

MOOREBANK INTERMODAL PRECINCT

Moorebank Precinct West: Six-Monthly Operations Compliance Report

Report: #1

Period: May 2024 – Nov 2024

30 DECEMBER 2024



MOOREBANK INTERMODAL PRECINCT

May 2024 – November 2024

Author		
Checker		
Approver		

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Author Details

Author Details	Qualifications and Experience
	BSc Environmental Science

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, a Six-monthly 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	Six Monthly Operation Compliance Report (OCR)
Project Activity	Operation of an import-export terminal, rail link and warehouse and distribution facilities and associated infrastructure.
Report date	Monday, 30 December 2024

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, a Six-Monthly 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.

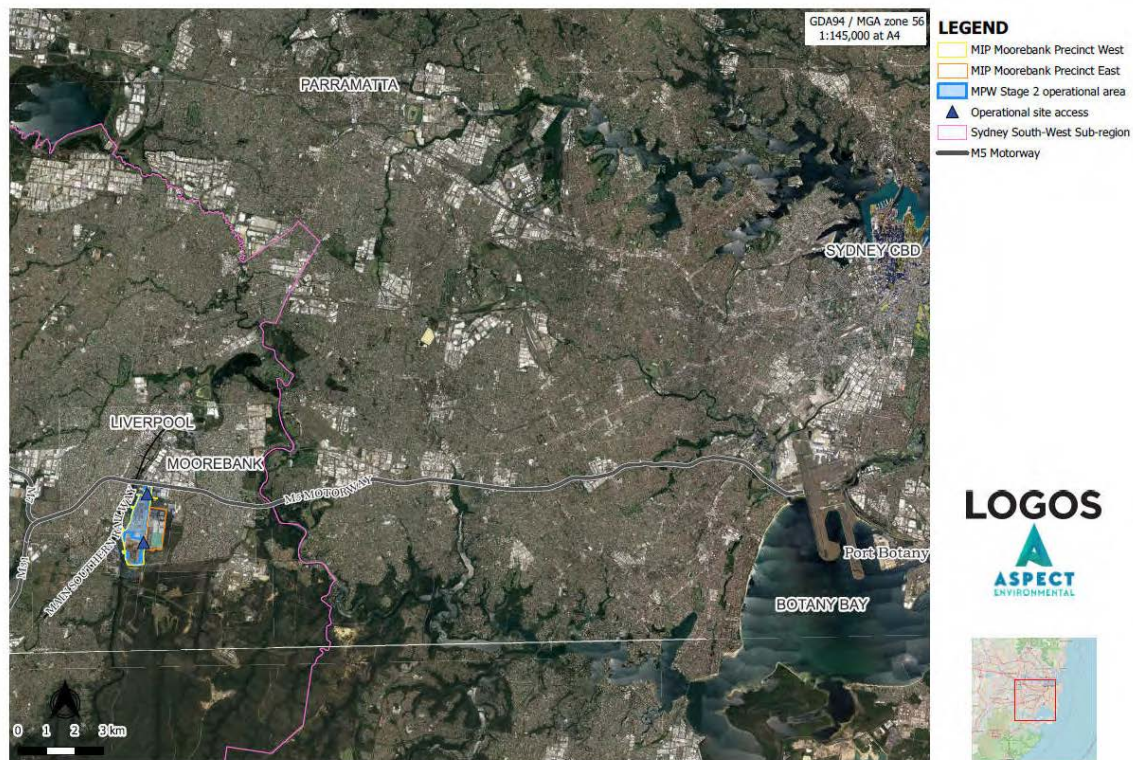


Figure 1 MPW 2 operational site location

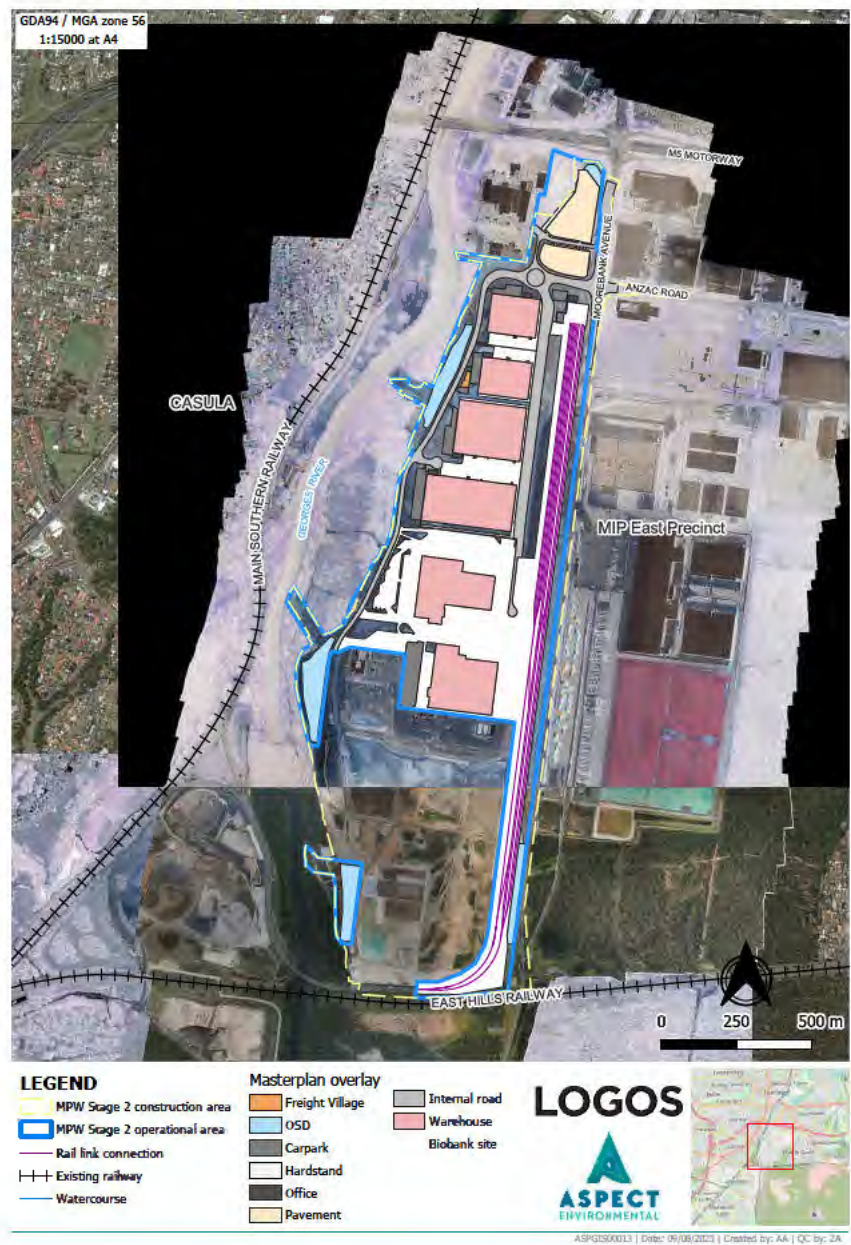


Figure 2 MPW 2 development area

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 May 2024 – November 2024.

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. **Error! Reference source not found.** 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 the following table

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)

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 K**.

4 ENVIRONMENTAL MONITORING

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.

5 AIR QUALITY MONITORING

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

5.1.1 Air quality monitoring station availability

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

Table 2-1: Monitoring station availability (%)

Monitoring station	May 2024	Jun 2024	Jul 2024	Aug 2024	Sep 2024	Oct 2024	Average %	Latest calibration date
	% availability each month							
AQM01	100	100	100	100	100	100	100	March 2024
AQM02	100	100	100	100	100	100	100	March 2024
	95	100	100	100	100	99	99	March 2024
AQM04	99	100	58 ¹	85 ²	100	100	88	March 2024

¹ AQM04 only had 58% availability for PM_{2.5} and PM₁₀, however, the monitor had 100% availability for NO₂ and CO

² AQM04 only had 85% availability for PM_{2.5} and PM₁₀, however, the monitor had 100% availability for NO₂ and CO

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.

- Compared to last reporting period, monitor AQM03 availability has improved significantly with an average of 99% for this reporting period (compared to 77% for the previous reporting period).
- Monitors AQM01 and AQM02 had 100% availability through the reporting period.
- AQM04 had 58% availability in July 2024 for PM_{2.5} and PM₁₀ and 85% availability in August 2024 for PM_{2.5} and PM₁₀. Availability was 100% at AQM04 in July and August for CO and NO₂. This has resulting in a lower average availability (88%) for the reporting period, compared to 100% for the previous reporting period. Availability improved for September and October 2024.

5.1.2 Dust deposition

Dust deposition data from seven DDGs located around the site is provided by SERS and have been provided for incorporation into the monitoring program since May 2021.

DPHI has set the criteria for dust deposition rates, and these are provided in Table 2.

Table 1 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.

5.1.3 Dust deposition gauge results

The results of the collection period May – November 2024 as provided by SERS is shown in Table 3

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	Average
May 2024	2.7	0.4	0.5	1.3	0.5	0.6	1.0	1.0
June 2024	0.6	0.2	0.4	3.6	0.3	0.3	0.2	0.8
July 2024	0.5	<0.1	<0.1	1.1	0.4	0.4	0.1	0.5
August 2024	1.2	0.6	1.1	1.7	0.5	0.8	0.1	0.9
September 2024	0.8	0.5	N/A*	3.6	0.7	1.8	0.3	1.3
October 2024	1.5	1.0	1.2	2.0	1.0	1.0	0.8	1.2

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

* Stage 2 DDG 2 was damaged while handling therefore no results available for the sampling period.

All months (except for October 2024) include data from two different SERS DDG reports to ensure the entire month was covered. This was due to collection periods ending during the month rather than at the beginning or end of the month and sometimes covered over two months' worth of data. NOTE: The information in the table provides consolidated results per month to minimise any confusion with the exceedances.

As shown in Table 3, there were four individual gauge exceedances between May 2024 and October 2024. However, no monthly average exceedances of the dust deposition (insoluble solids) 2 g/m²/month (incremental) and 4 g/m²/month (cumulative) criteria occurred between 8 April 2024 and 24 October 2024. Annual exceedances

Twelve months of air quality monitoring are provided graphically and in table form in Appendix A. AQM03 did not record any data between June 2023 and 19 September 2023 and also had low data availability between 33% and 88% for each month between October 2023 and April 2024. This has resulted in a low average availability for the monitor for the rolling 12 month averages.

The sensors and monitoring software was swapped out in mid-April 2024 and as such, there was no data available to calculate the monthly and annual averages for April 2024. Daily, and hourly (1hr/8hr) exceedances were calculated for April 2024 and are described in further detail below.

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

5.1.4 PM_{2.5} and PM₁₀ Monitoring

The 12-month rolling annual average for the period November 2023 to October 2024 for all four monitors combined was below the annual average criteria (i.e. 8.0 µg/m³ for PM_{2.5} and 25.0 µg/m³ for PM₁₀) for each month, excluding April 2024. As of October 2024, the 12-month rolling annual average for all four monitors (excluding April 2024) was 3.7 µg/m³ for PM_{2.5} and 10.1 µg/m³ for PM₁₀ NO₂ Monitoring

The 12-month rolling annual average for all four monitors for the period November 2023 to October 2024 was below the annual average criteria (0.03 ppm) for each month.

As of October 2024, the 12-month rolling annual average (excluding April 2024) for NO₂ for all four monitors is 0.009 ppm, well below the annual average criteria of 0.03 ppm. CO

CO does not require annual reporting.

5.1.5 NO₂ Monitoring

The 12-month rolling annual average for all four monitors for the period November 2023 to October 2024 was below the annual average criteria (0.03 ppm) for each month.

As of October 2024, the 12-month rolling annual average (excluding April 2024) for NO₂ for all four monitors is 0.009 ppm, well below the annual average criteria of 0.03 ppm.

5.1.6 CO

CO does not require annual reporting.

5.1.7 24-hour exceedances

24-hour exceedances are reported in the sections below:

5.1.8 PM_{2.5} Monitoring

A review of the data for the reporting period (May 2024 to October 2024) did not identify any exceedance of the 24-hour average criteria (25 µg/m³) for PM_{2.5} for the 6-month reporting period.

5.1.9 PM₁₀ Monitoring

One exceedance of the 50 µg/m³/day limit for PM₁₀ was recorded during the 6-month reporting period (May 2024 to October 2024). This exceedance is summarised in Table 4. The table includes the 24-hour average for PM₁₀ recorded at the Liverpool monitoring station for comparison and includes analysis of the exceedance.

Date of exceedance	AQM01 µg/m ³	AQM02 µg/m ³	AQM03 µg/m ³	AQM04 µg/m ³	Liverpool average ⁸
13/08/2024	-	-	-	61.9	15.9

Analysis of exceedance

The higher recordings occurred from 10am to midnight. No out of hours works occurred during the time of exceedance. Trains were arriving/ departing the terminal on this day during times of exceedance. However,

AQM04 is located approximately 680 metres to the north of where the trains operate, therefore the exceedance is unlikely to be related to the train movements. The exceedance did not coincide with any higher readings at the Liverpool air quality monitoring station. This may indicate that more localised sources are influencing air quality in this location.

5.1.10 NO₂ 1-hour exceedances

No exceedance of NO₂ 1-hour criteria (0.12 ppm / 120 ppb) were observed during the 6-month reporting period.

5.1.11 CO 8-hour exceedances

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

5.1.12 Complaints (Air Quality)

No complaints were made relating to air quality during this reporting period.

5.1.13 Ad-hoc monitoring

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

6 NOISE MONITORING

Noise monitoring measurements have been performed, consistent with the requirements of SSD 7709 and the Operational Noise and Vibration Management Plan. During this reporting period the following noise measurements were undertaken:

- **Warehouse Noise Monitoring**

Warehouse noise monitoring is required to be undertaken following the occupation of each warehouse. Noise monitoring was undertaken for MPW Warehouse N1 & N2 where valid data could be obtained. Processing and analysis of this monitoring data was reported under the applicable CoC B139 in November 2024. No additional warehouses commenced operations where valid monitoring data can be measured within the reporting period.

- **Continuous Noise Monitoring**

- The first annual report is due in April 2025

- **Noise Complaints**

- See app G

- **Angle of Attack Rail Noise Report**

This report is not due until Interstate terminal is under operations.

7 WATER QUALITY MONITORING

The baseline monitoring forms the basis for the ongoing Biodiversity Monitoring Strategy (BMS) to assess stream health in accordance with Moorebank Precinct East CoC B106, to 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 BMS outlines monitoring requirements and includes the Stormwater Monitoring Strategy required by Moorebank Precinct East CoC B43 and B44. There are no reporting requirements under MPW SSD 7709

8 STORM WATER INFRASTRUCTURE

Stormwater infrastructure managed under the Stormwater Infrastructure Operation and Maintenance Plan were inspected and assessed during the period. No significant actions were required for the operation of Stormwater infrastructure at the site.

The annual independent audit will be undertaken in July 2025 by a suitably qualified WSUD professional.

9 FLORA AND FAUNA MONITORING

Ongoing internal reporting. No submission required under SSD 7709

10 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 MPW Stage 2 Condition 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 MPW Stage 2 Condition B120

11 PREVIOUS REPORT ACTIONS

This is the first Six-Monthly Operational Compliance Report. Ongoing actions being tracked will be reported in the next Six-Monthly Operational Compliance Report.

11.1 Incidents

There were no operational incidents reported in MPW operations in the reporting period.

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APPENDIX A - SSD 7709 PART A

Status				Compliance Status		
Closed	Lodged with D...	Ongoing	Open	Compliant	Not Triggered	

Approval (ID)	Condition	DEVELOPMENT PHASE	Compliance Status	Monitoring methodology	Evidence and Comments	SUMMARY OF REQUIREMENTS
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.	At all times	Compliant	CCS	Community Communication Strategy from - 29 JUNE 2021 - Revision J	reasonable and feasible measures must be implemented to prevent
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	Compliance	OEMP - Rev 7 - Dated 06/05/24	employees, contractors (and their sub-contractors) are made aware of, and are instructed to comply with, the conditions of this consent
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	Not Triggered	Terms of Consent	No evidence at moment as condition not triggered	Planning Secretary may make written directions to the Applicant
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	At all times	Not Triggered	Terms of Consent	Noted requirement - No evidences at moment.	See the conditions description
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.	At all times	Not Triggered	Limits of Consent	Noted requirement - No evidences at moment.	See the conditions description
A13	The container freight throughput for MPW must not exceed 500,000 TEU p.a.	Operation	Compliant	Limits of Consent	BTODR currently being produced and expected to be completed in December/24	See the conditions description BTODR
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	Compliant	Fill Importation Management Plan	BTODR currently being produced and expected to be completed in December/24	See the conditions description BTODR
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	Limits of Consent	Condition addressed in construction contracts	See the conditions description
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	Limits of Consent	BTODR currently being produced and expected to be completed in December/24	See the conditions description BTODR
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	Limits of Consent	Data currently being collected by tenants	See the conditions description
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	Limits of Consent	- Final Occupation Certificate checklist - Construction of 6 warehouses and 24/7 operation of a warehousing estate - Construction Certificate - Construction and 24/7 operation of an intermodal terminal (IMT) facility to support a container freight throughput volume of 500,000 twenty-foot equivalent units (TEUs) per annum. - Occupation Certificate N1 - Occupation Certificate N2 - Evidence of Stocks	Property Manager provided: - Evidence the warehouses logistic day-to-day examples of use - Evidence of product distribution - IMEX to Warehouse, date, time (see the stock on hand report) -BTODR - leases
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	Fill Importation Management Plan	Warehouses construction certificate - Final Occupation Certificate of Warehouses - Interim occupation certificate - Stock of containers on hand report, dated 26 september 2024	Warehouses construction certificate - Final Occupation Certificate of Warehouses - Interim occupation certificate - Stock of containers on hand report, dated 26 september 2024

	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	Fill Importation Management Plan	- Knight Frank statement of No occupation before commencement of operations - Dated September 2024.	KF provided confirmation that no occupation occurred before commencement of operation. See BTODR and leases
	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	Limits of Consent	- Final Occupation Certificate of Warehouses - Interim Occupation Certificate	Not triggered
	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	Applicability of Guidelines	-No evidences as not triggered	See the conditions description
	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	Evidence of Consultation	-Submission to the department reports, management plan under Major Project Platform	See the conditions description

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: (i) 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 C18 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 (j) prepare and submit to the Planning Secretary and other relevant regulatory agencies, for information, an Environmental Representative Monthly Report providing the information set out in the Department’s Environmental Representative Protocol (2018) under the heading “Environmental Representative Monthly Reports.” The Environmental Representative Monthly Report must be submitted within seven calendar days following the end of each month for the duration of the ER’s engagement for the development, or as otherwise agreed with the Planning Secretary.	Operation	Compliant	Environmental Representative	- ER Report for 1 Feb 2024 to 27 Feb 2024 - ER Report for 1 March 2024 to 30 March 2024 - ER Report for 1 April 2024 to 30 April 2024 - ER Report for 1 May 2024 to 30 May 2024 - ER Report for 1 Jun 2024 to 30 Jun 2024 - ER Report for 1 Jul 2024 to 30 Jul 2024 - ER Report for 1 August 2024 to 31August 2024 - Stormwater Quality Monitoring Program, rev 03, dated 22/06/2023	For the duration works until 6 months after the commencement of operation (or staged operation), or as agreed with the Planning Secretary the approved ER must the rest of the consent condition details the role of the ER
	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	CCS	Community Communication Strategy from - 29 JUNE 2021 - Revision J	See the conditions description
	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	Compliant	Environmental Representative	Noted requirement - No evidences at moment.	ER Audits
	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.	At all times	Compliant	Submitting, Staging, Combining and Updating Strategies, Plans or Programs	Management plans - MOD 3 – SSD-7709 – approved 22 July 2024 - Stormwater Design Development Report, DPHI receipt approved in 19th March 24 - Revised Operational Compliance Monitoring and Reporting Program, DPHI approved in 14th June 24 - Revised Operational Emergency Response Plan, DPHI approved in 26th June 24 - Revised Operational Emergency Response Plan, DPHI approved in 30th May 24	Strategies, Plans or Programs
	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.	At all times	Compliant	Submitting, Staging, Combining and Updating Strategies, Plans or Programs	Management plans to be updated and submitted as required. No updates at moment.	Management plans
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.	Prior to operation of warehouse	Compliant	Staging of Construction	MPW Stage 2 (SSD 7709) – Estate Infrastructure Evidence required under Condition of Consent A45 - Dated 5 September 2023 Moorebank Precinct West - Stage 2 (SSD-7709) Evidence of Estate Infrastructure for Warehouses 5 & 6, Condition A45 - Dated 13 October 2023 Submission of statements to the department on September 2023	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 S1: 29/01/2025 S2: 23/02/2025 S3: 23/05/2025 S4: 09/09/2025 S5: 17/03/2025 S6: 27/05/2025 S7: 09/09/2025 S8: 12/10/2026 S9: 13/10/2026

SSD 10431		SSD-7709-Mod-2. Determined 30/09/2021		SSD-7709-Mod-1 (Building Height Increase). Determined 24/12/2020	
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:					
A46	(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	Compliant	Notification of Commencement	-MPW STAGE 2 SSD 7709 COC A46 NOTIFICATION OF COMMENCEMENT OF OPERATIONS dated 22/05/2024 WHN1: Occupation 22/05/2024 WHN2: Occupation 29/05/2024 WHN3: Occupation 19/05/2025 WHN4: Occupation 19/05/2025 -DPH Receipt of A46 Notification submission JR RDC West 12: 13/06/2024 JN NDC West 13: 15/04/2024
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.	Prior to operation	Compliant	Utilities and Public Infrastructure	Sydney Water compliance certificate - 20/06/2023 Obtain a Compliance Certificate for water and sewerage infrastructure
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.	At all times	Compliant	Advisory Notes	Condition addressed in construction contracts Licenses

APPENDIX B - SSD 7709 PART B

Approval (ID)	Condition	DEVELOPMENT PHASE	Compliance Status	Monitoring Methodology	Evidence and Comments	SUMMARY OF REQUIREMENTS
B3	To ensure the site will be developed in an integrated manner and that the whole development will comply with the conditions of this consent, submission of the Development Layout Drawings required by Condition B2 cannot be staged.	At all times	Compliant	Development Layout		ensure the site will be developed in an integrated manner. Layout Drawings required by Condition B2 cannot be staged.
B12	On-site detention (OSD) must attenuate peak flows from the development such that both the: (a) 1 in 1 year ARI event post development peak discharge rate is equivalent to the pre-development (un-developed catchment) 1 in 1 year ARI event; and (b) 1 in 100 year ARI event post development peak discharge rate is equivalent to the pre-development (un-developed catchment) 1 in 100 year ARI event.	At all times	Compliant	Design		must attenuate peak flows from the development
B13	OSD basins must: (a) be visually unobtrusive and sit within the final landform and landscaping; (b) ensure public safety by incorporation of 'safer by design' principles; and (c) have all sides with a maximum batter slope of 1V:4H, except at the OSD outlets.	At all times	Compliant	Design		must attenuate peak flows from the development
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.	At all times	Compliant	CCS	Community Communication Strategy from - 29 JUNE 2021 - Revision J	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.
B21	Outlet structures for the discharge of site stormwater drainage to the Georges River, Anzac Creek, external drainage or natural drainage lines must be constructed of natural materials to minimise erosion, facilitate natural geomorphic processes and include vegetation as necessary (gabion baskets and gabion mattresses are not acceptable).	At all times	Compliant	Stormwater Outlet Structures	Design - MID storwater report	Outlet structures compliance
B22	Outlet structures must ensure habitat connectivity and wildlife movement is maintained along the Georges River riparian corridor.	At all times	Compliant	Stormwater Outlet Structures	Design - MID storwater report	Outlet structures compliance

B24	Drawings must show: (a) all information on a drainage catchment plans and a schedule of stormwater drainage elements (pipe lines and structures). Drainage drawing documentation is to be in accordance with the requirements detailed in Liverpool Council's Development Design Specification "D5 – Stormwater drainage design" clauses D5.22 and D5.24; (b) location and width of controlled overland flow paths; (c) maximum design flow levels to AHD; (d) maintenance access to each on OSD basin; and (e) the integration with MPE Stage 1 and MPE Stage 2 stormwater infrastructure including: (i) stormwater infrastructure on the MPW site that is intended to convey (pipes or overland flow paths) or treat or detain stormwater from MPE Stage 1 and MPE Stage 2, and/ or (ii) drawings demonstrating that stormwater detention and treatment infrastructure has been provided for and approved under MPE Stage 1 and MPE Stage 2 for western draining MPE catchments.	At all times	Compliant	Stormwater System Design Drawings	Design -
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B25	All stormwater quality elements are to be detailed in the drawings including: (a) general arrangement plans at 1:500 and detailed plans as required at 1:200, showing system layout with key features including pipe arrangement with pipe sizes, diversion structure, high flow bypass, pre-treatment system, inlets, outlets, underdrainage, and maintenance vehicular access. The plans must show how the bioretention system will achieve separate cells of a maximum area of 1000 m2 with flow splitting; (b) long and cross sections showing key features and levels including liner (base level of bioretention system), submerged zone level, drainage layer, transition layer, filter surface level, extended detention level, bund/ embankment level, and level of detention storage; (c) pipe long sections, including invert levels, pipe sizes; (d) details of key structures including diversion, pre-treatment system (make/ model), inlets, outlets; (e) landscape plan including plant species; (f) specification of filter media; and (g) shadow diagrams, including surrounding features of OSD basins, actual building heights and full size of proposed trees, as per the landscape plans.	At all times	Compliant	Stormwater System Design Drawings	Design -
B26	Stormwater outlet drawings must show: (a) material type, size, thickness, with accompanying hydraulic calculations demonstrating the achievement of relevant stability thresholds; (b) design arrangement including longitudinal sections, cross sections and typical arrangements; (c) typical arrangements including details of any liners, keying into bed/ banks and filter material; and (d) the tie in with the receiving water normal water level and/ or seasonal low flow levels.	At all times	Compliant	CCS	Community Communication Strategy from - 29 JUNE 2021 - Revision J Drawing
			Not Triggered	Construction Erosion and Sediment Control	
			Not Triggered	Construction Erosion and Sediment Control	

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.	Prior to operation	Compliant	OEMP	Stormwater Infrastructure Operation and Maintenance Plan. SIOMP, DPHI receipt approval, 08th march 24
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	Stormwater System	WSUD Audit report Oct/24 - Lodged in Oct 24 Audit stormwater quality system must be undertaken by a suitably qualified professional with demonstrable experience in WSUD.

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 quantity 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.	Prior to operation	Compliant	SQMP	Stormwater Quality Monitoring Program - Rev 3 - 22/06/2023 Receipt Stormwater Quality Monitoring Plan, Condition B38 - 17/10/2023
B40	The Applicant must: (a) keep accurate records of the source, volume and type of fill imported to, and material removed from, the site; and (b) make these records available to the Department or EPA upon request.	At all times	Not Triggered	Land Disturbance, Earthworks and Importation of Fill	Records available to the Department or EPA upon request.
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	Compliant	POAQMP	This is captured by the dust deposition gauges (DDG's) owned/managed by SERS. Arcadis (Sam) to talk with KnightFrank (Michael) regarding movement of DDGs to capture site wide conditions. Currently only capturing MPE. ensure dust emissions generated by the development do not cause exceedances CoC B46 requires that 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.

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.	Prior to operation	Compliant	POAQMP	POAQMP - rev 15 - dated 20/02/23	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, CoC B47A requires preparation and implementation of a Precinct Operational AQMP, which includes monitoring for each emission source associated with site operations. The MIP West Precinct Stage 2 POAQMP, therefore, considers and covers matters of air quality management for the entire MIP (East and West precincts) during the operational phase
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).	Prior to operation	Compliant	POAQMP	Precinct Operational Air Quality Management Plan, Condition B47A DHPI RECEIPT ON 20/12/2023	AQMP secretary approval
B58	The Revised Landscape Design Drawings and Revised Architectural Drawings and associated elements must demonstrate a design that meets the design criteria and other requirements listed in Conditions B59 to B74.	At all times	Compliant	Criteria	Designs	design that meets the design criteria

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	Lighting	No evidences at moment comply with latest version of AS, and lighting be designed to reduce light spill and be mounted . KF to provide evidences
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;	At all times	Compliant	CCS	Community Communication Strategy from - 29 JUNE 2021 - Revision J signage is not permitted advertising or moving or flashing signs; west facing illuminated building signage visible from residences; and internally illuminated signs that are visible from residences;
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.	Prior to operation	Compliant	Landscape Maintenance	Landscape Vegetation Management Plan (LVMP) - Approved by DPHI in 18th December 2023
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.	At all times	Compliant	Pest and Weed Control	- Weed inspection, Moorebank Intermodal Terminal, dated 26/09/2019 - Weed inspection, Moorebank Intermodal Terminal, dated 26/08/2019 - Weed inspection, Moorebank Intermodal Terminal, dated 26/11/2019 - Weed inspection services ongoing with Toolijooa in December/24 measures to manage pests

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.	Prior to operation	Compliant	Operational Traffic and Access Management Plan	- DPHI Operational Traffic and Access Management Plan, Conditions B118 and B119 Approval Receipt, Dated 20/12/2023 - Operational Traffic and Access Management Plan, rev 09, Dated 08/04/2024 - DPHI Revised Operational Transport and Access Management Plan, Condition A42(c), Dated 07/06/2024	prepare an Operational Traffic and Access Management Plan (OTAMP) and submit it to the Planning Secretary for approval.
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.	Prior to operation	Compliant	Operational Traffic and Access Management Plan	- Operational Traffic and Access Management Plan, rev 09, Dated 08/04/2024 - DPHI Revised Operational Transport and Access Management Plan, Condition A42(c), Dated 07/06/2024	OTAMP must form part of the OEMP

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

Biannual Trip Origin and
Destination Report

BTODR currently being prepared and expected to be submitted to the Department on December 24

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.

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, RtS 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. <i>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.</i> Traffic Audits under condition B120A are required to be undertaken within 90 days of the following trigger events:	Operation	Not Triggered	Traffic Audit	No evidences at moment as event not triggered	See the condition description
B120b	(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	Traffic Audit	No evidences at moment as event not triggered	See the condition description

	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.					
B120c	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	Traffic Audit	No evidences at moment as event not triggered	See the condition description
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	Traffic Audit	No evidences at moment as event not triggered	See the condition description

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.	Pre-operation	Compliant	Workplace Travel	- Workplace Travel Plan - Revision 08 . Dated 06/03/2024 - Workplace Travel Plan and submit it to the Planning Secretary for information.	Workplace Travel Plan and submit it to the Planning Secretary for information.
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.	Pre-operation	Not Triggered	Workplace Travel	No evidence at moment	annual report on employee numbers to the Department, TfNSW and RMS
B130	The permitted hours of operation are detailed in Table 3.	Operation	Compliant	Limits of consent	Hours of Operation - Website - Tenancy schedule	Operation hours

B131

The Applicant must ensure that 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). does not exceed the noise limits in Table 4.

Operation

Compliant

Intermodal Terminal
Operational Noise Limits

1) It is recommended the Moorebank Noise Management Precinct - Management Plan (9/7/2024) is implemented, which details the how to achieve the Table 4 cumulative operational noise requirements.

2) Noise monitoring undertaken as per B139, B140, and B140A will all help to achieve the B131 noise limits.

3) Data being collected for the period of 2024 after commencement of operations in May.

1.Noise quota tech memo Section 2.3.2 details the required assessment meteorological conditions. Please confirm the meteorological conditions included in the modelling.

RTA - ISO 9613-2 does includes downwind propagation conditions but does not specifically achieve the specified project meteorological conditions detailed in Section 2.3.2. The modelling should use a model where the meteorological parameters can be defined as required (ie. CONCAWE) to specifically achieve the INP detailed meteorological conditions. I can discuss this one further with Andrew Mitchell (DDEG) if required.

2.The DDEG report notes SoundPlan was used to model the noise levels. Please confirm what elements and assumptions (with some specific details) have been included in this noise model.

RTA – Noted regarding the smoke control fans assumed not part of normal operations. However, this does then mean that the fans do not operate in dual-mode, and are not used for things like night-purge. This should be confirmed.

3.Noise quota tech memo Section 2.3.1, notes that breakout via the construction elements of the building

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	Compliant	POAQMP	CoC B132(c) requires that 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). The Best Practice Reviews are completed each year and recommendations are provided to ensure air emissions standards are being recognised and incorporated where possible. comply with best practice plant for the intermodal terminal facility, wagons using the development must incorporate available best practice noise technologies
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	Operation of Rail terminal, Locomotives and Wagons	Task 6A - Rail Noise Monitoring Report (annual) Rail monitoring annual reporting (monitoring by others) a monitoring and performance management regime is to be established in accordance with the conditions of this consent,
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).	Prior operation	Compliant	ONMP	Operational Noise Management Plan (ONMP) - DHPI approval receipt in 08th Mar 24
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	ONMP	ONMP - Rev 7 - 06/05/2024 ONMP must for part of the OEMP

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.	Prior operation	Compliant	Mechanical Plant and Other Noisy Equipment Monitoring	- Noise monitoring report N1/ N2 submitted to the department on 15th November 24. There's an explanation about exceedence of 2 months for reporting period due to collecting valid data. Dependency on the condition B138. See comments on the B138.
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	Operation	Compliant	Site Noise Monitoring and Reporting	Site noise monitoring currently being addressed by Renzo Tonin Report must include impacts, monitoring, methodology, assessment on the performance

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:	Operation Compliant	Site Noise Monitoring and Reporting 1) Timing has been triggered by commencement of operation of N1/N2 August 2024. Monitoring will be required between November 2024 and January 2025, as first warehouses commenced operating August 2024. 2) Coordinating with resident a 9 Casula during October 2024 would assist with preparation for monitoring, as access permissions for monitoring are required, or the identification of an alternative location if this is not forthcoming. This would require access to the eastern yard of the property. noise impact monitoring and residual noise impact mitigation
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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	Rail Noise Monitoring and Reporting	Omnis Environment Suite monitoring system in place. install and maintain a rail noise monitoring system
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.	Prior to operation	Compliant	Rail Noise Monitoring and Reporting	submit to the Planning Secretary for approval, justification supporting the appropriateness of the location for rail noise monitoring
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	Rail Noise Monitoring and Reporting	the Applicant must provide an annual Rail Noise Monitoring Report to the Planning Secretary for a period of 5 years

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	KMP	Koala Management Plan - Dated 12 March 2020 - Fauna monitoring Rev 3
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.	Prior to operation	Compliant	KMP	Koala Management Plan - Operational Flora and Fauna Management Plan Dated 12 March 2020 - (OFFMP) must be prepared and be submitted to the Rev 3 Planning Secretary for approval.

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.	At all times	Compliant	Hazards and Risks total quantities of dangerous goods to be provided after operation in June/25 commence KF to provide evidences in June/25
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	Hazards and Risks Oct/24: 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. Final Safety Study, Condition B176B submitted to secretary on 10/12/2024 KF to provide evidences of JR/JN DG quantities

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. 5, 'Hazard	Operation	Compliant	Hazards and Risks - Final Hazard Analysis Receipt, Woolworths Rev 1 - JN Fire Safety Study Receipt, Woolworths Rev 3 Evidence to be provided: Dangerous goods evidence - 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.
B177d	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	Compliant	Hazards and Risks No evidences at moment Hazard Audit of the warehouse/s must be carried out and a report submitted to the Planning Secretary within one month of each audit.

B177e	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.	At all times	Compliant	Hazards and Risks	No evidences at moment	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
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	Hazards and Risks	No evidences at moment	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
B178	Fuel stored on the site must only be used for the purposes of refuelling IMT facility plant and equipment, locomotives and trucks associated with the operation of the Warehouse JR and JN Distribution Precinct.	Operation	Compliant	Hazards and Risks	No evidences at moment	Fuel stored ON SITE - Mod-3 KF to provide evidences
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.	Prior-operation	Compliant	Hazards and Risks	- CoC B179 statement for JR/ JN Distribution submitted on 22 October 2024 - MoNDC DHI receipt submission on 12 December 2024	Submission of occupation and operation statement
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	Waste Management	No evidences at moment	obtain agreement from Council for the design of the as condition not triggered waste storage
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	Waste Management	Satisfied on OEMP page 45 - 5.2.1.3. Waste	See the condition description

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	Compliant	Crushing Plant	container wash down facility must include oily water separation, comply with sydney water, include bunding to exclude wash area waste
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	OPERATION OF PLANT AND EQUIPMENT	No evidences at moment See the condition description
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	TENANCY ACTIVITIES	- Statements acknowledging compliance provided of N1 and N2 WHN1: Occupation 22/05/2024 WHN2: Occupation 29/05/2024 WHN3: Occupation 19/05/2025 WHN4: Occupation 19/05/2025 - Pending RDC statement

APPENDIX C – SSD 7709 PART C

Approval (ID)	Condition	DEVELOPMENT PHASE	Compliance Status	Monitoring methodology	Evidence and Comments	SUMMARY OF REQUIREMENTS
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	At all times	Compliant	POAQMP/ OEMP/ ASSMP	Operation Independent Audit Program - Rev 03 - 22/03/2024 Submission to the department made by Aspect on 12/04/2024 Operational Flora and Fauna Management Plan - Rev 09 - Dated 06/05/2024	Review folders and collect past records from 21, 22, 23 and 24

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.	Prior to operation	Compliant	POAQMP/ OEMP	OEMP receipt provided	DPE Receipt
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	Prior to operation	Compliant	POAQMP/ OEMP/ LVMP	OEMP receipt provided	DPE Receipt

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).

Prior to operation

Compliant

OEMP

OEMP receipt provided

DPE Receipt

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.

Operations

Not Triggered

REVISION OF STRATEGIES, PLANS AND PROGRAMS

No evidences at moment

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.:

Operations

Compliant

REVISION OF
STRATEGIES,
PLANS AND
PROGRAMS

OFFMP approved in 12
December 2024, receipt
in the folder

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.	Operations	Not Triggered	Incident Notification, Reporting and Response	No evidences at moment	Incident notification
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.	Operations	Not Triggered	Department notification	No evidences at moment	Non-compliance notification

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.	At all times	Not Triggered	Department notification	No evidences at moment	Non-compliance notification
C13	A non-compliance which has been notified as an incident does not need to also be notified as a non-compliance.	At all times	Not Triggered	Department notification	No evidences at moment	Non-compliance notification

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.	Operations	Not Triggered	Compliance Reporting Post Approval Requirements (Department 2018)	No evidences at moment	POCR
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C15	Notwithstanding 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.	At all times	Compliant	Compliance Reporting Post Approval Requirements (Department 2018)	The reports are currently being submitted to the departments.	Compliance Reporting Post Approval Requirements (Department 2018)
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.	1 month before construction and operations commence	Compliant	OIAP	Operation Independent Audit Program - Rev 03 - 22/03/2024 Submission to the department made by Aspect on 12/04/2024	DPE Receipt

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

Compliant

Compliance Reporting Post Approval Requirements (Department 2018)

Noted. Audits to be in place.

Compliance Reporting Post Approval Requirements (Department 2018)

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

Compliant

Compliance
Reporting Post
Approval
Requirements
(Department
2018)

The reports are currently
being submitted to the
departments.

Compliance
Reporting Post
Approval
Requirements
(Department 2018)

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.

Operations

Compliant

Compliance
Reporting Post
Approval
Requirements
(Department
2018)

The reports are currently
being submitted to the
departments.

Compliance
Reporting Post
Approval
Requirements
(Department 2018)

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.

At all times

Compliant

Compliance
Reporting Post
Approval
Requirements
(Department
2018)

The reports are currently
being submitted to the
departments.

Compliance
Reporting Post
Approval
Requirements
(Department 2018)

APPENDIX D – AIR QUALITY MONITORING COMPLIANCE REPORT

MOOREBANK INTERMODAL PRECINCT – EAST AND WEST PRECINCTS

Operational Air Quality Six Monthly Compliance Report #9
May 2024 – October 2024

05 DECEMBER 2024

A large, solid orange geometric shape, resembling a stylized triangle or a section of a larger polygon, is positioned in the bottom right corner of the page. It extends from the bottom edge and the right edge, with its hypotenuse facing towards the top left. A thin white line runs diagonally across the orange shape, and a thin white horizontal line runs across the page just above the orange shape.

CONTACT

[REDACTED]
Environmental Consultant

T +61 2 8907 2684

M +61431 941 703

E sam.brown@arcadis.com

Arcadis

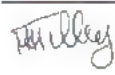
Level 16

580 George Street
Sydney NSW 2000

MOOREBANK INTERMODAL PRECINCT – EAST AND WEST PRECINCTS

Operational Air Quality Six Monthly Compliance Report #9

May 2024 – October 2024

Author	Samuel Brown	
Checker	Heather Tilley	
Approver	Heather Tilley	

Report No PREC-ARC-EN-RPT-0014
Date 5/12/2024
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	03/12/2024	Submitted draft to client for review	SB	HT
002	05/12/2024	Submitted final to client based on comments	SB	HT

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1 INTRODUCTION

1.1 Background

The Moorebank Logistics Park¹ – Precinct East Operational Air Quality Monitoring Programme Framework (OAQMPF - dated 19 March 2020) initially 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 Operational Air Quality Management Plan (OAQMP - Revision 18 dated 20 January 2023) monitoring and reporting requirements.

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 2020 December 2023.

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). This Operational Air Quality Six Monthly Compliance Report #9 (this report) 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, i.e.:

- *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 of the:

- **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 and Warehouse 7a and 7b. Warehouse 6 is occupied but not currently operating.

No major construction related activities occurred in 2024, with only internal fit-out and preparation for operations occurring. These activities were 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
1 April 2024 to 30 June 2024	Moorebank Avenue upgrade (Including Anzac and Bapaume Roads)

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 OAQMPP (March 2020) and Section 4.3 of the POAQMP (December 2023).

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

MIP East Precinct (MPE) commenced operations on 13 May 2020 and MIP West Precinct (MPW) commenced operations in April 2024.

This six-monthly internal air quality report has been prepared to provide an overview of operational air quality results for the six-month operational period from 1 May 2024 to 31 October 2024 (inclusive) to inform the six-monthly operational compliance reports required for the life of the project.

This report will be the ninth report since MIP (East Precinct) operations began in May 2020. Eight of the reports were for MPE only, and the ninth report (this report) combines the operations of MIP (East and West Precincts).

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:

- NO₂ (range: 0-25 ppb)
- PM₁₀ (particles with have a diameter less than 10 microns)
- PM_{2.5} (range: 0-1000 µg/m³)
- 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 PM₁ i.e. particulates of less than one micron in size.

2.2 Dust deposition gauges

Seven DDG's are located across both precincts. 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.

The DDGs were installed in May 2021 and 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.

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 and to a slightly lesser extent, any construction activities occurring at MPW Stage 2.

