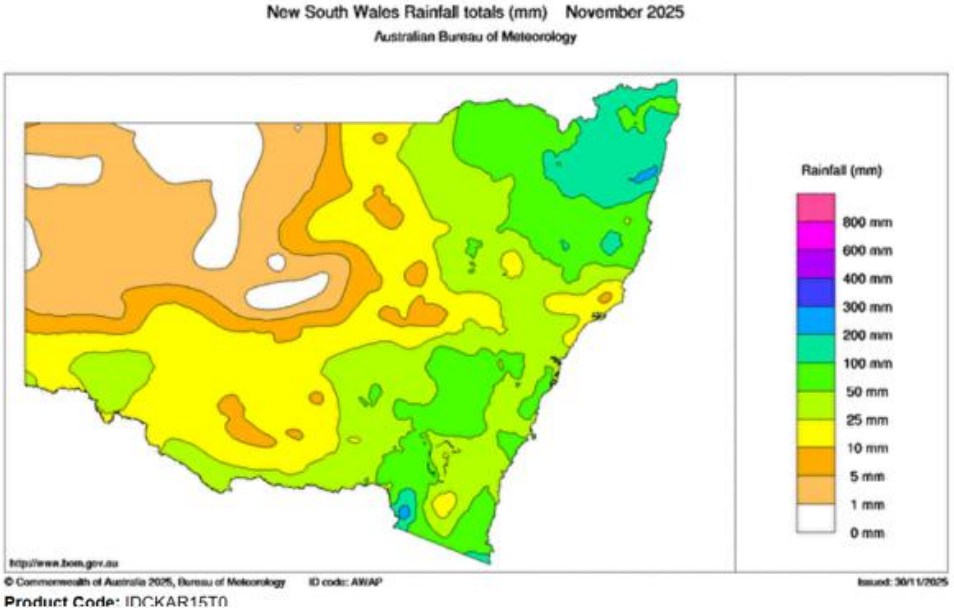
This data was collected on behalf of MID plumbing in accordance with 'The Stormwater Infrastructure Operation and Maintenance Plan Moorebank Logistics Park – West Precinct 2020' and in compliance with Condition of Consent B40 (Liverpool City) for the subject site. The results of such monitoring data collection are presented within this report.

2.5 Rainfall

Between the 1st of November and the 31st of November 2025 Moorebank received 61.6mm of rainfall.

NSW Monthly Rainfall November 2025

61.6 mm for the month in Holsworthy NSW.



3. Results

Data results captured by our water quality sampling are presented herein and are representative of baseline water quality results for Moorebank Precinct West Basin 5. Threshold guideline quantitative values for the water quality parameter themes are compared and correlated to ANZECC/ARMCANZ (2000) guidelines under the categorisation thresholds – Waterway benchmark group: 'The protection of slightly disturbed lowland river ecosystems in southeast Australia'.

As these are the first samples results collected under our scope for the SIOMP-MPW sites, the sampling results presented in this report will be considered for future analysis against subsequent results for use as baseline data for the drainage network SIOMP function.

B) 6-Inlet (OSD-6)

Measures	Results
Date & Time	26/11/2025 – 10.23am
Temperature	26.4
Dissolved Oxygen %	112
Dissolved Oxygen mg/L	9.0
Salinity SPC ms/cm	0.165
Salinity C-ms/cm	170
TDS mg/L Total Dissolved Solids	108
pH	8.39
ORP mV Oxidation reduction potential	172.7
NTU	-4.40

Collection Site B) 6 Basin inlet

B) 6-0utlet (OSD-6)

Measures	Results
Date & Time	26/11/2025 – 10.48am
Temperature	21.1
Dissolved Oxygen %	107
Dissolved Oxygen mg/L	9.5
Salinity SPC ms/cm	0.411
Salinity C-ms/cm	380.8
TDS mg/L Total Dissolved Solids	267
pH	8.37
ORP mV Oxidation reduction potential	175.7
NTU	3.66

Nitrogen

Reporting period	ANZECC Guideline*	April 2025	Nov 2025
Nitrogen µg/L	350 µg/L	600 µg/L	900 µg/L

***** ANZECC 2000 Guidelines 350 µg/L for rivers flowing to the coast

Phosphorus

Reporting period	ANZECC Guideline*	April 2025	Nov 2025
Phosphorous µg/L	50 µg/L	30 µg/L	90 µg/L

***** ANZECC 2000 Guidelines 50 µg/L for rivers flowing to the coast

Testing period	Trigger Value
Nitrogen µg/L	350 µg/L for rivers
Phosphorous	25 µg/L - 50 µg/L

µg/L	

Location Basin 6 Outflow

Nitrogen 900 µg/L (Guideline trigger 350 µg/L)

Phosphorus 90 µg/L (Guideline trigger 50 µg/L)

Both Nitrogen and Phosphorus are exceeding the ANZECC baseline values during this testing period.

Consideration must be given to low water volume in the outflow and shallowing puddling of the water sample medium which would contribute to higher concentration reading for these nutrient values.

Metals

Testing period	Trigger value ANZECC	Nov 2025		
Copper mg/L	0.0014 mg/L	0.007		
Zinc mg/L	0.008 mg/L	<0.005		
Arsenic mg/L	0.03 mg/L	<0.001		
Cadmium	0.05 µg/L	<0.0001		
Chromium	5 µg/L	<0.001		
Nickle	0.1 µg/L	<0.001		
Lead	0.005 mg/L	<0.001		

Concentrations for dissolved metals are under the ANZECC guidelines for all listed soluble metals.

Results for these parameters are considered positive for WQM discharges at the outlet and demonstrate that soluble metals are being captured throughout the SIOMP network reducing mobilisation and accretion into the natural waterways.

Total Suspended Solids

TSS results appear stabilised over the April and November testing period, the levels are under the trigger values Values are below the ANZECC guidelines and considered acceptable.

Testing period	EPA trigger value	April 2025	Nov 2025	
TSS mg/L	50 mg/L	11mg/L	28 mg/L	

pH

pH values fall within the desirable range at the discharge location, albeit the reading is at the top of the range for alkalinity.

Testing	Trigger Value - ANZECC 2000 Guidelines *Lowland rivers	April 2025	Nov 2025		
pH	Min 6.5 Max 8.5	8.08	8.37		

PFAS;

OSD -5 - PFAS – Qube Logistics, Moorebank, NSW			
PFAS Surrogate	**Measure** µg/L	**95% species protection (DEE 2016)**	**Triggered**
13C4-PFOS % **Sum of PFAS**	83.1 % 0.39 (µg/L)	.13 (µg/L)	Y
13C8-PFOA % **Sum of PFHxS and PFOS**	87.1 % 0.02 (µg/L)	220 (µg/L)	N
Notes: This Guidance focuses on PFOS and PFOA as potential indicators of wider contamination by related PFASs. The reasons for this approach include: • Most research undertaken on PFASs internationally and in Australia has focused on PFOS and PFOA due to their frequent occurrence in the environment, persistence, and bioaccumulation. • PFOS and PFOA can also be the breakdown endpoint of other precursor products. • PFOS and PFOA are the most commonly encountered PFAS in the environment and wildlife. • Information on other PFASs, of which there are several hundred known, is more limited. • Effective management of PFOS and PFOA may help address potential contamination where other PFASs may also be present. * DEE 2016. Commonwealth Environmental Management Guidance on Perfluorooctane Sulfonic Acid (PFOS) and Perfluorooctanoic Acid (PFOA). Department of the Environment and Energy.			

PFAS concentrations exceed the guideline values for PFOS and occur at 0.02 (µg/L) for PFOA.

Total Hydrocarbons

OSD-5 - Total hydrocarbons – Qube Logistics, Moorebank, NSW

Total Hydrocarbons assessed alongside baseline data (2018) and Spring monitoring (2025) for Aquatic Monitoring location 11&12 (AQ11 & AQ12 Anzac Creek).

Lab results - Total hydrocarbons:	**Trigger value ANZECC Guidelines 2000 – slightly disturbed lowland river ecosystem**	**Triggered**	**Baseline monitoring April 2018 (presented by Biosis)**	**November 2025**					
Benzene µg/L	1300 µg/L	N	<1	<1					
Toluene µg/L	-	N	<2	<2					
Ethylbenzene µg/L	-	N	<2	<2					
meta-& para-Xylene µg/L	200 µg/L	N	-	<2					
Ortho-Xylene µg/L	470 µg/L	N	<2	<2					
Total Xylenes µg/L	-	N	-	<2					
Sum of BTEX µg/L	-	N	-	<1					
Naphthalene µg/L	85 µg/L	N	-	<5					
			Notes: • The data were compared to the default trigger values (DTVs) recommended by ANZECC/ARMCANZ (2000) for the protection of slightly disturbed lowland river ecosystems in southeast Australia. • Moorebank Precinct East Stage 2: Biodiversity Monitoring in Anzac Creek Autumn						

		2019 Survey - Final Report, Bio-Analysis Pty Ltd (2019) • Moorebank Precinct East - Stage 2 B106 – Baseline Aquatic Ecological Monitoring Report and Biodiversity Monitoring Strategy (SSD 7628) Biosis (2018) • A commonly encountered example of additive toxicity of mixtures is the simple aromatic hydrocarbons commonly associated with contaminated petroleum sites, benzene, toluene, ethyl benzene and xylenes, collectively known as BTEX

Total hydrocarbons are recorded within the baseline parameter values and have not changed across this testing period to other prior results.

3.2 Interpreting Results

Phosphorous Values

Phosphorus

Phosphorus rates from this testing period are considered above the Anzecc guidelines.

Stormwater runoff is a major cause of physical, chemical (i.e. nutrients), and microbial degradation of receiving waters. Nitrogen (N) and phosphorus (P) are of particular concern and interest in urban stormwater runoff due to their role in eutrophication of water bodies, onset of harmful algal blooms, and fish kills. refer (Yun-Ya Yang & Gurpal S. Toor)

The linkages between urbanization and increased N and P export is well established; however, the contributions and dynamics of N and P are often site-specific, the synchronicity between N and P in aquatic environment has been widely used as an ecological indicator of biological growth and nutrient limitation.

Understanding P dynamics in stormwater runoff can help to implement and enhance the effectiveness of strategies to control P loss and transport to receiving waters.

P values from this testing period were slightly raised above the ANZECC guidelines, however are considered reasonable for the testing environment and sample pool.

Nitrogen Values

Nitrogen

Nitrogen values are above the guideline rates, however this is a reduction in concentration when compared to the samples of October 2024, which provides an improvement in nitrogen concentration.

Five (5) Industrial Applications of Nitrogen

While the main industrial use of nitrogen is to create ammonia that is required for fertilizer, explosives, and other materials, it uses go far beyond these applications. From food packaging to pharmaceuticals, nitrogen gas can be found in more places and used for more purposes than you may have realized.

Food Packaging: It is common practice for food processing companies to use compressed nitrogen to displace oxygen in the packaging of perishable foods. Without oxygen, the shelf life of foods such as meats, fruits, vegetables, and various snack foods can be extended. Nitrogen can also add a cushion around food to keep it safe during transport.

Chemical Blanketing: Nitrogen is typically used to prevent fires and explosions in dangerous atmospheres like chemical plants or manufacturing facilities, by lowering the oxygen level below explosive limits.

Electronics: In the process of assembling electronics, nitrogen gas is used when two electronic components are forming a permanent connection, also known as soldering. The gas is used to reduce surface tension so there is a cleaner break away from the site of the electrical bond. Nitrogen gas is also used in a computer's main processing system to prevent it from overheating.

Laboratory: Laboratories require a very specific environment to ensure that tests and results are carried out accurately. Nitrogen gas is used to control oxygen levels, humidity and temperature, and maintain an appropriate

atmosphere for highly sensitive procedures and equipment. Additionally, there are various pieces of laboratory equipment that require nitrogen for purging.

Laser Cutting: The application of nitrogen as a purging gas in the steel industry is extremely important. It is used as an assist gas to blow away molten material and achieve a stronger stainless or aluminized steel product that is also more resistant to corrosion.

https://nigen.com/industries-that-benefit-from-on-site-nitrogen-systems/

Industries That Benefit from On-Site Nitrogen Systems

Gaseous nitrogen is very useful in large-scale manufacturing and industrial applications. The large volumes of nitrogen gas required for these operations are either sourced from vendors in gas cylinders or generated on-site. In this article, we will highlight critical industrial processes that benefit from on-site nitrogen systems.

Dissolved Oxygen – Measures:

Dissolved oxygen (DO) is oxygen held (dissolved) in the water and available to aquatic organisms.

The amount of dissolved oxygen in a river or stream can tell us a lot about its water quality.

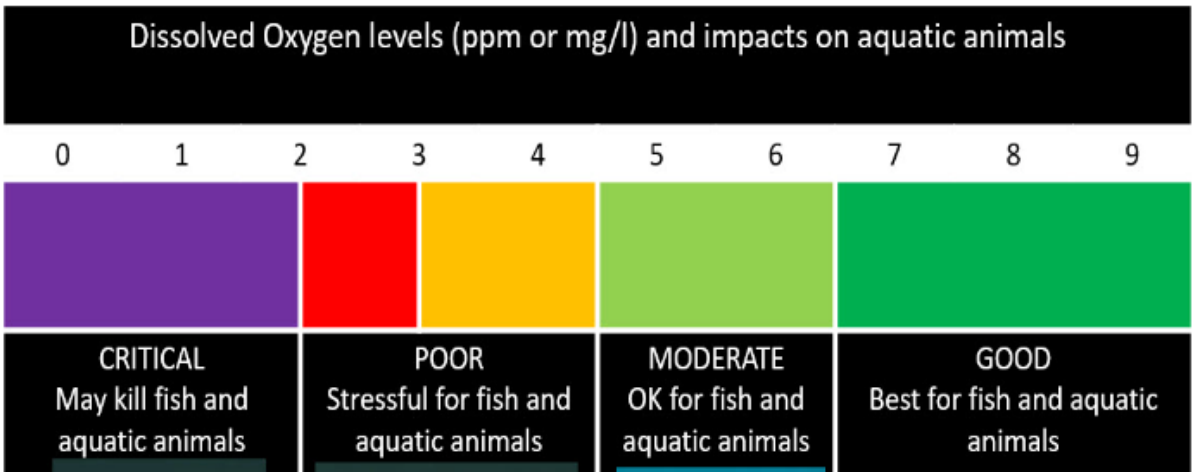
Water will naturally contain a certain amount of dissolved oxygen that is absorbed from the air and produced by plants and algae living in the water.

Temperature has a large effect on the amount of oxygen dissolved in water; cold water can hold higher levels of oxygen than warmer water. Higher water temperatures over summer will cause oxygen levels to drop.

Other factors such as river flow, wind, nutrients and bacterial activity can also affect the amount of dissolved oxygen in waterways.

Dissolved oxygen levels typically range between 5 and 14 mg/L (or ppm).

Example:



Salinity – Measures:

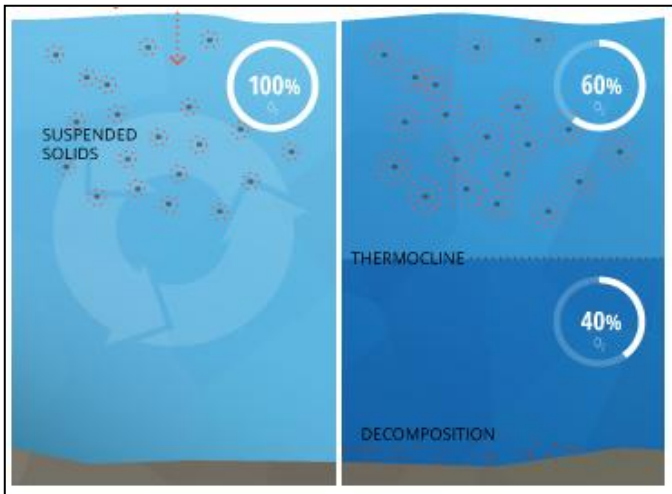
Electrical conductivity is a measure of the saltiness of the water and is measured on a scale from 0 to 50,000 uS/cm. Electrical conductivity is measured in microsiemens per centimeter (uS/cm). Freshwater is usually between 0 and 1,500 uS/cm and typical sea water has a conductivity value of about 50,000 uS/cm.

Examples:

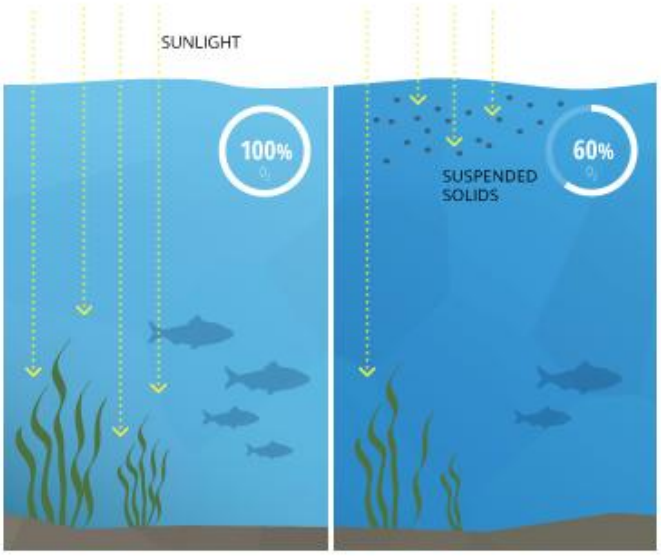
µS/cm	Use
0 - 800	• Good drinking water for humans (provided there is no organic pollution and not too much suspended clay material) • Generally good for irrigation, though above 300µS/cm some care must be, particularly with overhead sprinklers, which may cause leaf, scorch on some salt sensitive plants. • Suitable for all livestock
800 - 2500	• Can be consumed by humans, although most would prefer water in the lower half of this range if available • When used for irrigation, requires special management including suitable soils, good drainage and consideration of salt tolerance of plants • Suitable for all livestock
2500 -10,000	• Not recommended for human consumption, although water up to 3000 µS/cm can be consumed • Not normally suitable for irrigation, although water up to 6000 µS/cm can be used on very salt tolerant crops with very special management techniques. Over 6000 µS/cm, occasional emergency may be possible with care • When used for drinking water by poultry and pigs, the salinity should be limited to about 6000 µS/cm. Most other livestock can use water up to 10000 µS/cm

Total Dissolve Solids (TDS) – Measures

Dissolved solids, smaller than 2 microns, refer to any minerals, salts, metals, in the form of molecules, atoms, cations or anions dissolved in water. Total dissolved solids (TDS) comprise inorganic salts (principally calcium, magnesium, potassium, sodium, bicarbonates, chlorides and sulfates) and some small amounts of organic matter that dissolve in water.
The TDS concentration is the sum of all filterable substances in water that can be determined gravimetrically. However, in most cases, TDS is primarily comprised of ions.
High levels of total suspended solids can affect turbidity, increase water temperatures and decrease dissolved oxygen (DO) levels. This can cause the water to heat up more rapidly because the suspended particles absorb more heat and deplete oxygen, which can adversely affect aquatic life.



Suspended solids can increase the temperature of water as they absorb additional heat from the sun. This can also cause dissolved oxygen levels to drop below the thermocline, creating hypoxic conditions.

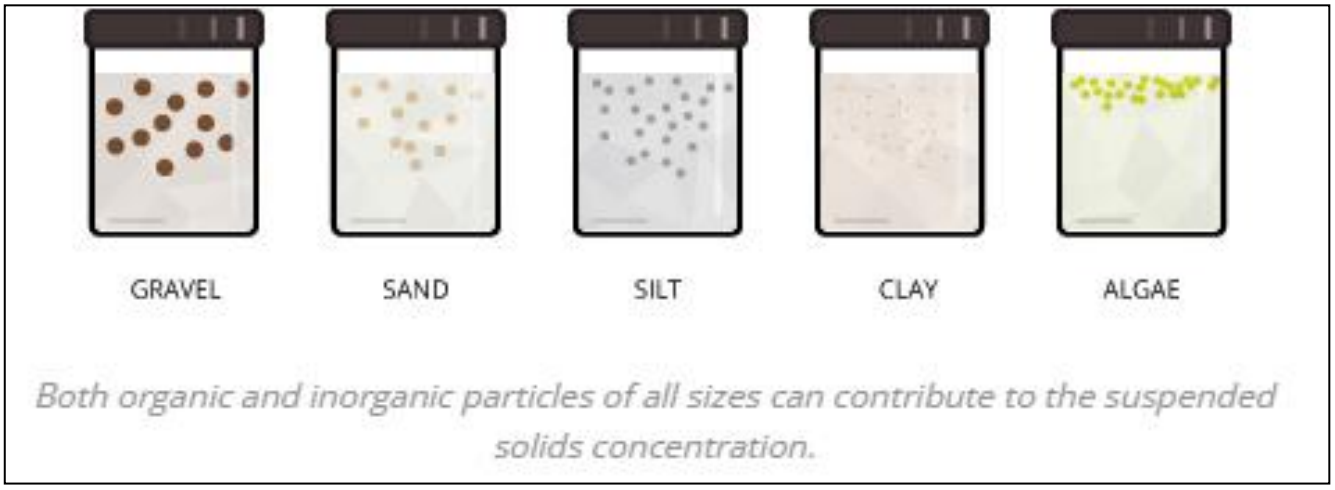


Suspended solids, particularly algae, can block sunlight from reaching submerged plants. This can cause dissolved oxygen levels to drop, as the plants rely on respiration (consuming oxygen) instead of photosynthesis.

Turbidity – Total Suspended Solids (TSS)

Turbidity data are reported in Nephelometric Turbidity Units (NTU). To provide a sense of scale, water with a turbidity of 1 NTU is crystal clear, water at 5 NTU has a tiny trace of discolouration, and water at 100 NTU is brown and opaque. The standard is less than 10 NTU for rural streams and rivers and less than 30 NTU for urban lakes and ponds.

Total suspended solids (TSS) are particles that are larger than 2 microns found in the water column. Anything smaller than 2 microns (average filter size) is considered a dissolved solid. Most suspended solids are made up of inorganic materials, though bacteria and algae can also contribute to the total solids concentration.



Both organic and inorganic particles of all sizes can contribute to the suspended solids concentration.

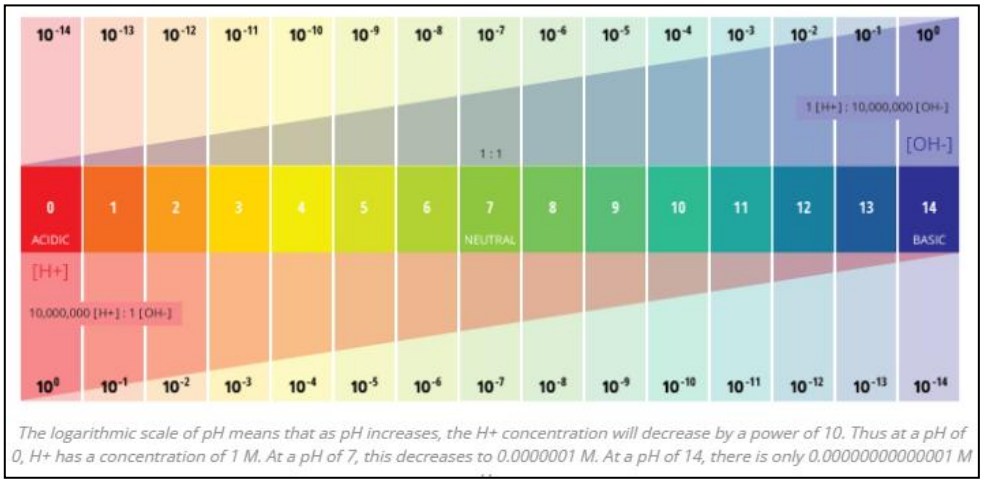
pH – Acidity / Alkalinity – Measures

The pH refers to the degree of acidity or alkalinity of a substance. A pH of 7 is neutral. A value above 7 indicates that the water is more alkaline and a pH below 7 indicates acidic conditions.

A pH of 7 is considered neutral. The logarithmic scale means that each number below 7 is 10 times more acidic than the previous number when counting down. Likewise, when counting up above 7, each number is 10 times more basic than the previous number pH stands for the "power of hydrogen" [3]. The numerical value of pH is determined by the molar concentration of hydrogen ions (H+) [3]. This is done by taking the negative logarithm of the H+ concentration (-log(H+)).

Standard values for pH readings are expected, pH 6.5–9 for rural streams and rivers and pH 6–9 for urban lakes and ponds.

In freshwater systems pH sets up the conditions for how easy it is for nutrients to be available and how easily things like heavy metals (toxicity for aquatic life) can dissolve in the water. Rivers and lakes generally range between 5



The logarithmic scale of pH means that as pH increases, the H+ concentration will decrease by a power of 10. Thus at a pH of 0, H+ has a concentration of 1 M. At a pH of 7, this decreases to 0.0000001 M. At a pH of 14, there is only 0.00000000000001 M

(acidic) and 9 (basic) on the pH scale.

PFAS are per- and polyfluoroalkyl substances, In Australia, the historical use of PFAS in fire-fighting foams has resulted in increased levels being detected at sites like airports, Defence bases, and other sites where fire-fighting training has

been conducted, or where fire suppression systems are installed for extinguishing liquid-fuel fires. Increased environmental levels of PFAS have also been found near some industrial areas, effluent outfalls and landfill sites refer (Australian Government ; What are PFAS? | Australian Government PFAS Taskforce.)

PFAS chemicals can persist in the environment for decades, polluting waterways, soil and air, and build up in the bodies of animals and humans over time.
Two of the best-known types of PFAS are PFOS (perfluorooctane sulfonate), previously used in Scotchgard and firefighting foams, and PFOA (perfluorooctanoic acid), historically used to make Teflon cookware.
Today, both chemicals are recognised internationally as being toxic to humans and wildlife and have been discontinued (or are being progressively phased out) in many countries, including Australia.
Refer (ABC Health News PFAS 'forever chemicals' are all around us. What does it mean for our health? - ABC News)

Bioaccumulation of hydrocarbons in the water table:

Polycyclic aromatic hydrocarbons (PAHs) are a major class of organic contaminants.
PAH causes various toxic effects in living organisms including carcinogenicity.

Polycyclic aromatic hydrocarbons (PAHs) are considered a major class of organic contaminants or pollutants, which are poisonous, mutagenic, genotoxic, and/or carcinogenic. Due to their ubiquitous occurrence and recalcitrance, PAHs-related pollution possesses significant public health and environmental concerns.

- PAHs are primarily released from human activities such as fossil fuel combustion, industrial processes, and oil spills.
- Bioaccumulation: These compounds accumulate in aquatic organisms, including fish and other aquatic species , and can also transfer through the food chain, posing risks to human health.
- Ecological Impact: The bioaccumulation of hydrocarbons disrupts aquatic ecosystems, leading to reduced biodiversity and increased toxicity in affected organisms.

Aquatic ecosystems	
Indicator	Numerical criteria (trigger values)
Total phosphorus 10 µg/L	• Upland rivers: 20 µg/L • Lowland rivers: 25 µg/L for rivers flowing to the coast; • Lakes & reservoirs: 10 µg/L • Estuaries: 30 µg/L
Total nitrogen 400 µg/L	• Upland rivers: 250 µg/L • Lowland rivers: 350 µg/L for rivers flowing to the coast; • Lakes & reservoirs: 350 µg/L • Estuaries: 300µg/L
Chlorophyll-a	• Upland rivers: not applicable • Lowland rivers: 5 µg/L • Lakes & reservoirs: 5 µg/L. • Estuaries: 4 µg/L.
Turbidity 17.53 NTU	• Upland rivers: 2–25 NTU (see supporting information) • Lowland rivers: 6–50 NTU (see supporting information) • Lakes & reservoirs: 1–20 NTU • Estuaries: 0.5–10 NTU
Salinity (electrical conductivity) 590 µS/cm	• Upland rivers: 30–350 µS/cm • Lowland rivers: 125–2200 µS/cm supporting information
Dissolved oxygen 10.19 ppm	• Upland rivers: 90–110% • Lowland rivers: 85–110% • Freshwater lakes & reservoirs: 90–110% • Estuaries: 80–110% Note: Dissolved oxygen values were derived from daytime measurements. Dissolved oxygen concentrations may vary diurnally and with depth. Monitoring programs should assess this potential variability.
pH 8.32	• Upland rivers: 6.5–8.0 • Lowland rivers: 6.5–8.5 • Freshwater lakes & reservoirs: 6.5–8.0 • Estuaries: 7.0–8.5 Changes of more than 0.5 pH units from the natural seasonal maximum or minimum should be investigated.

Map Image 5. Stormwater Testing Site OP-6 – Basin OSD-6 – MPW

Sample Site Map

0 30 60 120 Meters

Client: M.I.D Plumbing	Map Issue: Basin 6 Sample Site Map
Address: BUSHMASTER AVENUE MOOREBANK2170	Time: 10/07/2024 2:24 PM

LGA: LIVERPOOL CITY COUNCIL	Scale: 1:2,000
Lot/DP: 5 to 14/DP 1299137	Spatial Reference: WGS 1984 Web Mercator Auxiliary Sphere
Units: Meters	

Marco Perry
Environmental/Bushfire Planner
Bsc EnvSc

Marco@apical-bushfire.com.au

BASIN 6 (OSD-6) – OUTFLOW

Site image 1. Testing site Basin OSD-6 – Inlet SIOMP Flows

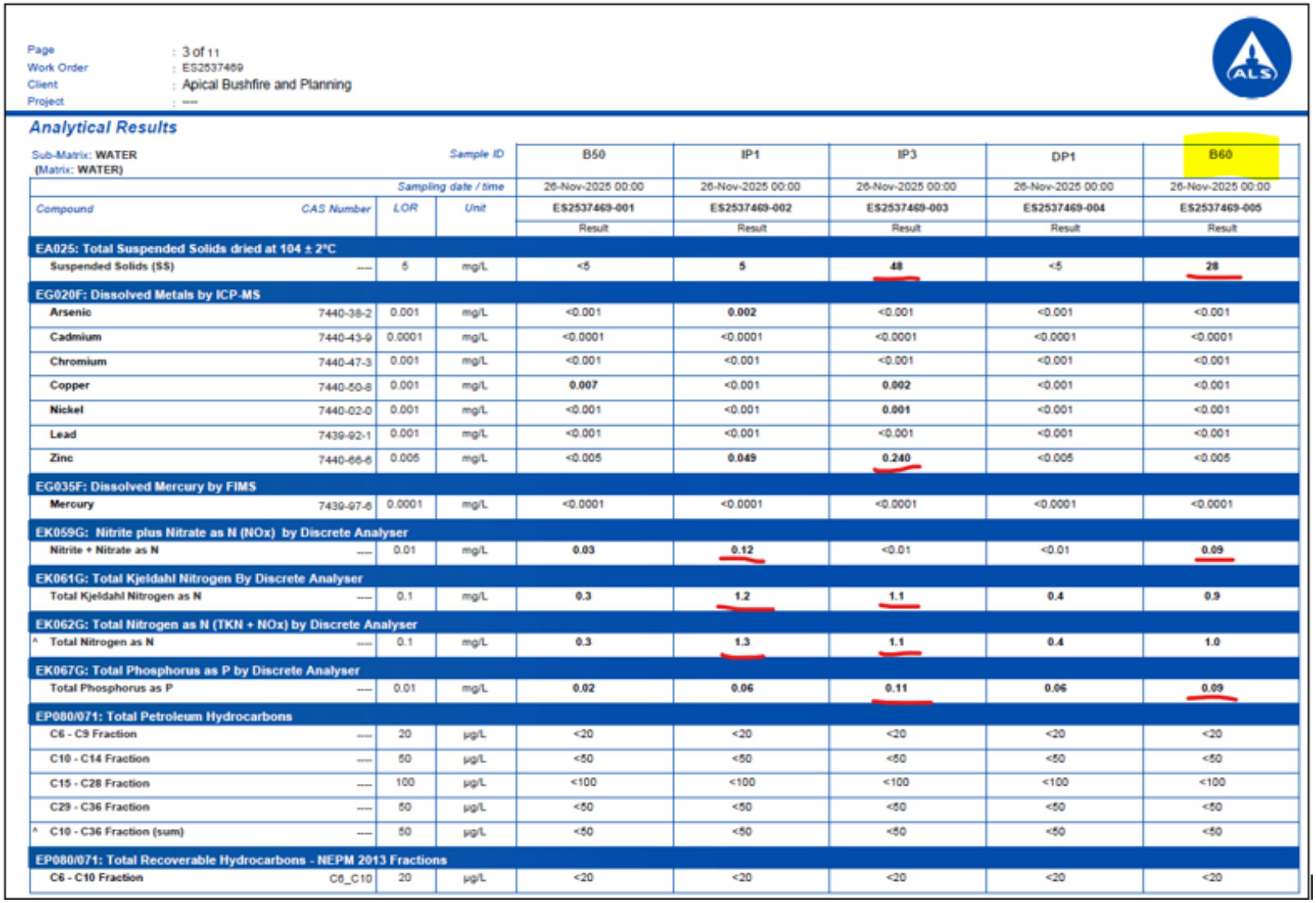
Outflow rock ramp (OSD-6) to Georges River

Water Quality Monitoring Comparative Table (Temporal)

Table 4. Retention Basin 5 MPW. Testing Site MPW 5 Outflow

Testing Site MPW Outflow	May 2024 baseline	October 2024	April 2025	Nov 2025
pH	6.39	6.21	8.32	8.37
Dissolved Oxygen - %/L	4.11mg/L	10.5	10.19	9.5mg/L
Actual Electronic Conductivity	0.054945	0.008	93.5 ORP mV	175.7 ORP mV
Temperature - ℃	18.12	19.5	21.9	21.1
Turbidity	0.03 NTU	6.62	17.53	3.66 NTU
Total phosphorous - mg/L	0.04 mg/L	0.03	<0.01	0.09mg/L
Total nitrogen - mg/L	1.7 mg/L	0.4	0.4	1.0mg/L
Kjeldahl nitrogen mg/L	1.0 mg/L	0.4	0.3	0.9 mg/L
Dissolved metals				
Arsenic	<0.001	<0.001	<0.001	<0.001
Cadmium	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	<0.001	<0.001	<0.001	<0.001
Copper	0.017	<0.001	0.005	0.001
Nickel	0.001	<0.001	0.001	0.001
Lead	<0.001	<0.001	<0.001	<0.001
Zinc	<0.005	0.008	<0.005	<0.005
Mercury	<0.0001	<0.0001	<0.0001	<0.0001
PFAS				
Lab results – SUM of PFAS Micrograms/L	0.13	0.04	0.08	0.39
SUM of PFHxS & PFOS Microgrms/L	0.04	0.04	0.01	0.33
Total suspended solids mg/L	6	<5	10	28mg/L
Total hydrocarbons				
Benzene	<1	<1	<1	<1
Toluene	<2	<2	<2	<2
Ethylbenzene	<2	<2	<2	<2
meta-& para-Xylene	<2	<2	<2	<2
Ortho-Xylene	<2	<2	<2	<2
Total Xylenes	<2	<2	<2	<2
Sum of BTEX	<1	<1	<1	<1
Naphthalene	<5	<5	<5	<5

Results



Page : 3 of 11
Work Order : ES2537469
Client : Apical Bushfire and Planning
Project : ----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	B50	IP1	IP3	DP1	B60
			Sampling date / time	26-Nov-2025 00:00	26-Nov-2025 00:00	26-Nov-2025 00:00	26-Nov-2025 00:00	26-Nov-2025 00:00
Compound	CAS Number	LOR	Unit	ES2537469-001	ES2537469-002	ES2537469-003	ES2537469-004	ES2537469-005
				Result	Result	Result	Result	Result
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	<5	5	48	<5	28
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	0.002	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	0.007	<0.001	0.002	<0.001	<0.001
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L	<0.005	0.049	0.240	<0.005	<0.005
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	0.03	0.12	<0.01	<0.01	0.09
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.3	1.2	1.1	0.4	0.9
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	0.3	1.3	1.1	0.4	1.0
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	0.02	0.06	0.11	0.06	0.09
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	<20	<20

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	B50	IP1	IP3	DP1	B60
				Sampling date / time	26-Nov-2025 00:00	26-Nov-2025 00:00	26-Nov-2025 00:00	26-Nov-2025 00:00	26-Nov-2025 00:00
Compound	CAS Number	LOR	Unit		ES2537469-001	ES2537469-002	ES2537469-003	ES2537469-004	ES2537469-005
					Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluoropropane sulfonic acid (PFPrS)	423-41-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	**0.04**	**0.03**	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	**0.04**	**0.03**	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L		<0.01	**0.16**	**0.10**	**0.03**	**0.15**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	**0.08**	**0.03**	**0.02**	**0.18**
Perfluorononane sulfonic acid (PFNS)	68259-12-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	B50	IP1	IP3	DP1	B60
				Sampling date / time	26-Nov-2025 00:00	26-Nov-2025 00:00	26-Nov-2025 00:00	26-Nov-2025 00:00	26-Nov-2025 00:00
Compound	CAS Number	LOR	Unit		ES2537469-001	ES2537469-002	ES2537469-003	ES2537469-004	ES2537469-005
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	**0.04**	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	**0.14**	**0.09**	**0.03**	**0.05**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	**0.03**	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	**0.05**	**0.03**	<0.01	**0.01**
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
Perfluorohexadecanoic acid (PFHxDA)	67905-19-5	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	B50	IP1	IP3	DP1	B60
				Sampling date / time	26-Nov-2025 00:00	26-Nov-2025 00:00	26-Nov-2025 00:00	26-Nov-2025 00:00	26-Nov-2025 00:00
Compound	CAS Number	LOR	Unit		ES2537469-001	ES2537469-002	ES2537469-003	ES2537469-004	ES2537469-005
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	0.58	0.31	0.08	0.39
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	0.24	0.13	0.05	0.33
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	0.54	0.28	0.08	0.39
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		77.5	80.0	88.1	80.2	117
Toluene-D8	2037-26-5	2	%		100	98.7	102	96.3	98.5
4-Bromofluorobenzene	460-00-4	2	%		112	111	109	100	123
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		87.9	84.6	84.8	86.0	83.1
13C8-PFOA	----	0.02	%		89.5	88.1	87.5	87.9	87.1

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	B6I	B5I	B8O	B8I	----
			Sampling date / time	26-Nov-2025 00:00	26-Nov-2025 00:00	26-Nov-2025 00:00	26-Nov-2025 00:00	----
Compound	CAS Number	LOR	Unit	ES2537469-006	ES2537469-007	ES2537469-008	ES2537469-009	----
				Result	Result	Result	Result	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	<5	13	199	6	----
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	0.002	<0.001	0.003	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	0.002	----
Copper	7440-50-8	0.001	mg/L	0.003	<0.001	0.001	0.005	----
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.001	0.004	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Zinc	7440-66-6	0.005	mg/L	0.012	<0.005	0.006	<0.005	----
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	0.05	0.12	0.04	0.16	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.9	1.0	0.6	1.7	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	1.0	1.1	0.6	1.9	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	0.09	0.21	0.05	0.04	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	----
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	----
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	<100	----
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	<50	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	<20	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	B6I	B5I	B8O	B8I	----
				Sampling date / time	26-Nov-2025 00:00	26-Nov-2025 00:00	26-Nov-2025 00:00	26-Nov-2025 00:00	----
Compound	CAS Number	LOR	Unit		ES2537469-006	ES2537469-007	ES2537469-008	ES2537469-009	----
					Result	Result	Result	Result	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	----
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	----
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	----
^ Total Xylenes	----	2	µg/L		<2	<2	<2	<2	----
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	----
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluoropropane sulfonic acid (PFPrS)	423-41-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L		<0.01	<0.01	0.03	0.02	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	0.01	0.03	0.03	----
Perfluorononane sulfonic acid (PFNS)	68259-12-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	B6I	B5I	B8O	B8I	----
				Sampling date / time	26-Nov-2025 00:00	26-Nov-2025 00:00	26-Nov-2025 00:00	26-Nov-2025 00:00	----
Compound	CAS Number	LOR	Unit		ES2537469-006	ES2537469-007	ES2537469-008	ES2537469-009	--------
					Result	Result	Result	Result	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	**0.03**	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	**0.02**	**0.07**	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	**0.01**	**0.01**	**0.03**	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
Perfluorohexadecanoic acid (PFHxDA)	67905-19-5	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	B6I	B5I	B8O	B8I	----
				Sampling date / time	26-Nov-2025 00:00	26-Nov-2025 00:00	26-Nov-2025 00:00	26-Nov-2025 00:00	----
Compound	CAS Number	LOR	Unit		ES2537469-006	ES2537469-007	ES2537469-008	ES2537469-009	-------
					Result	Result	Result	Result	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	0.02	0.09	0.18	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	0.01	0.06	0.05	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	0.02	0.09	0.18	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		79.7	106	81.4	80.5	----
Toluene-D8	2037-26-5	2	%		100	81.9	98.5	99.2	----
4-Bromofluorobenzene	460-00-4	2	%		113	106	111	104	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		83.2	84.6	83.4	84.7	----
13C8-PFOA	----	0.02	%		86.6	87.2	86.0	85.5	----

Appendix B. ANZECC & ARMCANZ (2000) water quality guidelines

Table 3.4.1 Trigger values for toxicants at alternative levels of protection. Values in grey shading are the trigger values applying to typical *slightly–moderately disturbed systems*; see table 3.4.2 and Section 3.4.2.4 for guidance on applying these levels to different ecosystem conditions.

Chemical		Trigger values for freshwater (µgL^{-1})				Trigger values for marine water (µgL^{-1})			
		Level of protection (% species)				Level of protection (% species)			
		99%	95%	90%	80%	99%	95%	90%	80%
METALS & METALLOIDS									
Aluminium	pH >6.5	27	55	80	150	ID	ID	ID	ID
Aluminium	pH <6.5	ID	ID	ID	ID	ID	ID	ID	ID
Antimony		ID	ID	ID	ID	ID	ID	ID	ID
Arsenic (As III)		1	24	94 [C]	360 [C]	ID	ID	ID	ID
Arsenic (AsV)		0.8	13	42	140 [C]	ID	ID	ID	ID
Beryllium		ID	ID	ID	ID	ID	ID	ID	ID
Bismuth		ID	ID	ID	ID	ID	ID	ID	ID
Boron		90	370 [C]	680 [C]	1300 [C]	ID	ID	ID	ID
Cadmium	H	0.06	0.2	0.4	0.8 [C]	0.7 [B]	5.5 [B, C]	14 [B, C]	36 [B, A]
Chromium (Cr III)	H	ID	ID	ID	ID	7.7	27.4	48.6	90.6
Chromium (CrVI)		0.01	1.0 [C]	6 [A]	40 [A]	0.14	4.4	20 [C]	85 [C]
Cobalt		ID	ID	ID	ID	0.005	1	14	150 [C]
Copper	H	1.0	1.4	1.8 [C]	2.5 [C]	0.3	1.3	3 [C]	8 [A]
Gallium		ID	ID	ID	ID	ID	ID	ID	ID
Iron		ID	ID	ID	ID	ID	ID	ID	ID
Lanthanum		ID	ID	ID	ID	ID	ID	ID	ID
Lead	H	1.0	3.4	5.6	9.4 [C]	2.2	4.4	6.6 [C]	12 [C]
Manganese		1200	1900 [C]	2500 [C]	3600 [C]	ID	ID	ID	ID
Mercury (inorganic)	B	0.06	0.6	1.9 [C]	5.4 [A]	0.1	0.4 [C]	0.7 [C]	1.4 [C]
Mercury (methyl)		ID	ID	ID	ID	ID	ID	ID	ID
Molybdenum		ID	ID	ID	ID	ID	ID	ID	ID
Nickel	H	8	11	13	17 [C]	7	70 [C]	200 [A]	560 [A]
Selenium (Total)	B	5	11	18	34	ID	ID	ID	ID
Selenium (SeIV)	B	ID	ID	ID	ID	ID	ID	ID	ID
Silver		0.02	0.05	0.1	0.2 [C]	0.8	1.4	1.8	2.6 [C]
Thallium		ID	ID	ID	ID	ID	ID	ID	ID
Tin (inorganic, SnIV)		ID	ID	ID	ID	ID	ID	ID	ID
Tributyltin (as µg/L Sn)		ID	ID	ID	ID	0.0004	0.006 [C]	0.02 [C]	0.05 [C]
Uranium		ID	ID	ID	ID	ID	ID	ID	ID
Vanadium		ID	ID	ID	ID	50	100	160	280
Zinc	H	2.4	8.0 [C]	15 [C]	31 [C]	7	15 [C]	23 [C]	43 [C]
NON-METALLIC INORGANICS									
Ammonia	D	320	900 [C]	1430 [C]	2300 [A]	500	910	1200	1700
Chlorine	E	0.4	3	6 [A]	13 [A]	ID	ID	ID	ID
Cyanide	F	4	7	11	18	2	4	7	14
Nitrate	J	17	700	3400 [C]	17000 [A]	ID	ID	ID	ID
Hydrogen sulfide	G	0.5	1.0	1.5	2.6	ID	ID	ID	ID
ORGANIC ALCOHOLS									
Ethanol		400	1400	2400 [C]	4000 [C]	ID	ID	ID	ID
Ethylene glycol		ID	ID	ID	ID	ID	ID	ID	ID
Isopropyl alcohol		ID	ID	ID	ID	ID	ID	ID	ID
CHLORINATED ALKANES									
Chloromethanes									
Dichloromethane		ID	ID	ID	ID	ID	ID	ID	ID
Chloroform		ID	ID	ID	ID	ID	ID	ID	ID
Carbon tetrachloride		ID	ID	ID	ID	ID	ID	ID	ID
Chloroethanes									
1,2-dichloroethane		ID	ID	ID	ID	ID	ID	ID	ID
1,1,1-trichloroethane		ID	ID	ID	ID	ID	ID	ID	ID

Chemical	Trigger values for freshwater (µgL^{-1})				Trigger values for marine water (µgL^{-1})			
	Level of protection (% species)				Level of protection (% species)			
	99%	95%	90%	80%	99%	95%	90%	80%
1,1,2-trichloroethane	5400	6500	7300	8400	140	1900	5800 [C]	18000 [C]
1,1,2,2-tetrachloroethane	ID	ID	ID	ID	ID	ID	ID	ID
Pentachloroethane	ID	ID	ID	ID	ID	ID	ID	ID
Hexachloroethane B	290	360	420	500	ID	ID	ID	ID
Chloropropanes								
1,1-dichloropropane	ID	ID	ID	ID	ID	ID	ID	ID
1,2-dichloropropane	ID	ID	ID	ID	ID	ID	ID	ID
1,3-dichloropropane	ID	ID	ID	ID	ID	ID	ID	ID
CHLORINATED ALKENES								
Chloroethylene	ID	ID	ID	ID	ID	ID	ID	ID
1,1-dichloroethylene	ID	ID	ID	ID	ID	ID	ID	ID
1,1,2-trichloroethylene	ID	ID	ID	ID	ID	ID	ID	ID
1,1,2,2-tetrachloroethylene	ID	ID	ID	ID	ID	ID	ID	ID
3-chloropropene	ID	ID	ID	ID	ID	ID	ID	ID
1,3-dichloropropene	ID	ID	ID	ID	ID	ID	ID	ID
ANILINES								
Aniline	8	250 [A]	1100 [A]	4800 [A]	ID	ID	ID	ID
2,4-dichloroaniline	0.6	7	20	60 [C]	ID	ID	ID	ID
2,5-dichloroaniline	ID	ID	ID	ID	ID	ID	ID	ID
3,4-dichloroaniline	1.3	3	6 [C]	13 [C]	85	150	190	260
3,5-dichloroaniline	ID	ID	ID	ID	ID	ID	ID	ID
Benzidine	ID	ID	ID	ID	ID	ID	ID	ID
Dichlorobenzidine	ID	ID	ID	ID	ID	ID	ID	ID
AROMATIC HYDROCARBONS								
Benzene	600	950	1300	2000	500 [C]	700 [C]	900 [C]	1300 [C]
Toluene	ID	ID	ID	ID	ID	ID	ID	ID
Ethylbenzene	ID	ID	ID	ID	ID	ID	ID	ID
o-xylene	200	350	470	640	ID	ID	ID	ID
m-xylene	ID	ID	ID	ID	ID	ID	ID	ID
p-xylene	140	200	250	340	ID	ID	ID	ID
m+*p*-xylene	ID	ID	ID	ID	ID	ID	ID	ID
Cumene	ID	ID	ID	ID	ID	ID	ID	ID
Polycyclic Aromatic Hydrocarbons								
Naphthalene	2.5	16	37	85	50 [C]	70 [C]	90 [C]	120 [C]
Anthracene B	ID	ID	ID	ID	ID	ID	ID	ID
Phenanthrene B	ID	ID	ID	ID	ID	ID	ID	ID
Fluoranthene B	ID	ID	ID	ID	ID	ID	ID	ID
Benzo(a)pyrene B	ID	ID	ID	ID	ID	ID	ID	ID
Nitrobenzenes								
Nitrobenzene	230	550	820	1300	ID	ID	ID	ID
1,2-dinitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,3-dinitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,4-dinitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,3,5-trinitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-methoxy-2-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-methoxy-4-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-chloro-2-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-chloro-3-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-chloro-4-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-chloro-2,4-dinitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,2-dichloro-3-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,3-dichloro-5-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,4-dichloro-2-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
2,4-dichloro-2-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID

Chemical	Trigger values for freshwater (µgL^{-1})				Trigger values for marine water (µgL^{-1})			
	Level of protection (% species)				Level of protection (% species)			
	99%	95%	90%	80%	99%	95%	90%	80%
Hexazinone	ID	ID	ID	ID	ID	ID	ID	ID
Simazine	0.2	3.2	11	35	ID	ID	ID	ID
Urea herbicides								
Diuron	ID	ID	ID	ID	ID	ID	ID	ID
Tebuthiuron	0.02	2.2	20	160 [C]	ID	ID	ID	ID
Miscellaneous herbicides								
Acrolein	ID	ID	ID	ID	ID	ID	ID	ID
Bromacil	ID	ID	ID	ID	ID	ID	ID	ID
Glyphosate	370	1200	2000	3600 [A]	ID	ID	ID	ID
Imazethapyr	ID	ID	ID	ID	ID	ID	ID	ID
Ioxynil	ID	ID	ID	ID	ID	ID	ID	ID
Metolachlor	ID	ID	ID	ID	ID	ID	ID	ID
Sethoxydim	ID	ID	ID	ID	ID	ID	ID	ID
Trifluralin B	2.6	4.4	6	9 [A]	ID	ID	ID	ID
GENERIC GROUPS OF CHEMICALS								
Surfactants								
Linear alkylbenzene sulfonates (LAS)	65	280	520 [C]	1000 [C]	ID	ID	ID	ID
Alcohol ethoxyolated sulfate (AES)	340	650	850 [C]	1100 [C]	ID	ID	ID	ID
Alcohol ethoxylated surfactants (AE)	50	140	220	360 [C]	ID	ID	ID	ID
Oils & Petroleum Hydrocarbons	ID	ID	ID	ID	ID	ID	ID	ID
Oil Spill Dispersants								
BP 1100X	ID	ID	ID	ID	ID	ID	ID	ID
Corexit 7664	ID	ID	ID	ID	ID	ID	ID	ID
Corexit 8667		ID	ID	ID	ID	ID	ID	ID
Corexit 9527	ID	ID	ID	ID	230	1100	2200	4400 [A]
Corexit 9550	ID	ID	ID	ID	ID	ID	ID	ID

Notes: Where the final water quality guideline to be applied to a site is below current analytical practical quantitation limits, see Section 3.4.3.3 for guidance.

Most trigger values listed here for metals and metalloids are *High reliability* figures, derived from field or chronic NOEC data (see 3.4.2.3 for reference to Volume 2). The exceptions are *Moderate reliability* for freshwater aluminium (pH >6.5), manganese and marine chromium (III).

Most trigger values listed here for non-metallic inorganics and organic chemicals are *Moderate reliability* figures, derived from acute LC_{50} data (see 3.4.2.3 for reference to Volume 2). The exceptions are *High reliability* for freshwater ammonia, 3,4-DCA, endosulfan, chlorpyrifos, esfenvalerate, tebuthiuron, three surfactants and marine for 1,1,2-TCE and chlorpyrifos.

* = *High reliability* figure for esfenvalerate derived from mesocosm NOEC data (no alternative protection levels available).

A = Figure may not protect key test species from acute toxicity (and chronic) — check Section 8.3.7 for spread of data and its significance. 'A' indicates that trigger value > acute toxicity figure; note that trigger value should be <1/3 of acute figure (Section 8.3.4.4).

B = Chemicals for which possible bioaccumulation and secondary poisoning effects should be considered (see Sections 8.3.3.4 and 8.3.5.7).

C = Figure may not protect key test species from chronic toxicity (this refers to experimental chronic figures or geometric mean for species) — check Section 8.3.7 for spread of data and its significance. Where grey shading and 'C' coincide, refer to text in Section 8.3.7.

D = Ammonia as TOTAL ammonia as [NH_3-N] at pH 8. For changes in trigger value with pH refer to Section 8.3.7.2.

E = Chlorine as total chlorine, as [Cl]; see Section 8.3.7.2.

F = Cyanide as un-ionised HCN, measured as [CN]; see Section 8.3.7.2.

G = Sulfide as un-ionised H_2S, measured as [S]; see Section 8.3.7.2.

H = Chemicals for which algorithms have been provided in table 3.4.3 to account for the effects of hardness. The values have been calculated using a hardness of 30 mg/L $CaCO_3$. These should be adjusted to the site-specific hardness (see Section 3.4.3).

J = Figures protect against toxicity and do not relate to eutrophication issues. Refer to Section 3.3 if eutrophication is the issue of concern.

ID = Insufficient data to derive a reliable trigger value. Users advised to check if a low reliability value or an ECL is given in Section 8.3.7.

T = Tainting or flavour impairment of fish flesh may possibly occur at concentrations below the trigger value. See Sections 4.4.5.3/3 and 8.3.7.