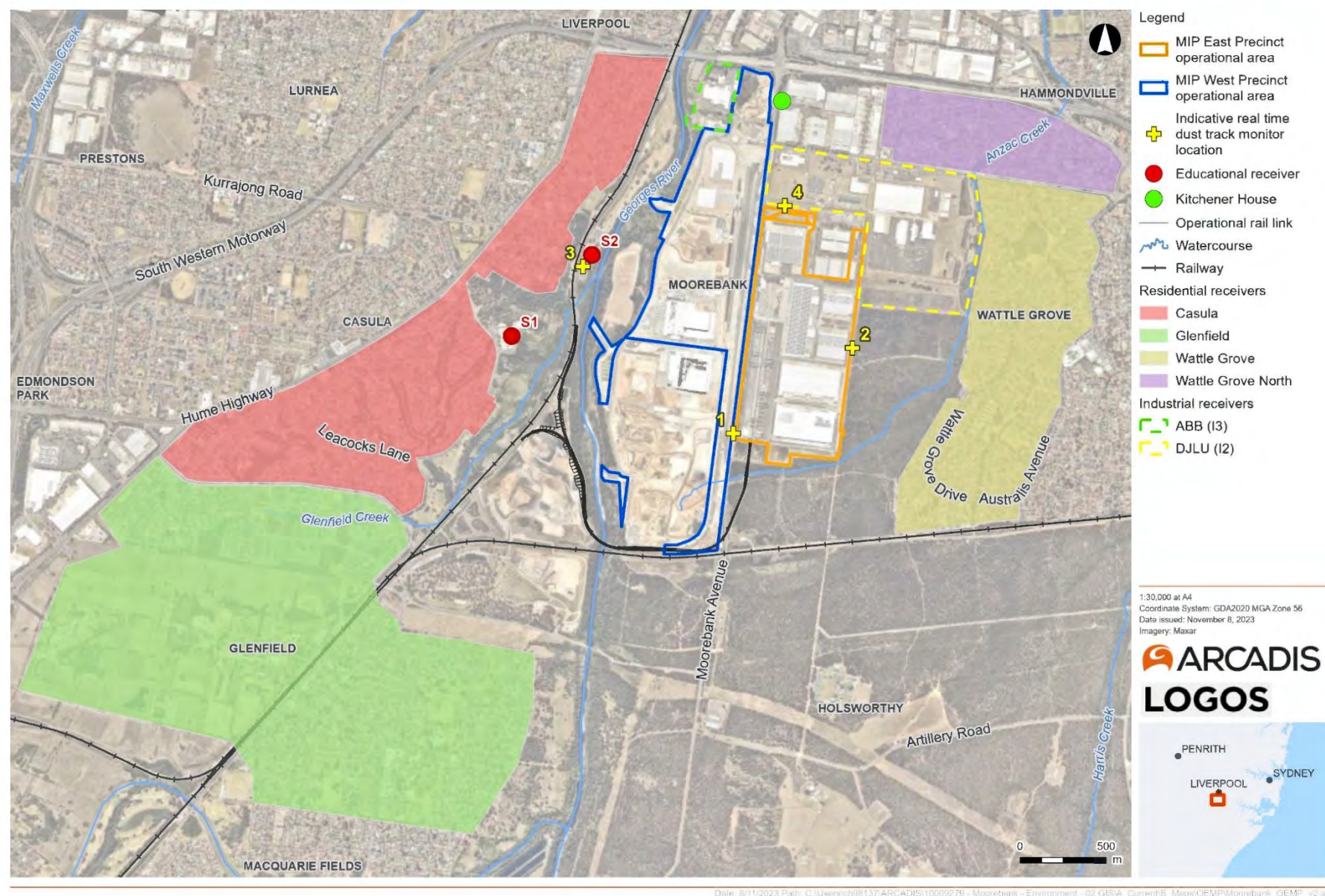


Figure 2-1: Continuous real-time air quality monitors (Source: Arcadis, 2023)

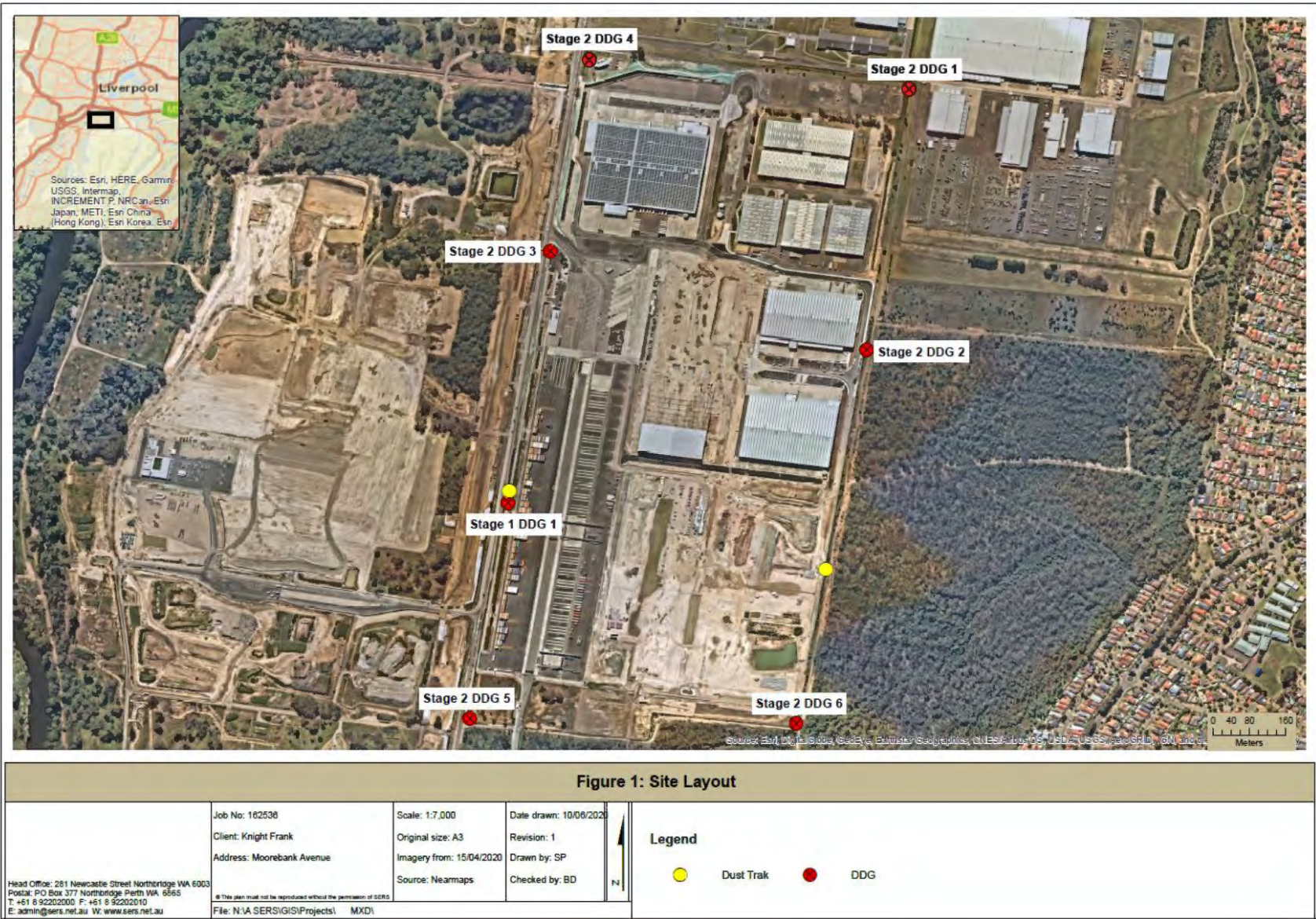


Figure 2-2: Location of Dust Deposition Gauges (Source: SERS, October 2024). Stage refers to approval stages for MPE.

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 2024	Jun 2024	Jul 2024	Aug 2024	Sep 2024	Oct 2024	Average %	Latest calibration date
	% availability each month							
AQM01	100	100	100	100	100	100	100	March 2024
AQM02	100	100	100	100	100	100	100	March 2024
AQM03	95	100	100	100	100	99	99	March 2024
AQM04	99	100	58 ¹	85 ²	100	100	88	March 2024

¹ AQM04 only had 58% availability for PM_{2.5} and PM₁₀, however, the monitor had 100% availability for NO₂ and CO

² AQM04 only had 85% availability for PM_{2.5} and PM₁₀, however, the monitor had 100% availability for NO₂ and CO

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.

- Compared to last reporting period, monitor AQM03 availability has improved significantly with an average of 99% for this reporting period (compared to 77% for the previous reporting period).
- Monitors AQM01 and AQM02 had 100% availability through the reporting period.
- AQM04 had 58% availability in July 2024 for PM_{2.5} and PM₁₀ and 85% availability in August 2024 for PM_{2.5} and PM₁₀. Availability was 100% at AQM04 in July and August for CO and NO₂. This has resulting in a lower average availability (88%) for the reporting period, compared to 100% for the previous reporting period. Availability improved for September and October 2024.

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

The site weather station was unavailable for August 2024, September 2024 and October 2024, therefore, weather data from the government operated Bankstown Airport Automatic Weather Station (AWS) (station 066137) was used to assess the prevailing wind conditions for these months.

3.1.2.1 Site weather station

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

Table 3-1: Site weather station average wind speed and direction for May 2024 to July 2024

Month	Wind speed (m/s)	Beaufort Wind scale category ³	Wind direction
May 2024	1.1	Light air	Southwest (233°)
June 2024	0.9	Light air	West-southwest (243°)
July 2024	0.5	Light air	West-southwest (241°)

3.1.2.2 Bankstown Airport AWS

The AWS was used as a reference station from August 2024 to October 2024 as there was no data available from the site weather station between these months.

The average wind speed and direction data at 9 am and 3 pm from the Bankstown Airport AWS from August 2024 to October 2024 is summarised in Table 3-2.

Table 3-2: Bankstown Airport AWS average wind speed and direction for August 2024 to October 2024

Month	9 am			3 pm		
	Wind direction	Wind speed (m/s)	Beaufort Wind scale category	Wind direction	Wind speed (m/s)	Beaufort Wind scale category
Aug 2024	Variable	2.6	Light breeze	Variable	3.9	Gentle breeze
Sep 2024	Variable	3.1	Light breeze	Variable	5.5	Moderate breeze
Oct 2024	West-northwest	3.1	Light breeze	East-southeast	5.9	Moderate breeze

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)

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 be 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 3-3.

Table 3-3: 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 2024	10.7	20.8	0.8	62.7
June 2024	6.8	17.5	176.4	78.2
July 2024	7.0	17.6	48.4	47.9
Aug 2024	9.6	21.6	20.2	48.9
Sep 2024	9.7	23.8	32.2	44.3
Oct 2024	12.5	24.3	38.2	61.4

Source: [Bankstown, NSW - October 2024 - Daily Weather Observations \(bom.gov.au\)](https://www.bom.gov.au)

Rainfall for the reporting period was mixed throughout the 6-month period. However, June 2024 was well above the long-term monthly average rainfall and May 2024 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 3-1⁴.

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

Air quality categories (AQC)							
Air pollutant	Averaging period	Units	GOOD	FAIR	POOR	VERY POOR	EXTREMELY POOR
Ozone	1-hour	pphm	<6.7	6.7–10.0	10.0–15.0	15.0–20.0	20.0 and above
O ₃	4-hour rolling	pphm	<5.4	5.4–8.0	8.0–12.0	12.0–16.0	16.0 and above
Nitrogen dioxide	1-hour	pphm	<8	8–12	12–18	18–24	24 and above
NO ₂							
Visibility	1-hour	bsp	<1.5	1.5–3.0	3.0–6.0	6.0–18.0	18.0 and above
Neph							
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	1-hour	pphm	<13.3	13.3–20.0	20.0–30.0	30.0–40.0	40.0 and above
SO ₂							
Particulate matter	1-hour	µg/m ³	<50	50–100	100–200	200–600	600 and above
< 10 µm PM ₁₀							
Particulate matter	1-hour	µg/m ³	<25	25–50	50–100	100–300	300 and above
< 2.5 µm PM _{2.5}							

Figure 3-1: Air quality categories

The PM₁₀, PM_{2.5}, NO₂, Visibility and CO air quality data from the Liverpool⁵ monitoring station is reviewed monthly and is summarised for the six-month reporting period in Table 3-4.

Table 3-4: 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 average	Good	Good every day
PM ₁₀ 24-hour average	Mostly good, with 7 days fair.	'Good' every day except for: - Friday 24 May 2024 had 'fair' PM₁₀ (39.7 µg/m³) - Tuesday 28 May 2024 had 'fair' PM₁₀ (37.5 µg/m³) - Wednesday 29 May 2024 had 'fair' PM₁₀ (45.5 µg/m³) - Wednesday 24 July 2024 had 'fair' PM₁₀ (35.3 µg/m³) - Friday 30 August 2024 had 'fair' PM₁₀ (43.9 µg/m³) - Wednesday 4 September 2024 had 'fair' PM₁₀ (34.1 µg/m³) - Wednesday 25 September 2024 had 'fair' PM₁₀ (36.0 µg/m³).
PM _{2.5} 24-hour average	Mostly good, with 3 days fair.	'Good' every day except for: - Tuesday 28 May 2024 had 'fair' PM_{2.5} (17.1 µg/m³) - Wednesday 29 May 2024 had 'fair' PM_{2.5} (17.2 µg/m³) - Monday 5 August 2024 had 'fair' PM_{2.5} (16.9 µg/m³).

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

Month	Average for Reporting Period	Comment for reporting period
Visibility ⁶ ,	Mostly good, with 2 days fair.	'Good' every day except for: • Sunday 19 May 2024 had 'fair' Visibility ($1.54 \times 10^{-4} \text{ m}^{-1}$) • Saturday 29 June 2024 had 'fair' Visibility ($1.67 \times 10^{-4} \text{ m}^{-1}$).

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 $1.5 \times 10^{-4} \text{ m}^{-1}$. NSW has adopted a 1-hour visibility standard of $2.1 \times 10^{-4} \text{ m}^{-1}$, 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}, PM₁₀, NO₂ and CO

The National Environment Protection Measure for Ambient Air (Air NEPM)⁷ has established new national standards for assessment of air quality for NO₂ and CO, which came into effect 13 May 2021. These criteria are detailed in Table 4-1. The air quality data at MPE was assessed against the new criteria from June 2021.

Table 4-1: Monitoring criteria (applied from June 2021)

Monitoring focus	Averaging period	Criteria / Trigger
PM _{2.5}	24-hour average	25 µg/m ³
	Annual average	8 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

It is also worth noting that in 2025, the criteria for PM_{2.5} will change to 20 µg/m³ for the 24-hour averaging period and 7 µg/m³ for the annual average.

4.1.2 Dust deposition

Dust deposition data from seven DDGs located around MIP is provided by SERS and have been provided for incorporation into the monitoring program since May 2021.

DPE 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 8 April 2024 to 24 October 2024 as provided by SERS is shown in Table 4-3.

Table 4-3: Dust deposition (insoluble solids g/m²/month) results from 8 April 2024 to 24 October 2024

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	Average
May 2024	2.7	0.4	0.5	1.3	0.5	0.6	1.0	1.0
June 2024	0.6	0.2	0.4	3.6	0.3	0.3	0.2	0.8
July 2024	0.5	<0.1	<0.1	1.1	0.4	0.4	0.1	0.5
August 2024	1.2	0.6	1.1	1.7	0.5	0.8	0.1	0.9
September 2024	0.8	0.5	N/A*	3.6	0.7	1.8	0.3	1.3
October 2024	1.5	1.0	1.2	2.0	1.0	1.0	0.8	1.2

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

* Stage 2 DDG 2 was damaged while handling therefore no results available for the sampling period.

All months (except for October 2024) include data from two different SERS DDG reports to ensure the entire month was covered. This was due to collection periods ending during the month rather than at the beginning or end of the month and sometimes covered over two months' worth of data. NOTE: The information in the table provides consolidated results per month to minimise any confusion with the exceedances.

As shown in Table 4-3, there were four individual gauge exceedances between May 2024 and October 2024. However, no monthly average exceedances of the dust deposition (insoluble solids) 2 g/m²/month (incremental) and 4 g/m²/month (cumulative) criteria occurred between 8 April 2024 and 24 October 2024.

4.3 Continuous monitor results

Monitoring data for PM_{2.5}, PM₁₀, NO₂ 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.

AQM03 did not record any data between June 2023 and 19 September 2023 and also had low data availability between 33% and 88% for each month between October 2023 and April 2024. This has resulted in a low average availability for the monitor for the rolling 12 month averages.

The sensors and monitoring software was swapped out in mid-April 2024 and as such, there was no data available to calculate the monthly and annual averages for April 2024. Daily, and hourly (1hr/8hr) exceedances were calculated for April 2024 and are described in further detail below.

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

4.3.1.1 PM_{2.5} and PM₁₀ Monitoring

The 12-month rolling annual average for the period November 2023 to October 2024 for all four monitors combined was below the annual average criteria (i.e. 8.0 µg/m³ for PM_{2.5} and 25.0 µg/m³ for PM₁₀) for each month, excluding April 2024.

As of October 2024, the 12-month rolling annual average for all four monitors (excluding April 2024) was 3.7 µg/m³ for PM_{2.5} and 10.1 µg/m³ for PM₁₀.

See [Appendix A.1](#) and [Appendix A.2](#) for more details.

4.3.1.2 NO₂ Monitoring

The 12-month rolling annual average for all four monitors for the period November 2023 to October 2024 was below the annual average criteria (0.03 ppm) for each month.

As of October 2024, the 12-month rolling annual average (excluding April 2024) for NO₂ for all four monitors is 0.009 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 2024 to October 2024) did not identify any exceedance of the 24-hour average criteria (25 µg/m³) for PM_{2.5} for the 6-month reporting period.

4.3.2.2 PM₁₀ Monitoring

One exceedance of the 50 µg/m³/day limit for PM₁₀ was recorded during the 6-month reporting period (May 2024 to October 2024). This exceedance is summarised in Table 4-4. The table includes the 24-hour average for PM₁₀ recorded at the Liverpool monitoring station for comparison and includes analysis of the exceedance.

Table 4-4 Summary of exceedance of the PM₁₀ 50 µg/m³/day limit

Date of exceedance	AQM01 µg/m ³	AQM02 µg/m ³	AQM03 µg/m ³	AQM04 µg/m ³	Liverpool average ^a
13/08/2024	-	-	-	61.9	15.9

Analysis of exceedance

The higher recordings occurred from 10am to midnight. No out of hours works occurred during the time of exceedance.

Trains were arriving/ departing the terminal on this day during times of exceedance. However, AQM04 is located approximately 680 metres to the north of where the trains operate, therefore the exceedance is unlikely to be related to the train movements.

The exceedance did not coincide with any higher readings at the Liverpool air quality monitoring station. This may indicate that more localised sources are influencing air quality in this location.

^a Liverpool average: The 24-hour average is the average of the 1-hour averages recorded for the day (i.e., between 01:00 and 24:00)

4.3.3 NO₂ 1-hour exceedances

No exceedance of NO₂ 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

No complaints were made relating to air quality during this reporting period.

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 2024 to October 2024 (inclusive).

The following summarises the monitoring results for this reporting period:

- The rolling annual average for all four monitors combined was below the annual average criteria ($8.0 \mu\text{g}/\text{m}^3$ for $\text{PM}_{2.5}$ and $25.0 \mu\text{g}/\text{m}^3$ for PM_{10}) for each month during the reporting period (excluding April 2024).
- There were no exceedances of the $\text{PM}_{2.5}$ 24-hour average criteria ($25 \mu\text{g}/\text{m}^3$) during the 6-month reporting period.
- There was one (1) exceedance (out of 184 days) of the PM_{10} 24-hour average criteria ($50 \mu\text{g}/\text{m}^3$) during the 6-month reporting period (0.5%).
 - The exceedance was recorded at AQM04.
 - The exceedance had higher readings from approximately 10am to midnight.
 - The exceedance did not coincide with any higher readings at the Liverpool air quality monitoring station. This may indicate more localised sources influencing air quality.
 - August 2024 was a drier month compared to long-term averages, which may have contributed to the exceedance.
 - No out of standard hours work occurred during times of PM_{10} exceedance.
 - The exceedance occurred during times when trains were entering/exiting the site, although based on the location of the monitors from the trains (~680 metres) it is therefore considered unlikely that the exceedance was attributed to the train movements.
- 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) at AQM02 and AQM04 (the only monitors that recorded CO) during the 6-month reporting period.
- There were four individual gauge exceedances of the dust deposition (insoluble solids) $2 \text{ g}/\text{m}^2/\text{month}$ (incremental) criteria between May 2024 and October 2024. However, no monthly average exceedances of the dust deposition (insoluble solids) $2 \text{ g}/\text{m}^2/\text{month}$ (incremental) and $4 \text{ g}/\text{m}^2/\text{month}$ (cumulative) criteria occurred between 8 April and 24 October 2024 as reported by SERS.
- It is recommended that monitors continue to be calibrated annually as per operational requirements and device specifications.

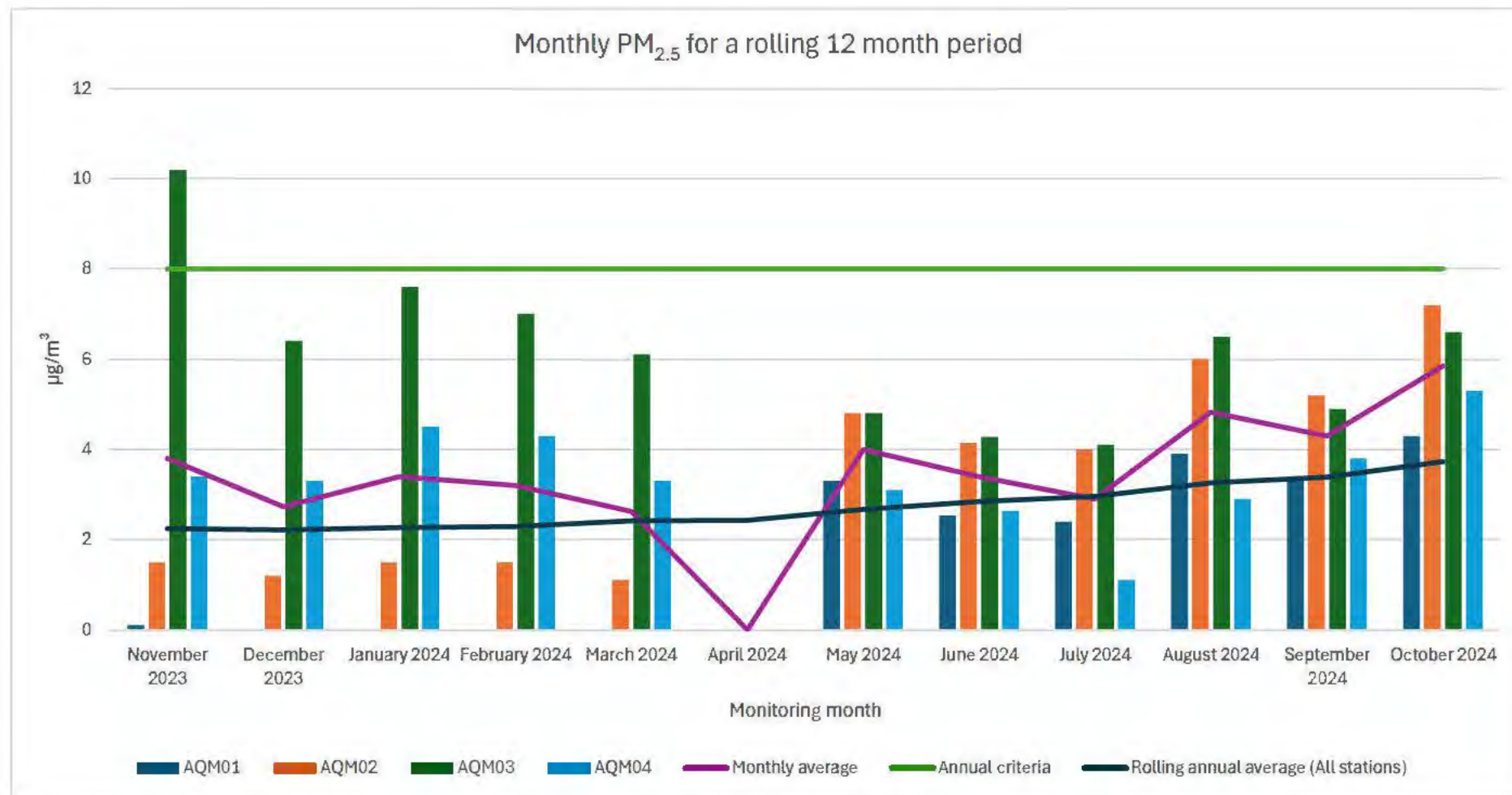
APPENDIX A

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 2023	0.1	1.5	10.2	3.4	3.8	2.2	8.0	No exceedance of annual average criteria. AQM03 had sporadic recording of data through the month.
December 2023	0.0	1.2	6.4	3.3	2.7	2.2	8.0	No exceedance of annual average criteria.
January 2024	0.0	1.5	7.6	4.5	3.4	2.3	8.0	No exceedance of annual average criteria. AQM03 had sporadic recording of data through the month.
February 2024	0.0	1.5	7.0	4.3	3.2	2.3	8.0	No exceedance of annual average criteria. AQM03 had sporadic recording of data through the month.
March 2024	0.0	1.1	6.1	3.3	2.6	2.4	8.0	No exceedance of annual average criteria. AQM03 had sporadic recording of data through the month.
April 2024	N/A	N/A	N/A	N/A	N/A	2.4	8.0	Sensors and monitoring systems were swapped half-way through April, therefore data is inconsistent, and averages aren't available for the month.
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.
Rolling 12 month average	1.8	3.5	6.2	3.4	-	-	8.0	No exceedance of annual average criteria.
All months[^]	1.0	3.3	6.6	2.7	3.3	-	8.0	No exceedance of annual average criteria.

Bold/grey indicates an exceedance of the criteria.

[^] All months since May 2020

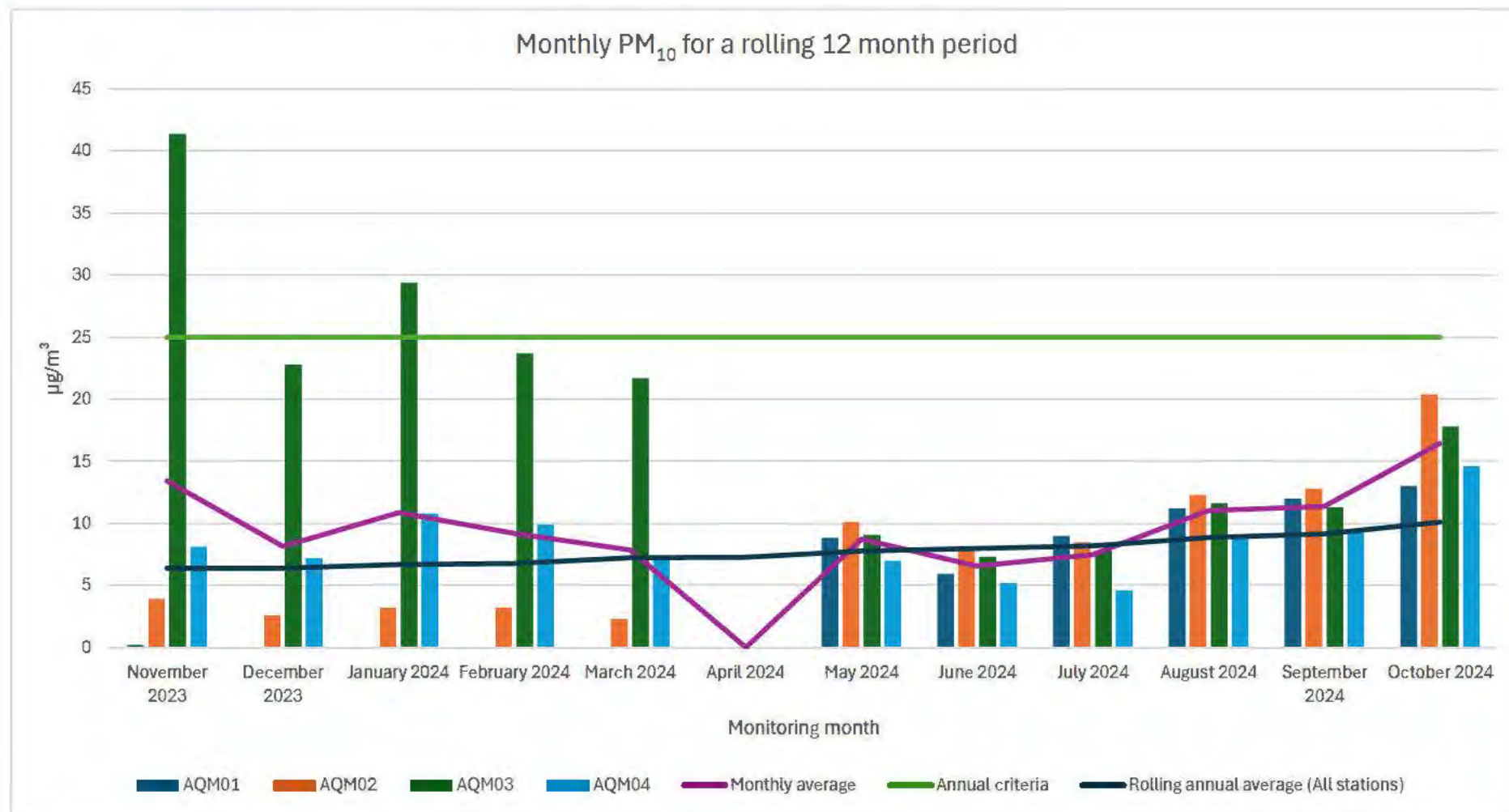


Monthly PM_{2.5} over 12 months including the 6-months for this report

Appendix A.2: Rolling 12-month particulate data (PM₁₀)

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 2023	0.2	3.9	41.4	8.1	13.4	6.4	25.0	No exceedance of annual average criteria. AQM03 had sporadic recording of data through the month.
December 2023	0.0	2.6	22.8	7.2	8.2	6.4	25.0	No exceedance of annual average criteria.
January 2024	0.0	3.2	29.4	10.8	10.9	6.7	25.0	No exceedance of annual average criteria. AQM03 had sporadic recording of data through the month.
February 2024	0.0	3.2	23.7	9.9	9.2	6.8	25.0	No exceedance of annual average criteria. AQM03 had sporadic recording of data through the month.
March 2024	0.0	2.3	21.7	7.4	7.9	7.2	25.0	No exceedance of annual average criteria. AQM03 had sporadic recording of data through the month and a very high maximum.
April 2024	N/A	N/A	N/A	N/A	N/A	7.2	25.0	Sensors and monitoring systems were swapped half-way through April, therefore data is inconsistent, and averages aren't available for the month.
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.
Rolling 12 month average	5.5	7.9	18.5	8.5	-	-	25.0	No exceedance of annual average criteria.
All months [^]	2.9	9.6	22.2	5.9	9.9	-	25.0	No exceedance of annual average criteria.

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



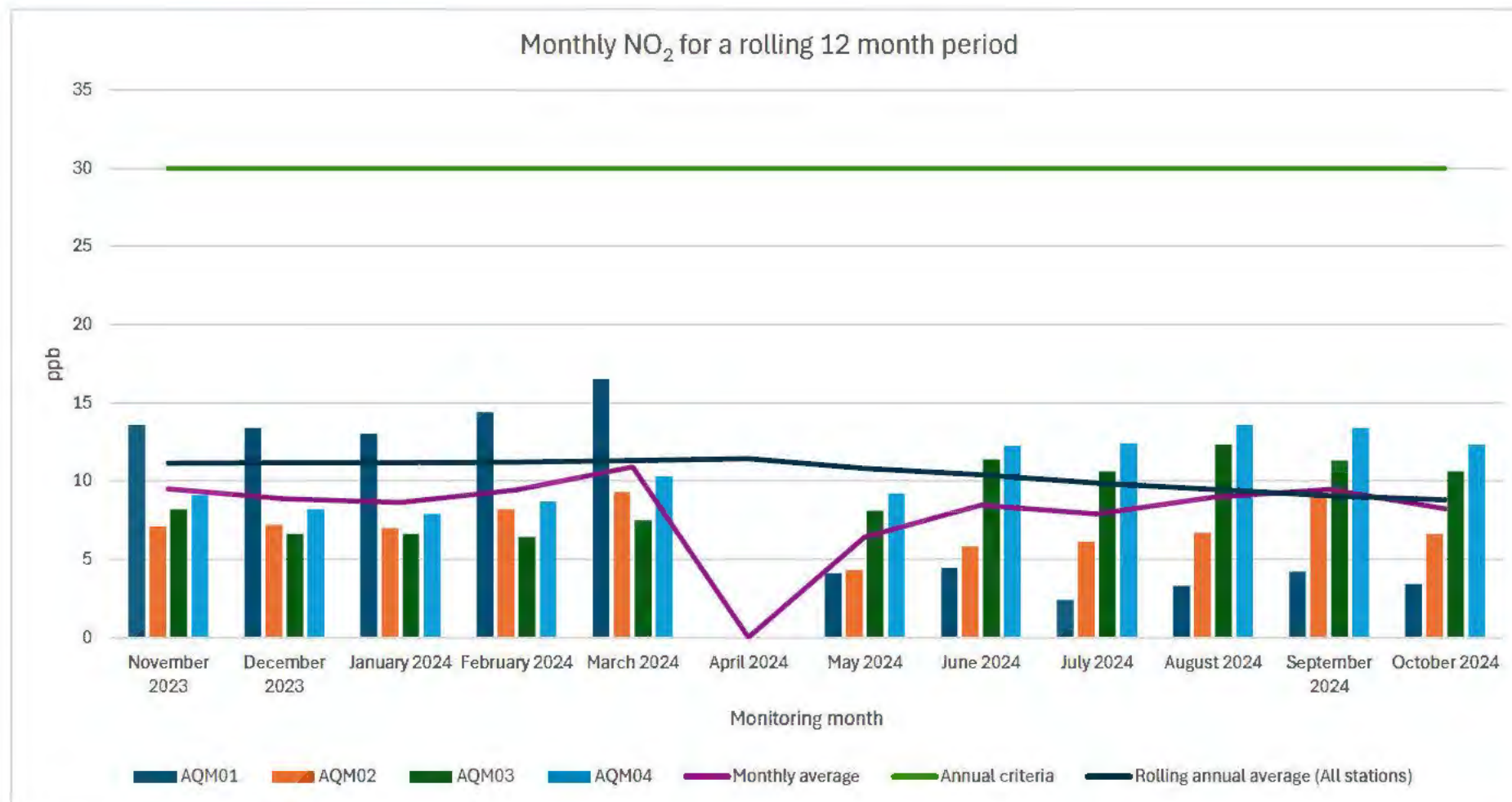
Monthly PM₁₀ over 12 months including the 6-months for this report

Appendix A.3: Rolling monthly and annual particulate data (NO₂)

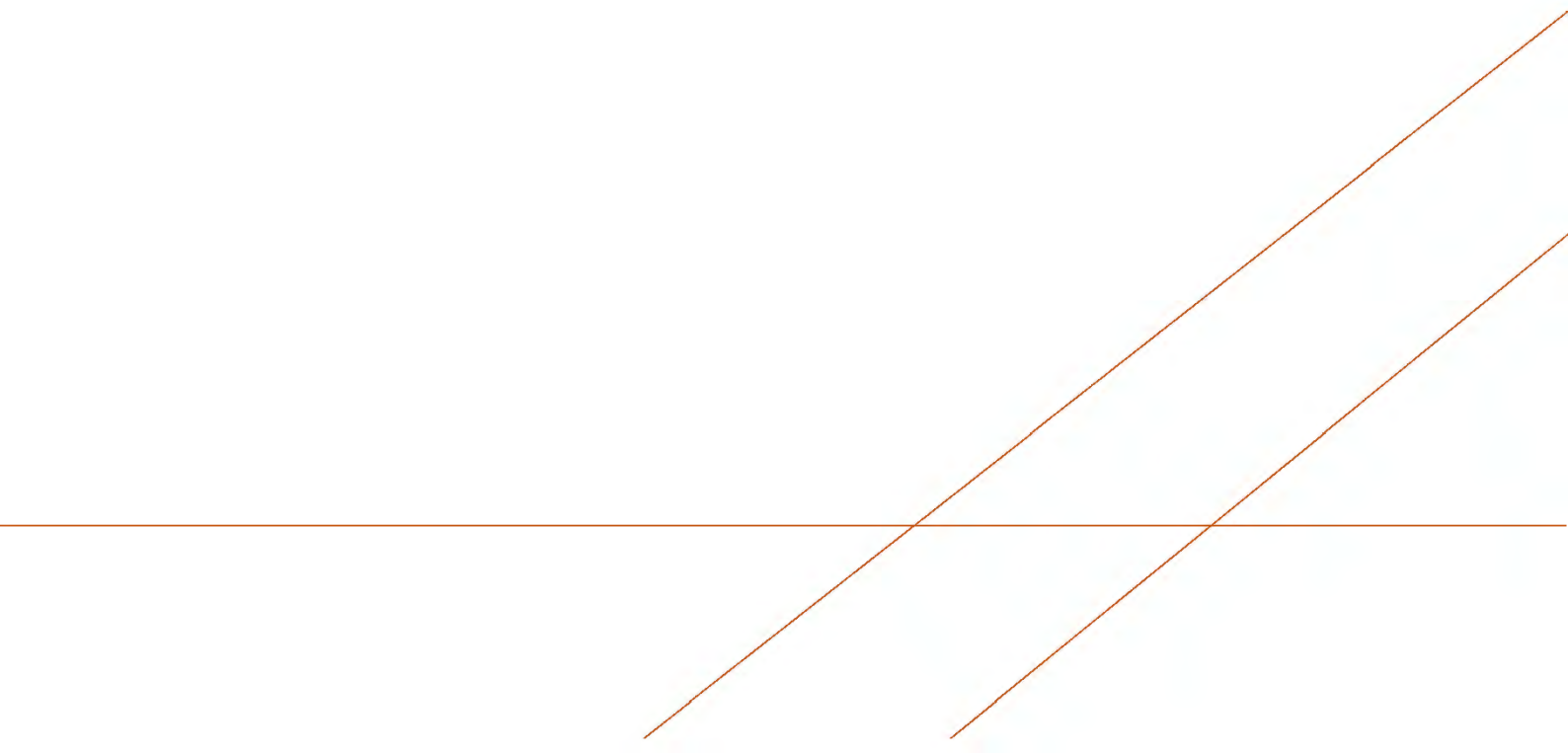
Month	Average AQM01	Average AQM02	Average AQM03	Average AQM04	Months Average All stations	Rolling annual average All stations	Annual average criteria	Comments
	ppb	ppb	ppb	ppb	ppb	ppb	ppm / ppb*	
November 2023	13.6	7.1	8.2	9.1	9.5	11.1	0.03 / 30.0	No exceedance of annual average criteria. AQM03 had sporadic recording of data through the month.
December 2023	13.4	7.2	6.6	8.2	8.9	11.2	0.03 / 30.0	No exceedance of annual average criteria.
January 2024	13.0	7.0	6.6	7.9	8.6	11.2	0.03 / 30.0	No exceedance of annual average criteria. AQM03 had sporadic recording of data through the month.
February 2024	14.4	8.2	6.4	8.7	9.4	11.2	0.03 / 30.0	No exceedance of annual average criteria. AQM03 had sporadic recording of data through the month.
March 2024	16.5	9.3	7.5	10.3	10.9	11.3	0.03 / 30.0	No exceedance of annual average criteria. AQM03 had sporadic recording of data through the month.
April 2024	N/A	N/A	N/A	N/A	N/A	11.3	0.03 / 30.0	Sensors and monitoring systems were swapped half-way through April, therefore data is inconsistent, and averages aren't available for the month
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.
Rolling 12 month average	0.008 ppm / 8.4 ppb	0.007 ppm / 7.0 ppb	0.009 ppm / 9.1 ppb	0.011 ppm / 10.7 ppb	-	-	0.03 / 30.0	No exceedance of annual average criteria.
All months^	0.007 ppm / 7.3 ppb	0.006 ppm / 6.0 ppb	0.040 ppm / 39.9 ppb	0.011 ppm / 11.2 ppb	0.015 ppm / 15.4 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 NO₂ over 12 months including the 6-months for this report



APPENDIX E – NOISE MONITORING REPORTS

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MOOREBANK INTERMODAL PRECINCT WEST

Monitoring Report for Mechanical Plant (SSD 7709 B139) - Warehouse N1

12 November 2024

The Trust Company (Australia) Limited (ACN 000 000 993) as trustee of the
Moorebank Industrial Warehouse Trust c/- Tactical Group

TM306-22-01F01 N1 B139 Noise Monitoring Assessment (r3).docx

Document details

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Attention:	

Document control

Date	Revision history	Non-issued revision	Issued revision	Prepared	Instructed	Reviewed / Authorised
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12.11.2024	Final	-	3	M. Ali	A. Leslie	A. Leslie

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In preparing this report, we have relied upon, and presumed accurate, any information (or confirmation of the absence thereof) provided by the Client and/or from other sources. Except as otherwise stated in the report, we have not attempted to verify the accuracy or completeness of any such information. If the information is subsequently determined to be false, inaccurate, or incomplete then it is possible that our observations and conclusions as expressed in this report may change.

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1 Introduction

1.1 Monitoring report purpose

Renzo Tonin & Associates was engaged by Logos Investment Management (Logos) on behalf of The Trust Company (Australia) Limited (ACN 000 000 993) as trustee of the Moorebank Industrial Warehouse Trust to undertake noise monitoring of the warehouse mechanical plant and other noisy equipment to satisfy the (State Significant Development (SSD) 7709 B139 consent condition (CoC) for the Warehouse N1. Warehouse N1 is located within the Moorebank Precinct West (MPW), which forms part of the Moorebank Intermodal Precinct (MIP) at Moorebank, NSW. Warehouse N1 is currently tenanted by Maersk.

The Sydney Intermodal 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). Warehouse operations, including the site that is operated by Maersk (Warehouse N1), fall under the area and activities approved as part of SSD 7709.

Specifically, this report has been prepared to address the noise emissions from the fixed mechanical plant and equipment of the warehouse that operate as part of typical warehouse operations in accordance CoC B139 of SSD 7709, and as detailed in the MPW Stage 2 Operational Noise Management Plan¹ (MPW S2 ONMP).

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 Warehouse operations description – Warehouse N1 (Tenant: Maersk)

1.2.1 Location

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 an East Precinct and a West Precinct, located east and west of Moorebank Avenue respectively, as shown in Figure 1.

1.2.2 Operational activities and facilities and hours of operation

Maersk is the current tenant of Warehouse N1 and undertakes warehouse and distribution activities from the warehouse. The day to day activities include:

¹ Logos, Operational Noise Management Plan Moorebank Intermodal Precinct – West Precinct Stage 2, Revision 4, dated 15/4/2024, available https://moorebankintermodalprecinct.com.au/wp-content/uploads/2024/04/SSD7709-MPW2-ONMP_Rev4_redacted.pdf, accessed 15/10/2024

- Truck unloading/loading activities with electric forklifts
- Electric forklift operations in/out of the warehouse
- Receipt and despatch of goods via truck and containers
- Storage and handling of goods within the warehouse
- Packing and unpacking of containers internally
- Recessed loading dock container activities, including prime mover coupling and de-coupling
- Despatching and receiving truck movements in and out of the facility
- General office administrative and support functions.

Maersk warehouse and distribution activities operate 6:00am to 6:00pm Monday to Friday.

The despatch and receiving container activities via trucks mostly occur from the recessed dock located at north-west side of Warehouse N1, typically between the hours of 6:00am and 6:00pm, with the busiest period predicted around 6:00am to 9:00am. The despatch and receiving truck activities mostly occur via the hardstand at the south-west side of the warehouse, typically between the hours of 6:00am and 3:00pm. Additionally, on the eastern side of the warehouse containers are transferred from the rail terminals (IMEX for MPE and INTS for MPW (*currently not operational*)). Container operations had not commenced at the time of the noise monitoring. This is where containers are placed at roller doors for loading/unloading within the warehouse.

1.2.3 Mechanical plant and other noisy equipment

The following fixed mechanical plant and equipment operate as part of typical warehouse operations, which are detailed in Section 5.1 and Figure 2.

- Condenser units, located on the mechanical plant deck for main office
- Condenser units and exhaust fans serving the dock office
- Fans and intake/discharge openings, serving the main office internal mechanical plant and equipment
- Roof mounted Smoke Clearance Fans (SCFs)

2 Nearby sensitive receivers

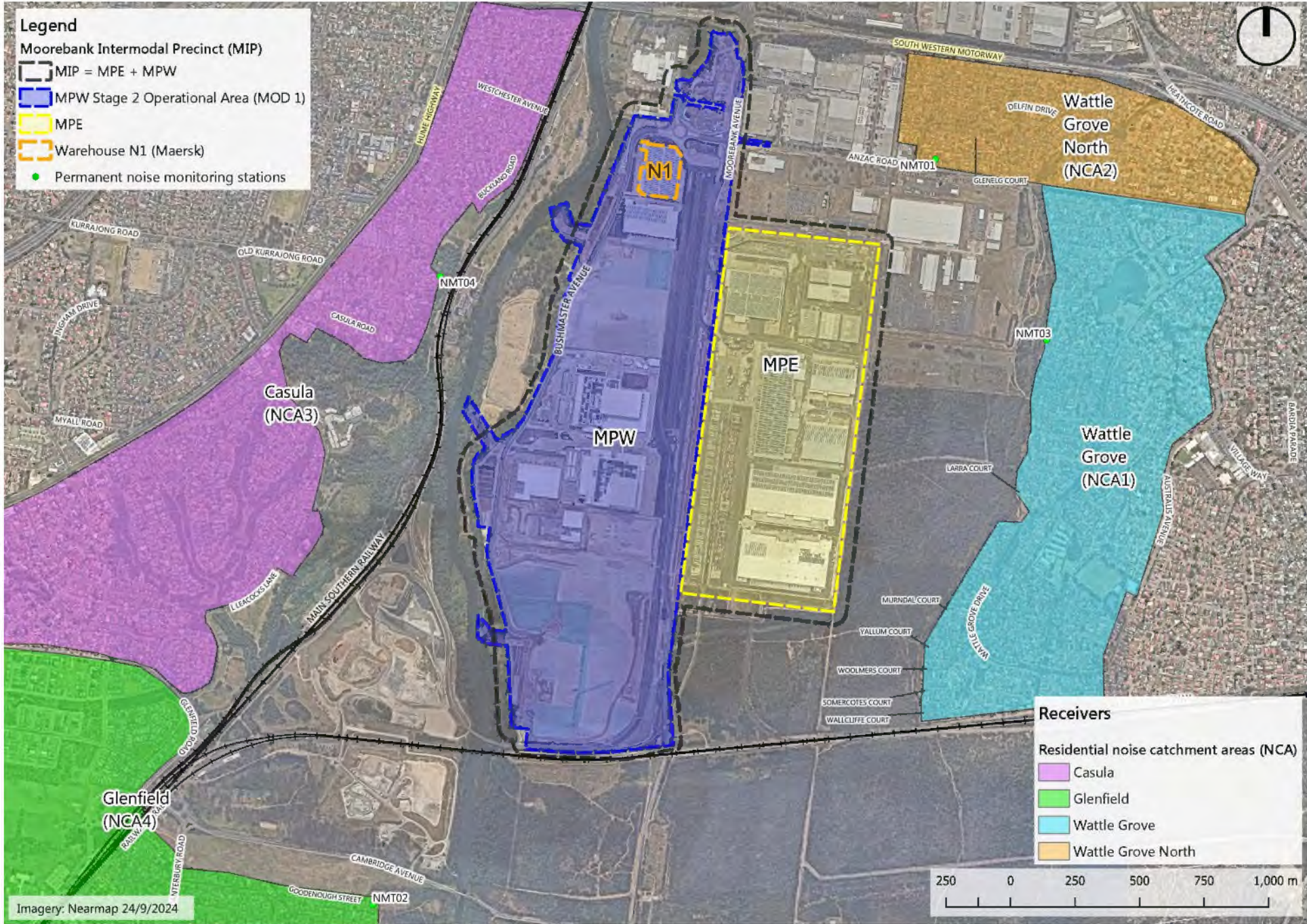
The potentially affected residential receivers nearby to MPW are located in the suburbs of Casula, Glenfield, Wattle Grove and Wattle Grove North. The closest and potentially most affected residential receivers are located within Casula.