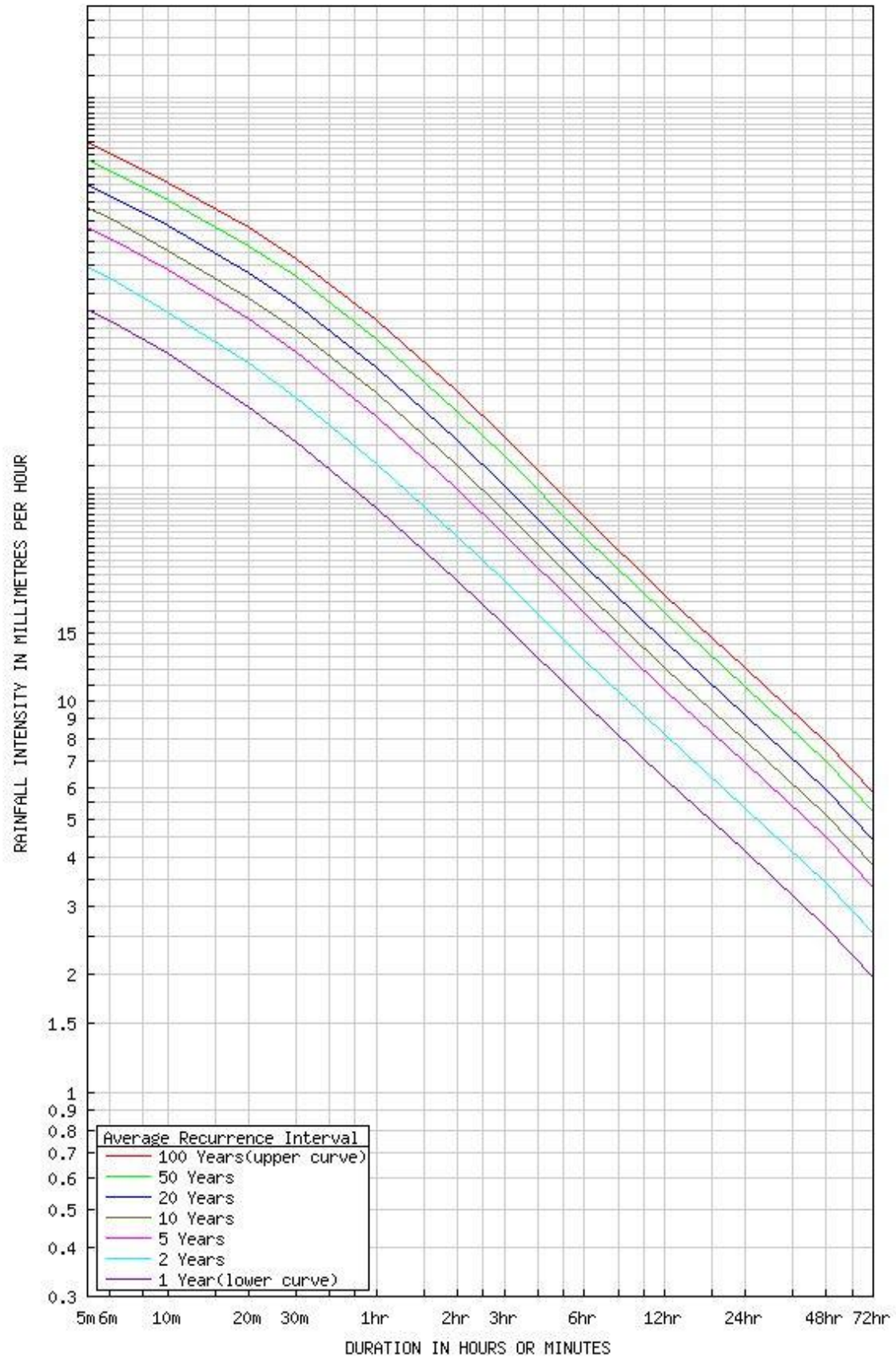
Table 5. Ecological water quality guideline values developed by water regulators

Exposure scenario	PFOS	PFOA	Exposure scenario	Comments and source
Freshwater	0.00023 µg/L	19 µg/L	99% species protection - high conservation value systems	Australian and New Zealand Guidelines for Fresh and Marine Water Quality - technical draft default guideline values for PFOS and PFOA. Note 1: The 99% species protection level for PFOS is close to the level of detection. Agencies may wish to apply a 'detect' threshold in such circumstances rather than a quantified measurement. Note 2: The draft guidelines do not account for effects which result from the biomagnification of toxicants in air-breathing animals or in animals which prey on aquatic organisms. Note 3: The WQGs advise [41] that the 99% level of protection be used for slightly to moderately disturbed systems. This approach is generally adopted for chemicals that bioaccumulate and biomagnify in wildlife. Regulators may specify or environmental legislation may prescribe the level of species protection required, rather than allowing for case-by-case assessments.
	0.13 µg/L	220 µg/L	95% species protection - slightly to moderately disturbed systems	
	2 µg/L	632 µg/L	90% species protection - highly disturbed systems	
	31 µg/L	1824 µg/L	80% species protection - highly disturbed systems	
Interim marine	0.00023 µg/L	19 µg/L	99% species protection - high conservation value systems	As above. Freshwater values are to be used on an interim basis until final marine guideline values can be set using the nationally-agreed process under the Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Note 1: The WQG advise that in the case of estuaries, the most stringent of freshwater and marine criteria apply, taking account of any available salinity correction. Note 2: Marine guideline values developed by CRC CARE are under consideration through the nationally-agreed water quality guideline development process.
	0.13 µg/L	220 µg/L	95% species protection - slightly to moderately disturbed systems	
	2 µg/L	632 µg/L	90% species protection - highly disturbed systems	
	31 µg/L	1824 µg/L	80% species protection - highly disturbed systems	

Type of indicator	Indicator	Units	Fresh waters	Marine waters
	Dissolved oxygen[2]	mg/L	> 6 (> 80–90% saturation)	> 6 (> 80–90% saturation)
	Nutrients/nuisance growths	–	(Section 2.3.3)	(Section 2.3.3)
	pH	–	6.5–9.0	< 0.2 pH unit change
	Salinity	mg/L	< 1000 (about 1,500 µS/cm)	–
	Suspended particulate matter/turbidity	–	< 10% change seasonal mean concentration (see also colour & clarity)	< 10% change seasonal mean concentration (see also colour & clarity)
	Temperature[3]	–	< 2°C increase	< 2°C increase
Toxicants				
Inorganic toxicants	Aluminium	µg/L	< 5.0 (if pH < = 6.5)	NR
	Aluminium	µg/L	< 100.0 (if pH > 6.5)	–
	Ammonia	µg/L	20.0–30.0 (Table 2.3)	NR
	Antimony	µg/L	30.0	500.0
	Arsenic	µg/L	50.0	50.0
	Beryllium	µg/L	4.0[4]	NR
	Cadmium	µg/L	0.2–2.0[5]	2.0
	Chromium	µg/L	10.0	50.0
	Copper	µg/L	2.0–5.0[5]	5.0
	Cyanide	µg/L	5.0	5.0
	Iron	µg/L	1,000.0[6]	NR
	Lead	µg/L	1.0–5.0[5]	5.0
	Mercury	µg/L	0.1	0.1
	Nickel	µg/L	15.0–150.0[5]	15.0
	Selenium	µg/L	5.0	70.0
	Silver	µg/L	0.1	1.0
	Sulfide	µg/L	2.0	2.0
	Thallium	µg/L	4.0	20.0
	Tin (tributyltin)	µg/L	0.008	0.002
	Zinc	µg/L	5.0–50.0[6]	50.0
Organic toxicants	Acrylonitrile	µg/L	NR	NR
	Benzidine	µg/L	NR	NR
	Dichlorobenzidine	µg/L	NR	NR
	Diphenylhydrazine	µg/L	NR	NR
Halogenated aliphatic compounds	Hexachlorobutadiene	µg/L	0.1	0.3
	Halogenated ethers	µg/L	NR	NR
	Isophorone	µg/L	NR	NR
Monocyclic aromatic compounds	Benzene	µg/L	300.0	300.0
	Chlorinated benzenes	µg/L	(Table 2.8)	NR

https://www.waterquality.gov.au/sites/default/files/documents/ANZECC-1992-guidelines.pdf

Appendix C. Intensity Frequency Duration – Average Recurrence Interval Indicator
Intensity-Frequency-Duration (bom.gov.au)



Apical
Bushfire and Planning

Moorebank Logistics Park West Precinct

Basin 8 (OSD-8)

Autumn Stormwater Network Water Quality Monitoring Data & Reporting November 2025

Site image: retention basin 8 MPW (Apical image April 2025)

Prepared for: MID Plumbing P/L

Prepared by: Daniel Anderson (BEnvSc, MEnvSc)

Romy Brien (BSc NRM)

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Phone: 0415617771
Office: PO Box 149 Kiama NSW 2533
ABN: 656 420 10 400

Consulted Documents / database.

Australia and New Zealand Guidelines for fresh and Marine Water Quality (2000)
NATIONAL WATER QUALITY MANAGEMENT STRATEGY - Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000) - Volume 2 - Aquatic ecosystems

Bureau of Meteorology – Australian Government Australia's official weather forecasts & weather radar - Bureau of Meteorology (bom.gov.au)

Moorebank Intermodal Precinct West – Stage 3 (SSD 10431) | Assessment Report March 2021
https://moorebankintermodalprecinct.com.au/wp-content/uploads/2023/04/MPW-S3-DPIE-assessment-report-to-IPC.pdf

WQM Report Western Precinct _Basin 8_Autumn 2024 – Apical Bushfire and Planning - April 2024

WQM Report Western Precinct _Basin 8_Spring 2024 – Apical Bushfire and Planning - October 2024

Development Consent - Section 4.38 of the Environmental Planning and Assessment Act 1979 - Application Number: SSD 7709 Applicant: Sydney Intermodal Terminal Alliance (SIMTA) as Qube Holdings Limited Consent Authority: The Independent Planning Commission Site: Moorebank Avenue, Moorebank Lot 1 DP 1197707 Lot 100 DP 1049508 Lot 101 DP 1049508 Lot 2 DP 1197707 Part Lot 3 DP 1197707 Part Anzac Road and Moorebank Avenue public road reserves Development: Moorebank Precinct West Stage 2 (MPW Stage 2)

Development Consent - Section 4.38 of the Environmental Planning and Assessment Act 1979 - Application Number: SSD 10431 Applicant: Sydney Intermodal Terminal Alliance (SIMTA) as Qube Holdings Limited Consent Authority: The Independent Planning Commission Site: Moorebank Avenue, Moorebank Lot 1 DP 1197707 Lot 100 DP 1049508 Lot 101 DP 1049508 Moorebank Precinct West Stage 3 (MPW Stage 3)

Australian Laboratory Services (ALS) Work Order EW2402561 Certificate of Analysis Water Sample Data 09th April 2025.

Liverpool DCP
Liverpool's Development Control Plans | Liverpool City Council (nsw.gov.au)

DEE 2016. Commonwealth Environmental Management Guidance on Perfluorooctane Sulfonic Acid (PFOS) and Perfluorooctanoic Acid (PFOA). Department of the Environment and Energy.
https://environment.gov.au/system/files/pages/dfb876c5-581e-48b7-868c-242fe69dad68/files/draft-environmental-mgt-guidance-pfos-pfoa.pdf

Development Consent SSD 7709 - Section 4.38 of the Environmental Planning and Assessment Act 1979
https://www.ipcn.nsw.gov.au/resources/pac/media/files/pac/projects/2019/05/moorebank-intermodal-precinct-west-stage-2/referral-from-department-of-planning-and-environment/revised-recommended-conditions/mpw-stage-2-recommended-conditions-inclusive-of-edits-191105.pdf

Glossary

The following definitions apply to terms used in this report. Many of these definitions are consistent with relevant national literature and cited where appropriate.

Current status trigger value
Concentrations of water quality indicators that reflect existing ecosystem condition, and therefore provide a target for ecosystem maintenance and a benchmark against which future water quality trends may be monitored.

Environmental value
Particular values or uses of the environment important for a healthy ecosystem or for public benefit, welfare, safety or health and requiring protection from the effects of pollution or degradation (Environment Australia 2002).

Indicator
A parameter (biological, physical or chemical) used to provide a measure of the quality of water or the condition of an ecosystem (Environment Australia 2002).

Low-risk trigger value
Concentrations (or loads) of key performance indicators [of water quality] at which if not exceeded, there is a low risk that adverse biological effects will occur (ANZECC 2000a).

Median
The middle reading, or 50th percentile, of all readings taken. i.e. of the readings 10, 13, 9, 16 and 11 (re-ordering these to read 9, 10, 11, 13 and 16), the median is 11. The mean (or average), is the sum of all values divided by the total number of readings (which in this case equals 11.8).

Reference condition
Refers to a site which is unmodified or minimally modified from 'natural' condition. Most commonly, reference sites are subject to limited disturbance from human activity. The reference condition then serves as a standard or target against which environmental change in other similar sites can be assessed.

Trigger value
A concentration that, if exceeded, would indicate a potential environmental problem, and so 'trigger' a management response, such as further investigation and/or remedial actions (ANZECC 2000a).

Water quality guideline
A numerical concentration level (e.g. of a contaminant) or narrative statement (e.g. visual appearance of a water body) recommended to support and maintain a designated water use (ANZECC 2000a)

1.1 Background

The Sydney Intermodal Terminal Alliance (SIMTA) received approval for the construction and operation of Stage 3 (the Project) of Moorebank Precinct West (MPW), which comprises the third stage of development within the Moorebank Precinct West under Development Approval SSD-10431.

The proposal is SSD under clause 19 of Schedule 1 of the State Environmental Planning Policy (State and Regional Development) 2011, as it is development for the purpose of rail and related transport facilities.

The MPW site is located on the western side of Moorebank Avenue and forms the western section of the Moorebank Intermodal Precinct (Map image 1 & 2). The MPW site is approximately 2.5 kilometres (km) from the Liverpool city centre, 27 km south-west of the Sydney Central Business District (CBD) and 26 km west of Port Botany.

The MPW site is irregular in shape, approximately 3 km from north to south and 960 m from east to west at its widest point and covers an area of approximately 220 ha. It is situated between the Georges River to the west (with the SSFL running north-south to the west of the river); and Moorebank Avenue to the east.

Works on the MPW site to date have commenced under two current and active development consents:

• MPW Stage 1 early works, which provides demolition, rehabilitation, remediation of contaminated land, and the establishment of construction facilities and access including site security (as part of the SSD 5066 consent)

• MPW Stage 2, which provides for the construction and 24/7 operation of an intermodal facility and associated warehousing (SSD 7709).

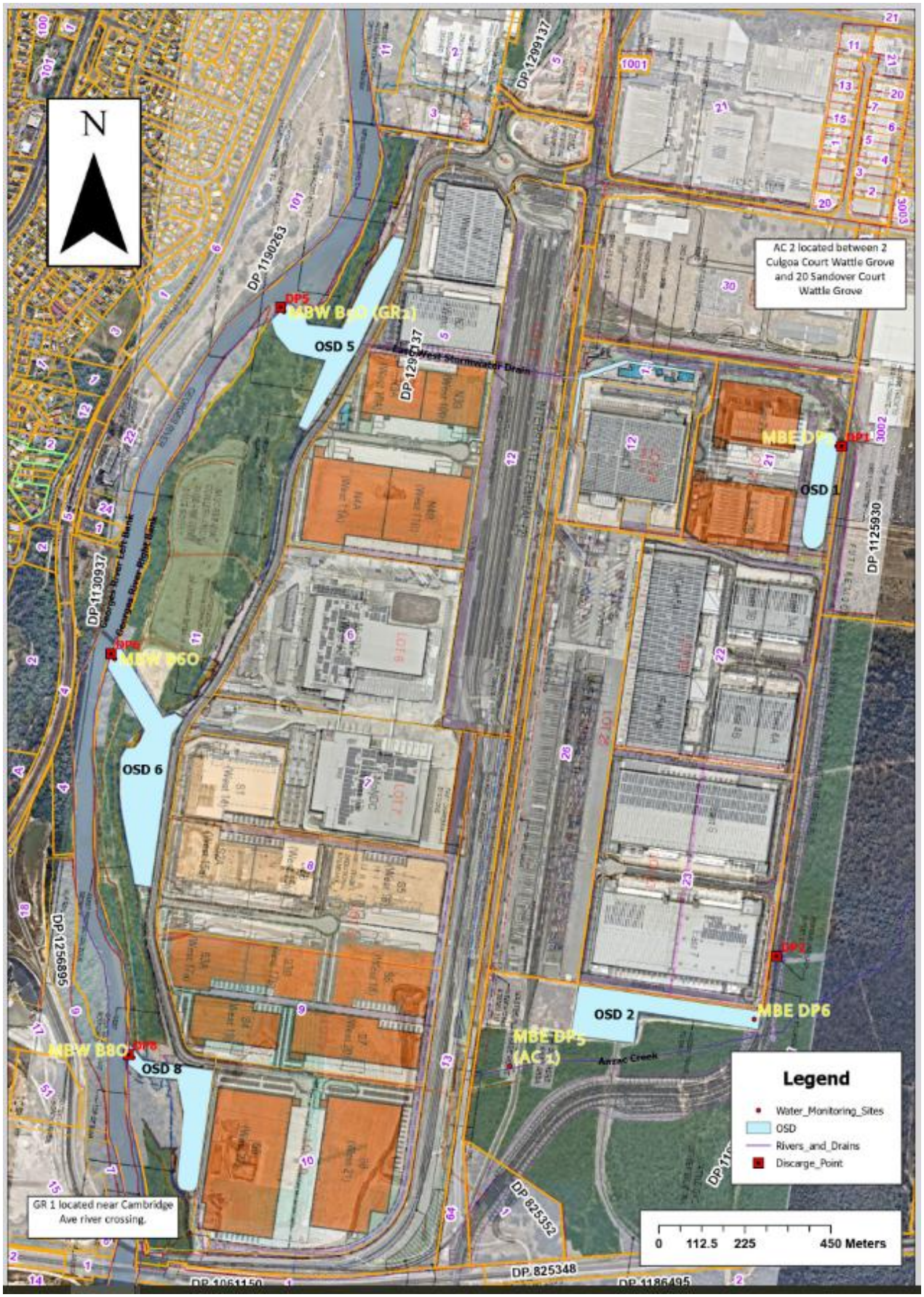
Across the entire precinct there are six onsite detention basins. Bioretention/biofiltration systems also make up the stormwater management infrastructure within the site.

This water quality monitoring program is guided by the Stormwater Infrastructure Operation and Maintenance Plan (SIOPM) and is provided to Qube Holdings Limited (the Applicant) on behalf of MID Plumbing. Three onsite bio-retention basins are present within Moorebank Precinct West. This report is in reference to Basin 8 (MPW – south).

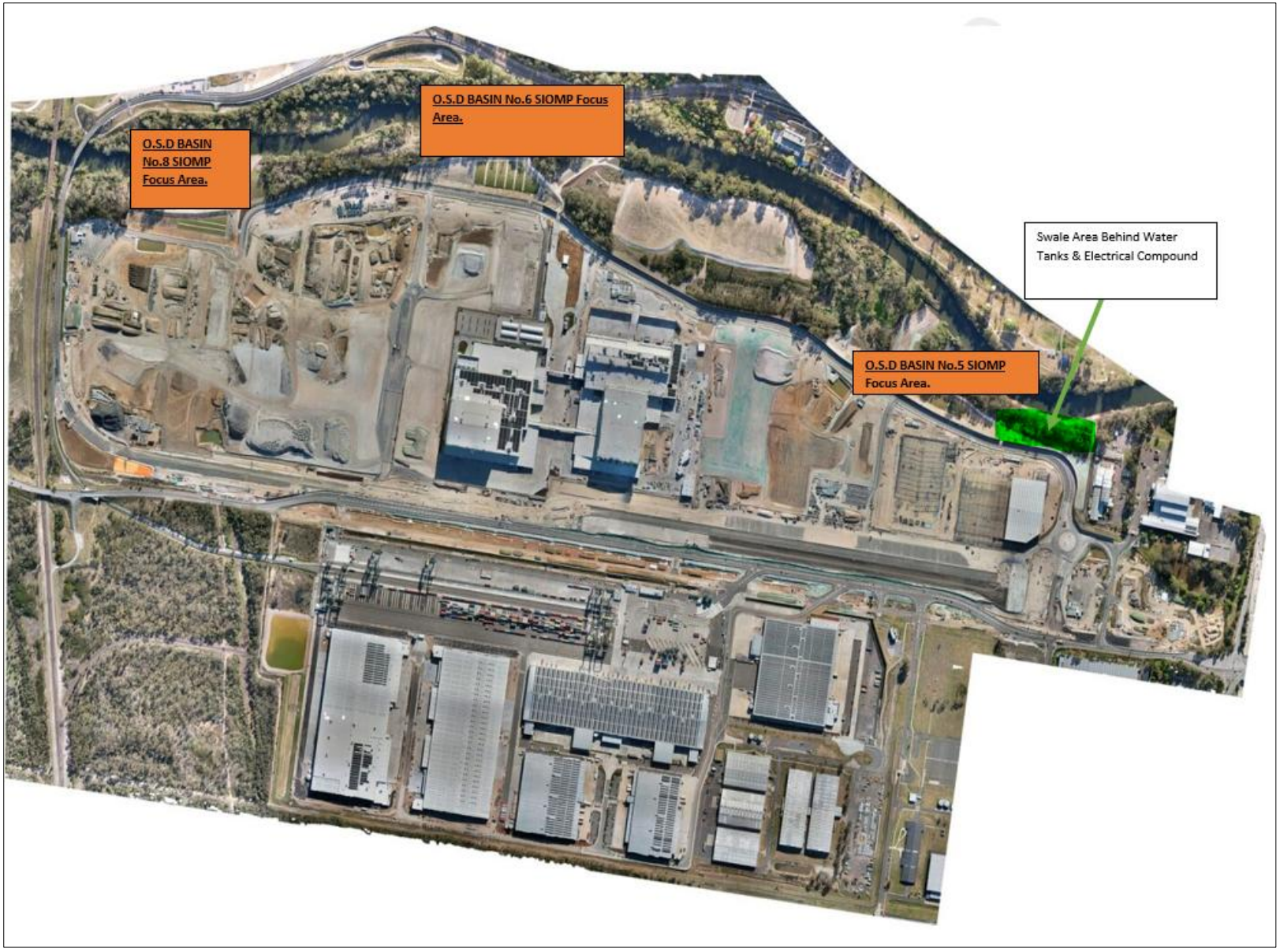
Development Consent - Section 4.38 of the Environmental Planning and Assessment Act 1979 - Application Number: SSD 7709 Moorebank Precinct West Stage 2 (MPW Stage 2)

CoC	Requirement
Stormwater Quality Monitoring	
B38.	Stormwater Quality Monitoring Program - Prior to commencement of operation Part of the Operational Environmental Management Plan

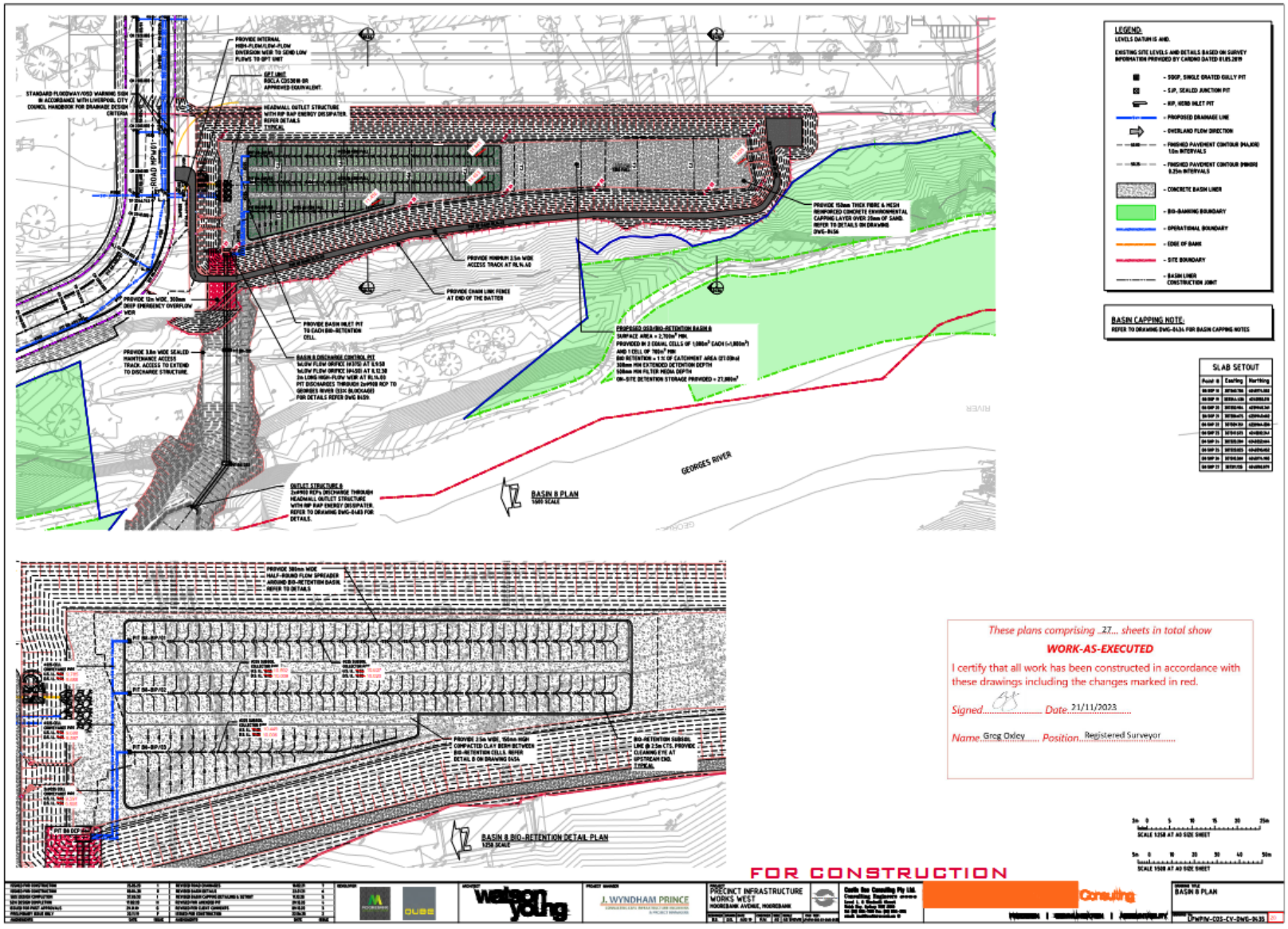
Map image 1. Overview subject site (MPW) provided by Arcadis



Map Image 2. Moorebank Precinct West Detention Basins (provided by MID Plumbing)

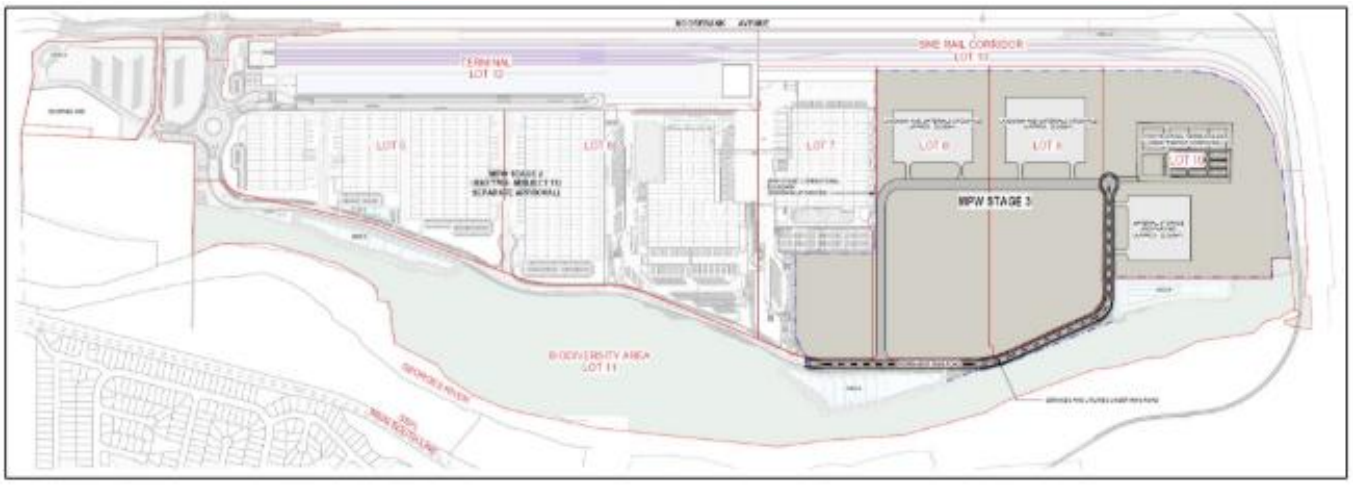


Map image 3. Detention Basin 8 MPW (south)



Reference information

Map image 4. Moorebank Intermodal Precinct West – Stage 3 State Significant Development Assessment (SSD-10431) March 2021



20. Stormwater Management System or Works	That untreated stormwater is not disposed of into the Georges River or its tributaries.	Detailed stormwater assessments were undertaken as part of MPW Stage 2, and remain applicable to the Stage 3 proposal. The Department has recommended conditions that would enforce these requirements, by ensuring that appropriate measures are implemented to manage stormwater impacts during construction. In regard to management of stormwater during operation of the MPW site, the MPW Stage 2 proposal incorporates a robust set of conditions to manage the release of stormwater via six onsite detention basins (OSD), a major east-west covered culvert and associated drainage infrastructure.
	The likely impact of stormwater disposal on the quality of any receiving waters.	
	That the levels of nutrients and sediments entering the waterway are not increased by the proposed development.	
	Whether any proposals to manage stormwater are in accordance with the local council's stormwater management plans and the Managing Urban Stormwater series of documents and meet the local council's stormwater management objectives.	
	Whether the principles outlined in the *Managing Urban Stormwater Soils and Construction Handbook* (1998) prepared by and available from Landcom and the Department of Housing are followed during each stage of a development (including subdivision).	

2. Monitoring Program Methodology

2.1 Monitoring Sites

To support stormwater and drainage management of the facility the MLP West precinct has established a vast stormwater infrastructure system consisting of several Water Sensitive Urban Design (WSUD) functions including raingardens detention basins and bio-swales. These networks are designed to minimise the velocity and peak discharge of stormwater draining from the site and act as onsite detention basins to harvest and sequester potential pollutants generated at the site through designed biological processes.

The stormwater infrastructure system discharges water into the natural drainage system via three outlets:

- Basin 5 detains water from the northern section of MPW before discharging into Georges River
- Basin 6 detains water from the mid-section of MPW before discharging into Georges River
- Basin 8 detains water from the southern section of MPW before discharging into Georges River

Monitoring of the discharge points has been established via our ongoing program with MID Plumbing under the SIOMP program to collect qualitative data and analyse the performance of the WSUD provisions and to establish any potential trends in water quality readings from the stormwater network discharge points prior to release of water into the natural hydrological systems of Anzac Creek and the Georges River.

Table 1. Type of outlet MPW

Discharge Point (see figure 2)	Associated Outlet (see figure 1)	Type of outlet/detention basin
Basin 5	Inlet	Bio retention
	Outlet	Outlet point
	Georges River	River
Basin 6	Inlet	Bio retention
	Outlet	Outlet point
Basin 8	Inlet	Bio retention
	Outlet	Outlet structure

2.2 Water Quality Assessment

Surface water quality data collected at the discharge points is assessed with reference to ANZECC Guidelines (2000) and correlated with baseline Water Quality monitoring results provided by previous condition assessment reports.

By comparing water test data under the program across the testing timeline we can identify and report upon trends, identify exceedances and exclude potential anomalies for datasets.

Table 2. ANZECC Low Risk Trigger Values

Ecosystem type	Turbidity NTU	EC µS/cm	pH*	DO	TN mg/L	NO_x - N mg/L	NH_4^+ - N mg/L	TP mg/L	DRP - P mg/L
Upland river	2-25	30-350	6.5-7.5	90-110	0.480	0.190	0.013	0.013	0.005
Lowland river	6-50	125-2200	6.5-8.0	85-110	0.500	0.190	0.020	0.050	0.020

Values for Low Land River Systems as insert above are used as the reference guide to water quality parameter values and overall health and safety statements regarding the quality of discharged water from the SIOMP drainage network.

Annual spring and autumn water quality data presented from Anzac Creek and Georges River testing programs by other scientific consultants may also be cross referenced to the data prepared by Apical under the SIOMP program to establish potential trends in results and identify increases in accumulated pollutants from the site under operational condition, which may appear present within adjacent natural waterways.

Site data was collected in the form of water samples and in field data recordings at the prescribed monitoring points, water samples and water probe readings are undertaken following Australia and New Zealand guidelines for fresh and marine water quality – 2000 (ANZECC Guidelines), In situ water quality parameters relevant to stream health and aquatic assessment profiling were collected in field with a multiparameter hand-held water quality monitoring probe (Aquatroll 600).

Water data is collected, analysed and collated under the same methodologies and process under each testing period, the ensure consistency in the process.

Measures tested and samples taken:

- pH
- Dissolved Oxygen
- Electrical Conductivity
- Water Temperature and
- Turbidity

Water samples are collected at inlet and discharge points (Basin 5, Basin 6 & Basin 8) then sent to Australian Laboratory Services (ALS) for quality testing analysis Surface water (alsglobal.com).

Water analytical suites / testing parameters are provided to obtain overall water condition results and chemical sampling of collected water is undertaken for a range of nutrients, metals, and hydrocarbons relevant to stream health and aquatic assessment protocol, key nutrients, metals, and pollutants included in the assessment to reflect an overall suite of water quality condition guides which are listed below:

- Total phosphorous
- Total Nitrogen
- Kjeldahl Nitrogen
- Dissolved Metals
- PFAS
- Total Suspended Solids
- Total Hydrocarbons

The raw data results from the lab analysis provided to us by ALS Laboratory Services are presented within this report (see Appendix A).

Key water quality data attributes are recorded, tables and compared against; previous condition baseline data, Liverpool Development Control Plan (DCP) water quality targets, Conditions of Consent B40 and ANZECC Guideline (2000) trigger limits under the condition category -(90% protection criteria for freshwater natural systems).

The water quality guidelines are applied to ensure adjacent natural waterways George River and Anzac creek are not adversely affected by poor water quality discharge from the Moorebank logistics park site and operations.

Trends observed in our datasets are analysed on a temporal scale with any trigger values for specific water quality measures highlighted and presented within the results chapter of each seasonal report. This report provides baseline data and Spring 2025 data for Basin 8 (MPW) from which trend analysis will compound over future reporting periods.

2.3 Data Analysis

The water quality measurements collected are used to assess water quality at each site in terms of health of aquatic ecosystems by comparison with guideline values recommended by the ANZECC and ARMCANZ (2000) guidelines for the protection of lowland streams (i.e. systems at < 150 m altitude) in south-east Australia. This categorisation for stream health is deemed relevant for the description of Anzac Creek, the recipient natural way due to the location in the geomorphic landscape and correlations of expected biophysical health and habitat profiles for similar stream environments.

2.4 Survey dates and personnel

On the 15th December 2025, ecologists from Apical Bushfire and Planning attended Moorebank Precinct West (MPW) to collect water quality data across the testing sites which are located within selected inlet points and discharge points within the stormwater drainage and management system (SIOMP) located within the Moorebank Logistics Park site West (See map image 2).

Inlet and outlet points within the network are representative of variant sites where stormwater will enter a node of the system (as a point source) and then release from the that node of the system at a discharge point. By recording inlet and discharge data water quality can be tracked along the continuum within the system to determine condition changes and overall trends in measured quality at given sites.

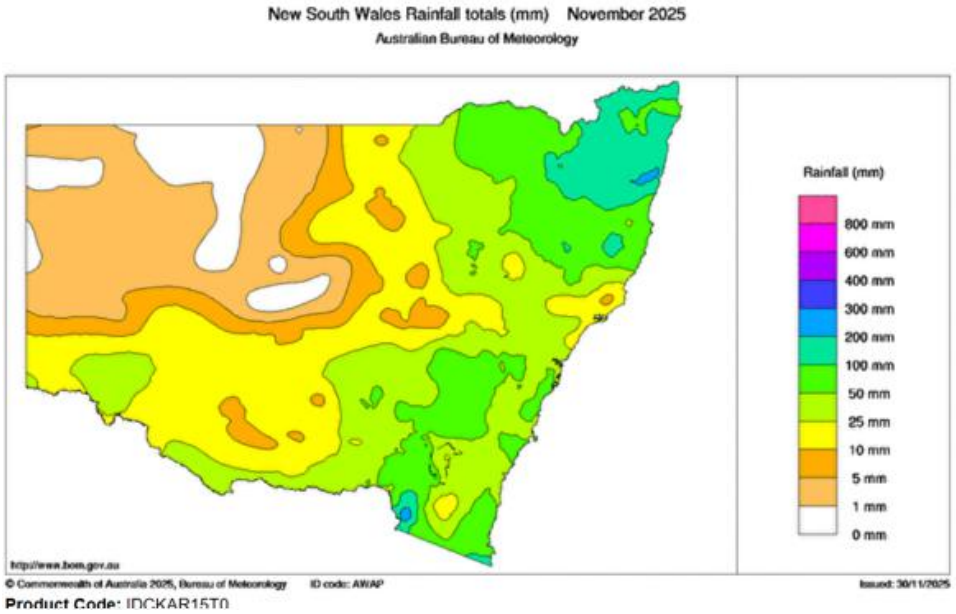
This data was collected on behalf of MID plumbing in accordance with 'The Stormwater Infrastructure Operation and Maintenance Plan Moorebank Logistics Park – West Precinct 2020' and in compliance with Condition of Consent B40 (Liverpool City) for the subject site. The results of such monitoring data collection are presented within this report.

2.5 Rainfall

Between the 1st of November and the 31st of November 2025 Moorebank received 61.6mm of rainfall.

NSW Monthly Rainfall November 2025

61.6 mm for the month in Holsworthy NSW.



3. Results

Data results captured by our water quality sampling are presented herein and are representative of baseline & Spring (2024) water quality results for Moorebank Precinct West Basin 8. Threshold guideline quantitative values for the water quality parameter themes are compared and correlated to ANZECC/ARMCANZ (2000) guidelines under the categorisation thresholds – Waterway benchmark group: 'The protection of slightly disturbed lowland river ecosystems in southeast Australia'.

As these are the first samples results collected under our scope for the SIOMP-MPW sites, the sampling results presented in this report will be considered for future analysis against subsequent results for use as baseline data for the drainage network SIOMP function.

B) 8 -Inlet (OSD-8)

Measures	Results Nov 25	Results	Results
Date & Time:	26/11/2025 – 9.48am		
Temperature	25.6		
Dissolved Oxygen %	107		
Dissolved Oxygen mg/L	8.7		
Salinity SPC ms/cm	0.906		
Salinity C-ms/cm	916		
TDS mg/L Total Dissolved Solids	589		
pH	7.89		
ORP mV Oxidation reduction potential	193.4		
NTU	440.58		

Collection Site OSD-8 (Basin inlets)

Collection Site (OSD-8) Inlet water source from SIOMP

B) 8 Outlet Results A) (OSD-8)

Measures	Results Nov 25	Results	Results
Date & Time	26/11/2025 – 9.54am		
Temperature	22.9		
Dissolved Oxygen %	101		
Dissolved Oxygen mg/L	8.7		
Salinity SPC ms/cm	0.003		
Salinity C-ms/cm	2.9		
TDS mg/L Total Dissolved Solids	2		
pH	6.3		
ORP mV Oxidation reduction potential	279		
NTU	152.80		

Collection Site (OSD-8) Basin Discharge to Georges River

B) 8 Outlet Results B) (OSD-8)

Measures	Results Nov 25	Results	Results
Date & Time	26/11/2025 – 9.54am		
Temperature	23.2		
Dissolved Oxygen %	101		
Dissolved Oxygen mg/L	8.6		
Salinity SPC ms/cm	0.003		
Salinity C-ms/cm	2.9		
TDS mg/L Total Dissolved Solids	2		
pH	5.91		
ORP mV Oxidation reduction potential	289.7		
NTU	155.34		

Collection Site (OSD-8) Basin Discharge to Georges River

Nitrogen

Reporting period	ANZECC Guideline*	April 2025	Nov 2025
Nitrogen µg/L	350 µg/L	400 µg/L	600 µg/L

***** ANZECC 2000 Guidelines 350 µg/L for rivers flowing to the coast

Phosphorus

Reporting period	ANZECC Guideline*	April 2025	Nov 2025
Phosphorous µg/L	50 µg/L	40µg/L	50 µg/L

***** ANZECC 2000 Guidelines 50 µg/L for rivers flowing to the coast

Testing period	Trigger Value
Nitrogen µg/L	350 µg/L for rivers
Phosphorous µg/L	25 µg/L - 50 µg/L

Location Basin 8 Outflow

Phosphorous 50 µg/L (Guideline trigger 25 µg/L)

Nitrogen 600 µg/L (Guideline trigger 350)

Both nutrient values exceed the ANZECC guidelines at the OSD-8 discharge culvert.

It must be noted that water outflow volumes are low and highly concentrated at the time of the assessment. Low volume pools will concentrate nutrient particles and sediments and contribute to elevated levels for both N & P under these test / sample conditions.

Metals

Testing period	Trigger value ANZECC	Nov 2025		
Copper mg/L	0.0014 mg/L	0.007		
Zinc mg/L	0.008 mg/L	<0.005		
Arsenic mg/L	0.03 mg/L	<0.001		
Cadmium	0.05 µg/L	<0.0001		
Chromium	5 µg/L	<0.001		
Nickle	0.1 µg/L	<0.001		
Lead	0.005 mg/L	<0.001		

Concentrations for dissolved metals are under the ANZECC guidelines for all listed soluble metals.

Results for these parameters are considered positive for WQM discharges at the outlet and demonstrate that soluble metals are being captured throughout the SIOMP network reducing mobilisation and accretion into the natural waterways.

Total Suspended Solids

The TSS result from OSD-8 is excessively high and is considered an anomaly reading.
The cause for the reading may relate to a low volume and low flow water pool accessible for testing.

Testing period	EPA trigger value	April 2025	Nov 2025	
TSS mg/L	50 mg/L	11mg/L	199 mg/L	

pH

pH value is very low compared to the previous reading at this sample location. The pH should be noted and be prioritised for reviewed again across the next sample period.

Testing	Trigger Value - ANZECC 2000 Guidelines *Lowland rivers	April 2025	Nov 2025		
pH	Min 6.5 Max 8.5	8.08	5.91		

PFAS;

OSD -5 - PFAS – Qube Logistics, Moorebank, NSW			
PFAS Surrogate	**Measure** µg/L	**95% species protection (DEE 2016)**	**Triggered**
13C4-PFOS % **Sum of PFAS**	83.4 % 0.09 (µg/L)	.13 (µg/L)	N
13C8-PFOA % **Sum of PFHxS and PFOS**	86.0 % 0.06 (µg/L)	220 (µg/L)	N

Notes:
This Guidance focuses on PFOS and PFOA as potential indicators of wider contamination by related PFASs. The reasons for this approach include:
• Most research undertaken on PFASs internationally and in Australia has focused on PFOS and PFOA due to their frequent occurrence in the environment, persistence, and bioaccumulation.
• PFOS and PFOA can also be the breakdown endpoint of other precursor products.
• PFOS and PFOA are the most commonly encountered PFAS in the environment and wildlife.
• Information on other PFASs, of which there are several hundred known, is more limited.
• Effective management of PFOS and PFOA may help address potential contamination where other PFASs may also be present.

* DEE 2016. Commonwealth Environmental Management Guidance on Perfluorooctane Sulfonic Acid (PFOS) and Perfluorooctanoic Acid (PFOA). Department of the Environment and Energy.

PFAS concentrations are within the guidelines by the provided sample readings.

Total Hydrocarbons

OSD-5 - Total hydrocarbons – Qube Logistics, Moorebank, NSW

Total Hydrocarbons assessed alongside baseline data (2018) and Spring monitoring (2025) for Aquatic Monitoring location 11&12
(AQ11 & AQ12 Anzac Creek).

Lab results - Total hydrocarbons:	Trigger value ANZECC Guidelines 2000 – slightly disturbed lowland river ecosystem	Triggered	Baseline monitoring April 2018 (presented by Biosis)	November 2025					
Benzene µg/L	1300 µg/L	N	<1	<1					
Toluene µg/L	-	N	<2	<2					
Ethylbenzene µg/L	-	N	<2	<2					
meta-& para-Xylene µg/L	200 µg/L	N	-	<2					
Ortho-Xylene µg/L	470 µg/L	N	<2	<2					
Total Xylenes µg/L	-	N	-	<2					
Sum of BTEX µg/L	-	N	-	<1					
Naphthalene µg/L	85 µg/L	N	-	<5					

Notes:

- The data were compared to the default trigger values (DTVs) recommended by ANZECC/ARMCANZ (2000) for the protection of slightly disturbed lowland river ecosystems in southeast Australia.
- Moorebank Precinct East Stage 2: Biodiversity Monitoring in Anzac Creek Autumn 2019 Survey - Final Report, Bio-Analysis Pty Ltd (2019)
- Moorebank Precinct East - Stage 2 B106 – Baseline Aquatic Ecological Monitoring Report and Biodiversity Monitoring Strategy (SSD 7628) Biosis (2018)
- A commonly encountered example of additive toxicity of mixtures is the simple aromatic hydrocarbons commonly associated with contaminated petroleum sites, benzene, toluene, ethyl benzene and xylenes, collectively known as BTEX

Total hydrocarbons are recorded within the baseline parameter values and have not changed across this testing period to other prior results.

3.2 Interpreting Results

Phosphorous Values

Phosphorus

Stormwater runoff is a major cause of physical, chemical (i.e. nutrients), and microbial degradation of receiving waters. Nitrogen (N) and phosphorus (P) are of particular concern and interest in urban stormwater runoff due to their role in eutrophication of water bodies, onset of harmful algal blooms, and fish kills. refer (Yun-Ya Yang & Gurpal S. Toor)

The linkages between urbanization and increased N and P export is well established; however, the contributions and dynamics of N and P are often site-specific, the synchronicity between N and P in aquatic environment has been widely used as an ecological indicator of biological growth and nutrient limitation.

Understanding P dynamics in stormwater runoff can help to implement and enhance the effectiveness of strategies to control P loss and transport to receiving waters.

P values from this testing period were slightly raised above the ANZECC guidelines, however are considered reasonable for the testing environment and sample pool.

Nitrogen Values

Nitrogen

A previous spike in Nitrogen has decreased to almost meet the ANZECC trigger value for rivers flowing to the coast at this collection point. This may be due to increased vegetation within the system allowing for uptake of excess nitrogen being mobilised by the stormwater.

Nitrogen values are above the guideline rates, however this is a reduction in concentration when compared to the samples of October 2024, which provides an improvement in nitrogen concentration.

Five (5) Industrial Applications of Nitrogen

While the main industrial use of nitrogen is to create ammonia that is required for fertilizer, explosives, and other materials, it uses go far beyond these applications. From food packaging to pharmaceuticals, nitrogen gas can be found in more places and used for more purposes than you may have realized.

Food Packaging: It is common practice for food processing companies to use compressed nitrogen to displace oxygen in the packaging of perishable foods. Without oxygen, the shelf life of foods such as meats, fruits, vegetables, and various snack foods can be extended. Nitrogen can also add a cushion around food to keep it safe during transport.

Chemical Blanketing: Nitrogen is typically used to prevent fires and explosions in dangerous atmospheres like chemical plants or manufacturing facilities, by lowering the oxygen level below explosive limits.

Electronics: In the process of assembling electronics, nitrogen gas is used when two electronic components are forming a permanent connection, also known as soldering. The gas is used to reduce surface tension so there is a cleaner break away from the site of the electrical bond. Nitrogen gas is also used in a computer's main processing system to prevent it from overheating.

Laboratory: Laboratories require a very specific environment to ensure that tests and results are carried out accurately. Nitrogen gas is used to control oxygen levels, humidity and temperature, and maintain an appropriate atmosphere for highly sensitive procedures and equipment. Additionally, there are various pieces of laboratory equipment that require nitrogen for purging.

Laser Cutting: The application of nitrogen as a purging gas in the steel industry is extremely important. It is used as an assist gas to blow away molten material and achieve a stronger stainless or aluminized steel product that is also more resistant to corrosion.

https://nigen.com/industries-that-benefit-from-on-site-nitrogen-systems/

Industries That Benefit from On-Site Nitrogen Systems

Gaseous nitrogen is very useful in large-scale manufacturing and industrial applications. The large volumes of nitrogen gas required for these operations are either sourced from vendors in gas cylinders or generated on-site. In this article, we will highlight critical industrial processes that benefit from on-site nitrogen system

Dissolved Oxygen – Measures:

Dissolved oxygen (DO) is oxygen held (dissolved) in the water and available to aquatic organisms.

The amount of dissolved oxygen in a river or stream can tell us a lot about its water quality.

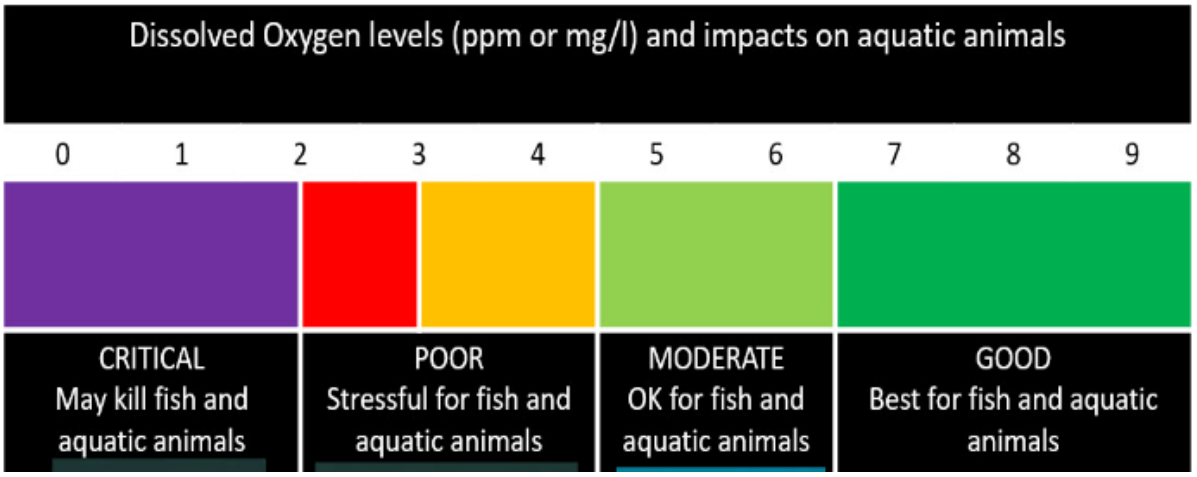
Water will naturally contain a certain amount of dissolved oxygen that is absorbed from the air and produced by plants and algae living in the water.

Temperature has a large effect on the amount of oxygen dissolved in water; cold water can hold higher levels of oxygen than warmer water. Higher water temperatures over summer will cause oxygen levels to drop.

Other factors such as river flow, wind, nutrients and bacterial activity can also affect the amount of dissolved oxygen in waterways.

Dissolved oxygen levels typically range between 5 and 14 mg/L (or ppm).

Example:



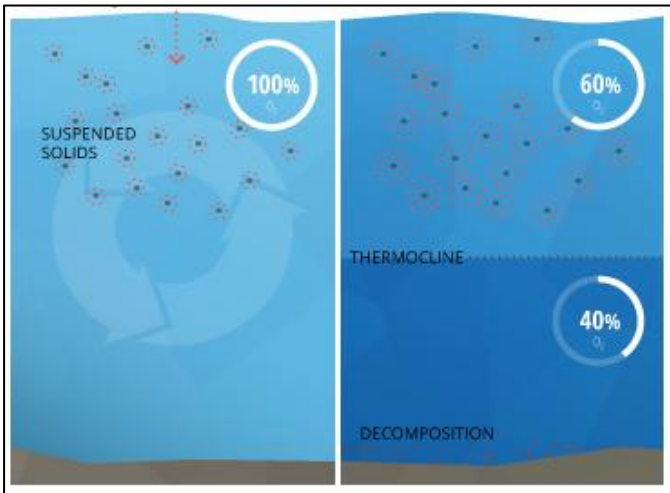
Salinity – Measures:

Electrical conductivity is a measure of the saltiness of the water and is measured on a scale from 0 to 50,000 uS/cm. Electrical conductivity is measured in microsiemens per centimeter (uS/cm). Freshwater is usually between 0 and 1,500 uS/cm and typical sea water has a conductivity value of about 50,000 uS/cm. Examples:

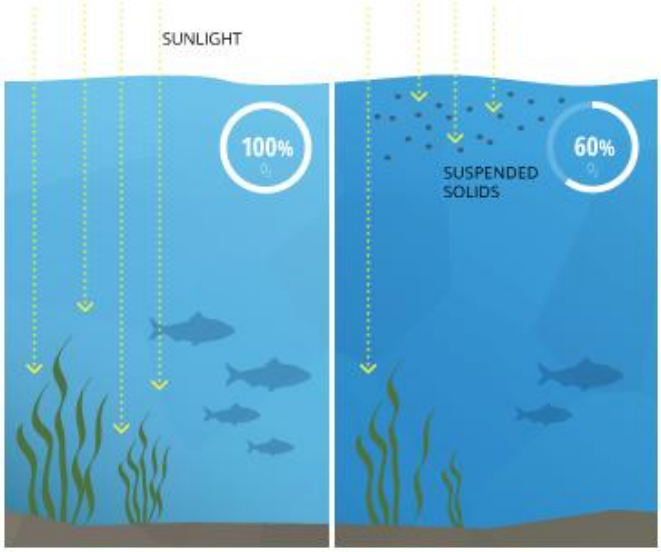
µS/cm	Use
0 - 800	• Good drinking water for humans (provided there is no organic pollution and not too much suspended clay material) • Generally good for irrigation, though above 300µS/cm some care must be, particularly with overhead sprinklers, which may cause leaf, scorch on some salt sensitive plants. • Suitable for all livestock
800 - 2500	• Can be consumed by humans, although most would prefer water in the lower half of this range if available • When used for irrigation, requires special management including suitable soils, good drainage and consideration of salt tolerance of plants • Suitable for all livestock
2500 -10,000	• Not recommended for human consumption, although water up to 3000 µS/cm can be consumed • Not normally suitable for irrigation, although water up to 6000 µS/cm can be used on very salt tolerant crops with very special management techniques. Over 6000 µS/cm, occasional emergency may be possible with care • When used for drinking water by poultry and pigs, the salinity should be limited to about 6000 µS/cm. Most other livestock can use water up to 10000 µS/cm

Total Dissolve Solids (TDS) – Measures

Dissolved solids, smaller than 2 microns, refer to any minerals, salts, metals, in the form of molecules, atoms, cations or anions dissolved in water. Total dissolved solids (TDS) comprise inorganic salts (principally calcium, magnesium, potassium, sodium, bicarbonates, chlorides and sulfates) and some small amounts of organic matter that dissolve in water.
The TDS concentration is the sum of all filterable substances in water that can be determined gravimetrically. However, in most cases, TDS is primarily comprised of ions.
High levels of total suspended solids can affect turbidity, increase water temperatures and decrease dissolved oxygen (DO) levels. This can cause the water to heat up more rapidly because the suspended particles absorb more heat and deplete oxygen, which can adversely affect aquatic life.