A summary of the approximate distance to the nearest residential receivers in the surrounding area are provided in Table 1, as identified in SSD 7709 B131. The locations of the residential noise catchment areas (NCAs) are shown in Figure 1.

Table 1 Noise sensitive receivers and approximate distance from MPW Warehouse N1 (Maersk)

Noise Catchment Area (NCA)	Receiver type	Approximate distance from Warehouse N1, metres
Wattle Grove (NCA1)	Residential	1,250
Wattle Grove North (NCA2)		650
Casula (NCA3)		430
Glenfield (NCA4)		2,570

Figure 1 Warehouse N1 location, MIP, MPW and MPE precincts



3 Summary of noise objectives

This report has been prepared to address the noise emissions from the fixed mechanical plant and equipment of the warehouse that operate as part of typical warehouse operations in accordance CoC B139 of SSD 7709, and as detailed in the MPW S2 ONMP.

CoC B139 requires monitoring of actual operational noise emissions, to compare them against those assessed under CoC B138. The CoC B138 noise assessment, is required to demonstrate that the plant and equipment has been selected to meet the overall noise limits specified in SSD 7709 CoC B131 (Table 4). As such, the following section outlines the requirements for both CoC B139 and the overall CoC B131 (Table 4) noise limits.

3.1 Operational noise limits

The operational noise limits applicable for all noise generating activities within MPW, including warehouse operations, are presented in Table 4 of SSD 7709 CoC B131 and are reproduced in Table 2. The noise limits are applicable not only to all operational noise sources approved under SSD 7709 but are inclusive of operations as part of SSD 6766 and SSD 7628. The $L_{Aeq}(15 \text{ minute})$ criteria are applicable during the day, evening and night-time periods and the L_{Amax} sleep disturbance noise limits are applicable during the night-time period. The noise limits are applicable under prevailing meteorological conditions of wind speeds of up to 3 m/s at 10 metres above ground level or stability category 'F' temperature inversion conditions.

Table 2 SSD 7709 CoC B131 operational noise limits^{4,6}, dB(A)

Sensitive receiver	Day ^{1,3,5} $L_{Aeq, 15 \text{ minute}}$	Evening ^{1,3,5} $L_{Aeq, 15 \text{ minute}}$	Night ^{1,3,5} $L_{Aeq, 15 \text{ minute}}$	Night ^{2,3,5} L_{Amax} , 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:
- To determine compliance with the $L_{Aeq,15\text{-minute}}$ 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 L_{Amax} Sleep Arousal Screening Level in 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:
 - wind speeds up to 3m/s at 10 meters above ground level; or
 - atmospheric stability category F (with no wind).
 - 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)."
 - 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.
 - 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).

3.2 CoC B139 assessment noise requirements

3.2.1 Requirements

The management of operational noise emission from warehouse mechanical plant and equipment activities within MPW Stage 2 is outlined in the MPW S2 ONMP. Specifically, this report has been prepared to address the requirements of CoC B139 in SSD 7709, as detailed in Section 4.1.1 of the MPW S2 ONMP.

This report includes noise monitoring performed to address the requirements in CoC B139, as detailed in Table 4-1 in Section 4.1.1 of the MPW S2 ONMP.

The requirements of CoC B139 state:

*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.*

CoC B139 requires that the monitored noise levels be compared against the predicted levels in accordance with the CoC B138, as detailed in Section 3.2.2.

As the timing of the monitoring is identified as "operation/occupation", which can occur at different times. To address this issue, the MPW ONMP Table 4-1 notes that "Where operations do not commence within two months of occupation, the assessment report will be submitted within two months of the commencement of operations."

It should also be noted that the monitoring has to be undertaken where "... for a minimum period of one week where valid data is collected". As such, it is important that operations are representative of typical operations, in order for the monitored data to be valid.

3.2.2 CoC B138 assessment

Mechanical plant and equipment noise levels were reviewed prior to construction to satisfy CoC B138. This is detailed in the DDEG Report (*reference 202578-A CAN01 R0 Moorebank Precinct West - Warehouse N1 and N2, dated 6/7/2023*) (B138 assessment). This report provided the noise levels calculated for warehouse operations (outlined in Section 3 and Table 5 of the B138 assessment) and noise emissions from general mechanical plant and equipment for Warehouse N1 at all nearby noise sensitive receivers, for verification under CoC B139. The predicted CoC B138 noise levels are presented reproduced in Table 3.

Table 3 Predicted noise levels – Mechanical plant and equipment – Warehouse N1 (DDEG, 2023)

NCA	Predicted noise levels, L_{Aeq} , dB(A) ^{1,2}
Wattle Grove (NCA 1)	<10
Wattle Grove North (NCA 2)	<10
Casula (NCA 3)	15
Glenfield (NCA 4)	<10

- Notes:
1. The B138 assessment notes, that since the warehouse facility is expected to operate 24 hours a day, mechanical plant will be assessed against the night-time Operational Noise Limits. It is expected that compliance against these limits will result in compliance at all other times.
 2. Predicted levels sourced from Table 5 of the DDEG 'Mechanical Equipment Assessment: Warehouse N1 and N2 – MPW' Report (reference 202578-A CAN01 R0 Moorebank Precinct West - Warehouse N1 and N2, dated 6/7/2023) (B138 assessment).

The CoC B138 assessment concluded that the mechanical plant and equipment noise levels would achieve the noise limits presented in Table 4 of SSD 7709, and Table 4-1 in Section 4.1.1 of the MPW S2 ONMP.

As part of inspections and enquires for the CoC B139 noise monitoring planning, it was identified that the smoke clearance fans (SCF) could operate as part of typical operations. These items were not included in B138 assessment because at that stage, it was understood they would operate only during an emergency fire situation. As they could operate as part of typical operations for daytime ventilation or night-purge, they have been included in the CoC B139 noise monitoring assessment.

3.2.3 Noise monitoring timing

It is understood that the Warehouse N1 received its occupation certificate 13 May 2024, and commenced operations as of 25th August 2024. In regard to the timing of the noise monitoring:

1. It is understood that operations of N1 commenced on 25th August 2024.
2. An inspection of the warehouse and its operations were undertaken on 2 September as part of the noise monitoring planning, as some tenant operational activities had commenced. However, issues with the operations of the mechanical plant were identified as part of this inspection, which meant that the warehouse was not operating as typical, and noise emissions would not be typical and a valid representation of noise emissions. Adjustments were required and recommissioning was then undertaken so that valid operational data could be measured.
3. Following recommissioning of the mechanical equipment on 10 September 2024, operations were then given one week to settle into typical operations.
4. Noise monitoring commenced 16 September 2024, so that assessment and reporting of valid operational data could be completed approximately within 2 months of typical operations commencing.

4 Measurement methodology and results

4.1 Noise monitoring approach

The NSW Environment Protection Authority's (EPA) *Noise Policy for Industry* (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 B139 Warehouse N1 assessment, the following points were considered:

- The CoC B138 assessment identifies that residential receiver noise levels are expected to be 15 dB(A) $L_{Aeq15min}$ or lower.
- The Warehouse N1 mechanical plant are expected to be more than 10 dB below these existing noise levels, measured at the surrounding NCAs by RTA or based upon a review of the permanent noise monitoring station noise levels during the key operational night period (6:00am to 7:00am), prior to the commencement of Warehouse N1 operations. The attended monitoring showed that the existing noise levels are typically greater than 40 dB(A) $L_{Aeq15min}$, and were controlled by noise sources outside of MIP, such as road traffic noise (ie. M5 and Hume Highway).
- The Warehouse N1 mechanical plant are expected to be more than 10 dB below the background noise levels established at the environmental assessment stage.
- There is no suitable intermediate noise monitoring locations noting both the terrain (Georges River and lower terrain between Casula and N1, and Moorebank Avenue or other warehouses between N1 and other receivers).
- A number of co-located warehouse and industrial operations operate co-currently within the MIP.
- Noise source locations are both roof mounted and ground level mounted.

Noting that the existing ambient noise levels are already high at receivers compared with the expected noise emission levels, quantification of the noise under investigation via direct noise measurement of operational noise emissions from the warehouse mechanical plant and equipment operations is not possible at the residential receiver locations or easily intermediate locations. The NPfI also provides guidance about using noise modelling to review the performance of an industrial operation that is co-located with separate but noise-generating industrial sites impacting the same receiver, similar to the Warehouse N1 within the MIP situation.

As such, the CoC B139 noise monitoring has used a combination of on-site attended noise measurements, unattended monitoring, and noise modelling to quantify the noise emission performance of the warehouse mechanical plant and equipment.

4.2 Compliance measurement methodology

The noise monitoring undertaken to satisfy the requirements of CoC B139 has included the following noise monitoring and assessment steps:

4.2.1 Noise monitoring

The following noise monitoring was undertaken:

1. **Unattended noise monitoring** nearby to the key mechanical plant items for a period of 10 days, to confirm the noise levels of the mechanical plant when operations occurred.
2. **On-site attended measurement** of all mechanical plant and other noisy equipment items to quantify noise emission levels of mechanical plant and equipment that operate as part of the Warehouse N1 (Maersk) operations (Section 5.1).
3. **Receiver attended measurements** to confirm that the mechanical plant and other noisy equipment items were not quantifiable at the nearest critical receiver locations (Casula), and undertaken noise monitoring to aid with confirming the performance of the noise model used to determine noise emission levels.

4.2.2 Data analysis and assessment

Following the noise monitoring, the following steps were undertaken to assess the noise level contributions at the nearby sensitive receivers:

1. **Noise source analysis** - Review the mechanical plant and equipment attended measurement data, analyse results and quantify noise source levels from all the fixed mechanical plant and equipment for Warehouse N1 (Maersk).
2. **Noise model setup and performance review** - Setup and calibrate the noise model for individual mechanical plant items, including the Smoke Clearance Fans (SCFs), main office mechanical plant and equipment as well as the dock office mechanical equipment for the assessment of reasonable worst-case noise operations.
3. **Noise emission quantification** - Calculate the fixed mechanical plant and equipment noise levels from the Warehouse N1 (Maersk) operations to all nearby surrounding receivers and determine the noise level contribution at the property with the highest noise levels within each NCA.

4.3 Instrumentation

A range of noise monitoring equipment was used to undertake the compliance noise monitoring. A summary of measurement equipment and calibration dates is provided in Table 4.

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 4 Noise measurement equipment

Monitoring location/ purpose	Monitoring period used (2024)	Equipment (RTA ref.)	Serial number	Last date calibrated
On-site attended noise measurements	16/9 to 18/9 & 1/10	NTi XL2 (XL2-8)	A2A-16217-E0	04/08/2023
On-site attended noise measurements	16/9 to 18/9	NTi XL2 (XL2-A)	A2A-20889-E0	26/10/2023
On-site attended noise measurements	1/10	NTi XL2 (XL2-C)	A2A-19156-E0	28/02/2024
On-site attended noise measurements	1/10	NTi XL2 (RTA07-046)	A2A-20264-E0	03/04/2024
Unattended on-site noise measurements (N1 Roof)	16/9 to 1/10	NTi XL2 (RTA07-045)	A2A-20397-E0	14/03/2024
Field calibration	16/9 to 18/9 & 1/10	B&K 4231	2677710	15/01/2024
Field calibration	16/9 to 18/9 & 1/10	B&K 4231	3009707	16/01/2024
Field calibration	16/9 to 18/9 & 1/10	B&K 4231	3027924	11/10/2024

Four Envirosuite permanent noise monitors are set up at nearby representative residential locations in the community within each NCA as detailed in Table 5 and shown as NMT01 to NMT04 in Figure 1.

Table 5 Permanent noise monitoring stations

Monitoring location	Description	Equipment	Serial No	Last date calibrated
NMT01 (Wattle Grove North)	Permanent noise monitor	8&K 2250	3025394	Calibrations undertaken by Envirosuite
NMT02 (Glenfield)	Permanent noise monitor	8&K 2250	2764962	
NMT03 (Wattle Grove)	Permanent noise monitor	8&K 2250	3025351	
NMT04 (Casula)	Permanent noise monitor	B&K 2250	3025317	

4.4 Meteorological conditions

Meteorological conditions during the period of the attended noise measurement surveys have been reviewed to determine the prevailing wind and temperature inversion conditions were appropriate. For a period of the monitoring, the data from the Moorebank meteorological data monitoring station adjacent to Bushmaster Avenue was not available, and so instead data from the Bureau of Meteorology (BOM) automatic weather station (AWS) (Holsworthy Aerodrome) (Station 95761) was used as it is located approximately 5 km south-east from the MIP. On-site weather observations were consistent with the BOM data.

During the attended noise measurement periods at Warehouse N1 and the nearby receivers, the weather conditions were as detailed in Table 6.

Table 6 Attended noise measurement surveys weather observations

Date / Time period	Air temperature, °C	Relative humidity, %	Average wind speed (at 10 m above ground level), m/s	Wind direction, degrees and Cardinal	Cloud cover	Rain
17/09/2024 8:30am – 4:00pm	13 - 21	32 - 57	2 - 5	Ranged from WSW to NW, changing to easterly after 3:30pm	Generally clear skies with a few scattered clouds	None
18/09/2024 5:30am – 4:00pm	5 - 26	10 - 80	1 - 7 ¹	Ranged from SW to NW	Clear skies throughout	None
1/10/2024 5:30am – 11:30am	8 - 20	54 - 96	0 - 3	Winds were generally calm, or from NW to N	Clear skies throughout	None

Notes: 1. Winds were above 5m/s at 11:30am, and after 3:00pm. During the attended monitoring, a handheld anemometer was used, and confirmed wind speeds at the sound level meter were not above 5m/s, as required by the NPfl.

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.

Data from the BOM AWS (Holsworthy Aerodrome) (Station 95761) was used to exclude weather affected data (wind (greater than 5m/s) or rain) in the unattended noise monitoring presented in APPENDIX C in accordance with the NPfl.

5 Monitoring analysis

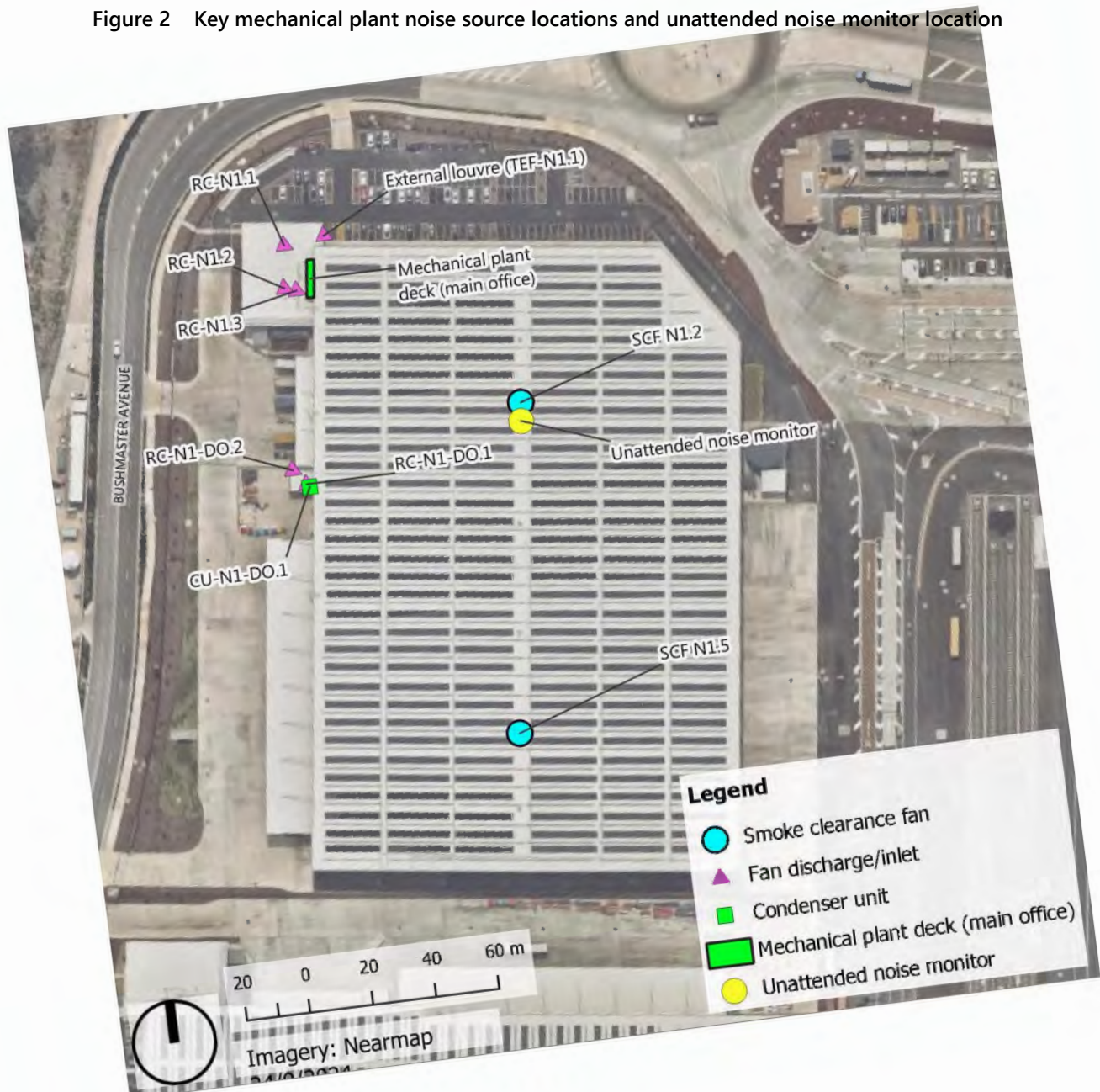
5.1 Key mechanical plant and equipment noise sources

Based on as-built construction information, site inspections, site personal observations, attended and unattended noise measurements, main sources for the mechanical plant and equipment are as follows:

- Mechanical plant deck for main office
- Mechanical plant for dock office
- Main office internal mechanical plant and equipment intake/discharge openings
- Smoke Clearance Fans (SCFs)

A full list of the equipment and their location is provided in APPENDIX B, and the location of the external noise emission locations (ie. fan intake/discharge or condenser unit location) are presented in Figure 2.

Figure 2 Key mechanical plant noise source locations and unattended noise monitor location



5.2 Attended noise measurements

Attended noise measurements of individual mechanical plant and equipment items and typical operations were undertaken at Warehouse N1 on 18 September 2024, in order to quantify the noise emissions from the installed mechanical plant and equipment in operation. These noise levels have been used to develop the CoC B139 operational noise compliance noise model.

During all measurements of mechanical plant and equipment, the specific noise source being measured was the dominant noise source. All plant and equipment items were forced on into a typical operational state for the purposes of undertaking the attended noise measurements. Observations were made of the on-site specific mechanical plant item during operations to ensure they were undertaking typical operations.

The most intensive mechanical plant and equipment, specifically the SCFs installed on the roof, operate subject to various existing environmental factors such as the temperature and humidity, and so do not operate at all times. In order to measure and quantify the noise emission levels from SCFs (only SCF-N1-1.2 and SCF-N1-1.5 operate a part of typical operations) and air conditioning system, these items were manually activated such that they would operate in their typical pre-programmed operational setting. This manual operation was performed onsite for the purpose of undertaking attended measurements and due to the uncertainty of getting the suitable environmental conditions during the noise monitoring period from 16 September to 1 October 2024.

Results from the on-site attended measurements of the critical mechanical plant and equipment are summarised in Table 7.

Table 7 On-site attended mechanical plant noise measurement results (18 September 2024)

Activity noise sources	Time	Measurement duration (t), sec	Measurement distance (m)	Measured noise levels, dB(A)		
				L _{Aeq}	L _{A90}	L _{AFmax}
Smoke Clearance Fans (SCFs)						
SCF-N1.2						
Typical operation at 5m ¹	9:14 am	133	5	61	61	63
Typical operation at 10m ¹	9:25 am	139	10	58	57	61
SCF-N1.5						
Typical operation at 5m ¹	9:55 am	124	5	61	60	66
Typical operation at 10m ¹	10:25 am	146	10	57	56	64
Background noise level (at roof at SCF-N1.5)	10:02 am	7 min	-	51	49	60
Mechanical plant main office						
CU-N1-1.1	11:27 am	63	6	57	56	62
CU-N1-1.2						
CU-N1-1.3						
CU-N1-1.4						
CU-N1-1.5						
CU-N1-COMMS						
CU-N1-G.1						
CU-N1-G.2						
CU-N1-G.3						
CU-N1-G.4						
All above condenser units	11:24 am	60	2	58	58	61
All above condenser units	11:27 am	65	7	57	55	63
Background noise level (main office roof)	10:45 am	4 min	-	56	52	63
RC-N1.1 (connected to FCU-N1-1.1 & FCU-N1-1.2)	inaudible at 1 metre at 52 dB(A) L _{A90}					
RC-N1.2 (connected to FCU-N1-1.3/1.4/1.5)	inaudible at 1 metre at 52 dB(A) L _{A90}					
RC-N1.3 (connected to TEF-N1.2	10:42 am	36	1	55	54	59

Activity noise sources	Time	Measurement duration (t), sec	Measurement distance (m)	Measured noise levels, dB(A)		
				L _{Aeq}	L _{A90}	L _{AFmax}
TEF-N1.1 (louvre exhausting to carpark)	8:19 am	64	6	57	56	61
Mechanical plant dock office						
CU-N1-DO.1	12:47 pm	34	1	52	51	56
TEF-N1.DO.1	12:32 pm	30	1	61	52	74

Notes: 1. SCFs attended noise measurements conducted onsite with similar SCFs system settings pre-programmed as the system would operate during the typical scheduled operations.

5.3 Unattended noise measurements

During the attended noise survey in Section 5.1, it was observed that two SCF (SCF-N1-1.2 and SCF-N1-1.5) could operate during typical operations, and were considered to be the main noise source contributors for the Warehouse N1 mechanical plant noise emissions. To confirm that the noise levels measured as part of the attended noise survey presented in Section 5.1 represented the levels as part of normal operations were typical, a minimum one week period an unattended noise monitoring was undertaken as required by CoC B139. The unattended noise monitoring was undertaken over the period between 16 September and 1 October 2024. The unattended noise monitor was installed at 5 metres from the SCF-N1-1.2 so that it would dominate monitored noise levels if and when in operation. The location of these SCFs and unattended noise logger are shown in Figure 2

The monitoring data was analysed, with atypical spikes (rise in the existing/ambient noise levels) identifying the operation of the SCFs. The SCF were manually operated on 18 September and 1 October to ensure that sample data was measured.

It was observed that the fan operated on 3 times during the monitoring period, each of which were manually forced. No automatic operation occurred during the monitoring period. During each time the typical noise level from the fan was 61 dB(A), which was consistent with that measured during the attended noise survey.

Detailed results from the unattended noise monitoring are provided in APPENDIX B.

5.4 Mechanical plant and equipment noise source levels

Based upon the attended and unattended noise monitoring presented in the above sections, the following noise source levels for the key typical operating mechanical plant and equipment have been established based upon periods of typical operation. These have been based upon either direct measurement, or supplier data that has been confirmed through monitoring of cumulative noise level (ie. condenser units on mechanical deck). The compliance noise model detailed in Section 6 has also been used to calibrate source levels where measurement of sources in isolation was not feasible or practicable. The sound power level inputs presented in Table 8 were used in the CoC B139 operational noise compliance modelling detailed in Section 6 in the locations presented in Figure 2.

Table 8 CoC B139 operational noise compliance noise source levels

Site items / operation	Individual item sound power level (SWL) ($L_{Aeq,1}$), dB(A)	Comment
Smoke clearance fans (SCFs)		
SCF-N1.2 (at typical operational speed) ²	84 ⁵	Attended measured level
SCF-N1.5 (at typical operational speed) ²	84 ⁵	Attended measured level
Mechanical plant (Main office) ¹		
CU-N1-G.1	67 ⁴	Supplier value for confirmed units. 3 dB adjustment has been applied to all condenser units, to adjust for cumulative measured noise levels when in operation. All units located within the main office roof plant deck (see Figure 2).
CU-N1-G.2	68 ⁴	
CU-N1-G.3	68 ⁴	
CU-N1-G.4	68 ⁴	
CU-N1-1.1	68 ⁴	
CU-N1-1.2	73 ⁴	
CU-N1-1.3	68 ⁴	
CU-N1-1.4	68 ⁴	
CU-N1-1.5	59 ⁴	
CU-N1-COMMS	63 ⁴	
RC-N1.1 (connected to FCU-N1-1.1 & FCU-N1-1.2)	50 ³	Fan internal. Noise levels measured at external cowl noise emission point. Inaudible at 52 dB(A) at 1m.
RC-N1.2 (connected to FCU-N1-1.3/1.4/1.5)	50 ³	
RC-N1.3 (connected to TEF-N1.2)	56	Fan internal. Noise levels measured at external cowl noise emission point
TEF-N1.1 (louvre exhausting to carpark)	77	Measured level
Mechanical Plant (Dock Office) ³		
CU-N1-DO.1	63	Measured level [Supplier level = L_w 62dB(A)]
RC-N1.DO.1 (connected to AC-N1-DO.1)	50	Fan internal. Cowl external noise emission point
RC-N1.DO.2 (connected to TEF-N1.DO.1)	60	

- Notes:
1. All the mechanical plant and equipment associated with the main office mechanical plant deck was operating simultaneously during the attended noise measurements and the cumulative noise levels measured reflects the worst-case scenario with all mechanical plant items in operation via the manual operation at full load.
 2. Fans were programmed to operate at reduced speed as part of typical operations. During a fire emergency the fans would operate at full speed.
 3. Noise emissions were not audible in a 52 dB(A) LA90 environment, as such noise emission level is assumed to be no more than L_w 50 dB(A), based upon a noise level of no higher than 42 dB(A) at 1 metre.
 4. A 3 dB correction has been applied to all condenser units, to adjust for cumulative measured noise levels when in operation. This correction is included in the presented noise level.
 5. Based upon highest measured levels from multiple attended measurements and unattended noise monitoring.

6 CoC B139 operational noise modelling and assessment

As detailed in Section 4, it was not possible to directly measure or estimate the warehouse mechanical plant and equipment noise levels at nearby receivers. As such, this assessment has used a combination of on-site attended noise measurements and unattended monitoring presented in Section 5. This section presents the noise modelling used to assess the noise emissions of the Warehouse N1 mechanical plant and equipment.

6.1 General modelling assumptions and methods

Modelling and assessment of warehouse noise emissions was determined by modelling the noise sources, receiver locations, existing built structures and topographical features, using CadnaA (version 2024). The noise predictions are based on the CONCAWE noise prediction algorithms, noting that the nearby critical noise sensitive receivers are greater 100 metres from the site. The CONCAWE environmental noise prediction method is an appropriate method for predicting the noise propagation in these circumstances. The performance of the noise model used is reviewed in Section 6.2.

The noise prediction model considers:

- Location of all noise sources
- Height of sources and receivers referenced to digital ground contours both onsite and outside the warehouse and MIP areas
- Noise source levels of individual mechanical plant and equipment. All fixed mechanical plant and equipment noise sources associated with Warehouse N1 (Maersk) operations have been included in the noise modelling, including the SCFs. Final noise emission levels are presented with and without the SCF, noting the infrequent nature of their use.
- Separation distances between sources and receivers
- Ground type between sources and receivers
- Attenuation from buildings and built structures and topography (natural and purpose built)
- Atmospheric losses and assessment meteorological conditions.

The modelled activities and assumptions for the mechanical plant and equipment operating and the duration and frequency of operation as part of the 'reasonable' worst-case operational scenarios are described in Section 6.3.

6.2 Noise model performance

To confirm the suitability of the noise model development for the assessment and assessing the CoC B139 noise emissions, the noise model has been reviewed against onsite and receiver concurrent noise measurements.

The review of the noise model performance uses a combination of noise monitoring at the warehouse, where clear noise source locations and levels could be measured, combined with concurrent noise measurements at the nearest key residential receivers in Casula. These noise measurements were conducted on 1 October 2024 between 6:00am and 7:30am. As the mechanical plant and equipment were not audible at the receiver, other onsite noise events (ie. truck activity high noise events) have been used to confirm the noise model performance. Where noise events were audible and quantifiable at both monitoring locations, these have been used for the review.

Shown in Figure 3 are the monitoring locations along with the location of the onsite activity noise event locations. The validation scenario that was modelled along with the predicted outcomes are presented in Table 9. Based on this validation, the noise model is considered suitable for modelling and assessing noise emissions.

Figure 3 Noise model performance review noise monitoring locations

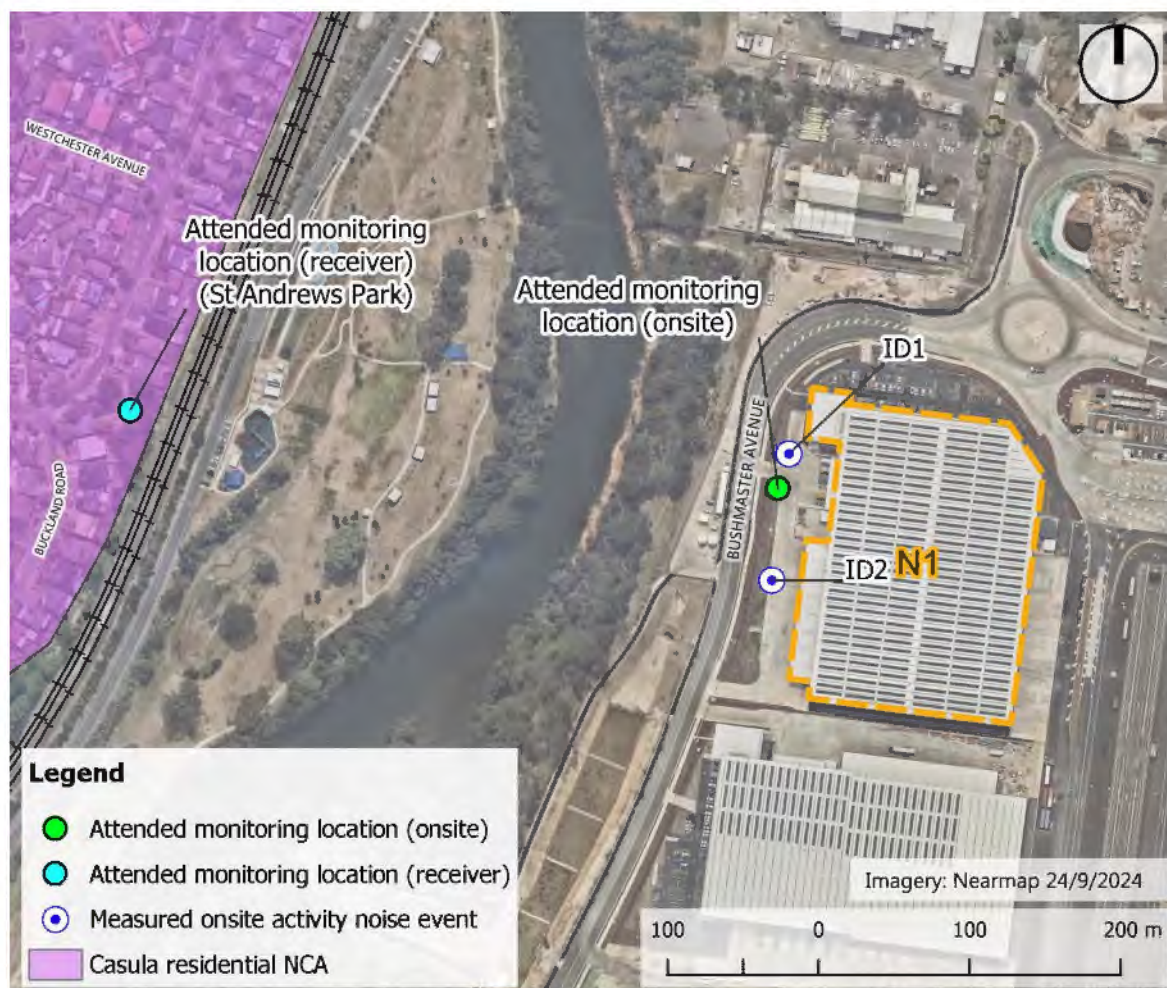


Table 9 Comparison between measured and modelled noise levels

ID	Noise event	Monitoring location	Prevailing meteorological conditions ¹	Measurement time	Estimated site contribution noise level, dB(A) L _{Amax}	Model predicted noise level, dB(A) L _{Amax}	Difference, dB
1	Prime mover container coupling activity	Onsite	Wind – 0 m/s Direction – 3 degrees Humidity – 95%	6:45 am 1/10/2024	82	82 ³	0
		Casula ⁵	Temperature – 12°C Stability Class F (based upon the NPfl sigma-theta method) ² Note 1		50	48	2
2	Truck unloading equipment on hardstand	Onsite	Wind – 0.75 m/s. Direction – 350 degrees Humidity – 95%	6:55 am 1/10/2024	70	70 ³	0
		Casula ⁵	Temperature – 12°C Stability Class E (based upon the NPfl sigma-theta method) ² Note 1		46-48 ⁴	46	0

- Notes:
1. Meteorological data based upon the MIP meteorological data monitoring station adjacent to Bushmaster Avenue, in between Casula and N1.
 2. Night time stability class, based upon NPfl Fact Sheet D1.4 'Use of sigma-theta data'
 3. Modelled with CONCAWE for consistency, however, CONCAWE is typically not valid under 100m.
 4. Measured noise event L_{Amax} level was only 2-4 dB(A) above the background noise level (traffic controlled), and so has been corrected for the existing background noise level and a likely range estimated.
 5. Monitoring undertaken at St Andrews Park, Casula

6.3 Assessment operational scenarios

All measurable noise-generating mechanical plant and equipment that operate as part of typical operations have been included in the assessment modelling as required by CoC B139. These are listed in Table 8. The noise emission locations of these sources are shown in Figure 2.

SCFs (SCF N1-1.2 and SCF N1-1.5 only) are the main mechanical plant and equipment noise sources for Warehouse N1 operations and considered to be critical noise sources, when in operation, for the reasonable worst case intrusive scenario (15-minute period) assessment at the nearest residential receivers in proximity to Warehouse N1. However, as the SCF operate infrequently and were not included in the B138 noise assessment, noise emission levels are presented with and without these fans in operation for the purpose of the assessment.

6.4 Noise compliance assessment

Predicted mechanical plant and equipment operational compliance noise levels are presented in Table 10. The noise levels have been predicted to each of the surrounding residential receiver noise catchments with all nearby residences assessed, and the highest residential receiver noise level in each catchment area reported in Table 10. These noise levels represent the reasonable worst-case intrusiveness operational scenario (15-minute period) from typical mechanical plant and equipment operations of the warehouse.

The modelling incorporated the worst-case prevailing meteorological conditions, as required by CoC B131, which are wind speeds of up to 3 m/s at 10 metres above ground level or stability category 'F' temperature inversion conditions.

The mechanical plant and equipment noise sources are steady-state or quasi-steady-state. Therefore, there is unlikely to be significant variation between $L_{Aeq,15min}$ values and L_{AFmax} values, and no significant peak noise events are expected. As such, by achieving the night period L_{Aeq} (15-minute) requirements, the noise emissions will achieve the L_{AFmax} , sleep arousal screening level requirements of 52 dB(A) L_{Amax} .

The results in Table 10 show that although the predicted CoC B139 operational compliance noise levels are above those predicted in the CoC B138 assessment, they are substantially below the SSD 7709 CoC B131 noise limits. As such, it can be concluded that they achieve the requirements, such that they have been selected and installed to achieve the overall noise limits specified in SSD 7709 Table 4 (CoC B131).

Table 10 CoC B139 predicted noise levels – Mechanical plant and equipment - Warehouse N1

NCA	Mechanical plant and equipment (Warehouse N1)						B138 assessment predicted noise levels	SSD 7709 CoC B131 noise limits		
	Predicted operational compliance noise levels ^{1,2} , L _{Aeq} 15 minute							L _{Aeq} 15 minute		
	With SCF in operation			Without SCF in operation			Night			
	Day	Evening	Night	Day	Evening	Night				
Wattle Grove (NCA 1)	<10	<10	<10	<10	<10	<10	<10	44	42	42
Wattle Grove North (NCA 2)	12	12	11	<10	<10	<10	<10	41	41	41
Casula (NCA 3)	24	24	24	20	20	19	15	46	44	39
Glenfield (NCA 4)	<10	<10	<10	<10	<10	<10	<10	49	46	42

- Notes
- Modelling meteorological were as follows, consistent with the range applicable for the B131 noise limits:
 - Day/Evening - Winds speeds of 3m/s at 10 meters above ground level (all directions)
 - Night - Atmospheric stability category F (with no wind).
 - Modelling based upon average temperature and humidity conditions during the monitoring period.

7 Conclusion

Renzo Tonin & Associates (RTA) was engaged by Logos Investment Management (Logos) on behalf of The Trust Company (Australia) Limited (ACN 000 000 993) as trustee of the Moorebank Industrial Warehouse Trust to undertake noise monitoring of the warehouse mechanical plant and other noisy equipment to satisfy the (State Significant Development (SSD) 7709 B139 consent condition (CoC) for the Warehouse N1. Warehouse N1 is located within the Moorebank Precinct West (MPW), which forms part of the Moorebank Intermodal Precinct (MIP) at Moorebank, NSW. Warehouse N1 is currently tenanted by Maersk.

This report has been prepared to monitor and assess noise emissions from the fixed mechanical plant and equipment of the warehouse that operate as part of typical warehouse operations in accordance CoC B139 of SSD 7709, and as detailed in the MPW Operational Noise Management Plan² (MPW S2 ONMP).

CoC B139 requires noise monitoring of actual mechanical plant and other noisy equipment operations for a minimum period of one week where valid data is collected following the commencement of operations of each warehouse within MPW. This monitoring is to verify mechanical plant and equipment noise levels predicted as part of the CoC B138 noise assessment. The CoC B138 noise assessment was required to demonstrate that the plant and equipment has been selected to meet the overall noise limits specified in SSD 7709 CoC B131 (Table 4). As such, this report has compared noise emission levels for both the CoC B138 predictions and the overall noise limits specified in SSD 7709 CoC B131 (Table 4).

The NSW EPA *Noise Policy for Industry* (NPfI) provides guidance for monitoring the performance of a noise-generating industrial facility, which includes direct measurement at a receiver location, direct measurement at alternative or intermediate location/s, unattended monitoring and modelling. As the existing ambient noise levels are already high at residences nearby to Warehouse N1 compared with the expected noise emission levels, a combination of on-site attended noise measurements, unattended monitoring, and noise modelling have been used to quantify the noise emission performance of the warehouse mechanical plant and equipment.

As part of the assessment, a series of noise measurements were undertaken over a two week period. Unattended noise monitoring was undertaken at one rooftop location at Warehouse N1 over a period of two weeks between 16 September and 1 October 2024. In addition, attended noise measurements were undertaken on 16, 17 and 18 September 2024 and 1 October 2024. The aim of the measurements was to quantify fixed mechanical plant and equipment operational noise levels on-site, in order to develop a noise model and determine noise emission levels at nearby residences.

The monitoring data was analysed to confirm the warehouse mechanical plant and equipment noise sources levels. These were used to then develop a noise prediction model for the warehouse. The noise

² Logos, Operational Noise Management Plan Moorebank Intermodal Precinct - West Precinct Stage 2, Revision 4, dated 15/4/2024, available https://moorebankintermodalprecinct.com.au/wp-content/uploads/2024/04/SSD7709-MPW2-ONMP_Rev4_redacted.pdf, accessed 15/10/2024

model was reviewed against onsite and receiver concurrent noise measurements to confirm its suitability to assessing the CoC B139 noise emissions.

The results outcome of this assessment is that although the predicted B139 operational compliance noise levels are slightly above those predicted in the B138 noise assessment, they are substantially below the SSD 7709 CoC B131 noise limits. As such, it can be concluded that the noise emissions from the fixed mechanical plant and equipment installed at Warehouse N1 achieve the noise emission requirements, such that they have been selected and installed to achieve the overall noise limits specified in SSD 7709 Table 4 (CoC B131).

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

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 L ₉₀ 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 L _{eq} 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 Mechanical plant and equipment

Table 11 Operational mechanical plant noise measurement (external noise emissions) – Warehouse N1

Item	Designation	Make	Model	Noise emission location	Notes
Condenser unit	CU-N1-G.1	Fujitsu	AOTH36KHTA	Office roof plant deck	
	CU-N1-G.2	Fujitsu	AOTH45KBTA		
	CU-N1-G.3	Fujitsu	AOTH45KBTA		
	CU-N1-G.4	Fujitsu	AOTH45KBTA		
	CU-N1-1.1	Fujitsu	AOTH45KBTA		
	CU-N1-1.2	Fujitsu	AOTA72LALT		
	CU-N1-1.3	Fujitsu	AOTH45KBTA		
	CU-N1-1.4	Fujitsu	AOTH60KBTA		
	CU-N1-1.5	Fujitsu	AOTH18KHTA		
	CU-N1-COMMS	Fujitsu	AOTG24KMTC		
	CU-N1-DO.1	Fujitsu	AOTH18KHTA	Dock office	
Smoke clearance fan	SCF-N1.2	Pacific Ventilation	VD10DC27A-4KFF	Roof ridgeline	Can operate during typical operations, daytime ventilation or night purge
	SCF-N1.5	Pacific Ventilation	VD10DC27A-4KFF		
	SCF-N1.1	Pacific Ventilation	VD10DC27A-4KFF		No normal operations. Fire event only
	SCF-N1.3	Pacific Ventilation	VD10DC27A-4KFF		
	SCF-N1.5	Pacific Ventilation	VD10DC27A-4KFF		
	SCF-N1.6	Pacific Ventilation	VD10DC27A-4KFF		
Toilet exhaust fan	TEF-N1.1	Pacific Ventilation	ICQ355-4EE	Noise emission from façade louvre to northern carpark	
	TEF-N1.2	Pacific Ventilation	ICQ355-4EE	Ducted to office roof cowl	
	TEF-N1.DO.1	Pacific Ventilation	MFP200-V-HIGH	Ducted to dock office roof	
Cowls (noise emission point) for makeup-air, outdoor air fans or toilet exhaust fans	RC-N1.1	Pacific Ventilation	-	Office roof	Connected to FCU-N1-1.1, FCU-N1-1.2
	RC-N1.2	Pacific Ventilation	-	Office roof	Connected to FCU-N1-1.3, FCU-N2-1.4, FCU-N2-1.5
	RC-N1.3	Pacific Ventilation	VCQ-2+::S:S:S	Office roof	Connected to TEF-N1.2
	RC-N1.DO.1	-	-	Dock office roof	Connected to AC-N1-DO.1
	RC-N1.DO.2	-	-	Dock office roof	Connected to TEF-N1.DO.1

APPENDIX C **Logger location – Warehouse N1 roof**

Dates of Survey: 16/09/2024 - 02/10/2024
Monitoring ID: -
Address: 8 Bushmaster Ave, Moorebank (Warehouse N1)
Description: Warehouse N1 roof (5m from SCF-N1.2)

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 Week⁴	47	48	46	54	53	55

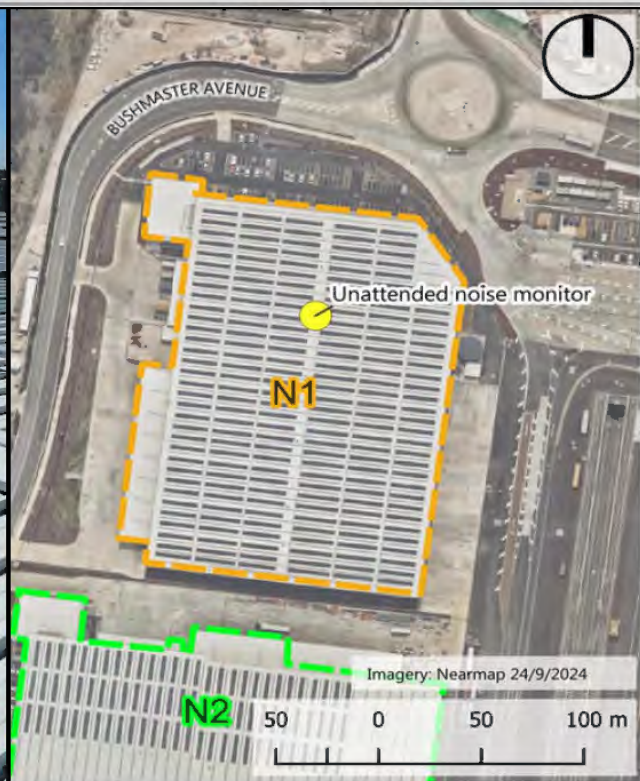
Notes:

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 5.00am Monday to Sunday & Public Holidays
4. Rating Background Level (RBL) for LA90 and logarithmic average for LAeq

Logger location photograph

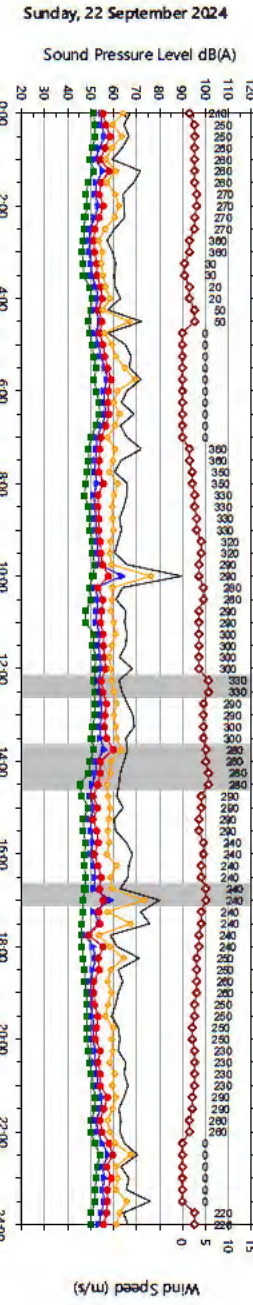
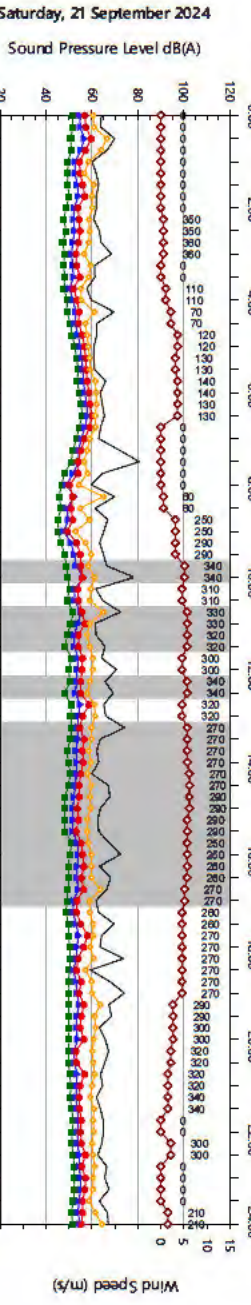
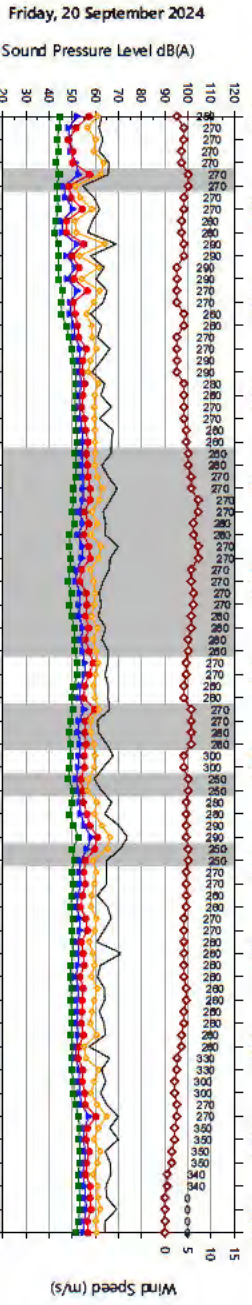
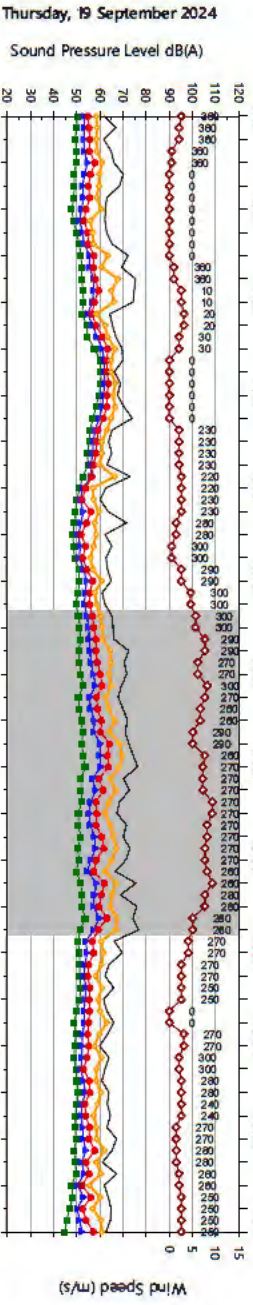
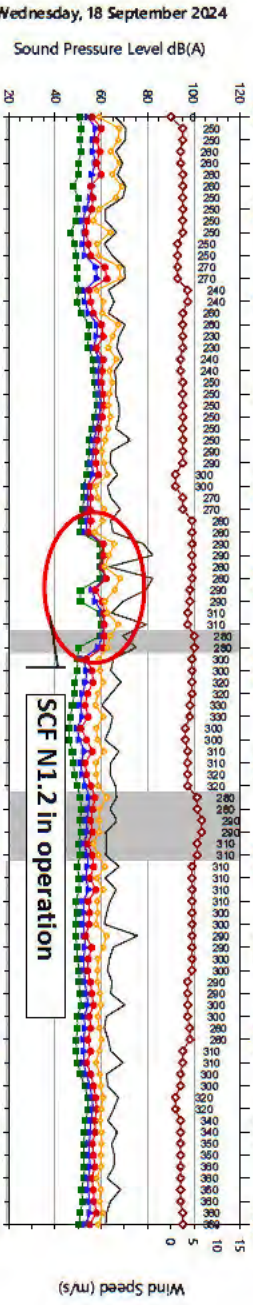
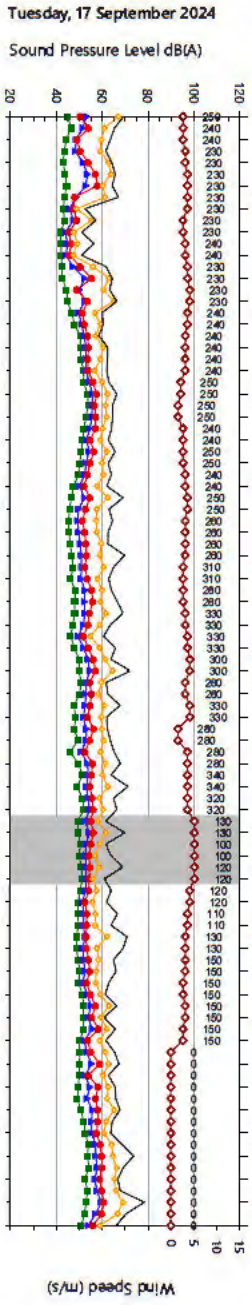
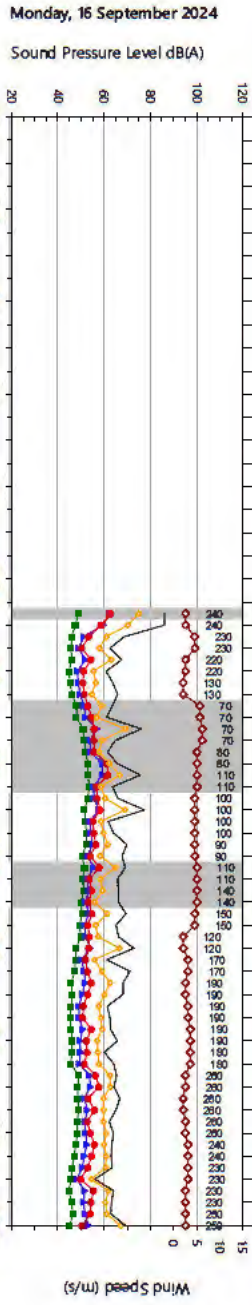


Logger location map



Unattended Monitoring Results

Location: 8 Bushmaster Ave, Moorebank (Warehouse N1) -
Warehouse N1 roof (5m from SCF-N1.2)



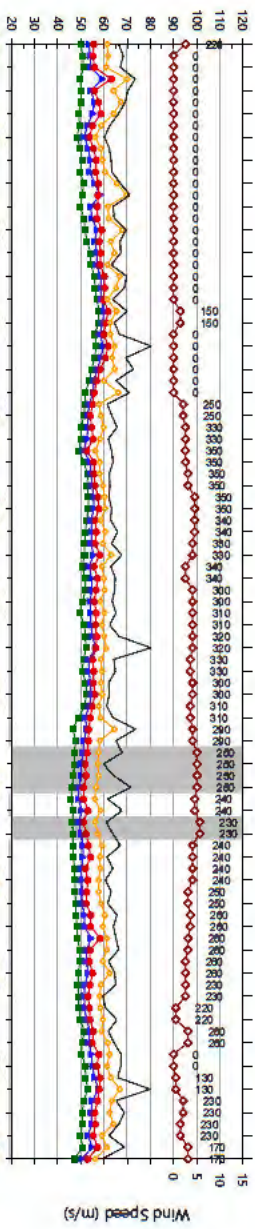
Legend: L90 (green dashed line), Leq (blue dashed line), L10 (red dashed line), L1 (yellow dashed line), Lmax (black solid line), Wind Speed and Direction (red line with diamond markers)

Unattended Monitoring Results

Location: 8 Bushmaster Ave, Moorebank (Warehouse N1) -
Warehouse N1 roof (5m from SCF-N1.2)

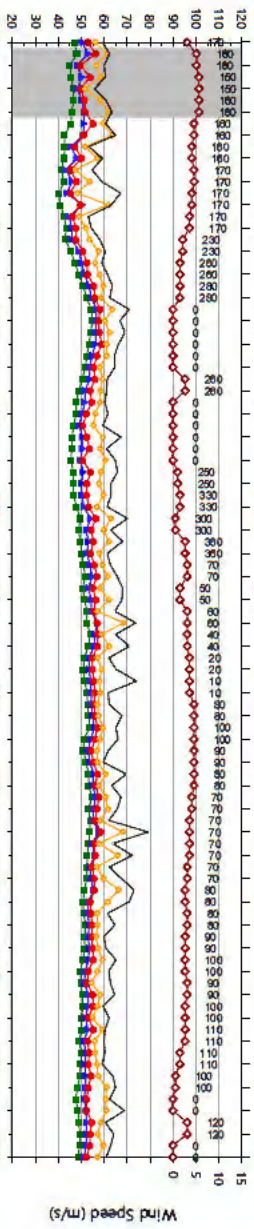
Monday, 23 September 2024

Sound Pressure Level dB(A)



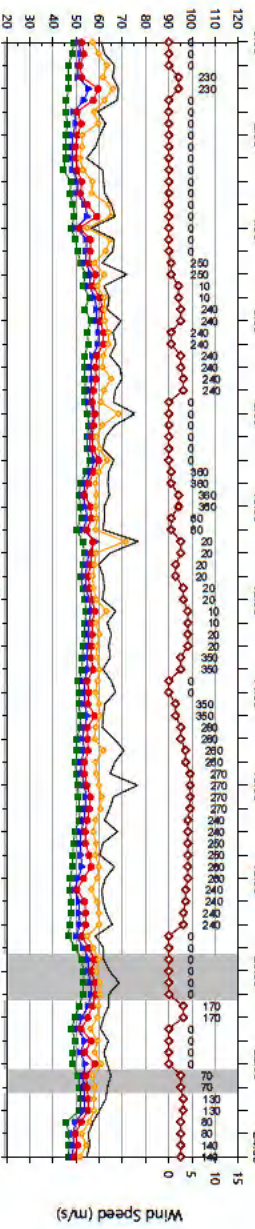
Tuesday, 24 September 2024

Sound Pressure Level dB(A)



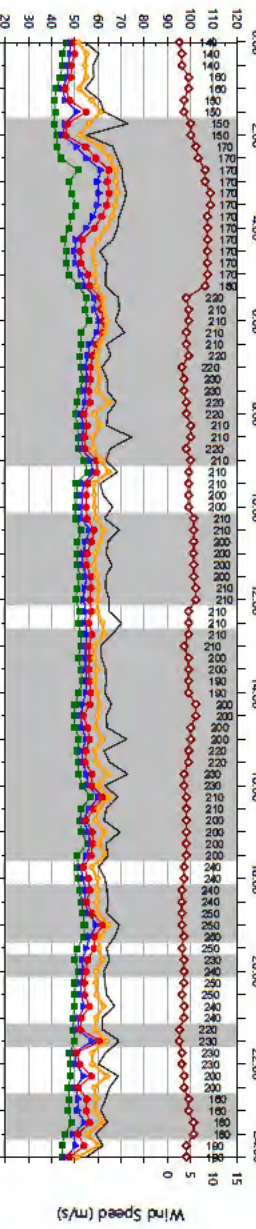
Wednesday, 25 September 2024

Sound Pressure Level dB(A)



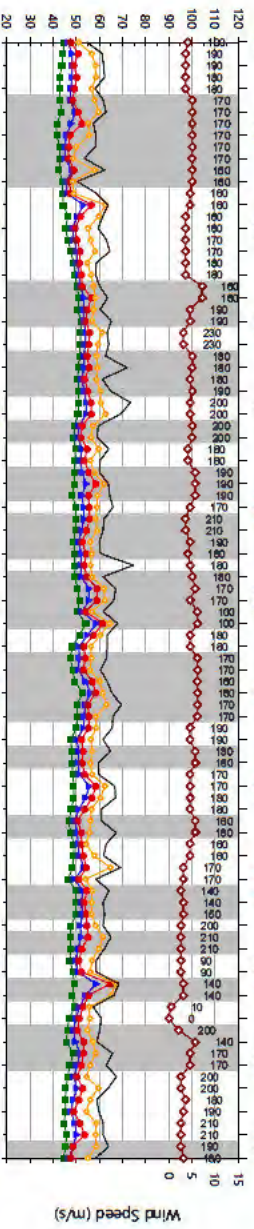
Thursday, 26 September 2024

Sound Pressure Level dB(A)



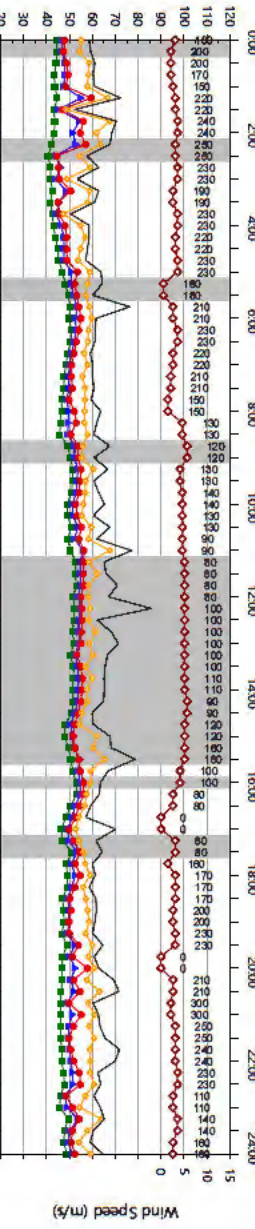
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Sound Pressure Level dB(A)



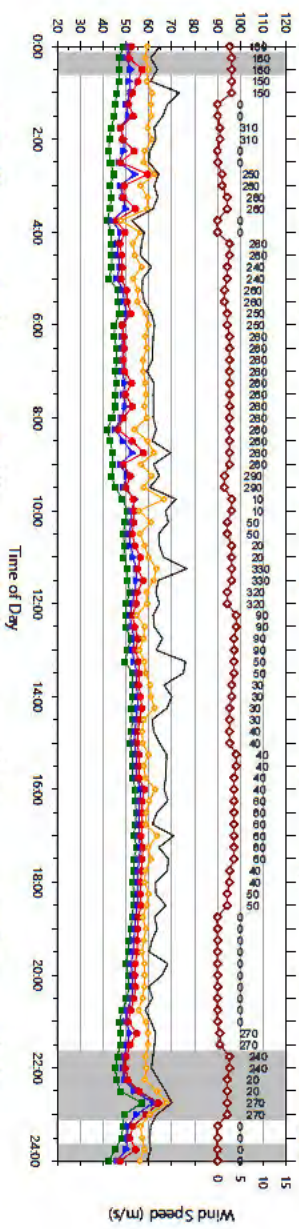
Saturday, 28 September 2024

Sound Pressure Level dB(A)



Sunday, 29 September 2024

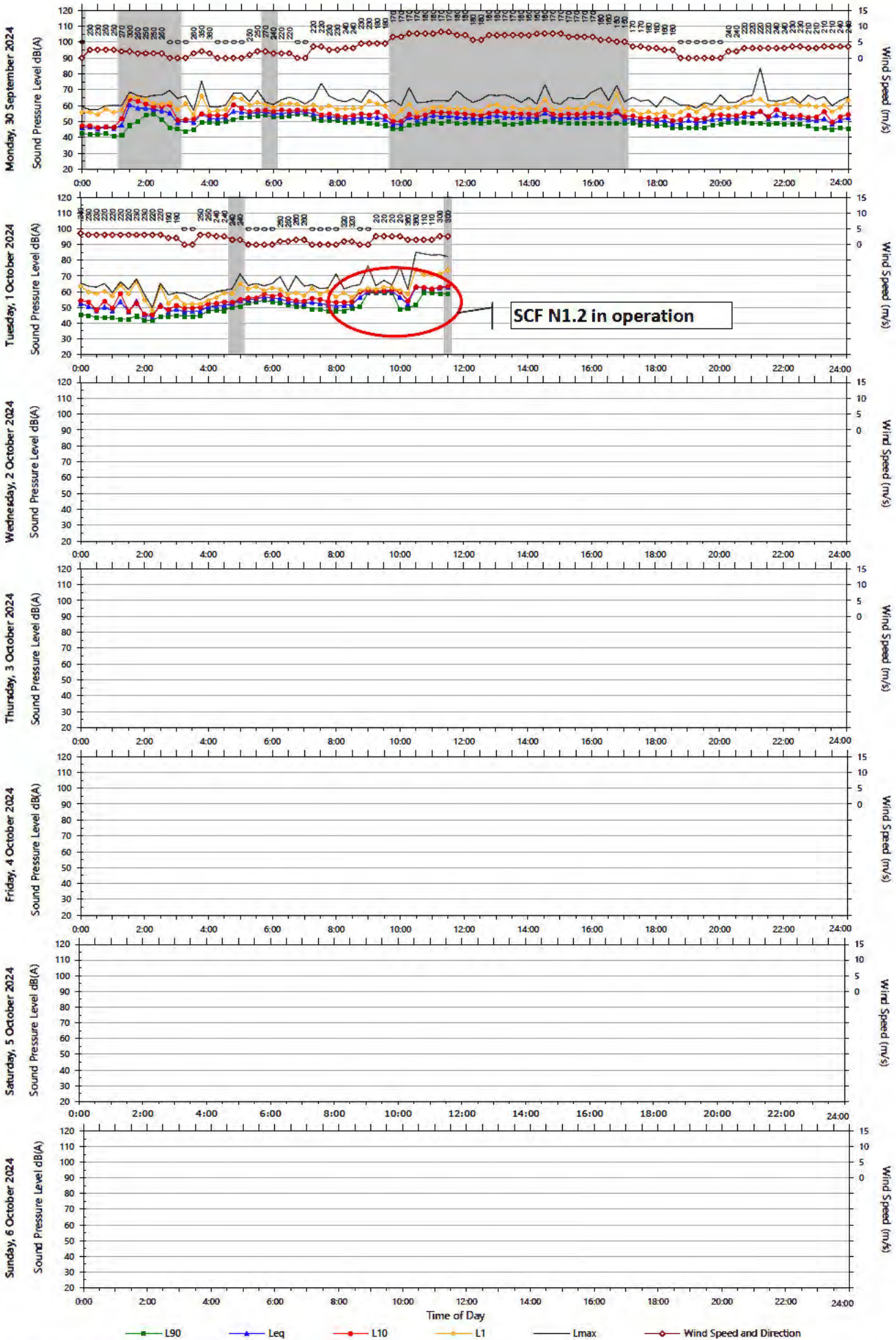
Sound Pressure Level dB(A)



Legend: L90 (green line), Leq (blue line), L10 (red line), L1 (orange line), Lmax (black line), Wind Speed and Direction (red line with diamond markers)

Unattended Monitoring Results

Location: 8 Bushmaster Ave, Moorebank (Warehouse N1) -
Warehouse N1 roof (5m from SCF-N1.2)



Data File: 2024-09-16_SLM_001_123_Rpt_Report.txt

Template: QTE-26 Logger Graphs Program (r46)

MOOREBANK INTERMODAL PRECINCT WEST

Monitoring Report for Mechanical Plant (SSD 7709 B139) - Warehouse N2

12 November 2024

The Trust Company (Australia) Limited (ACN 000 000 993) as trustee of the
Moorebank Industrial Warehouse Trust c/- Tactical Group

TM306-22-02F01 N2 B139 Noise Monitoring Assessment (r2).docx

Document details

Detail	Reference
Doc reference:	TM306-22-02F01 N2 B139 Noise Monitoring Assessment (r2).docx
Prepared for:	The Trust Company (Australia) Limited (ACN 000 000 993) as trustee of the Moorebank Industrial Warehouse Trust c/- Tactical Group
Attention:	

Document control

Date	Revision history	Non-issued revision	Issued revision	Prepared	Instructed	Reviewed / Authorised
25.10.2024	Initial issue (draft)	0	1	M. Ali	A. Leslie	A. Leslie
12.11.2024	Final	-	2	M. Ali	A. Leslie	A. Leslie

File Path: R:\AssocSydProjects\TM301-TM350\TM306 ale Moorebank Intermodal Terminal (LOGOS)\Task22 MPW Monitoring\1 Docs\03 Report\02 N2\B139 Assessment Report\TM306-22-02F01 N2 B139 Noise Monitoring Assessment (r2).docx

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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 Logos Investment Management (Logos) on behalf of The Trust Company (Australia) Limited (ACN 000 000 993) as trustee of the Moorebank Industrial Warehouse Trust to undertake noise monitoring of the warehouse mechanical plant and other noisy equipment to satisfy the (State Significant Development (SSD) 7709 B139 consent condition (CoC) for the Warehouse N2. Warehouse N2 is located within the Moorebank Precinct West (MPW), which forms part of the Moorebank Intermodal Precinct (MIP) at Moorebank, NSW. Warehouse N2 is currently tenanted by Sydney Tools.

The Sydney Intermodal 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). Warehouse operations, including the site that is operated by Sydney Tools (Warehouse N2), fall under the area and activities approved as part of SSD 7709.

Specifically, this report has been prepared to address the noise emissions from the fixed mechanical plant and equipment of the warehouse that operate as part of typical warehouse operations in accordance CoC B139 of SSD 7709, and as detailed in the MPW Stage 2 Operational Noise Management Plan¹ (MPW S2 ONMP).

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 Warehouse operations description – Warehouse N2 (Tenant: Sydney Tools)

1.2.1 Location

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 an East Precinct and a West Precinct, located east and west of Moorebank Avenue respectively, as shown in Figure 1.

1.2.2 Operational activities and facilities and hours of operation

Sydney Tools is the current tenant of Warehouse N2 and undertakes warehouse and distribution activities from the warehouse. The day to day activities include:

¹ Logos, Operational Noise Management Plan Moorebank Intermodal Precinct – West Precinct Stage 2, Revision 4, dated 15/4/2024, available https://moorebankintermodalprecinct.com.au/wp-content/uploads/2024/04/SSD7709-MPW2-ONMP_Rev4_redacted.pdf, accessed 15/10/2024

- Truck unloading/loading activities with electric forklifts
- Electric forklift operations in/out of the warehouse
- Receipt and despatch of goods via truck and containers
- Storage and handling of goods within the warehouse
- Packing and unpacking of containers internally and externally
- Despatching and receiving truck movements in and out of the facility
- General office administrative and support functions.

Sydney Tools warehouse and distribution activities operate 6:30am to 6:30pm Monday to Friday.

The despatch and receiving container activities via trucks mostly occur on the northern hardstand of Warehouse N2, typically between the hours of 7:30am to 3:30pm. The despatch and receiving truck activities mostly occur via the hardstand at the north side of the warehouse, typically between the hours of 7:30am to 3:30pm. Additionally, on the southern side of the warehouse, containers are transferred from the rail terminals (IMEX for MPE and INTS for MPW (*currently not operational*)). This is where containers are placed at roller doors for loading/unloading within the warehouse.

1.2.3 Mechanical plant and other noisy equipment

The following fixed mechanical plant and equipment operate as part of typical warehouse operations, which are detailed in Section 5.1 and Figure 2.

- Condenser units, located on the mechanical plant deck for main office
- Condenser units and exhaust fans serving the dock office
- Fans and intake/discharge openings, serving the main office internal mechanical plant and equipment
- Roof mounted Smoke Clearance Fans (SCFs)

2 Nearby sensitive receivers

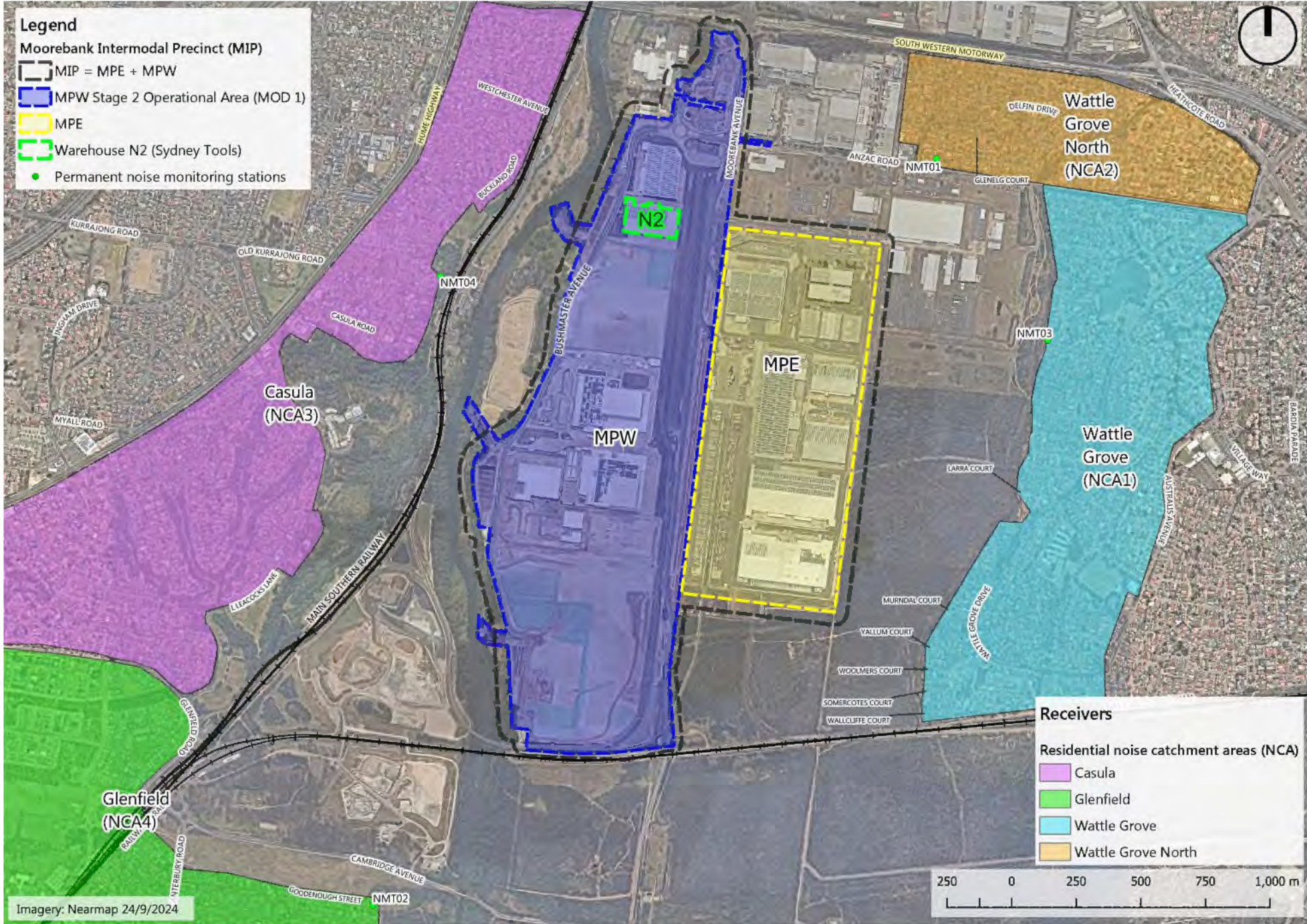
The potentially affected residential receivers nearby to MPW are located in the suburbs of Casula, Glenfield, Wattle Grove and Wattle Grove North. The closest and potentially most affected residential receivers are located within Casula.

A summary of the approximate distance to the nearest residential receivers in the surrounding area are provided in Table 1, as identified in SSD 7709 B131. The locations of the residential noise catchment areas (NCAs) are shown in Figure 1.

Table 1 Noise sensitive receivers and approximate distance from MPW Warehouse N2 (Sydney Tools)

Noise Catchment Area (NCA)	Receiver type	Approximate distance from Warehouse N2, metres
Wattle Grove (NCA1)	Residential	1,450
Wattle Grove North (NCA2)		890
Casula (NCA3)		420
Glenfield (NCA4)		2,490

Figure 1 Warehouse N2 location, MIP, MPW and MPE precincts



3 Summary of noise objectives

This report has been prepared to address the noise emissions from the fixed mechanical plant and equipment of the warehouse that operate as part of typical warehouse operations in accordance CoC B139 of SSD 7709, and as detailed in the MPW S2 ONMP.

CoC B139 requires monitoring of actual operational noise emissions, to compare them against those assessed under CoC B138. The CoC B138 noise assessment, is required to demonstrate that the plant and equipment has been selected to meet the overall noise limits specified in SSD 7709 CoC B131 (Table 4). As such, the following section outlines the requirements for both CoC B139 and the overall CoC B131 (Table 4) noise limits.

3.1 Operational noise limits

The operational noise limits applicable for all noise generating activities within MPW, including warehouse operations, are presented in Table 4 of SSD 7709 CoC B131 and are reproduced in Table 2. The noise limits are applicable not only to all operational noise sources approved under SSD 7709 but are inclusive of operations as part of SSD 6766 and SSD 7628. The $L_{Aeq}(15 \text{ minute})$ criteria are applicable during the day, evening and night-time periods and the L_{Amax} sleep disturbance noise limits are applicable during the night-time period. The noise limits are applicable under prevailing meteorological conditions of wind speeds of up to 3 m/s at 10 metres above ground level or stability category 'F' temperature inversion conditions.

Table 2 SSD 7709 CoC B131 operational noise limits^{4,6}, dB(A)

Sensitive receiver	Day ^{1,3,5} $L_{Aeq, 15 \text{ minute}}$	Evening ^{1,3,5} $L_{Aeq, 15 \text{ minute}}$	Night ^{1,3,5} $L_{Aeq, 15 \text{ minute}}$	Night ^{2,3,5} L_{Amax} , 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:
- To determine compliance with the $L_{Aeq,15\text{-minute}}$ 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 L_{Amax} Sleep Arousal Screening Level in 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:
 - wind speeds up to 3m/s at 10 meters above ground level; or
 - atmospheric stability category F (with no wind).
 - 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)."
 - 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.
 - 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).

3.2 CoC B139 assessment noise requirements

3.2.1 Requirements

The management of operational noise emission from warehouse mechanical plant and equipment activities within MPW Stage 2 is outlined in the MPW S2 ONMP. Specifically, this report has been prepared to address the requirements of CoC B139 in SSD 7709, as detailed in Section 4.1.1 of the MPW S2 ONMP.

This report includes noise monitoring performed to address the requirements in CoC B139, as detailed in Table 4-1 in Section 4.1.1 of the MPW S2 ONMP.

The requirements of CoC B139 state:

*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.*

CoC B139 requires that the monitored noise levels be compared against the predicted levels in accordance with the CoC B138, as detailed in Section 3.2.2.

As the timing of the monitoring is identified as "operation/occupation", which can occur at different times. To address this issue, the MPW ONMP Table 4-1 notes that "Where operations do not commence within two months of occupation, the assessment report will be submitted within two months of the commencement of operations."

It should also be noted that the monitoring has to be undertaken where "... for a minimum period of one week where valid data is collected". As such, it is important that operations are representative of typical operations, in order for the monitored data to be valid.

3.2.2 CoC B138 assessment

Mechanical plant and equipment noise levels were reviewed prior to construction to satisfy CoC B138. This is detailed in the DDEG Report (*reference 202578-A CAN01 R0 Moorebank Precinct West - Warehouse N1 and N2, dated 6/7/2023*) (B138 assessment). This report provided the noise levels calculated for warehouse operations (outlined in Section 3 and Table 6 of the B138 assessment) and noise emissions from general mechanical plant and equipment for Warehouse N2 at all nearby noise sensitive receivers, for verification under CoC B139. The predicted CoC B138 noise levels are presented reproduced in Table 3.

Table 3 Predicted noise levels – Mechanical plant and equipment – Warehouse N2 (DDEG, 2023)

NCA	Predicted noise levels, L_{Aeq} , dB(A) ^{1,2}
Wattle Grove (NCA 1)	<10
Wattle Grove North (NCA 2)	<10
Casula (NCA 3)	15
Glenfield (NCA 4)	<10

- Notes:
1. The B138 assessment notes, that since the warehouse facility is expected to operate 24 hours a day, mechanical plant will be assessed against the night-time Operational Noise Limits. It is expected that compliance against these limits will result in compliance at all other times.
 2. Predicted levels sourced from Table 6 of the DDEG 'Mechanical Equipment Assessment: Warehouse N1 and N2 – MPW' Report (reference 202578-A CAN01 R0 Moorebank Precinct West - Warehouse N1 and N2, dated 6/7/2023) (B138 assessment).

The CoC B138 assessment concluded that the mechanical plant and equipment noise levels would achieve the noise limits presented in Table 4 of SSD 7709, and Table 4-1 in Section 4.1.1 of the MPW S2 ONMP.

As part of inspections and enquires for the CoC B139 noise monitoring planning, it was identified that the smoke clearance fans (SCFs) could operate as part of typical operations. These items were not included in B138 assessment because at that stage, it was understood they would operate only during an emergency fire situation. As they could operate as part of typical operations for daytime ventilation or night-purge, they have been included in the CoC B139 noise monitoring assessment.

3.2.3 Noise monitoring timing

It is understood that the Warehouse N2 received its occupation certificate 22 May 2024, and commenced operations as of 1st August 2024. In regard to the timing of the noise monitoring:

1. It is understood that operations of N2 commenced on 1st August 2024.
2. An inspection of the warehouse and its operations were undertaken on 2 September as part of the noise monitoring planning, as some tenant operational activities had commenced. However, issues with the operations of the mechanical plant were identified as part of this inspection, which meant that the warehouse was not operating as typical, and noise emissions would not be typical and a valid representation of noise emissions. Adjustments were required and recommissioning was then undertaken so that valid operational data could be measured.
3. Following recommissioning of the mechanical equipment on 10 September 2024, operations were then given one week to settle into typical operations.
4. Noise monitoring commenced 16 September 2024, so that assessment and reporting of valid operational data could be completed approximately within 2 months of typical operations commencing.

4 Measurement methodology and results

4.1 Noise monitoring approach

The NSW Environment Protection Authority's (EPA) *Noise Policy for Industry* (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 B139 Warehouse N2 assessment, the following points were considered:

- The CoC B138 assessment identifies that residential receiver noise levels are expected to be 15 dB(A) $L_{Aeq15min}$ or lower.
- The Warehouse N2 mechanical plant are expected to be more than 10 dB below these existing noise levels, measured at the surrounding NCAs by RTA or based upon a review of the permanent noise monitoring station noise levels during the key operational night period (6:30am to 7:00am), prior to the commencement of Warehouse N2 operations. The attended monitoring showed that the existing noise levels are typically greater than 40 dB(A) $L_{Aeq15min}$, and were controlled by noise sources outside of MIP, such as road traffic noise (ie. M5 and Hume Highway).
- The Warehouse N2 mechanical plant are expected to be more than 10 dB below the background noise levels established at the environmental assessment stage.
- There is no suitable intermediate noise monitoring locations noting both the terrain (Georges River and lower terrain between Casula and N2, and Moorebank Avenue or other warehouses between N2 and other receivers).
- A number of co-located warehouse and industrial operations operate co-currently within the MIP.
- Noise source locations are both roof mounted and ground level mounted.

Noting that the existing ambient noise levels are already high at receivers compared with the expected noise emission levels, quantification of the noise under investigation via direct noise measurement of operational noise emissions from the warehouse mechanical plant and equipment operations is not possible at the residential receiver locations or easily intermediate locations. The NPfI also provides guidance about using noise modelling to review the performance of an industrial operation that is co-located with separate but noise-generating industrial sites impacting the same receiver, similar to the Warehouse N2 within the MIP situation.

As such, the CoC B139 noise monitoring has used a combination of on-site attended noise measurements, unattended monitoring, and noise modelling to quantify the noise emission performance of the warehouse mechanical plant and equipment.

4.2 Compliance measurement methodology

The noise monitoring undertaken to satisfy the requirements of CoC B139 has included the following noise monitoring and assessment steps:

4.2.1 Noise monitoring

The following noise monitoring was undertaken:

1. **Unattended noise monitoring** nearby to the key mechanical plant items for a period of 10 days, to confirm the noise levels of the mechanical plant when operations occurred.
2. **On-site attended measurement** of all mechanical plant and other noisy equipment items to quantify noise emission levels of mechanical plant and equipment that operate as part of the Warehouse N2 (Sydney Tools) operations (Section 5.1).
3. **Receiver attended measurements** to confirm that the mechanical plant and other noisy equipment items were not quantifiable at the nearest critical receiver locations (Casula), and undertaken noise monitoring to aid with confirming the performance of the noise model used to determine noise emission levels.

4.2.2 Data analysis and assessment

Following the noise monitoring, the following steps were undertaken to assess the noise level contributions at the nearby sensitive receivers:

1. **Noise source analysis** - Review the mechanical plant and equipment attended measurement data, analyse results and quantify noise source levels from all the fixed mechanical plant and equipment for Warehouse N2 (Sydney Tools).
2. **Noise model setup and performance review** - Setup and calibrate the noise model for individual mechanical plant items, including the Smoke Clearance Fans (SCFs), main office mechanical plant and equipment as well as the dock office mechanical equipment for the assessment of reasonable worst-case noise operations.
3. **Noise emission quantification** - Calculate the fixed mechanical plant and equipment noise levels from the Warehouse N2 (Sydney Tools) operations to all nearby surrounding receivers and determine the noise level contribution at the property with the highest noise levels within each NCA.

4.3 Instrumentation

A range of noise monitoring equipment was used to undertake the compliance noise monitoring. A summary of measurement equipment and calibration dates is provided in Table 4.

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 4 Noise measurement equipment

Monitoring location/ purpose	Monitoring period used (2024)	Equipment (RTA ref.)	Serial number	Last date calibrated
On-site attended noise measurements	16/9 to 18/9 & 1/10	NTi XL2 (XL2-8)	A2A-16217-E0	04/08/2023
On-site attended noise measurements	16/9 to 18/9	NTi XL2 (XL2-A)	A2A-20889-E0	26/10/2023
On-site attended noise measurements	1/10	NTi XL2 (XL2-C)	A2A-19156-E0	28/02/2024
On-site attended noise measurements	1/10	NTi XL2 (RTA07-046)	A2A-20264-E0	03/04/2024
Unattended on-site noise measurements (N2 Roof)	16/9 to 1/10	NTi XL2 (RTA07-051)	A2A-17474-E0	14/07/2023
Field calibration	16/9 to 18/9 & 1/10	B&K 4231	2677710	15/01/2024
Field calibration	16/9 to 18/9 & 1/10	B&K 4231	3009707	16/01/2024
Field calibration	16/9 to 18/9 & 1/10	B&K 4231	3027924	11/10/2024

Four Envirosuite permanent noise monitors are set up at nearby representative residential locations in the community within each NCA as detailed in Table 5 and shown as NMT01 to NMT04 in Figure 1.

Table 5 Permanent noise monitoring stations

Monitoring location	Description	Equipment	Serial No	Last date calibrated
NMT01 (Wattle Grove North)	Permanent noise monitor	8&K 2250	3025394	Calibrations undertaken by Envirosuite
NMT02 (Glenfield)	Permanent noise monitor	8&K 2250	2764962	
NMT03 (Wattle Grove)	Permanent noise monitor	8&K 2250	3025351	
NMT04 (Casula)	Permanent noise monitor	B&K 2250	3025317	

4.4 Meteorological conditions

Meteorological conditions during the period of the attended noise measurement surveys have been reviewed to determine the prevailing wind and temperature inversion conditions were appropriate. For a period of the monitoring, the data from the Moorebank meteorological data monitoring station adjacent to Bushmaster Avenue was not available, and so instead data from the Bureau of Meteorology (BOM) automatic weather station (AWS) (Holsworthy Aerodrome) (Station 95761) was used as it is located approximately 5 km south-east from the MIP. On-site weather observations were consistent with the BOM data.

During the attended noise measurement periods at Warehouse N2 and the nearby receivers, the weather conditions were as detailed in Table 6.

Table 6 Attended noise measurement surveys weather observations

Date / Time period	Air temperature, °C	Relative humidity, %	Average wind speed (at 10 m above ground level), m/s	Wind direction, degrees and Cardinal	Cloud cover	Rain
17/09/2024 8:30am – 4:00pm	13 - 21	32 - 57	2 - 5	Ranged from WSW to NW, changing to easterly after 3:30pm	Generally clear skies with a few scattered clouds	None
18/09/2024 5:30am – 4:00pm	5 - 26	10 - 80	1 - 7 ¹	Ranged from SW to NW	Clear skies throughout	None
1/10/2024 5:30am – 11:30am	8 - 20	54 - 96	0 - 3	Winds were generally calm, or from NW to N	Clear skies throughout	None

Notes: 1. Winds were above 5m/s at 11:30am, and after 3:00pm. During the attended monitoring, a handheld anemometer was used, and confirmed wind speeds at the sound level meter were not above 5m/s, as required by the NPfl.

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.

Data from the BOM AWS (Holsworthy Aerodrome) (Station 95761) was used to exclude weather affected data (wind (greater than 5m/s) or rain) in the unattended noise monitoring presented in APPENDIX C in accordance with the NPfl.