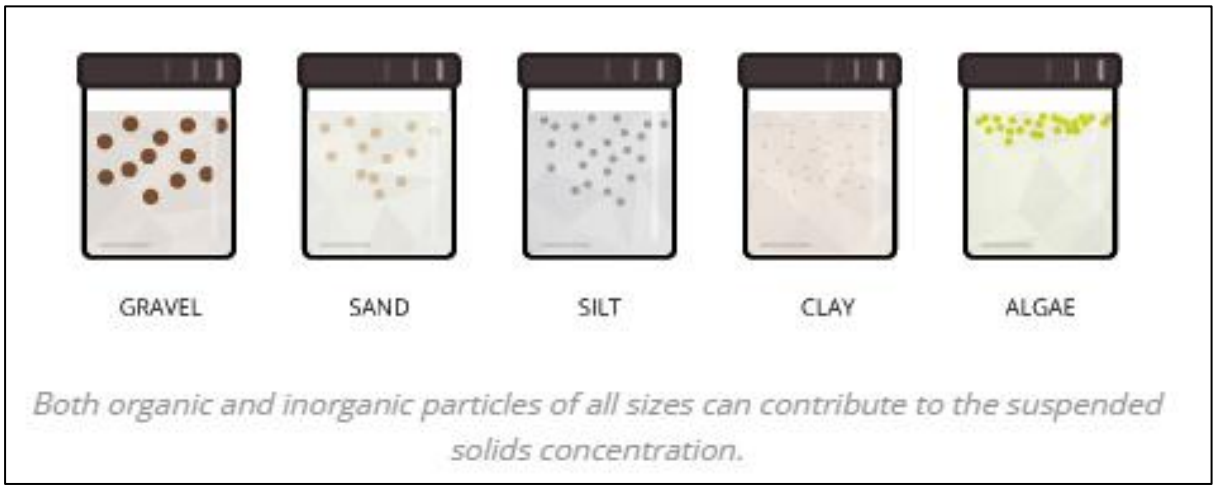
Suspended solids can increase the temperature of water as they absorb additional heat from the sun. This can also cause dissolved oxygen levels to drop below the thermocline, creating hypoxic conditions.



Suspended solids, particularly algae, can block sunlight from reaching submerged plants. This can cause dissolved oxygen levels to drop, as the plants rely on respiration (consuming oxygen) instead of photosynthesis.

Turbidity – Total Suspended Solids (TSS)

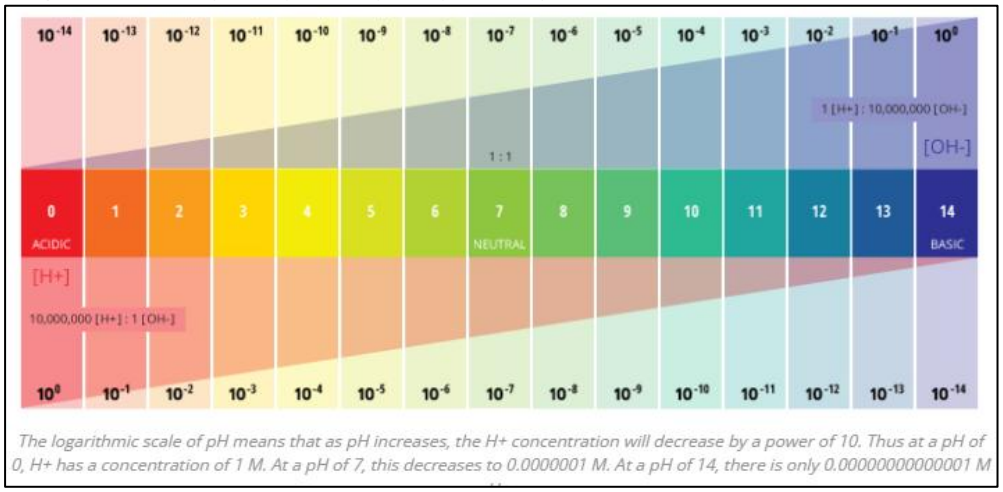
Turbidity data are reported in Nephelometric Turbidity Units (NTU). To provide a sense of scale, water with a turbidity of 1 NTU is crystal clear, water at 5 NTU has a tiny trace of discolouration, and water at 100 NTU is brown and opaque. The standard is less than 10 NTU for rural streams and rivers and less than 30 NTU for urban lakes and ponds.
Total suspended solids (TSS) are particles that are larger than 2 microns found in the water column. Anything smaller than 2 microns (average filter size) is considered a dissolved solid. Most suspended solids are made up of inorganic materials, though bacteria and algae can also contribute to the total solids concentration.



Both organic and inorganic particles of all sizes can contribute to the suspended solids concentration.

pH – Acidity / Alkalinity – Measures

The pH refers to the degree of acidity or alkalinity of a substance. A pH of 7 is neutral. A value above 7 indicates that the water is more alkaline and a pH below 7 indicates acidic conditions.
A pH of 7 is considered neutral. The logarithmic scale means that each number below 7 is 10 times more acidic than the previous number when counting down. Likewise, when counting up above 7, each number is 10 times more basic than the previous number pH stands for the "power of hydrogen" [3]. The numerical value of pH is determined by the molar concentration of hydrogen ions (H+) [3]. This is done by taking the negative logarithm of the H+ concentration (-log(H+)).
Standard values for pH readings are expected, pH 6.5–9 for rural streams and rivers and pH 6–9 for urban lakes and ponds.
In freshwater systems pH sets up the conditions for how easy it is for nutrients to be available and how easily things like heavy metals (toxicity for aquatic life) can dissolve in the water. Rivers and lakes generally range between 5 (acidic) and 9 (basic) on the pH scale.



The logarithmic scale of pH means that as pH increases, the H+ concentration will decrease by a power of 10. Thus at a pH of 0, H+ has a concentration of 1 M. At a pH of 7, this decreases to 0.0000001 M. At a pH of 14, there is only 0.00000000000001 M

Summary of Results

Aquatic ecosystems	
Indicator	**Numerical criteria (trigger values)**
Total phosphorus 50 µg/L	Upland rivers: 20 µg/L Lowland rivers: 25 µg/L for rivers flowing to the coast; Lakes & reservoirs: 10 µg/L Estuaries: 30 µg/L
Total nitrogen 600 µg/L	Upland rivers: 250 µg/L Lowland rivers: 350 µg/L for rivers flowing to the coast; Lakes & reservoirs: 350 µg/L Estuaries: 300µg/L
Chlorophyll-a	Upland rivers: not applicable Lowland rivers: 5 µg/L Lakes & reservoirs: 5 µg/L. Estuaries: 4 µg/L.
Turbidity 152.8 NTU	Upland rivers: 2–25 NTU (see supporting information) Lowland rivers: 6–50 NTU (see supporting information) Lakes & reservoirs: 1–20 NTU Estuaries: 0.5–10 NTU
Salinity (electrical conductivity) SPC 0.003 µS/cm	Upland rivers: 30–350 µS/cm Lowland rivers: 125–2200 µS/cm supporting information
Dissolved oxygen 101%	Upland rivers: 90–110% Lowland rivers: 85–110% Freshwater lakes & reservoirs: 90–110% Estuaries: 80–110% Note: Dissolved oxygen values were derived from daytime measurements. Dissolved oxygen concentrations may vary diurnally and with depth. Monitoring programs should assess this potential variability.
pH 6.3	Upland rivers: 6.5–8.0 Lowland rivers: 6.5–8.5 Freshwater lakes & reservoirs: 6.5–8.0 Estuaries: 7.0–8.5 Changes of more than 0.5 pH units from the natural seasonal maximum or minimum should be investigated.

3.1 Key Summary of Results Spring 2025

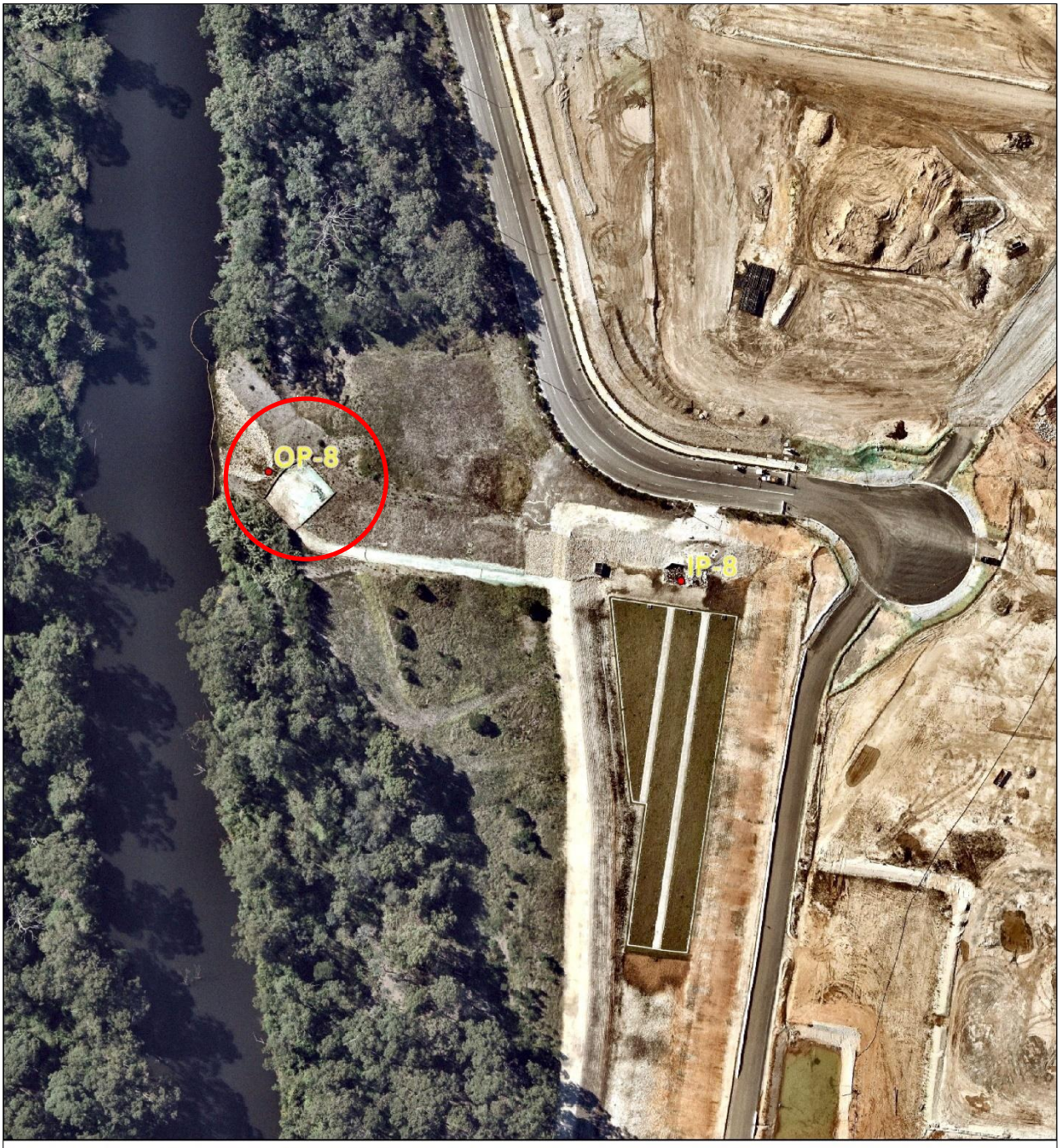
Both Nitrogen and phosphorous trigger the Anzecc guideline within the water samples from basin 8. This may be due to low water flow and low water volumes at the collection points which will contribute to increasing concentrations in samples, particularly for N & P readings.

pH has decreased significantly at basin 8 (8.12 down to 5.91).

This is considered an extreme change and most probable an anomaly in the testing results.

This value will continue to be monitored during future testing periods, to determine a less volatile trend and consistent reading for pH.

Map Image 5. Stormwater Testing Site – Moorebank Logistics Park



Sample Site Map

0 30 60 120 Meters

Client: M.I.D Plumbing	Map Issue: Basin 8 Sample Site Map
Address: BUSHMASTER AVENUE MOOREBANK2170	Time: 10/07/2024 2:25 PM

LGA: LIVERPOOL CITY COUNCIL	Scale: 1:2,000
Lot/DP: 5 to 14/DP 1299137	Spatial Reference: WGS 1984 Web Mercator Auxiliary Sphere
Units: Meters	

Marco Perry
Environmental/Bushfire Planner
Bsc EnvSc

Marco@apical-bushfire.com.au

Map image 6.

Basin 5 (B5)
Georges River
Titalka Park
Anzac Rd
Carroll Park
Georges River
Casula Station
Moorebank
Basin 6 (B6)
Georges River
Moorebank Ave
Basin 8 (B8)

STORMWATER DISCHARGE TESTING SITE

BASIN 8 – OSD 8 INFLOW

Site image 1. Testing site Basin OSD-8 inflow water from the SIOMP network

Table 3. In-situ data and observations Retention Basin 8 outflow

(a) Total phosphorus

Basin 8. - Total phosphorous – Qube Logistics, Moorebank, NSW		Trigger Trigger Value - ANZECC 2000 Guidelines	Triggered
Lab results - Total phosphorous:	40 µg/L	25 µg/L - 50 µg/L	N
Notes: • Channel Culvert • Trigger value 50 µg/L for lowland rivers, trigger value 25 µg/L for rivers flowing to the coast Anzecc Guidelines 2000.			

Phosphorus levels at inflow samples are within the ANZECC guidelines

(b) Total Nitrogen as N (TKN + NOx) by Discrete Analyser

Basin 8.1 inflow - Total nitrogen – Qube Logistics, Moorebank, NSW		Trigger Value - ANZECC 2000 Guidelines	Triggered
Lab results -Total nitrogen:	1,900 µg/L	350 µg/L for rivers flowing to the coast	Y
Notes: • Total Nitrogen as N (TKN + NOx) by Discrete Analyser • Trigger values are based on a low-lying river			

Total nitrogen at the inlet source to OSD-8 is approximately 5 times the ANZECC guidelines rating.
Total nitrogen levels leaving the basin at the discharge is however recorded at 600 µg/L or 300% lower than the inlet rating.

(c) Kjeldahl nitrogen Total Kjeldahl Nitrogen as N

Basin 8.1 inflow - Kjeldahl nitrogen – Qube Logistics, Moorebank, NSW		Trigger Value - ANZECC 2000 Guidelines	Triggered
Lab results – kjeldahl nitrogen:	1,700 µg/L	-	-
Notes: • Total Kjeldahl Nitrogen as N			

Total nitrogen at the inlet source to OSD-8 is approximately 5 times the ANZECC guidelines rating.

(d) Dissolved metals;

Basin 8.1 inflow - Dissolved metals – Qube Logistics, Moorebank, NSW			
Equipment used: - Sample bottles collected from monitoring site ALS Environmental Laboratory Testing Report			
Lab results – Dissolved metals:	**Measures mg/L**	**Trigger value ANZECC Guidelines 2000 95% protection criteria**	**Triggered**
Arsenic	<0.003	0.013 mg/L	N
Cadmium	<0.0001	0.0002 mg/L	N
Chromium	0.002	0.001 mg/L	Y
Copper	0.005	0.0014mg/L	N
Nickel	0.004	0.011 mg/L	N
Lead	<0.001	0.0034 mg/L	N
Zinc	<0.005	0.008 mg/L	N
Mercury	<0.0001	0.0006 mg/L	N
Notes: - ANZECC Guidelines (2000) suggest 0.002 mg/L is considered appropriate for slightly-moderately disturbed systems. - A small spike in cadmium reading is provided by the sample			

(e) PFAS;

Basin 8.1 inflow - PFAS – Qube Logistics, Moorebank, NSW			
PFAS Surrogate	**Measure** µg/L	**95% species protection (DEE 2016)**	**Triggered**
Sum of PFAS **13C4-PFOS**	0.18µg/L 84.7%	.13 (µg/L)	Y
Sum of PFHxS and PFOS **13C8-PFOA**	0.05µg/L 85.5%	220 (µg/L)	N
Notes: This Guidance focuses on PFOS and PFOA as potential indicators of wider contamination by related PFASs. The reasons for this approach include: • Most research undertaken on PFASs internationally and in Australia has focused on PFOS and PFOA due to their frequent occurrence in the environment, persistence, and bioaccumulation. • PFOS and PFOA can also be the breakdown endpoint of other precursor products. • PFOS and PFOA are the most commonly encountered PFAS in the environment and wildlife. • Information on other PFASs, of which there are several hundred known, is more limited. • Effective management of PFOS and PFOA may help address potential contamination where other PFASs may also be present. * DEE 2016. Commonwealth Environmental Management Guidance on Perfluorooctane Sulfonic Acid (PFOS) and Perfluorooctanoic Acid (PFOA). Department of the Environment and Energy.			

(f) Total suspended solids.

Basin 8.1 inflow - Total suspended solids – Qube Logistics, Moorebank, NSW		EPA exceedance value	Trigger
Lab results – Total suspended solids: mg/L	6 mg/L	50 mg/L	N
Notes: • Total Suspended Solids dried at 104 ± 2°C • Total Suspended Solids (TSS)			

(g) Total hydrocarbons

Basin 8.1 inflow - Total hydrocarbons – Qube Logistics, Moorebank, NSW

Total Hydrocarbons assessed alongside baseline data (2018) and Autumn monitoring (2019) for Aquatic Monitoring location 11&12 (AQ11 & AQ12 Anzac Creek).

Lab results -Total hydrocarbons:	Trigger value ANZECC Guidelines 2000 – slightly disturbed lowland river ecosystem	Triggered	Monitoring discharge points May 2024 (Apical)	Monitoring discharge points October 2024 (Apical)	Monitoring discharge points April 2025 (Apical)	Nov 2025	Trend
Benzene µg/L	1300 µg/L	N	<1	<1	<1	<1	No Exceedance
Toluene µg/L	-	N	<2	<2	<2	<2	No Exceedance
Ethylbenzene µg/L	-	N	<2	<2	<2	<2	No Exceedance
meta-& para-Xylene µg/L	200 µg/L	N	<2	<2	<2	<2	No Exceedance
Ortho-Xylene µg/L	470 µg/L	N	<2	<2	<2	<2	No Exceedance
Total Xylenes µg/L	-	-	<2	<2	<2	<2	No Exceedance
Sum of BTEX µg/L	-	-	<1	<1	<1	<1	No Exceedance
Naphthalene µg/L	85 µg/L	N	<5	<5	<5	<5	No Exceedance

Notes:

- The data were compared to the default trigger values (DTVs) recommended by ANZECC/ARMCANZ (2000) for the protection of slightly disturbed lowland river ecosystems in southeast Australia.
- A commonly encountered example of additive toxicity of mixtures is the simple aromatic hydrocarbons commonly associated with contaminated petroleum sites, benzene, toluene, ethyl benzene and xylenes, collectively known as BTEX

Water Quality Monitoring Comparative Table (Temporal)

Table 4. Retention Basin 8 MPW. Testing Site OP-8

Testing Site MPW 8.1 Inflow		May 2024	October 2024	April 2025	Nov 2025
pH		8.51	6.44	8.12	6.3
Dissolved Oxygen - %/L		13.07 mg/L	10.5 ppm	9.09 ppm	101%
Actual Electronic Conductivity (SPC -ms/cm)		0.558 SPC - ms/cm	8.3 (C-ms/cm)	282.3	0.003 SPC ms/cm
Temperature - ℃		15.5	19.3	21.5	23
Turbidity		5.39 NTU	6.80 NTU	28.72 NTU	152.80
Total phosphorous - mg/L		0.06 mg/L	0.05 mg/L	0.04 mg/L	0.05mg/L
Total nitrogen - mg/L		0.07 mg/L	0.8 mg/L	0.4 mg/L	0.6,mg/L
Kjeldahl nitrogen mg/L		0.07 mg/L	0.7 mg/L	0.4 mg/L	1.7mg/L
Dissolved metals					
Arsenic		<0.001	<0.001	<0.001	0.003
Cadmium		<0.0001	<0.0001	<0.0001	<0.0001
Chromium		<0.001	<0.001	<0.001	0.002
Copper		0.002	<0.001	<0.001	0.005
Nickel		0.001	0.001	<0.001	0.004
Lead		<0.001	<0.001	<0.001	<0.001
Zinc		<0.005	<0.005	<0.005	<0.005
Mercury		<0.0001	<0.0001	<0.0001	<0.0001
PFAS					
Lab results – SUM of PFAS Micrograms/L		0.04	0.69	0.01	0.18
SUM of PFHxS & PFOS Microgrms/L		0.04	0.56	0.01	0.05
Total suspended solids mg/L		<5	<5	13	6
Total hydrocarbons					
Benzene	<1	<1	<1	<1	<1
Toluene	<2	<2	<2	<2	<2
Ethylbenzene	<2	<2	<2	<2	<2
meta-& para-Xylene	<2	<2	<2	<2	<2
Ortho-Xylene	<2	<2	<2	<2	<2
Total Xylenes	<2	<2	<2	<2	<2
Sum of BTEX	<1	<1	<1	<1	<1
Naphthalene	<5	<5	<5	<5	<5

Results

Page : 7 of 11
Work Order : ES2537469
Client : Apical Bushfire and Planning
Project : ----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	B6I	B5I	B8O	B8I	----
				Sampling date / time	26-Nov-2025 00:00	26-Nov-2025 00:00	26-Nov-2025 00:00	26-Nov-2025 00:00	----
Compound	CAS Number	LOR	Unit		ES2537469-006	ES2537469-007	ES2537469-008	ES2537469-009	----------
					Result	Result	Result	Result	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		<5	13	199	6	----
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	0.002	<0.001	0.003	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	----
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	0.002	----
Copper	7440-50-8	0.001	mg/L		0.003	<0.001	0.001	0.005	----
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	0.001	0.004	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Zinc	7440-66-6	0.005	mg/L		0.012	<0.005	0.006	<0.005	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		0.05	0.12	0.04	0.16	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		0.9	1.0	0.6	1.7	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		1.0	1.1	0.6	1.9	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		0.09	0.21	0.05	0.04	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	----
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	----
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	----
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	B6I	B5I	B8O	B8I	----
				Sampling date / time	26-Nov-2025 00:00	26-Nov-2025 00:00	26-Nov-2025 00:00	26-Nov-2025 00:00	----
Compound	CAS Number	LOR	Unit		ES2537469-006	ES2537469-007	ES2537469-008	ES2537469-009	----------
					Result	Result	Result	Result	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	----
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	----
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	----
^ Total Xylenes	----	2	µg/L		<2	<2	<2	<2	----
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	----
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluoropropane sulfonic acid (PFPrS)	423-41-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L		<0.01	<0.01	**0.03**	**0.02**	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	**0.01**	**0.03**	**0.03**	----
Perfluorononane sulfonic acid (PFNS)	68259-12-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----

Analytical Results

Sub-Matrix: WATER
(Matrix: WATER)

Compound	CAS Number	LOR	Unit	Sample ID	B6I	B5I	B80	B8I	----
				Sampling date / time	26-Nov-2025 00:00	26-Nov-2025 00:00	26-Nov-2025 00:00	26-Nov-2025 00:00	----
					ES2537469-006	ES2537469-007	ES2537469-008	ES2537469-009	---------
					Result	Result	Result	Result	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	**0.03**	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	**0.02**	**0.07**	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	**0.01**	**0.01**	**0.03**	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
Perfluorohexadecanoic acid (PFHxDA)	67905-19-5	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	B6I	B5I	B8O	B8I	----
				Sampling date / time	26-Nov-2025 00:00	26-Nov-2025 00:00	26-Nov-2025 00:00	26-Nov-2025 00:00	----
Compound	CAS Number	LOR	Unit		ES2537469-006	ES2537469-007	ES2537469-008	ES2537469-009	----------
					Result	Result	Result	Result	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	0.02	0.09	0.18	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	0.01	0.06	0.05	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	0.02	0.09	0.18	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		79.7	106	81.4	80.5	----
Toluene-D8	2037-26-5	2	%		100	81.9	98.5	99.2	----
4-Bromofluorobenzene	460-00-4	2	%		113	106	111	104	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		83.2	84.6	83.4	84.7	----
13C8-PFOA	----	0.02	%		86.6	87.2	86.0	85.5	----

Appendix B. ANZECC & ARMCANZ (2000) water quality guidelines

Table 3.4.1 Trigger values for toxicants at alternative levels of protection. Values in grey shading are the trigger values applying to typical *slightly–moderately disturbed systems*; see table 3.4.2 and Section 3.4.2.4 for guidance on applying these levels to different ecosystem conditions.

Chemical		Trigger values for freshwater (µgL^{-1})				Trigger values for marine water (µgL^{-1})			
		Level of protection (% species)				Level of protection (% species)			
		99%	95%	90%	80%	99%	95%	90%	80%
METALS & METALLOIDS									
Aluminium	pH >6.5	27	55	80	150	ID	ID	ID	ID
Aluminium	pH <6.5	ID	ID	ID	ID	ID	ID	ID	ID
Antimony		ID	ID	ID	ID	ID	ID	ID	ID
Arsenic (As III)		1	24	94 [C]	360 [C]	ID	ID	ID	ID
Arsenic (AsV)		0.8	13	42	140 [C]	ID	ID	ID	ID
Beryllium		ID	ID	ID	ID	ID	ID	ID	ID
Bismuth		ID	ID	ID	ID	ID	ID	ID	ID
Boron		90	370 [C]	680 [C]	1300 [C]	ID	ID	ID	ID
Cadmium	H	0.06	0.2	0.4	0.8 [C]	0.7 [B]	5.5 [B, C]	14 [B, C]	36 [B, A]
Chromium (Cr III)	H	ID	ID	ID	ID	7.7	27.4	48.6	90.6
Chromium (CrVI)		0.01	1.0 [C]	6 [A]	40 [A]	0.14	4.4	20 [C]	85 [C]
Cobalt		ID	ID	ID	ID	0.005	1	14	150 [C]
Copper	H	1.0	1.4	1.8 [C]	2.5 [C]	0.3	1.3	3 [C]	8 [A]
Gallium		ID	ID	ID	ID	ID	ID	ID	ID
Iron		ID	ID	ID	ID	ID	ID	ID	ID
Lanthanum		ID	ID	ID	ID	ID	ID	ID	ID
Lead	H	1.0	3.4	5.6	9.4 [C]	2.2	4.4	6.6 [C]	12 [C]
Manganese		1200	1900 [C]	2500 [C]	3600 [C]	ID	ID	ID	ID
Mercury (inorganic)	B	0.06	0.6	1.9 [C]	5.4 [A]	0.1	0.4 [C]	0.7 [C]	1.4 [C]
Mercury (methyl)		ID	ID	ID	ID	ID	ID	ID	ID
Molybdenum		ID	ID	ID	ID	ID	ID	ID	ID
Nickel	H	8	11	13	17 [C]	7	70 [C]	200 [A]	560 [A]
Selenium (Total)	B	5	11	18	34	ID	ID	ID	ID
Selenium (SeIV)	B	ID	ID	ID	ID	ID	ID	ID	ID
Silver		0.02	0.05	0.1	0.2 [C]	0.8	1.4	1.8	2.6 [C]
Thallium		ID	ID	ID	ID	ID	ID	ID	ID
Tin (inorganic, SnIV)		ID	ID	ID	ID	ID	ID	ID	ID
Tributyltin (as µg/L Sn)		ID	ID	ID	ID	0.0004	0.006 [C]	0.02 [C]	0.05 [C]
Uranium		ID	ID	ID	ID	ID	ID	ID	ID
Vanadium		ID	ID	ID	ID	50	100	160	280
Zinc	H	2.4	8.0 [C]	15 [C]	31 [C]	7	15 [C]	23 [C]	43 [C]
NON-METALLIC INORGANICS									
Ammonia	D	320	900 [C]	1430 [C]	2300 [A]	500	910	1200	1700
Chlorine	E	0.4	3	6 [A]	13 [A]	ID	ID	ID	ID
Cyanide	F	4	7	11	18	2	4	7	14
Nitrate	J	17	700	3400 [C]	17000 [A]	ID	ID	ID	ID
Hydrogen sulfide	G	0.5	1.0	1.5	2.6	ID	ID	ID	ID
ORGANIC ALCOHOLS									
Ethanol		400	1400	2400 [C]	4000 [C]	ID	ID	ID	ID
Ethylene glycol		ID	ID	ID	ID	ID	ID	ID	ID
Isopropyl alcohol		ID	ID	ID	ID	ID	ID	ID	ID
CHLORINATED ALKANES									
Chloromethanes									
Dichloromethane		ID	ID	ID	ID	ID	ID	ID	ID
Chloroform		ID	ID	ID	ID	ID	ID	ID	ID
Carbon tetrachloride		ID	ID	ID	ID	ID	ID	ID	ID
Chloroethanes									
1,2-dichloroethane		ID	ID	ID	ID	ID	ID	ID	ID
1,1,1-trichloroethane		ID	ID	ID	ID	ID	ID	ID	ID

Chemical	Trigger values for freshwater (µgL^{-1})				Trigger values for marine water (µgL^{-1})			
	Level of protection (% species)				Level of protection (% species)			
	99%	95%	90%	80%	99%	95%	90%	80%
1,1,2-trichloroethane	5400	6500	7300	8400	140	1900	5800 [C]	18000 [C]
1,1,2,2-tetrachloroethane	ID	ID	ID	ID	ID	ID	ID	ID
Pentachloroethane	ID	ID	ID	ID	ID	ID	ID	ID
Hexachloroethane B	290	360	420	500	ID	ID	ID	ID
Chloropropanes								
1,1-dichloropropane	ID	ID	ID	ID	ID	ID	ID	ID
1,2-dichloropropane	ID	ID	ID	ID	ID	ID	ID	ID
1,3-dichloropropane	ID	ID	ID	ID	ID	ID	ID	ID
CHLORINATED ALKENES								
Chloroethylene	ID	ID	ID	ID	ID	ID	ID	ID
1,1-dichloroethylene	ID	ID	ID	ID	ID	ID	ID	ID
1,1,2-trichloroethylene	ID	ID	ID	ID	ID	ID	ID	ID
1,1,2,2-tetrachloroethylene	ID	ID	ID	ID	ID	ID	ID	ID
3-chloropropene	ID	ID	ID	ID	ID	ID	ID	ID
1,3-dichloropropene	ID	ID	ID	ID	ID	ID	ID	ID
ANILINES								
Aniline	8	250 [A]	1100 [A]	4800 [A]	ID	ID	ID	ID
2,4-dichloroaniline	0.6	7	20	60 [C]	ID	ID	ID	ID
2,5-dichloroaniline	ID	ID	ID	ID	ID	ID	ID	ID
3,4-dichloroaniline	1.3	3	6 [C]	13 [C]	85	150	190	260
3,5-dichloroaniline	ID	ID	ID	ID	ID	ID	ID	ID
Benzidine	ID	ID	ID	ID	ID	ID	ID	ID
Dichlorobenzidine	ID	ID	ID	ID	ID	ID	ID	ID
AROMATIC HYDROCARBONS								
Benzene	600	950	1300	2000	500 [C]	700 [C]	900 [C]	1300 [C]
Toluene	ID	ID	ID	ID	ID	ID	ID	ID
Ethylbenzene	ID	ID	ID	ID	ID	ID	ID	ID
o-xylene	200	350	470	640	ID	ID	ID	ID
m-xylene	ID	ID	ID	ID	ID	ID	ID	ID
p-xylene	140	200	250	340	ID	ID	ID	ID
m+*p*-xylene	ID	ID	ID	ID	ID	ID	ID	ID
Cumene	ID	ID	ID	ID	ID	ID	ID	ID
Polycyclic Aromatic Hydrocarbons								
Naphthalene	2.5	16	37	85	50 [C]	70 [C]	90 [C]	120 [C]
Anthracene B	ID	ID	ID	ID	ID	ID	ID	ID
Phenanthrene B	ID	ID	ID	ID	ID	ID	ID	ID
Fluoranthene B	ID	ID	ID	ID	ID	ID	ID	ID
Benzo(a)pyrene B	ID	ID	ID	ID	ID	ID	ID	ID
Nitrobenzenes								
Nitrobenzene	230	550	820	1300	ID	ID	ID	ID
1,2-dinitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,3-dinitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,4-dinitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,3,5-trinitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-methoxy-2-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-methoxy-4-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-chloro-2-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-chloro-3-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-chloro-4-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1-chloro-2,4-dinitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,2-dichloro-3-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,3-dichloro-5-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
1,4-dichloro-2-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID
2,4-dichloro-2-nitrobenzene	ID	ID	ID	ID	ID	ID	ID	ID

Chemical	Trigger values for freshwater (µgL^{-1})				Trigger values for marine water (µgL^{-1})			
	Level of protection (% species)				Level of protection (% species)			
	99%	95%	90%	80%	99%	95%	90%	80%
Hexazinone	ID	ID	ID	ID	ID	ID	ID	ID
Simazine	0.2	3.2	11	35	ID	ID	ID	ID
Urea herbicides								
Diuron	ID	ID	ID	ID	ID	ID	ID	ID
Tebuthiuron	0.02	2.2	20	160 [C]	ID	ID	ID	ID
Miscellaneous herbicides								
Acrolein	ID	ID	ID	ID	ID	ID	ID	ID
Bromacil	ID	ID	ID	ID	ID	ID	ID	ID
Glyphosate	370	1200	2000	3600 [A]	ID	ID	ID	ID
Imazethapyr	ID	ID	ID	ID	ID	ID	ID	ID
Ioxynil	ID	ID	ID	ID	ID	ID	ID	ID
Metolachlor	ID	ID	ID	ID	ID	ID	ID	ID
Sethoxydim	ID	ID	ID	ID	ID	ID	ID	ID
Trifluralin B	2.6	4.4	6	9 [A]	ID	ID	ID	ID
GENERIC GROUPS OF CHEMICALS								
Surfactants								
Linear alkylbenzene sulfonates (LAS)	65	280	520 [C]	1000 [C]	ID	ID	ID	ID
Alcohol ethoxyolated sulfate (AES)	340	650	850 [C]	1100 [C]	ID	ID	ID	ID
Alcohol ethoxylated surfactants (AE)	50	140	220	360 [C]	ID	ID	ID	ID
Oils & Petroleum Hydrocarbons	ID	ID	ID	ID	ID	ID	ID	ID
Oil Spill Dispersants								
BP 1100X	ID	ID	ID	ID	ID	ID	ID	ID
Corexit 7664	ID	ID	ID	ID	ID	ID	ID	ID
Corexit 8667		ID	ID	ID	ID	ID	ID	ID
Corexit 9527	ID	ID	ID	ID	230	1100	2200	4400 [A]
Corexit 9550	ID	ID	ID	ID	ID	ID	ID	ID

Notes: Where the final water quality guideline to be applied to a site is below current analytical practical quantitation limits, see Section 3.4.3.3 for guidance.

Most trigger values listed here for metals and metalloids are *High reliability* figures, derived from field or chronic NOEC data (see 3.4.2.3 for reference to Volume 2). The exceptions are *Moderate reliability* for freshwater aluminium (pH >6.5), manganese and marine chromium (III).

Most trigger values listed here for non-metallic inorganics and organic chemicals are *Moderate reliability* figures, derived from acute LC_{50} data (see 3.4.2.3 for reference to Volume 2). The exceptions are *High reliability* for freshwater ammonia, 3,4-DCA, endosulfan, chlorpyrifos, esfenvalerate, tebuthiuron, three surfactants and marine for 1,1,2-TCE and chlorpyrifos.

* = *High reliability* figure for esfenvalerate derived from mesocosm NOEC data (no alternative protection levels available).

A = Figure may not protect key test species from acute toxicity (and chronic) — check Section 8.3.7 for spread of data and its significance. 'A' indicates that trigger value > acute toxicity figure; note that trigger value should be <1/3 of acute figure (Section 8.3.4.4).

B = Chemicals for which possible bioaccumulation and secondary poisoning effects should be considered (see Sections 8.3.3.4 and 8.3.5.7).

C = Figure may not protect key test species from chronic toxicity (this refers to experimental chronic figures or geometric mean for species) — check Section 8.3.7 for spread of data and its significance. Where grey shading and 'C' coincide, refer to text in Section 8.3.7.

D = Ammonia as TOTAL ammonia as [NH_3-N] at pH 8. For changes in trigger value with pH refer to Section 8.3.7.2.

E = Chlorine as total chlorine, as [Cl]; see Section 8.3.7.2.

F = Cyanide as un-ionised HCN, measured as [CN]; see Section 8.3.7.2.

G = Sulfide as un-ionised H_2S, measured as [S]; see Section 8.3.7.2.

H = Chemicals for which algorithms have been provided in table 3.4.3 to account for the effects of hardness. The values have been calculated using a hardness of 30 mg/L $CaCO_3$. These should be adjusted to the site-specific hardness (see Section 3.4.3).

J = Figures protect against toxicity and do not relate to eutrophication issues. Refer to Section 3.3 if eutrophication is the issue of concern.

ID = Insufficient data to derive a reliable trigger value. Users advised to check if a low reliability value or an ECL is given in Section 8.3.7.

T = Tainting or flavour impairment of fish flesh may possibly occur at concentrations below the trigger value. See Sections 4.4.5.3/3 and 8.3.7.

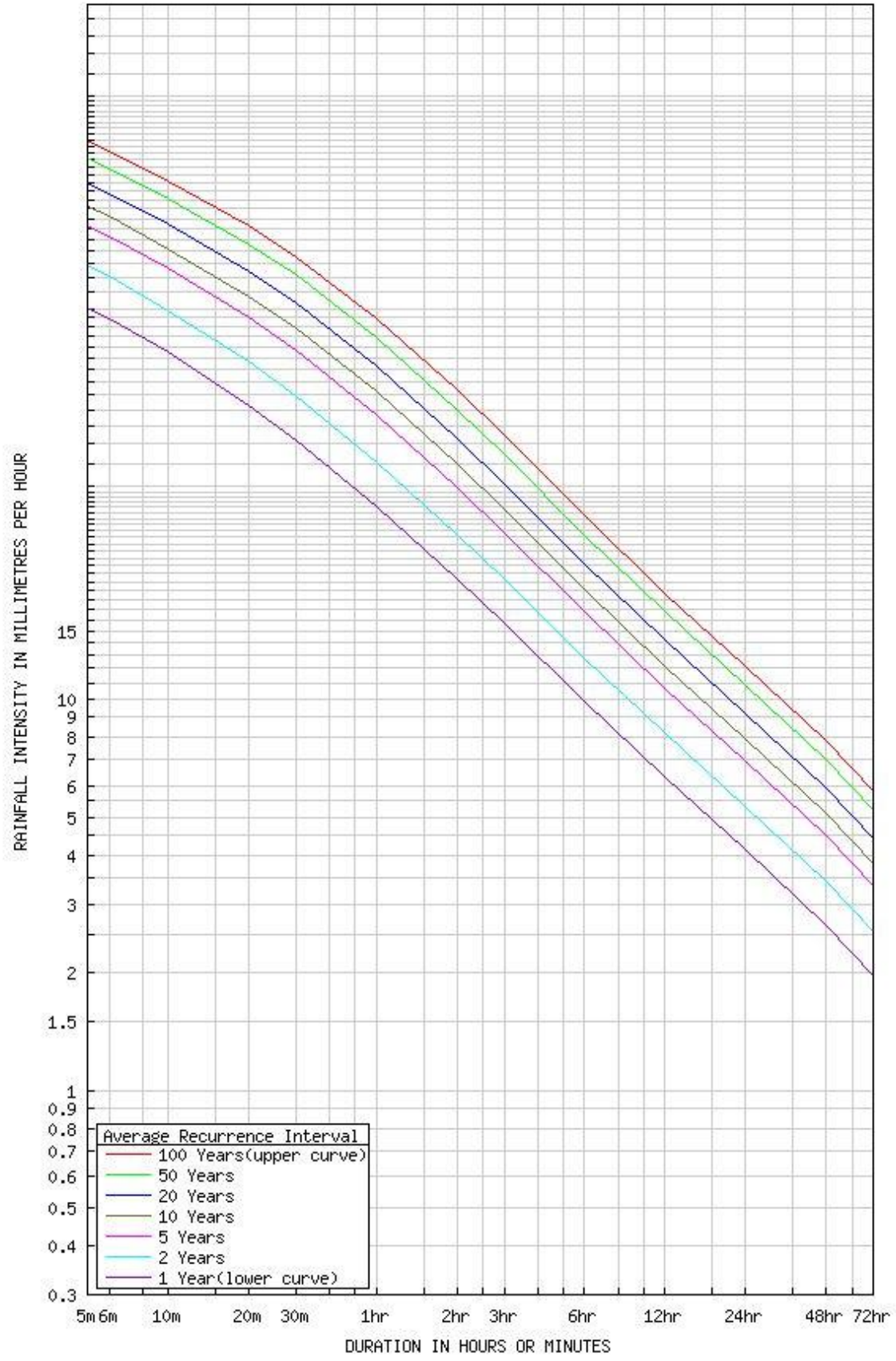
Table 5. Ecological water quality guideline values developed by water regulators

Exposure scenario	PFOS	PFOA	Exposure scenario	Comments and source
Freshwater	0.00023 µg/L	19 µg/L	99% species protection - high conservation value systems	Australian and New Zealand Guidelines for Fresh and Marine Water Quality - technical draft default guideline values for PFOS and PFOA. Note 1: The 99% species protection level for PFOS is close to the level of detection. Agencies may wish to apply a 'detect' threshold in such circumstances rather than a quantified measurement. Note 2: The draft guidelines do not account for effects which result from the biomagnification of toxicants in air-breathing animals or in animals which prey on aquatic organisms. Note 3: The WQGs advise[41] that the 99% level of protection be used for slightly to moderately disturbed systems. This approach is generally adopted for chemicals that bioaccumulate and biomagnify in wildlife. Regulators may specify or environmental legislation may prescribe the level of species protection required, rather than allowing for case-by-case assessments.
	0.13 µg/L	220 µg/L	95% species protection - slightly to moderately disturbed systems	
	2 µg/L	632 µg/L	90% species protection - highly disturbed systems	
	31 µg/L	1824 µg/L	80% species protection - highly disturbed systems	
Interim marine	0.00023 µg/L	19 µg/L	99% species protection - high conservation value systems	As above. Freshwater values are to be used on an interim basis until final marine guideline values can be set using the nationally-agreed process under the Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Note 1: The WQG advise that in the case of estuaries, the most stringent of freshwater and marine criteria apply, taking account of any available salinity correction. Note 2: Marine guideline values developed by CRC CARE are under consideration through the nationally-agreed water quality guideline development process.
	0.13 µg/L	220 µg/L	95% species protection - slightly to moderately disturbed systems	
	2 µg/L	632 µg/L	90% species protection - highly disturbed systems	
	31 µg/L	1824 µg/L	80% species protection - highly disturbed systems	

https://www.waterquality.gov.au/sites/default/files/documents/ANZECC-1992-guidelines.pdf

Type of indicator	Indicator	Units	Fresh waters	Marine waters
	Dissolved oxygen[2]	mg/L	> 6 (> 80–90% saturation)	> 6 (> 80–90% saturation)
	Nutrients/nuisance growths	–	(Section 2.3.3)	(Section 2.3.3)
	pH	–	6.5–9.0	< 0.2 pH unit change
	Salinity	mg/L	< 1000 (about 1,500 µS/cm)	–
	Suspended particulate matter/turbidity	–	< 10% change seasonal mean concentration (see also colour & clarity)	< 10% change seasonal mean concentration (see also colour & clarity)
	Temperature[3]	–	< 2°C increase	< 2°C increase
Toxicants				
Inorganic toxicants	Aluminium	µg/L	< 5.0 (if pH < = 6.5)	NR
	Aluminium	µg/L	< 100.0 (if pH > 6.5)	–
	Ammonia	µg/L	20.0–30.0 (Table 2.3)	NR
	Antimony	µg/L	30.0	500.0
	Arsenic	µg/L	50.0	50.0
	Beryllium	µg/L	4.0[4]	NR
	Cadmium	µg/L	0.2–2.0[5]	2.0
	Chromium	µg/L	10.0	50.0
	Copper	µg/L	2.0–5.0[5]	5.0
	Cyanide	µg/L	5.0	5.0
	Iron	µg/L	1,000.0[6]	NR
	Lead	µg/L	1.0–5.0[5]	5.0
	Mercury	µg/L	0.1	0.1
	Nickel	µg/L	15.0–150.0[5]	15.0
	Selenium	µg/L	5.0	70.0
	Silver	µg/L	0.1	1.0
	Sulfide	µg/L	2.0	2.0
	Thallium	µg/L	4.0	20.0
	Tin (tributyltin)	µg/L	0.008	0.002
	Zinc	µg/L	5.0–50.0[6]	50.0
Organic toxicants	Acrylonitrile	µg/L	NR	NR
	Benzidine	µg/L	NR	NR
	Dichlorobenzidine	µg/L	NR	NR
	Diphenylhydrazine	µg/L	NR	NR
Halogenated aliphatic compounds	Hexachlorobutadiene	µg/L	0.1	0.3
	Halogenated ethers	µg/L	NR	NR
	Isophorone	µg/L	NR	NR
Monocyclic aromatic compounds	Benzene	µg/L	300.0	300.0
	Chlorinated benzenes	µg/L	(Table 2.8)	NR

Appendix C. Intensity Frequency Duration – Average Recurrence Interval Indicator
Intensity-Frequency-Duration (bom.gov.au)



Moorebank Intermodal Precinct

APPENDIX G – COMPLAINTS REGISTER

Moorebank Intermodal Precinct Complaints Register – 2 December 2025				
Date received	**Complainant**	**Nature of complaint**	**Location (MIP/MARW)**	**Status**
01/12/2025	**Community member**	*Complaint: Community member is concerned that the Moorebank Intermodal By-pass and Cambridge Avenue upgrade fail to address the precinct's future traffic needs. Concerned that by building the by-pass as one lane each way will create a choke point between two-lane sections and leading to costly duplication later.* *Response: It was noted that the information recently published by Transport for NSW regarding the Cambridge Avenue Upgrade in relation to Moorebank Intermodal Precinct (MIP), the Department's statement that the upgrade is intended to provide secondary access to MIP is incorrect. Under the existing conditions of consent for MIP, no vehicles associated with the Precinct are permitted to access Cambridge Avenue. All freight traffic must enter and exit the precinct to the north, in accordance with the approved Construction Traffic and Access Management Plan (CTAMP) and Operational Traffic and Access Management Plan (OTAMP). To avoid confusion within the community and among our stakeholders, we have asked Transport for NSW to update its communications to reflect this.*	**MIP**	**CLOSED**
30/11/2025	**Community member**	*Complaint: Community member raised concern with lights from the MIP site that shine directly into their main bedroom, making it difficult to sleep. Request that these lights be turned off by 9:00 PM nightly to reduce disruption for themselves and neighbouring properties.* *Response: The project team will visit the community members' home to identify the light source. Further investigation will be undertaken once the source is confirmed.*	**MIP**	**OPEN**
26/11/2025	**Community member**	*Compliant: Community member raised issue with two large bins obstructing view of traffic at intersection Delfin Drive and Anzac Rd (near the fire station). Request for these to be removed to mitigate risk of traffic hazard.* *Response: After investigating, it was confirmed that these blue bins are not associated with MIP and do not belong to the Fire Station. The community member was alerted to the fact that these bins may belong to TFNSW or Liverpool Council, possibly related to recent road works on Anzac Road and to contact them.*	**Other**	**CLOSED**
25/11/2025	**Community member**	*Complaint: Community member reported issue with container dropping on hardstand in the early hours of the morning.* *Response: An email was issued to the community member referring to them where all information about the planning and approval related to the operation of MIP. The complaint was escalated to QUBE operations team for investigate the date and time of the incident.*	**MIP (Qube)**	**OPEN**

Moorebank Intermodal Precinct Complaints Register – 2 December 2025				
Date received	**Complainant**	**Nature of complaint**	**Location (MIP/MARW)**	**Status**
11/11/2025	**Community member**	*Query*: Community member following up on damage to a private vehicle which took place occurred in September 2025 on Anzac Road in Moorebank due to ongoing roadworks. *Response*: Roadworks assessed and found to meet the required Transport for NSW standards. Issue has been discussed with the community member and the matter has been escalated within ESR.	**MIP**	**CLOSED**
28/10/2025	**Community Member**	*Query*: Trees growing through site fence in bushland located to the west of Wattle Grove is almost reaching a neighbouring boundary fence. Request that these trees be pruned back due to perceived fire hazard. *Response:* Message has been left with Community member on 18 November 2025. Overhanging tree removal has also been undertaken recently in this location.	**MIP**	**CLOSED**
20/10/2025	**Community Member**	*Query:* A community member asked about fire prevention management in the former ADF boot land at Wattle Grove West (from Moorebank Avenue to the Wattle Grove residential boundary). *Response:* The community member was provided with the following information: the bushland to the west of Wattle Grove is managed under Biodiversity Agreement BA 341, which permits specific bushfire management activities. These include maintaining the Asset Protection Zone and fire access tracks, providing gate access to the RFS, and undertaking ongoing weed reduction to minimise fuel loads.	**MIP**	**Closed**
9/10/2025	**Community Member**	*Noise:* Liverpool City Council informed the project team of a complaint regarding noisy night works along Anzac Road and Delfin Drive, which continued until 2am. Upon investigation, it was determined that the works were related to horizontal directional drilling (HDD) activities by ROC Communications for telecommunications infrastructure. *Response*: The matter was referred to the ROC Communications project manager for appropriate resolution.	**MIP**	**Closed**
30/09/2025	**MIP tenants**	*Dust management:* Management company for the warehouse complex located next to the project advised that tenants in both north and south locations of the east precinct had raised a complaint regarding dust coming from the project. They requested more effective dust suppression measures and controls. *Response:* Measures taken include: - Increased watercarts onsite and allocated one to specifically the work zone nearest the warehouses.	**MAR**	**Closed**

Moorebank Intermodal Precinct Complaints Register – 2 December 2025				
Date received	**Complainant**	**Nature of complaint**	**Location (MIP/MARW)**	**Status**
		- Increased dust monitoring during inspections. - Commenced proposed scheduled application in the work zone - Dust management including speed reductions discussed at prestart with staff and contractors. - Dust management scheduled as the next environmental toolbox topic		
26/09/2025	**Community Member**	*Noise:* Community member contacted the project information line reporting noisy activities off/around Anzac Road observed Thurs 25/9 and Fri 26/9, describing them as 'jet plane' sounding/earthworks moving and warehousing noises. *Response:* The project team investigated precinct activities and eliminated the noise being made from precinct contractors related to transmission line infrastructure, Moorebank/Anzac Rd intersection upgrade or MAR works. A detailed response was provided with the suggestion to contact Liverpool City Council for an understanding of other activities occurring in the area.	**MIP**	**Closed**
16/09/2025	**Community Member**	*Traffic congestion:* Community member emailed to report that he experienced a 2-hour delay travelling to Liverpool via Moorebank Avenue and missed his specialist appointment. He noted that the traffic lights are not synchronized to facilitate traffic flow and large trucks were blocking the intersections illegally. *Response*: The team investigated and found that unfortunately there was a traffic signal timer glitch which caused the lights to change too quickly and this coincided with the lane closure as part of pavement works on Bapuame Road, Moorebank Ave and the intersection of Anzac Road. We advised the community member that we notified Net Ops as part of TfNSW as the responsibility authority and subsequently reopened the lane to improve traffic flow. The project team also provided contact information for the relevant SCAT dept in TfNSW should the complainant wish to follow up further.	**MIP**	**Closed**
16/09/2025	**Community Member**	*Traffic congestion:* Community member contacted the project information line to report issues with the traffic light at the intersection of Anzac Road (and Moorebank Ave) and that traffic was banked up all the way to the Army Barracks with only approximately three vehicles or one truck passing through at a time. *Response*: Spoke to community member to ascertain further information and found that in his perspective, a lane closure was the problem causing the heavy congestion. Followed up with the project team and contractor and upon further investigation, found that there was a traffic signal timer glitch that occurred during the off-peak lane closure which significantly impacted traffic flow. Offered the caller the contact information for the relevant SCAT dept in TfNSW should they wish to follow up directly with that authority responsible for traffic light sequencing. The caller was satisfied at providing the feedback and reporting the heavy traffic impacts, emphasizing that the area requires 'common sense' with traffic management.	**MIP**	**Closed**