5 Monitoring analysis

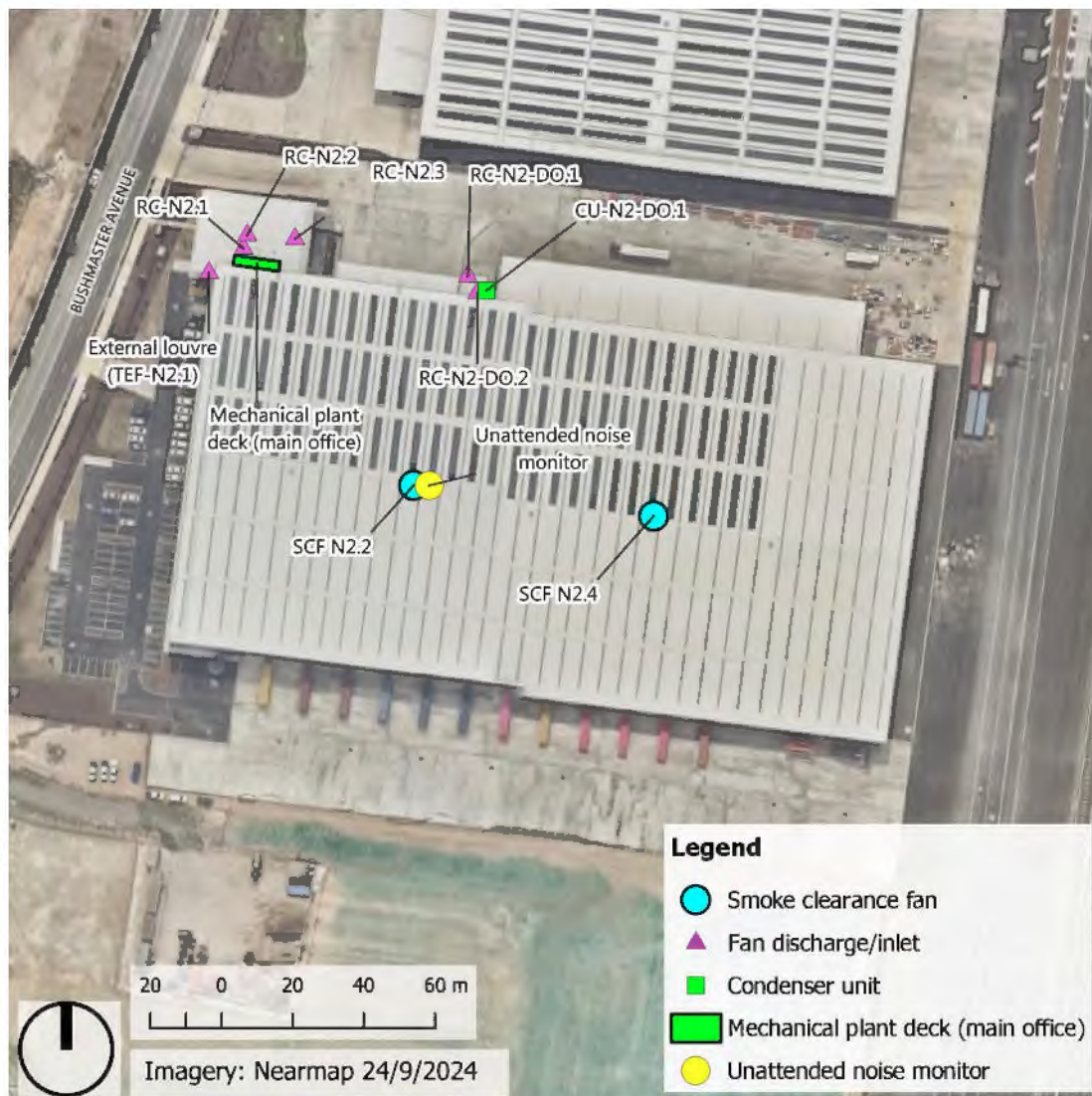
5.1 Key mechanical plant and equipment noise sources

Based on as-built construction information, site inspections, site personal observations, attended and unattended noise measurements, main sources for the mechanical plant and equipment are as follows:

- Mechanical plant deck for main office
- Mechanical plant for dock office
- Main office internal mechanical plant and equipment intake/discharge openings
- Smoke Clearance Fans (SCFs)

A full list of the equipment and their location is provided in APPENDIX B, and the location of the external noise emission locations (ie. fan intake/discharge or condenser unit location) are presented in Figure 2.

Figure 2 Key mechanical plant noise source locations and unattended noise monitor location



5.2 Attended noise measurements

Attended noise measurements of individual mechanical plant and equipment items and typical operations were undertaken at Warehouse N2 on 17 and 18 September 2024, in order to quantify the noise emissions from the installed mechanical plant and equipment in operation. These noise levels have been used to develop the CoC B139 operational noise compliance noise model.

During all measurements of mechanical plant and equipment, the specific noise source being measured was the dominant noise source. All plant and equipment items were forced on into a typical operational state for the purposes of undertaking the attended noise measurements. Observations were made of the on-site specific mechanical plant item during operations to ensure they were undertaking typical operations.

The most intensive mechanical plant and equipment, specifically the SCFs installed on the roof, operate subject to various existing environmental factors such as the temperature and humidity, and so do not operate at all times. In order to measure and quantify the noise emission levels from SCFs (only SCF-N2-2.2 and SCF-N2-2.4 operate as a part of typical operations) and air conditioning system, these items were manually activated such that they would operate in their typical pre-programmed operational setting. This manual operation was performed onsite for the purpose of undertaking attended measurements and due to the uncertainty of getting the suitable environmental conditions during the noise monitoring period from 16 September to 1 October 2024.

Results from the on-site attended measurements of the critical mechanical plant and equipment are summarised in Table 7.

Table 7 On-site attended mechanical plant noise measurement results (17 and 18 September 2024)

Activity noise sources	Time	Measurement duration (t), sec	Measurement distance (m)	Measured noise levels, dB(A)		
				L _{Aeq}	L _{A90}	L _{Afmax}
Smoke Clearance Fans (SCFs)						
SCF-N2.2						
Typical operation at 5m ¹	2:37 pm	127	5	61	61	64
Typical operation at 10m ¹	2:48 pm	148	10	57	56	60
SCF-N2.4						
Typical operation at 5m ¹	2:48 pm	122	5	61	61	63
Typical operation at 10m ¹	2:52 pm	122	10	57	57	60
Background noise level (at roof, 10m from SCF-N2.4)	2:04 pm	303	0	48	46	60

Activity noise sources	Time	Measurement duration (t), sec	Measurement distance (m)	Measured noise levels, dB(A)		
				L _{Aeq}	L _{A90}	L _{AFmax}
Mechanical plant main office						
CU-N2-1.1	2:39 pm	60	2	61	60	64
CU-N2-1.2						
CU-N2-1.3						
CU-N2-1.4						
CU-N2-COMMS						
CU-N2-G.1						
CU-N2-G.2						
CU-N2-G.3						
CU-N2-G.4						
All above condenser units	2:14 pm	12	3	53	51	64
All above condenser units	2:32 pm	61	3	56	55	61
Background noise level (main office roof)	2:58 pm	300	0	53	50	66
RC-N2.1 (connected to FCU-N2-1.1 & FCU-N2-1.2)	2:42 pm	52	1	59	57	62
RC-N2.2 (connected to FCU-N2-1.3/1.4/1.5)	2:42 pm	60	1	57	56	62
RC-N2.3 (connected to TEF-N2.2	inaudible at 1 metre at 50 dB(A) L _{A90}					
TEF-N2.1 (louvre exhausting to carpark)	7:59 am	63	5	57	56	62
Mechanical plant dock office ²						
CU-N2-DO.1	3:21 pm	61	1	53	50	70

- Notes:
1. SCFs attended noise measurements conducted onsite with similar SCFs system settings pre-programmed as the system would operate during the typical scheduled operations.
 2. Fan inaudible at ground level, and dock office roof inaccessible for measurement. Assumed same level as measured for N1 dock office.

5.3 Unattended noise measurements

During the attended noise survey in Section 5.1, it was observed that two SCF (SCF-N2-2.2 and SCF-N2-2.4) could operate during typical operations, and were considered to be the main noise source contributors for the Warehouse N2 mechanical plant noise emissions. To confirm that the noise levels measured as part of the attended noise survey presented in Section 5.1 represented the levels as part of normal operations were typical, a minimum one week period an unattended noise monitoring was undertaken as required by CoC B139. The unattended noise monitoring was undertaken over the period between 16 September and 1 October 2024. The unattended noise monitor was installed at 5 metres from the SCF-N2-2.2 so that it would dominate monitored noise levels if and when in operation. The location of these SCFs and unattended noise logger are shown in Figure 2.

The monitoring data was analysed, with atypical spikes (rise in the existing/ambient noise levels) identifying the operation of the SCFs. The SCF were manually operated on 17 September and 1 October to ensure that sample data was measured.

It was observed that the fan operated on 2 times during the monitoring period, each of which were manually forced. No automatic operation occurred during the monitoring period. During both periods in which the fan operated, it was found it operated at a noise level at the logger of 57 dB(A), which then step up to a typical noise level of 61 dB(A), which remained during the rest of the operation. This higher level was consistent with that measured during the attended noise survey and has been adopted for the noise modelling.

Detailed results from the unattended noise monitoring are provided in APPENDIX B.

5.4 Mechanical plant and equipment noise source levels

Based upon the attended and unattended noise monitoring presented in the above sections, the following noise source levels for the key typical operating mechanical plant and equipment have been established based upon periods of typical operation. These have been based upon either direct measurement, or supplier data that has been confirmed through monitoring of cumulative noise level (ie. condenser units on mechanical deck). The compliance noise model detailed in Section 6 has also been used to calibrate source levels where measurement of sources in isolation was not feasible or practicable. The sound power level inputs presented in Table 8 were used in the CoC B139 operational noise compliance modelling detailed in Section 6 in the locations presented in Figure 2.

Table 8 CoC B139 operational noise compliance noise source levels

Site items / operation	Individual item sound power level (SWL) (L_{Aeq}), dB(A)	Comment
Smoke clearance fans (SCFs)		
SCF-N2.2 (at typical operational speed) ²	85 ⁵	Attended measured level
SCF-N2.4 (at typical operational speed) ²	85 ⁵	Attended measured level
Mechanical plant (Main office)¹		
CU-N2-G.1	70 ⁴	Supplier value for confirmed units. 1 dB adjustment has been applied to all condenser units, to adjust for cumulative measured noise levels when in operation. All units located within the main office roof plant deck (see Figure 2).
CU-N2-G.2	70 ⁴	
CU-N2-G.3	70 ⁴	
CU-N2-G.4	70 ⁴	
CU-N2-1.1	70 ⁴	
CU-N2-1.2	70 ⁴	
CU-N2-1.3	70 ⁴	
CU-N2-1.4	75 ⁴	
CU-N2-COMMS	67 ⁴	
RC-N2.1 (connected to TEF-N2.2)	66	Fan coil unit internal. Noise levels measured at external cowl noise emission point.
RC-N2.2 (connected to FCU-N2-1.1, FCU-N2-1.2)	62	
RC-N2.3 (connected to FCU-N2-1.3, FCU-N2-1.4)	50 ³	Fan internal. Noise levels measured at external cowl noise emission point. Inaudible at 50 dB(A) at 1m.
TEF-N2.1 (louvre exhausting to carpark)	77	Measured level of external louvre, fan internal.

Site items / operation	Individual item sound power level (SWL) ($L_{Aeq,t}$), dB(A)	Comment
Mechanical Plant (Dock Office)		
CU-N2-DO.1	62	Measured level [Supplier level = L_w 71dB(A)]
RC-N2.DO.1 (connected to AC-N2-DO.1)	50	See Note 3
RC-N2.DO.2 (connected to TEF-N2.DO.1)	50	

- Notes:
1. All the mechanical plant and equipment associated with the main office mechanical plant deck was operating simultaneously during the attended noise measurements and the cumulative noise levels measured reflects the worst-case scenario with all mechanical plant items in operation via the manual operation at full load.
 2. Fans were programmed to operate at reduced speed as part of typical operations. During a fire emergency the fans would operate at full speed.
 3. Noise emissions were not audible in a 50 dB(A) L_{A90} environment at ground level, and dock office roof inaccessible for measurement. Assumed same level as measured for N1 dock office.
 4. A 3 dB correction has been applied to all condenser units, to adjust for cumulative measured noise levels when in operation. This correction is included in the presented noise level.
 5. Based upon highest measured levels from multiple attended measurements and unattended noise monitoring.

6 CoC B139 operational noise modelling and assessment

As detailed in Section 4, it was not possible to directly measure or estimate the warehouse mechanical plant and equipment noise levels at nearby receivers. As such, this assessment has used a combination of on-site attended noise measurements and unattended monitoring presented in Section 5. This section presents the noise modelling used to assess the noise emissions of the Warehouse N2 mechanical plant and equipment.

6.1 General modelling assumptions and methods

Modelling and assessment of warehouse noise emissions was determined by modelling the noise sources, receiver locations, existing built structures and topographical features, using CadnaA (version 2024). The noise predictions are based on the CONCAWE noise prediction algorithms, noting that the nearby critical noise sensitive receivers are greater 100 metres from the site. The CONCAWE environmental noise prediction method is an appropriate method for predicting the noise propagation in these circumstances. The performance of the noise model used is reviewed in Section 6.2.

The noise prediction model considers:

- Location of all noise sources
- Height of sources and receivers referenced to digital ground contours both onsite and outside the warehouse and MIP areas
- Noise source levels of individual mechanical plant and equipment. All fixed mechanical plant and equipment noise sources associated with Warehouse N2 (Sydney Tools) operations have been included in the noise modelling, including the SCFs. Final noise emission levels are presented with and without the SCF, noting the infrequent nature of their use.
- Separation distances between sources and receivers
- Ground type between sources and receivers
- Attenuation from buildings and built structures and topography (natural and purpose built)
- Atmospheric losses and assessment meteorological conditions.

The modelled activities and assumptions for the mechanical plant and equipment operating and the duration and frequency of operation as part of the 'reasonable' worst-case operational scenarios are described in Section 6.3.

6.2 Noise model performance

To confirm the suitability of the noise model development for the assessment and assessing the CoC B139 noise emissions, the noise model has been reviewed against onsite and receiver concurrent noise measurements.

The review of the noise model performance uses a combination of noise monitoring at the N1 and N2 warehouses, where clear noise source locations and levels could be measured, combined with concurrent noise measurements at the nearest key residential receivers in Casula. These noise measurements were conducted on 1 October 2024 between 6:00am and 7:30am. As the mechanical plant and equipment were not audible at the receiver, other onsite noise events (ie. truck activity high noise events) have been used to confirm the noise model performance. Where noise events were audible and quantifiable at both monitoring locations, these have been used for the review.

Shown in Figure 3 are the monitoring locations along with the location of the onsite activity noise event locations. The validation scenario that was modelled along with the predicted outcomes are presented in Table 9. Based on this validation, the noise model is considered suitable for modelling and assessing noise emissions.

Figure 3 Noise model performance review noise monitoring locations

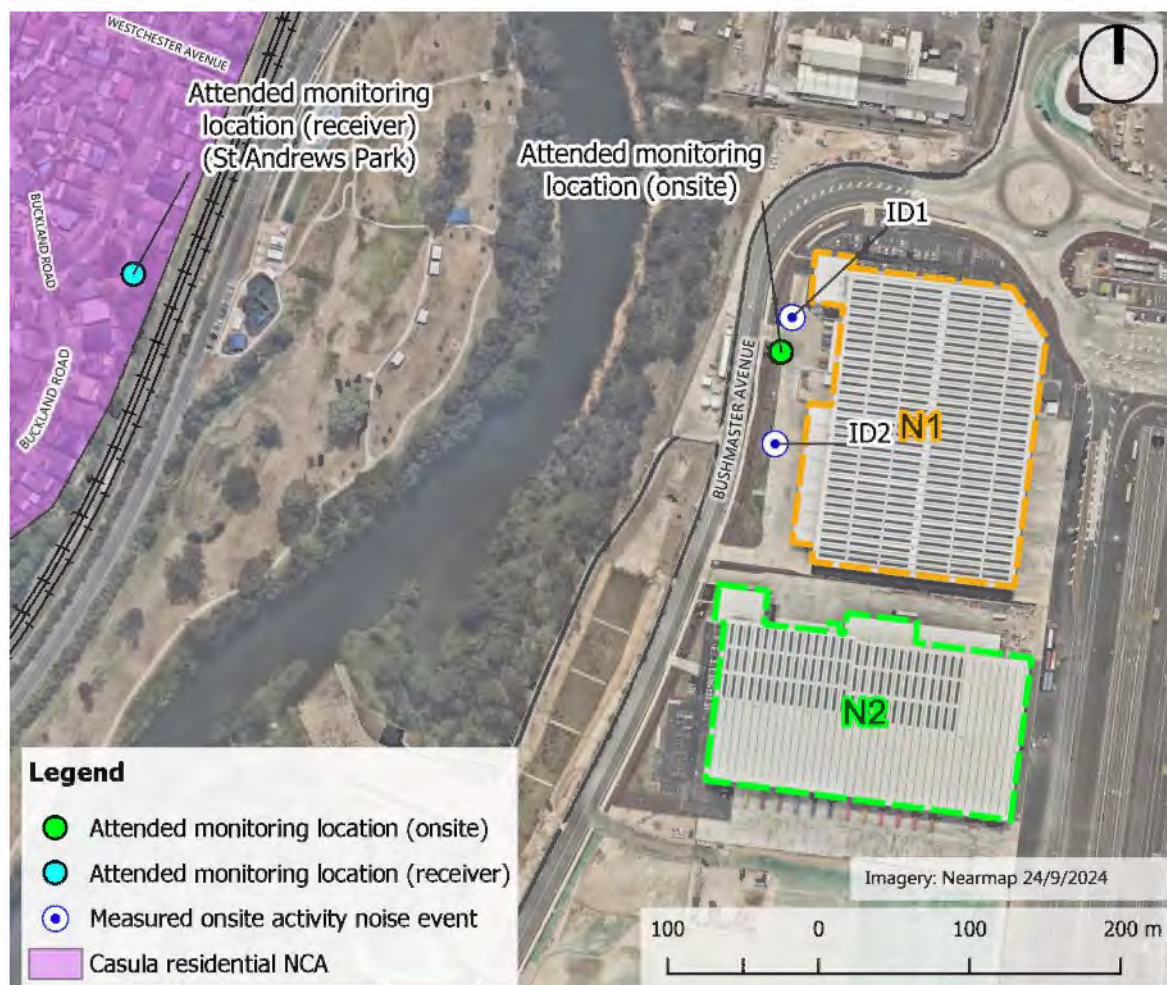


Table 9 Comparison between measured and modelled noise levels

ID	Noise event	Monitoring location	Prevailing meteorological conditions ¹	Measurement time	Estimated site contribution noise level, dB(A) L _{Amax}	Model predicted noise level, dB(A) L _{Amax}	Difference, dB
1	Prime mover container coupling activity	Onsite	Wind – 0 m/s Direction – 3 degrees Humidity – 95%	6:45 am 1/10/2024	82	82 ³	0
		Casula ⁵	Temperature – 12°C Stability Class F (based upon the NPfl sigma-theta method) ² Note 1		50	48	2
2	Truck unloading equipment on hardstand	Onsite	Wind – 0.75 m/s. Direction – 350 degrees Humidity – 95%	6:55 am 1/10/2024	70	70 ³	0
		Casula ⁵	Temperature – 12°C Stability Class E (based upon the NPfl sigma-theta method) ² Note 1		46-48 ⁴	46	0

- Notes:
1. Meteorological data based upon the MIP meteorological data monitoring station adjacent to Bushmaster Avenue, in between Casula and N1.
 2. Night time stability class, based upon NPfl Fact Sheet D1.4 'Use of sigma-theta data'
 3. Modelled with CONCAWE for consistency, however, CONCAWE is typically not valid under 100m.
 4. Measured noise event L_{Amax} level was only 2-4 dB(A) above the background noise level (traffic controlled), and so has been corrected for the existing background noise level and a likely range estimated.
 5. Monitoring undertaken at St Andrews Park, Casula

6.3 Assessment operational scenarios

All measurable noise-generating mechanical plant and equipment that operate as part of typical operations have been included in the assessment modelling as required by CoC B139. These are listed in Table 8. The noise emission locations of these sources are shown in Figure 2.

SCFs (SCF N2-2.2 and SCF N2-2.4 only) are the main mechanical plant and equipment noise sources for Warehouse N2 operations and considered to be critical noise sources, when in operation, for the reasonable worst case intrusive scenario (15-minute period) assessment at the nearest residential receivers in proximity to Warehouse N2. However, as the SCF operate infrequently and were not included in the B138 noise assessment, noise emission levels are presented with and without these fans in operation for the purpose of the assessment.

6.4 Noise compliance assessment

Predicted mechanical plant and equipment operational compliance noise levels are presented in Table 10. The noise levels have been predicted to each of the surrounding residential receiver noise catchments with all nearby residences assessed, and the highest residential receiver noise level in each catchment area reported in Table 10. These noise levels represent the reasonable worst-case intrusiveness operational scenario (15-minute period) from typical mechanical plant and equipment operations of the warehouse.

The modelling incorporated the worst-case prevailing meteorological conditions, as required by CoC B131, which are wind speeds of up to 3 m/s at 10 metres above ground level or stability category 'F' temperature inversion conditions.

The mechanical plant and equipment noise sources are steady-state or quasi-steady-state. Therefore, there is unlikely to be significant variation between $L_{Aeq,15min}$ values and L_{AFmax} values, and no significant peak noise events are expected. As such, by achieving the night period L_{Aeq} (15-minute) requirements, the noise emissions will achieve the L_{AFmax} , sleep arousal screening level requirements of 52 dB(A) L_{Amax} .

The results in Table 10 show that although the predicted CoC B139 operational compliance noise levels are above those predicted in the CoC B138 assessment, they are substantially below the SSD 7709 CoC B131 noise limits. As such, it can be concluded that they achieve the requirements, such that they have been selected and installed to achieve the overall noise limits specified in SSD 7709 Table 4 (CoC B131).

Table 10 CoC B139 predicted noise levels – Mechanical plant and equipment - Warehouse N2

NCA	Mechanical plant and equipment (Warehouse N2)						B138 assessment predicted noise levels	SSD 7709 CoC B131 noise limits		
	Predicted operational compliance noise levels ^{1,2} , L _{Aeq} 15 minute							L _{Aeq} 15 minute		
	With SCF in operation			Without SCF in operation						
	Day	Evening	Night	Day	Evening	Night	Night			
Wattle Grove (NCA 1)	<10	<10	<10	<10	<10	<10	<10	44	42	42
Wattle Grove North (NCA 2)	13	13	12	<10	<10	<10	<10	41	41	41
Casula (NCA 3)	26	26	26	23	23	22	15	46	44	39
Glenfield (NCA 4)	<10	<10	<10	<10	<10	<10	<10	49	46	42

- Notes
- Modelling meteorological were as follows, consistent with the range applicable for the B131 noise limits:
 - Day/Evening - Winds speeds of 3m/s at 10 meters above ground level (all directions)
 - Night - Atmospheric stability category F (with no wind).
 - Modelling based upon average temperature and humidity conditions during the monitoring period.

7 Conclusion

Renzo Tonin & Associates (RTA) was engaged by Logos Investment Management (Logos) on behalf of The Trust Company (Australia) Limited (ACN 000 000 993) as trustee of the Moorebank Industrial Warehouse Trust to undertake noise monitoring of the warehouse mechanical plant and other noisy equipment to satisfy the (State Significant Development (SSD) 7709 B139 consent condition (CoC) for the Warehouse N2. Warehouse N2 is located within the Moorebank Precinct West (MPW), which forms part of the Moorebank Intermodal Precinct (MIP) at Moorebank, NSW. Warehouse N2 is currently tenanted by Sydney Tools.

This report has been prepared to monitor and assess noise emissions from the fixed mechanical plant and equipment of the warehouse that operate as part of typical warehouse operations in accordance CoC B139 of SSD 7709, and as detailed in the MPW Operational Noise Management Plan² (MPW S2 ONMP).

CoC B139 requires noise monitoring of actual mechanical plant and other noisy equipment operations for a minimum period of one week where valid data is collected following the commencement of operations of each warehouse within MPW. This monitoring is to verify mechanical plant and equipment noise levels predicted as part of the CoC B138 noise assessment. The CoC B138 noise assessment was required to demonstrate that the plant and equipment has been selected to meet the overall noise limits specified in SSD 7709 CoC B131 (Table 4). As such, this report has compared noise emission levels for both the CoC B138 predictions and the overall noise limits specified in SSD 7709 CoC B131 (Table 4).

The NSW EPA *Noise Policy for Industry* (NPfI) provides guidance for monitoring the performance of a noise-generating industrial facility, which includes direct measurement at a receiver location, direct measurement at alternative or intermediate location/s, unattended monitoring and modelling. As the existing ambient noise levels are already high at residences nearby to Warehouse N2 compared with the expected noise emission levels, a combination of on-site attended noise measurements, unattended monitoring, and noise modelling have been used to quantify the noise emission performance of the warehouse mechanical plant and equipment.

As part of the assessment, a series of noise measurements were undertaken over a two week period. Unattended noise monitoring was undertaken at one rooftop location at Warehouse N2 over a period of two weeks between 16 September and 1 October 2024. In addition, attended noise measurements were undertaken on 17 and 18 September 2024, and on 1 October 2024. The aim of the measurements was to quantify fixed mechanical plant and equipment operational noise levels on-site, in order to develop a noise model and determine noise emission levels at nearby residences.

The monitoring data was analysed to confirm the warehouse mechanical plant and equipment noise sources levels. These were used to then develop a noise prediction model for the warehouse. The noise

² Logos, Operational Noise Management Plan Moorebank Intermodal Precinct - West Precinct Stage 2, Revision 4, dated 15/4/2024, available https://moorebankintermodalprecinct.com.au/wp-content/uploads/2024/04/SSD7709-MPW2-ONMP_Rev4_redacted.pdf, accessed 15/10/2024

model was reviewed against onsite and receiver concurrent noise measurements to confirm its suitability to assessing the CoC B139 noise emissions.

The results outcome of this assessment is that although the predicted B139 operational compliance noise levels are slightly above those predicted in the B138 noise assessment, they are substantially below the SSD 7709 CoC B131 noise limits. As such, it can be concluded that the noise emissions from the fixed mechanical plant and equipment installed at Warehouse N2 achieve the noise emission requirements, such that they have been selected and installed to achieve the overall noise limits specified in SSD 7709 Table 4 (CoC B131).

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

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 L _{eq} 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 Mechanical plant and equipment

Table 11 Operational mechanical plant noise measurement (external noise emissions) – Warehouse N2

Item	Designation	Make	Model	Noise emission location	Notes
Condenser unit	CU-N2-G.1	Fujitsu	AOTH45KBTA	Office roof plant deck	
	CU-N2-G.2	Fujitsu	AOTH60KBTA		
	CU-N2-G.3	Fujitsu	AOTH45KBTA		
	CU-N2-G.4	Fujitsu	AOTH60KBTA		
	CU-N2-1.1	Fujitsu	AOTH45KBTA		
	CU-N2-1.2	Fujitsu	AOTH60KBTA		
	CU-N2-1.3	Fujitsu	AOTH45KBTA		
	CU-N2-1.4	Fujitsu	AOTA90LALT		
	CU-N2-COMMS	Fujitsu	AOTH30KMTD		
	CU-N2-DO.1	Fujitsu	AOTG45KBTA	Dock office	
Smoke clearance fan	SCF-N2.2	Pacific Ventilation	VD10DC27A-4KFF	Roof ridgeline	Can operate during typical operations, daytime ventilation or night purge
	SCF-N2.4	Pacific Ventilation	VD10DC27A-4KFF		
	SCF-N2.1	Pacific Ventilation	VD10DC27A-4KFF		No normal operations. Fire event only
	SCF-N2.3	Pacific Ventilation	VD10DC27A-4KFF		
	SCF-N2.5	Pacific Ventilation	VD10DC27A-4KFF		
	SCF-N2.6	Pacific Ventilation	VD10DC27A-4KFF		
Toilet exhaust fan	TEF-N2.1	Pacific Ventilation	ICQ450-4EE	Noise emission from façade louvre to north-west carpark at ground level.	
	TEF-N2.2	Pacific Ventilation	ICQ355-4EE	Noise emission from RC-N2.1 on office roof.	
	TEF-N2.DO.1	Pacific Ventilation	MFP200-V-HIGH	Noise emission from RC-N2.DO.2 on dock office roof	
Cowls (noise emission point) for makeup-air, outdoor air fans or toilet exhaust fans	RC-N2.1	Pacific Ventilation	VCQ-0:S:S:S	Office roof	Connected to TEF-N2.2
	RC-N2.2	Pacific Ventilation	VCQ-0:S:S:S	Office roof	Connected to FCU-N2-1.1, FCU-N2-1.2
	RC-N2.3	Fantech	RV1	Office roof	Connected to FCU-N2-1.3, FCU-N2-1.4
	RC-N2.DO.1	-	-	Dock office roof	Connected to AC-N2-DO.01
	RC-N2.DO.2	-	-	Dock office roof	Connected to TEF-N2-DO.1

APPENDIX C **Logger location – Warehouse N2 roof**

Dates of Survey: 16/09/2024 - 02/10/2024
Monitoring ID: -
Address: 9 Bushmaster Ave, Moorebank (Warehouse N2)
Description: Warehouse N2 roof (5m from SCF-N2.2)

Background & Ambient Noise Monitoring Results

	LA90 Background Noise Levels			LAeq Ambient Noise Levels		
	Day ¹	Evening ²	Night ³	Day ¹	Evening ²	Night ³
Representative Week ⁴	46	46	45	53	51	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 5.00am Monday to Sunday & Public Holidays
4. Rating Background Level (RBL) for LA90 and logarithmic average for LAeq

Logger location photograph

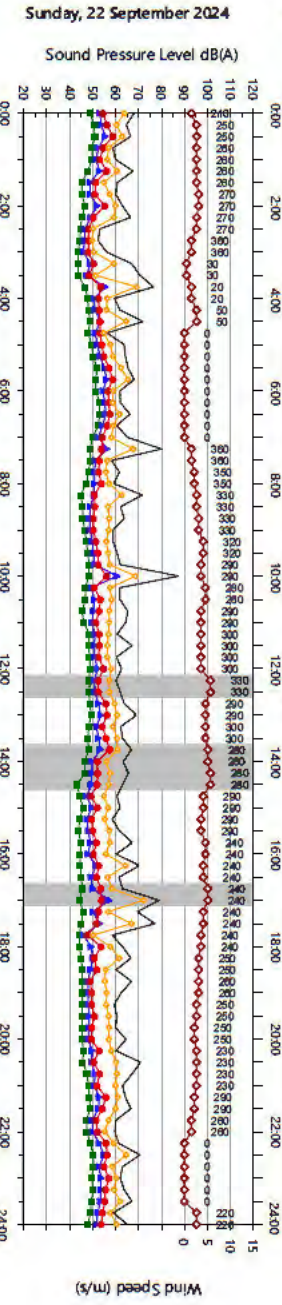
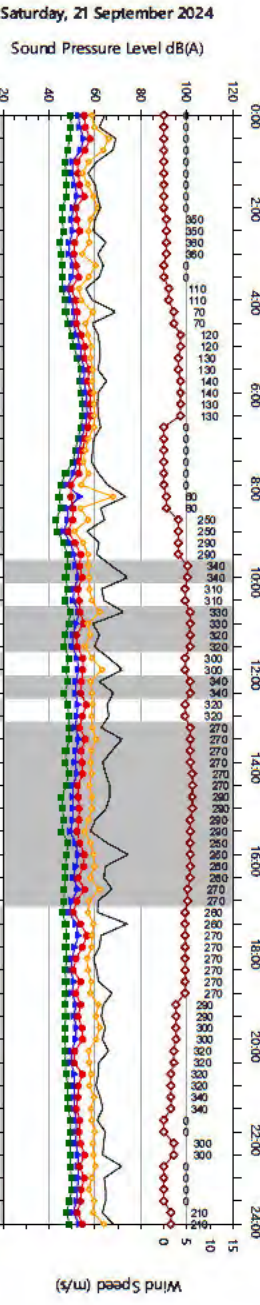
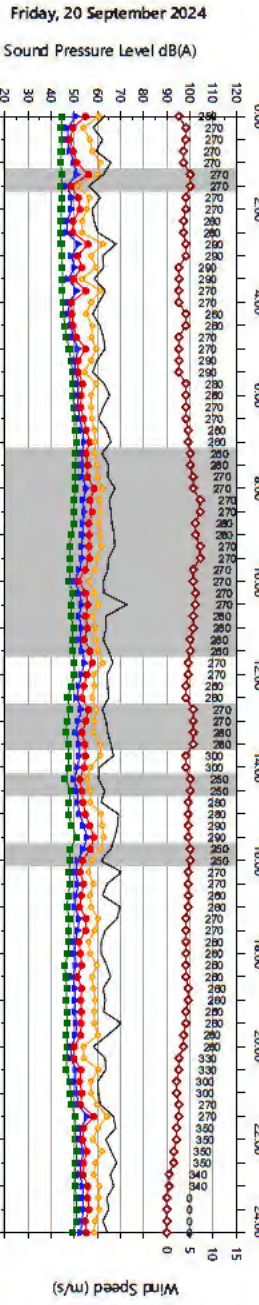
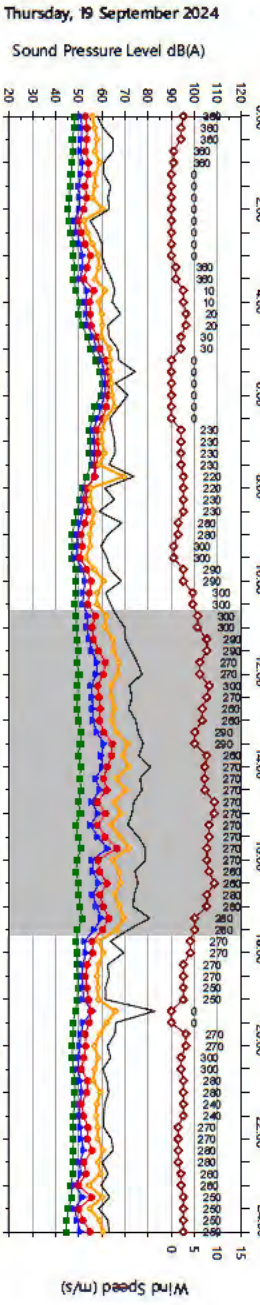
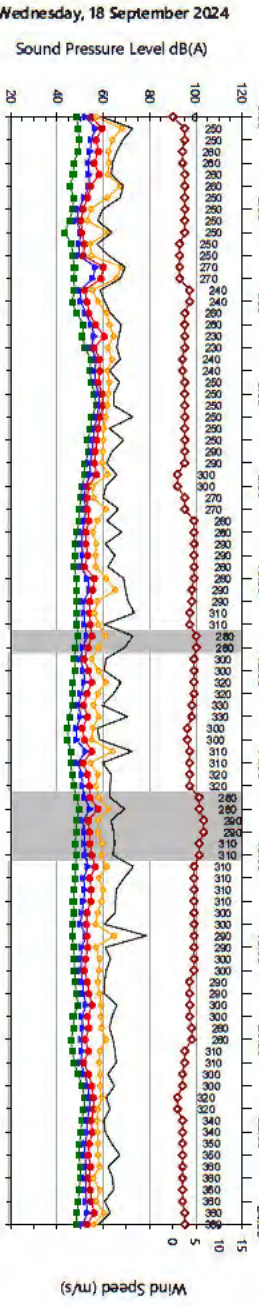
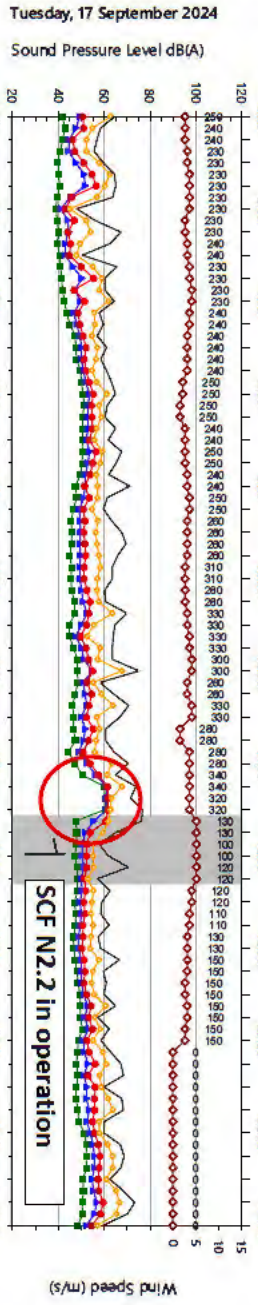
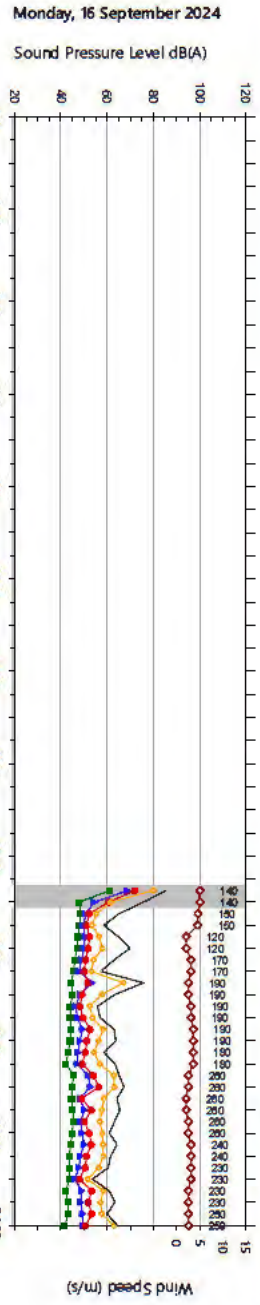


Logger location map



Unattended Monitoring Results

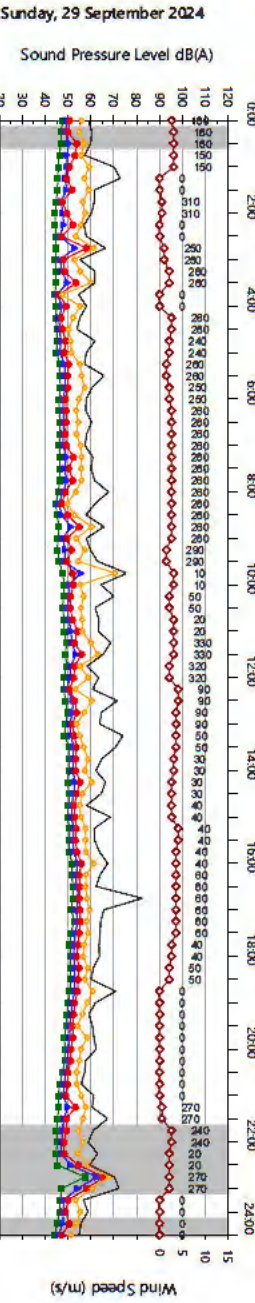
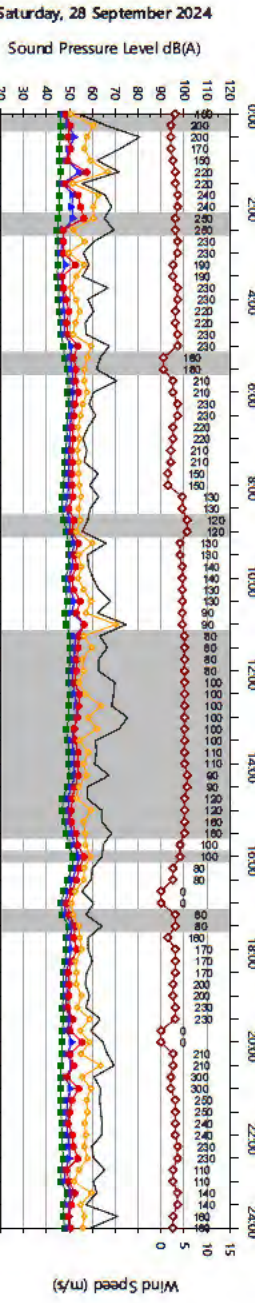
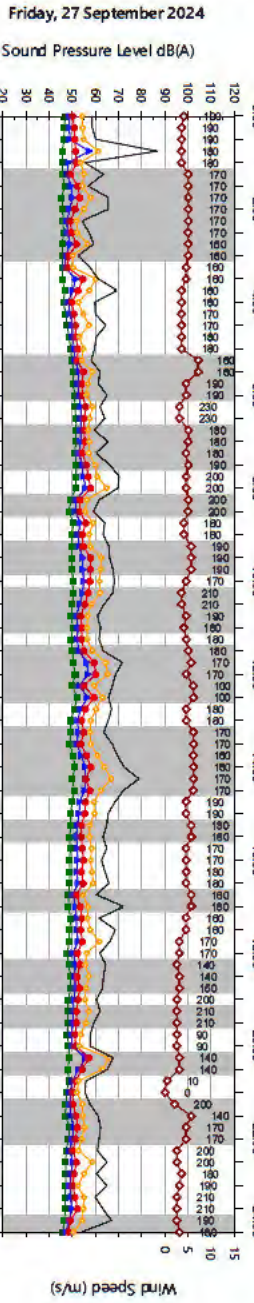
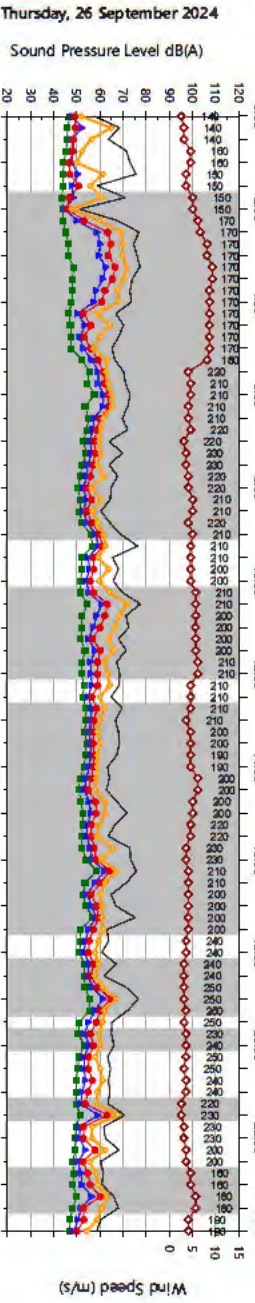
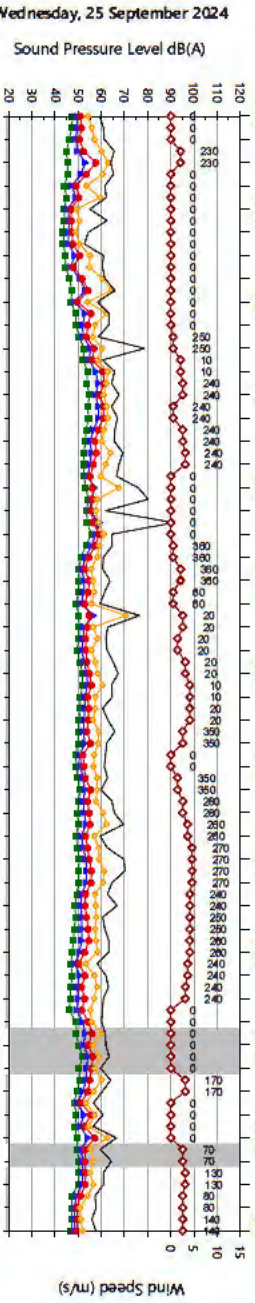
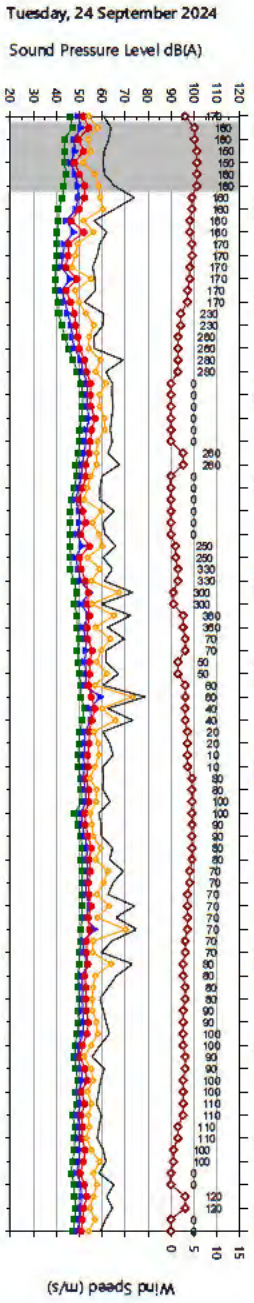
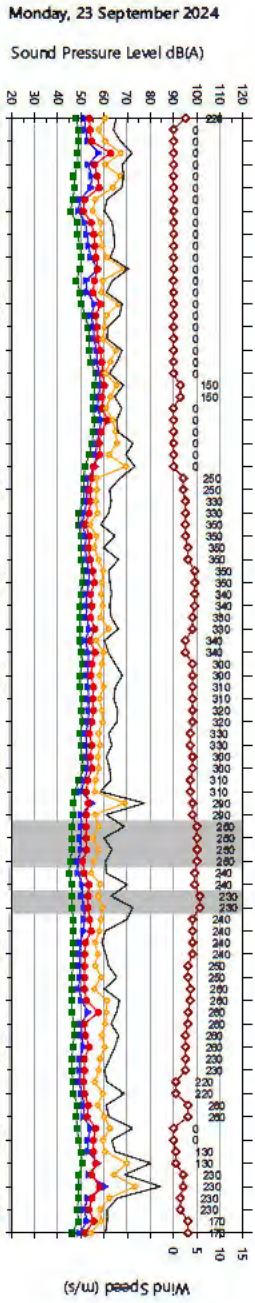
Location: 9 Bushmaster Ave, Moorebank (Warehouse N2) -
Warehouse N2 roof (5m from SCF-N2.2)



Legend: L90 (green line), Leq (blue line), L10 (red line), L1 (yellow line), Lmax (black line), Wind Speed and Direction (red line with diamond markers)

Unattended Monitoring Results

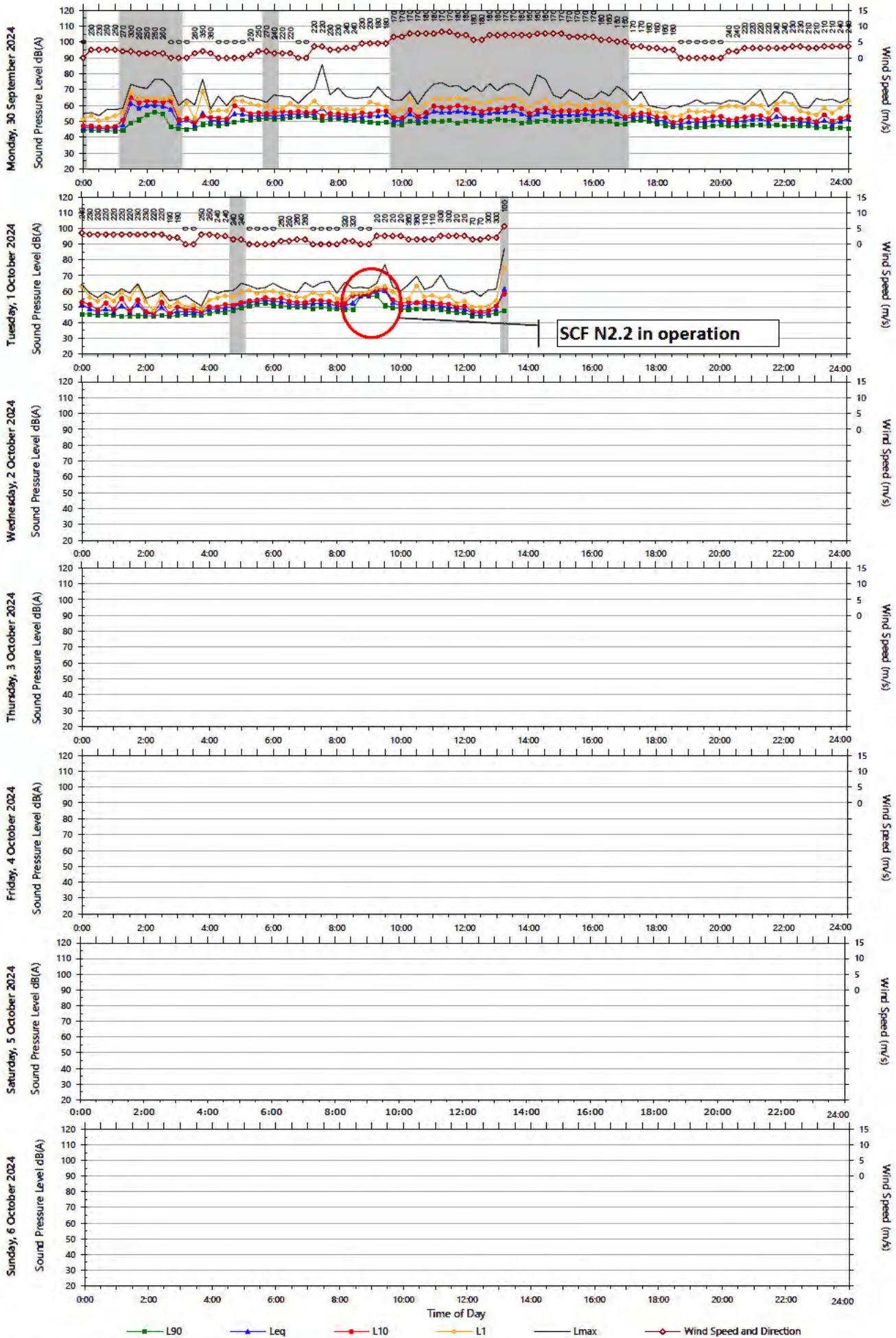
Location: 9 Bushmaster Ave, Moorebank (Warehouse N2) -
Warehouse N2 roof (5m from SCF-N2.2)



Legend: L90 (green line with squares), Leq (blue line with circles), L10 (red line with triangles), L1 (yellow line with diamonds), Lmax (black line), Wind Speed and Direction (red line with diamonds)

Unattended Monitoring Results

Location: 9 Bushmaster Ave, Moorebank (Warehouse N2) -
Warehouse N2 roof (5m from SCF-N2.2)



Data File: 2024-09-16_SLM_001_123_Rpt_Report.txt

Template: QTE-26 Logger Graphs Program (r46)

APPENDIX F – WATER QUALITY MONITORING REPORTS

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)

Romy Brien (BSc NRM)

E-mail: daniel@apical-bushfire.com.au

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 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 (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).