Moorebank Intermodal Precinct Complaints Register – 2 December 2025				
Date received	**Complainant**	**Nature of complaint**	**Location (MIP/MARW)**	**Status**
12/09/2025	**Community Member**	*Blocked pedestrian access:* A MIP employee's family member contacted the project information line to report blocked pedestrian access to the Moorebank Intermodal Precinct. They expressed frustration after being passed between several parties without receiving a satisfactory resolution. *Response*: The employee's family member explained that their family member relies on pedestrian access to catch a bus to work and for the past three days the access had been blocked without alternative arrangements. ESR and National Intermodal were contacted for assistance with the matter and begun to explore solutions. National Intermodal and ESR treated the issue as a priority, working together to explore short-term and long-term solutions. A call was made back to the caller on Monday evening (15/9/25) with an initial estimated timeframe of 48 hours for commencement of the reinstated access but the family member was dissatisfied with the response and requested escalation with a callback from management. National Intermodal and ESR transitioned as the point of contact and resolved to provide a driver for the employee each weekday to and from work until the footpath became accessible. The footpath was reopened on 22/09/25.	**MIP**	**Closed**
2/09/2025	**Community Member**	*Traffic management/road condition:* A community member reported unsafe road conditions along Anzac Avenue, including exposed metal plates and insufficient caution signage. *Response*: The issue was referred to Vaughan Civil for immediate attention. Due to multiple recent complaints, the matter was escalated to their Project Manager. Liverpool City Council was also informed and asked to assist in monitoring the site to ensure public safety and compliance with roadwork standards.	**MIP**	**Closed**
2/09/2025	**Community Member**	*Traffic management:* A community member reported a near-miss incident while turning right from Moorebank Avenue onto Anzac Road (northbound), due to two lanes merging into one without adequate signage or sufficient space to safely accommodate turning vehicles. *Response*: The project team investigated and confirmed that the traffic management setup in question is not associated with the current project works but is being managed by Vaughan Civil. The matter was referred to Vaughan Civil for review, with a request to address the safety concerns and implement any necessary rectifications.	**MIP**	**Closed**
1/09/2025	**Community Member**	*Property damage*: A community member reported that recent roadworks caused damage to their vehicle due to uneven steel road plates and insufficient signage. *Response:* The project team contacted the caller to confirm the location, which was identified as Anzac Avenue. As the current project does not have any steel plates in use, the matter was referred to Vaughan Civil. Vaughan Civil is undertaking works in the area on behalf of Endeavour Energy's 33kV transmission infrastructure project and were asked to address the issue and contact the community member.	**MIP**	**Closed**
31/08/2025	**Community Member**	*Noise:* A community member called the project hotline at 11:30pm to report excessive truck, forklift and banging noises occurring since 10pm.	**MIP**	**Closed**

Moorebank Intermodal Precinct Complaints Register – 2 December 2025				
Date received	**Complainant**	**Nature of complaint**	**Location (MIP/MARW)**	**Status**
		Response: The project team investigated and confirmed there were no overnight activities taking place at the ITS site. The matter was referred to Qube for follow-up regarding any IMEX-related activities that may have contributed to the noise. As a precautionary measure, the project contractor installed noise curtains around localised intersection works and conducted a toolbox talk to address noise-generating behaviours with staff.		
12/08/2025	**Community Member**	*Traffic congestion:* A community member responded to an email correspondence from March 2025 regarding traffic congestion on Moorebank Avenue, Cambridge Avenue and Canterbury Road. They reported only slight improvements since adjustments were previously made to the SCATS (traffic light phase timing to improve northbound flows). They advised they are still experiencing significant delays particularly during school drop-off hours and suggested that traffic lights were not coordinated. *Response*: Feedback was shared with the project team and the community member was advised that the current Moorebank Avenue is temporary and will be replaced as part of the realignment project designed to streamline traffic flows around the precinct. They were also informed that Transport for NSW is responsible for sequencing of traffic lights however we could raise the matter on their behalf.	**MIP**	**Closed**
1/08/2025	**Community Member**	*Traffic management:* A community member phoned the project hotline to report an incident involving traffic management and a traffic controller's behaviour with managing contraflow along Anzac Avenue near the intersection about 7pm on Sunday. Discussed the incident with the caller for further details and passed this on to the project team and contractor to look into further. *Response:* The contractor followed up with their traffic management company, which conducted an investigation and provided a response report. The contractor then contacted the caller to emphasize their commitment to safety and adherence to protocols. Although there were differing accounts of the event from the caller and the traffic controller, the company has implemented reinforcement measures, including additional staff briefings. It is also suspected the incident occurred during a shift change and a brief period when the boom gates were relocated from the intersection. The caller was satisfied with the information provided and action taken.	**MIP**	**Closed**
1/08/2025	**Community Member**	*Property damage:* A community member submitted a claim for a punctured tyre to Liverpool City Council, alleging it was sustained 22 July 2025 from metal debris left on the road from works at Moorebank Avenue near Anzac Road and Bushmaster Avenue. *Response:* The project team investigated with our contractor who reviewed the provided information and video footage. There was no evidence of debris found on the road and additionally the contractor did not have any works occurring in that vicinity nor for a period before, so it is unlikely to be related to project works. A response was provided on 6 August	**MIP**	**Closed**

Moorebank Intermodal Precinct Complaints Register – 2 December 2025				
Date received	**Complainant**	**Nature of complaint**	**Location (MIP/MARW)**	**Status**
		to Liverpool City Council to advise of our findings.		
15/07/2025	**Community Member**	Road works: Phone enquiry received from nearby community member in Lurnea who complained about the extended length of time to complete for works occurring on Moorebank Avenue (specifically the 200m stretch up to the Anzac Road intersection). Caller complained of heavy traffic congestion in the area and sought more information about project works and when it will all finish. *Response:* Spoke to caller, explaining the unforeseen delays associated with weather conditions and the Endeavour Energy project, and advised caller about upcoming traffic switch for MAAI (25-28 July). Added him to the project subscriber list and followed up with emails providing a copy of the upcoming OOH notification and website link, advised him MAAI is expected to be fully completed by the end of 2025 and that MAR is scheduled to be ongoing for approximately 18m (although mostly being undertaken offline).	**MIP**	**Closed**
5/07/2025	**Community Member**	Truck movements: An enquiry was received regarding the Cambridge Avenue upgrade, truck movements at the Moorebank Intermodal Precinct (MIP), and whether these movements can be restricted during peak traffic hours. The enquirer also raised general concerns about the need for greater coordination with other government departments to minimise traffic impacts. *Response*: The enquirer was informed of the essential role that truck movements play in supporting the multiple warehousing and logistics operations within the precinct. They were reassured that the project is committed to managing and mitigating traffic impacts including through two key initiatives underway with the delivery of the MAR project and the Moorebank Intermodal Terminal Road Access (MITRA) Strategy in collaboration with Transport for NSW. The enquirer was also referred to Transport for NSW as the appropriate authority for further information regarding the Cambridge Avenue upgrade.	**MIP**	**Closed**
4/06/2025	**Community Member**	Road works: Caller enquired about works along Anzac Road from the Moorebank Avenue intersection up to the Fire Station as it seems constantly being dug up and the road is not holding up in the rain. Upon investigation, activities relate to the installation of the 33kw transmission line as part of Endeavour Energy's separate project. *Response*: Caller was contacted by the project team and advised that MAAI works with final reinstatement is due end-July around the intersection. Remainder works are being undertaken by Vaughan Civil. Feedback was passed on to Vaughan Civil who also phoned caller to advise that works are continuing and explain that reinstatement is temporary after each shift and permanent road reinstatement will be carried out once works are complete.	**MIP**	**Closed**
23/05/2025	**Community Member**	Property damage: Stakeholder's vehicle tyre was damaged from driving over a significant pothole along Moorebank Avenue and requested reimbursement/support to rectify the damage. Council was also contacted for assistance by stakeholder and contacted the	**MIP**	**Closed**

Moorebank Intermodal Precinct Complaints Register – 2 December 2025				
Date received	**Complainant**	**Nature of complaint**	**Location (MIP/MARW)**	**Status**
		project team due to receiving a few community complaints. Response: Pothole was investigated and location confirmed belonging to Defence. Stakeholder and Council was referred to a Defence contact for follow up.		
22/05/2025	**Community Member**	Noise: Resident phoned the project number around midnight to report loud container noises over the last few nights and requested contact details to complain to Government agencies. *Response*: Project team investigated and eliminated any contractor works relating to MAAI or MAR and known precinct activities. On closer review it appears potentially related to Qube and information has been passed on to their Director of Communications – awaiting response.	**MIP**	**Open**
18/05/2025	**Community and CCC Member**	Environmental reporting: Stakeholder emailed to lodge a complaint regarding environmental reporting with respect to specific emissions information and more detailed data that they have requested for some time. *Response*: There has been ongoing correspondence and attempts to provide the requested information. This is currently being reviewed again to confirm that the project team has provided the requested information as best as they are able. Additional information has subsequently been provided, and a member of project team will follow up with stakeholder.	**MIP**	**Closed**
24/04/2025	**Community Member**	Noise: Caller phoned the project hotline in the evening, reporting incessant banging and vibrations through the house. *Response*: Caller was phoned back for more information but could not be reached.	**MIP**	**Closed**
24/04/2025	**Community Member**	Noise: Resident phoned the project hotline to make a complaint about overnight works being very disruptive into the early morning affecting sleep. Resident reported smashing and banging, reversing beepers and seeing tippers and lights. Resident called back the following night reporting the same. *Response*: Resident was phoned to discuss. The project team investigated, confirming there were no overnight works at either location. Resident was sent follow up email advising of no night work activities from MIP, provided a copy of recent OOH letter notification for periodic works until June (although nothing expected for a few weeks) and suggestion to contact Council or Sydney Trains in case of any related activities.	**MIP**	**Closed**
5/04/2025	**Community Member**	Noise: Ongoing concerns about the long-term potential of noise and potential for increased bushfire risk due to an increase in traffic accessing the intermodal terminal, cranes movements and handling of containers, once works are completed. Status: Stakeholder acknowledged; no response required. Note not a construction-based comment.		**Closed**
27/03/2025	**Community Member**	Noise: Concerned the upcoming night works required for the Moorebank Avenue upgrade will impact residents on the Western side of Wattle Grove. Response sent to stakeholder on 4/4		**Closed**

Moorebank Intermodal Precinct Complaints Register – 2 December 2025				
Date received	**Complainant**	**Nature of complaint**	**Location (MIP/MARW)**	**Status**
24/03/2025	**Community Member**	Traffic and disruptions: Concerns raised around ongoing roadworks including the recent Anzac Road closure between Moorebank Ave and Delfin Dr. Additionally, concerns raised around interruptions from the upgrade of underground electrical supply continuing to September 2025. Response sent to stakeholder 7 April.		**Closed**
17/03/2025	**Community Member**	MAR Construction: Complaint in agreement with prior complaint. Concern about location of Moorebank Avenue Realignment and the risks of increased noise from the precinct. Stated that noise walls were necessary for project. Response sent to stakeholder on 4/4.		**Closed**
17/03/2025	**Community Member**	MAR Construction: Concern about location of Moorebank Avenue Realignment and the risks of increased noise from the precinct. Stated that noise walls were necessary for project. Stakeholder contacted, and complaint receipt acknowledged.		**Closed**
9/03/2025	**Community Member**	MAR Construction: Concern about location of Moorebank Avenue Realignment and the risks of increased noise and bushfires from road moving to the east of the precinct. Suggested noise wall the duration of the road. Response sent to stakeholder on 11/3.		**Closed**
8/03/2025	**Community Member**	Traffic Impacts: Excessive traffic congestion on Moorebank Avenue in mornings heading north towards Liverpool. Response sent to Stakeholder on 27/3		**Closed**
8/03/2025	**Community Member**	Traffic Impacts: Excessive traffic congestion on Moorebank Avenue, Cambridge Avenue, and Canterbury Road. Two traffic light sets within MIP holding traffic. Response sent to Stakeholder on 27/3		**Closed**
2024 Complaints				
18/12/2024	**Community Member**	Building design and Visual Impact: Stakeholder from Glenfield voiced dissatisfaction with the buildings and loss of city views due to Moorebank Development. Complaint acknowledged and plantings to reduce visual impact discussed with stakeholder and complaint closed.		**Closed**
17/12/2024	**Community Member**	Vegetation management: Statement of disapproval in relation to the revegetation approach from a community member. Complaint acknowledged and possible options for improvements discussed with stakeholder		**Closed**
2/12/2024	**Community Member**	Dust: Complaint regarding airborne dust from precinct reaching property in Wattle Grove. This has required an increase in the number of times the pool needs to be cleaned. Requested improvements to dust management on site. Investigation undertaken, and property 1.76kms away from earthworks. Complaint passed to teams to ensure dust management remains a focus. Stakeholder satisfied.		**Closed**

Moorebank Intermodal Precinct Complaints Register – 2 December 2025				
Date received	**Complainant**	**Nature of complaint**	**Location (MIP/MARW)**	**Status**
29/10/2024	**Community Member**	Noise: Complaint regarding noise at ABB Site. Noise linked to sandblasting at ABB site. Stakeholder provided update and link to complaint line for ABB.		**Closed**
28/10/2024	**Community Member**	Traffic: Complaint received regarding traffic stationary on Moorebank Avenue. Contractor has struck overhead wires and traffic is stopped while area made safe. Stakeholder advised of incident.		**Closed**
24/10/2024	**Community Member**	Traffic: Concerned with traffic layout of Anzac Road causing traffic build up. Request for an additional right turn lane. Stakeholder advised there is insufficient width to have two right turn lanes.		**Closed**
12/10/2024	**Community Member**	Vegetation management: Dissatisfied with quality of cut of reeds at Woolmers Court. Concern about reeds being left on ground being a fire risk. Contractors returned to site and mulched reeds. Stakeholder updated.		**Closed**
11/10/2024	**Community Member**	Vegetation management: Quality of cut of reeds at Woolmers Court. Dissatisfied with quality of cut. Concern about reeds being left on ground being a fire risk. Contractors returned to site and mulched reeds. Stakeholder updated.		**Closed**
19/09/2024	**Community Member**	Traffic: Concerned with traffic backing up on the M5 when turning onto Moorebank Avenue, wondered if there was a change to traffic conditions to cause the congestion. Investigation conducted, no change to traffic conditions on Moorebank Avenue, issue present at other M5 offramps during morning peak. Likely issue relating to wider network. Stakeholder informed and satisfied.		**Closed**
13/09/2024	**Community Member**	Follow up and dissatisfaction with outcome of pushbike accident complaint resolution. Concern with safety of designated bike route. Update sent to stakeholder regarding outcome of investigation. Work completed to standard and no claim. Item closed.		**Closed**
29/08/2024	**Community Member**	Concern surrounding extent of work, and if road construction will reach Glenfield Road roundabout. Concerns about biodiversity losses through project. Response provided with links to additional information on projects.		**Closed**
27/08/2024	**Community Member**	Question relating to how many trucks are taken off roads and how many containers have been handled each quarter. General complaint against time for Moorebank Ave project to be finished. BMD and MIP provided responses		**Closed**
14/08/2024	**Community Member**	Caller advised excessive noise from smashing containers. Requesting for the noise to stop. Does not want to speak with someone and wanting complaint to be passed on. Stakeholder contacted and acknowledged the receipt of the complaint		**Closed**
23/07/2024	**Community member**	Traffic: Community member lodged complaint about conditions of road upgrade of Moorebank Avenue, poor signage on the road, and workers on the phone not directing traffic. Stakeholder contacted and informed of investigation into traffic management and signage. Stakeholder provided update that project is inline with TfNSW approved traffic Management Plan		**Closed**

Moorebank Intermodal Precinct

APPENDIX H – WEED MONITORING REPORTS

MIP BI-MONTHLY WEED MONITORING REPORT – JUNE 2025

Introduction

Arcadis has been commissioned to conduct bi-monthly weed monitoring surveys within the operational areas of Moorebank Precinct East (MPE) and Moorebank Precinct West (MPW). These areas together are known as the Moorebank Intermodal Precinct (MIP).

The MPE operational facility includes the Import and Export Terminal (IMEX), Rail Access Land Package (RALP), warehouses, distribution facilities and freight village, and stormwater trunk drainage infrastructure and landscaping areas. The MPW operational facility includes the landscaped vegetation along Bushmasters Avenue (Figure 1).

Regular monitoring of the MIP operational facilities will inform the land manager of weed cover, and the presence of any weeds listed as 'priority' for the Greater Sydney Local Land Services region under the *Biosecurity Act 2015*.

The schedule for the bi-monthly weed monitoring inspections for the 2025-26 monitoring year are detailed in Table 1. This document will be treated as live throughout the monitoring year and will be updated at the end of each inspection.

Table 1 Schedule for bi-monthly weed inspections

Inspection month	Date completed
June 2025	25/06/2025
August 2025	*TBC*
October 2025	*TBC*
December 2026	*TBC*
February 2026	*TBC*
April 2026	*TBC*

Background

Arcadis has been monitoring the MPE operational facility for weed occurrence since April 2020. The RALP, which includes the MPE operational RALP, has seen significant change and works over the time Arcadis has conducted weed monitoring. Additionally, works conducted in MPW in 2023/24 have changed the layout and vegetation spread in the RALP. Several weed remediation events have occurred since the inception of weed monitoring, detailed below in Table 2.

Table 2 Summary of weed events throughout monitoring history

Timing	Summary of events	Weed contractor
Spring 2020	• Weeds removed from batters and revegetated with native species, as per the Urban Design and Landscaping Plan (UDLP) for MPE	Spray Grass Solutions

Timing	Summary of events	Weed contractor
	• Cumberland Plain Seeds were procured to provide technical oversight of revegetation effort	
December 2021	• As per recommendations from Spray Grass Solutions and Cumberland Plain Seeds, the monitoring methodology was changed • Changes included reporting on cover on 'priority' weeds species and key weeds specific to the project.	
December 2022 to June 2023	• Weed remediation works commenced • Priority weed species were targeted • Native species were identified throughout the RALP to avoid accidental removal.	P&E Services
December 2023 to present	• Weed remediation works continued • Regular maintenance of priority weed species via slashing, hand removal and herbicide spraying	Toolijooa Environmental Restoration

Methodology

Arcadis ecologist Kate Mauger attended the MIP operational area on 25 June 2025. Monitoring involved traversing the MIP operational facility on foot, surveying landscaped areas, stormwater infrastructure and soft batters adjoining the RALP for increases in weed abundance of the identified species in Appendix A and Appendix B. The areas surveyed are presented in Figure 1.

The weather on the 25 June was windy, with a maximum temperature of 16.2°C, and the weather recorded at Holsworthy Aerodrome (station 066161) (BOM 2025).

Study Limitations

The data presented within this report is restricted to what was observed and recorded by the attending Arcadis ecologists during the site assessment on 25 June 2025.

Monitoring of weeds was restricted to the operational facility; weeds were not assessed within the bounds of the active construction areas surrounding new warehouses.

Surveys were not undertaken in areas extending beyond the junction between the QUBE RALP and the Southern Sydney Freight Line (SSFL).

Figure 1. Survey extent within the MPI operational facility

Results

Results of the weed monitoring surveys during the June 2025 survey are summarised below in Table 3. Weed records, previously recorded threatened flora species records, and instances of native species within the survey extent are shown in Figure 2.

Progress photographs of monitoring locations are provided in Appendix E and a complete flora species inventory in Appendix F.

Table 3 Summary of weed abundances across all inspection areas in MPI, for the current survey

Inspection area	Weed abundances for current survey	Photo of inspection area
Moorebank Precinct East (MPE)		
Rail Access Land Package (RALP)	• Chloris gayana (Rhodes Grass) and small amounts of *Themeda quadrivalvis* (Grader Grass) were removed during this inspection • Some areas of *Lantana camara* (Lantana) were slashed along the fences adjacent to the Georges River BioBank site • The southern section of the RALP, in areas that have previously experienced significant batter erosion, were being colonised intensely by *Tagetes minuta* (Stinking Roger), and were slashed during this inspection (see adjacent photo).	

Inspection area	Weed abundances for current survey	Photo of inspection area
IMEX building and adjacent drainage infrastructure	• *Acacia falcata* (Hickory Wattle) continue to grow unimpeded by weeds.	

Inspection area	Weed abundances for current survey	Photo of inspection area
Warehouse areas	• Large areas of the native *Cynodon dactylon* (Couch Grass) are present across most of these areas and is generally outcompeting weed species. • Occurrences of weeds in the warehouse area and the adjacent drainage infrastructure is restricted to scattered individuals of *Senecio madagascariensis* (Fireweed), *Plantago lanceolata* (Plantain), *Trifolium arvense* (Clover) and exotic grasses like *Chloris gayana* (Rhodes Grass), *Sporobolus africanus* (Parramatta Grass), *Paspalum urvillei* (Giant Paspalum) and *Ehrharta erect* (Panic Veldtgrass) • Majority of this area has now been claimed by the Moorebank Avenue Upgrade project.	

Inspection area	Weed abundances for current survey	Photo of inspection area
Eastern boundary drainage infrastructure	• Drainage infrastructure dominated by *Bulboschoenus fluviatilis* (Marsh club-rush) whilst other are dominated by *Typha orientalis* (Bulrush). Where space is present between stands of theses native emergent species small clumps of *Persicaria decipiens* (Slender Knotweed), *Daviesia ulicifolia*, *Ficinia nodosa* (Knotted Club-rush), *Carex tereticaulis* and *Juncus usitatus* are present. Other native species such as *Imperata cylindrica* and *Lomandra longifolia* were observed in the drainage channels. • Areas of erosion still present.	

Inspection area	Weed abundances for current survey	Photo of inspection area
Moorebank Precinct West (MPW)		
Landscaped areas along Bushmasters Avenue	• Landscapes vegetation is in good condition, with minor weed incursions • Weed species present include *Sonchus oleraceus* (Common Sowthistle), *Chloris virgata* (Rhodes Grass), *Bidens pilosa*, *Conyza bonariensis* (Fleabane), *Cyclospermum leptophyllum* (Slender Celery), and *Tagetes minuta* (Stinking Roger). • Areas with limtied to no landscaped vegetation are particularly susceptible to weed incursion from cleared areas (see adjacent photo)	

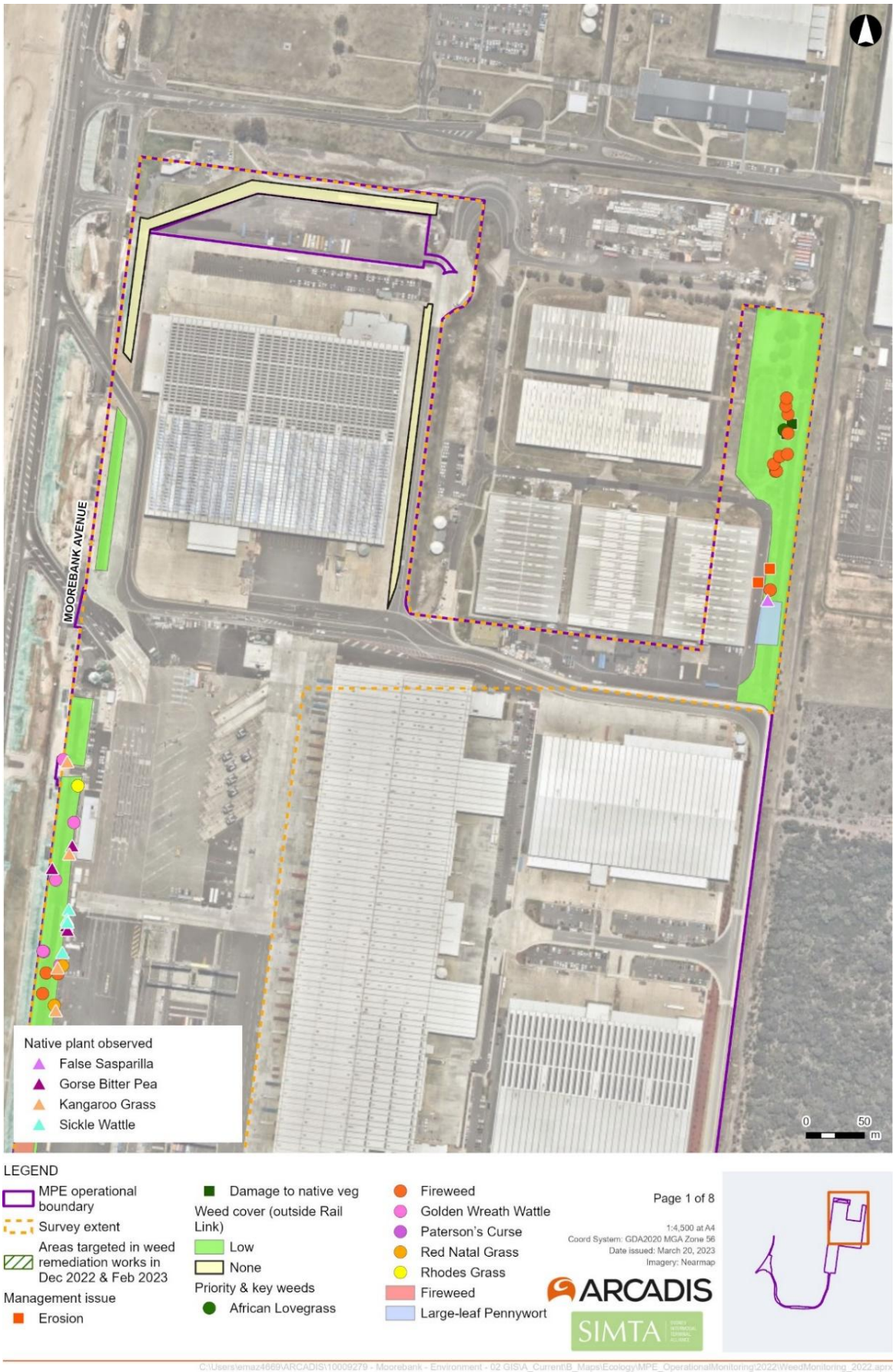


Figure 2 Instances of weeds, native species and threatened flora records in the survey extent and MIP operational boundary (1 of 8)

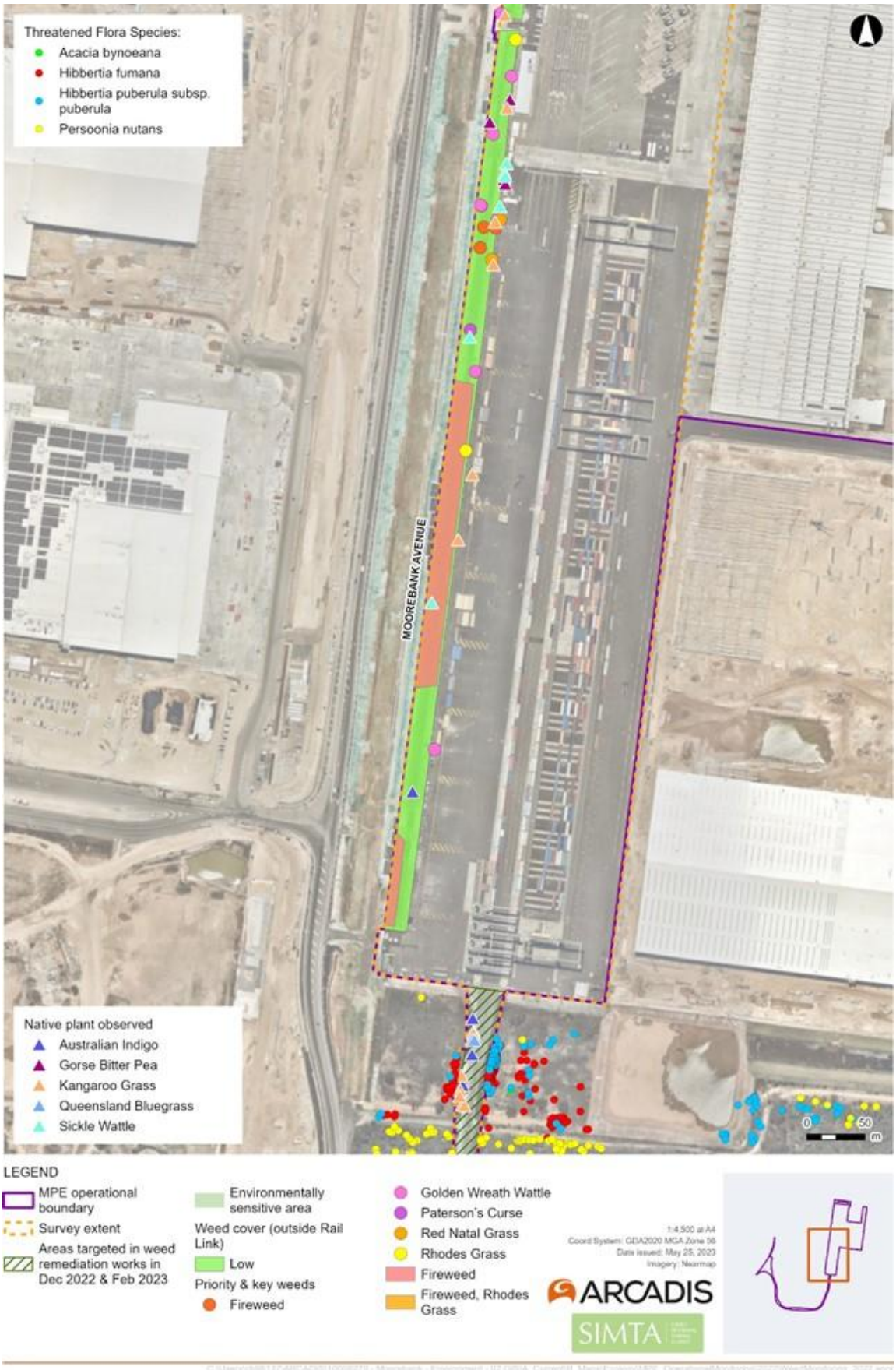


Figure 2 Instances of weeds, native species and threatened flora records in the survey extent and MIP operational boundary (2 of 8)

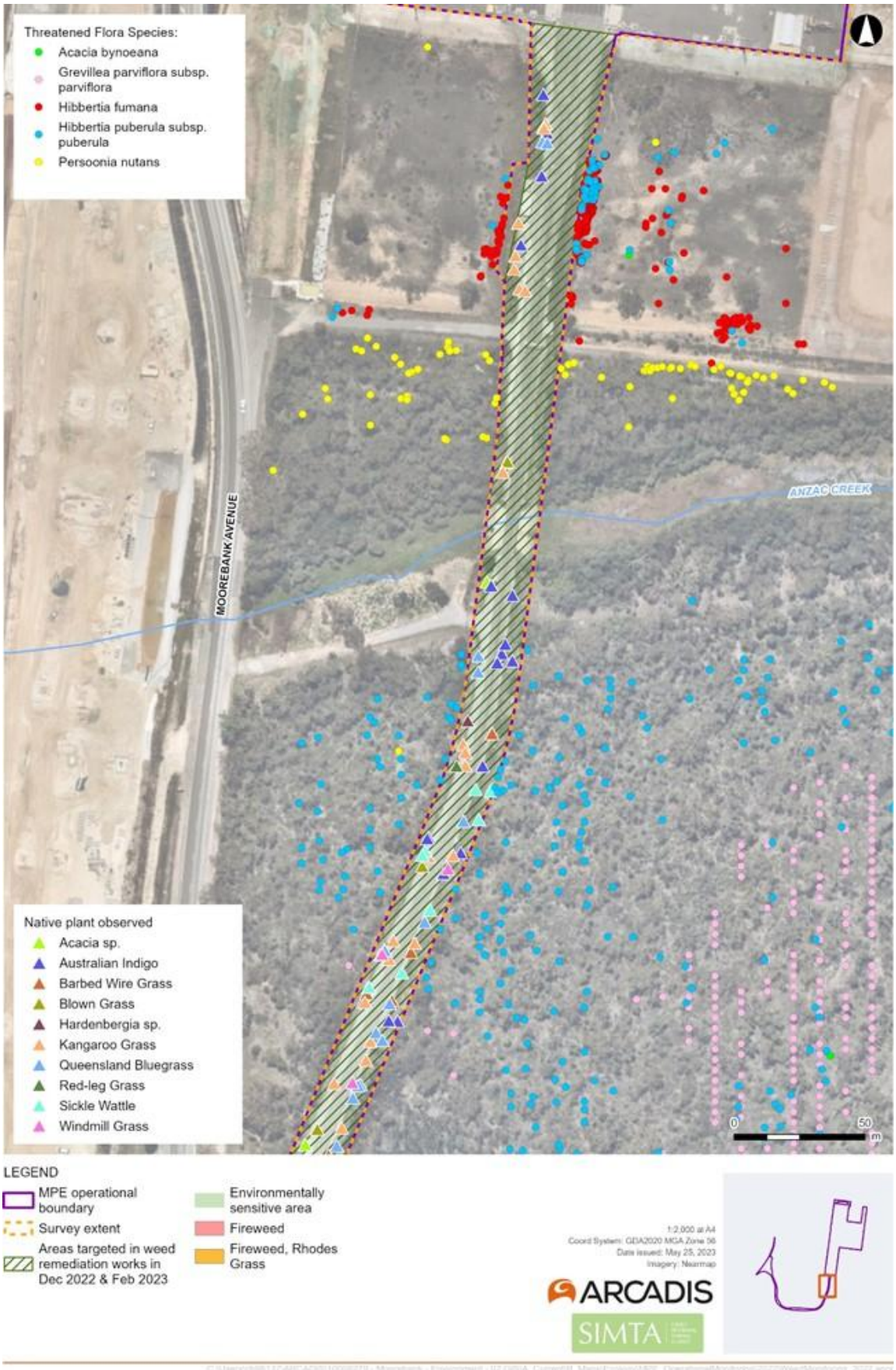


Figure 2 Instances of weeds, native species and threatened flora records in the survey extent and MIP operational boundary (3 of 8)

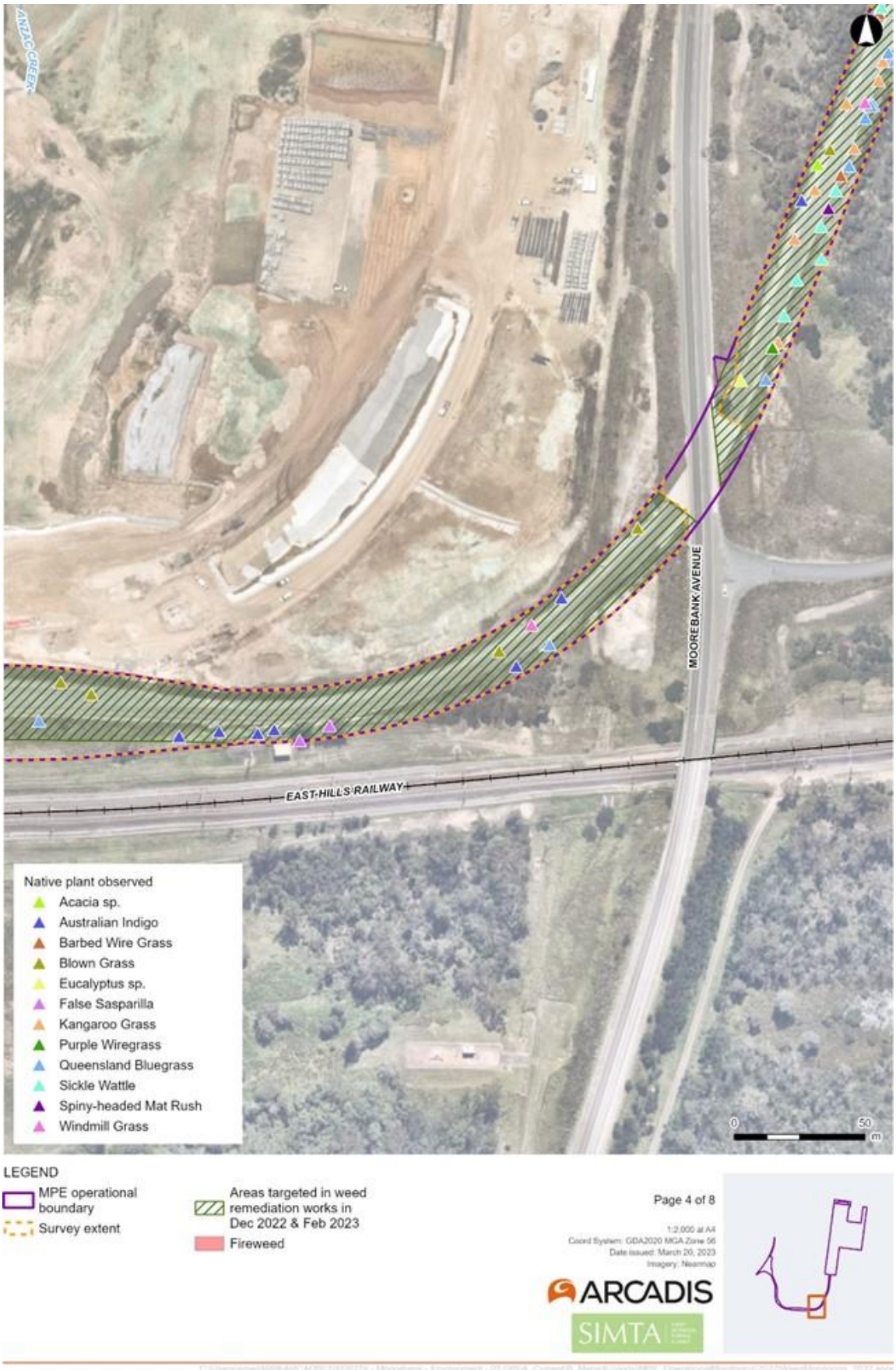


Figure 2 Instances of weeds, native species and threatened flora records in the survey extent and MIP operational boundary (4 of 8)

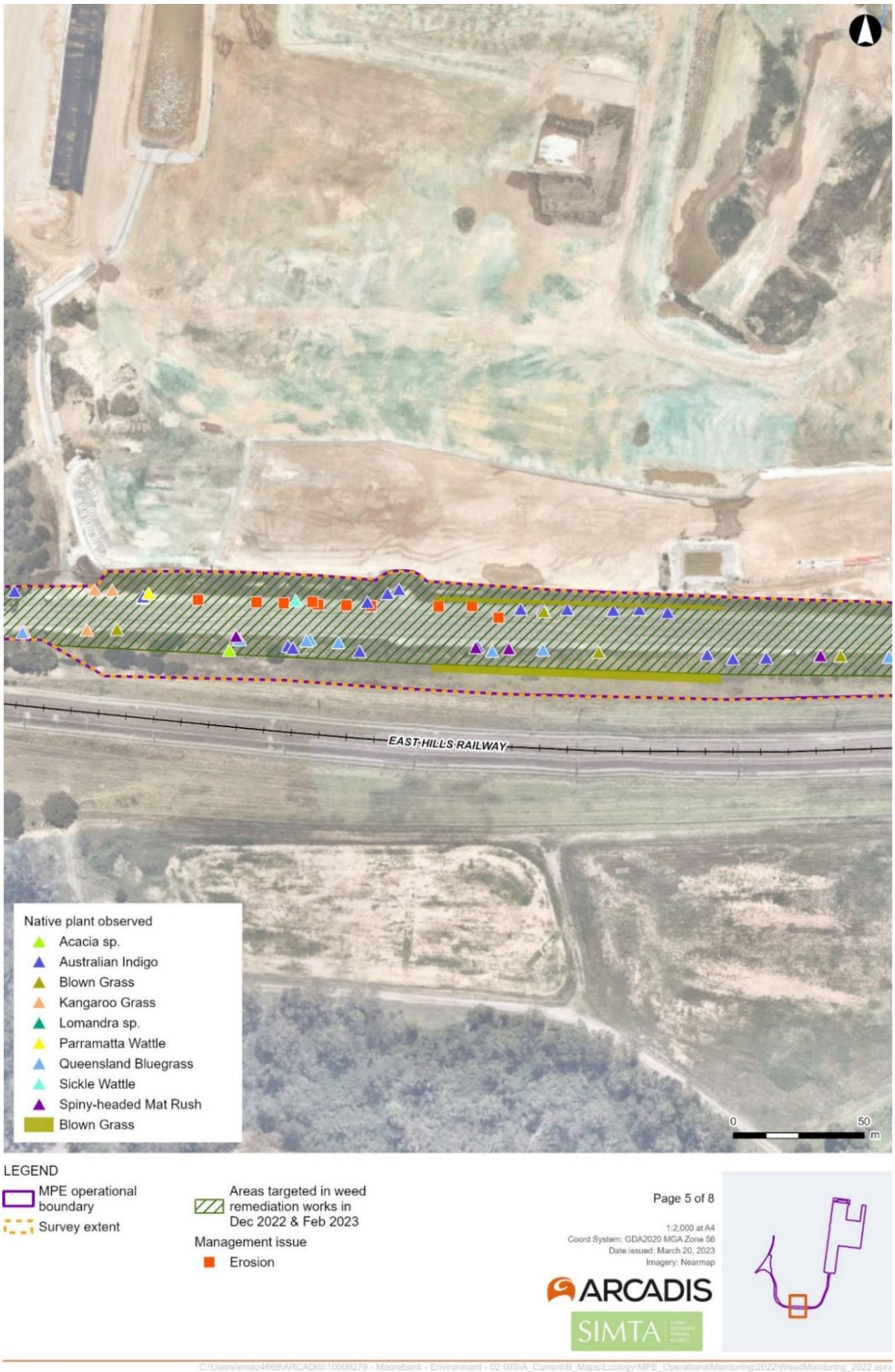


Figure 2 Instances of weeds, native species and threatened flora records in the survey extent and MIP operational boundary (5 of 8)

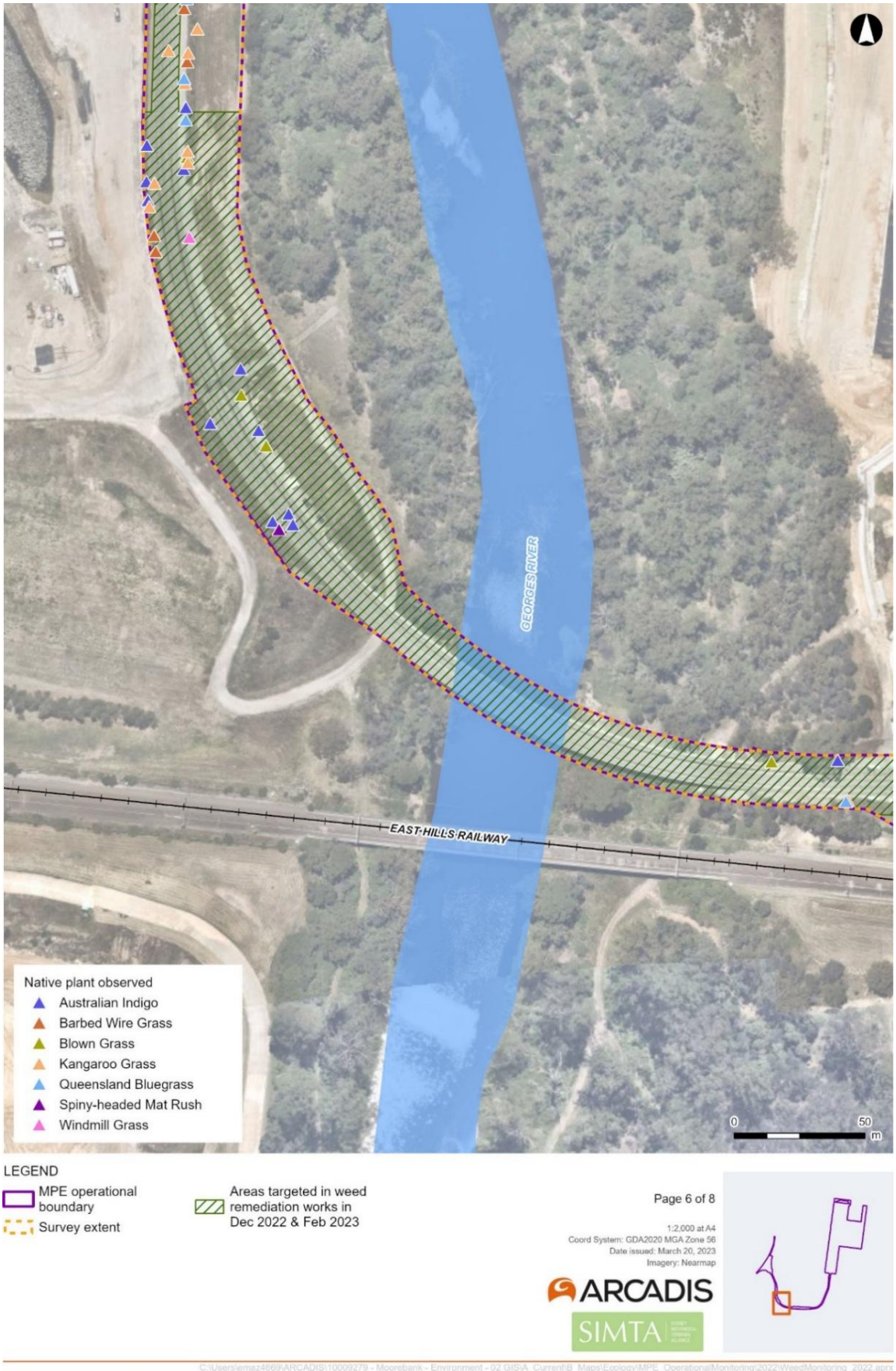


Figure 2 Instances of weeds, native species and threatened flora records in the survey extent and MIP operational boundary (6 of 8)

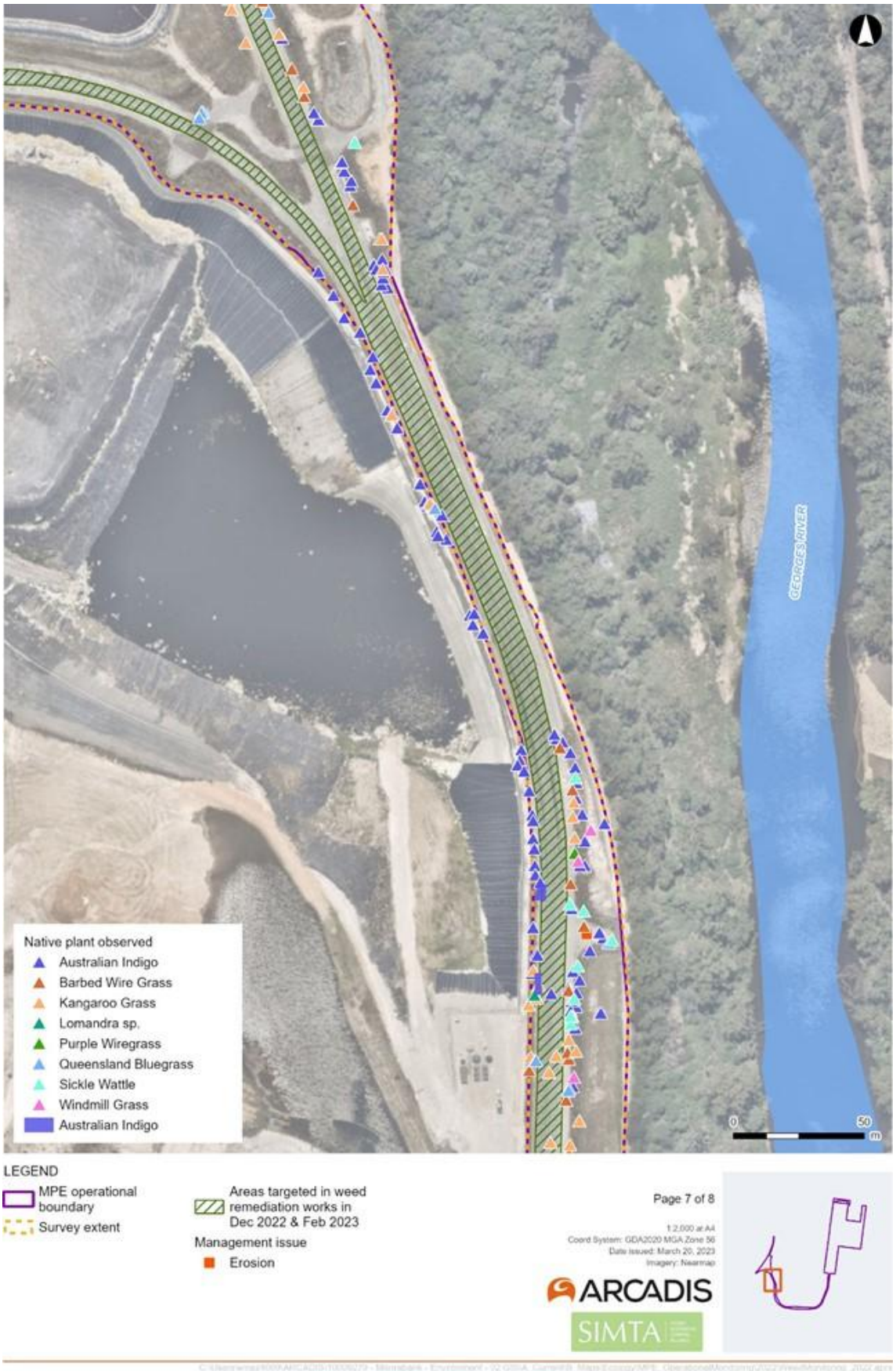


Figure 2 Instances of weeds, native species and threatened flora records in the survey extent and MIP operational boundary (7 of 8)

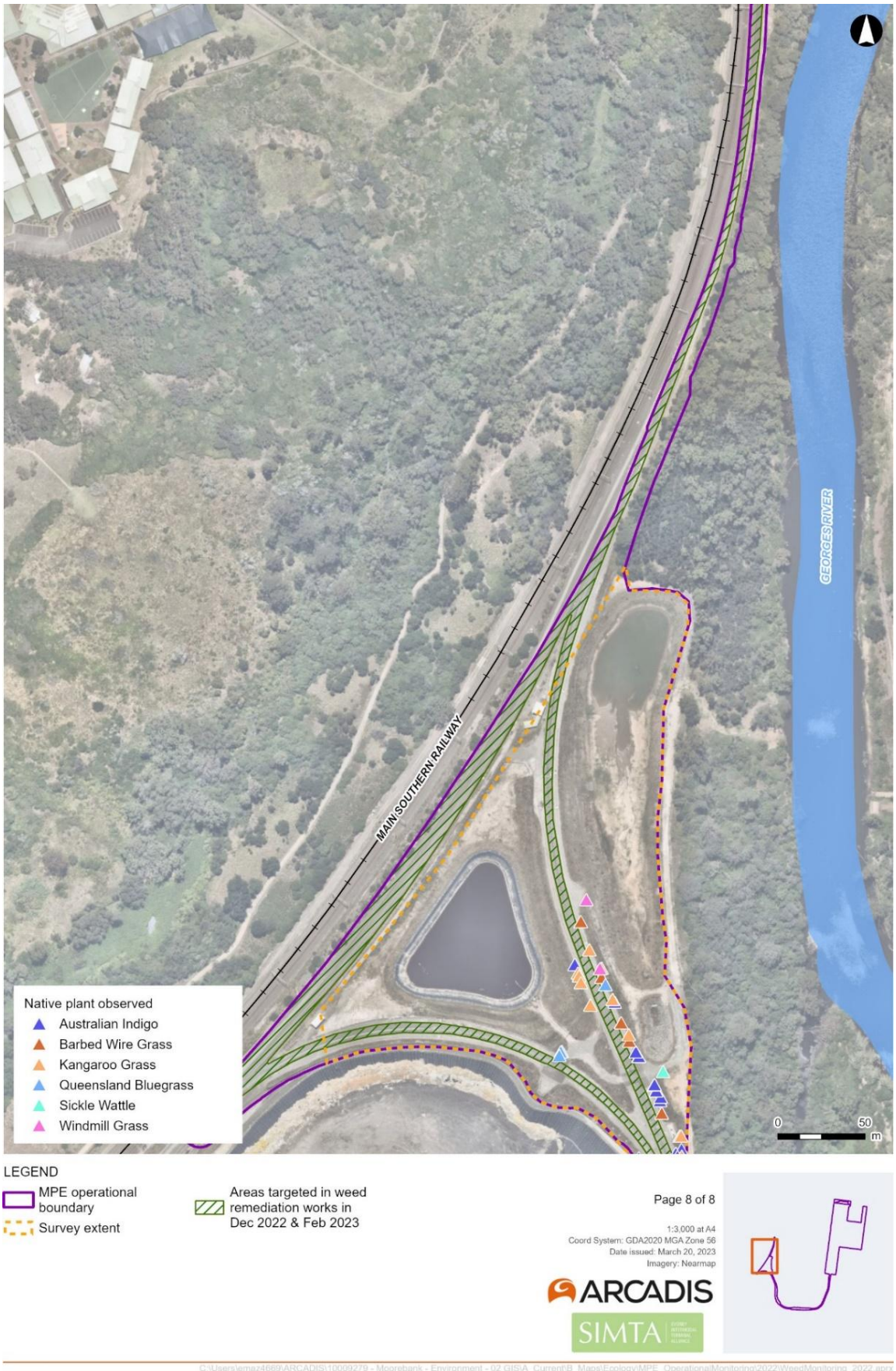


Figure 2 Instances of weeds, native species and threatened flora records in the survey extent and MIP operational boundary (8 of 8)

Recommendations

Weed monitoring and weed remedition works should continue throughout the 2025/26 monitoinrg year. Table 4 summrises the recommendations for weed remediation within the MIP. Additionally, the weed remediation works being conducted by Toolijooa in the RALP have been compared against the critera in Appendix C and are considered to be consistent.

Recommended actions documented in previous weed monitoring reports are included in Appendix D. The catalogue has been reviewed and updated to reflect works which have been completed and is considerate of the revegetation methodology proposed by Spray Grass Solutions and Cumberland Plain Seeds.