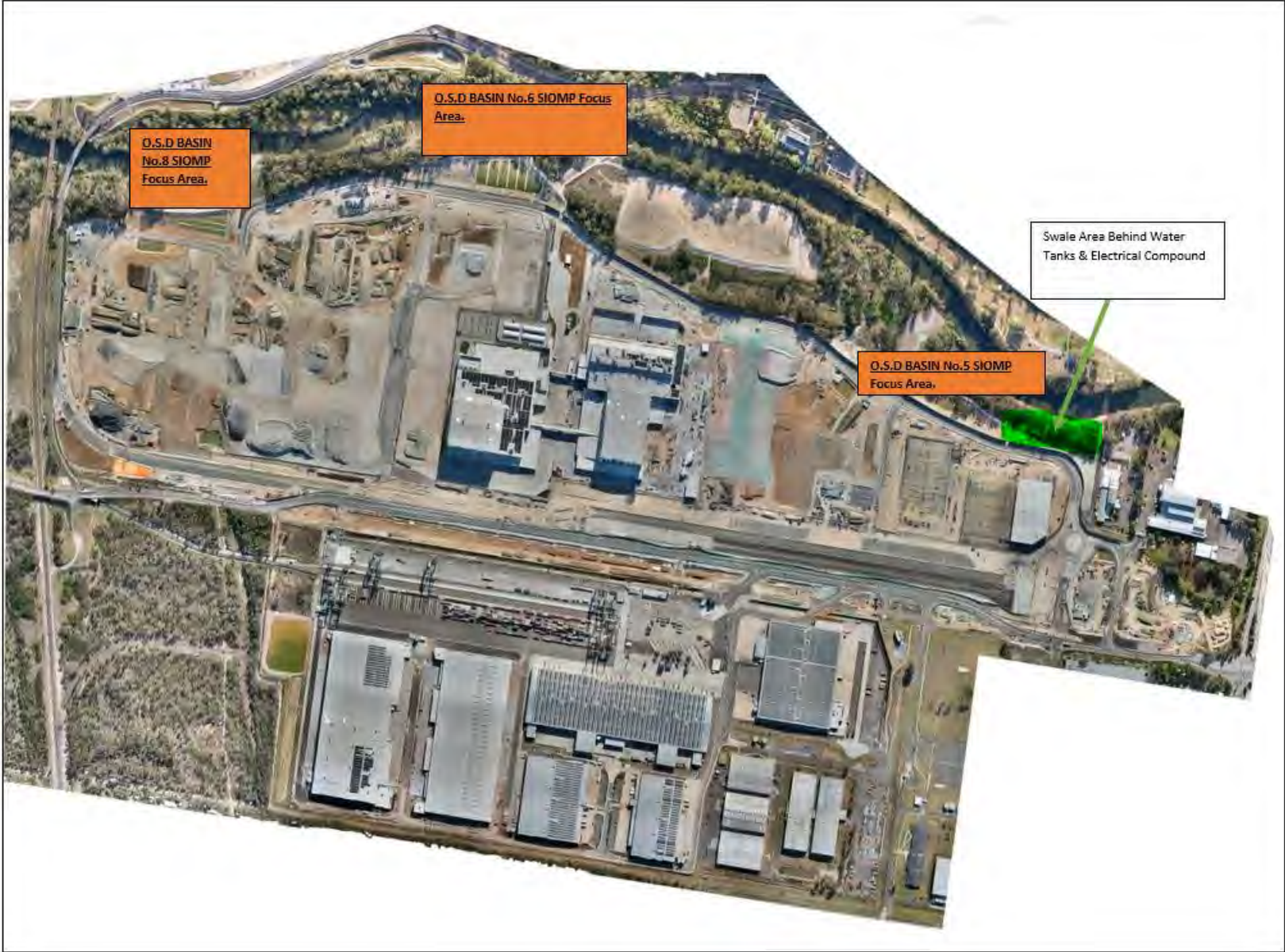
Across the entire precinct there are six onsite detention basins. Bioretention/biofiltration systems also make up the stormwater management infrastructure within the site.

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).

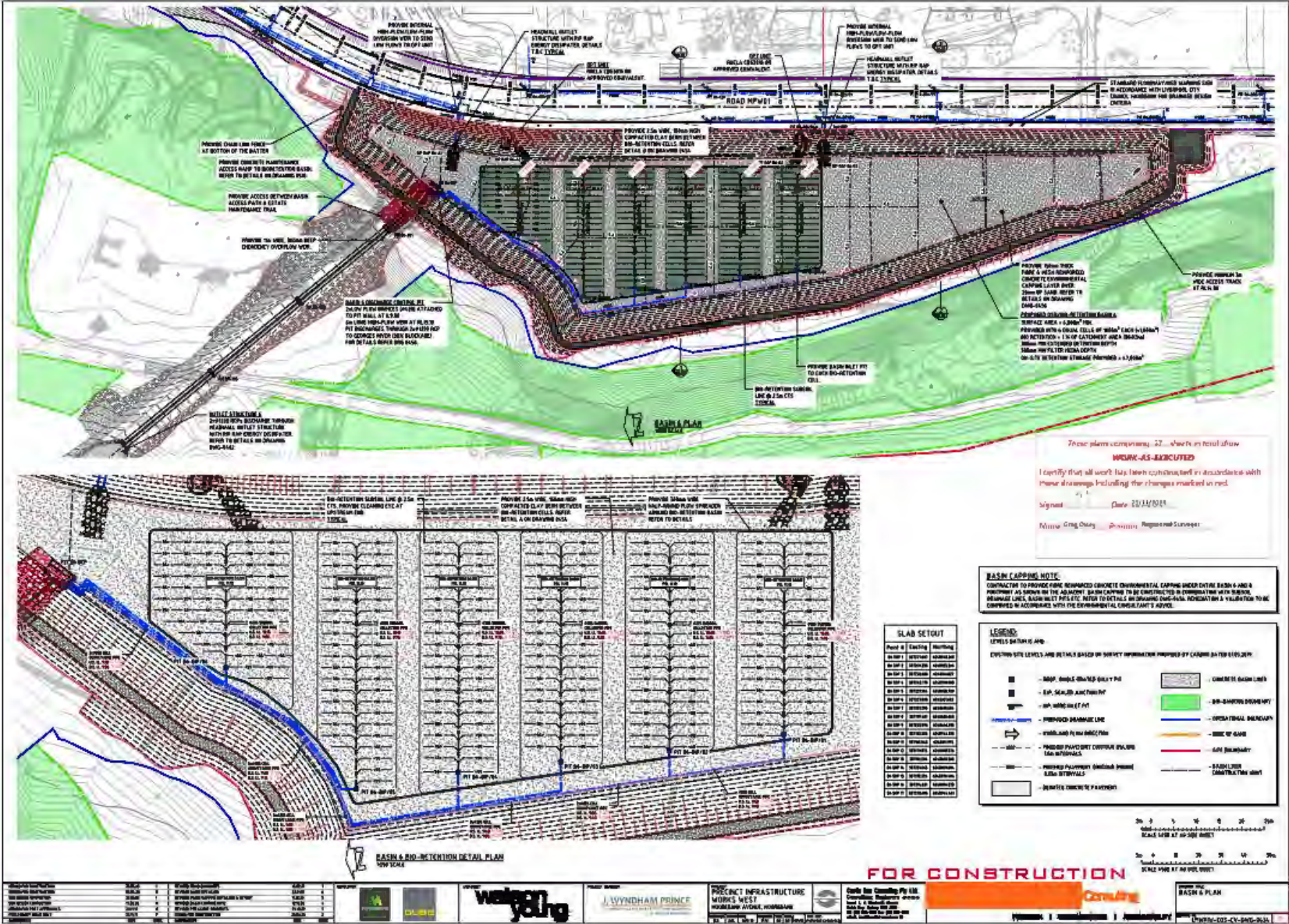
Development Consent - Section 4.38 of the Environmental Planning and Assessment Act 1979 -
Application Number: SSD 7709 Moorebank Precinct West Stage 2 (MPW Stage 2)

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

Map Image 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, to 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 \(alsglobal.com\)](https://www.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
		°C	°C				km/h	local		°C	%	g th	km/h	hPa	hPa
1	Su	7.3	26.5	0			NW	37	14:12	18.2	41		N	6	1012.6
2	Mo	13.4	24.3	0			WNW	74	10:34	23.0	22		NW	20	1008.1
3	Tu	7.9	18.8	0			WSW	48	02:09	12.8	44		WSW	19	1029.5
4	We	2.3	22.9	0			N	37	11:25	10.5	69		W	9	1029.7
5	Th	5.5	27.2	0			N	28	10:46	13.9	66	8	Calm		1024.6
6	Fr	10.7	29.4	0			NW	48	14:37	20.5	53		NNW	9	1022.5
7	Sa	14.0	24.7	0			SE	43	13:08	23.9	46	6	ESE	11	1021.5
8	Su	14.5	20.8	0			SSW	22	07:01	14.9	54	8	WSW	13	1021.3
9	Mo	8.1	24.3	0			WSW	41	11:19	17.4	45		NW	13	1017.8
10	Tu	8.5	22.1	0			ENE	26	14:15	16.6	58		WNW	9	1025.7
11	We	6.7	26.1	0			S	33	19:53	16.5	75		Calm		1024.7
12	Th	15.2	20.1	0			S	57	15:21	16.9	70	8	S	22	1021.7
13	Fr	10.2	19.3	0			SW	30	09:33	12.9	53	8	WSW	13	1028.4
14	Sa	4.8	24.0	0			S	54	21:08	13.8	70		WNW	7	1023.6
15	Su	6.4	17.0	0			SSW	61	12:36	12.6	46	1	SSW	20	1026.8
16	Mo	3.5	19.9	0			E	31	13:14	11.3	51		WNW	9	1026.6
17	Tu	5.8	22.2	0			SE	30	15:39	14.5	51		W	11	1026.4
18	We	4.2	26.1	0			WNW	44	15:12	16.5	37		W	17	1018.0
19	Th	7.9	26.7	0			W	59	15:34	17.3	37		WNW	6	1009.8
20	Fr	11.3	24.8	0			W	41	08:37	16.5	38		W	22	1010.9
21	Sa	8.3	24.2	0			WSW	39	16:26	18.6	41		WSW	11	1010.7
22	Su	8.2	25.7	0			WNW	33	13:50	18.8	41		NNW	11	1016.0
23	Mo	6.6	28.7	0			SW	33	16:37	18.6	51		NNW	9	1019.4
24	Tu	11.6	26.7	0			SSE	28	00:13	17.8	65	1	Calm		1021.6
25	We	13.9	26.8	0			W	31	16:29	18.3	64	8	Calm		1014.7
26	Th	10.5	13.5	8.6			S	54	02:38	10.8	91	8	SW	19	1019.2
27	Fr	10.2	17.2	12.2			SSE	41	05:24	13.1	83	8	S	15	1027.9
28	Sa	9.8	19.1	7.8			E	35	12:47	17.0	61	8	ESE	20	1029.4
29	Su	10.0	21.4	0.6			ENE	26	15:07	17.1	78	3	WSW	9	1023.7
30	Mo	14.1	20.3	7.4			S	48	11:20	17.5	74	8	SW	17	1019.7
Statistics for September 2024															
Mean		9.0	23.0							16.3	56	6		11	1021.1
Lowest		2.3	13.5	0						10.5	22	1	Calm		1008.1
Highest		15.2	29.4	12.2			WNW	74		23.9	91	8	#	22	1029.7
Total				36.6											

IOCJDW2161.202409 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
		°C	°C				km/h	local		°C	%	g th	km/h	hPa	hPa
1	Tu	7.6	23.0	0.2			E	37	15:50	17.0	65		Calm		1023.5
2	We	12.9	19.2	5.2			SSE	37	11:23	14.4	94	8	SSE	11	1030.8
3	Th	11.6	20.9	0.4			E	31	15:08	18.3	60	8	ENE	9	1031.0
4	Fr	6.3	24.7	0.2			ENE	24	14:37	16.1	68		NNW	9	1020.8
5	Sa	13.3	25.9	2.0			WNW	43	10:00	21.8	66	2	WNW	13	1007.6
6	Su	10.3	27.4	0			W	46	15:01	18.6	56		NNW	9	1011.1
7	Mo	10.2	29.1	0			SSE	50	22:52	18.5	61	1	NNW	7	1017.9
8	Tu	13.9	15.4	0			SSE	54	23:16	14.2	80	8	SSE	19	1023.2
9	We	11.9	16.8	0			SSE	31	11:14	15.3	60	8	S	17	1026.8
10	Th	10.4	24.9	0			N	33	11:23	15.9	74		NW	9	1023.8
11	Fr	12.5	24.9	0			SSE	31	22:37	18.6	74		WSW	6	1024.3
12	Sa	14.4	18.8	5.0			SSE	57	00:35	16.0	66	8	SSE	17	1026.6
13	Su	8.7	21.4	0			E	30	16:00	13.3	76	8	WSW	7	1027.6
14	Mo	9.0		0						16.2	71	8	W	9	1019.4
Statistics for the first 14 days of October 2024															
Mean		10.9	22.5							16.7	69	6		10	1022.5
Lowest		6.3	15.4	0						13.3	56	1	Calm		1007.6
Highest		14.4	29.1	5.2			SSE	57		21.8	94	8	SSE	19	1031.0
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 $\text{NH}_4 \cdot \text{N}$ 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 Environment 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.

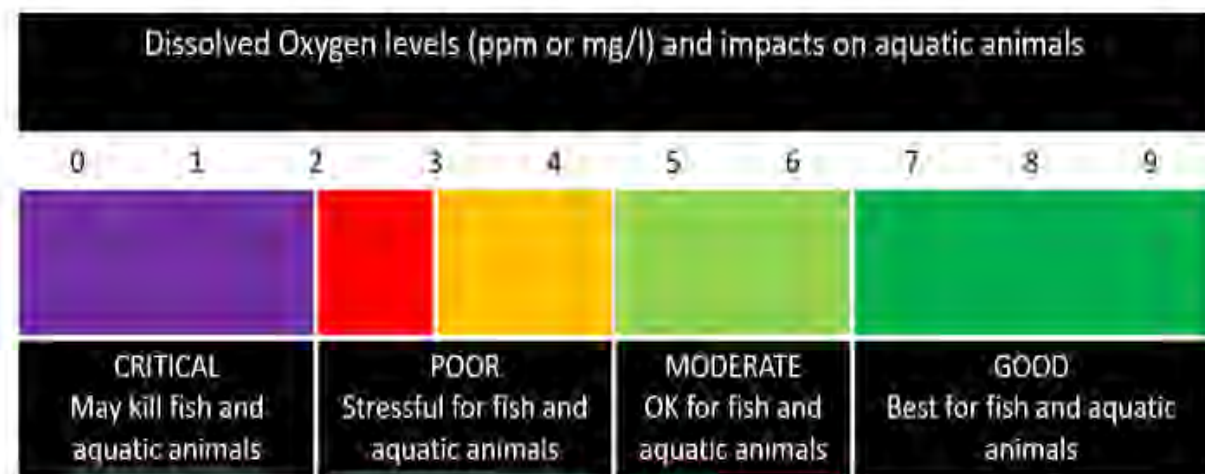
Water will naturally contain a certain amount of dissolved oxygen that is absorbed from the air and produced by plants and algae living in the water.

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 $\mu\text{S}/\text{cm}$. Electrical conductivity is measured in microsiemens per centimeter ($\mu\text{S}/\text{cm}$). Freshwater is usually between 0 and 1,500 $\mu\text{S}/\text{cm}$ and typical sea water has a conductivity value of about 50,000 $\mu\text{S}/\text{cm}$. Examples:

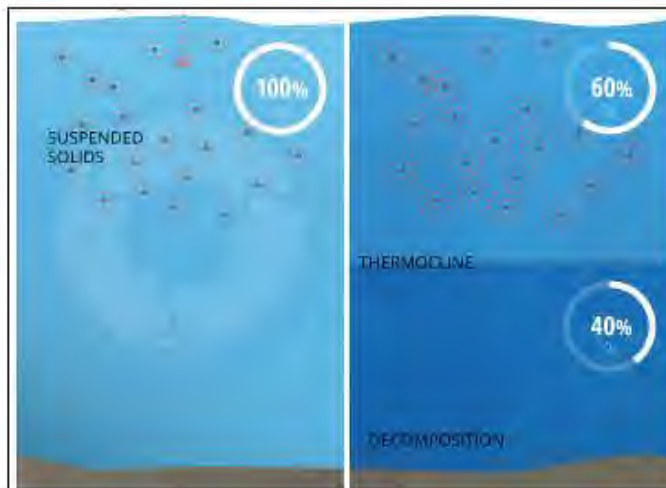
$\mu\text{S}/\text{cm}$	Use
0 - 800	• Good drinking water for humans (provided there is no organic pollution and not too much suspended clay material) • Generally good for irrigation, though above 300$\mu\text{S}/\text{cm}$ some care must be, particularly with overhead sprinklers, which may cause leaf 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 $\mu\text{S}/\text{cm}$ can be consumed • Not normally suitable for irrigation, although water up to 6000 $\mu\text{S}/\text{cm}$ can be used on very salt tolerant crops with very special management techniques. Over 6000 $\mu\text{S}/\text{cm}$, occasional emergency may be possible with care • When used for drinking water by poultry and pigs, the salinity should be limited to about 6000 $\mu\text{S}/\text{cm}$. Most other livestock can use water up to 10000 $\mu\text{S}/\text{cm}$

Total Dissolve Solids (TDS) – Measures

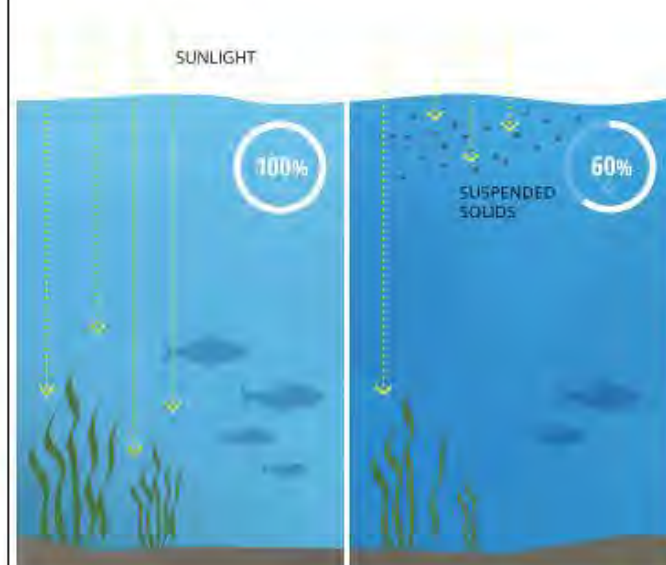
Dissolved solids, smaller than 2 microns, refer to any minerals, salts, metals, in the form of molecules, atoms, cations or anions dissolved in water. Total dissolved solids (TDS) comprise inorganic salts (principally calcium, magnesium, potassium, sodium, bicarbonates, chlorides and sulfates) and some 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.

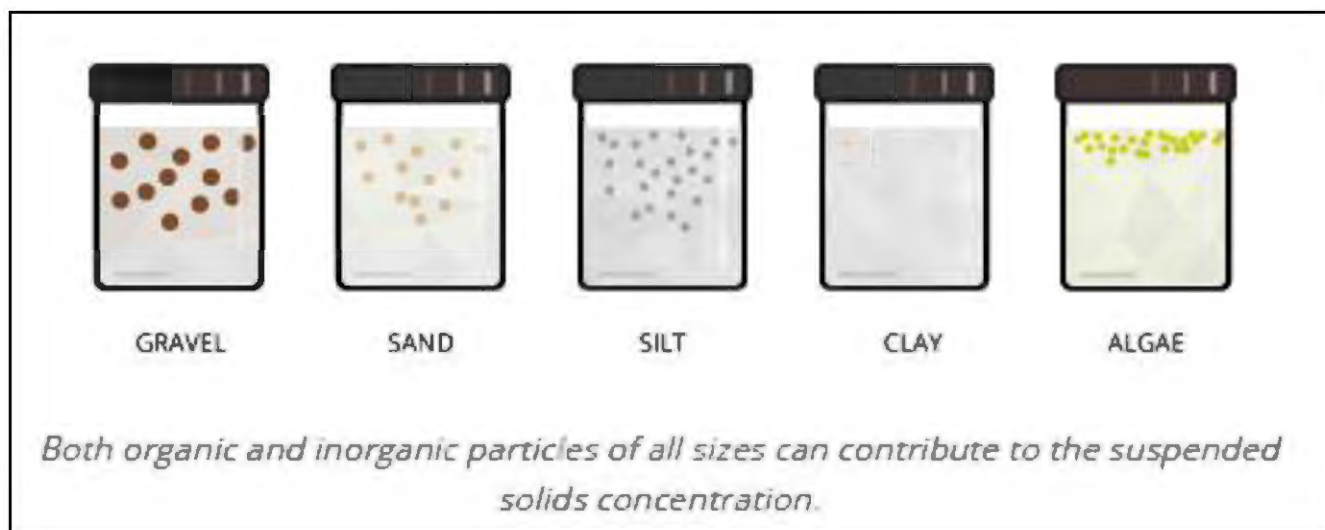


Suspended solids, particularly algae, can block sunlight from reaching submerged plants. This can cause dissolved oxygen levels to drop, as the plants rely on respiration (consuming oxygen) instead of photosynthesis.

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.



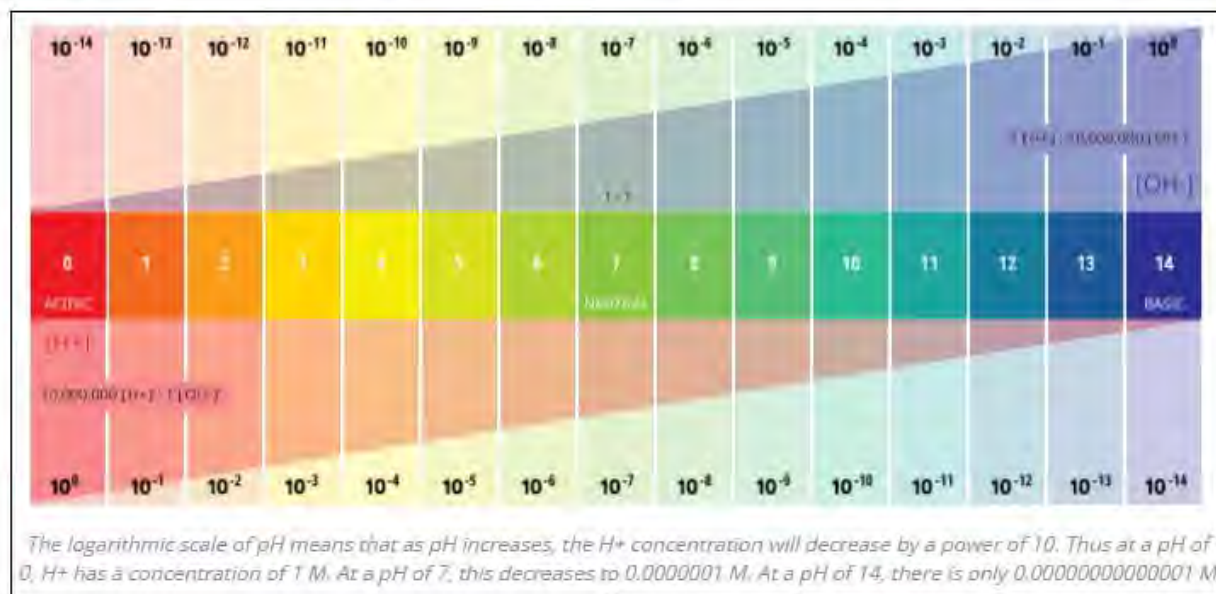
pH – Acidity / Alkalinity – Measures

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.



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	0.13	.13 (µg/L)	
Perfluorooctanoic acid (PFOA)	0.13	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 outflow

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 _{0.0001})	
Temperature - °C	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 (µg/L ⁻¹)				Trigger values for marine water (µg/L ⁻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 (CrIII)	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	0.06	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	260
Zinc	H	2.4	6.0 ^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	2.5	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 ($\mu\text{g L}^{-1}$)				Trigger values for marine water ($\mu\text{g L}^{-1}$)			
	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
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
Phenanthrene	B	ID	ID	ID	ID	ID	ID	ID
Fluoranthene	B	ID	ID	ID	ID	ID	ID	ID
Benzo(a)pyrene	B	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 ($\mu\text{g/L}^{-1}$)				Trigger values for marine water ($\mu\text{g/L}^{-1}$)			
	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 ^H	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	2.5	4.4	6	9 ^A	ID	ID	ID
GENERIC GROUPS OF CHEMICALS								
Surfactants								
Linear alkylbenzene sulfonates (LAS)	65	280	520 ^C	1000 ^C	ID	ID	ID	ID
Alcohol ethoxylated 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								
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 9650	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 LC₅₀ 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.

^A = *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 (NH₃-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 H₂S, 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 CaCO₃. 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.

I = 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.

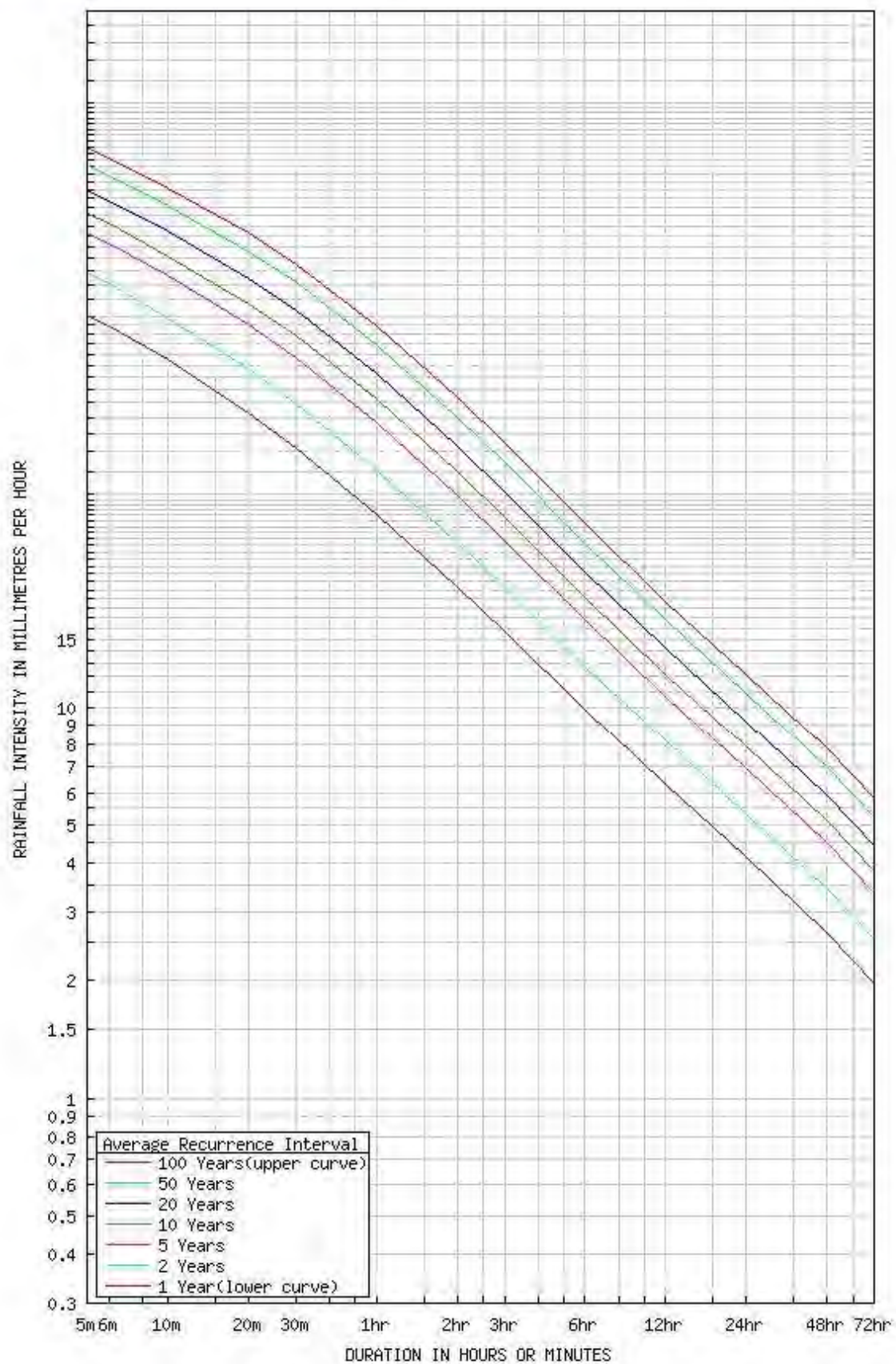
Table 5. Ecological water quality guideline values developed by water regulators

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.
	0.13 µg/L	220 µg/L	95% species protection - slightly to moderately disturbed systems	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.
	2 µg/L	632 µg/L	90% species protection - highly disturbed systems	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.
	31 µg/L	1824 µg/L	80% species protection - highly disturbed systems	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.
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.
	0.13 µg/L	220 µg/L	95% species protection - slightly to moderately disturbed systems	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.
	2 µg/L	632 µg/L	90% species protection - highly disturbed systems	Note 2: Marine guideline values developed by CRC CARE are under consideration through the nationally-agreed water quality guideline development process.
	31 µg/L	1824 µg/L	80% species protection - highly disturbed systems	

Australian Water Quality Guidelines for Fresh and Marine Waters

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 ⁵	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 \(bom.gov.au\)](http://Intensity-Frequency-Duration (bom.gov.au))



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.

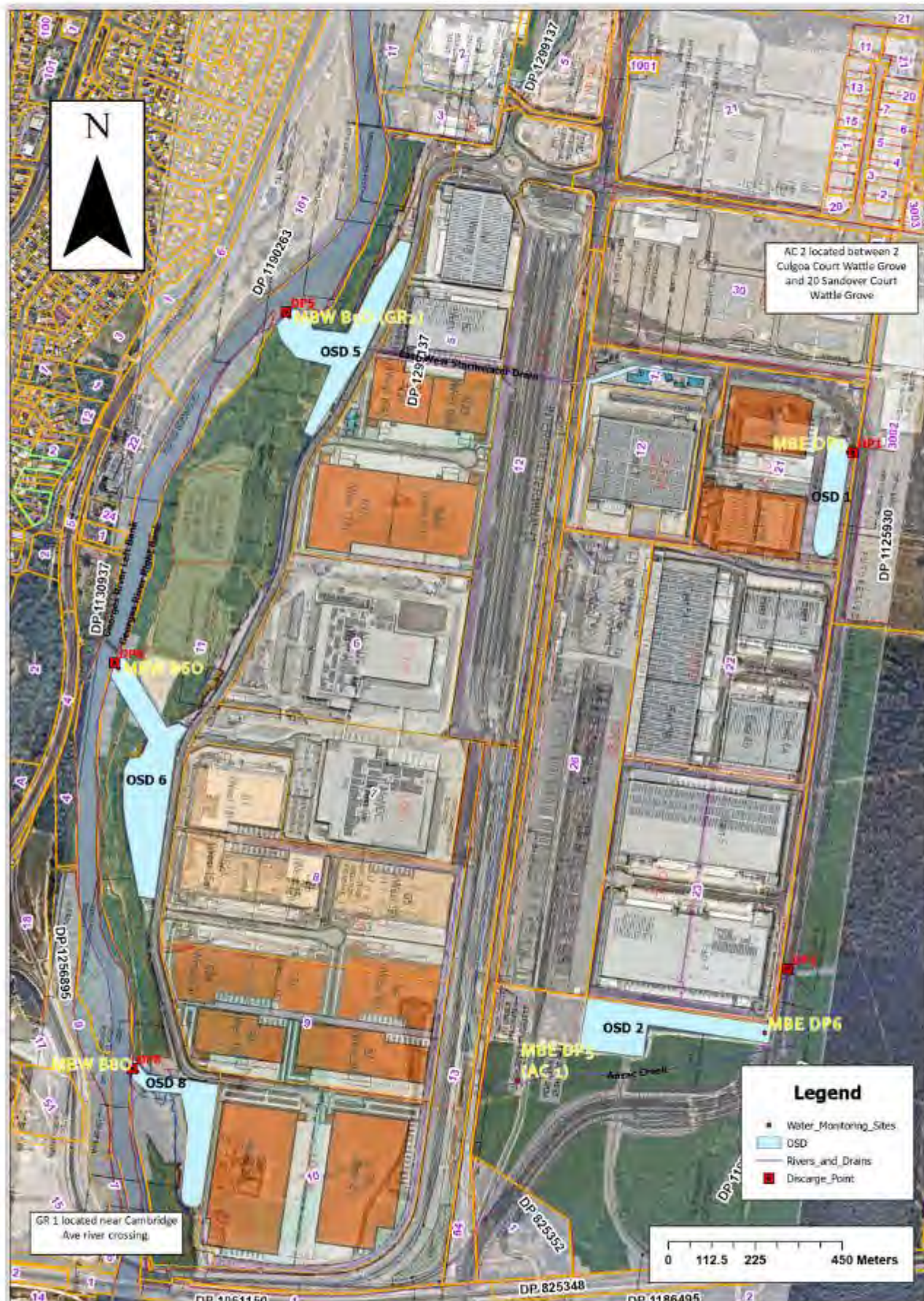
Three onsite bio-retention basins are present within Moorebank Precinct West. This report is in reference to baseline water quality condition reporting for Basin 5 (MPW – north).

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)

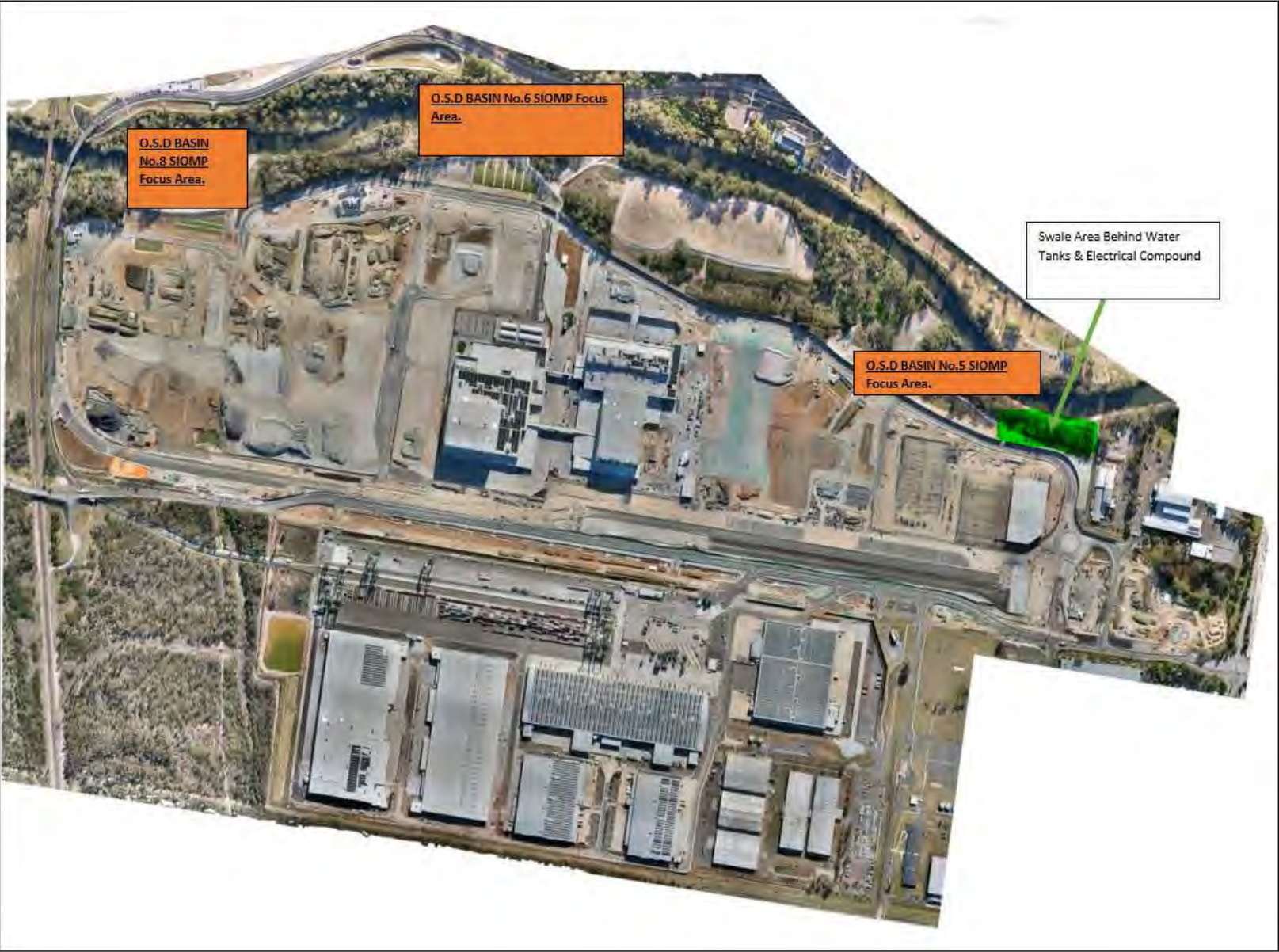
CoC	Requirement
Stormwater Quality Monitoring	
B38.	Stormwater Quality Monitoring Program - Prior to commencement of operation Part of the Operational Environmental Management Plan

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)



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 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 $\mu\text{S/cm}$	pH ⁺	DO	TN mg/L	NO ₃ -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	0.600	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 \(alsglobal.com\)](http://Surface%20water%20(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 ARMICANZ (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 October 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	%	g th	km/h	hPa	°C	%	g th	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																	

ICDJDW2161.202409 Prepared at 13:00 UTC on Monday 14 October 2024

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					km/h	local	°C	%	g th		km/h	hPa	°C	%	g th		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 $\text{NH}_4^+ \text{N}$ 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 Environment 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.

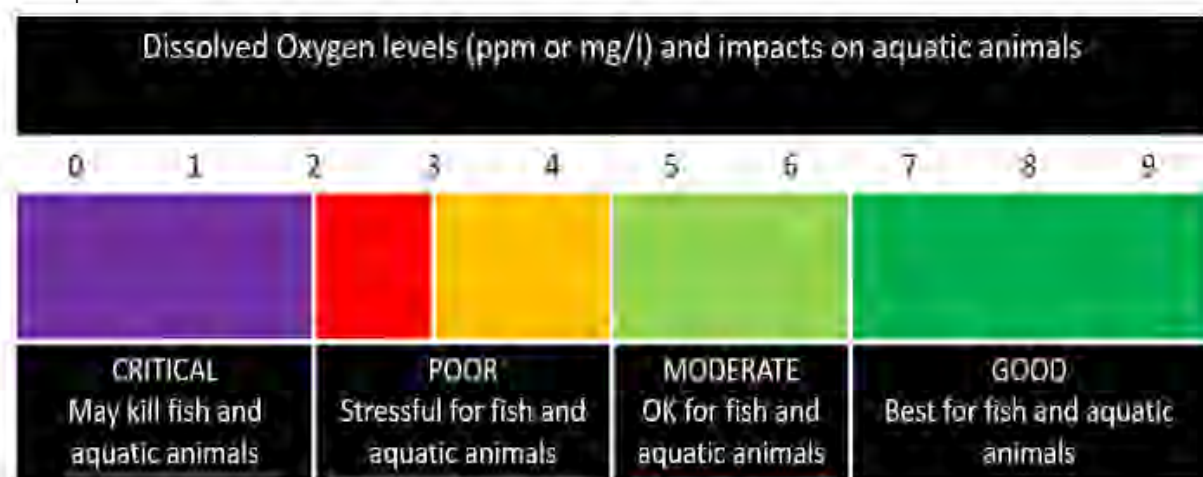
Water will naturally contain a certain amount of dissolved oxygen that is absorbed from the air and produced by plants and algae living in the water.

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 $\mu\text{S}/\text{cm}$. Electrical conductivity is measured in microsiemens per centimeter ($\mu\text{S}/\text{cm}$). Freshwater is usually between 0 and 1,500 $\mu\text{S}/\text{cm}$ and typical sea water has a conductivity value of about 50,000 $\mu\text{S}/\text{cm}$. Examples:

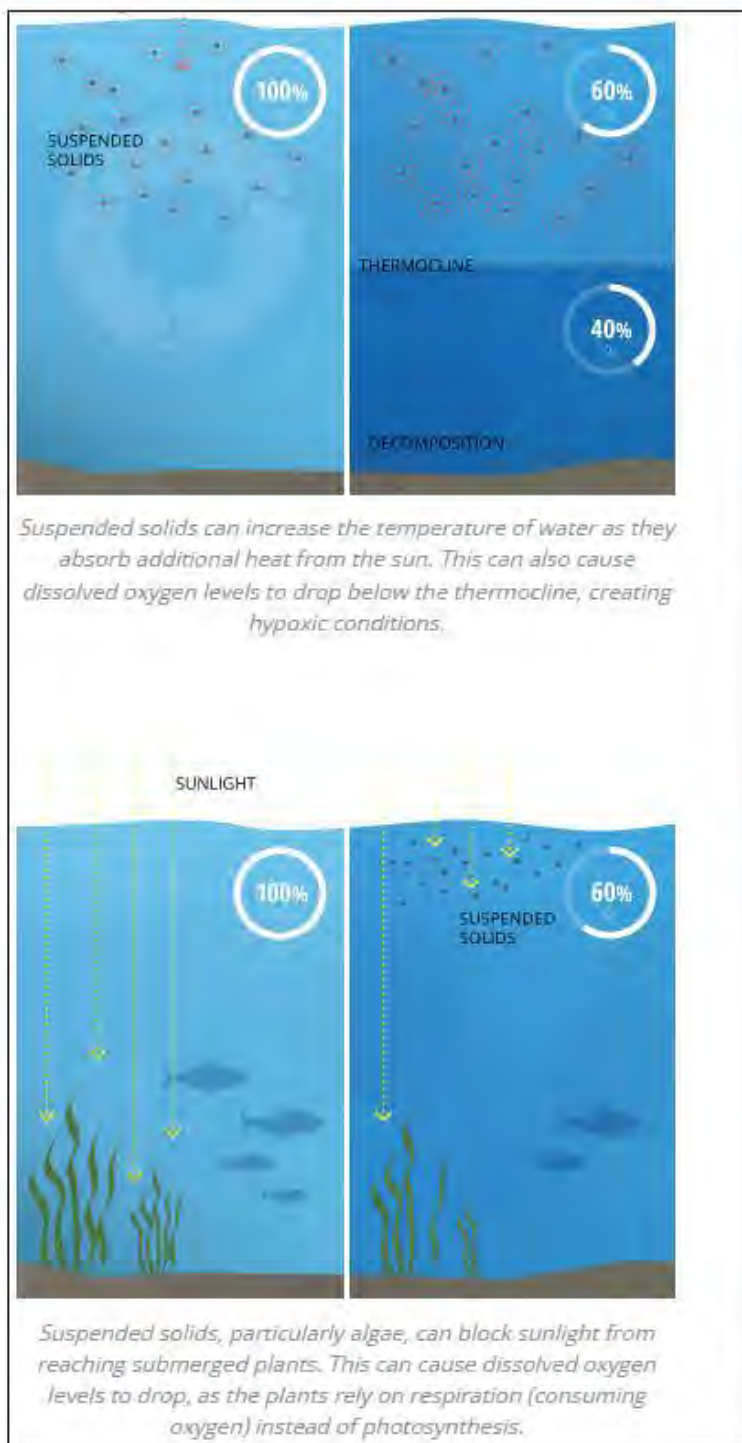
$\mu\text{S}/\text{cm}$	Use
0 - 800	• Good drinking water for humans (provided there is no organic pollution and not too much suspended clay material) • Generally good for irrigation, though above 300$\mu\text{S}/\text{cm}$ some care must be, particularly with overhead sprinklers, which may cause leaf 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 $\mu\text{S}/\text{cm}$ can be consumed • Not normally suitable for irrigation, although water up to 6000 $\mu\text{S}/\text{cm}$ can be used on very salt tolerant crops with very special management techniques. Over 6000 $\mu\text{S}/\text{cm}$, occasional emergency may be possible with care • When used for drinking water by poultry and pigs, the salinity should be limited to about 6000 $\mu\text{S}/\text{cm}$. Most other livestock can use water up to 10000 $\mu\text{S}/\text{cm}$

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.

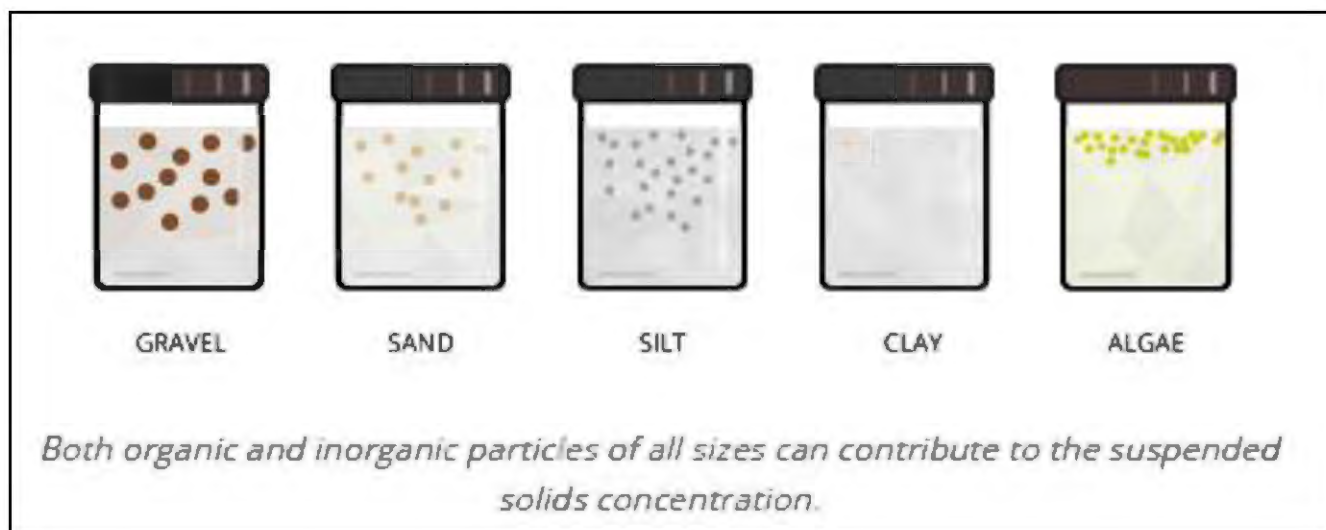
High levels of total suspended solids can affect turbidity, increase water temperatures and decrease dissolved oxygen (DO) levels. This can cause the water to heat up more rapidly because the suspended particles absorb more heat and deplete oxygen, which can adversely affect aquatic life.



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.



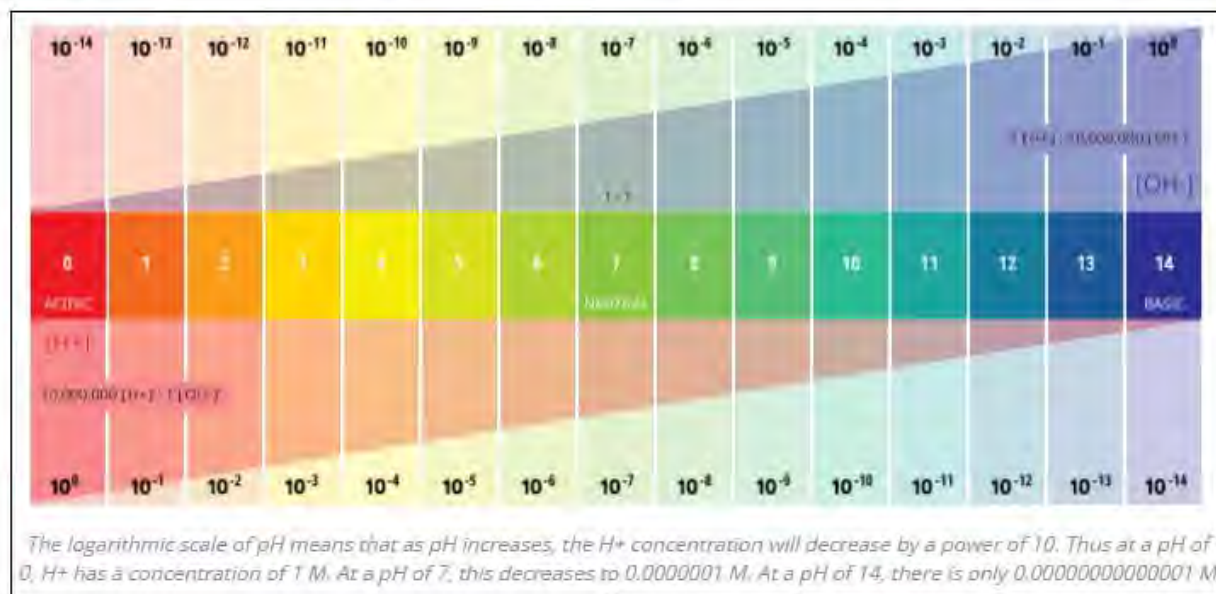
pH – Acidity / Alkalinity – Measures

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.



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 uS/cm	125–2200 uS/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 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 - °C	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	7440-65-6	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									
^A 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
^A 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)

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									
^A 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	
^A >C10 - C40 Fraction (sum)	—	100	µg/L	<100	<100	<100	<100	<100	
^A >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	105-38-3 106-42-3	2	µg/L	<2	<2	<2	<2	<2	
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	<2	
^A Total Xylenes	—	2	µg/L	<2	<2	<2	<2	<2	
^A 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)	2705-91-4	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 (PFPA)	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 (FO SA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFO SA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFO SA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFO SE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFO SE)	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 (MeFO SAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFO SAA)	2991-90-6	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	355-48-4/1763-23-1	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 (µg/L ⁻¹)				Trigger values for marine water (µg/L ⁻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 (AsIII)		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 (CrIII)	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	0.06	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	6.0 ^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	2.5	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 ($\mu\text{g L}^{-1}$)				Trigger values for marine water ($\mu\text{g L}^{-1}$)			
	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
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
Phenanthrene	B	ID	ID	ID	ID	ID	ID	ID
Fluoranthene	B	ID	ID	ID	ID	ID	ID	ID
Benzo(a)pyrene	B	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 (µg/L ⁻¹)				Trigger values for marine water (µg/L ⁻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 ^H	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	2.5	4.4	6	9 ^A	ID	ID	ID
GENERIC GROUPS OF CHEMICALS								
Surfactants								
Linear alkylbenzene sulfonates (LAS)	55	280	520 ^C	1000 ^C	ID	ID	ID	ID
Alcohol ethoxylated 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								
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 9650	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 LC₅₀ 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.

^A = *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 (NH₃-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 H₂S, 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 CaCO₃. 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.

I = 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.

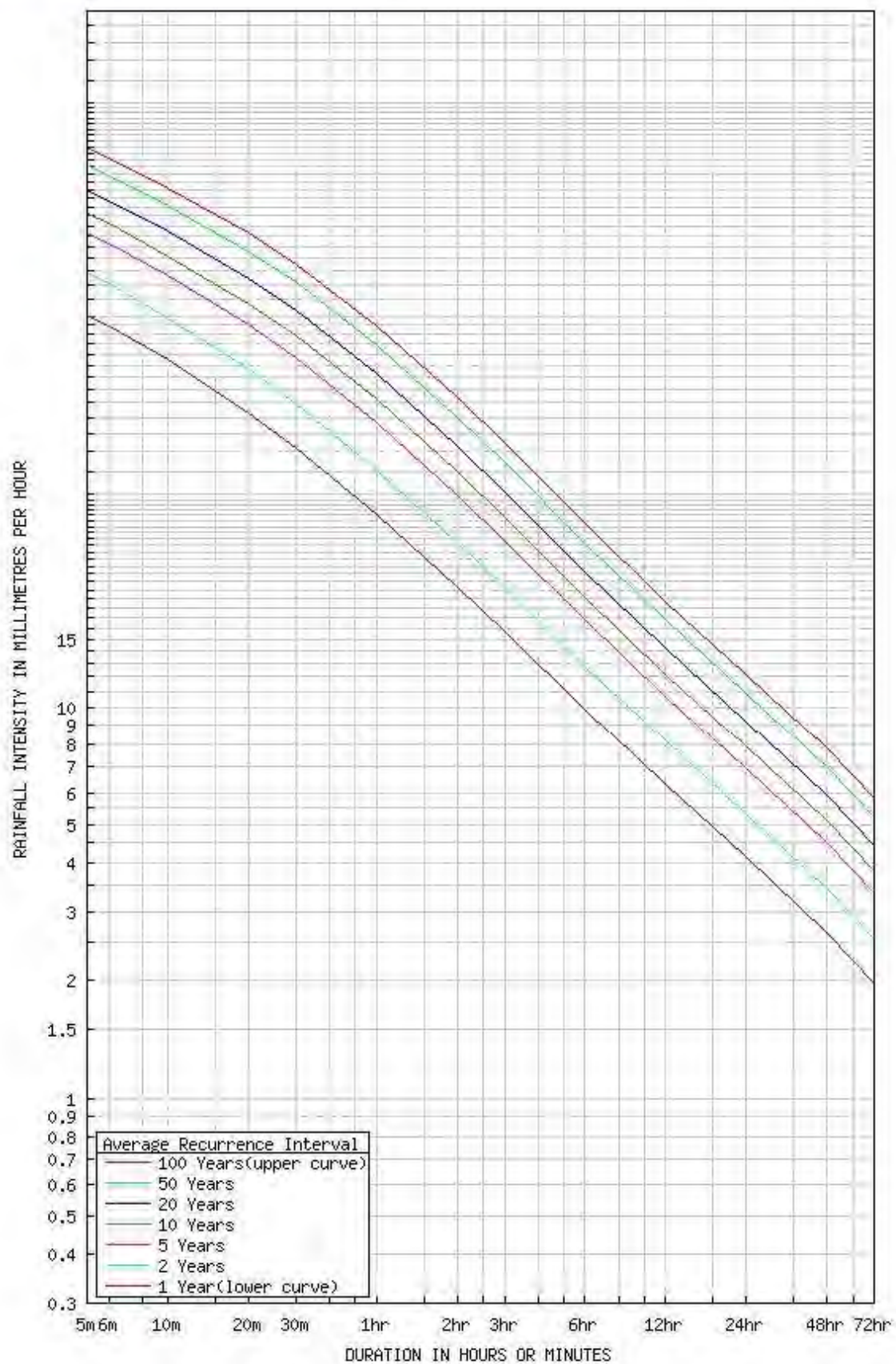
Table 5. Ecological water quality guideline values developed by water regulators

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.
	0.13 µg/L	220 µg/L	95% species protection - slightly to moderately disturbed systems	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.
	2 µg/L	632 µg/L	90% species protection - highly disturbed systems	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.
	31 µg/L	1824 µg/L	80% species protection - highly disturbed systems	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.
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.
	0.13 µg/L	220 µg/L	95% species protection - slightly to moderately disturbed systems	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.
	2 µg/L	632 µg/L	90% species protection - highly disturbed systems	Note 2: Marine guideline values developed by CRC CARE are under consideration through the nationally-agreed water quality guideline development process.
	31 µg/L	1824 µg/L	80% species protection - highly disturbed systems	

Australian Water Quality Guidelines for Fresh and Marine Waters

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 ⁵	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 \(bom.gov.au\)](http://Intensity-Frequency-Duration (bom.gov.au))



Moorebank Logistics Park West Precinct

Basin 8

Autumn Stormwater Network Water Quality
Monitoring Data & Reporting May 2024



Site image: Outlet retention basin 8 MPW

Prepared for: MID Plumbing P/L

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

Romy Brien (*BSc NRM*)

E-mail: daniel@apical-bushfire.com.au
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](#)

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 site management 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).

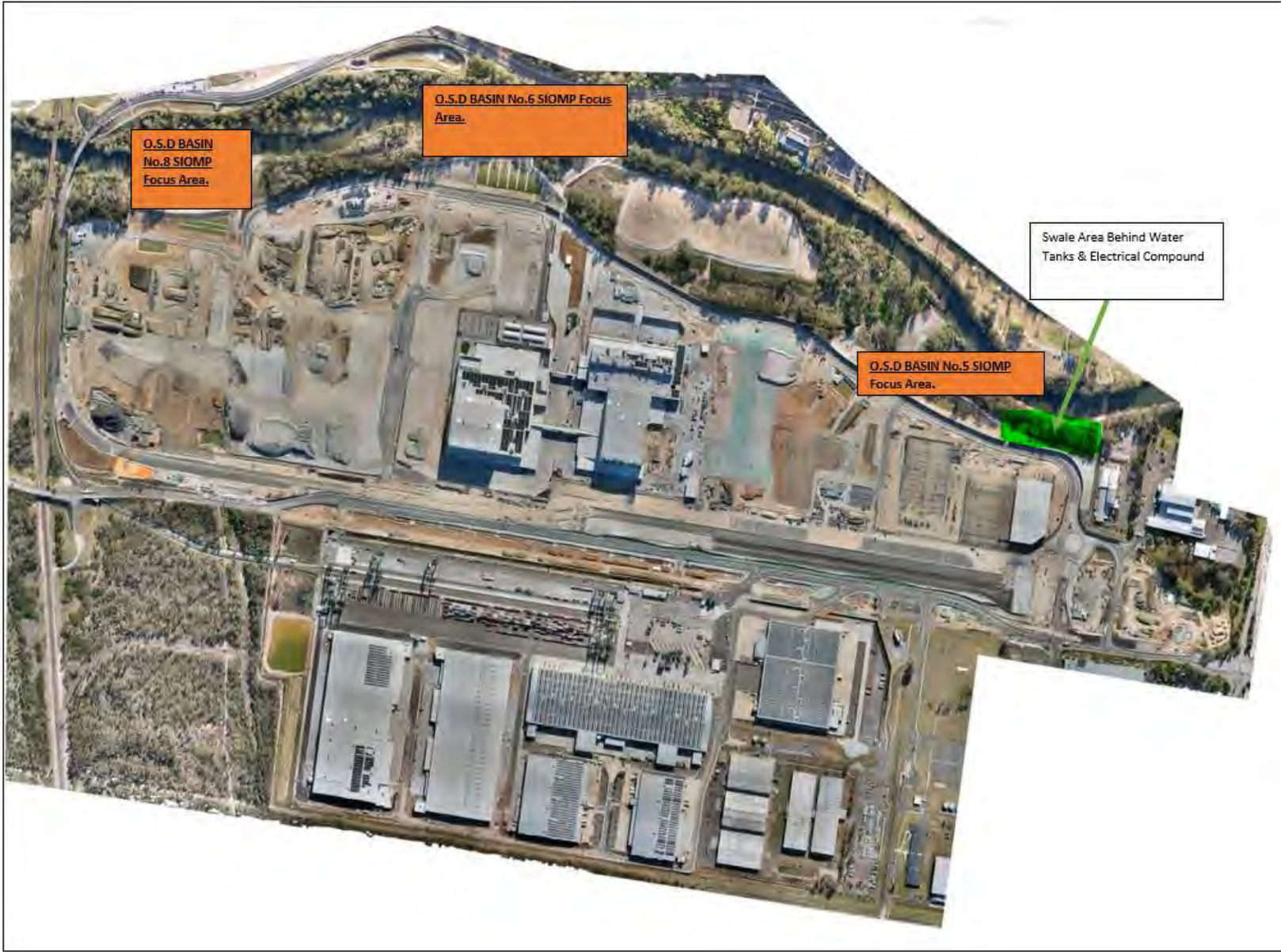
Development Consent - Section 4.38 of the Environmental Planning and Assessment Act 1979 -
Application Number: SSD 7709 Moorebank Precinct West Stage 2 (MPW Stage 2)

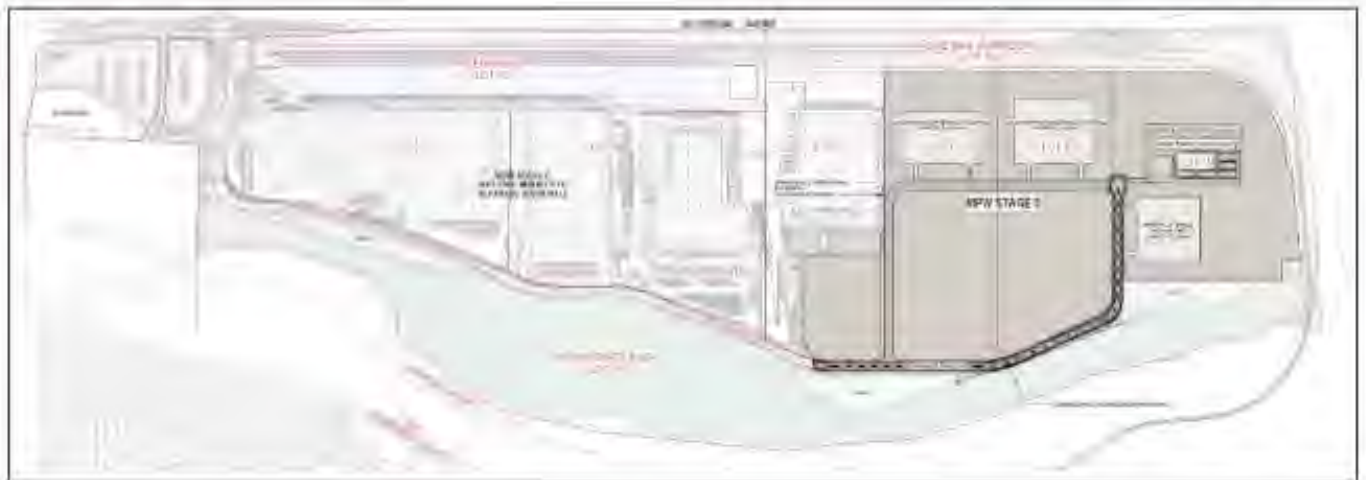
CoC	Requirement
Stormwater Quality Monitoring	
B38.	Stormwater Quality Monitoring Program - Prior to commencement of operation Part of the Operational Environmental Management Plan

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



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





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.

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.

ANZECC Low Risk Trigger Values

Ecosystem type	Turbidity NTU	EC µS/cm	pH*	DO	TN mg/L	NO ₃ ⁻ -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	0.600	0.190	0.020	0.050	0.020

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, to 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 \(alsglobal.com\)](https://www.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 ARMICANZ (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 May 31st 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 May and the 31st of May 2024 Moorebank received approximately 99.6mm of rainfall ([Holsworthy Aerodrome, NSW - May 2024 - Daily Weather Observations \(bom.gov.au\)](#)).

The mean daily maximum temperature during May was 20.2 degrees Celsius, the mean daily minimum temperature was 10.1 degrees Celsius.

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

Holsworthy Aerodrome, New South Wales May 2024 Daily Weather Observations

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	%	g th		km/h	hPa	°C	%	g th		km/h	hPa
1	We	12.5	19.7	0.2			S	41	15:14	14.6	71	5	WSW	15	1030.5	18.2	62	4	SSW	26	1028.9
2	Th	10.8	20.6	0.4			SE	35	14:49	14.9	88	8	SW	11	1031.8	17.6	68	6	SE	26	1029.6
3	Fr	11.7	17.7	0.6			SSE	30	15:25	14.6	95	8	SSW	6	1030.1	16.7	77	8	SSE	15	1027.2
4	Sa	11.7	19.6	2.4			SSE	26	14:16	14.4	96	8	WNW	4	1025.7	18.0	76	8	SSE	13	1022.5
5	Su	13.9	19.3	6.6			ESE	44	23:56	14.6	95	8	SE	13	1022.8	15.3	92	8	SSW	9	1021.2
6	Mo	13.9	21.0	42.4			SE	52	14:51	18.4	70	8	SSE	26	1027.4	20.0	59	3	SE	30	1028.2
7	Tu	12.1	19.9	2.8			SE	35	15:21	15.0	93		W	9	1031.1	19.2	67	8	SE	13	1029.0
8	We	12.5	19.4	8.6			ESE	31	13:20	14.6	97	8	WNW	2	1032.0	17.5	88	8	Calm		1029.0
9	Th	12.0		9.6						15.1	96	8	W	6	1032.0	19.0	76	8	SE	17	1029.9
10	Fr	13.3	21.2				SE	26	13:51	15.1	95	8	SW	7	1030.8	19.0	74	8	SE	11	1027.8
11	Sa	14.6	16.5							15.7	97	8	Calm		1027.2	16.1	92	8	E	9	1024.4
12	Su	13.4	20.3	21.8			SSW	31	14:37	14.5	96	8	W	7	1021.2	17.1	79	8	SW	13	1018.1
13	Mo	14.2	21.5	4.2			SSW	46	11:45	17.2	86	8	SW	17	1019.8	20.1	67	6	SSW	17	1019.6
14	Tu	9.6	22.6	0			WSW	24	11:02	15.6	77		W	9	1025.2	21.3	58		ESE	17	1024.2
15	We	11.9	22.0	0			NNW	20	13:00	15.7	79		W	9	1029.6	21.5	57		NNW	9	1025.9
16	Th	10.3	22.1	0			SW	19	05:01	13.5	86	4	W	9	1029.8	21.2	58	2	N	7	1026.9
17	Fr	9.9	23.4	0			S	20	22:59	14.2	94		W	9	1025.4	22.7	46		WNW	7	1020.2
18	Sa	11.5	15.8	0			S	57	01:04	12.6	60	8	SW	17	1023.6	14.4	58	8	SSW	26	1022.7
19	Su	7.8	17.9	0			W	30	08:30	11.0	58		WSW	17	1022.8	17.3	37		WNW	9	1019.7
20	Mo	7.9	17.9	0			S	39	15:34	12.9	55	1	SW	17	1023.1	17.9	56	8	SSW	17	1022.5
21	Tu	10.7	19.0	0			S	35	15:53	13.6	66	1	WSW	15	1027.6	17.7	58		S	17	1025.5
22	We	7.7	19.3	0			SSE	26	15:26	12.0	74		W	13	1027.3	18.7	42		W	11	1023.9
23	Th	5.7	21.0	0			SW	24	04:01	11.4	76		W	13	1027.7	20.5	35		Calm		1025.2
24	Fr	5.7	21.2	0			SE	28	16:26	11.6	88		W	9	1027.7	19.7	56		NE	4	1025.3
25	Sa	7.6	18.4	0			SW	20	03:31	11.9	84		WSW	15	1028.8	17.8	64	8	Calm		1025.6
26	Su	8.1	21.9	0			WNW	20	13:55	12.5	86		W	9	1026.0	21.2	44		Calm		1022.7
27	Mo	6.9	20.5	0			WSW	26	11:20	12.0	79		W	9	1025.6	19.2	50		SE	15	1024.1
28	Tu	5.1	21.3	0			N	20	12:56	10.4	87		WNW	9	1028.8	20.7	46		N	6	1026.1
29	We	3.7	21.8	0			NNE	17	13:56	9.5	92		W	7	1029.6	21.1	52		Calm		1025.6
30	Th	5.3	23.1	0			N	24	13:44	10.6	93		W	7	1026.9	22.0	51		NNE	11	1022.1
31	Fr	10.6	20.3	0			NNE	37	09:52	19.3	62	7	N	17	1017.6	20.2	68	7	NNW	13	1014.8
Statistics for May 2024																					
Mean		10.1	20.2							13.8	82	6		10	1027.0	19.0	61	6		11	1024.5
Lowest		3.7	15.8	0						9.5	55	1		Calm	1017.6	14.4	35	2		Calm	1014.8
Highest		14.6	23.4	42.4			S	57		19.3	97	8	SSE	26	1032.0	22.7	92	8	SE	30	1029.9
Total				99.6																	

IDCJDW2161.202405 Prepared at 13:00 UTC on Sunday 2 June 2024

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 May 2024

Location DP-8

pH

The pH level for DP-8 was recorded at pH 8.51 which is above the ANZECC 2000 Guidelines for lowland rivers (range of 6.5-8.5).

Reporting period	ANZECC Guideline*	May 2024
pH	6.5-8.5	8.51

Nutrients

Nitrogen is recorded as exceeding EPA and ANZECC guideline trigger values with double the value present.

Water within the outflow was approximately 5-10cm deep at the time of testing which can provide some relevant context to the results. This may have resulted in minimal dilution of nutrients within the detention basin contributing to increased concentrations due to the influence of low water levels and limited flow and dilution of nutrients in higher volumes of water in the system.

Reporting period	ANZECC Guideline*	May 2024
Nitrogen µg/L	350 µg/L	700 µg/L

* ANZECC 2000 Guidelines 350 µg/L for rivers flowing to the coast

Phosphorous

Phosphorous is increased within DP 8 but not to the same extent as nitrogen concentrations.

Phosphorus concentrations are recorded above the ANZECC guideline.

Water within the outflow was approximately 5-10cm deep at the time of testing which can provide some relevant context to the results. This may have resulted in minimal dilution of nutrients within the detention basin contributing to increased concentrations due to the influence of low water levels and limited flow and dilution of nutrients in higher volumes of water in the system.

Reporting period	ANZECC Guideline*	May 2024
Phosphorous µg/L	50 µg/L	60 µg/L

* ANZECC 2000 Guidelines 50 µg/L for rivers flowing to the coast

Total Suspended Solids (TSS)

TSS is below the EPA trigger value at DP 8 during this testing period.
The recorded levels are considered acceptable and under the noted ANZECC guidelines.

Testing Period	EPA trigger value	May 2024
Total suspended solids mg/L	50 mg/L	<5

Turbidity

Turbidity is below the ANZECC trigger value at DP 8.
Turbidity values are well below the ANZECC guidelines and considered acceptable.

Testing period	ANZECC Trigger	May 2024
Turbidity NTU	6-50 NTU	5.39 NTU

Metals

The following Metals were tested for including arsenic, cadmium, chromium, copper, nickel, lead, zinc & mercury. All metals at DP 8 are below ANZECC Guidelines.

Testing period	ANZECC Trigger	May 2024
Arsenic		<0.001 mg
Cadmium		<0.0001 mg
Chromium		<0.001 mg
Copper		0.002 mg
Nickel		0.001 mg
Lead		<0.001 mg
Zinc		<0.005 mg
Mercury		<0.0001 mg

Summary DP-8 Results

Exceedance in Nitrogen

Results in excessive levels deemed double the advised ANZECC concentrations.

Exceedance in Phosphorus Levels

Results show a slight exceedance in phosphorus levels.

Location DP-8

Limited water in DP 8 at time of monitoring – 31/05/2024

Location IP-8

pH

The pH level for IP-8 was recorded at pH 9.02 which is above the ANZECC 2000 Guidelines for lowland rivers (range of 6.5-8.5).

Reporting period	ANZECC Guideline*	May 2024
pH	6.5-8.5	9.02

Nitrogen

Nitrogen concentrations at IP-8 are 3300 µg/L higher than nitrogen concentrations at the outflow point showing a high level of absorption carried out by the bio-swale. Pre-treatment nitrogen concentrations are 11 times higher than ANZECC Guidelines opposed to double at the OP-8.

Reporting period	*	May 2024
Nitrogen µg/L	350 µg/L	4100 µg/L

* ANZECC 2000 Guidelines 350 µg/L for rivers flowing to the coast

Phosphorous

Phosphorus concentrations are 20 µg/L lower than ANZECC Guidelines.

Reporting period	ANZECC Guideline*	May 2024
Phosphorous µg/L	50 µg/L	30 µg/L

Total Suspended Solids (TSS)

TSS is below the EPA trigger value at OP 8 during this testing period.
The recorded levels are considered acceptable and under the noted ANZECC guidelines.

Testing Period	EPA trigger value	May 2024
Total suspended solids mg/L	50 mg/L	19mg/L

Turbidity

Turbidity is below the ANZECC trigger value at DP 8.
Turbidity values are well below the ANZECC guidelines and considered acceptable.

Testing period	ANZECC Trigger	May 2024
Turbidity NTU	6-50 NTU	30.15 NTU

Metals

The following Metals were tested for including arsenic, cadmium, chromium, copper, nickel, lead, zinc & mercury. All metals at IP 8 are below ANZECC Guidelines.

Testing period	ANZECC Trigger	May 2024
Arsenic		<0.001 mg
Cadmium		<0.0001 mg
Chromium		<0.001 mg
Copper		<0.001 mg
Nickel		<0.001 mg
Lead		<0.001 mg
Zinc		<0.005 mg
Mercury		<0.0001 mg

Summary IP-8 Results

Exceedance in Nitrogen

Results in excessive levels deemed double the advised ANZECC concentrations.

3.1 Key Summary of Results Autumn (May) 2024

Both samples drawn from Basin 8 contain above threshold nitrogen levels, but shows that the Bio-swale is having an effect reducing the concentration of nitrogen within run-off from 4100ug/L to 700ug/L.

Both samples drawn from Basin 8 contain above threshold pH levels.

One sample drawn from Basin 8 (DP-8) contains above the threshold phosphorus levels.

Elevated levels of Nitrogen and phosphorus within DP-8 are of concern given the high concentration levels. It is recommended that plantings to occur within the Bioswale are chosen from species that are known to have a high absorption capacity of nitrogen and phosphorus.

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.

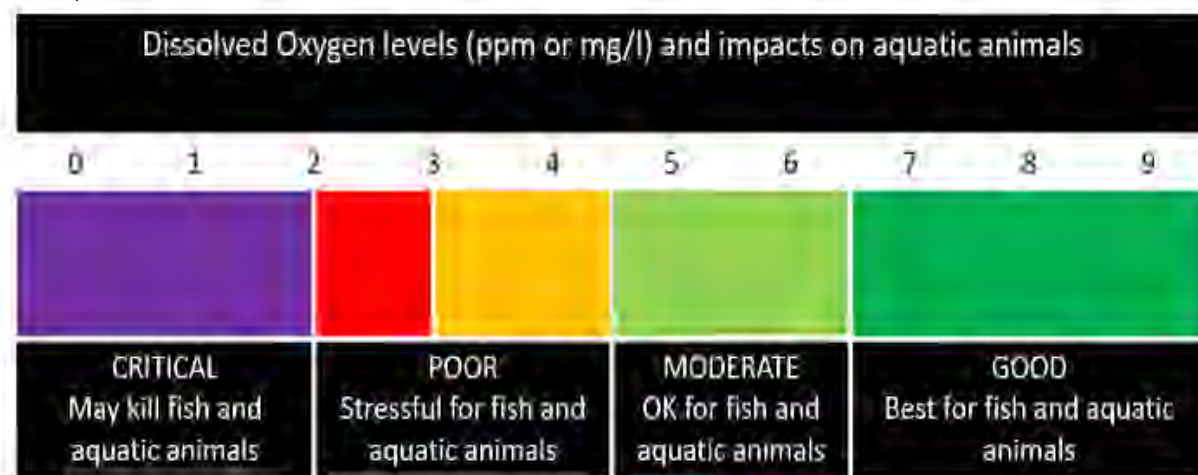
Water will naturally contain a certain amount of dissolved oxygen that is absorbed from the air and produced by plants and algae living in the water.

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 $\mu\text{S}/\text{cm}$. Electrical conductivity is measured in microsiemens per centimeter ($\mu\text{S}/\text{cm}$). Freshwater is usually between 0 and 1,500 $\mu\text{S}/\text{cm}$ and typical sea water has a conductivity value of about 50,000 $\mu\text{S}/\text{cm}$. Examples:

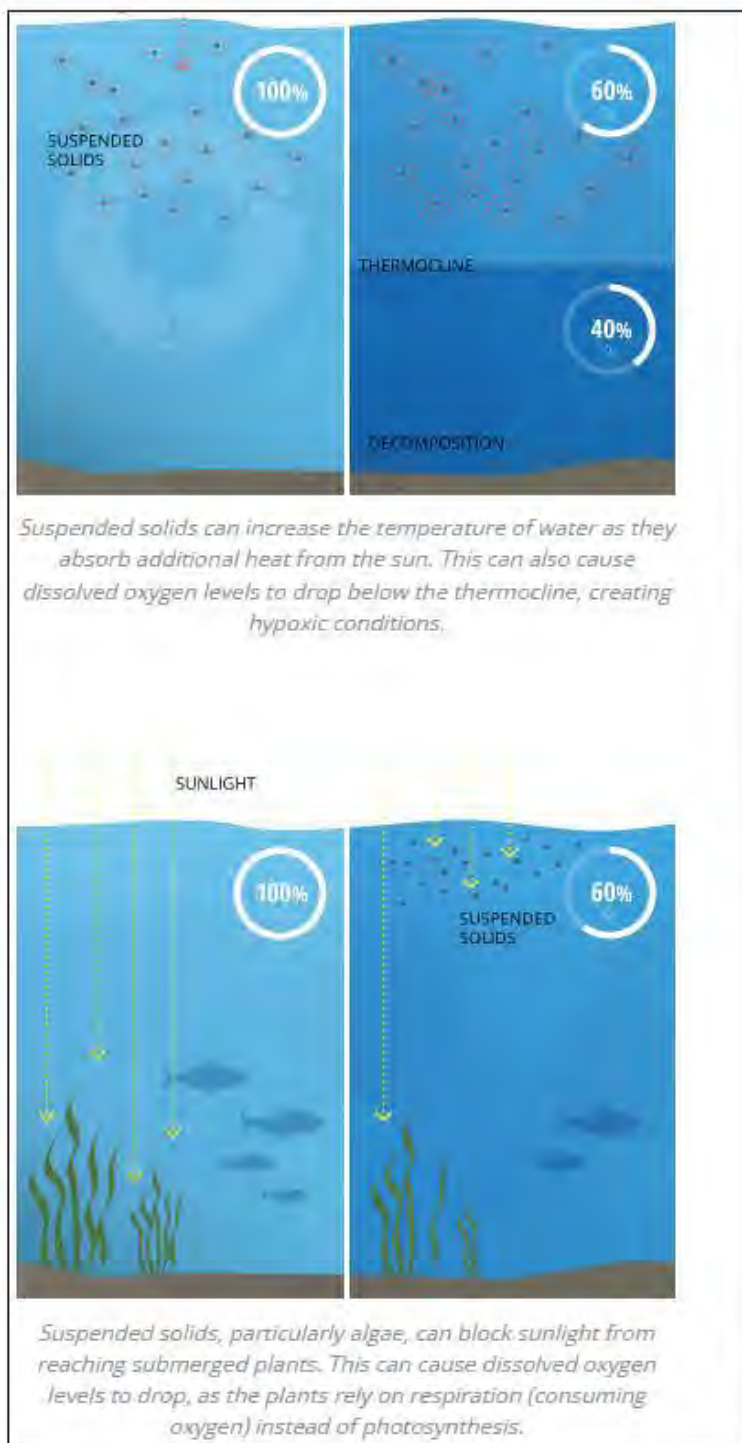
$\mu\text{S}/\text{cm}$	Use
0 - 800	• Good drinking water for humans (provided there is no organic pollution and not too much suspended clay material) • Generally good for irrigation, though above 300$\mu\text{S}/\text{cm}$ some care must be, particularly with overhead sprinklers, which may cause leaf 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 $\mu\text{S}/\text{cm}$ can be consumed • Not normally suitable for irrigation, although water up to 6000 $\mu\text{S}/\text{cm}$ can be used on very salt tolerant crops with very special management techniques. Over 6000 $\mu\text{S}/\text{cm}$, occasional emergency may be possible with care • When used for drinking water by poultry and pigs, the salinity should be limited to about 6000 $\mu\text{S}/\text{cm}$. Most other livestock can use water up to 10000 $\mu\text{S}/\text{cm}$

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.

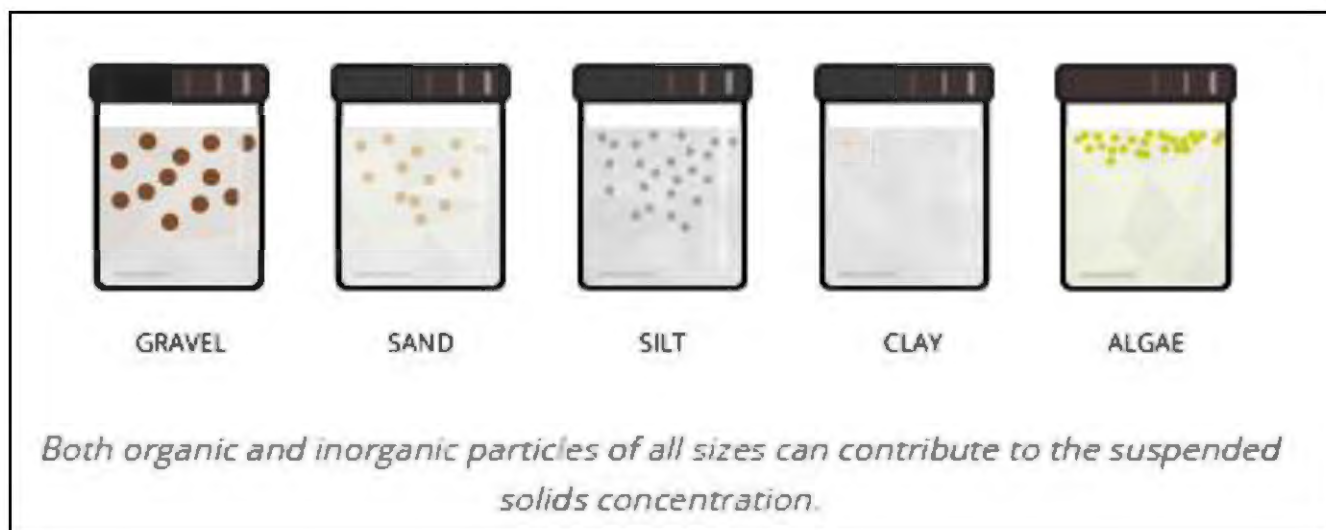
High levels of total suspended solids can affect turbidity, increase water temperatures and decrease dissolved oxygen (DO) levels. This can cause the water to heat up more rapidly because the suspended particles absorb more heat and deplete oxygen, which can adversely affect aquatic life.



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.



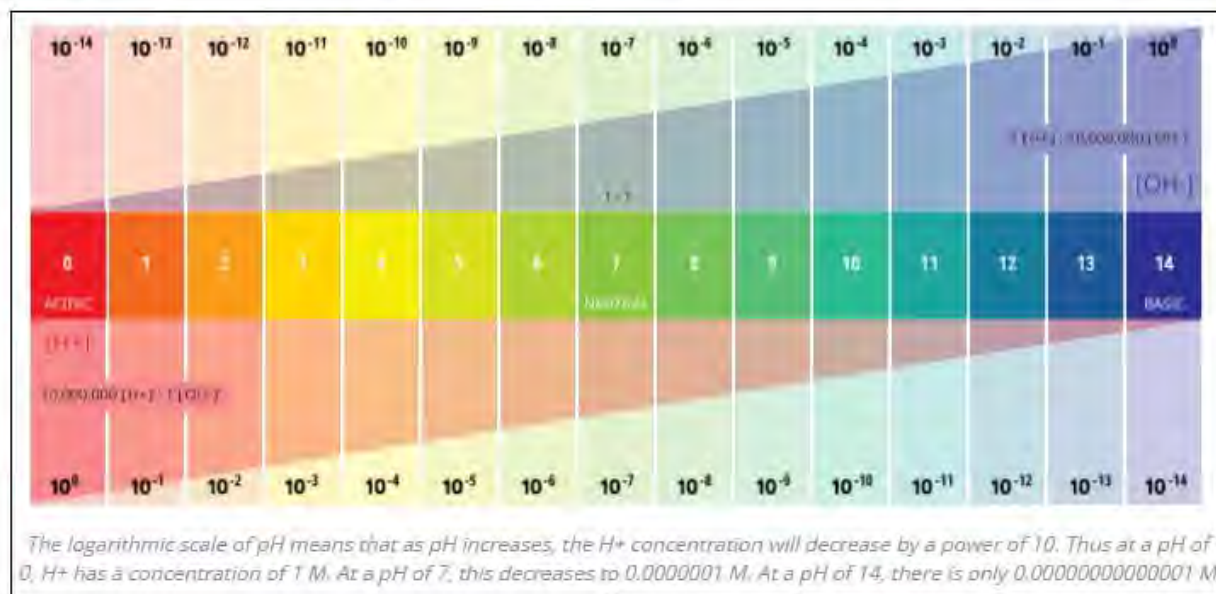
pH – Acidity / Alkalinity – Measures

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.