Table 4 Recommended actions for weed remediation in the MIP

Area	Recommendation
All areas	• Targeted weed remediation to continue during the 2025/26 monitoring year and is to be conducted using the same methods and at the same locations as previously conducted
Rail Access Land Package (RALP)	• Weed remediation works will focus on controlling priority and key weed species (Appendix A and Appendix B)
	• Suppression of environmental weeds and encroachment into areas of bushland should occur where possible
	• Hand weeding should be conducted for individuals, whereas slashing and herbicide spraying should be adopted to target larger patches of weeds. However, extreme care must be taken when conducting any weed management within the RALP, as many native grasses have become established • Hand weeding is only feasible on annual species such as *Themeda quadrivalvis* (Grader Grass) and *Senecio madagascariensis* (Fireweed) due to their relatively small root system
	• Contractors should identify the extent of the works zone and discuss 'No Go' zones with all involved in the works. Weeding must be restricted to identified weeds and native species to be retained should be identified prior to works commencing
	• Priority and aggressive weed species outside revegetated RALP areas should be removed. Weeds that should be targeted include *Senecio madagascariensis* (Fireweed)
	• Large patches of *Eragrostis curvula* (African Lovegrass), *Chloris gayana* (Rhodes Grass) and *Themeda quadrivalvis* (Grader Grass) between the RALP and the East Hills train line should be slashed regularly to prevent seeding events (Figure 2 (5 of 8)). This will reduce the colonisation of these grasses into revegetation areas • Slashing should only occur when plants are not seeding to prevent further spread. As more native species become established in these areas, slashing may impact their growth; therefore, non-targeted slashing should be avoided
	• Application of herbicide within the RALP and in areas adjacent to the Moorebank biobank site should be conducted to prevent overspray (off-target poisoning). If herbicide application occurs, recommended herbicides for tussock grass, *Chloris gayana* (Rhodes Grass) and *Eragrostis curvula* (African Lovegrass), include glyphosate or flupropanate, while plants are actively growing during summer and spring. Native vegetation outside the

Area	Recommendation
	RALP fence must not be impacted by herbicide during weed remediation works • No herbicide spraying should be conducted outside the RALP, specifically adjacent to ecologically sensitive areas south of the MPE Operational facility (Figure 2). Manual weed remediation works in ecologically sensitive areas should not extend beyond the construction envelope of the RALP. If further clarification is necessary, the project ecologist should be consulted
	• Batters that currently have limited vegetation cover should be colonised by a native seed mix as soon as practical. This will ensure that these areas are not colonised by weed species and will further reduce erosion during heavy rainfall events
	• Continue to collect litter from within the RALP and in adjacent areas
IMEX building and adjacent drainage infrastructure	• Soft batters within the trunk drainage system and retention basin/swale at the north-eastern extent of the facility should be inspected for weed growth. Weed levels should be controlled through herbicide application, slashing and hand weeding. Weed remediation works should be conducted in accordance with the approved Weed Management Plan
Warehouse areas	• Weed levels should be controlled through herbicide application, slashing and hand weeding. Weed remediation works should be conducted in accordance with the approved Weed Management Plan
Eastern boundary drainage infrastructure	• Weed levels should be controlled through herbicide application, slashing and hand weeding. Weed remediation works should be conducted in accordance with the approved Weed Management Plan • Erosion in the drainage infrastructure should be controlled by planting additional native ground cover species to maintain batters during heavy rainfall events
Landscaped areas along Bushmasters Avenue	• Continued maintenance of these landscaped areas should be maintained at a frequency that does not increase the current abundance of identified weed species. This is pertinent for areas where landscaped species have died back, and bare ground is more abundant • Areas adjacent to cleared areas in the MPW operational area should be sprayed for weeds to limited the potential for spreading

References

Arcadis (2019a) Urban Design and Landscape Plan. Moorebank Precinct East Stage 1

Arcadis (2019b) Operational Flora and Fauna Management Plan. Moorebank Logistics Park – East Precinct

Arcadis (2019c) Landscape Vegetation Management Sub Plan. Moorebank Precinct East Stage 2

Arcadis (2020) MPE Operational – Weed Monitoring Report December 2020

Arcadis (2020) Urban Design and Landscape Plan. Moorebank Precinct East Stage 2

Bureau of Meteorology (BOM) (2021) Climate Data Online. Weather and Climate: Holsworthy Aerodrome NSW (station 066161) http://www.bom.gov.au/climate/dwo/IDCJDW2161.latest.shtml

NSW Department of Primary Industries (DPI) (accessed 2021) NSW WeedWise. priority weeds for the Greater Sydney. https://weeds.dpi.nsw.gov.au/WeedBiosecurities?AreaId=3

APPENDIX A PRIORITY WEED PROFILES

Lantana *(Lantana camara)*

Fireweed *(Senecio madagarsensis)*

Alligator Weed *(Alternanthera philoxeroides)*

African Olive (*Olea europea* subsp. *cuspitada*)

Lantana *(Lantana camara)*

Fireweed *(Senecio madagarsensis)*

Bridal Creeper *(Asparagus asparagoides)*

Peruvian Primrose (*Ludwigia peruviana*)

APPENDIX B KEY WEED PROFILES

Rhodes Grass (*Chloris gayana*)

African Love Grass (*Eragrostis curvula*)

Patterson's Curse (*Echienum planteganium*)

Coolatai Grass (*Hyparrhenia hirta*)

Grader Grass (*Themeda quadrivalvis*)

Red Natal Grass (*Melinis repens*)

APPENDIX C WEED REMEDIATION WORKS TRACKING

Priority	Action	Action description	Current performance assessment
1	Eradicate 'priority' weeds	Target' priority' weed species through manual removal and herbicide treatment. Herbicide application should consider timing (i.e., applying herbicide when weeds are actively growing) and best practice methodologies. Areas outlined by coloured polygons in Figure 2 should be prioritised.	One priority weed species are present within the RALP: *Senecio madagascariensis* (Fireweed). These should be removed as a priority. Progress has been made through remediation works within the RALP. Continued management must be undertaken to work towards eradication.
2	Removal of key and aggressive weed species	Key weed species, including African Lovegrass, Rhodes Grass, Paterson's Curse, Coolatai Grass and Grader Grass, should be removed from revegetated areas of soft batter. Aggressive weed species, including Moth Vine and Castor Oil Plant, should be removed from all operational areas using a combination of manual and herbicide control. Areas outlined by coloured polygons in Figure 2 should be prioritised.	Key weed species, including Rhodes Grass, African Lovegrass, Coolatai Grass, Paterson's Curse, and Grader Grass, are colonising soft batters in the RALP. These weeds should be removed. Progress has been made through remediation works within the RALP. Continued management must be undertaken to work towards eradication.
3	Suppress further colonisation of environmental weeds and encroachment into areas of bushland	Control of exotic species adjacent to the biobank site and ecologically sensitive areas. Manual removal should be adopted in areas adjacent to threatened flora locations. Areas outlined by coloured polygons in Figure 2 should be prioritised.	Weed growth is stabilising through continued weed management on soft batters adjacent to the biobank site and ecologically sensitive areas. Manual removal, including routine slashing, is being used to prevent present weeds from reaching seeding maturity and further encroaching on adjacent high-value areas (biobank site and ecologically sensitive areas containing threatened plant species). All works should be restricted to the operational area and not extend into the biobank site or identified ecologically sensitive areas. Slashing should only be conducted when weed species are not in flower to prevent further spread. Appropriate slashing time is during winter for most species.

Priority	Action	Action description	Current performance assessment
4	Slashing of invasive grasses to prevent seeding.	Management of invasive grasses such as Rhodes Grass and African Love Grass through regular mowing or slashing. Areas outlined by coloured polygons in Figure 2 should be prioritised.	Slashing has been adopted to manage the regrowth of invasive grasses (African Lovegrass, Grader Grass) within the RALP in ballast and gravel areas. Some areas beyond the Georges River bridge are yet to be managed. Slashing should be used to manage large expanses of exotic grassland to prevent seeding events. However, as native grasses become established, extreme care must be taken, and indiscriminate slashing must be avoided. A contractor with knowledge of native species should be employed to carry out this task, in failing that, an ecologist should be on site to monitor weed remediation.
5	Reduce cover of weeds within the RALP	Reduction of weed cover by applying control methods commensurate with the Operational Flora and Fauna Management Plan (Arcadis 2019).	Works should involve targeted slashing of mature plants and removing flowering and seed heads to minimise seeding. Targeted slashing has been previously employed to control weed colonisation on soft batters. However, it must be continued to limit the re-colonisation of weeds within the RALP. Future weed control actions will focus on removing and reducing the cover of priority and key weed species and suppressing the further colonisation of common weeds, which is consistent with the rehabilitation methodology proposed by Spray Grass Solutions and Cumberland Plain Seeds.
6	Remove herbaceous and woody weeds within the operational area and trunk drainage infrastructure.	Reduction in herbaceous and woody weeds by applying control methods commensurate with the Operational Flora and Fauna Management Plan (Arcadis 2019)	Weed cover has generally remained low within trunk drainage infrastructure and at the north-eastern extent of the MIP East operational facility.

APPENDIX D RECOMMENDED ACTIONS CATALOGUE

Month of logging	Recommended action	Status (Not started, Commenced, Complete)	Comments
April 2020	Eradicate priority weeds species, including Bridal Creeper, Alligator Weed, Lantana, Fireweed and African Olive	Completed	Most instances of these weeds have been removed from the RALP. Small instances of Fireweed occur, however these are being managed by the current weed remediation works within the RALP.
April 2020	Remove key and aggressive weed species within RALP, including Golden Wreath Wattle, Moth Vine, Castor Oil Plant, Small-leafed Privet, Grader Grass and Balloon Vine	Commenced	Grader Grass has been observed colonising remediated areas within the RALP. This species should be removed to prevent further colonisation and infestations. Golden Wreath Wattle, Moth Vine and Castor Oil Plant on the southern side of the RALP in the area between the operational boundary and the East Hills line rail corridor. Consideration should be given to the management of these areas to reduce encroachment into recently remediated areas.
June 2020	Planning should commence to revegetate soft batters and un-developed areas within the MPE operational facility with native species in accordance with the approved Urban Design and Landscaping Plan (Arcadis 2019a, Arcadis 2020)	Commenced	Revegetation has commenced for remediated areas using a hydro-mulch containing a seed palette commensurate with the UDLP (Arcadis 2020). Previous instances of native seed setting have been colonized by weed species within the RALP and should be cleared and re-set with a native seed mix as soon as practical.
December 2020	Exotic species, specifically *Medicago polymorpha* (Burr Medic), should be removed from grassland on either side of the RALP at its eastern extent, closest to the operational area.	Commenced	Targeted manual removal, including slashing, has been conducted for exotic species outside the RALP fencing. A qualified bush regeneration contractor should be used to avoid impacts on

Month of logging	Recommended action	Status (Not started, Commenced, Complete)	Comments
			native species. Strictly no herbicide should be used in this area, and works should not extend beyond the RALP construction envelope. Where possible, contractors should not access/pass through adjacent areas.
December 2021	Collect litter scattered through the RALP and in adjacent areas	Commenced	Litter remains in the RALP and adjacent areas.
December 2021	Control aggressive weed species Coolatai Grass and Paterson's Curse within the RALP	Commenced	New instances of aggressive weed species Coolatai Grass and Paterson's Curse within the RALP should be removed as soon as practicable to avoid the spread of these species into ecologically sensitive areas adjacent to the RALP.
February 2022	Continued targeted slashing of woody and herbaceous weeds within the RALP.	Completed	Majority of large woody weeds have been removed from the RALP. Continue regular slashing of large woody weeds to remove the fertile seed head and discourage further germination of these weeds within the RALP should occur.
December 2022	Prioritise weed remediation works for priority and key weed species which have experienced accelerated growth in recent months.	Commenced	Areas of particularly high biomass of priority and key weed species should be prioritised for weed remediation works in coming months to avoid mass seeding events.
	Begin remediation of soft batters which have slipped following extreme rainfall events in recent weeks	Not started	Areas within the operational facility, including a number of areas within the RALP, require urgent batter remediation in areas of batter slipping.
December 2022	Begin weed remediation of gravel and ballast areas along RALP	Commenced	Removal of all vegetation in gravel and ballast areas due along RALP using slashing and

Month of logging	Recommended action	Status (Not started, Commenced, Complete)	Comments
			herbicide due to safety concerns of train operators and prevent spread of weeds.
December 2022	Continue weed remediation works along the soft batters within the RALP.	Commenced	Future weed remediation works should include targeted slashing and spraying of priority and key weed species, whilst avoiding native species by hand weeding within a one metre buffer zone of native individuals.
February 2023	Continue weed remediation works along the soft batters within the RALP beyond Georges River bridge.	Commenced	Future weed remediation works should include targeted slashing and spraying of priority and key weed species, whilst avoiding native species by hand weeding within a one metre buffer zone of native individuals.
April 2023	No weed remediation has occurred since February 2023. Expected to recommence in June 2023, in same areas that have previously been remediated.	Commenced	Future weed remediation works should include targeted slashing and spraying of priority and key weed species, whilst avoiding native species by hand weeding within a one metre buffer zone of native individuals.
June 2023	Continue weed remediation works along the soft batters within the RALP	Commenced	Future weed remediation works should include targeted slashing and spraying of priority and key weed species, whilst avoiding native species by hand weeding within a one metre buffer zone of native individuals.
December 2023	Toolijooa Environmental Restoration inducted as primary weed control contractors. Weed remediation recommenced throughout the RALP	Commenced	Future weed remediation works should include targeted slashing and spraying of priority and key weed species, whilst avoiding native species by hand weeding within a one metre buffer zone of native individuals.

APPENDIX E REMEDIATION PROGRESS PHOTOGRAPHS

April 2021

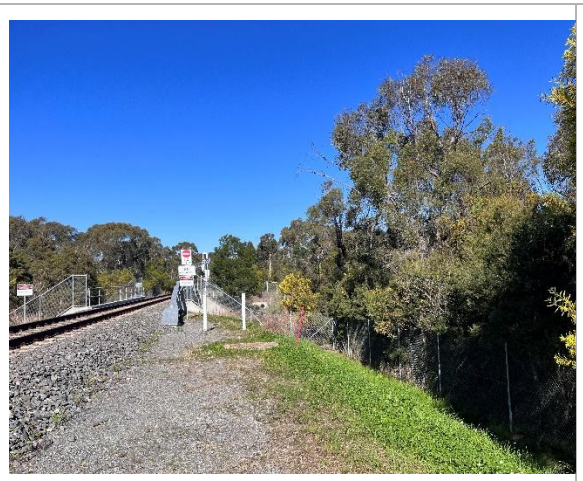
December 2023

June 2025

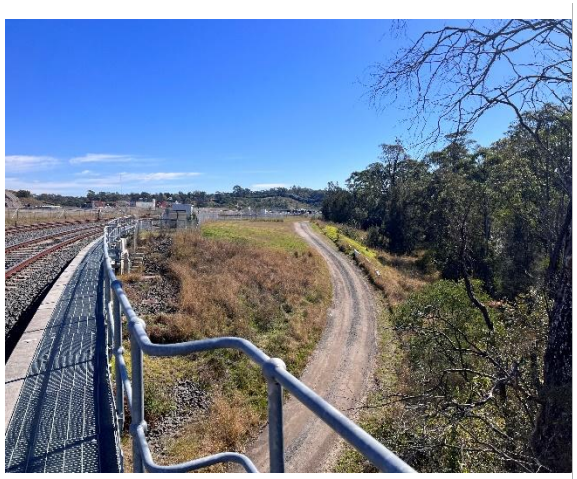
April 2021

December 2023

June 2025

		
April 2021	December 2023	June 2025
April 2021	December 2023	June 2025

April 2021	December 2023	June 2025
April 2021	December 2023	June 2025

		
April 2021	**December 2023**	**June 2025**

APPENDIX F FLORA SPECIES INVENTORY

Scientific name	Common name	Exotic	Priority/key weed
Acacia falcata	Hickory Wattle		
Acacia parramattensis	Parramatta Wattle		
Acacia saligna	Golden Wreath Wattle	*	
Alternanthera philoxeroides	Alligator weed	*	Priority
Alternanthera pungens	Khaki Weed	*	
Araujia sericifera	Moth Vine	*	
Asparagus asparagoides	Bridal Creeper	*	Priority
Atriplex semibaccata	Creeping Saltbush		
Austrodanthonia spp.	-		
Avena spp.	Oats	*	
Bidens pilosa	Cobbler's Pegs	*	
Brassica rapa	Field Mustard	*	
Briza maxima	Quaking Grass	*	
Briza minor	Shivery Grass	*	
Cenchrus clandestinus	Kikuyu Grass	*	
Centaurium spp.	-	*	
Chloris gayana	Rhodes Grass	*	Key
Chloris truncata	Windmill Grass		
Cirsium vulgare	Spear Thistle	*	
Convolvulus erubescens	Pink Bindweed		
Conyza bonariensis	Flaxleaf Fleabane	*	
Cyclospermum leptophyllum	Slender Celery	*	
Cynodon dactylon	Common Couch		
Cymbopogon refractus	Barbed Wire Grass		
Cyperus eragrostis	Umbrella Sedge	*	
Daviesia ulicifolia	Gorse Bitter Pea		
Dichanthium sericeum	Queensland Bluegrass		
Dichondra repens	Kidney Weed		
Echium plantagineum	Paterson's Curse	*	Key
Eragrostis brownii	Brown's Lovegrass		
Eragrostis curvula	African Lovegrass	*	Key
Euchiton spp.	-		
Ficinia nodosa	Knobby Club-rush		
Foeniculum vulgare	Fennel	*	
Glycine clandestina	-		

Scientific name	Common name	Exotic	Priority/key weed
Hardenbergia violacea	False Sarsaparilla		
Hypochoeris radicata	Catsear	*	
Indigofera australis	Australian Indigo		
Juncus usitatus	-		
Lantana camara	Lantana	*	Priority
Lachnagrostis filiformis	Blown Grass		
Lactuca serriola	Prickly Lettuce	*	
Linum trigynum	French Flax	*	
Lolium perenne	Perennial Ryegrass	*	
Lomandra longifolia	Spiny-headed Mat-rush		
Lysimachia arvensis	Scarlet Pimpernel	*	
Ludwigia peruviana	Peruvian water primrose	*	Priority
Medicago polymorpha	Burr Medic	*	
Melilotus alba	Bokhara	*	
Melinis repens	Red Natal Grass	*	Key
Modiola caroliniana	Red-flowered Mallow	*	
Olea europaea subsp. cuspidate	African Olive	*	Priority
Paspalum dilatatum	Paspalum	*	
Persicaria decipiens	Slender Knotweed		
Phytolacca octandra	Inkweed	*	
Plantago lanceolata	Lamb's Tongues	*	
Portulaca oleracea	Common Purslane		
Rumex crispus	Curled Dock	*	
Senecio madagascariensis	Fireweed	*	Priority
Setaria parviflora	-	*	
Sida rhombifolia	Paddy's Lucerne	*	Key
Solanum nigrum	Black-berry Nightshade	*	
Solanum sisymbriifolium		*	
Sonchus oleraceus	Common Sowthistle	*	
Tagetes minuta	Stinking Roger	*	
Themeda quadrivalvis	Grader Grass	*	Key
Themeda triandra	-		
Trifolium arvense	Haresfoot Clover	*	
Trifolium repens	White Clover	*	
Trifolium michelianum	Bolansa Clover	*	
Verbena bonariensis	Purpletop	*	

Scientific name	Common name	Exotic	Priority/key weed
Verbena rigida var. Rigida	Veined Verbena	*	

MIP BI-MONTHLY WEED MONITORING REPORT – AUGUST 2025

Introduction

Arcadis has been commissioned to conduct bi-monthly weed monitoring surveys within the operational areas of Moorebank Precinct East (MPE) and Moorebank Precinct West (MPW). These areas together are known as the Moorebank Intermodal Precinct (MIP).

The MPE operational facility includes the Import and Export Terminal (IMEX), Rail Access Land Package (RALP), warehouses, distribution facilities and freight village, and stormwater trunk drainage infrastructure and landscaping areas. The MPW operational facility includes the landscaped vegetation along Bushmasters Avenue (Figure 1).

Regular monitoring of the MIP operational facilities will inform the land manager of weed cover, and the presence of any weeds listed as 'priority' for the Greater Sydney Local Land Services region under the *Biosecurity Act 2015*.

The schedule for the bi-monthly weed monitoring inspections for the 2025-26 monitoring year are detailed in Table 1. This document will be treated as live throughout the monitoring year and will be updated at the end of each inspection.

Table 1 Schedule for bi-monthly weed inspections

Inspection month	Date completed
June 2025	25/06/2025
August 2025	27/08/2025
October 2025	*TBC*
December 2026	*TBC*
February 2026	*TBC*
April 2026	*TBC*

Background

Arcadis has been monitoring the MPE operational facility for weed occurrence since April 2020. The RALP, which includes the MPE operational RALP, has seen significant change and works over the time Arcadis has conducted weed monitoring. Additionally, works conducted in MPW in 2023/24 have changed the layout and vegetation spread in the RALP. Several weed remediation events have occurred since the inception of weed monitoring, detailed below in Table 2.

Table 2 Summary of weed events throughout monitoring history

Timing	Summary of events	Weed contractor
Spring 2020	• Weeds removed from batters and revegetated with native species, as per the Urban Design and Landscaping Plan (UDLP) for MPE	Spray Grass Solutions

Timing	Summary of events	Weed contractor
	• Cumberland Plain Seeds were procured to provide technical oversight of revegetation effort	
December 2021	• As per recommendations from Spray Grass Solutions and Cumberland Plain Seeds, the monitoring methodology was changed • Changes included reporting on cover on 'priority' weeds species and key weeds specific to the project.	
December 2022 to June 2023	• Weed remediation works commenced • Priority weed species were targeted • Native species were identified throughout the RALP to avoid accidental removal.	P&E Services
December 2023 to present	• Weed remediation works continued • Regular maintenance of priority weed species via slashing, hand removal and herbicide spraying	Toolijooa Environmental Restoration

Methodology

Arcadis ecologist Kate Mauger attended the MIP operational area on 27 August 2025. Monitoring involved traversing the MIP operational facility on foot, surveying landscaped areas, stormwater infrastructure and soft batters adjoining the RALP for increases in weed abundance of the identified species in Appendix A and Appendix B. The areas surveyed are presented in Figure 1.

The weather on the 27 August was cloudy, with a maximum temperature of 20.3°C, and the weather recorded at Holsworthy Aerodrome (station 066161) (BOM 2025).

Study Limitations

The data presented within this report is restricted to what was observed and recorded by the attending Arcadis ecologists during the site assessment on 27 August 2025.

Monitoring of weeds was restricted to the operational facility; weeds were not assessed within the bounds of the active construction areas surrounding new warehouses or other infrastructure.

Surveys were not undertaken in areas extending beyond the junction between the QUBE RALP and the Southern Sydney Freight Line (SSFL).

Figure 1. Survey extent within the MPI operational facility

Results

Results of the weed monitoring surveys during the August 2025 survey are summarised below in Table 3. Weed records, previously recorded threatened flora species records, and instances of native species within the survey extent are shown in Figure 2.

Progress photographs of monitoring locations are provided in Appendix E and a complete flora species inventory in Appendix F.

Table 3 Summary of weed abundances across all inspection areas in MPI, for the current survey

Inspection area	Weed abundances for current survey	Photo of inspection area
Moorebank Precinct East (MPE)		
Rail Access Land Package (RALP)	• Weed growth has been slow since June 2025 inspection • Small instances of Fireweed slashed • Steep areas along berms are being avoided for slashing due to safety concerns. Additionally, the small amounts of exotic vegetation are currently stabilising these berms, and will be targeted once construction is finalised in the MPW areas.	

Inspection area	Weed abundances for current survey	Photo of inspection area
IMEX building and adjacent drainage infrastructure	• *Acacia falcata* (Hickory Wattle) continue to grow unimpeded by weeds.	

Inspection area	Weed abundances for current survey	Photo of inspection area
Warehouse areas	• Large areas of the native *Cynodon dactylon* (Couch Grass) are present across most of these areas and is generally outcompeting weed species. • Occurrences of weeds in the warehouse area and the adjacent drainage infrastructure is restricted to scattered individuals of *Senecio madagascariensis* (Fireweed), *Plantago lanceolata* (Plantain), *Trifolium arvense* (Clover) and exotic grasses like *Chloris gayana* (Rhodes Grass), *Sporobolus africanus* (Parramatta Grass), *Paspalum urvillei* (Giant Paspalum) and *Ehrharta erect* (Panic Veldtgrass) • Majority of this area has now been claimed by the Moorebank Avenue Upgrade project.	

Inspection area	Weed abundances for current survey	Photo of inspection area
Eastern boundary drainage infrastructure	• Drainage infrastructure dominated by *Bulboschoenus fluviatilis* (Marsh club-rush) whilst other are dominated by *Typha orientalis* (Bulrush). Where space is present between stands of theses native emergent species small clumps of *Persicaria decipiens* (Slender Knotweed), *Daviesia ulicifolia*, *Ficinia nodosa* (Knotted Club-rush), *Carex tereticaulis* and *Juncus usitatus* are present. Other native species such as *Imperata cylindrica* and *Lomandra longifolia* were observed in the drainage channels. • Areas of erosion still present.	

Inspection area	Weed abundances for current survey	Photo of inspection area
Moorebank Precinct West (MPW)		
Landscaped areas along Bushmasters Avenue	• Landscapes vegetation is in good condition, with minor weed incursions • Weed species present include *Sonchus oleraceus* (Common Sowthistle), *Chloris virgata* (Rhodes Grass), *Bidens pilosa*, *Conyza bonariensis* (Fleabane), *Cyclospermum leptophyllum* (Slender Celery), and *Tagetes minuta* (Stinking Roger). • Areas with limtied to no landscaped vegetation are particularly susceptible to weed incursion from cleared areas (see adjacent photo)	

Inspection area	Weed abundances for current survey	Photo of inspection area
APZ area – northern MPW	• Suppression of Medicago and other herbacious weeds occuring in this area (*Sonchus oleraceus* (Common Sowthistle), *Circium vulagre*) • Methods include slashing and hand removal around native species	

Inspection area	Weed abundances for current survey	Photo of inspection area
Sediment basins adjacent to BioBank site	• Spot spraying, and hand pulling of weeds occuring along boundary of basins and BioBank site	

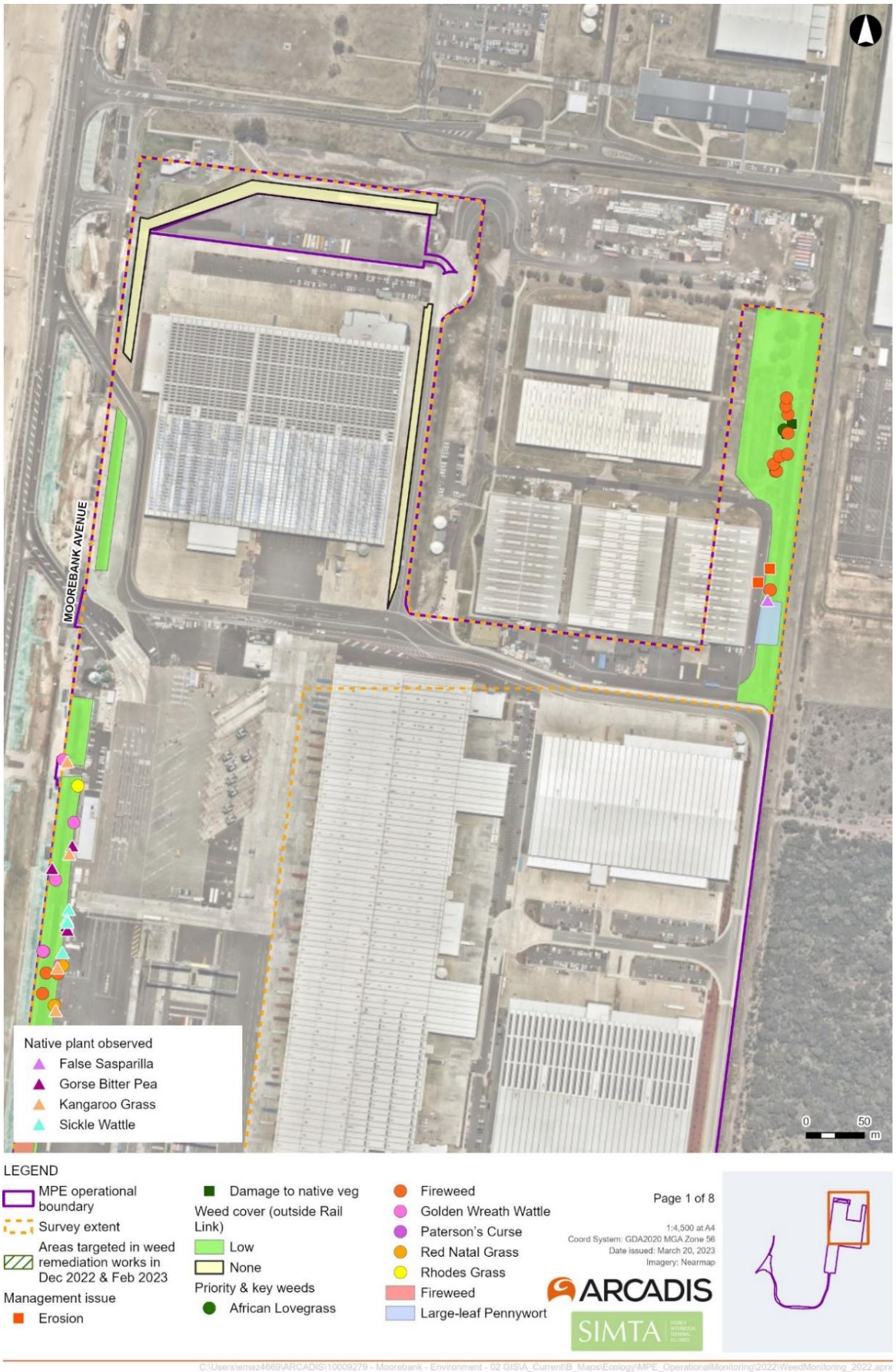


Figure 2 Instances of weeds, native species and threatened flora records in the survey extent and MIP operational boundary (1 of 8)

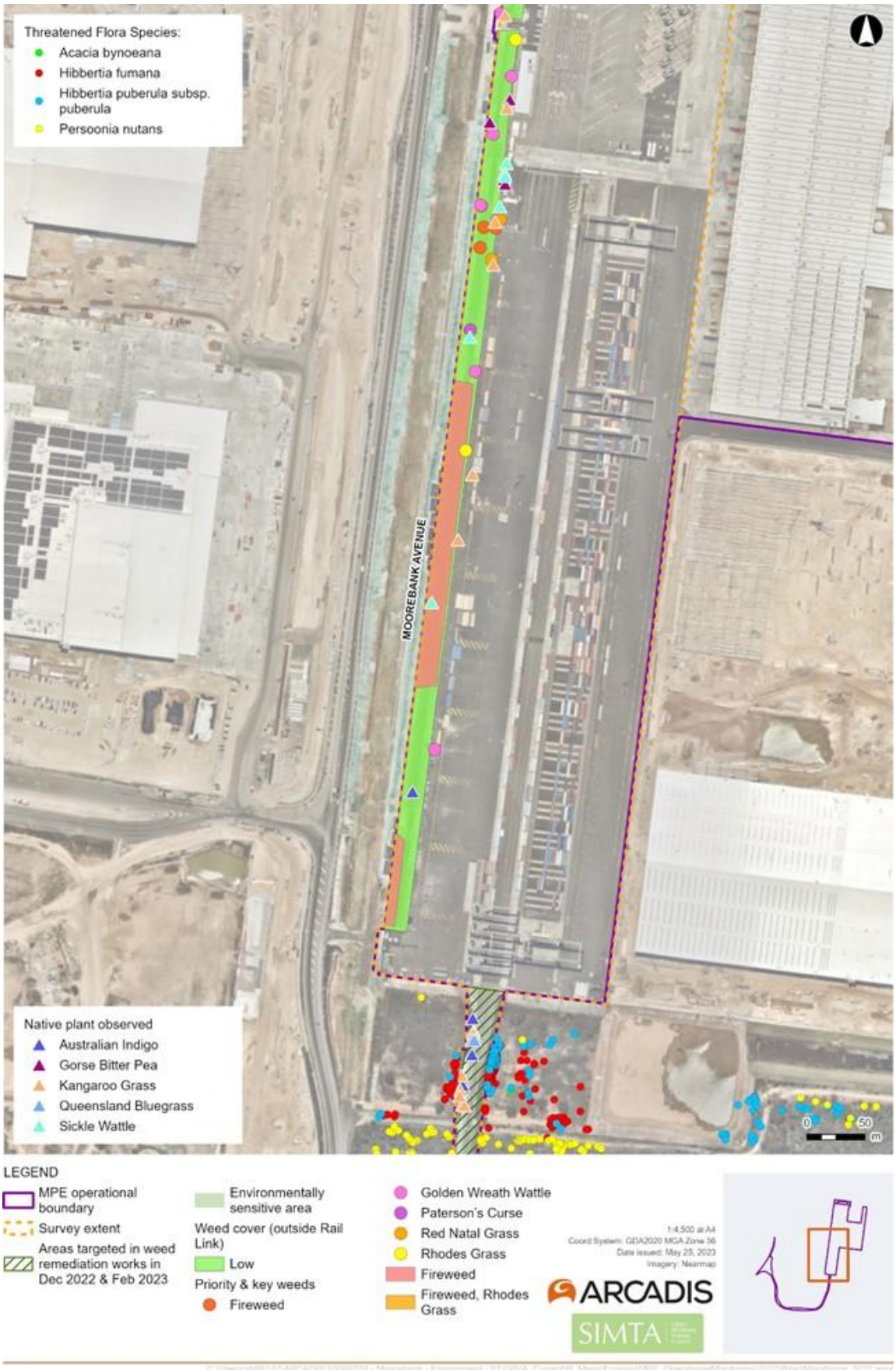


Figure 2 Instances of weeds, native species and threatened flora records in the survey extent and MIP operational boundary (2 of 8)

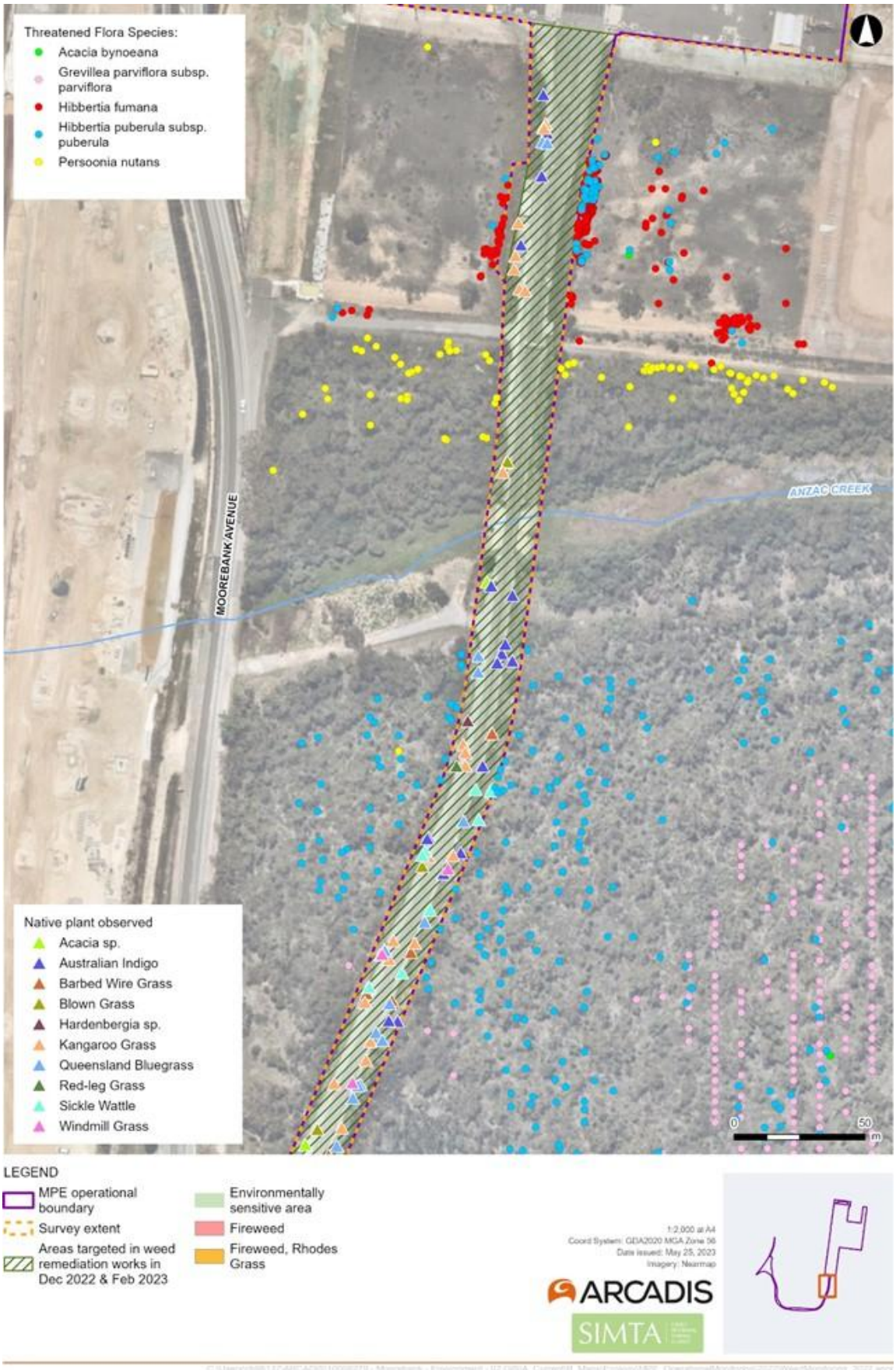


Figure 2 Instances of weeds, native species and threatened flora records in the survey extent and MIP operational boundary (3 of 8)

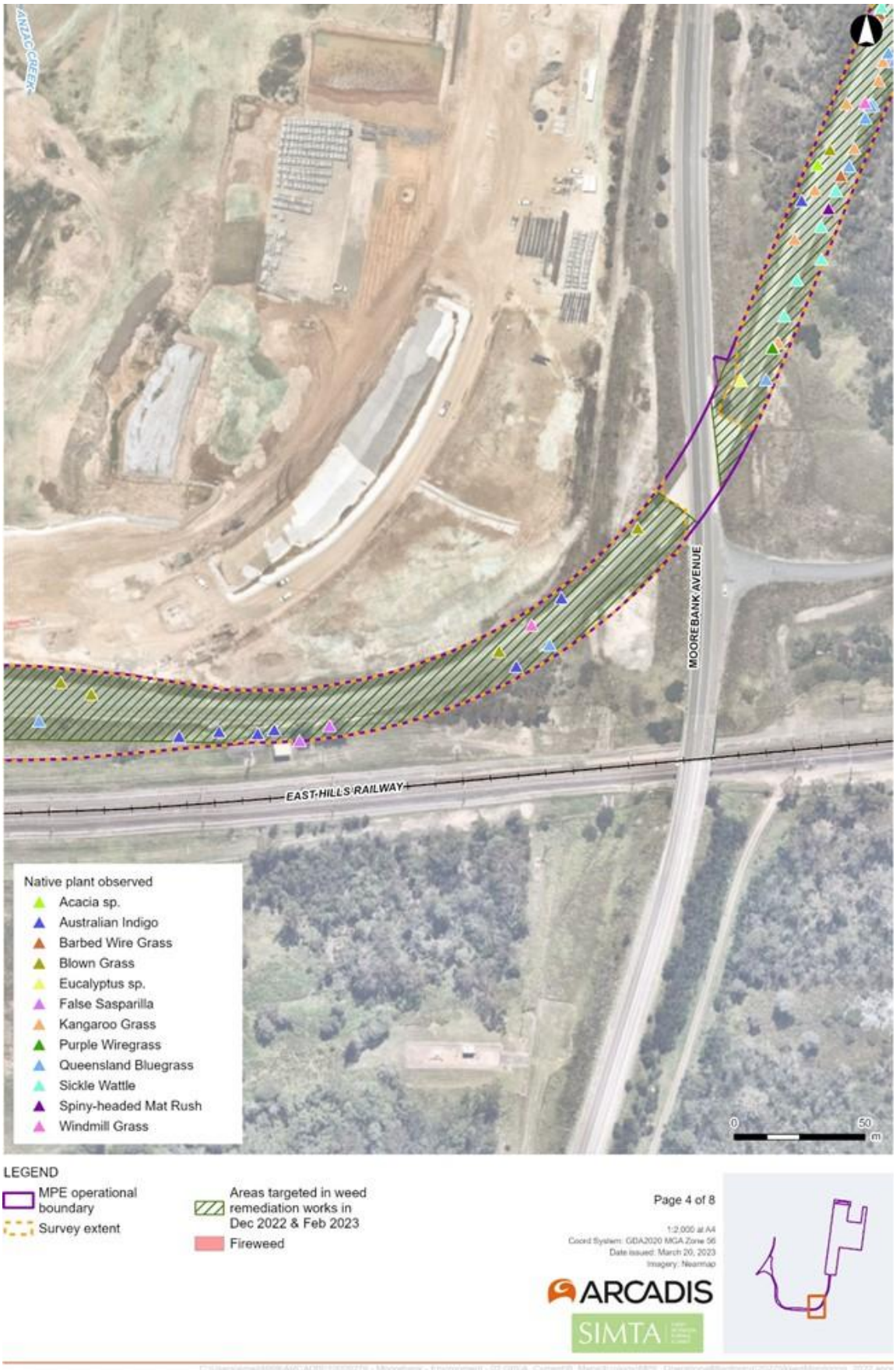


Figure 2 Instances of weeds, native species and threatened flora records in the survey extent and MIP operational boundary (4 of 8)

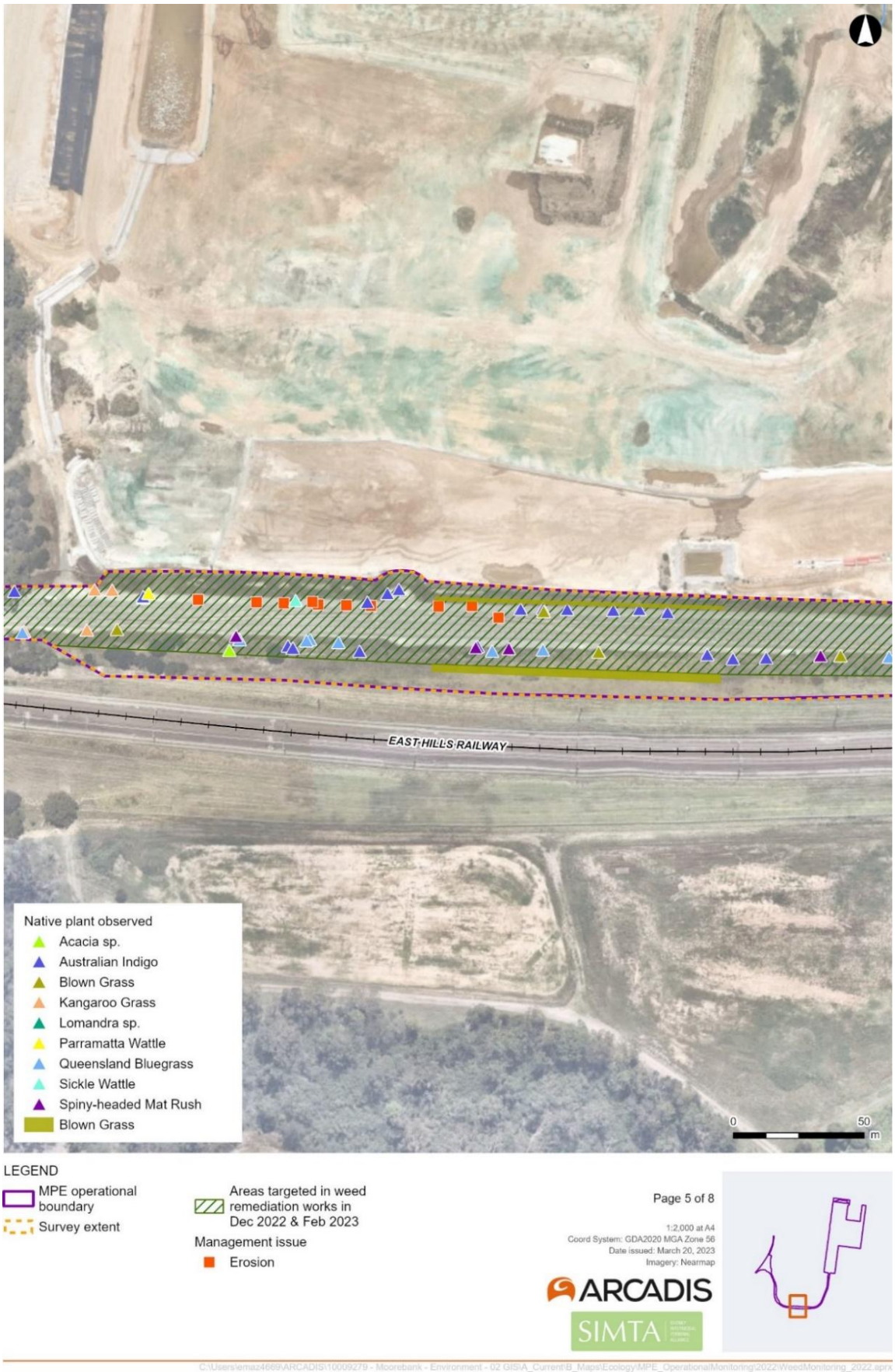


Figure 2 Instances of weeds, native species and threatened flora records in the survey extent and MIP operational boundary (5 of 8)

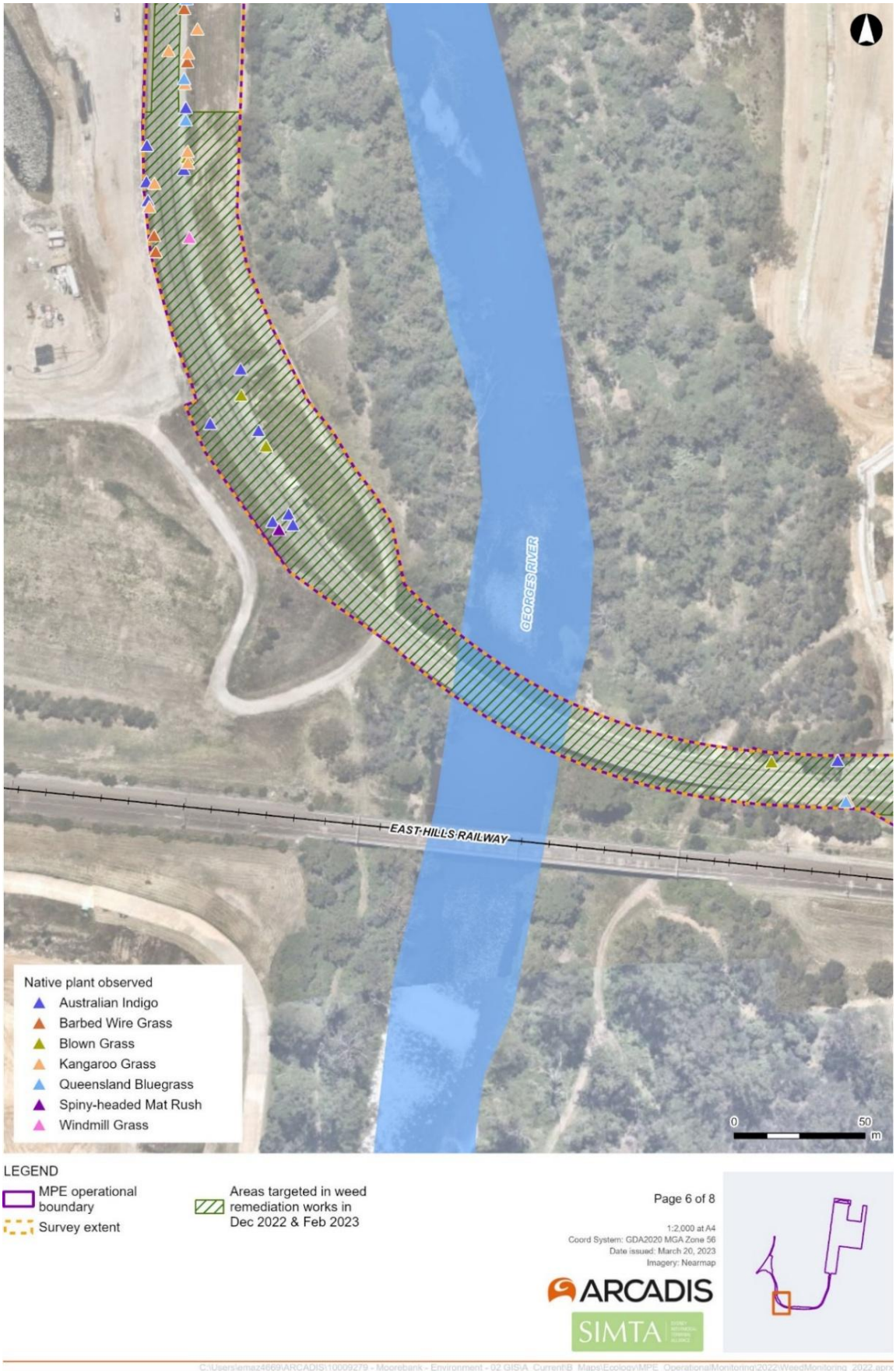


Figure 2 Instances of weeds, native species and threatened flora records in the survey extent and MIP operational boundary (6 of 8)

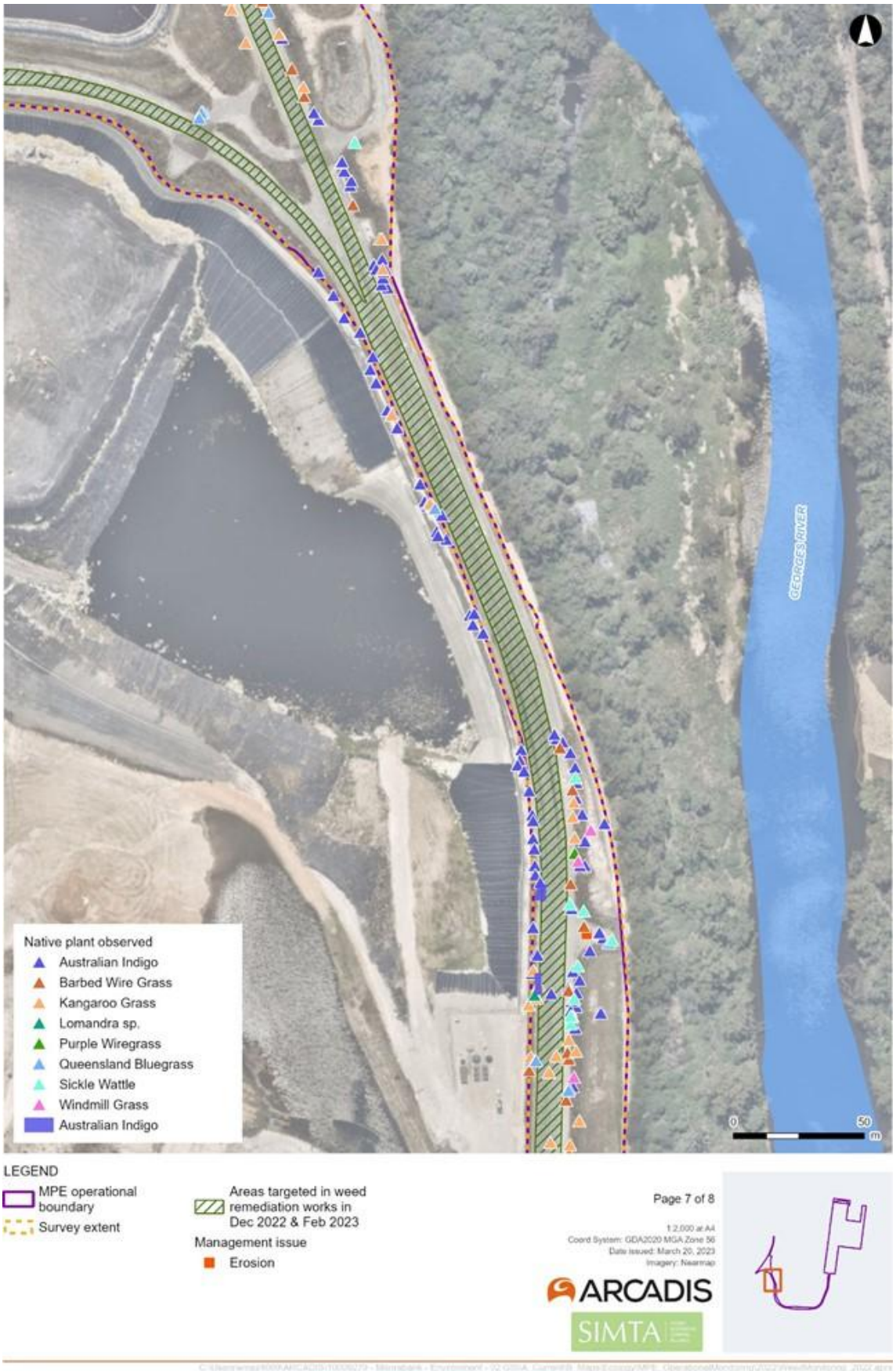


Figure 2 Instances of weeds, native species and threatened flora records in the survey extent and MIP operational boundary (7 of 8)

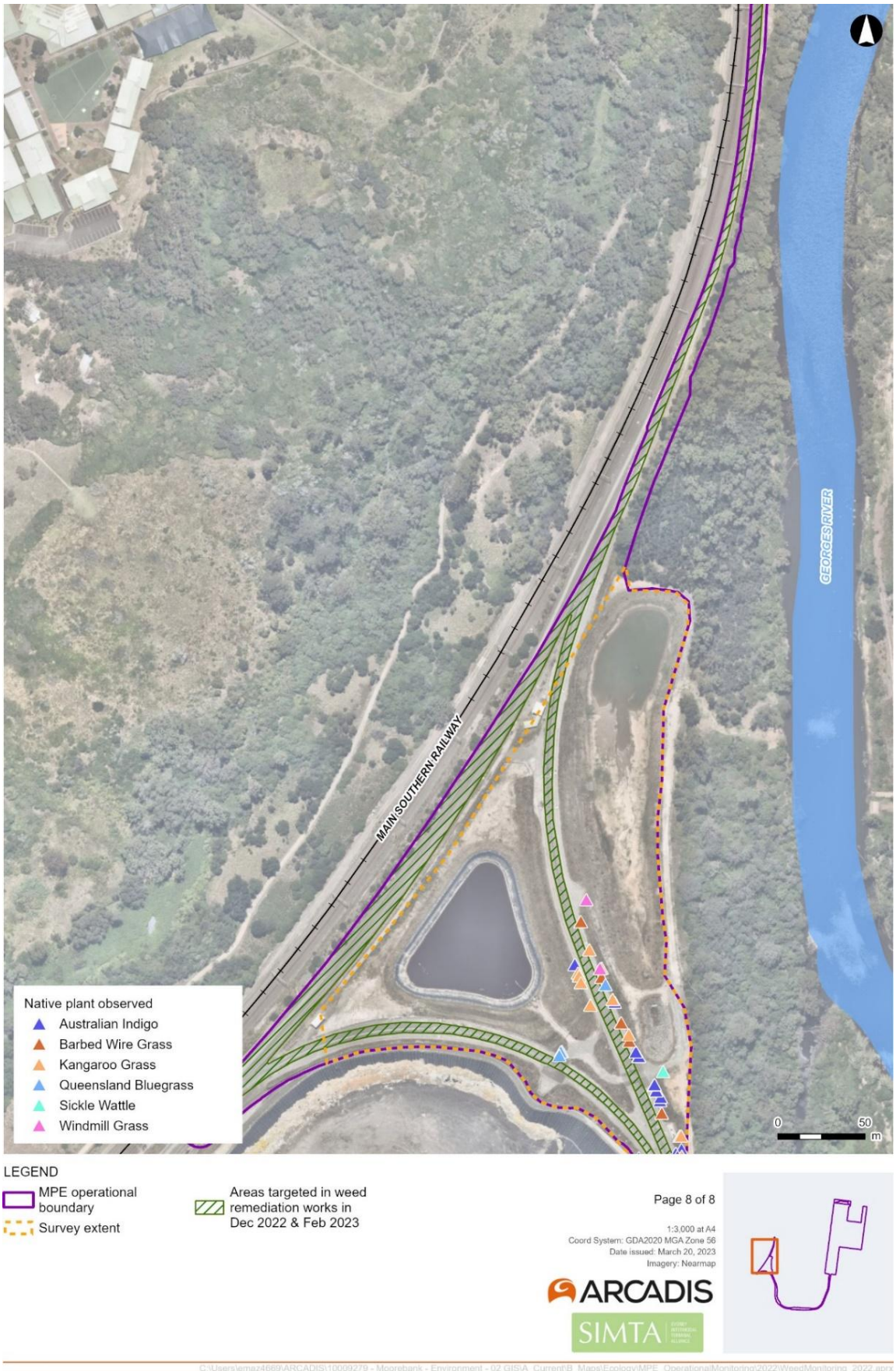


Figure 2 Instances of weeds, native species and threatened flora records in the survey extent and MIP operational boundary (8 of 8)

Recommendations

Weed monitoring and weed remedition works should continue throughout the 2025/26 monitoinrg year. Table 4 summrises the recommendations for weed remediation within the MIP. Additionally, the weed remediation works being conducted by Toolijooa in the RALP have been compared against the critera in Appendix C and are considered to be consistent.

Recommended actions documented in previous weed monitoring reports are included in Appendix D. The catalogue has been reviewed and updated to reflect works which have been completed and is considerate of the revegetation methodology proposed by Spray Grass Solutions and Cumberland Plain Seeds.

Table 4 Recommended actions for weed remediation in the MIP

Area	Recommendation
All areas	• Targeted weed remediation to continue during the 2025/26 monitoring year and is to be conducted using the same methods and at the same locations as previously conducted
Rail Access Land Package (RALP)	• Weed remediation works will focus on controlling priority and key weed species (Appendix A and Appendix B)
	• Suppression of environmental weeds and encroachment into areas of bushland should occur where possible
	• Hand weeding should be conducted for individuals, whereas slashing and herbicide spraying should be adopted to target larger patches of weeds. However, extreme care must be taken when conducting any weed management within the RALP, as many native grasses have become established • Hand weeding is only feasible on annual species such as *Themeda quadrivalvis* (Grader Grass) and *Senecio madagascariensis* (Fireweed) due to their relatively small root system
	• Contractors should identify the extent of the works zone and discuss 'No Go' zones with all involved in the works. Weeding must be restricted to identified weeds and native species to be retained should be identified prior to works commencing
	• Priority and aggressive weed species outside revegetated RALP areas should be removed. Weeds that should be targeted include *Senecio madagascariensis* (Fireweed)
	• Large patches of *Eragrostis curvula* (African Lovegrass), *Chloris gayana* (Rhodes Grass) and *Themeda quadrivalvis* (Grader Grass) between the RALP and the East Hills train line should be slashed regularly to prevent seeding events (Figure 2 (5 of 8)). This will reduce the colonisation of these grasses into revegetation areas • Slashing should only occur when plants are not seeding to prevent further spread. As more native species become established in these areas, slashing may impact their growth; therefore, non-targeted slashing should be avoided
	• Application of herbicide within the RALP and in areas adjacent to the Moorebank biobank site should be conducted to prevent overspray (off-target poisoning). If herbicide application occurs, recommended herbicides for tussock grass, *Chloris gayana* (Rhodes Grass) and *Eragrostis curvula* (African Lovegrass), include glyphosate or flupropanate, while plants are actively growing during summer and spring. Native vegetation outside the

Area	Recommendation
	RALP fence must not be impacted by herbicide during weed remediation works • No herbicide spraying should be conducted outside the RALP, specifically adjacent to ecologically sensitive areas south of the MPE Operational facility (Figure 2). Manual weed remediation works in ecologically sensitive areas should not extend beyond the construction envelope of the RALP. If further clarification is necessary, the project ecologist should be consulted
	• Batters that currently have limited vegetation cover should be colonised by a native seed mix as soon as practical. This will ensure that these areas are not colonised by weed species and will further reduce erosion during heavy rainfall events
	• Continue to collect litter from within the RALP and in adjacent areas
IMEX building and adjacent drainage infrastructure	• Soft batters within the trunk drainage system and retention basin/swale at the north-eastern extent of the facility should be inspected for weed growth. Weed levels should be controlled through herbicide application, slashing and hand weeding. Weed remediation works should be conducted in accordance with the approved Weed Management Plan
Warehouse areas	• Weed levels should be controlled through herbicide application, slashing and hand weeding. Weed remediation works should be conducted in accordance with the approved Weed Management Plan
Eastern boundary drainage infrastructure	• Weed levels should be controlled through herbicide application, slashing and hand weeding. Weed remediation works should be conducted in accordance with the approved Weed Management Plan • Erosion in the drainage infrastructure should be controlled by planting additional native ground cover species to maintain batters during heavy rainfall events
Landscaped areas along Bushmasters Avenue	• Continued maintenance of these landscaped areas should be maintained at a frequency that does not increase the current abundance of identified weed species. This is pertinent for areas where landscaped species have died back, and bare ground is more abundant • Areas adjacent to cleared areas in the MPW operational area should be sprayed for weeds to limited the potential for spreading

References

Arcadis (2019a) Urban Design and Landscape Plan. Moorebank Precinct East Stage 1

Arcadis (2019b) Operational Flora and Fauna Management Plan. Moorebank Logistics Park – East Precinct

Arcadis (2019c) Landscape Vegetation Management Sub Plan. Moorebank Precinct East Stage 2

Arcadis (2020) MPE Operational – Weed Monitoring Report December 2020

Arcadis (2020) Urban Design and Landscape Plan. Moorebank Precinct East Stage 2

Bureau of Meteorology (BOM) (2021) Climate Data Online. Weather and Climate: Holsworthy Aerodrome NSW (station 066161) http://www.bom.gov.au/climate/dwo/IDCJDW2161.latest.shtml

NSW Department of Primary Industries (DPI) (accessed 2021) NSW WeedWise. priority weeds for the Greater Sydney. https://weeds.dpi.nsw.gov.au/WeedBiosecurities?AreaId=3

APPENDIX A PRIORITY WEED PROFILES

Lantana *(Lantana camara)*

Fireweed *(Senecio madagarsensis)*

Alligator Weed *(Alternanthera philoxeroides)*

African Olive (*Olea europea* subsp. *cuspitada*)

Lantana *(Lantana camara)*

Fireweed *(Senecio madagarsensis)*

Bridal Creeper *(Asparagus asparagoides)*

Peruvian Primrose (*Ludwigia peruviana*)

APPENDIX B KEY WEED PROFILES

Rhodes Grass (*Chloris gayana*)

African Love Grass (*Eragrostis curvula*)

Patterson's Curse (*Echienum planteganium*)

Coolatai Grass (*Hyparrhenia hirta*)

Grader Grass (*Themeda quadrivalvis*)

Red Natal Grass (*Melinis repens*)

APPENDIX C WEED REMEDIATION WORKS TRACKING

Priority	Action	Action description	Current performance assessment
1	Eradicate 'priority' weeds	Target' priority' weed species through manual removal and herbicide treatment. Herbicide application should consider timing (i.e., applying herbicide when weeds are actively growing) and best practice methodologies. Areas outlined by coloured polygons in Figure 2 should be prioritised.	One priority weed species are present within the RALP: *Senecio madagascariensis* (Fireweed). These should be removed as a priority. Progress has been made through remediation works within the RALP. Continued management must be undertaken to work towards eradication.
2	Removal of key and aggressive weed species	Key weed species, including African Lovegrass, Rhodes Grass, Paterson's Curse, Coolatai Grass and Grader Grass, should be removed from revegetated areas of soft batter. Aggressive weed species, including Moth Vine and Castor Oil Plant, should be removed from all operational areas using a combination of manual and herbicide control. Areas outlined by coloured polygons in Figure 2 should be prioritised.	Key weed species, including Rhodes Grass, African Lovegrass, Coolatai Grass, Paterson's Curse, and Grader Grass, are colonising soft batters in the RALP. These weeds should be removed. Progress has been made through remediation works within the RALP. Continued management must be undertaken to work towards eradication.
3	Suppress further colonisation of environmental weeds and encroachment into areas of bushland	Control of exotic species adjacent to the biobank site and ecologically sensitive areas. Manual removal should be adopted in areas adjacent to threatened flora locations. Areas outlined by coloured polygons in Figure 2 should be prioritised.	Weed growth is stabilising through continued weed management on soft batters adjacent to the biobank site and ecologically sensitive areas. Manual removal, including routine slashing, is being used to prevent present weeds from reaching seeding maturity and further encroaching on adjacent high-value areas (biobank site and ecologically sensitive areas containing threatened plant species). All works should be restricted to the operational area and not extend into the biobank site or identified ecologically sensitive areas. Slashing should only be conducted when weed species are not in flower to prevent further spread. Appropriate slashing time is during winter for most species.

Priority	Action	Action description	Current performance assessment
4	Slashing of invasive grasses to prevent seeding.	Management of invasive grasses such as Rhodes Grass and African Love Grass through regular mowing or slashing. Areas outlined by coloured polygons in Figure 2 should be prioritised.	Slashing has been adopted to manage the regrowth of invasive grasses (African Lovegrass, Grader Grass) within the RALP in ballast and gravel areas. Some areas beyond the Georges River bridge are yet to be managed. Slashing should be used to manage large expanses of exotic grassland to prevent seeding events. However, as native grasses become established, extreme care must be taken, and indiscriminate slashing must be avoided. A contractor with knowledge of native species should be employed to carry out this task, in failing that, an ecologist should be on site to monitor weed remediation.
5	Reduce cover of weeds within the RALP	Reduction of weed cover by applying control methods commensurate with the Operational Flora and Fauna Management Plan (Arcadis 2019).	Works should involve targeted slashing of mature plants and removing flowering and seed heads to minimise seeding. Targeted slashing has been previously employed to control weed colonisation on soft batters. However, it must be continued to limit the re-colonisation of weeds within the RALP. Future weed control actions will focus on removing and reducing the cover of priority and key weed species and suppressing the further colonisation of common weeds, which is consistent with the rehabilitation methodology proposed by Spray Grass Solutions and Cumberland Plain Seeds.
6	Remove herbaceous and woody weeds within the operational area and trunk drainage infrastructure.	Reduction in herbaceous and woody weeds by applying control methods commensurate with the Operational Flora and Fauna Management Plan (Arcadis 2019)	Weed cover has generally remained low within trunk drainage infrastructure and at the north-eastern extent of the MIP East operational facility.

APPENDIX D RECOMMENDED ACTIONS CATALOGUE

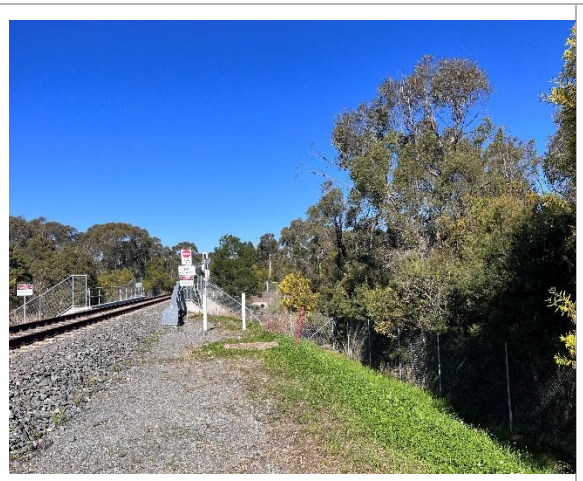
Month of logging	Recommended action	Status (Not started, Commenced, Complete)	Comments
April 2020	Eradicate priority weeds species, including Bridal Creeper, Alligator Weed, Lantana, Fireweed and African Olive	Completed	Most instances of these weeds have been removed from the RALP. Small instances of Fireweed occur, however these are being managed by the current weed remediation works within the RALP.
April 2020	Remove key and aggressive weed species within RALP, including Golden Wreath Wattle, Moth Vine, Castor Oil Plant, Small-leafed Privet, Grader Grass and Balloon Vine	Commenced	Grader Grass has been observed colonising remediated areas within the RALP. This species should be removed to prevent further colonisation and infestations. Golden Wreath Wattle, Moth Vine and Castor Oil Plant on the southern side of the RALP in the area between the operational boundary and the East Hills line rail corridor. Consideration should be given to the management of these areas to reduce encroachment into recently remediated areas.
June 2020	Planning should commence to revegetate soft batters and un-developed areas within the MPE operational facility with native species in accordance with the approved Urban Design and Landscaping Plan (Arcadis 2019a, Arcadis 2020)	Commenced	Revegetation has commenced for remediated areas using a hydro-mulch containing a seed palette commensurate with the UDLP (Arcadis 2020). Previous instances of native seed setting have been colonized by weed species within the RALP and should be cleared and re-set with a native seed mix as soon as practical.
December 2020	Exotic species, specifically *Medicago polymorpha* (Burr Medic), should be removed from grassland on either side of the RALP at its eastern extent, closest to the operational area.	Commenced	Targeted manual removal, including slashing, has been conducted for exotic species outside the RALP fencing. A qualified bush regeneration contractor should be used to avoid impacts on

Month of logging	Recommended action	Status (Not started, Commenced, Complete)	Comments
			native species. Strictly no herbicide should be used in this area, and works should not extend beyond the RALP construction envelope. Where possible, contractors should not access/pass through adjacent areas.
December 2021	Collect litter scattered through the RALP and in adjacent areas	Commenced	Litter remains in the RALP and adjacent areas.
December 2021	Control aggressive weed species Coolatai Grass and Paterson's Curse within the RALP	Commenced	New instances of aggressive weed species Coolatai Grass and Paterson's Curse within the RALP should be removed as soon as practicable to avoid the spread of these species into ecologically sensitive areas adjacent to the RALP.
February 2022	Continued targeted slashing of woody and herbaceous weeds within the RALP.	Completed	Majority of large woody weeds have been removed from the RALP. Continue regular slashing of large woody weeds to remove the fertile seed head and discourage further germination of these weeds within the RALP should occur.
December 2022	Prioritise weed remediation works for priority and key weed species which have experienced accelerated growth in recent months.	Commenced	Areas of particularly high biomass of priority and key weed species should be prioritised for weed remediation works in coming months to avoid mass seeding events.
	Begin remediation of soft batters which have slipped following extreme rainfall events in recent weeks	Not started	Areas within the operational facility, including a number of areas within the RALP, require urgent batter remediation in areas of batter slipping.
December 2022	Begin weed remediation of gravel and ballast areas along RALP	Commenced	Removal of all vegetation in gravel and ballast areas due along RALP using slashing and

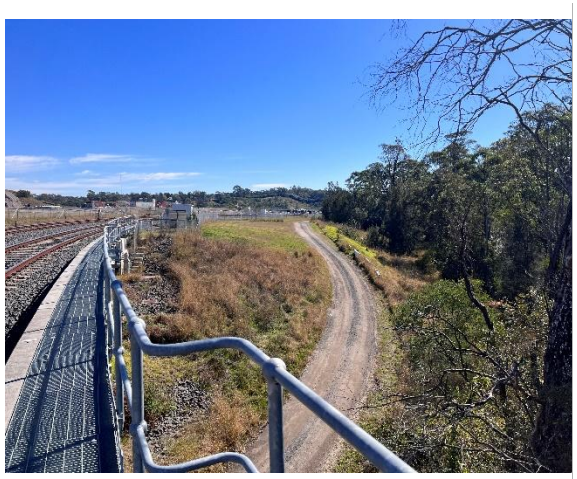
Month of logging	Recommended action	Status (Not started, Commenced, Complete)	Comments
			herbicide due to safety concerns of train operators and prevent spread of weeds.
December 2022	Continue weed remediation works along the soft batters within the RALP.	Commenced	Future weed remediation works should include targeted slashing and spraying of priority and key weed species, whilst avoiding native species by hand weeding within a one metre buffer zone of native individuals.
February 2023	Continue weed remediation works along the soft batters within the RALP beyond Georges River bridge.	Commenced	Future weed remediation works should include targeted slashing and spraying of priority and key weed species, whilst avoiding native species by hand weeding within a one metre buffer zone of native individuals.
April 2023	No weed remediation has occurred since February 2023. Expected to recommence in June 2023, in same areas that have previously been remediated.	Commenced	Future weed remediation works should include targeted slashing and spraying of priority and key weed species, whilst avoiding native species by hand weeding within a one metre buffer zone of native individuals.
June 2023	Continue weed remediation works along the soft batters within the RALP	Commenced	Future weed remediation works should include targeted slashing and spraying of priority and key weed species, whilst avoiding native species by hand weeding within a one metre buffer zone of native individuals.
December 2023	Toolijooa Environmental Restoration inducted as primary weed control contractors. Weed remediation recommenced throughout the RALP	Commenced	Future weed remediation works should include targeted slashing and spraying of priority and key weed species, whilst avoiding native species by hand weeding within a one metre buffer zone of native individuals.

APPENDIX E REMEDIATION PROGRESS PHOTOGRAPHS

April 2021	December 2023	August 2025
April 2021	December 2023	August 2025

		
April 2021	December 2023	August 2025
April 2021	December 2023	August 2025

April 2021	December 2023	August 2025
April 2021	December 2023	August 2025

		
April 2021	**December 2023**	**August 2025**

APPENDIX F FLORA SPECIES INVENTORY

Scientific name	Common name	Exotic	Priority/key weed
Acacia falcata	Hickory Wattle		
Acacia parramattensis	Parramatta Wattle		
Acacia saligna	Golden Wreath Wattle	*	
Alternanthera philoxeroides	Alligator weed	*	Priority
Alternanthera pungens	Khaki Weed	*	
Araujia sericifera	Moth Vine	*	
Asparagus asparagoides	Bridal Creeper	*	Priority
Atriplex semibaccata	Creeping Saltbush		
Austrodanthonia spp.	-		
Avena spp.	Oats	*	
Bidens pilosa	Cobbler's Pegs	*	
Brassica rapa	Field Mustard	*	
Briza maxima	Quaking Grass	*	
Briza minor	Shivery Grass	*	
Cenchrus clandestinus	Kikuyu Grass	*	
Centaurium spp.	-	*	
Chloris gayana	Rhodes Grass	*	Key
Chloris truncata	Windmill Grass		
Cirsium vulgare	Spear Thistle	*	
Convolvulus erubescens	Pink Bindweed		
Conyza bonariensis	Flaxleaf Fleabane	*	
Cyclospermum leptophyllum	Slender Celery	*	
Cynodon dactylon	Common Couch		
Cymbopogon refractus	Barbed Wire Grass		
Cyperus eragrostis	Umbrella Sedge	*	
Daviesia ulicifolia	Gorse Bitter Pea		
Dichanthium sericeum	Queensland Bluegrass		
Dichondra repens	Kidney Weed		
Echium plantagineum	Paterson's Curse	*	Key
Eragrostis brownii	Brown's Lovegrass		
Eragrostis curvula	African Lovegrass	*	Key
Euchiton spp.	-		
Ficinia nodosa	Knobby Club-rush		
Foeniculum vulgare	Fennel	*	
Glycine clandestina	-		

Scientific name	Common name	Exotic	Priority/key weed
Hardenbergia violacea	False Sarsaparilla		
Hypochoeris radicata	Catsear	*	
Indigofera australis	Australian Indigo		
Juncus usitatus	-		
Lantana camara	Lantana	*	Priority
Lachnagrostis filiformis	Blown Grass		
Lactuca serriola	Prickly Lettuce	*	
Linum trigynum	French Flax	*	
Lolium perenne	Perennial Ryegrass	*	
Lomandra longifolia	Spiny-headed Mat-rush		
Lysimachia arvensis	Scarlet Pimpernel	*	
Ludwigia peruviana	Peruvian water primrose	*	Priority
Medicago polymorpha	Burr Medic	*	
Melilotus alba	Bokhara	*	
Melinis repens	Red Natal Grass	*	Key
Modiola caroliniana	Red-flowered Mallow	*	
Olea europaea subsp. cuspidate	African Olive	*	Priority
Paspalum dilatatum	Paspalum	*	
Persicaria decipiens	Slender Knotweed		
Phytolacca octandra	Inkweed	*	
Plantago lanceolata	Lamb's Tongues	*	
Portulaca oleracea	Common Purslane		
Rumex crispus	Curled Dock	*	
Senecio madagascariensis	Fireweed	*	Priority
Setaria parviflora	-	*	
Sida rhombifolia	Paddy's Lucerne	*	Key
Solanum nigrum	Black-berry Nightshade	*	
Solanum sisymbriifolium		*	
Sonchus oleraceus	Common Sowthistle	*	
Tagetes minuta	Stinking Roger	*	
Themeda quadrivalvis	Grader Grass	*	Key
Themeda triandra	-		
Trifolium arvense	Haresfoot Clover	*	
Trifolium repens	White Clover	*	
Trifolium michelianum	Bolansa Clover	*	
Verbena bonariensis	Purpletop	*	

Scientific name	Common name	Exotic	Priority/key weed
Verbena rigida var. Rigida	Veined Verbena	*	

MIP BI-MONTHLY WEED MONITORING REPORT – OCTOBER 2025

Introduction

Arcadis has been commissioned to conduct bi-monthly weed monitoring surveys within the operational areas of Moorebank Precinct East (MPE) and Moorebank Precinct West (MPW). These areas together are known as the Moorebank Intermodal Precinct (MIP).

The MPE operational facility includes the Import and Export Terminal (IMEX), Rail Access Land Package (RALP), warehouses, distribution facilities and freight village, and stormwater trunk drainage infrastructure and landscaping areas. The MPW operational facility includes the landscaped vegetation along Bushmasters Avenue (Figure 1).

Regular monitoring of the MIP operational facilities will inform the land manager of weed cover, and the presence of any weeds listed as 'priority' for the Greater Sydney Local Land Services region under the *Biosecurity Act 2015*.

The schedule for the bi-monthly weed monitoring inspections for the 2025-26 monitoring year are detailed in Table 1. This document will be treated as live throughout the monitoring year and will be updated at the end of each inspection.

Table 1 Schedule for bi-monthly weed inspections

Inspection month	Date completed
June 2025	25/06/2025
August 2025	27/08/2025
October 2025	05/11/2025
December 2026	*TBC*
February 2026	*TBC*
April 2026	*TBC*

Background

Arcadis has been monitoring the MPE operational facility for weed occurrence since April 2020. The RALP, which includes the MPE operational RALP, has seen significant change and works over the time Arcadis has conducted weed monitoring. Additionally, works conducted in MPW in 2023/24 have changed the layout and vegetation spread in the RALP. Several weed remediation events have occurred since the inception of weed monitoring, detailed below in Table 2.

Table 2 Summary of weed events throughout monitoring history

Timing	Summary of events	Weed contractor
Spring 2020	• Weeds removed from batters and revegetated with native species, as per the Urban Design and Landscaping Plan (UDLP) for MPE	Spray Grass Solutions

Timing	Summary of events	Weed contractor
	• Cumberland Plain Seeds were procured to provide technical oversight of revegetation effort	
December 2021	• As per recommendations from Spray Grass Solutions and Cumberland Plain Seeds, the monitoring methodology was changed • Changes included reporting on cover on 'priority' weeds species and key weeds specific to the project.	
December 2022 to June 2023	• Weed remediation works commenced • Priority weed species were targeted • Native species were identified throughout the RALP to avoid accidental removal.	P&E Services
December 2023 to present	• Weed remediation works continued • Regular maintenance of priority weed species via slashing, hand removal and herbicide spraying	Toolijooa Environmental Restoration

Methodology

Arcadis ecologist Kate Mauger attended the MIP operational area on 5 November 2025. Monitoring involved traversing the MIP operational facility on foot, surveying landscaped areas, stormwater infrastructure and soft batters adjoining the RALP for increases in weed abundance of the identified species in Appendix A and Appendix B. The areas surveyed are presented in Figure 1.

The weather on the 5 November was sunny, with a maximum temperature of 28°C, and the weather recorded at Holsworthy Aerodrome (station 066161) (BOM 2025).

Study Limitations

The data presented within this report is restricted to what was observed and recorded by the attending Arcadis ecologists during the site assessment on 5 November 2025.

Monitoring of weeds was restricted to the operational facility; weeds were not assessed within the bounds of the active construction areas surrounding new warehouses or other infrastructure.

Surveys were not undertaken in areas extending beyond the junction between the QUBE RALP and the Southern Sydney Freight Line (SSFL).

Figure 1. Survey extent within the MPI operational facility

Results

Results of the weed monitoring surveys during the October/November 2025 survey are summarised below in Table 3. Weed records, previously recorded threatened flora species records, and instances of native species within the survey extent are shown in Figure 2.

Progress photographs of monitoring locations are provided in Appendix E and a complete flora species inventory in Appendix F.

Table 3 Summary of weed abundances across all inspection areas in MPI, for the current survey

Inspection area	Weed abundances for current survey	Photo of inspection area
Moorebank Precinct East (MPE)		
Rail Access Land Package (RALP)	• Weed growth continous to be supressed, particuraly in the areas immedaitely adjacent to the BioBank site. Large instances of native grasses (*Themeda triandra*) are growing substantially • Steep areas along berms are being avoided for slashing due to safety concerns. Additionally, the small amounts of exotic vegetation are currently stabilising these berms, and will be targeted once construction is finalised in the MPW areas.	

Inspection area	Weed abundances for current survey	Photo of inspection area
IMEX building and adjacent drainage infrastructure	• *Acacia falcata* (Hickory Wattle) continue to grow unimpeded by weeds.	

Inspection area	Weed abundances for current survey	Photo of inspection area
Warehouse areas	• Majority of this area has now been claimed by the Moorebank Avenue Upgrade project and is unable to be surveyed adequately • Occurrences of weeds in the warehouse area and the adjacent drainage infrastructure is restricted to scattered individuals of *Senecio madagascariensis* (Fireweed), *Plantago lanceolata* (Plantain), *Trifolium arvense* (Clover) and exotic grasses like *Chloris gayana* (Rhodes Grass), *Sporobolus africanus* (Parramatta Grass), *Paspalum urvillei* (Giant Paspalum) and *Ehrharta erect* (Panic Veldtgrass).	

Inspection area	Weed abundances for current survey	Photo of inspection area
Eastern boundary drainage infrastructure	• Majority of this area has now been claimed by the Moorebank Avenue Upgrade project and is unable to be surveyed adequately • Drainage infrastructure dominated by *Bulboschoenus fluviatilis* (Marsh club-rush) whilst other are dominated by *Typha orientalis* (Bulrush). Where space is present between stands of theses native emergent species small clumps of *Persicaria decipiens* (Slender Knotweed), *Daviesia ulicifolia*, *Ficinia nodosa* (Knotted Club-rush), *Carex tereticaulis* and *Juncus usitatus* are present. Other native species such as *Imperata cylindrica* and *Lomandra longifolia* were observed in the drainage channels. • Areas of erosion still present.	

Inspection area	Weed abundances for current survey	Photo of inspection area
Moorebank Precinct West (MPW)		
Landscaped areas along Bushmasters Avenue	• Landscapes vegetation is in good condition, with minor weed incursions • Weed species present include *Sonchus oleraceus* (Common Sowthistle), *Chloris virgata* (Rhodes Grass), *Bidens pilosa*, *Conyza bonariensis* (Fleabane), *Cyclospermum leptophyllum* (Slender Celery), and *Tagetes minuta* (Stinking Roger). • Areas with limtied to no landscaped vegetation are particularly susceptible to weed incursion from cleared areas (see adjacent photo)	

Inspection area	Weed abundances for current survey	Photo of inspection area
APZ area – northern MPW	• Suppression of *Medicago polymorpha* and other herbacious weeds occuring in this area (*Sonchus oleraceus* (Common Sowthistle), *Circium vulagre*) • Methods include slashing and hand removal around native species • Large stands of the native shrub *Dodonea viscosa* are growing unimpeded.	

Sediment basins adjacent to BioBank site	• Spot spraying, and hand pulling of weeds occuring along boundary of basins and BioBank site • No significant increases in weed coverage were observed around the basin outlet points	

Inspection area	Weed abundances for current survey	Photo of inspection area

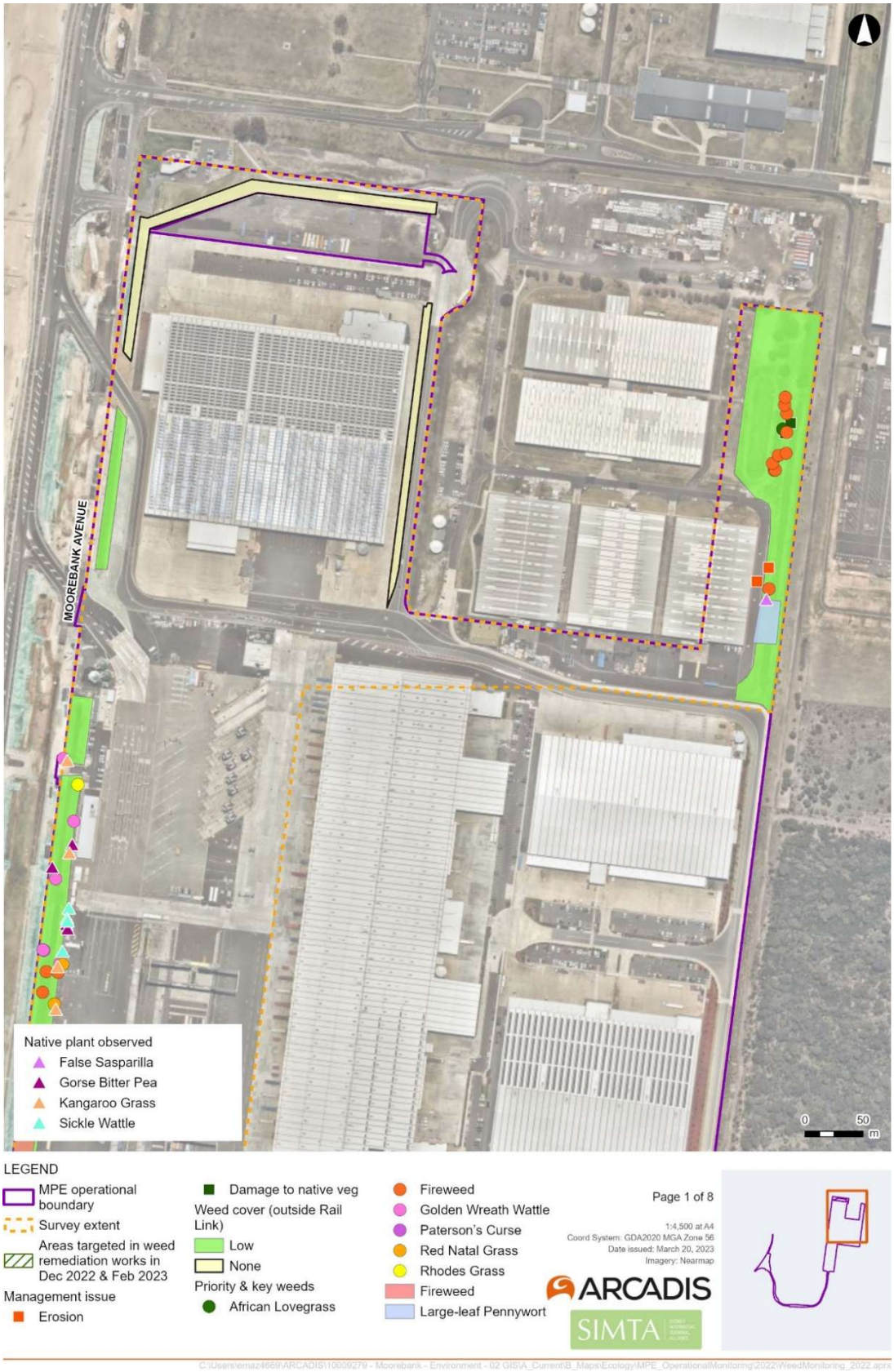


Figure 2 Instances of weeds, native species and threatened flora records in the survey extent and MIP operational boundary (1 of 8)

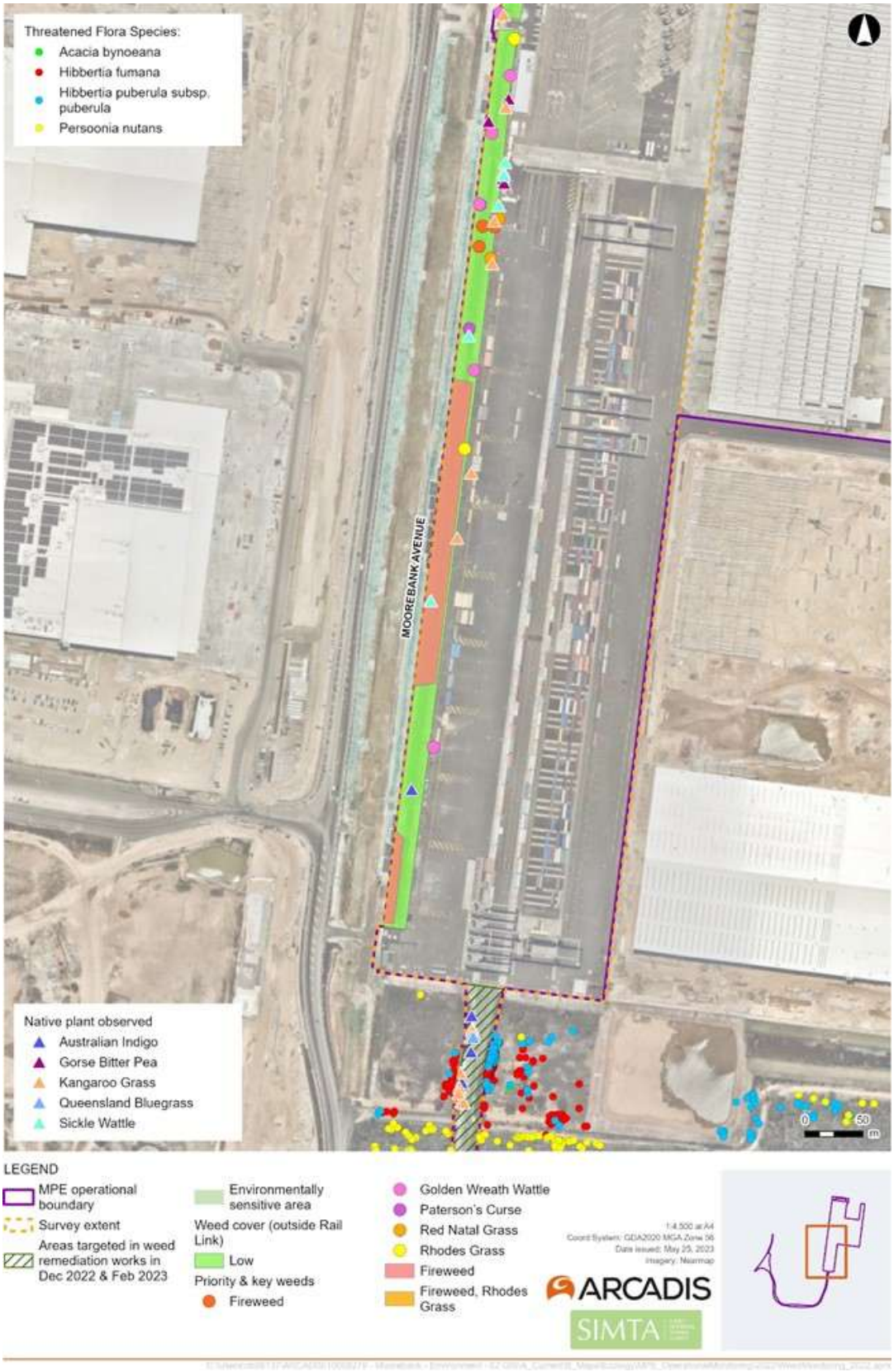


Figure 2 Instances of weeds, native species and threatened flora records in the survey extent and MIP operational boundary (2 of 8)

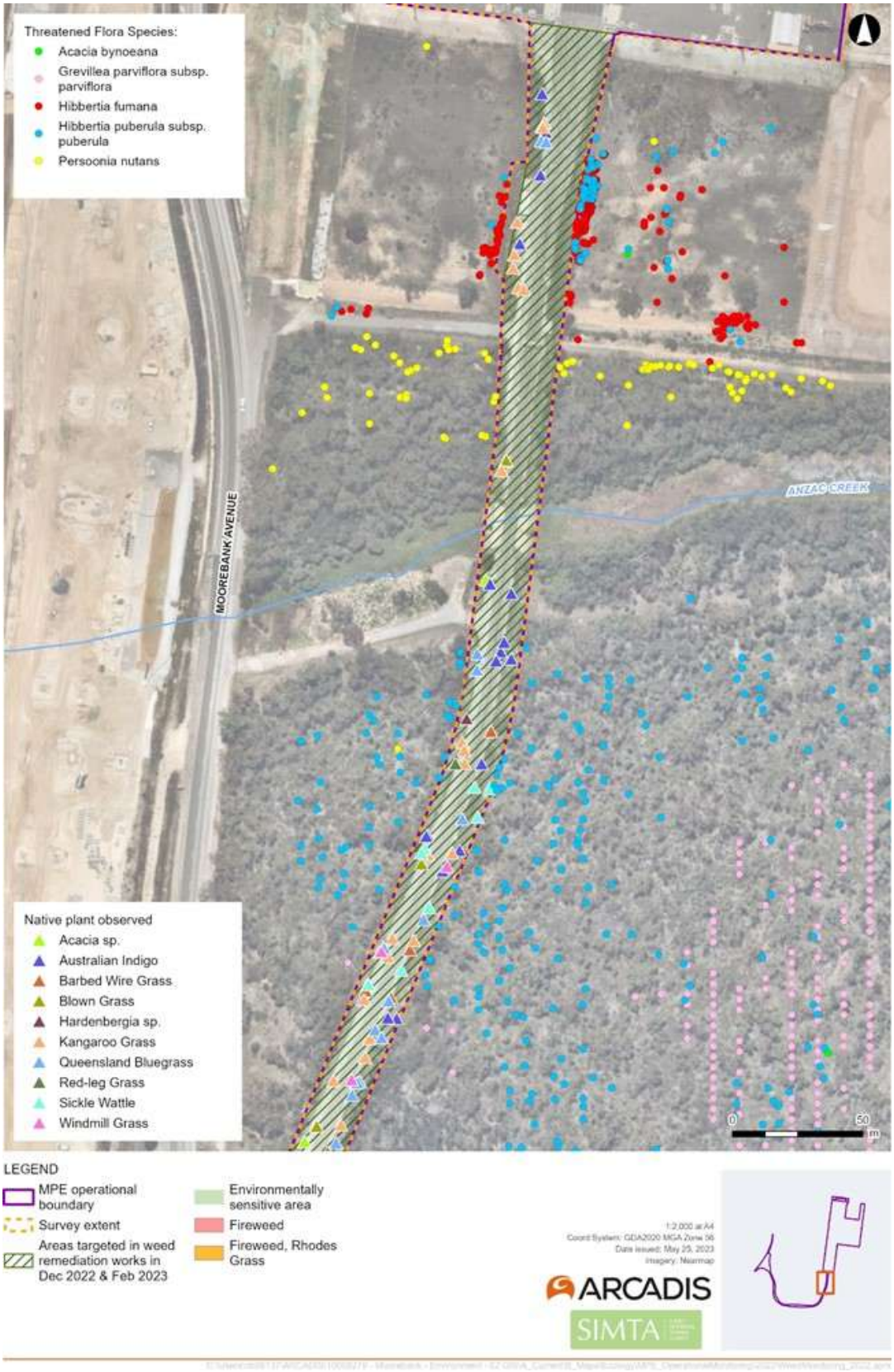


Figure 2 Instances of weeds, native species and threatened flora records in the survey extent and MIP operational boundary (3 of 8)

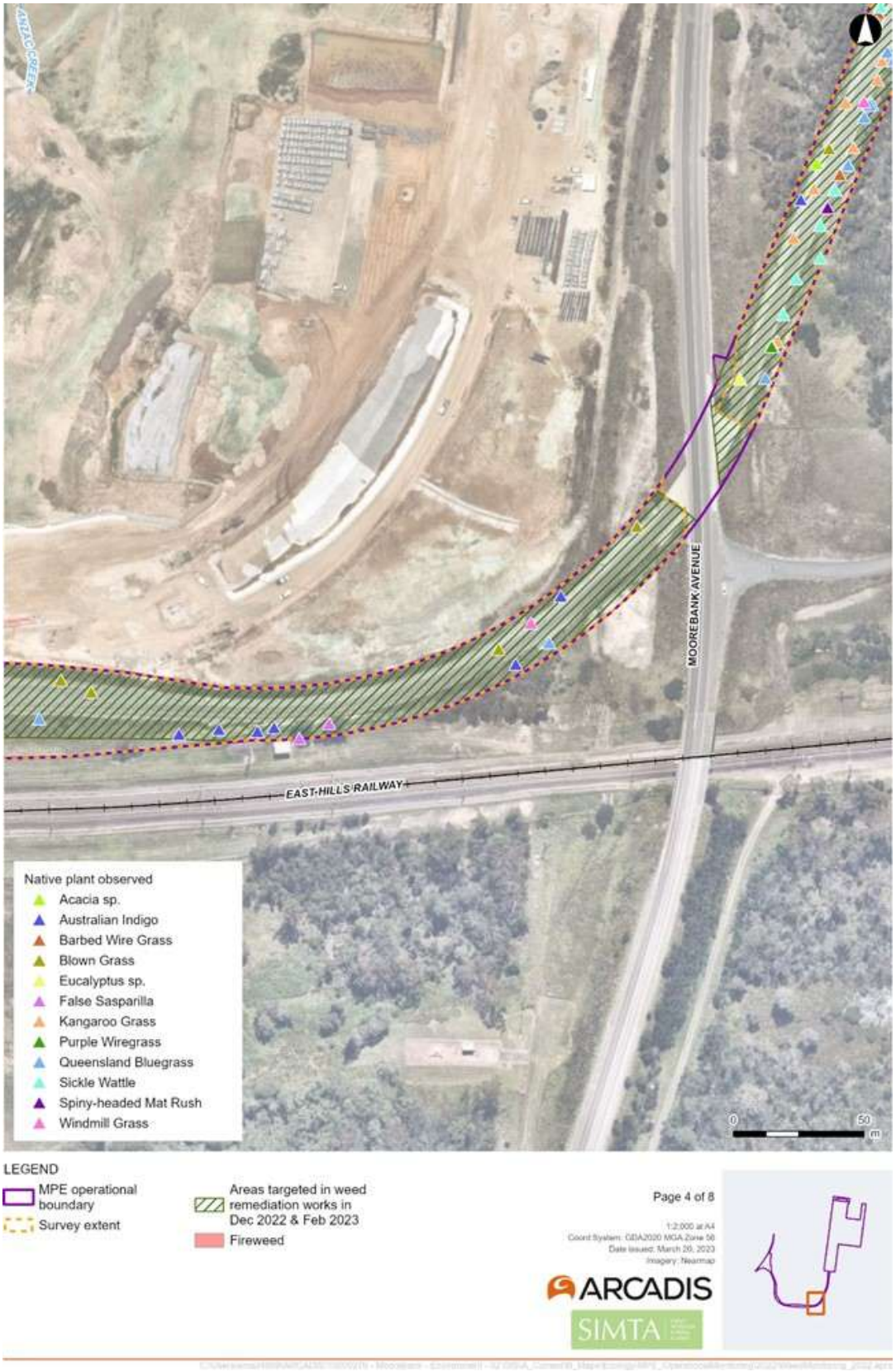


Figure 2 Instances of weeds, native species and threatened flora records in the survey extent and MIP operational boundary (4 of 8)

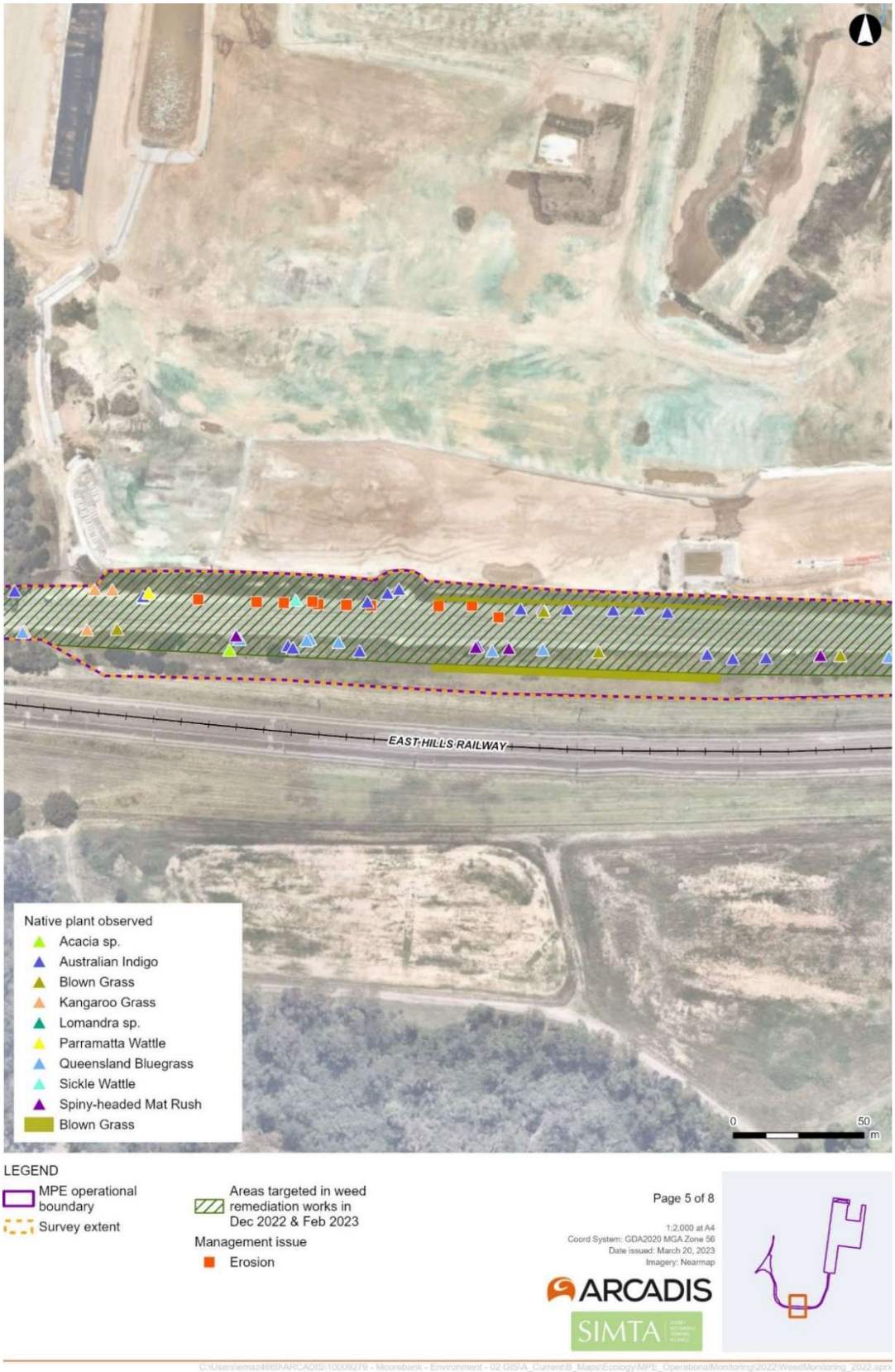


Figure 2 Instances of weeds, native species and threatened flora records in the survey extent and MIP operational boundary (5 of 8)

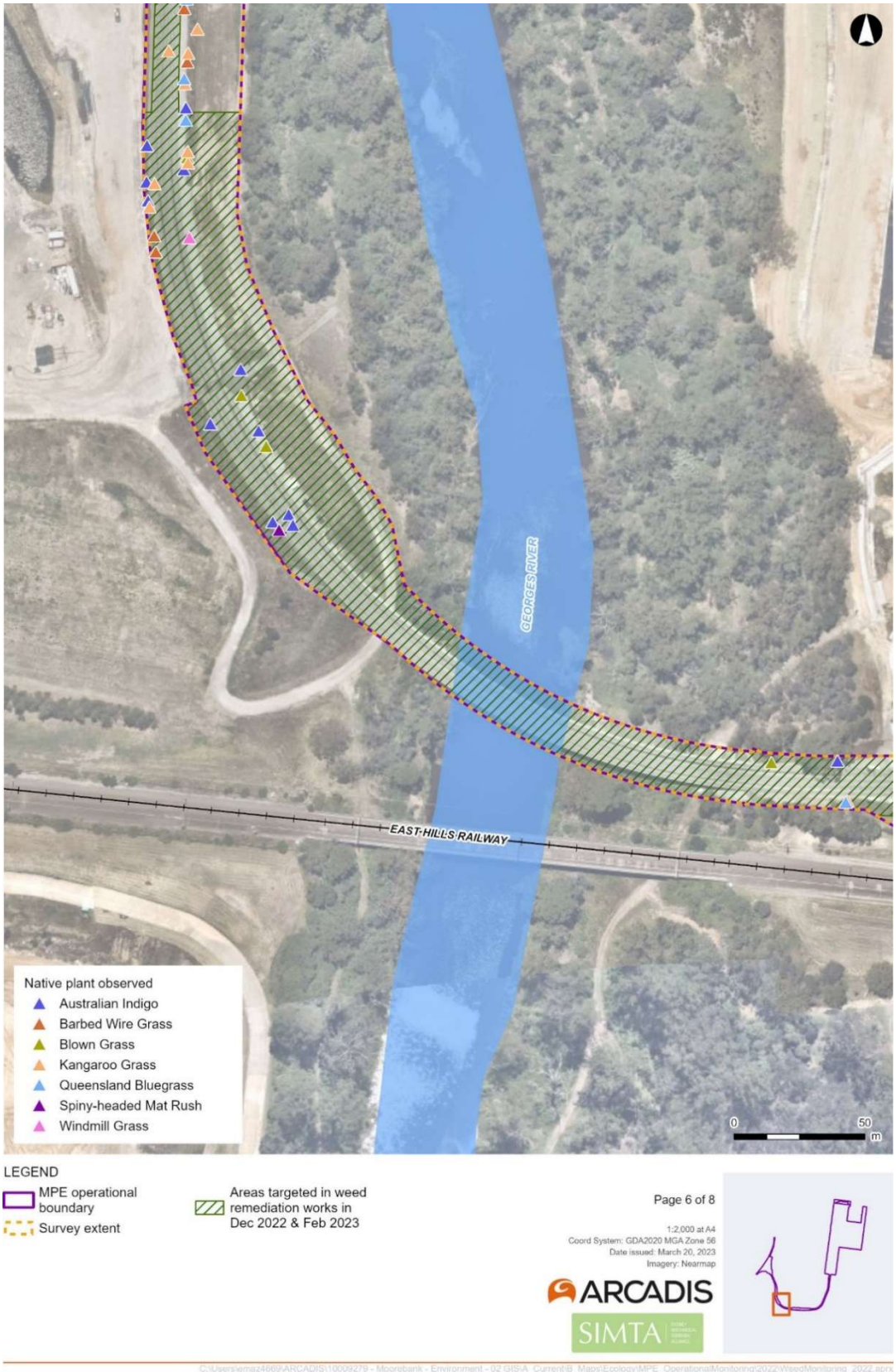


Figure 2 Instances of weeds, native species and threatened flora records in the survey extent and MIP operational boundary (6 of 8)

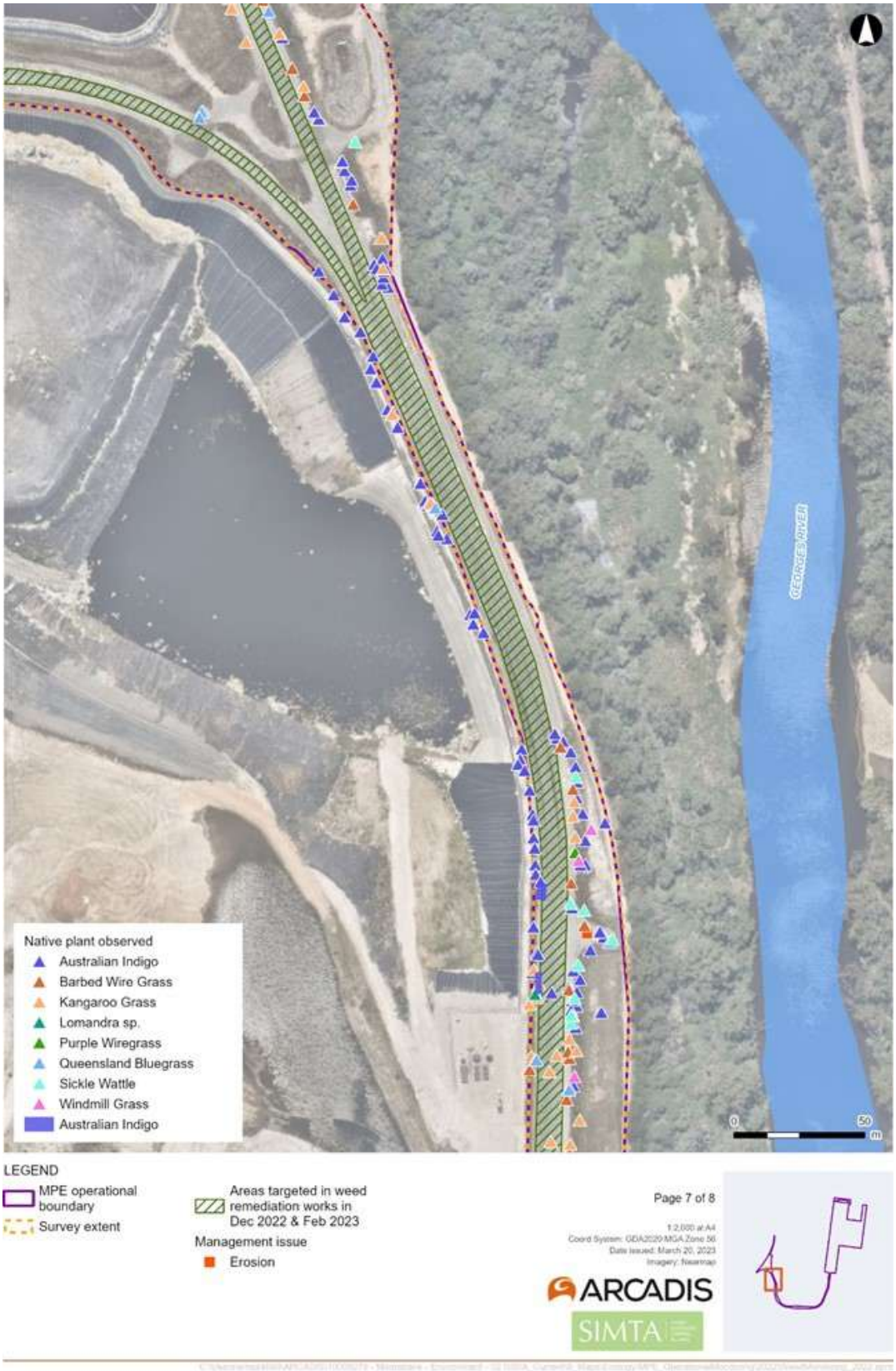


Figure 2 Instances of weeds, native species and threatened flora records in the survey extent and MIP operational boundary (7 of 8)

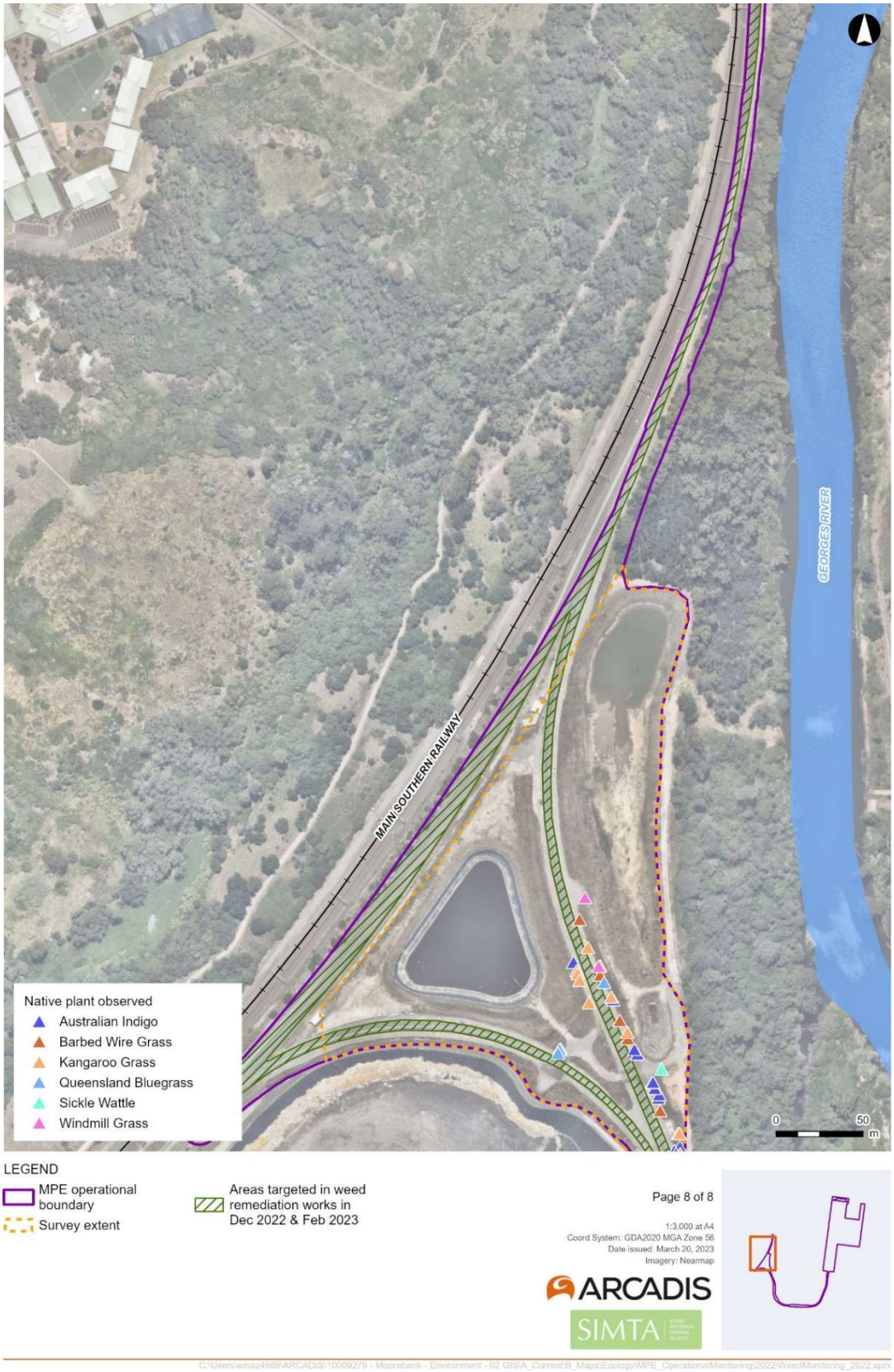


Figure 2 Instances of weeds, native species and threatened flora records in the survey extent and MIP operational boundary (8 of 8)

Recommendations

Weed monitoring and weed remedition works should continue throughout the 2025/26 monitoinrg year. Table 4 summrises the recommendations for weed remediation within the MIP. Additionally, the weed remediation works being conducted by Toolijooa in the RALP have been compared against the critera in Appendix C and are considered to be consistent.

Recommended actions documented in previous weed monitoring reports are included in Appendix D. The catalogue has been reviewed and updated to reflect works which have been completed and is considerate of the revegetation methodology proposed by Spray Grass Solutions and Cumberland Plain Seeds.

Table 4 Recommended actions for weed remediation in the MIP

Area	Recommendation
All areas	• Targeted weed remediation to continue during the 2025/26 monitoring year and is to be conducted using the same methods and at the same locations as previously conducted
Rail Access Land Package (RALP)	• Weed remediation works will focus on controlling priority and key weed species (Appendix A and Appendix B)
	• Suppression of environmental weeds and encroachment into areas of bushland should occur where possible
	• Hand weeding should be conducted for individuals, whereas slashing and herbicide spraying should be adopted to target larger patches of weeds. However, extreme care must be taken when conducting any weed management within the RALP, as many native grasses have become established • Hand weeding is only feasible on annual species such as *Themeda quadrivalvis* (Grader Grass) and *Senecio madagascariensis* (Fireweed) due to their relatively small root system
	• Contractors should identify the extent of the works zone and discuss 'No Go' zones with all involved in the works. Weeding must be restricted to identified weeds and native species to be retained should be identified prior to works commencing
	• Priority and aggressive weed species outside revegetated RALP areas should be removed. Weeds that should be targeted include *Senecio madagascariensis* (Fireweed)
	• Large patches of *Eragrostis curvula* (African Lovegrass), *Chloris gayana* (Rhodes Grass) and *Themeda quadrivalvis* (Grader Grass) between the RALP and the East Hills train line should be slashed regularly to prevent seeding events (Figure 2 (5 of 8)). This will reduce the colonisation of these grasses into revegetation areas • Slashing should only occur when plants are not seeding to prevent further spread. As more native species become established in these areas, slashing may impact their growth; therefore, non-targeted slashing should be avoided
	• Application of herbicide within the RALP and in areas adjacent to the Moorebank biobank site should be conducted to prevent overspray (off-target poisoning). If herbicide application occurs, recommended herbicides for tussock grass, *Chloris gayana* (Rhodes Grass) and *Eragrostis curvula* (African Lovegrass), include glyphosate or flupropanate, while plants are actively growing during summer and spring. Native vegetation outside the

Area	Recommendation
	RALP fence must not be impacted by herbicide during weed remediation works • No herbicide spraying should be conducted outside the RALP, specifically adjacent to ecologically sensitive areas south of the MPE Operational facility (Figure 2). Manual weed remediation works in ecologically sensitive areas should not extend beyond the construction envelope of the RALP. If further clarification is necessary, the project ecologist should be consulted
	• Batters that currently have limited vegetation cover should be colonised by a native seed mix as soon as practical. This will ensure that these areas are not colonised by weed species and will further reduce erosion during heavy rainfall events
	• Continue to collect litter from within the RALP and in adjacent areas
IMEX building and adjacent drainage infrastructure	• Soft batters within the trunk drainage system and retention basin/swale at the north-eastern extent of the facility should be inspected for weed growth. Weed levels should be controlled through herbicide application, slashing and hand weeding. Weed remediation works should be conducted in accordance with the approved Weed Management Plan
Warehouse areas	• Weed levels should be controlled through herbicide application, slashing and hand weeding. Weed remediation works should be conducted in accordance with the approved Weed Management Plan
Eastern boundary drainage infrastructure	• Weed levels should be controlled through herbicide application, slashing and hand weeding. Weed remediation works should be conducted in accordance with the approved Weed Management Plan • Erosion in the drainage infrastructure should be controlled by planting additional native ground cover species to maintain batters during heavy rainfall events
Landscaped areas along Bushmasters Avenue	• Continued maintenance of these landscaped areas should be maintained at a frequency that does not increase the current abundance of identified weed species. This is pertinent for areas where landscaped species have died back, and bare ground is more abundant • Areas adjacent to cleared areas in the MPW operational area should be sprayed for weeds to limited the potential for spreading
APZ area – northern MPW	• Weed levels should be controlled through herbicide application, slashing and hand weeding. Weed remediation works should be conducted in accordance with the approved Weed Management Plan
Sediment basins adjacent to BioBank site	• Weed levels should be controlled through herbicide application, slashing and hand weeding. Weed remediation works should be conducted in accordance with the approved Weed Management Plan

References

Arcadis (2019a) Urban Design and Landscape Plan. Moorebank Precinct East Stage 1

Arcadis (2019b) Operational Flora and Fauna Management Plan. Moorebank Logistics Park – East Precinct

Arcadis (2019c) Landscape Vegetation Management Sub Plan. Moorebank Precinct East Stage 2

Arcadis (2020) MPE Operational – Weed Monitoring Report December 2020

Arcadis (2020) Urban Design and Landscape Plan. Moorebank Precinct East Stage 2

Bureau of Meteorology (BOM) (2021) Climate Data Online. Weather and Climate: Holsworthy Aerodrome NSW (station 066161) http://www.bom.gov.au/climate/dwo/IDCJDW2161.latest.shtml

NSW Department of Primary Industries (DPI) (accessed 2021) NSW WeedWise. priority weeds for the Greater Sydney. https://weeds.dpi.nsw.gov.au/WeedBiosecurities?AreaId=3

APPENDIX A PRIORITY WEED PROFILES

Lantana *(Lantana camara)*

Fireweed *(Senecio madagarsensis)*

Alligator Weed *(Alternanthera philoxeroides)*

African Olive (*Olea europea* subsp. *cuspitada*)

Lantana *(Lantana camara)*

Fireweed *(Senecio madagarsensis)*

Bridal Creeper *(Asparagus asparagoides)*

Peruvian Primrose (*Ludwigia peruviana*)

APPENDIX B KEY WEED PROFILES

Rhodes Grass (*Chloris gayana*)

African Love Grass (*Eragrostis curvula*)

Patterson's Curse (*Echienum planteganium*)

Coolatai Grass (*Hyparrhenia hirta*)

Grader Grass (*Themeda quadrivalvis*)

Red Natal Grass (*Melinis repens*)

APPENDIX C WEED REMEDIATION WORKS TRACKING

Priority	Action	Action description	Current performance assessment
1	Eradicate 'priority' weeds	Target' priority' weed species through manual removal and herbicide treatment. Herbicide application should consider timing (i.e., applying herbicide when weeds are actively growing) and best practice methodologies. Areas outlined by coloured polygons in Figure 2 should be prioritised.	One priority weed species are present within the RALP: *Senecio madagascariensis* (Fireweed). These should be removed as a priority. Progress has been made through remediation works within the RALP. Continued management must be undertaken to work towards eradication.
2	Removal of key and aggressive weed species	Key weed species, including African Lovegrass, Rhodes Grass, Paterson's Curse, Coolatai Grass and Grader Grass, should be removed from revegetated areas of soft batter. Aggressive weed species, including Moth Vine and Castor Oil Plant, should be removed from all operational areas using a combination of manual and herbicide control. Areas outlined by coloured polygons in Figure 2 should be prioritised.	Key weed species, including Rhodes Grass, African Lovegrass, Coolatai Grass, Paterson's Curse, and Grader Grass, are colonising soft batters in the RALP. These weeds should be removed. Progress has been made through remediation works within the RALP. Continued management must be undertaken to work towards eradication.
3	Suppress further colonisation of environmental weeds and encroachment into areas of bushland	Control of exotic species adjacent to the biobank site and ecologically sensitive areas. Manual removal should be adopted in areas adjacent to threatened flora locations. Areas outlined by coloured polygons in Figure 2 should be prioritised.	Weed growth is stabilising through continued weed management on soft batters adjacent to the biobank site and ecologically sensitive areas. Manual removal, including routine slashing, is being used to prevent present weeds from reaching seeding maturity and further encroaching on adjacent high-value areas (biobank site and ecologically sensitive areas containing threatened plant species). All works should be restricted to the operational area and not extend into the biobank site or identified ecologically sensitive areas. Slashing should only be conducted when weed species are not in flower to prevent further spread. Appropriate slashing time is during winter for most species.

Priority	Action	Action description	Current performance assessment
4	Slashing of invasive grasses to prevent seeding.	Management of invasive grasses such as Rhodes Grass and African Love Grass through regular mowing or slashing. Areas outlined by coloured polygons in Figure 2 should be prioritised.	Slashing has been adopted to manage the regrowth of invasive grasses (African Lovegrass, Grader Grass) within the RALP in ballast and gravel areas. Some areas beyond the Georges River bridge are yet to be managed. Slashing should be used to manage large expanses of exotic grassland to prevent seeding events. However, as native grasses become established, extreme care must be taken, and indiscriminate slashing must be avoided. A contractor with knowledge of native species should be employed to carry out this task, in failing that, an ecologist should be on site to monitor weed remediation.
5	Reduce cover of weeds within the RALP	Reduction of weed cover by applying control methods commensurate with the Operational Flora and Fauna Management Plan (Arcadis 2019).	Works should involve targeted slashing of mature plants and removing flowering and seed heads to minimise seeding. Targeted slashing has been previously employed to control weed colonisation on soft batters. However, it must be continued to limit the re-colonisation of weeds within the RALP. Future weed control actions will focus on removing and reducing the cover of priority and key weed species and suppressing the further colonisation of common weeds, which is consistent with the rehabilitation methodology proposed by Spray Grass Solutions and Cumberland Plain Seeds.
6	Remove herbaceous and woody weeds within the operational area and trunk drainage infrastructure.	Reduction in herbaceous and woody weeds by applying control methods commensurate with the Operational Flora and Fauna Management Plan (Arcadis 2019)	Weed cover has generally remained low within trunk drainage infrastructure and at the north-eastern extent of the MIP East operational facility.

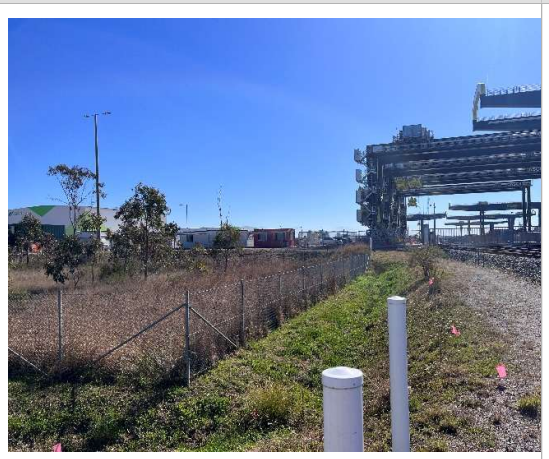
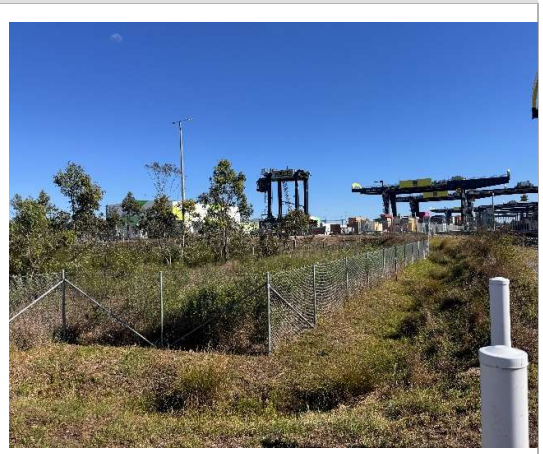
APPENDIX D RECOMMENDED ACTIONS CATALOGUE

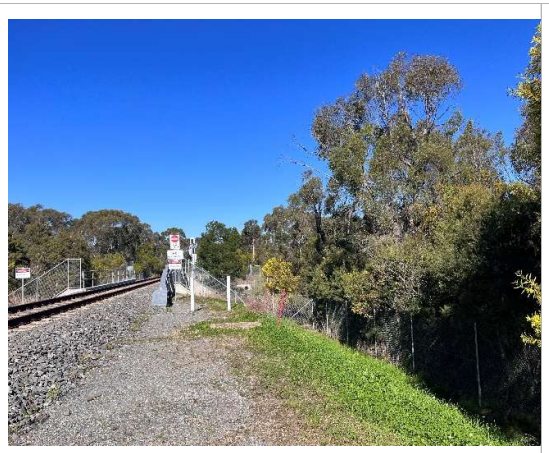
Month of logging	Recommended action	Status (Not started, Commenced, Complete)	Comments
April 2020	Eradicate priority weeds species, including Bridal Creeper, Alligator Weed, Lantana, Fireweed and African Olive	Completed	Most instances of these weeds have been removed from the RALP. Small instances of Fireweed occur, however these are being managed by the current weed remediation works within the RALP.
April 2020	Remove key and aggressive weed species within RALP, including Golden Wreath Wattle, Moth Vine, Castor Oil Plant, Small-leafed Privet, Grader Grass and Balloon Vine	Commenced	Grader Grass has been observed colonising remediated areas within the RALP. This species should be removed to prevent further colonisation and infestations. Golden Wreath Wattle, Moth Vine and Castor Oil Plant on the southern side of the RALP in the area between the operational boundary and the East Hills line rail corridor. Consideration should be given to the management of these areas to reduce encroachment into recently remediated areas.
June 2020	Planning should commence to revegetate soft batters and un-developed areas within the MPE operational facility with native species in accordance with the approved Urban Design and Landscaping Plan (Arcadis 2019a, Arcadis 2020)	Commenced	Revegetation has commenced for remediated areas using a hydro-mulch containing a seed palette commensurate with the UDLP (Arcadis 2020). Previous instances of native seed setting have been colonized by weed species within the RALP and should be cleared and re-set with a native seed mix as soon as practical.
December 2020	Exotic species, specifically *Medicago polymorpha* (Burr Medic), should be removed from grassland on either side of the RALP at its eastern extent, closest to the operational area.	Commenced	Targeted manual removal, including slashing, has been conducted for exotic species outside the RALP fencing. A qualified bush regeneration contractor should be used to avoid impacts on

Month of logging	Recommended action	Status (Not started, Commenced, Complete)	Comments
			native species. Strictly no herbicide should be used in this area, and works should not extend beyond the RALP construction envelope. Where possible, contractors should not access/pass through adjacent areas.
December 2021	Collect litter scattered through the RALP and in adjacent areas	Commenced	Litter remains in the RALP and adjacent areas.
December 2021	Control aggressive weed species Coolatai Grass and Paterson's Curse within the RALP	Commenced	New instances of aggressive weed species Coolatai Grass and Paterson's Curse within the RALP should be removed as soon as practicable to avoid the spread of these species into ecologically sensitive areas adjacent to the RALP.
February 2022	Continued targeted slashing of woody and herbaceous weeds within the RALP.	Completed	Majority of large woody weeds have been removed from the RALP. Continue regular slashing of large woody weeds to remove the fertile seed head and discourage further germination of these weeds within the RALP should occur.
December 2022	Prioritise weed remediation works for priority and key weed species which have experienced accelerated growth in recent months.	Commenced	Areas of particularly high biomass of priority and key weed species should be prioritised for weed remediation works in coming months to avoid mass seeding events.
	Begin remediation of soft batters which have slipped following extreme rainfall events in recent weeks	Not started	Areas within the operational facility, including a number of areas within the RALP, require urgent batter remediation in areas of batter slipping.
December 2022	Begin weed remediation of gravel and ballast areas along RALP	Commenced	Removal of all vegetation in gravel and ballast areas due along RALP using slashing and

Month of logging	Recommended action	Status (Not started, Commenced, Complete)	Comments
			herbicide due to safety concerns of train operators and prevent spread of weeds.
December 2022	Continue weed remediation works along the soft batters within the RALP.	Commenced	Future weed remediation works should include targeted slashing and spraying of priority and key weed species, whilst avoiding native species by hand weeding within a one metre buffer zone of native individuals.
February 2023	Continue weed remediation works along the soft batters within the RALP beyond Georges River bridge.	Commenced	Future weed remediation works should include targeted slashing and spraying of priority and key weed species, whilst avoiding native species by hand weeding within a one metre buffer zone of native individuals.
April 2023	No weed remediation has occurred since February 2023. Expected to recommence in June 2023, in same areas that have previously been remediated.	Commenced	Future weed remediation works should include targeted slashing and spraying of priority and key weed species, whilst avoiding native species by hand weeding within a one metre buffer zone of native individuals.
June 2023	Continue weed remediation works along the soft batters within the RALP	Commenced	Future weed remediation works should include targeted slashing and spraying of priority and key weed species, whilst avoiding native species by hand weeding within a one metre buffer zone of native individuals.
December 2023	Toolijooa Environmental Restoration inducted as primary weed control contractors. Weed remediation recommenced throughout the RALP	Commenced	Future weed remediation works should include targeted slashing and spraying of priority and key weed species, whilst avoiding native species by hand weeding within a one metre buffer zone of native individuals.

APPENDIX E REMEDIATION PROGRESS PHOTOGRAPHS

April 2021	December 2023	October/November 2025
		
April 2021	December 2023	October/November 2025

		
April 2021	December 2023	October/November 2025
April 2021	December 2023	October/November 2025

April 2021	December 2023	October/November 2025
April 2021	December 2023	October/November 2025

April 2021	**December 2023**	**October/November 2025**

APPENDIX F FLORA SPECIES INVENTORY

Scientific name	Common name	Exotic	Priority/key weed
Acacia falcata	Hickory Wattle		
Acacia parramattensis	Parramatta Wattle		
Acacia saligna	Golden Wreath Wattle	*	
Alternanthera philoxeroides	Alligator weed	*	Priority
Alternanthera pungens	Khaki Weed	*	
Araujia sericifera	Moth Vine	*	
Asparagus asparagoides	Bridal Creeper	*	Priority
Atriplex semibaccata	Creeping Saltbush		
Austrodanthonia spp.	-		
Avena spp.	Oats	*	
Bidens pilosa	Cobbler's Pegs	*	
Brassica rapa	Field Mustard	*	
Briza maxima	Quaking Grass	*	
Briza minor	Shivery Grass	*	
Cenchrus clandestinus	Kikuyu Grass	*	
Centaurium spp.	-	*	
Chloris gayana	Rhodes Grass	*	Key
Chloris truncata	Windmill Grass		
Cirsium vulgare	Spear Thistle	*	
Convolvulus erubescens	Pink Bindweed		
Conyza bonariensis	Flaxleaf Fleabane	*	
Cyclospermum leptophyllum	Slender Celery	*	
Cynodon dactylon	Common Couch		
Cymbopogon refractus	Barbed Wire Grass		
Cyperus eragrostis	Umbrella Sedge	*	
Daviesia ulicifolia	Gorse Bitter Pea		
Dichanthium sericeum	Queensland Bluegrass		
Dichondra repens	Kidney Weed		
Echium plantagineum	Paterson's Curse	*	Key
Eragrostis brownii	Brown's Lovegrass		
Eragrostis curvula	African Lovegrass	*	Key
Euchiton spp.	-		
Ficinia nodosa	Knobby Club-rush		
Foeniculum vulgare	Fennel	*	
Glycine clandestina	-		

Scientific name	Common name	Exotic	Priority/key weed
Hardenbergia violacea	False Sarsaparilla		
Hypochoeris radicata	Catsear	*	
Indigofera australis	Australian Indigo		
Juncus usitatus	-		
Lantana camara	Lantana	*	Priority
Lachnagrostis filiformis	Blown Grass		
Lactuca serriola	Prickly Lettuce	*	
Linum trigynum	French Flax	*	
Lolium perenne	Perennial Ryegrass	*	
Lomandra longifolia	Spiny-headed Mat-rush		
Lysimachia arvensis	Scarlet Pimpernel	*	
Ludwigia peruviana	Peruvian water primrose	*	Priority
Medicago polymorpha	Burr Medic	*	
Melilotus alba	Bokhara	*	
Melinis repens	Red Natal Grass	*	Key
Modiola caroliniana	Red-flowered Mallow	*	
Olea europaea subsp. cuspidate	African Olive	*	Priority
Paspalum dilatatum	Paspalum	*	
Persicaria decipiens	Slender Knotweed		
Phytolacca octandra	Inkweed	*	
Plantago lanceolata	Lamb's Tongues	*	
Portulaca oleracea	Common Purslane		
Rumex crispus	Curled Dock	*	
Senecio madagascariensis	Fireweed	*	Priority
Setaria parviflora	-	*	
Sida rhombifolia	Paddy's Lucerne	*	Key
Solanum nigrum	Black-berry Nightshade	*	
Solanum sisymbriifolium		*	
Sonchus oleraceus	Common Sowthistle	*	
Tagetes minuta	Stinking Roger	*	
Themeda quadrivalvis	Grader Grass	*	Key
Themeda triandra	-		
Trifolium arvense	Haresfoot Clover	*	
Trifolium repens	White Clover	*	
Trifolium michelianum	Bolansa Clover	*	
Verbena bonariensis	Purpletop	*	

Scientific name	Common name	Exotic	Priority/key weed
Verbena rigida var. Rigida	Veined Verbena	*	

Moorebank Intermodal Precinct

APPENDIX I – BTODR REPORTING

No attachments. To be submitted separately

Moorebank Intermodal Precinct

APPENDIX J – MPW OPERATIONS INCIDENT REGISTER

Report ID	ReportNarrative	Region	BranchName	ClubName	ManagerName	ManagerEmail	ManagerPhone	Parti_LoseMorning	Parti_LoseManagerEmail	Parti_LongestWait	Parti_LongestMin	Parti_IncidentType	Parti_SeatsInCar	Parti_SeatbeltStatus	Parti_SeatbeltLocation	Parti_SeatbeltCondition	Parti_SeatbeltNotes	Parti_IncidentDate	Parti_IncidentNarrative	Parti_VictimType	Parti_SeatbeltVictimFlag	Parti_SeatbeltVictimNotes	Parti_SeatbeltDamageDetails	Parti$_LodgedDate	Parti$_CompensationYes	Parti$_LiabilityAssessed	Parti$_RiskRating	Parti$_MonetaryYes	Parti$_VehicleYesNo	Parti$_VehicleMake	Parti$_VehicleYear	Parti$_VehicleFleetNo	Parti$_VictimWorkYes	Parti$_VictimAttendedYes	Parti$_VictimHospitalised	Parti$_VictimInjuryNotes	Parti$_VictimSeatbeltYes	Parti$_VictimAirbagYes	Parti$_EmployeeInvolvedYesNo
IR148002	01-Actions Completed	NSW	ASB Monasteria Ave, MOORREBANK (MOORREBANK (MUT Eleanor))	Knight Frank Facilities Response Centre	Mitch Casey	0451 916 500	mitch.casey@au.knightfrankcom	Steven Centacino	steven.centacino@au.knightfrankcom	10-Feb-25	2	Environmental	Medium	Male	No	10/02/2025 8:50	10/02/2025 8:56	Approx 8:55am - PSI observe fire on western side of Bushwalker Ave. Approx. 150-450m pasel FSC construction. FFA and trainee extinguish fire with fire extinguisher and buckets of water. Airport Services subsequently notified of fire. Between 8:45am - 8:55am - fire reignites and is once again extinguished by security via extinguisher. 8:55am - PSC asked to attend site by Airport Services. PSC arrive at 9:05am and observe fire is out. PSC observe Inland Safety Sys. Fire still smouldering - Knight Frankstaff security and water cart on site but fire again pop shut on 8 TRAINS equipment on shops business. TRAINS advised to formerly trig call on 000. TRAINS attended site between 9:15am - 9:45am and left shortly afterwards, advising that removal action taken was sufficient.												0-Feb-25	Major	Possible	High Risk	Incident Was Notifiable: Yes	Bow tomba identified in sand pit. Bow tomba was located 30-40m off the	Bow tomba identified in sand pit. Bow tomba was located 30-40m off the Security and maintenance staff were provided with extinguisher and again, when fire reignited water carts the fire was extinguished in once with FFC equipment by security. FRAINS advised of fire						Common Area
IR147548	01-Actions Completed	NSW	N1, Wall 400 Monasteria Ave, MOORREBANK (MOORREBANK (Warehouse N1 MHR West))	Knight Frank Facilities Response Centre	Mitch Casey	0451 916 500	mitch.casey@au.knightfrankcom	Steven Centacino	steven.centacino@au.knightfrankcom	12-Mar-25	3	Property Damage	Medium	Male	No	12/03/2025 9:50	12/03/2025 9:45	Please refer to email. "If we can please get some detail with our claim 12. It has been 10 by now of our drawcard. We will need it to be reported but for the time being please fill out the attached form. If you have any fear as, we are all under the warehouse. "	General Property Damage $1000+	12-Mar-25	Moderate	Possible	Medium Risk	Incident Was Notifiable: No	Refer to email attached.													Tenancy Area
IR146654	01-Actions Completed	NSW	N1, Wall 400 Monasteria Ave, MOORREBANK (MOORREBANK (Warehouse N1 MHR West))	Knight Frank Facilities Response Centre	Mitch Casey	0451 916 500	mitch.casey@au.knightfrankcom	Steven Centacino	steven.centacino@au.knightfrankcom	16-May-25	6	Property Damage	Low	Male	No	11/05/2025 15:15	11/05/2025 15:15	PSI Security attended site and were advised by the tenant, the TRAINS reported this alarm trip to be due to bathroom ait in Bedroom. Yet to receive billing advice from Premier.	Other/Tie Acemi only	25-May-25	Moderate	Possible	Medium Risk	Incident Was Notifiable: No													Tenancy Area
IR150259	01-Actions Completed	NSW	ASB Monasteria Ave, MOORREBANK (MOORREBANK (MUT Eleanor))	Knight Frank Facilities Response Centre	Steven Centacino	0451 283 275	steven.centacino@au.knightfrankcom	Steven Centacino	steven.centacino@au.knightfrankcom	2-Jun-25	7	Property Damage	Medium	Male	No	02/07/2025 8:45	02/07/2025 9:00	Call from Mat'dee Kasepowski and Bart Beesley reported a car accident on Bushwaker Ave. Car has struck off the road and into a wall. Single vehicle motor accident.	General Property Damage $1000+	2-Jun-25	Moderate	Possible	Medium Risk	Incident Was Notifiable: No													Common Area
IR150442	01-Actions Completed	NSW	ASB Monasteria Ave, MOORREBANK (MOORREBANK (MUT Eleanor))	Knight Frank Facilities Response Centre	Steven Centacino	0451 283 275	steven.centacino@au.knightfrankcom	Nihal Mukhthaal	nihal.mukhthaal@au.knightfrankcom	11-Jul-25	7	Property Damage	Medium	Male	No	29/06/2025 20:45	29/06/2025 23:45	Blue vehicle travelling north on Bushwaker Ave, witnessed speeding and loosing control.	General Property Damage $5 - $500, Other/Unsafe Driving	11-Jul-25	Moderate	Rare	Low Risk	Incident Was Notifiable: No													Common Area
IR150445	01-Actions Completed	NSW	N1, Wall 400 Monasteria Ave, MOORREBANK (MOORREBANK (Warehouse N1 MHR West))	Knight Frank Facilities Response Centre	Steven Centacino	0451 283 275	steven.centacino@au.knightfrankcom	Steven Centacino	steven.centacino@au.knightfrankcom	11-Jul-25	7	Property Damage	Medium	Male	No	11/07/2025 16:50	11/07/2025 17:00	Will settlement, three pulses of gravel were drifted allowing air to enter the office. Mtenkt have reported loss of window gaskets, however this is not the case.	General Property Damage $1000+ (Other/Settlement	11-Jul-25	Moderate	Rare	Low Risk	Incident Was Notifiable: No													Tenancy Area
IR152152	01-Actions Completed	NSW	ASB Monasteria Ave, MOORREBANK (MOORREBANK (MUT Eleanor))	Knight Frank Facilities Response Centre	Charlin Liyanaga	0489 293 931	Charlin.Liyanaga@au.knightfrankcom	Steven Centacino	steven.centacino@au.knightfrankcom	16-Sep-25	6	Environmental	Low	Male	No	16/09/2025 8:50	16/09/2025 8:56	An approximately 9:00 a.m. at MP West, an unauthorised protest rejoined a total weekly last stay and unmasked the trapped animal. The trap had been set by Paul Green from Natividad Invermedia expert of it total weekly monitoring.		16-Sep-25	Minor	Possible	Low Risk	Incident Was Notifiable: No													Common Area

Moorebank Intermodal Precinct

APPENDIX K – STORMWATER INFRASTRUCTURE

Moorebank Precinct West – WSUD Independent Audit

Report Prepared for:
Department of Planning, Housing & Infrastructure

November, 2025
Project No. 255

Prepared by:
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Document Information

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Mark Howley			20/10/25	PDF		
					10/11/25	PDF

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EXECUTIVE SUMMARY

Sustainability Workshop Ltd was engaged to carry out an independent audit of the operation of the water quality management elements of Moorebank Precinct West (MPW) Stage 2 which currently includes the following constructed warehouses:

- Warehouse N1 Maersk Logistics & Services Australia Pty Ltd
- Warehouse N2 Sydney Tools Pty Ltd
- Warehouse N3 TBA (not yet operational)
- Warehouse N4 TBA (not yet operational)Warehouse 5 Primary Connect – Moorebank Regional Distribution Centre (MoRDC)
- Warehouse 6 Primary Connect – Moorebank National Distribution Centre (MoNDC).

All other warehouses are not yet constructed, for example the southern warehouses. Refer to Attachment 1 which shows the latest map of the site.

Moorebank Precinct West (MPW) Stage 2 was approved under State Significant Development (SSD) 7709. The Stormwater Infrastructure Operation and Maintenance Plan (SIOMP) is a sub-plan to the Operational Environmental Management Plan (OEMP) and has been developed to address the requirement of MPW Stage 2 (SSD 7709) Conditions of Consent (CoC) B36 prior to the commencement of operation.

This audit was carried out to satisfy consent (CoC) B37, which requires an annual audit of the stormwater quality system to be undertaken by a suitably qualified professional and requires the independent auditor to:

1) Verify the condition of the treatment systems
2) Verify and document that the systems are working as intended
3) Verify the systems have been cleaned adequately
4) Verify there is no excessive build up of material
5) Identify any rectification issues required for the systems to adequately perform its intended function.

A site meeting followed by an inspection of the stormwater assets included in the scope of the audit was undertaken on the 10th September, 2025.

Prior to the site meeting a link to applicable maintenance records was provided.

The audit finds that:

1) In general, the WSUD infrastructure is being maintained in accordance with CoC B36.
2) At the time of the audit, OSD 5,6 and 8 were in a stage 2 (sacrificial) state and operational. These are serviced by gross pollutant traps (GPTs).

3) Only one of these GPTs is directly accessible by an eductor (sucker) truck and this makes maintenance more difficult and more expensive due to the extra time it takes to carry and connect additional 150mm (heavy) suction hose. It appears it is too late to rectify this.

4) We note the condition of the systems are currently in a sacrificial/temporary state. This means the OSD/bioretention basins are not in their final state (by design) due to the on-going construction and higher sediment loads being produced.

5) The batters of the OSD basins are not vegetated and therefore suffering erosion. If this is not rectified it will get worse over time. It is suggested that grass at the base of the batters is left longer to provide some vegetative buffering until vegetation is established on the bater slopes. There is evidence that significant sediment has been deposited within the basin and then removed.

6) There is a sacrificial layer of turf in the basins. Although there was good grass coverage across the floor of the basins, only the perimeter of this appears to be mown while the grass over the bio-cells is left longer. This appears to be having the effect of preventing water from being distributed across the bio-cells where it can infiltrate down through the media. A more consistent mowing approach would help to improve the distribution of water across the surface and arguably would result in better water quality outcomes.

7) I find that it is in fact very likely that the constructed elements of the system are working as intended to deliver best practice WSUD.

8) The systems are being cleaned and maintained so they remain functional, and the maintainer has a good understanding of the systems.

9) A check of Bureau of Meteorology data reveals there were no days with greater than 100mm of rainfall within the audit period.

10) No excessive build-up of material is evident and I have seen evidence of good cleaning practice to remove deposited material.

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1.0 INTRODUCTION

1.1. Project Overview

Sustainability Workshop was engaged to carry out an independent audit of Moorebank Precinct West (MPW) Stage 2 Water Sensitive urban Design. Approval for works was issued under State Significant Development (SSD) 7709.

The project is a large transport and industrial land development located east of the Georges River. Moorebank Precinct West (MPW) Stage 2 currently includes Warehouses :

- Warehouse N1 Maersk Logistics & Services Australia Pty Ltd
- Warehouse N2 Sydney Tools Pty Ltd
- Warehouse N3 TBA (not yet operational)Warehouse N4 TBA (not yet operational)
- Warehouse 5 Primary Connect – Moorebank Regional Distribution Centre (MoRDC)
- Warehouse 6 Primary Connect – Moorebank National Distribution Centre (MoNDC).

All other Warehouses in Precinct West are under construction or in the planning phase.

This Audit report focuses only on stormwater quality infrastructure and the operation and maintenance thereof.

From a stormwater quality perspective, large industrial areas shed high volumes of stormwater. The stormwater can be contaminated with various pollutants in both particulate and dissolved forms, notably zinc from roofs.

The design development process responded to several consent conditions which required that the proponent comply with what is commonly termed "best practice" stormwater management. That is, assuming that stormwater treatment assets were designed and constructed to best practice then it would be reasonable to expect a best practice outcome.

That outcome is defined in terms of pollutant removal fractions for total suspended solids, total phosphorus and total nitrogen. An approved stormwater system was modelled using MUSIC which is a widely adopted water quality model, design drawings prepared and approved and construction of various elements serving the warehouses undertaken.

It is deemed appropriate to rely on the condition assessment of the stormwater treatment assets, together with other evidence, such as maintenance log books and defects works to form an opinion of the performance of the system. In summary, we are relying on the best practice nature of stormwater management systems to indicate best practice performance.

On practical completion, built assets are handed over to the site manager which is Knight Frank. Knight Frank has engaged a contractor, MID Plumbing to both help identify defects during a defects liability period (and to carry out rectification works where approved) as well as to undertake routine maintenance of the stormwater assets.

A stormwater infrastructure operation and maintenance plan (SIOMP), was required and approved by DPIE and prepared by the proponent, SIMTA. The SIOMP identified the routine and non-routine maintenance activities required for the various stormwater assets including water quality assets such as GPT gross pollutant traps and bioretention basins.

We note that maintenance log books have been prepared to align with the specific actions included in the SIOMP.

1.2. Approval Requirements

MPW STAGE 2 SSD 7709 condition of consent (CoC) B37 requires an annual independent audit.

1.3. Audit Team

The audit of the water quality elements of the MPW Stage 2 site was undertaken by Mark Liebman, CPEng, MIEAust. Mark has over 25 years water quality management experience. He co-authored the design guides, notably the Blacktown City Council Water Sensitive Urban Design Standard Drawings which were used as reference guides for the design of the MPE Stage 2 site.

Mark is also an independent evaluator used by Stormwater Australia to assess the water quality performance of stormwater treatment devices against the newly released stormwater quality improvement device evaluation protocol (SQIDEP). Mark has also undertaken numerous evaluations of stormwater quality improvement devices for Blacktown Council which are relied on by numerous other Council's including Liverpool City Council.

Mark is suitably qualified and has demonstrable experience in WSUD.

1.4. Audit Objectives

The audit objective is to satisfy State Significant Development, condition of consent B37.

1.5. Audit Scope

Moorebank Precinct West (MPW) Stage 2 was approved under State Significant Development (SSD) 7709 .

The scope of this report includes Moorebank Precinct West (MPW) Stage 2. This includes review of OSD basins 5, 6 and 8.

Condition B37 specifically requires the independent auditor to:

1) Verify the condition of the treatment systems
2) Verify and document that the systems are working as intended
3) Verify the systems have been cleaned adequately
4) Verify there is no excessive build up of material
5) Identify any rectification issues required for the systems to adequately perform its intended function.

2.0 AUDIT METHODOLOGY

2.1. Audit Process

The Independent Audit was conducted in a manner consistent with AS/NZS ISO 19011.2019 – Guidelines for Auditing Management Systems and the methodology set out in the Department's IAPAR. An overview of the audit activities, as specified in AS/NZS ISO 19011, is presented in Figure 1.

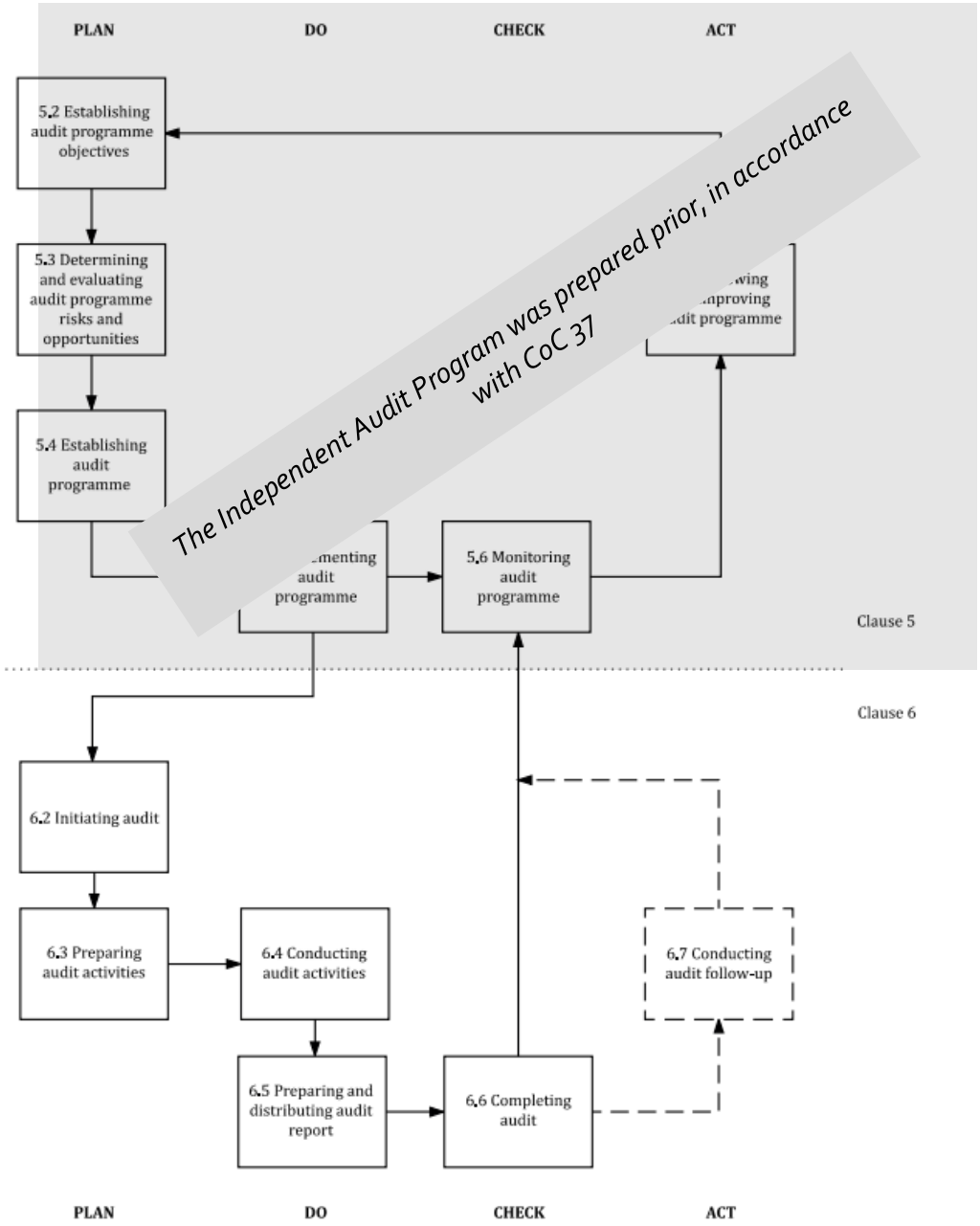

Figure 1 Audit activities overview (modified from AS/NZS ISO 19011). Subclause numbering refers to the relevant subclauses in the Standard.

2.2. Audit Process Detail

2.2.1. Initiation and Scope Development

Prior to the audit we confirmed the scope of the audit and inspected the site to gauge the level of complexity of the audit.

2.2.2. Preparation

Prior to the audit a number of documents were reviewed including:

- *Stormwater Infrastructure Operation and Maintenance Plan, Moorebank Intermodal Precinct – West Precinct Stage 2, November 2024, Rev 04.*

2.2.3. Site Personnel involvement

The on-site audit activities took place on 10th September, 2025. The following personnel took part in the audit:

- Mark Liebman – WSUD Auditor – Sustainability Workshop
- Mark Cugola – Director – MID Plumbing with an ecologist from Apical (Daniel Anderson)
- Baz Richards – Landscape Architect - Sustainability Workshop
- Mark Howley – Senior Project Manager – Tactical
- Matthew Kim – Project Manager - Tactical

2.2.4. Meetings

The on-site audit activities took place on 10th September, 2025.

2.2.5. Interviews

A brief formal interview was undertaken on the 10th September, 2025 with Mark Cugola from MID Plumbing and this occurred throughout the site inspection.

2.2.6. Site Inspection

A site inspection was undertaken on the 10th September, 2025 following the audit meeting. The site inspection involved:

1) Viewing GPT locations upstream of each basin
2) Viewing OSD 5
3) Viewing OSD 6
4) Viewing OSD 8 and its outlet to George's River

2.2.7. Document Review

Following the site inspection, a number of documents have been reviewed including:

- *Stormwater Infrastructure Operation and Maintenance Plan, Moorebank Intermodal Precinct – West Precinct Stage 2, November 2024, Rev 04.*
- *SSD7709 Consolidated Consent on the NSW Major Projects Planning Portal.*
- *Maintenance logbooks and photographic evidence prepared by MID Plumbing dated:*
  - *July 2024 – Maintenance logbook report (annual) and photographic evidence*
  - *October 2024 – Maintenance logbook report (quarterly) and photographic evidence and stormwater water quality monitoring data and reporting*
  - *January 2025 – Maintenance logbook (6 monthly service) and photographic evidence*
  - *February 2025 - Maintenance logbook (quarterly) report and photographic evidence*
  - *April 2025 – Maintenance logbook report (quarterly) quotation for maintenance works and photographic evidence and stormwater water quality monitoring data and reporting*
  - *May 2025 – monthly photo record*
  - *August 2025 – Maintenance logbook report (annual) including GPT service log sheets, photographic evidence*

2.2.8. General Audit Findings

Independent Audit findings were based on verifiable evidence. The evidence included:

- relevant records, documents and reports
- interviews of relevant site personnel
- photographs
- figures and plans; and
- site inspections of relevant locations, activities and processes.
- Discussion with the Maintenance Contractor.

2.2.9. Compliance Evaluation

The Auditor determined the compliance status of each compliance requirement in the Audit Table, using the descriptors from Table 2 of the IAPAR, being:

- **Compliant** – The Auditor has collected sufficient verifiable evidence to demonstrate that all elements of the requirement have been complied with within the scope of the audit.
- **Non-compliant** – The Auditor has determined that one or more specific elements of the conditions or requirements have not been complied with within the scope of the audit.

- **Not triggered** – A requirement has an activation or timing trigger that has not been met at the time when the audit is undertaken, therefore an assessment of compliance is not relevant.

Observations and notes may also be made to provide context, identify opportunities for improvement or highlight positive initiatives.

2.2.10. Completing the Audit

The Independent Audit Report was distributed to the proponent to check factual matters and for input into actions in response to findings (where relevant). The Auditor retained the right to make findings or recommendations based on the facts presented.

3.0 FINDINGS

3.1. Documents Audited

The SIOMP (Rev 3, 31/05/23) defines various maintenance actions and their associated frequencies. These have been documented in various tables in the SIOMP.

Each of these actions has been copied into a corresponding maintenance action within the maintenance logbooks which are completed and submitted quarterly by MID Plumbing in accordance with the quarterly reporting requirements of the SIOMP.

The maintenance log books have been audited for completeness by both verifying that all activities noted in the SIOMP have been correctly translated into the maintenance log books and then by verifying that all activities scheduled have been completed according to the log book.

3.2. Evidence Sighted

Difference sources of evidence have been sighted including:

1) Completed maintenance log books.
2) Evidence of contractor engagement viewed within the log books from photos included within them – generally the photos were within separate documents but locations and images readily identifiable.
3) Evidence of contractor engagement to carry out GPT maintenance from photos included in the log books and also separately via evidence of a contractor receipt.
4) Evidence of contractor maintenance reported within the log books for the bioretention basins including quotes for rectification works.
5) Visual inspections undertaken during the site – notably OSD Basin 5, OSD basin 6 and OSD basin 8.

At no time were any confined spaces entered. It is noted the GPT units are defined as confined spaces. The lids of the GPT units was not lifted and so the internal condition of the units cold not be determined during this audit. However clear photographic evidence was provided of the units under maintenance.

3.1. Compliance with Audit Objectives

CoC B37 requires the independent auditor to:

1) Verify the condition of the treatment systems within the scope
2) Verify and document that the systems are working as intended
3) Verify the systems have been cleaned adequately
4) Verify there is no excessive build up of material

Table 1 to 4 summarise the audit findings with respect to each of these requirements.

Table 1 Verification of the condition of the treatment systems within the scope

Asset Type	Details of item
OSD Basin 5	The condition of OSD Basin 5 was found to be in a sacrificial/ temporary state. Vegetation cover within the base of the basin is good. Weed removal had taken place. There was no litter debris within the basin. Jute mesh had been placed around batter slopes which have not been planted and there was evidence of embankment erosion, which is concerning as these are large basins. Minimal sediment was present on the surface of the basin. We have viewed photos of maintenance activities.
OSD Basin 6	The condition of OSD Basin 6 was found to be in a sacrificial/ temporary state. Vegetation cover within the base of the basin is good. Weed removal had taken place. There was no litter debris within the basin. Minimal sediment was present on the surface of the basin.
OSD Basin 8	The condition of OSD Basin 8 was found to be in a sacrificial/temporary state. Vegetation cover within the base of the basin is good. Weed removal had taken place. There was no litter debris within the basin. Minimal sediment was present on the surface of the basin.
GPT units	Condition 37 requires the condition of the water quality management infrastructure assets to be determined. In order for this to be determined inspection of open GPT units needs to be undertaken. We note there was not an opportunity for the independent auditor to assess the condition of the GPT units. It has been observed that the GPTs have been maintained twice during the audit period (July 2024 and January 2025) – this is in accordance with best practice. It has been reported that 100.44 tonnes of wet weight material was removed and disposed from all GPTs including: ODD 5 – 21.98 tonnes OSD 6 – 43 tonnes OSD 8 – 35.46 tonnes We have viewed before and after photos of the GPTs maintenance.

Table 2 Verify and Document the System is Working as intended

Asset Type	Details of item
OSD Basin 5	It appears that OSD Basin 5 is working as intended. The discharge point from the basin appears clear and in good condition which indicates the basins are working as intended.
OSD Basin 6	It appears that OSD Basin 6 is working as intended. The discharge point from the basin appears clear and in good condition which indicates the basins are working as intended.
OSD Basin 8	It appears that OSD Basin 8 is working as intended. The discharge point from the basin appears clear and in good condition which indicates the basins are working as intended.
GPT units	A total of 100.44 tonnes of wet weight material was removed from the units and they are working as intended.

Table 3 Verification the Systems have been cleaned adequately

Asset Type	Details of item
OSD Basin 5	We verify OSD Basin 5 to have been thoroughly cleaned. Surrounding roads were clean and well managed. Building sites had sediment and erosion control in place.
OSD Basin 6	We verify OSD Basin 6 to have been thoroughly cleaned. Surrounding roads were clean and well managed. Building sites had sediment and erosion control in place.
OSD Basin 8	We verify OSD Basin 8 to have been thoroughly cleaned. Surrounding roads were clean and well managed. Building sites had sediment and erosion control in place.
GPT Units	Based on the maintenance log books together with additional evidence that the GPT units have been cleaned adequately as required by the SIOMP. Cleaning of the GPTs twice per annum, as is occurring, is best practice. 100.44 tonnes of material was collected from the GPTs.

Table 4 Verification there is no excessive build up of material within the systems

Asset Type	Details of item
OSD Basin 5	We verify that there is no excessive build up of material within the system.
OSD Basin 6	We verify that there is no excessive build up of material within the system.
OSD Basin 8	We verify that there is no excessive build up of material within the system.
GPT units	We verify that there is no excessive build up of material within the units (based on the evidence presented and not based on a visual inspection of the GPTs as one was not undertaken due to confined spaces entry requirements.

3.2. Non-compliance, Observations and Actions

No non-compliances were detected.

This section including Table 5, presents observations from the Independent Audit. Actions are also presented in the table.

Table 5 Condition of consent B37 Audit findings and actions

Type	Details of item	Proposed or completed action	By whom and by when	Status
Observation	Grass cutting at OSD 5 has resulted in the borders being mown while the centre is unmown. This may be restricting the entry of water into the centre of the cells and reducing the volume of storage of the bioretention basin. It is noted we were unable to walk into the centre of the basin on the day of the site inspection due to wet weather. It may be that the longer grass in the centre is not at all precluding flows from entering the centre of the basin.	Grass cutting in centre of basin could further improve distribution of water across the basin. It is appreciated that longer grass would typically result in better water quality, in this context it may be resulting in reduced filtration prior to overflow occurring.	Maintenance Contractor	

	Distribution system at OSD 5 could be improved.			
Observation	Lack of vegetation on the sides of OSD Basin 5 will lead to ongoing erosion and deposition of silts and sands on the floor of the basin, especially in the distribution channel. This poses a risk of clogging the underlying transition drainage layer.	Ongoing monitoring and repairs during the sacrificial stage with work to establish a vegetated cover of the batter in accordance with design drawings. It is appreciated this batter could be disturbed during the final stage 3 phase where the sacrificial grass is removed and replaced with permanent vegetation.	Maintenance Contractor	
Observation	It is unknown what strength subsoil drainage pipes have been installed in the basins. This should be investigated prior to the final stage 3 conversion when it is almost certain due to the size of these basins that larger machinery will be working on the basins. There is therefore a risk of the subsoil pipes being crushed during construction.	A load limit for machines operating on the basins when they go through their final conversion should be investigated and managed to ensure subsoil pipes are not damaged.	Tactical or relevant PM or design manager.	

3.3. Rectification Measures

Appendix A includes a number of site photos.

We note we were unable to observe GPT units and so can't recommend any rectification measures beyond those already identified by MID Plumbing.

3.3.1. Bioretention basins (OSD 5,6 and 8)

The following rectification measures are recommended for the bioretention basin within OSD 5, OSD6 and 8:

1) Basin batters be topsoiled and vegetated in accordance with landscaping plans.
2) Basin 5 – more consistent mowing would allow for better distribution of the water across the grass cells in this large basin. There mowing more than the edges is recommended.

3.3.2. Water Quality Sampling

Technically, according to the SIOMP, only the outlets of the OSD basin need to be sampled. Refer to Section 4.1. Currently both inlet and outlet appear to be sampled. This is beneficial and would provide an opportunity to demonstrate some improvement in water quality between inlet and outlet if comparison tables were included in the water quality report.

I have reviewed water quality sample results and make the following observations:

1) Apical have sampled up and downstream of each basin. The SIOMP require sampling of the OSD basin outlets as well as upstream of the whole site and downstream of the site on the Georges River.
2) PFAS has been detected in basin outflows at levels exceeding default trigger values. This is surprising and could be an indication of previous undetected contamination of the site. It is beyond the scope of this audit to recommend further action except to recommend that professional advice is obtained to determine if this triggers a requirement for a site investigation in accordance with SIOMP (refer to Section 4.1 in the SIOMP) which requires a comparison of the analyte upstream and downstream of the site. This information may not have been presented in the Apical Report (it may not have been in their scope of works).
3) All other water quality indicators generally appeared to be good. Minor exceedances of default trigger values is not unexpected and as above, it is recommended that a comparison of the upstream (upstream of the site on the Georges River) and downstream water quality analytes on the Georges River is undertaken. It is quite possible that upstream water quality is worse than basin discharges.
4) The SIOMP requires 19 standard metals to be tested – only 8 are reported by Apical.
5) Apical is using DTVs for lowland rivers rather than the trigger values stipulated in the SIOMP.
6) It would be very helpful if the water quality reports could include a table of results comparing inlet and outlet results (for each OSD) so it can be seen if the basins are removing pollution.
7) There is no merit in obtaining dry weather grab samples. All sampling of basin inlet and outlet should be during wet weather. Dry weather samples are not representative of basin outflow.

CONCLUSIONS

We conclude that the development is, in all probability, complying with COC B36 and that the constructed stormwater systems are working as intended and are being maintained and cleaned. They are free from excessive build-up of material. Based on site observations of the outlets, we found no visual evidence of sediment build up, and the water quality at the Georges River discharge point, we did observe, did not appear to be impacted at all despite it being substantially wet on the day of the site inspection.

Three observations have been made during this audit though we find no evidence of non compliance with COC B36.

Two rectification measures have been included in this report and Sustainability Workshop would be happy to discuss these further. The recommendations are largely based on the assumption that a reduced life cycle cost is an operational objective

We commend ESR, Tactical, MID Plumbing (including Apical) and Knight Frank for their on-going work in establishing the site in accordance with stormwater quality best practice management.

Appendix A
Site Inspection Photos

Photo	Description
	OSD 5 showing signs of erosion on basin sides due to lack of vegetation and a well vegetated basin floor. The photo also shows how the mowing regime may prevent water from flowing into the centre of the cells. Rather it is distributed around the basin perimeter which is likely to be getting a higher hydraulic loading.

	OSD 5 Poor vegetation coverage in places. Some sediment in the distribution pipeline most likely from erosion of the batter.
	OSD 5 Basin outlet structure with rock armouring.

	OSD 8 No topsoil or vegetation on the batters of the basins.
	OSD 8 Water quality at outlet does not appear to be impacting the George's River.

	OSD 6 showing batters without topsoil or vegetation.
	OSD 8 Sacrificial state with HDPE lined batters and pump out operation from the adjacent sediment basin into the biocells. This basin also perimeter mowing with an appearance of diminished flow directed to centre of basin.

Attachment 1
SIOMP Features Map

Moorebank Intermodal Precinct

APPENDIX L – ARTIFICIAL HOLLOW MANAGEMENT

Artificial hollow management strategy

Moorebank Intermodal Precinct

November 2025

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1 Overview

The Moorebank Intermodal Precinct (MIP) is located in the Liverpool Local Government Area (LGA), 27 kilometres south-west of the Sydney central business district. Native vegetation and threatened species habitat required removal to facilitate development of the MIP and its various components including an import and export terminal connected to the South Sydney Freight Line (SSFL), warehousing and associated infrastructure. Impacts to biodiversity was assessed through the preparation of ecological impact assessments for the various development applications.

Although impacts to biodiversity was assessed through these impact assessment and offsets ultimately delivered, state Conditions of Consent and the Commonwealth Conditions of Approval identified a requirement to compensate for removal of tree hollows. The requirement for tree hollow replacement with artificial hollows (nest boxes) was stepped out and described in a Nest Box Strategy (NBS) (CPB 2017) prepared as a component of the Construction Flora and Fauna Management Pan for the initial stages of the development in 2017.

To compensate for the removal of 108 tree hollows from the MIP development a total of 247 nest boxes were installed within native bushland areas which fringe the development to the east (Bootland) and to the west (Georges River Corridor).

Since installation, annual monitoring surveys have been undertaken to review the effectiveness of the artificial hollows (nest boxes) and provide management recommendations to ensure nest boxes remain functional and do not endanger fauna. Overtime, the number of functional nest boxes has gradually decreased despite yearly efforts to repair and re-install boxes identified as dysfunctional during monitoring surveys. In the near future it is likely that considerably more of the nest boxes at MIP will become dilapidated and will require decommissioning.

A revision and update to the NBS is being undertaken by Arcadis on behalf of ESR (property owner) to:

- Outline ESRs obligatory requirement to maintain tree hollow offsets (artificial hollows) as owners of the MIP facility.
- Revise the strategy for replacing nest boxes as they are decommissioned, so that replacement artificial hollows are installed in optimum locations, utilise current technologies and best practice methods, and are most suitable to the target species.
- Provide recommendations to increase the longevity and accessibility and provide solutions to increase the management a monitoring efficiency of artificial hollows.

It is intended that this Artificial Hollow Management Strategy, once approved by the NSW Planning Secretary (or alternate as appropriate), will supersede the NBS (CPB 2017) and provide direction to ESR going forward for how artificial hollows will be managed across MIP to maintain the required tree hollow offset.

1.1 Requirement for offsetting

Nest boxes have been installed to compensate for the loss of tree hollows which were removed during vegetation clearing which occurred across the MIP to facilitate development. The requirement to offset tree hollows, which were progressively removed across the MIP development site, was identified in the state Conditions of Consent (CoC) (SSD 6766; SSD 5066) for the various stage of the and the overarching Commonwealth Conditions of Approval (CoA) (2011/6229).

A Nest Box Strategy (NBS) (CPVB 2017) was developed to identify the requirements for offsetting within the project CoC and CoA and describe how nest boxes would be installed at MIP. The main conditions which relate to the offsetting tree hollows as identified in the NBS is summarised in Table 1-1.

Table 1-1. Conditions relevant to installation and monitoring of nest boxes within MIP

Approval document	Condition	Description
EPBC Approval No. 2011/6229:	Annexure A - mitigation measures: 7.4.1.3 n	*Consider installation of nest boxes in woodland vegetation in the rail corridor that may offer alternative nesting habitat to hollow dependent species recorded in the study area.*
SSD 6766	E34 d) (ii) (b) clearing procedures (including nest box plan) within	*The identification of areas to be cleared and details of management measures to avoid residual habitat damage or*

Approval document	Condition	Description
	Table 1 Ministers Conditions of Consent	*loss and to minimise or eliminate time lags between the removal and subsequent replacement of habitat such as:* *clearing procedures (including nest box plan)*
	Final compilation of mitigation measures: 8C	*A nest box management strategy will be prepared prior to clearing hollow-bearing trees. The strategy will inform the installation of nest boxes in retained native vegetation in the riparian corridor of the Georges River and the woodland in the Southern Bootland and the ongoing monitoring and maintenance of nest boxes through the construction and operational phases.*
SSD 5506	Condition D21 (d) (ii) (d)	*The identification of areas to be cleared and details of management measures to avoid residual habitat damage or loss and to minimise or eliminate time lags between the removal and subsequent replacement of habitat such as:* *clearing procedures (including nest box plan)*

The NBS (CPB 2017) identified that a *"minimum offset ratio of 1:1 is typical on infrastructure projects, however based on the very small number of hollows to be removed, a ratio of 2:1 has been implemented on this project."* Further development at MIP, following preparation of the NBS required the removal of additional hollow-bearing trees bring the total number of hollows impacted across MIP to 108. A breakdown of the number of tree hollows removed for the various developments which make up the MIP is summarised in Table 1-2.

Table 1-2. Tree hollows removed by the Moorebank Intermodal Precinct project

Development component	Impacts to hollow-bearing trees
Import Export Terminal (IMEX)	25 hollows were identified across 13 hollow-bearing trees.
Rail Access Link Package (RALP):	33 hollows were identified across 30 hollow-bearing trees.
Precinct East Demolition Remediation (PEDR)	50 hollows across 39 hollow-bearing trees.

It was identified in an addendum (Biosis 2017) to the NBS that: *"Given the larger number of tree hollows to be removed… the minimum offset ratio of 1:1 of nest boxes per hollow removed should be applied. The higher offset ratio of 2:1 is only recommended where very few hollows are to be removed."*

As such, the requirement to offset the removal of 108 tree hollows is installation and maintenance of 108 nest boxes at the Moorebank Intermodal Precinct.

The NBS stipulated that the design of artificial hollows be suitable for the following threatened species identified as having potential to occur in the biodiversity impact assessments conducted for the various development approvals at the precinct:

- Barking Owl (*Ninox connivens*)
- Brown Treecreeper (Eastern subspecies) (*Climacteris picumnus* subsp. *victoriae*)
- Gang-gang Cockatoo (*Callocephalon fimbriatum*)
- Little Lorikeet (*Glossopsitta pusilla*)
- Eastern Pygmy-possum (*Cercartetus nanus*)
- Squirrel Glider (*Petaurus norfolkensis*).

It should be noted that only Little Lorikeet was confirmed to use the site during targeted surveys.

The artificial hollows were to be managed in perpetuity, ensuring they are maintained to a high standard and provide long lasting habitat for threatened species.

1.2 Implementation of the Nest Box Strategy

A total of 247 nest boxes were recorded by Arcadis during the first monitoring event undertaken in spring 2018. The presence of 247 nest boxes indicates that tree hollow removal was offset at a ratio of 2.3 nest boxes per hollow removed, which exceeds the conservative ratio of two artificial nest boxes for each hollow removed (2:1)

recommended in the NBS. There are no project documents which explain why more than the recommended number of 108 nest boxes (Biosis, 2017) were installed.

The 247 nest boxes were installed across two locations adjoining the MIP, which were later included in the Moorebank biobanks site under Biodiversity Agreement (BA 341). These locations comprised the Georges River Corridor (termed Moorebank offset area in BA 341) and within the Bootland (termed Wattle Grove offset area in BA341). Installation in these locations aligned with the recommendations of the NBS (CPB 2017). A description of these areas and the nest boxes that were installed has been summarised in Table 1-2.

Table 1-3. Installation locations for artificial hollows

Location	Description
Georges River Corridor (Riparian Corridor)	The Georges River Corridor is comprised of a narrow, linear strip of bushland that extends for approximately three kilometres, alongside the MPW project. This vegetation is within the Moorebank offset area. A total of 195 nest boxes have been installed in this area, including a mix of boxes designed for microbats, small, medium and large arboreal mammals, small birds, parrots, cockatoos and owls.
Bootland (Wattle Grove offset area)	The Bootland is located to the east of the MIP site. It is comprised of relatively intact native vegetation, providing potential habitat for several hollow dependant fauna species. A total of 52 nest boxes have been installed in this area, including a mix of boxes designed for microbats, small, medium and large arboreal mammals, small birds, parrots, cockatoos and owls. The southern Bootland was recently burned by intense bushfires and this vegetation is currently regenerating.

Since the initial monitoring survey (2018) there has been a reduction in the number of functional nest boxes across the site from 247 to 187 due to deterioration and decommission for various reasons (Arcadis 2025). There have also been some changes to the location of nest boxes along the Georges River Corridor and within the Bootland due to nest boxes being re-located from the impact area of MIP and the more recently the Moorebank Avenue Realignment project. A map showing the current locations of the 187 functional nest boxes is shown in Figure 1-1.

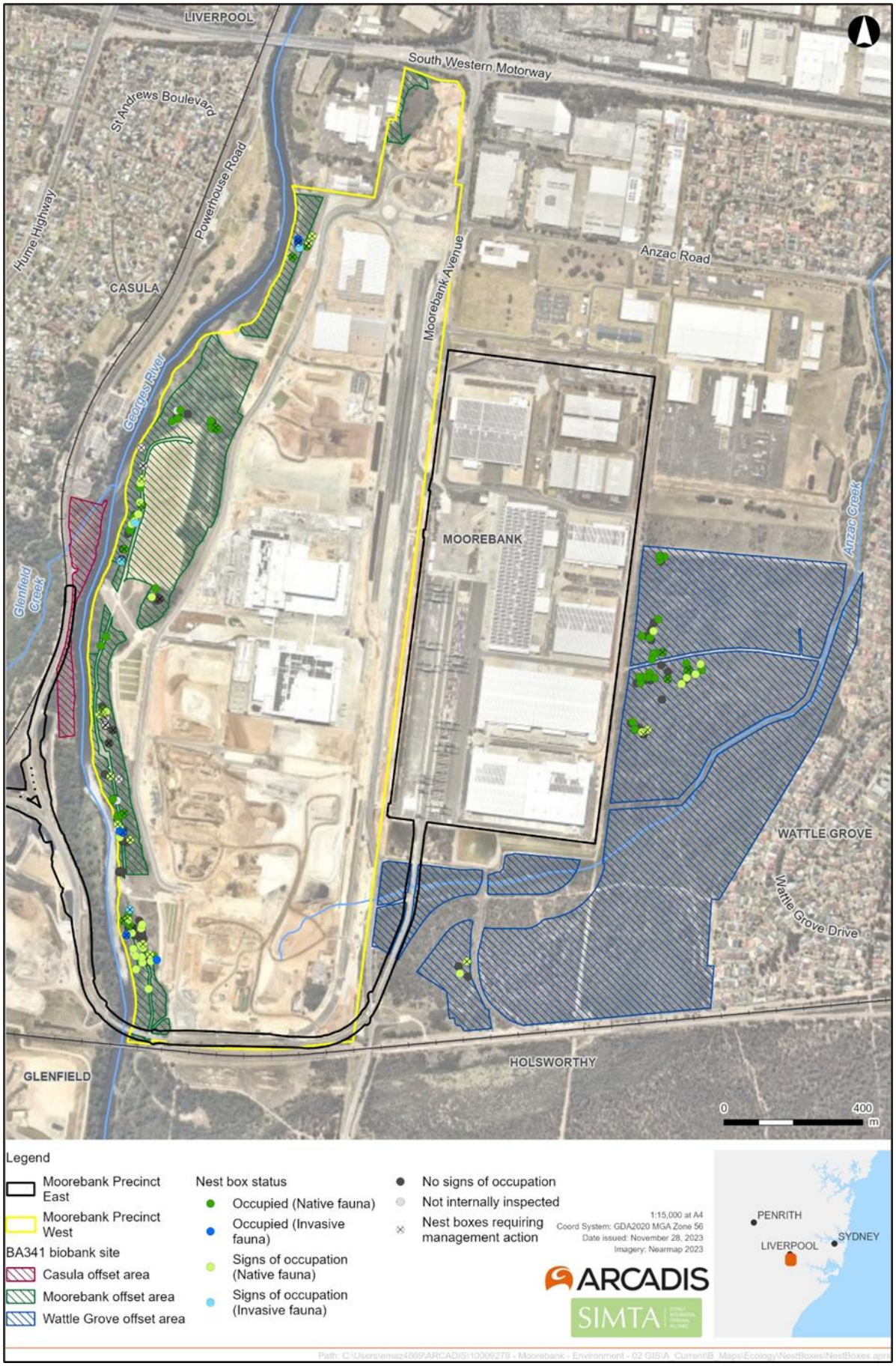

Figure 1-1. A map showing the locations of nest boxes checked in spring 2024.

2 Scope of this report

This Artificial Hollow Management Strategy (AHMS) has been prepared to supersede the NBS (CPB, 2017) and Addendum to the NBS (Biosis, 2017), and provide further direction to ESR regarding their obligatory requirement to maintain tree hollow offsets (artificial hollows) within the broader MIP facility. The strategy also considers and incorporates current best practice methods to replace dysfunctional nest boxes (artificial hollows) to maintain the minimum offset requirement of 108 hollows.

2.1 Objectives

This Artificial Hollow Management Strategy will supersede the NBS (CPB 2017) and provide direction to ESR going forward for how artificial hollows will be managed across MIP to maintain the required tree hollow offset.

The aim of this Artificial Hollow Management Strategy (AHMS) is to provide clear expectations and expert guidance on the implementation of the tree hollow offsets at MIP. The objectives of the strategy include:

- Review the offsetting requirement for impacted hollows and review the number of replacement artificial hollows, considering the results of annual monitoring over the past 5 year.
- Provide a list of target species for the artificial hollows
- Provide guidance on the sourcing, installation and monitoring of artificial hollows
- List any permit requirements for the installation and monitoring
- Provides clear objectives and guidance for future replacement and management of the artificial hollows at the MIP site to improve hollow longevity and accessibility

2.2 Guidelines and literature

Reports, best practice guidelines and plans of relevance to the preparation of this AHMS include:

- Beyer & Goldingay, 2006. The value of nest boxes in the research and management of Australian hollow-using arboreal marsupials. Wildlife Research 33: 161-174.
- BirdLife Australia (undated). Nest Boxes – Technical Information. Available at: http://birdlife.org.au/images/uploads/education_sheets/INFO-Nestbox-technical.pdf.
- Gibbons and Lindenmayer, 2002. Tree Hollows and Wildlife Conservation in Australia. CSIRO Publishing, Collingwood, Australia.
- Gleeson and Gleeson, 2012. Reducing the Impacts of Development on Wildlife. CSIRO Publishing, Collingwood.
- Goldingay and Stevens, 2009. Use of artificial tree hollows by Australian birds and bats. Wildlife Research 36: 81-97.
- Goldingay, 2009. Characteristics of tree hollows used by Australian birds and bats. Wildlife Research 36: 394-409.
- Goldingay, R. et al (2018). Outcomes of decades long installation of nest boxes for arboreal mammals in southern Australia.
- Lindenmayer, D. B. et al (2017). The anatomy of a failed offset
- OEH, 2015. Threatened Species Profile Database.
- TSSC, 2007. Loss of hollow-bearing trees – Key threatening process declaration. NSW Threatened Species Scientific Committee. Accessed online – http://www.environment.nsw.gov.au/determinations/lossofhollowtreesktp.htm.

3 Safety and permits

In New South Wales, an animal research permit is required for monitoring of the nest boxes. This includes an approved animal ethics application.

Australian Bat Lyssavirus (ABLV) is a virus which is similar to rabies and can be transmitted from bats to humans. It can be transmitted from flying foxes and microbats. It is a fatal disease. It can only be spread through

saliva and is not spread through urine or droppings. It has been detected in bat species in Australia on a few occasions . It is important that only trained and appropriately vaccinated individuals handle microbats in artificial cavities, if absolutely necessary to do so.

4 Review of artificial hollows at MIP

A maximum number of 253 nest boxes was recorded across the Georges River corridor (Moorebank offset area) and Bootland (Wattle Grove offset area) in spring 2019. During the most recent monitoring event (spring 2024) 214 of the 253 nest boxes remain. Of the 214 nest boxes monitored, 163 were functional and providing potential habitat to hollow-dependant fauna. The other 50 nest boxes were appraised to be dysfunctional and requiring some level of repair.

Review of fauna use and uptake of nest boxes across five years of monitoring has revealed high utilisation by suite of native fauna species including Sugar Gliders, Australia Wood Duck, Green Tree Frog, Rainbow Lorikeet and Southern Boobook Owl. Utilisation rates recorded across monitoring years has been shown in Figure 4-1. Nest box utilisation by native fauna are considered adequate if occupancy rates are greater than 10 per cent (Lindenmayer et al. 2017, Goldingay et al. 2018). Greater than 10 per cent occupancy has been recorded across all monitoring years. None of the target threatened species (Barking Owl, Brown Treecreeper, Gang-gang Cockatoo, Little Lorikeet, Eastern Pygmy-possum and Squirrel Glider) have been recorded using the nest boxes since monitoring commenced in 2018.

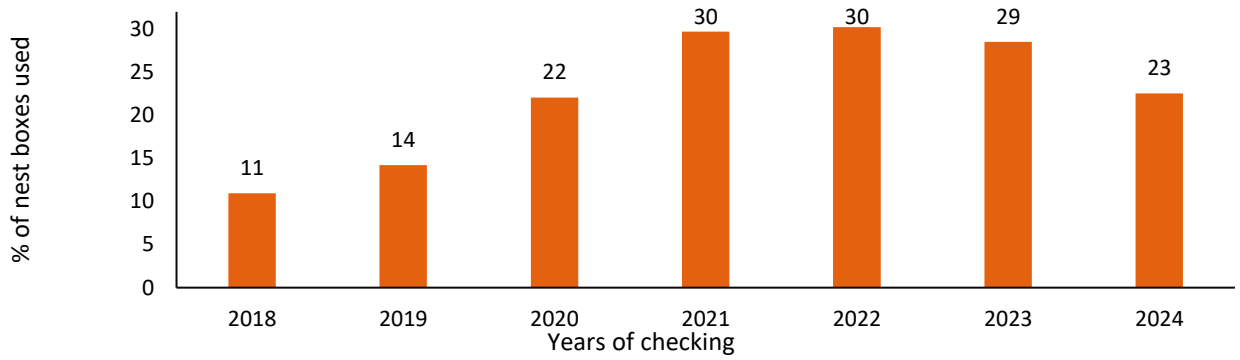

Figure 4-1. Nest box utilisation rates recorded during monitoring between 2018 -2024

Monitoring of these artificial hollows has identified high levels of attrition with many requiring reinstallations, refurbishments and replacements. Nest box maintenance works has been undertaken several times over the past five years in response to necessary actions identified in monitoring reports.

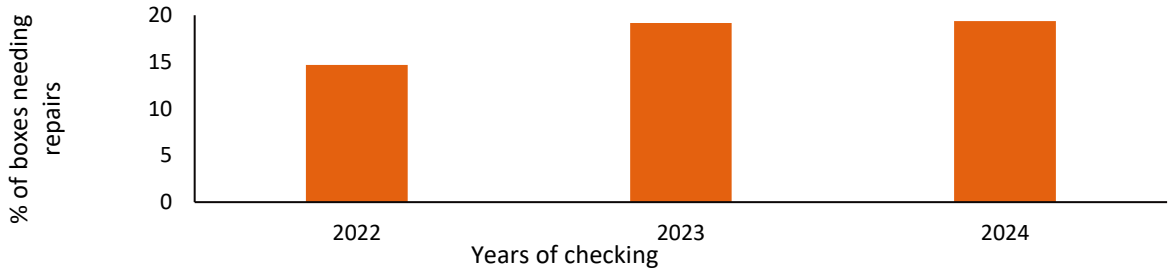

Figure 4-2. Percentage of nest boxes idnetfied as requiring repairs over the past three years

Monitoring has also identified an over-saturation of artificial hollows along the Georges River. Nest boxes were historically installed on every suitable tree and in some cases, multiple nest boxes of a similar design have been installed on a single tree. Monitoring data along this corridor has shown a lower utilisation rate when compared to locations where nest boxes have a greater spacing in the Bootland. The oversaturation of nest boxes is not considered optimal for target species and is currently only providing habitat to common species such as Ringtail Possums which do not rely on tree hollows.

5 Revised artificial hollow strategy

Based on the results of nest box monitoring over the past six years it is recommended that the artificial hollow management strategy at MIP be revised as per the recommendations set out in this plan. The proposed strategy has been set out below. It is anticipated that the strategy will be implemented over the next five to 10 years as existing boxes require replacing or decommissioning. It is not proposed that nest boxes will be prematurely decommissioned or relocated to expediate implementation of this revised strategy.

Number of artificial hollows to be maintained as offsets for loss of tree hollows

It is recommended that the artificial hollow offset ratio of 1:1 as recommended in the Addendum to the NBS (Biosis, 2017) for hollows removed be maintained. This equates to 108 artificial hollows across the MIP.

As of spring 2024 there was a total of 214 nest boxes across MIP. It is recommended that these boxes continue to be monitored, however when they are decommissioned, they are not replaced until the number of nest boxes reduces to 108. At which point any nest boxes that need replacing to meet the minimum offset requirement of 108 artificial hollows should be consider the recommendations discussed in this section.

Placement locations for artificial hollows

In considering the available habitat across the MIP for the target species, it is recommended that the 108 artificial hollows be distributed in five clusters (see Figure 5-1) across the Bootland (Wattle Grove Offset Area) and along the Georges River corridor (Moorebank Offset Area). Arcadis recommends that artificial hollows be installed in clusters because it will allow for an even coverage and ensures maximum opportunities for target species. Some species such as arboreal mammals also require nest sites that are nearby so that they can move between the suitable nest sites.

To relocate all of the artificial hollows into these clusters would take time to implement and may impact on the resident species utilising the hollows. It is proposed that installation of these clusters be undertaken in a gradual process over five to ten years which includes not replacing decommissioned nest boxes in the Georges River biobank until the minimum cluster size has been reached.

The Bootland (Wattle Grove Offset Area), which contains rich habitat for the target fauna species contains a relatively low number of nest boxes currently. It is recommended to distribute artificial hollows across these areas to ensure maximum opportunities for target species uptake. Nest boxes requiring repair or replacement along the Georges River or in over saturated areas should be progressively added to the Bootland until the cluster numbers are achieved.

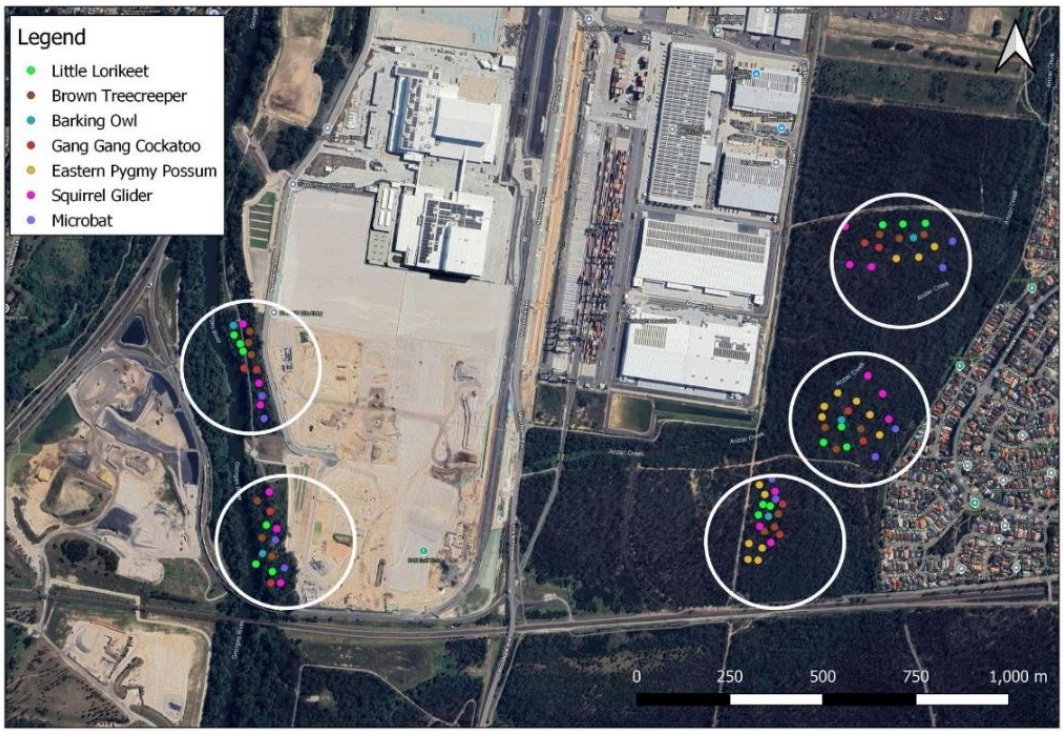

Figure 5-1. Proposed clusters of artificial hollows. Note that the habitat on the Georges River is considered of lower suitability for Eastern Pygmy-possum and therefore more hollows for this species have been added to Wattle Grove sites.

Artificial hollow target species

The current nest boxes that have been installed are generic designs and are not specific to the target threatened species including Barking Owl, Brown Treecreeper, Gang-gang Cockatoo, Little Lorikeet, Eastern Pygmy-possum and Squirrel Glider. To increase the chances of uptake by these target species it is recommended that artificial hollows installed to replace decommission nest boxes are designed for the target species. Additionally, the installation locations will prioritise the most suitable areas of habitat for the target species.

Table 5-1 provides an overview of each cluster. This number is based off an ecological assessment by Arcadis staff which have factored in multiple hollows for species that require a few dens versus species such as owl which only need hollows for breeding.

Species-specific artificial hollows should be installed strategically to ensure they are close to any required resources which could be important. It is also recommended that social animals have cavities installed in clusters (Terry et al. 2021). All hollows must be installed at suitable heights for both the species needs and for ease of access for monitoring and maintenance (<8m). A summary of artificial hollow considerations for the target species is summarised in Table 5-2.

Table 5-1. Recommended clusters of artificial hollows for target species

Target species	Artificial hollows per cluster	Total number of artificial hollows
Little Lorikeet	3	25
Brown Treecreeper	3	15
Barking Owl	1	5
Gang Gang Cockatoo	2	10
Eastern Pygmy possum	3-6	23
Squirrel Glider	3	20
Microbat	2	10
Total required		**108**

Table 5-2 Target species hollow dimensions and height to install

Target species	Listing status BC Act / EPBC Act	Artificial cavity installation tips	Nest Box Dimensions			
			Internal (mm)	Depth (mm)	Entrance (mm)	Height above ground (m)
Birds						
Little Lorikeet (*Glossopsitta pusilla*)	Vulnerable	Hollows should be installed in a cluster of three hollows in smooth barked varieties such as scribbly gum	150x150	350	35	2–6
Brown Treecreeper (*Climacteris picumnus* subsp. *Victoriae*)	Vulnerable		90-150	350	40	3 –6
Barking Owl (*Ninox connivens*)	Vulnerable		250x300	500	100	4–6
Gang-gang Cockatoo (*Callocephalon fimbriatum*)	Endangered / Endangered	Install near foraging resources and water. Cockatoos have a tendency to chew nest boxes. Consider installing a hardwood front on these boxes to reduce chewing impacts.	300x400	500	200	6
Mammals						
Eastern Pygmy-possum (*Cercartatus nanus*)	Vulnerable	Hollows should be installed close to the ground. Proximity to nectar rich resources and dense cover preferred.	150x150	300	30	1-2m
Squirrel Glider (*Petaurus norfolkensis*)	Vulnerable	Install in a minimum cluster of three hollows,	150x250	300	45	3–6
Microbats						
Eastern False Pipistrelle (*Falsistrellus tasmaniensis*)	Vulnerable	Microbat hollows should consist of an entrance with a slit.	100x100	400	25mm	3–5
Eastern Freetail-bat (*Mormopterus norfolkensis*)	Vulnerable		100x100	400	25mm	3–5
Greater Broad-nosed Bat (*Scoteanax rueppellii*)	Vulnerable		100x100	400	25mm	3–5

Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*)	Vulnerable		100x100	400	25mm	3–5

6 Implementation recommendations

6.1 Types of artificial hollows

6.1.1 Nest boxes

Essential to nest box designs is thick, timber that will protect the inhabitants from extremes in weather. Timber materials suitable include ply (both marine and construction), pine and hardwood. It is important to avoid the use of treated timbers which can contain arsenic and other chemicals which can be hazardous to wildlife. Thicker materials will buffer temperatures and ensure greater protection. Research by Griffiths et al. (2018) found that nest boxes provided poor protection to inhabitants during extreme heat. Construction of nest boxes using very thin materials should be avoided. While some researchers have experimented with insulation with positive results, thicker timber will provide additional buffering from external temperatures and are going to be easier to construct and source. Placement of nest boxes in shady positions and orientation can also reduce heat impacts. If there is a small number of hollows available, animals may have no choice but to use inferior hollows out of desperation which could result in impact to the animal's welfare.

Protecting a nest box from moisture will ensure greater longevity and lower costs in maintenance. Key to this success is ensuring the box is joined together using galvanised screws rather than nails. As some moisture cannot be avoided, if nails are used there is a higher chance that the joins will open up. Screws instead will grip better and ensure that gaps between joins are unlikely. A waterproof glue is essential between joins.

The top of the nest box must also overhang on all sides including the rear. Lids that are flush mounted against the rear of the box are at risk of water entering the box and dripping down the inside. The overhang at the back should only be approximately 10mm. An optional strip of foam weather-sealing along the underside of the lid could also prevent moisture from getting inside.

All nest boxes must be painted with a thick exterior water-based paint such as Dulux Weathershield. This paint dries as a membrane which provides exceptional protection from water and moisture. Cheaper fence paints act like a stain and will not provide adequate protection. In addition, a white-based paint should be used for the exterior. A study by Griffth et al. (2017) showed that in extreme heat, a white based paint reflected heat and was able to stay slightly cooler.

Plate 6-1. Commercially available nest boxes are usually constructed from ply

Internal ladders are important especially for deep boxes which can trap juvenile birds before fledging. Wire mesh ladders inside of nest boxes should be avoided due to the risk that this can become a hazard to wildlife with sharp edges. Instead, it is recommended that ladders either consist of pieces of timber glued in place or grooves cut in place.

Sourcing nest boxes from large suppliers can be an easy way to obtain them. However, it is important that the construction requirements discussed here are implemented into the box designs. Many large suppliers are either inexperienced with nest boxes or design their nest boxes for backyard hobbyists (Plate 6-1, Plate 6-2). The latter means that boxes are not designed to last many years with minimal maintenance. Nest boxes should consist of a waterproofed box. Avoid the use of mounting brackets on the back of nest boxes which can trap moisture. Ensuring that nest boxes have been constructed using appropriate materials will ensure long lifespans.

Plate 6-2. Commercially available nest boxes (left) often do not consist of appropriate water proofing and water will begin to damage the roof and back of the boxes. Lacquer wears very quickly on nest boxes and will need to be reapplied. In contrast, nest boxes painted (right) with a high-quality exterior paint such as Dulux Weathershield will last much longer.

A summary of nest box construction requirements include:

- Timber of a minimum of 18mm thickness is to be used for all nest boxes
- Preferred materials consist of ply, pine or hardwood preferred (avoid treated timber)
- Galvanized screws should be used instead of nails
- A waterproof glue should be used between the joins
- External surfaces must be painted with membrane paint such as Dulux Weathershield. The paint colour must be a white base (with a tint)
- An overhang (a minimum of 10mm) on each side including the rear which sits up against the tree. The overhang should extend further on the side of the entrance hole
- Drainage holes should be installed in the base
- All boxes must have numbers printed on the box to ensure easy identification

6.1.2 Log hollows

The process to collect log hollows can remove habitat on the ground for terrestrial species that rely on them. Collection of log hollows should be undertaken either through a process of where they can be salvaged before they are destroyed or carved using a drill.

Research has shown (Griffiths et al. 2018) that log hollows perform similar to natural tree hollows in buffering external temperatures. They are also likely to last much longer than nest boxes and have less maintenance. However, the limitations occur through the installation methods. Log hollows can be very heavy which makes them a risk during installation. Secondly, their large weight can also mean that installation methods using chains can have the potential impact on tree health.

6.1.3 Carved hollows

There are multiple designs of carved hollows. Each with varying design benefits. However, the use of the Hollow Hog should be preferred over other methods. This is because the Hollow Hog creates a large cavity from only

a small piece of living outer tissue being removed. This minimises risks to tree health. In addition, larger faceplates have been found to warp and be rejected by trees.

Where possible, it is also recommended that an entrance spout (Plate 6-3) be provided to reduce chances of callous regrowth over the entrance hollow. Care should be taken to ensure that the entrance spout be only short in length to allow for an inspection camera to be able to enter and inspect from the ground. A short entrance hollow spout is required. Where possible, the spouts should be positioned so that they point slightly downwards to prevent water egress.

Carved hollows required larger trees and are suited to smaller species such as eastern pygmy possum, little lorikeet, squirrel glider and microbats.

Plate 6-3. An example Hollow Hog with a short spout. The short spout will assist with preventing water egress while also allowing for a ground-based pole camera to be inserted without the need to climb the tree. Image by Matt Stephens from Hollow Hog

6.2 Installation methods

The locations for installation of the artificial hollows should broadly affect the locations where hollows have been removed. However, care also should be taken to install hollows where there is suitable habitat for the target species. Where possible, nest boxes should be installed at least 50 metres from the boundary of vegetation clearance. This will reduce edge effects from noise and light pollution ensuring a greater chance of the nest boxes being occupied.

To date, nest boxes have been mostly installed in the Georges River despite their only being a small amount of suitable habitat in this section. Furthermore, recent burns and floods have also degraded this section of habitat. It is recommended that any future nest box installations preference the Wattle Grove (Bootland) sites, particularly the areas to the south that contain suitable habitat for Eastern pygmy possum and Squirrel glider. If any nest boxes need to be relocated or installed, and they do not contain evidence of use, they should be moved to the Wattle Grove site.

Locations for installation should be based on the following criteria:

- Suitability of the vegetation for the target species.
- Distance from the hollow-bearing tree to be removed.
- Distance from existing and future disturbances.

Other site selection criteria will need to be assessed at the time of installation, such as:

- Proximity of other hollow resources in the immediate vicinity.
- Similarity of vegetation structure immediately surrounding the hollow-bearing tree and nest box location.

The Project Ecologist or experienced nest box installer will therefore use their discretion to determine the final location of the nest box.

All artificial cavities should be installed on the southeastern side of the tree. This ensures that they are in the shadow of the sun during summer heat reducing the impacts from extreme temperatures. All cavities must not be installed higher than 5 metres. This ensures they can readily be accessed with a ground operated inspection camera. It also ensures that if the cavity requires maintenance that it can be easily accessed or even removed via an extension ladder. The existing nest boxes should be lowered over the next few years so that they are all at management heights.

6.2.1 Nest boxes

Incorrectly installed nest boxes pose a risk to both wildlife and people. Two methods for securing nest boxes are as follows:

Habisure method (recommended)

This installation method was designed by Alan Franks from Hollow Log Homes (Franks and Franks 2006). This involves using a wire that has a folding spring built into the shape of the wire. As the tree grows, the wire spring expands, extending the lifespan of the box and reducing impacts to the tree from potential ringbarking. A piece of hose should be used on the opposite side of the box and the wire threaded through to prevent the wire digging into the tree. The Habisure method is considered a safe approach for tree health.

Occasionally the Habisure wire can become stiff and not expand as the tree grows resulting in ringbarking. In addition, installation with too much slack in the wire can result in the nest boxes and log hollows leaning over. All nest boxes and log hollows installed using this method should be monitored annual and adjustments made.

Nail hang method (optional)

Goldingay et al. (2018) attributed the nail hang method of attachment of nest boxes to trees as a key component in delivery of a successful 20 year long project in the Bendigo region. In this method, nest boxes are hung on an angled nail threaded through a small hole on the back of the box. As the tree grows, the box is shifted along the nail, extending the lifespan of the nest box. It is possible that this method could have a minor impact on the tree due to the nail, however, given the longevity of both the nest boxes and tree in the study by Goldingay et. al, (2018), it is considered that any impacts would be minor.

Other methods of attachment

Occasionally, both these methods may not be suitable. Very large heavy nest boxes may need to be attached using arborist ropes. Where possible, Council must avoid the use of attachment via a screw or other fixed method. By not allowing for movement as the tree grows, the nest box or log hollow can split and fall off the tree.

6.2.2 Carved hollows

Mechanically carved hollows utilise the sides of the tree so that they are much better are buffering external temperatures during extreme heat. This means that carved hollows are superior to nest boxes but do have some drawbacks. The most significant one is that the cavity size is limited by the diameter of the tree trunk or branch where the hollow will be constructed. To minimise the risk of tree failure due to the installation of carved hollows, trees should have at least two thirds of their thickness following construction of a chainsaw hollow (Mattheck et al., 1994). This means for instance, if a hollow requires a flood space with a depth of 20cm, the tree selected would be required to be over 60cm diameter at the hollow height. Care must also be taken for the thickness of the faceplate which may also take up some of that internal cavity space. Therefore, smaller cavities are of preference when mechanically carving tree hollows. The only exception to this rule is in a tree where the canopy has been removed and the risk of movement from wind is significantly reduced. Either way, an experienced arborist company should be consulted prior to any mechanically carved hollows and a risk assessment completed.

Callous regrowth has been shown to be a potential problem for mechanically carved tree hollows (Terry et al. 2021). However, there is some evidence that when a spout is provided in the form of a natural hollow, that is prevents this regrowth over the entrance. If a spout is to be used, it is important that it only be short (approximately 10cm) to ensure that a pole mounted camera can easily inspect inside the carved hollow.

Another issue identified with mechanically carved tree hollows are termites which can fill a newly carved hollow up with sawdust. This prevents other animals from using the hollow. Preliminary research into preventing this species has shown that placing some eucalyptus leaves inside of the hollow may be enough to deter them (Matt Stephens pers. coms).

Height

All artificial hollows should also be installed at an appropriate height which will allow to easy access with a ladder in the event of a nest box requiring maintenance. The height should also take into consideration the species needs – eg/Eastern Pygmy Possum utilise hollows at <1.5m high). Future hollow additions should not be located higher than 5 metres off the ground. Any relocated nest boxes should be installed at this height or lower.

There is a common misconception that animals require hollows to be located high in a tree canopy (Beyer and Goldingay 2006). If there is a need for a hollow, animals will usually accept what is available (Goldingay pers comms December 2022). Franks and Franks (2006) state that the majority of fauna in gardens will readily use cavities no higher than 3 m. Additionally, Grant (1997) states that nest boxes [and other hollows] should be installed 'as high as possible for the protection of their occupants but low enough for safe and regular maintenance.' Installing hollows in very high (>5m) locations can make reaching them difficult and add to costs when monitoring and maintenance is required. Installing hollows at heights between 3 and 5 m would ensure minimal disturbance from people, foxes and cats but still allow easy, safe access via a ladder when required. This will also reduce cost for monitoring ana maintenance as tree climbers will not be required.

6.3 Pest animal prevention

In an urban setting, feral species may utilise the artificial hollows. This includes Common (Indian) myna and European honeybee. A common misconception is that artificial hollows attract pest species. In actual fact, the use of all hollows, be it natural or artificial can be used by pest species. These unwanted animals do not preference artificial cavities over natural hollows. There are some strategies that can be used to reduce the chances of pest species.

6.3.1 European honeybee

The use of hollows by the introduced European honeybee (Plate 6-4) has been identified as a serious threat to hollow dependent fauna (Goldingay et al. 2020) and is listed a threatening process in NSW as part of the Biodiversity Conservation Act. These aggressive insects can evict other inhabitants. Bees have been shown to preference larger artificial cavities (Franks and Franks 2006). They may only stay for short periods in smaller cavities before moving on. They can also pose a threat to people in public parks as they can be very aggressive.

There is some evidence that placing wool or Lanolin on the underside of the top of an artificial hollow can deter bees from attaching their wax. Others have also burnt the underside of a lid. It is recommended that treatment of artificial cavities be undertaken as an insurance measure to prevent bees from becoming established. This should include placing wool on the underside of lids of all nest boxes and log hollows. Carved hollows which have a natural timber may be more difficult to attach carpet. In the case of a carved hollow, it is recommended to spray Lanolin on the top of the hollow.

If bees are found inside of an artificial cavity, steps should be taken to monitor the situation for up to three months. Sometimes, bees may move on by themselves. If the hive persists, it is recommended that professional removal be undertaken if it can be achieved safely. If public safety is a concern, the bees will need to be removed as soon as possible. This can be easier in a nest box which can be removed. But a mechanically carved hollow is much more difficult.

Hives can be treated with an insecticide and then the entrance closed up until the bees have all died. This must be undertaken at night when the bees are asleep and the risk to people are less. Treatment of bees is another reason why artificial cavities should be installed at management heights which allows for easy access with an extension ladder.

Plate 6-4. European honeybees have been found in nest boxes at Moorebank.

6.3.2 Common (Indian) myna

The Common myna frequently uses hollows to build nests and raise young. The species is known to build a nest in more nests than it will use. The impact of this bird on the local environment is likely to be overstated (Haythorp 2013). However, it is recommended where possible that excluding this species from the nest boxes be undertaken to ensure maximum opportunities for locally native species. A baffle design has frequently been added to nest boxes to discourage use by mynas (Homan 2000). However, a study by Haythorp (2013) make recommendations to improve the baffle design so that it still allowed eastern rosellas while excluding mynas. She found that many rosellas entered a nest box using the roof and the baffle would impede this access. Instead, she suggested that the baffle be attached from the sides of the box with the top open which would allow the birds to readily access the entrance hole from the top.

Table 6-1 provides some additional measures which can be used to reduce pest species use of the nest boxes. These measures can be implemented during construction and installation or can be implemented if pest species are noted during monitoring activities.

Table 6-1 Measures to minimise pest species occupation

Pest species	Appropriate measure
Common Myna	An overhanging sheet of ply in front of the entrance (known as a Myna baffle) successfully deters Common Myna whilst allowing native species to use them. Note the text above which describes how to best produce a baffle but still allow other parrots to utilise the box.
Ants and other insects	The box lid can be left open for a few weeks and the ants will usually move on quickly after this. If the ants do not relocate, talcum powder may be applied to the entrance, edges and inside of the nest boxes prevents use by ants.
European Honeybee	Lining the upper surfaces of nest box with a piece of carpet or Lanolin will help in prevent bees from attaching their wax to the surface.

7 Monitoring

The monitoring program should continue with the aim to identify fauna occupancy rates and to identify any required maintenance activities. All accessible artificial hollows should be checked annually in spring.

A pole mounted inspection camera is recommended to undertake monitoring as it is the most time efficient and will also have minimal distance on inhabitants. The following information should be recorded at each artificial hollow:

- Name of surveyor
- Inspection details (such as date and time)
- Nest box number and location
- Occupancy status including species observed and number of individuals
- Evidence of use (either species or evidence scratches, debris, feathers or whitewash).
- General condition of the nest box (Excellent, good, average, poor, repair required)
- Any recommended maintenance requirements (eg. Lid is missing, etc)
- Any other notes such as changes to land use or reasons for low occupancy

Annual monitoring will allow for the success of the artificial hollows to be evaluated and changes to be made as required to improve the functionality of the program.

8 Annual reporting

Following each annual spring monitoring event, a summary report will be prepared to describe the results of the monitoring program and identifying any corrective maintenance activities that were completed or are recommended. This report will be provided to ESR who will include in their annual reporting submission to NSW Planning Secretary (or alternate as appropriate), as part of the operational compliance reporting requirements.

The general structure of a report would likely include the following headings:

- Background (Offset requirement, nest box details, previous monitoring results)
- Methodology (Surveyors, Inspection details, Number of artificial hollows)
- Results (Occupancy and utilisation rates, artificial hollow condition)
- Discussion (Native fauna; Invasive fauna; Maintenance requirements)
- Appendix 1 (Nest boxes requiring maintenance)
- Appendix 2 (Fauna recorded in nest boxes)

In addition, species records for both native and non-native fauna are required to be submitted on an annual basis to NSW BioNet to remain compliant with the requirements of operating under a NSW Scientific Licence.

9 Maintenance

All artificial cavities will require maintenance to maximise lifespans. Some researchers have shown that nest boxes in particular have high attribution rates (Lindemayer et al. 2009) due to water egress damaging the timber. However, other studies (Goldingay et al. 2018) has shown that when implemented correctly, nest boxes can provide critical habitat to hollow dependent fauna over many decades.

Ensuring that the artificial cavities have been designed correctly will maximise the lifespans and ensure minimal maintenance is required. This includes ensuring that the cavities are appropriately water sealed and quality fittings are used including galvanised hinges and screws.

As artificial cavities are exposed to the weather and animals, they begin to wear. Cavities that require attention should be addressed immediately. As trees grow, the mountings of artificial cavities can require modification. Habisure springs may require adjustment to prevent ringbarking of trees. The monitoring should determine the cavities which will need attention.

Artificial hollow maintenance must be undertaken on an annual basis following the monitoring. Common maintenance activities that may be required include:

- The need to remove pest species
- Replacement of damaged artificial hollows
- Removal of excessive nesting material
- Moving artificial hollows that are not functioning correctly
- Checking that boxes are draining adequately

Any required maintenance activities should be noted within the annual report and classified as urgent or non-urgent activities. Urgent activities are ones that significantly hinder the ability of the nest box to deliver the objective of providing habitat for native species and should be actioned within 8 weeks of submission of the annual report. Non-urgent maintenance activities may be slight defects or temporary issues that do not require immediate action but that should be reassessed in the following monitoring event. All artificial hollows should be fully functional following any maintenance and repairs.

10 Adaptive management

Continued monitoring will provide data on utilisation and suitability of artificial hollows at MIP. The characteristics of an artificial hollow including its type, location, and specifics on how it has been installed can be evaluated. The findings from these monitoring events should be considered when implementing the strategy in proceeding years.

For example, if nest boxes are found to be frequently used by Eastern Pygmy Possums during monitoring surveys, whereas carved hollows for this species have recorded low (or no) signs of usage, future artificial hollows for this species should prioritise nest boxes over carved hollows.

It is suggested that this AHMS be reviewed and updated (as required) after five years. Progress towards implementing the strategy should be reviewed and the results of monitoring over the previous five years should be considered to determine if any of the recommendations from this strategy require updating. A literature review should also be completed to confirm that recommendations regarding artificial hollows in this report are still current and best practice.

11 References

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Moorebank Intermodal Precinct

APPENDIX M – COMPLIANCE REPORT DECLARATION

Project Name	Moorebank Intermodal Precinct (MIP) – West Precinct
Project Application Number	SSD 7709
Description of Project	Moorebank Intermodal Precinct aims to streamline the freight logistics supply chain from port to store, deliver savings to businesses and consumers, and help service the rapidly growing demand for imported goods in south-west Sydney. It is located approximately 27 kilometres (km) south-west of the Sydney Central Business District and approximately 26 km west of Port Botany within the Liverpool Local Government Area. The MIP is divided into an East Precinct and a West Precinct, located east and west of Moorebank Avenue respectively. The East Precinct includes the 24/7 operation of an import-export terminal (IMEX), rail link connecting to the South Sydney Freight Line (SSFL), warehousing and distribution facilities and freight village.
Project Address	Moorebank Intermodal Precinct, Moorebank, NSW, 2170
Proponent	The Trust Company Limited (ACN 004 027 749)
Title of Compliance Report	Moorebank Intermodal Precinct West Precinct – Operation Compliance Report
Date	Friday, 19 December 2025

I declare that I have reviewed relevant evidence and prepared the contents of the attached Compliance Report and to the best of my knowledge:

- the Compliance Report has been prepared in accordance with all relevant conditions of consent;
- the Compliance Report has been prepared in accordance with the Compliance Reporting Post Approval Requirements;
- the findings of the Compliance Report are reported truthfully, accurately and completely.
- due diligence and professional judgement have been exercised in preparing the Compliance Report; and
- the Compliance Report is an accurate summary of the compliance status of the development.

Notes:

- Under section 10.6 of the Environmental Planning and Assessment Act 1979 a person must not include false or misleading information (or provide information for inclusion in) a report of monitoring data or an audit report produced to the Minister in connection with an audit if the person knows that the information is false or misleading in a material respect. The proponent of an approved project must not fail to include information in (or provide information for inclusion in) a report of monitoring data or an audit report produced to the Minister in connection with an audit if the person knows that

the information is materially relevant to the monitoring or audit. The maximum penalty is, in the case of a corporation, $1 million and for an individual, $250,000; and

- The Crimes Act 1900 contains other offences relating to false and misleading information: section 307B (giving false or misleading information – maximum penalty 2 years' imprisonment or 200 penalty units, or both).

Name of Authorised Reporting Officer	Richard Mason
Title	MD Possum Environmental Consulting
Signature	
Qualification	Bachelor of Science – Environmental Science
Company	Possum Environmental Consulting
Company Address	7 Delprat Terrace, Whyalla South Australia 5600