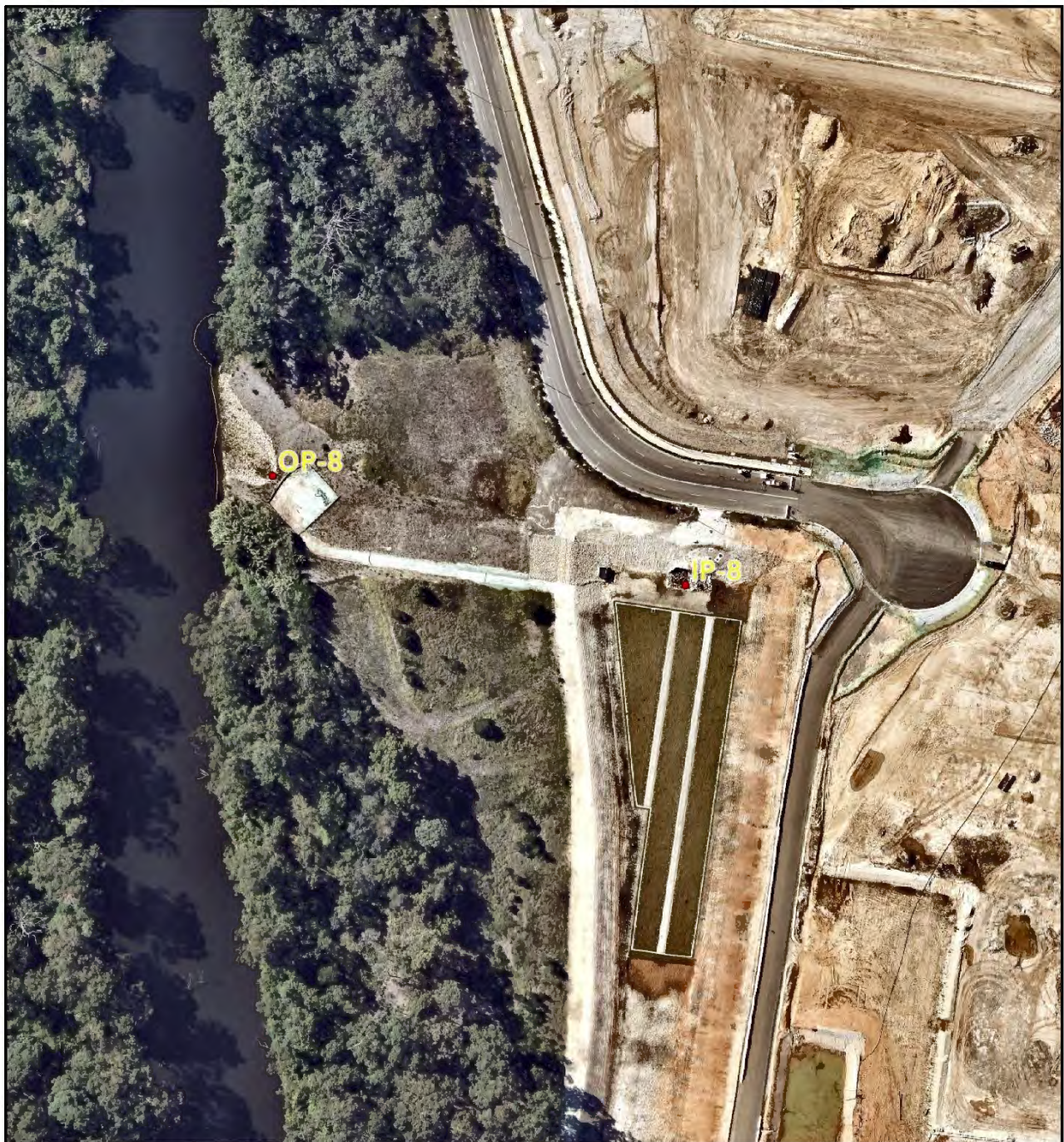
In freshwater systems pH sets up the conditions for how easy it is for nutrients to be available and how easily things like heavy metals (toxicity for aquatic life) can dissolve in the water. Rivers and lakes generally range between 5 (acidic) and 9 (basic) on the pH scale.



General Summary:

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.

Map Image 1. Stormwater Testing Sites – 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

Lot/DP:
5 to 14/DP
1299137

Units:
Meters

Scale:
1:2,000

Spatial Reference:
WGS 1984 Web
Mercator Auxiliary
Sphere

Marco Perry
Environmental/Bushfire Planner
Bsc EnvSc

Marco@apical-bushfire.com.au

STORMWATER DISCHARGE TESTING SITES (Results Tables)

Moorebank West Precinct			
Retention Basin 8 – Inflow (IP-8)			
Date: 31/05/2024	Time: 10:53am	Temp: 19.7 C	Humidity: 60%
Operator: Marco Perry	Coordinates: -33.961307, 150.914859		
Equipment used: Aquatroll 500			
Method:			
Parameter	Recording	Notes	
Temperature (Celcius)	12.6 C	N	
Dissolved Oxygen (DO mg/L)	11.3 DO mg/L	* ANZECC 2000 Guidelines Lowland rivers Lower limit: 85% Upper Limit: 110%	
Dissolved Oxygen (DO ppm)	11.3 ppm	* ANZECC 2000 Guidelines Lowland rivers Lower limit: 85% Upper Limit: 110%	
Electrical Conductivity (SPC -ms/cm)	0.205 SPC -ms/cm		
Electrical Conductivity (C -us/cm)	156.1 C -us/cm	* ANZECC 2000 Guidelines Lowland rivers 125–2200 µS/cm	
TDS (mg/L)	133 mg/L	N	
pH	9.02	* ANZECC 2000 Guidelines Lowland rivers Min 6.5 Max 8.5	
NTU	30.15	* ANZECC 2000 Guidelines Lowland rivers 6-50	

(a) Total phosphorus

Basin 8.1 inflow - Total phosphorous – Qube Logistics, Moorebank, NSW		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 8.1 inflow - Total nitrogen – Qube Logistics, Moorebank, NSW		Trigger Value - ANZECC 2000 Guidelines	Triggered
Lab results -Total nitrogen:	4100 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:	4100 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	<0.02 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. * 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	19 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)				Trend
Benzene µg/L	1300 µg/L	N	<1				No trend
Toluene µg/L	-	N	<2				No trend
Ethylbenzene µg/L	-	N	<2				No trend
meta- & para-Xylene µg/L	200 µg/L	N	<2				No trend
Ortho-Xylene µg/L	470 µg/L	N	<2				No trend
Total Xylenes µg/L	-	-	<2				No trend
Sum of BTEX µg/L	-	-	<1				No trend
Naphthalene µg/L	85 µg/L	N	<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							

Site image. (Basin 8 inflow) Monitoring Test Site MPW-8.1 inflow



Moorebank West Precinct Retention Basin 8 – Outflow (DP-8)

Date: 31/05/2024	Time: 11:09am	Temp: 19.7 C	Humidity: 60%
Operator: Marco Perry	Coordinates: -33.960983, 150.913382		
Equipment used:			
Method:			
Parameter	Recording	Notes	
Temperature (Celcius)	15.5 C	N	
Dissolved Oxygen (DO mg/L)	13.07 DO mg/L	* ANZECC 2000 Guidelines Lowland rivers Lower limit: 85% Upper Limit: 110%	
Dissolved Oxygen (DO ppm)	13.07 ppm	* ANZECC 2000 Guidelines Lowland rivers Lower limit: 85% Upper Limit: 110%	
Electrical Conductivity (SPC -ms/cm)	0.558 SPC -ms/cm		
Electrical Conductivity (C -us/cm)	456.4 C -us/cm	* ANZECC 2000 Guidelines Lowland rivers 125–2200 µS/cm	
TDS (mg/L)	363 mg/L	N	
pH	8.51	* ANZECC 2000 Guidelines Lowland rivers Min 6.5 Max 8.5	
NTU	5.39	* ANZECC 2000 Guidelines Lowland rivers 6-50	

(a) Total phosphorus

MPW 8.2 outflow - Total phosphorous – Qube Logistics, Moorebank, NSW		Trigger Value - ANZECC 2000 Guidelines	Triggered
Lab results - Total phosphorous:	60 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 8.2 outflow - Total nitrogen – Qube Logistics, Moorebank, NSW		Trigger Value - ANZECC 2000 Guidelines	Triggered
Lab results -Total nitrogen:	700 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 8.2 outflow - 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;

MPW 8.2 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	0.002	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: - A spike in copper and zinc has triggered ANZECC Guidelines 90% protection criteria.			

(e) PFAS;

MPW 8.2 outflow - PFAS – Qube Logistics, Moorebank, NSW			
PFAS Surrogate	Measure %	95% species protection (DEE 2016)	Exceedance?
Perfluorooctane sulfonic acid (PFOS) µg/L	<0.02 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 8.2 outflow - Total suspended solids – Qube Logistics, Moorebank, NSW		EPA exceedance value	Trigger
Lab results – Total suspended solids: mg/L	<5MG/L	50 mg/L	N
Notes: Total Suspended Solids dried at 104 ± 2°C Total Suspended Solids (TSS)			

(g) Total hydrocarbons

Basin 8.1 outflow - 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)				Trend
Benzene µg/L	1300 µg/L	N	<1				No trend
Toluene µg/L	-	N	<2				No trend
Ethylbenzene µg/L	-	N	<2				No trend
meta-& para-Xylene µg/L	200 µg/L	N	<2				No trend
Ortho-Xylene µg/L	470 µg/L	N	<2				No trend
Total Xylenes µg/L	-	-	<2				No trend
Sum of BTEX µg/L	-	-	<1				No trend
Naphthalene µg/L	85 µg/L	N	<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							

MPW Basin 8. Testing site 8.2 outflow



MPW Basin 8. Testing site 8.2 outflow



Water Quality Monitoring Comparative Table (Temporal)

Retention Basin 8 MPW, Testing Site OP-8

Testing Site MPW 8.1 Inflow		May 2024		
pH		8.51	-	-
Dissolved Oxygen - %/L		13.07 mg/L	-	-
Actual Electronic Conductivity (SPC -ms/cm)		0.558 SPC -ms/cm	-	-
Temperature - °C		15.5	-	-
Turbidity		5.39 NTU	-	-
Total phosphorous - mg/L		0.06 mg/L	-	-
Total nitrogen - mg/L		0.07 mg/L	-	-
Kjeldahl nitrogen mg/L		0.07 mg/L	-	-
Dissolved metals				
Arsenic		<0.001	-	
Cadmium		<0.0001	-	
Chromium		<0.001	-	
Copper		0.002	-	
Nickel		0.001		
Lead		<0.001	-	
Zinc		<0.005	-	
Mercury		<0.0001	-	
PFAS				
Lab results – SUM of PFAS Micrograms/L		0.04	-	
SUM of PFHxS & PFOS Microgrms/L		0.04	-	
Total suspended solids mg/L		<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		-

Retention Basin 8 MPW, Testing Site IP-8

Testing Site MPW IP-8		May 2024		
pH		9.02	-	-
Dissolved Oxygen - %/L		11.3mg/L	-	-
Actual Electronic Conductivity (SPC -ms/cm)		0.205 SPC -ms/cm	-	-
Temperature - °C		12.6 C	-	-
Turbidity		30.15 NTU	-	-
Total phosphorous - mg/L		0.03 mg/L	-	-
Total nitrogen - mg/L		4.1 mg/L	-	-
Kjeldahl nitrogen mg/L		4.1 mg/L	-	-
Dissolved metals				
Arsenic		<0.001	-	
Cadmium		<0.0001	-	
Chromium		<0.001	-	
Copper		<0.001	-	
Nickel		<0.001		
Lead		<0.001	-	
Zinc		<0.005	-	
Mercury		<0.0001	-	
PFAS				
Lab results – SUM of PFAS Micrograms/L		<0.01	-	
SUM of PFHxS & PFOS Microgrms/L		<0.01	-	
Total suspended solids mg/L		19	-	-
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 (MBW 8I is referred to as IP-8 & MBW 8O is referred to as OP-8)

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	MBW 8I	MBW8O	MBW7I	MW7O	MBW5R
Sampling date / time					31-May-2024 11:00	31-May-2024 11:15	31-May-2024 10:10	31-May-2024 10:30	31-May-2024 08:40
Compound	CAS Number	LOR	Unit		EW2402561-001	EW2402561-002	EW2402561-003	EW2402561-004	EW2402561-005
					Result	Result	Result	Result	Result
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	---	5	mg/L		19	<5	<5	23	26
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	0.003	<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	0.002	0.005	<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	7440-68-8	0.005	mg/L		<0.005	<0.005	0.021	<0.005	0.010
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		0.02	0.01	1.88	0.02	0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	---	0.1	mg/L		4.1	0.7	1.8	0.4	0.8
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	---	0.1	mg/L		4.1	0.7	3.7	0.4	0.8
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	---	0.01	mg/L		0.03	0.06	0.42	0.03	0.04
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:

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	MBW 8I	MBW8O	MBW7I	MW7O	MBW5R
Sampling date / time					31-May-2024 11:00	31-May-2024 11:15	31-May-2024 10:10	31-May-2024 10:30	31-May-2024 09:40
Compound	CAS Number	LOR	Unit		EW2402561-001	EW2402561-002	EW2402561-003	EW2402561-004	EW2402561-005
					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	108-38-3 108-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-8	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	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2708-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	0.05	0.05
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	0.04	0.03	0.08	0.04
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									

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	MBW 81	MBW80	MBW71	MW70	MBW5R
Sampling date / time					31-May-2024 11:00	31-May-2024 11:15	31-May-2024 10:10	31-May-2024 10:30	31-May-2024 09:40
Compound	CAS Number	LOR	Unit		EW2402561-001	EW2402561-002	EW2402561-003	EW2402561-004	EW2402561-005
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2708-90-3	0.02	µg/L		<0.02	<0.02	0.03	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	0.03	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-0	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-87-1	0.01	µg/L		<0.01	<0.01	0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-85-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-78-2	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)	307-65-1	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)	375-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31508-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-60-2	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)	1891-98-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
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)	2991-60-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID		MBW 8I		MBW8O		MBW7I		MW7O		MBW5R	
Sampling date / time						31-May-2024 11:00		31-May-2024 11:15		31-May-2024 10:10		31-May-2024 10:30		31-May-2024 09:40	
Compound		CAS Number		LOR	Unit	EW2402561-001		EW2402561-002		EW2402561-003		EW2402561-004		EW2402561-005	
						Result		Result		Result		Result		Result	
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued															
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)		39109-34-4		0.05	µg/L	<0.05		<0.05		<0.05		<0.05		<0.05	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)		120226-80-0		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		0.04		0.10		0.13		0.09	
Sum of PFHxS and PFOS		355-46-4/1783-23-1		0.01	µg/L	<0.01		0.04		0.03		0.13		0.05	
Sum of PFAS (WA DER List)		—		0.01	µg/L	<0.01		0.04		0.10		0.13		0.09	
EP080S: TPH(V)/BTEX Surrogates															
1,2-Dichloroethane-D4		17060-07-0		2	%	94.2		88.6		104		97.6		102	
Toluene-D8		2037-26-5		2	%	114		106		123		116		116	
4-Bromofluorobenzene		460-00-4		2	%	124		118		133		126		130	
EP231S: PFAS Surrogate															
13C4-PFOS		—		0.02	%	99.1		97.4		100.0		95.9		96.6	
13C8-PFOA		—		0.02	%	104		104		103		102		104	

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 (µg/L ⁻¹)				Trigger values for marine water (µg/L ⁻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 (AsIII)		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 (CrIII)	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	0.06	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	6.0 ^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	2.5	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 ($\mu\text{g L}^{-1}$)				Trigger values for marine water ($\mu\text{g L}^{-1}$)			
	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
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
Phenanthrene	B	ID	ID	ID	ID	ID	ID	ID
Fluoranthene	B	ID	ID	ID	ID	ID	ID	ID
Benzo(a)pyrene	B	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 ($\mu\text{g/L}^{-1}$)				Trigger values for marine water ($\mu\text{g/L}^{-1}$)			
	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 ^H	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	2.5	4.4	6	9 ^A	ID	ID	ID
GENERIC GROUPS OF CHEMICALS								
Surfactants								
Linear alkylbenzene sulfonates (LAS)	65	280	520 ^C	1000 ^C	ID	ID	ID	ID
Alcohol ethoxylated 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								
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 9650	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 LC₅₀ 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.

^A = *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 (NH₃-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 H₂S, 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 CaCO₃. 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.

I = 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.

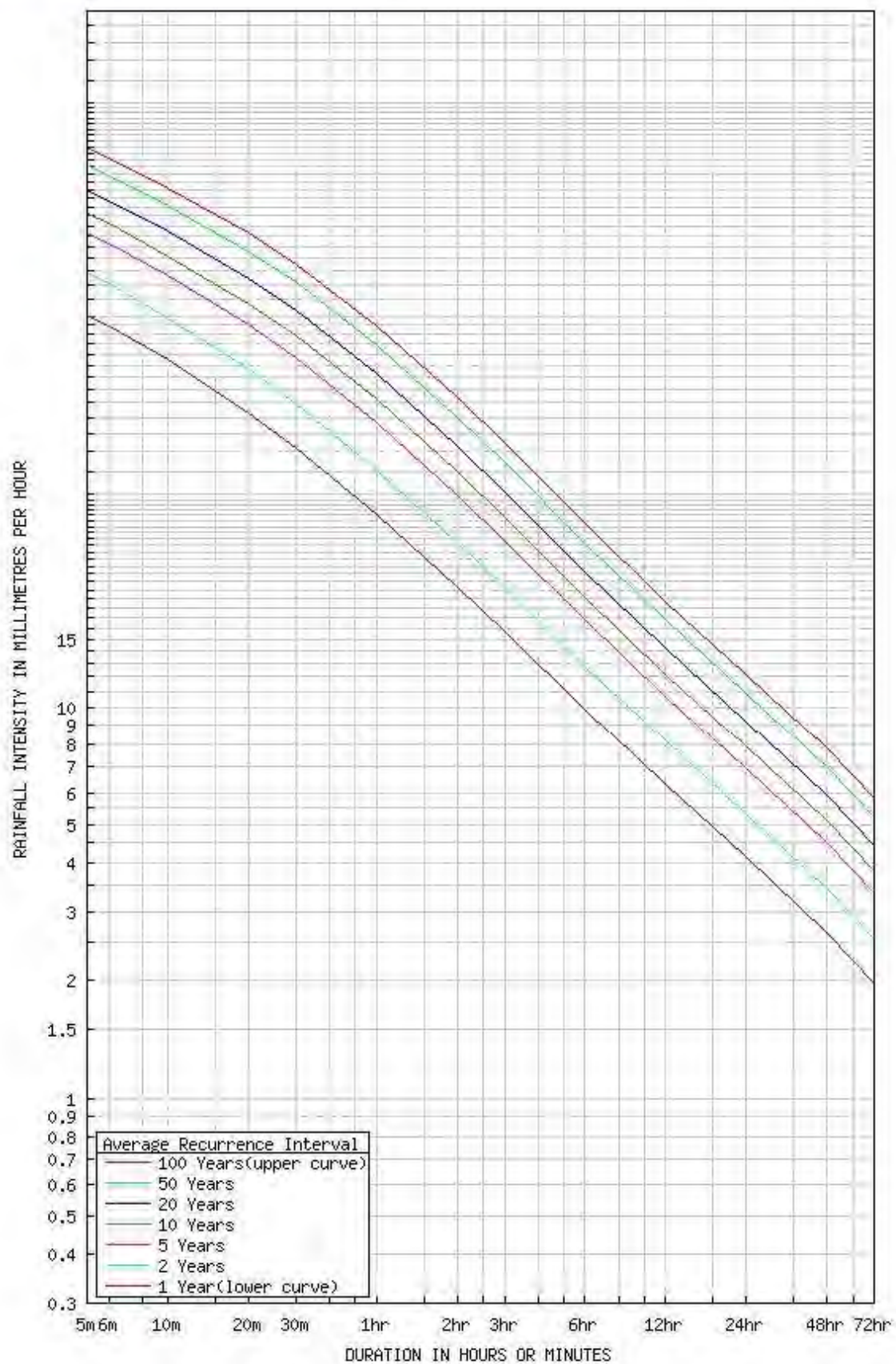
Table 5. Ecological water quality guideline values developed by water regulators

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.
	0.13 µg/L	220 µg/L	95% species protection - slightly to moderately disturbed systems	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.
	2 µg/L	632 µg/L	90% species protection - highly disturbed systems	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.
	31 µg/L	1824 µg/L	80% species protection - highly disturbed systems	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.
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.
	0.13 µg/L	220 µg/L	95% species protection - slightly to moderately disturbed systems	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.
	2 µg/L	632 µg/L	90% species protection - highly disturbed systems	Note 2: Marine guideline values developed by CRC CARE are under consideration through the nationally-agreed water quality guideline development process.
	31 µg/L	1824 µg/L	80% species protection - highly disturbed systems	

Australian Water Quality Guidelines for Fresh and Marine Waters

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 ⁵	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 \(bom.gov.au\)](http://Intensity-Frequency-Duration (bom.gov.au))





APPENDIX G - COMPLAINTS REGISTER

Moorebank Intermodal Precinct Complaints Register - as of 1 Nov 2024

Date received	Complainant	Nature of complaint	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 and all	Closed

		signage was installed correctly.	
18/06/2024	Community member	Noise: Community member lodged complaint about loud noise occurring from intermodal precinct. Believes it is linked to container management. Noise mitigation strategy developed and shared with stakeholders.	Closed
07/06/2024	Community member	Noise: Community member lodged complaint about loud noise occurring from intermodal precinct. Believes it is linked to container management. The Liverpool Military Area Base Management team have been contacted. They confirmed that defence related activities were occurring on Holsworthy on the 6 June in the early morning and throughout the day. This may be the source of the noise. Stakeholder notified.	Closed
07/06/2024	Community member	Noise: Community member lodged complaint about loud noise occurring from intermodal precinct. Believes it is linked to container management. The Liverpool Military Area Base Management team have been contacted. They confirmed that defence related activities were occurring on Holsworthy on the 6 June in the early morning and throughout the day. This may be the source of the noise. Stakeholder notified.	Closed
06/06/2024	Community member	Letterbox distribution: Community member lodged complaint about receiving project information in their letterbox which they consider to be junk mail. Resident's details passed on to distribution company. Caller informed.	Closed
06/06/2024	Community member	Noise: Community member lodged complaint about loud noise occurring from intermodal precinct. Believes it is linked to container management. Located approx. 1.5km from terminal. Considers noise to be not acceptable. The Liverpool Military Area Base Management team have also been contacted. They confirmed that defence related activities were occurring on Holsworthy on the 6 June in the early morning and throughout the day. This may be the source of the noise. Stakeholder notified.	Closed
23/05/2024	Community member	<i>Resubmission of complaint received on 26 April 2024.</i> Personal Injury and property damage: Motorcycle rider fell off bike on Moorebank Avenue at intersection with Anzac Road. Sustained injury and damage to property (bike, watch, phone). Original complaint submitted to Liverpool City Council and LCC contacted Logos. Currently investigating CCTV footage of the incident. Stakeholder acknowledged and provided update. Response provided to stakeholder, stating that condition of road was in acceptable condition for road works, and the location of the fall was a 35-50mm edge on final kerb to wearing course of asphalt. Moorebank Precinct will not be reimbursing the stakeholder for damages caused as part of the fall.	Closed
13/05/2024	Community member	Noise: Community member lodged complaint about loud noise occurring from intermodal precinct. Believes it is linked to container management. Stakeholder contacted and advised that the team at QUBE has been advised of complaints received relating to operational noise with container movement, and to possibly investigate mitigation measures. Stakeholder happy with response.	Closed

		The complaint is closed.	
30/04/2024	Community member	Noise: Community member lodged complaint about loud noise occurring from intermodal precinct – not sure if construction noise or operational noise. Sounds like operator dropping items. Heard in Wattle Grove @8:30pm 30/04 and keeping 3yr old up. - Currently investigating work location/operational practices possibly resulting in noise generation. Stakeholder contacted and advised that the team at QUBE has been advised of complaints received relating to operational noise with container movement, and to possibly investigate mitigation measures. The complaint is closed.	Closed
30/04/2024	Community member	Noise: Community member lodged complaint about loud noise occurring from intermodal precinct during night of 29/04. Noise from containers being loaded and unloaded. Concerned about level of noise when terminal is fully uploaded. - Currently investigating work location/operational practices possibly resulting in noise generation. Stakeholder contacted and advised that the team at QUBE has been advised of complaints received relating to operational noise with container movement, and to possibly investigate mitigation measures. Stakeholder happy with response. The complaint is closed.	Closed
27/04/2024	Community member	Light pollution: Multiple lights in intermodal precinct resulting in high noise pollution to residents in Casula. 4 lights currently turned on with 7 yet to be activated. Stakeholder worried about final lighting pollution. Concerned about direction of lights and colour scheme of warehouses getting lit up with current lighting. - Currently investigating lighting requirements and possible modifications to assist stakeholder. Stakeholder contacted and advised review of lighting had been undertaken and lights would be switched off until lights confirmed to be set at correct angle, and mitigation measures investigated. The complaint is closed	Closed
26/04/2024	Community member	Personal Injury and property damage: Motorcycle rider fell off bike on Moorebank Avenue at intersection with Anzac Road. Sustained injury and damage to property (bike, watch, phone). Original complaint submitted to Liverpool City Council and LCC contacted Logos. - Investigation complete. Site at an acceptable level and condition through construction. Response provided to stakeholder. Claim rejected	Closed
23/04/2024	Community member	Traffic impacts: Community member lodged complaint about current road layout of Moorebank Avenue – single lane from Anzac Road to M5 is heavily congested, and stakeholder is worried final layout is unequipped for traffic volume of operational precinct. - Informed stakeholder of Moorebank Avenue realignment works. - Currently seeking additional information to provide stakeholder to close out complaint. Stakeholder called and advised of road configuration after alignment completed. Pleased to know that single lane bottleneck would be removed. Also noted future realignment on Eastern side of MIP. Current work focused on Anzac Road to M5. Stakeholder pleased.	Closed

		The complaint is closed.	
05/04/2024	Community member	Noise: Community member lodged complaint about loud noise occurring morning of 5/04 from the intermodal terminal, which sounds like someone dropping something large every 30 seconds. Located in Casula and could be heard in Wattle Grove by family member. Stakeholder contacted and provided update: All noise monitors recorded identified noise; however no work activities were occurring on site. Noise not generated from MIP. Stakeholder appreciative of update and glad to see the effort that went into resolving complaint. The complaint has been closed.	Closed
01/02/2024	Community member	Noise: The complaint involved a loud echoing noise from a truck's hatch dropping dirt, disturbing a caller working from home across the river about 800 meters away from the construction site. The noise occurred within the scheduled hours, however, disrupted the caller's work online meeting. The caller acknowledged the normalcy of construction noise but emphasized the exceptional loudness on that morning. The caller's feedback was relayed to the construction team for consideration in the future. The complaint has been closed.	Closed
25/01/2024	Community member	Noise: A community member complained about helicopter lifting works that occurred on January 25th, 2024. The complaint suggested that the works extended beyond the scheduled and published hours, causing noise disturbances during nighttime. The investigation revealed that the works have been undertaken in accordance with the communicated schedule and there were no scheduled or unscheduled night works at the Precinct during the specified period. The complaint has been closed.	Closed
25/01/2024	Community member	Noise: CCC member (Casula resident) complained about noise and the days of operation related to helicopter lift works on January 25th, 2024. The complainant was informed that the helicopter lift works occurred in accordance with the communicated schedule and were sanctioned activities approved under the MPW Construction Noise and Vibration Management Plan. The complainant provided with a copy of the document for their reference. Additionally, the complainant was also advised that their specific observations regarding noise-related issues and preferences for certain days for this type of works would be subject to further investigation by the Project team and discussed during the upcoming Community Consultative Committee meeting. The complaint has been closed.	Closed
24/12/2023	Road User	Development impacts: A road user made a complaint regarding a visibility issue caused by an unidentified substance on the caller's vehicle surface while driving in the Precinct area. The investigation determined the substance in question originated from construction operations within the area. The complainant provided with a suitable cleaning product. Additionally, professional cleaning services have been arranged for their car to ensure the complete removal of the	Closed

		substance. The complaint has been closed.	
22/09/2023	Road User	Traffic lights: A road user made a complaint about traffic congestion at the intersection of Moorebank Avenue and Anzac Road during peak morning and evening hours. According to the complainant, the congestion is attributed to an auto-sensor system on Anzac Road that causes delays for road users traveling on Moorebank Avenue. The project team advised the complainant that these traffic signals are controlled by TfNSW and not by the Precinct, therefore the concern is to be raised with TfNSW. The complaint has been closed.	Closed
04/09/2023	Community member	Noise: A complainant reported noise in the late-night hours near the Fire and Rescue Station on Anzac Road. The area is outside of MIP development boundary, hence there are no construction works or operations being undertaken within the vicinity of the Fire and Rescue station on Anzac Road. The noise appears not related to the MIP development. The complaint has been closed.	Closed
21/08/2023	Community member	Noise: A Wattle Grove resident complained about a metallic clunking noise most often at night-time from a west facing wall (towards the precinct). The project team investigated and found no works that could initiate noises described by the complainant were being undertaken within the precinct during night-time hours at the time of complaint. The complainant was advised that the precinct could not identify any specific events that would have caused any excessive night-time noise. However, operational teams were reminded to stay vigilant when operating at night.	Closed
27/06/2023	Community member	Dust: A Wattle Grove resident provided feedback about dust generation on Moorebank Avenue. The project team investigated and found no exceedances of the criteria for deposited dust in the last three months. A letter response explaining specific methods for the management and monitoring of dust generation at the Precinct was provided to the complainant. The complaint has been closed.	Closed
30/05/2023	Community member	Noise: A Wattle Grove resident complained about noise in the early hours of the morning which they believed originated from the precinct. The project team investigated and found no works were being undertaken within the precinct on the night in question. The complaint has been closed.	Closed
10/05/2023	Road user	Traffic congestion: The complainant reported traffic congestion along Moorebank Avenue resulting in increased commute time. The project team investigated and found traffic signals controlled by TfNSW TMC had malfunctioned on the morning in question. A response was provided to the complainant advising of the signal outage and how to report future signal faults. Information about the closure of Chatham Road intersection was also provided.	Closed
27/04/2023	Road user	Road conditions: The complainant reported damage to their vehicle while driving on Moorebank Avenue. Further information required to investigate the complaint was not provided. The complaint has been closed.	Closed

07/02/2023	Road user	Road conditions: The complainant reported damage to their vehicle while driving on Moorebank Avenue. The project team liaised with the vehicle owner to resolve the complaint.	Closed
02/02/2023	Community member	Noise monitoring: Resident raised concern about specific locations of attended noise monitoring undertaken in 2022. The resident was provided with further clarification regarding the location of the noise monitoring as well as details of the noise monitoring requirements under the project's conditions of consent.	Closed
19/01/2023	Road user	Construction dust and mud: Road user complained about construction dust and mud on Moorebank Avenue. Road user was advised of mitigation measures in place including dust suppression, the use of water caters, wheel washing and sweeper trucks.	Closed

2022 Complaints

Date Received	Complainant	Nature of Complaint	Status
31/12/2022	Community member	Development impacts: Resident raised concern about the height of MPW warehousing and its impact on views. Resident was advised of initiatives to reduce impacts for community and was advised of the previous community consultation related to the development, including height of warehousing.	Closed
14/11/2022	CCC member	Construction schedule and upcoming works: CCC member (Casula resident) complained about helicopter lifting work continuing past standard construction hours. The project team investigated the incident with the relevant contractor, who has been instructed to implement measures to ensure that any future helicopter lifts do not exceed construction hours. Further, the team notified the complainant of upcoming helicopter lifting work in December.	Closed
10/10/2022	Local business	Water / Flooding: Water entered the premises of a site neighbour during a heavy rainfall event. Site contractors have undertaken remediation works to repair, regrade and lift the bund to drain the area, pump out remaining water and revegetate the area to stabilise the bund. Contractors will continue to monitor the area to pump excess water as required.	Closed
20/09/2022	Community member	General project and noise: A Wattle Grove resident complained about noise and hours of operation at the site, and about the project more broadly. The complainant was advised further additional attended noise monitoring will be undertaken.	Closed
21/08/2022	Community member	Noise: A Wattle Grove resident complained about noise and hours of operation at the site, including out of hours works helicopter activity undertaken on site. The complainant was advised the works were an approved activity under the approved MPE Stage 2 Construction Noise and Vibration Management Plan (CNVMP) and noise monitoring undertaken as required by out of hours work consent identified noise levels were under the predicted levels outlined in the CNVMP. The complainant was also advised their observations of noise at	Closed

		other days/times are being investigated further through additional noise monitoring. The complainant was advised further additional attended noise monitoring will be undertaken.	
18/8/2022	Community member	Noise: A Wattle Grove resident complained about noise and hours of operation at the site. The complainant was advised their observations are being investigated further through additional noise monitoring. The complainant was advised further additional attended noise monitoring will be undertaken.	Closed
17/8/2022	Community member	Noise: A Wattle Grove resident complained about noise and hours of operation at the site. The complainant was advised their observations are being investigated further through additional noise monitoring. The complainant was advised further additional attended noise monitoring will be undertaken.	Closed
16/8/2022	Community member	Noise: A Wattle Grove resident complained about noise and hours of operation at the site. The complainant was advised their observations are being investigated further through additional noise monitoring. The complainant was advised further additional attended noise monitoring will be undertaken.	Closed
13/8/2022	Community member	Noise: A Wattle Grove resident complained about noise and hours of operation at the site. The complainant was advised their observations are being investigated further through additional noise monitoring. The complainant was advised further additional attended noise monitoring will be undertaken.	Closed
13/8/2022	Community member	Noise: A Wattle Grove resident complained about noise and hours of operation at the site. The complainant was advised their observations are being investigated further through additional noise monitoring. The complainant was advised further additional attended noise monitoring will be undertaken.	Closed
12/8/2022	Community member	Noise: A Wattle Grove resident complained about noise and hours of operation at the site. The complainant was advised their observations are being investigated further through additional noise monitoring. The complainant was advised further additional attended noise monitoring will be undertaken.	Closed
12/8/2022	Community member	Noise: A Wattle Grove resident complained about noise and hours of operation at the site. The complainant was advised their observations are being investigated further through additional noise monitoring. The complainant was advised further additional attended noise monitoring will be undertaken.	Closed
11/8/2022	Community	Noise:	Closed

	member	A Wattle Grove resident complained about noise and hours of operation at the site. The complainant was advised their observations are being investigated further through additional noise monitoring. The complainant was advised further additional attended noise monitoring will be undertaken.	
10/8/2022	Community member	Noise: A Wattle Grove resident complained about noise and hours of operation at the site. The complainant was advised their observations are being investigated further through additional noise monitoring. The complainant was advised further additional attended noise monitoring will be undertaken.	Closed
31/7/2022	Community member	Noise: A Wattle Grove resident complained about noise and hours of operation at the site. The complainant was advised their observations are being investigated further through additional noise monitoring. The complainant was advised further additional attended noise monitoring will be undertaken.	Closed
30/7/2022	Community member	Noise: A Wattle Grove resident complained about noise and hours of operation at the site. The complainant was advised their observations are being investigated further through additional noise monitoring. The complainant was advised further additional attended noise monitoring will be undertaken.	Closed
29/7/2022	Community member	Noise: A Wattle Grove resident complained about noise and hours of operation at the site. The complainant was advised their observations are being investigated further through additional noise monitoring. The complainant was advised further additional attended noise monitoring will be undertaken.	Closed
28/7/2022	Community member	Noise: A Wattle Grove resident made a complaint about truck and container movement noise at the site. The complainant was advised the project has approval to operate 24/7 within limits of the Operational Noise and Vibration Management Plan and the project undertakes ongoing noise management and monitoring, including permanent noise monitors. Further, the team notified the complainant that staged commencement of automated electric crane operations later this year which are expected to result in more environmentally friendly operations on site. The complainant was advised further additional attended noise monitoring will be undertaken.	Closed
19/7/2022	Community member	Noise: A Wattle Grove resident complained about noise emanating from the site, particular trucks and container movement noise. The complainant was advised the project has approval to operate 24/7 within limits of the Operational Noise and Vibration Management Plan and the project undertakes ongoing noise management and monitoring, including permanent noise	Closed

		monitors. Further, the team notified the complainant that staged commencement of automated electric crane operations later this year which are expected to result in more environmentally friendly operations on site. The complainant was advised further additional attended noise monitoring will be undertaken	
4/7/2022	Local business	Flooding: Water entered the premises of a site neighbour during a heavy rainfall weather event (300mm +). Following an investigation, SIMTA contractors undertook cleaning of the site and repair to verges. Further work will be undertaken to repair swale damage.	Closed
18/06/2022	Community member	Noise: A resident in Wattle Grove made a complaint relating to container movement noise. The project team investigated and noise monitoring at the time described included some container noise which was within approved noise parameters for the site. As a result of the community member's observations, attended noise monitoring will be undertaken in the area to further explore (in addition to permanent noise monitoring already in place at locations determined by DPE). The complainant was advised further additional attended noise monitoring will be undertaken.	Closed
10/06/2022	Community member	Noise: A resident in Wattle Grove made a complaint about container movement noise. The project team investigated and noise monitoring at the time described included some container noise which was within approved noise parameters for the site. As a result of the community member's observations, attended noise monitoring will be undertaken in the area to further explore (in addition to permanent noise monitoring already in place at locations determined by DPE).	Closed
26/04/2022	CCC member	Noise: Complainant noted sound from a water pump has been operating 24/7 near the Georges River at the north of the site for about a week. The project team investigated the complaint and discovered the water level within the excavation works area had recently receded, causing the pump to function incorrectly. The complainant was informed acoustic blankets would be installed for additional noise attenuation and the pump would only be running during standard construction hours until they are in place. Further noise modelling will be undertaken before overnight pumping resumes.	Closed
19/02/2022	CCC member	Noise: Complainant noted weekend work was being carried out after 1pm Saturday. The complainant was advised a new extended weekend construction hours order had been issued by the NSW Minister for Planning and was supplied a copy of the order.	Closed
11/01/2022	CCC member	Noise: Complainant noted heavy vehicle noise late at night. No work was being undertaken on our project at that time, which complainant was advised.	Closed

Date received	Complainant	Nature of complaint	Status
25/11/2021	Road user	Condition of road: A motorist complained about potholes on Moorebank Avenue between East Hills railway line and Cambridge Avenue. The project team advised the motorist that the potholes are within the section of the road owned and managed by the Department of Defence and was not related to the project. The complainant was directed to contact Department of Defence. (Issue not related to project).	Closed
05/11/2021	Road user	Condition of road: A road user complained about the condition of Anzac Road. The project team investigated the specific location of Anzac Road and discovered this is an area of Anzac Road currently being upgraded by Liverpool City Council. This upgrade is unrelated to the project.	Closed
04/11/2021	CCC member	Dust: A CCC member reported dust coming from the southern end of Moorebank Precinct West. The project team reminded all contractors to ensure mitigation strategies continue to be implemented appropriately. Further discussions about dust management from active stockpiles were conducted with the overall project team. The complaint occurred on a day where the wind was 80-90km/hr - while water carts were suppressing dust on the day, it was impossible to eliminate the dust due to these high wind speeds.	Closed
01/11/2021	Community member	Noise: A resident in Wattle Grove complained about night works noise coming from Anzac Road. The project team discovered that these works are undertaken by Liverpool City Council and advised the resident to contact council. (Issue not related to project).	Closed
28/10/2021	Road user via Liverpool City Council	Condition of road: Liverpool City Council on behalf of road users complained about the condition of Bapaume Road, Moorebank. The project team is investigating ways to temporary remedy potholes and conditions of the road where possible. Please note this is a local controlled council road.	Closed
25/10/2021	Community member	Noise: A resident complained about noise coming from the Moorebank Intermodal Terminal direction. The project team acknowledged the complainant's concerns and requested more information about the noise so the team could carry out further investigation to identify the source. No further information was provided by the complainant, and project teams confirmed that no out of hours works were undertaken at the time by Moorebank Intermodal Terminal.	Closed
16/10/2021	Community member	Noise: A resident in Wattle Grove complained about night works noise. The project team investigated the complaint and discovered that night works (asphalting) were undertaken by nearby Holsworthy Army Barrack. Stakeholder was advised and encouraged to provide additional detail for future noise issues. (Issue not related to project.)	Closed
09/09/2021	CCC member	Noise:	Closed

		A CCC member complained about trucks beeping noise from a heavy vehicle in the early hours. The project team investigated the noise and discovered that it came from a Fire & Rescue NSW truck inspecting a local business premises. (Issue not related to project.)	
07/09/2021	Community member	General project: A resident in Glenfield complained about the height of warehousing on MPW hindering his cityscape view. The project team provided information to assist complainant understanding of works currently underway and those planned and approved for the near future.	Closed
17/07/2021	Road user	Vehicle Damage: A motorist reported a pothole on Anzac Road, east of Anzac Creek. The project team advised that the pothole was within the section of the road owned and managed by the Department of Defence and was not related to the project. The complainant was directed to DoD. (Issue not related to project.)	Closed
14/07/2021	Road user	Vehicle Damage: A motorist reported windscreen damaged by a rock from a truck on Moorebank Avenue. The project team investigated the claim and discovered the truck was not working on the project on the day of the incident. The motorist was directed to contact the truck company directly. (Issue not related to project.)	Closed
14/05/2021	Road user	Driver behaviour: Site neighbour advised that vehicle leaving site failed to completely stop moving at a stop sign. SIMTA contractors issued road safety to relevant team members.	Closed
13/05/2021	Community member	Noise: A resident from East Moorebank complained of OOH excavator noise during a one-month period. Further information was requested from the complainant, but no response was provided. Investigations indicated the noise was not related to the project.	Closed
06/05/2021	Local Business	Water/Flooding: Site neighbour advised that water was flowing from SIMTA property into culvert situated along fence line on private property. SIMTA introduced measures to help prevent runoff during heavy rainfall.	Closed
13/04/2021	Road user	Traffic lights: A road user complained about traffic congestion on Moorebank Avenue causing major delays. Roads and Maritime Services advised the light sequencing system was faulty. The project team had also directly reported the issue to TfNSW. (Issue not related to project.)	Closed
08/04/2021	Local Business	Water/Flooding: Advised by site neighbour that a water hose situated on SIMTA property was leaking. The project team inspected the hose and repaired it.	Closed
29/03/2021	Road user	Traffic lights: A road user complained about traffic congestion on Moorebank Avenue causing major delays. Roads and Maritime Services advised the light sequencing system was faulty. (Issue not related to project.)	Closed

29/03/2021	Road user	Traffic lights: A road user complained about traffic congestion on Moorebank Avenue causing major delays. Roads and Maritime Services advised the light sequencing system was faulty. (Issue not related to project.)	Closed
22/03/2021	Local Business	Water/Flooding: Water entered the premises of a site neighbour during heavy rainfall. As a gesture of goodwill, SIMTA offered to pay for the clean-up.	Closed
09/01/2021	CCC member	Noise: A CCC member complained about trucks tailgates making noise during the delivery of material to the site. The project team investigated the complaint and noted that the complaint related to trucks operating during standard construction hours and within approval conditions.	Closed

2020 Complaints

Date received	Complainant	Nature of complaint	Status
12/12/2020	CCC member	Noise: A CCC member complained about noise from night work. The project team acknowledge the CCC member's concerns and informed that they have amended the work methodology in response to previous complaints. The team advised they have moved the out-of-hours work to a section of the site located further away from homes in Casula, endeavouring to ensure all plant and machinery on MPW uses non-tonal reversing sounders. Furthermore, the project team also introduced several initiatives to reduce the impact of night works. Noise monitoring indicates that these initiatives appear to be working in helping reduced noise impacts from night works.	Closed
10/12/2020	Community member	Dust: A community member complained about dust impacts on her home. The project team outlined the measures used to mitigate the impact of dust; including frequent use of dust suppression vehicles, continually monitoring dust levels and work practices being altered during strong winds. The project team apologised the community member for any impacts.	Closed
09/11/2020	CCC member	Noise: A CCC member visited BMD gate on MPW and complained about noisy night work. The site supervisor discussed new noise mitigation measures had been put in place for the night work and the CCC member agreed the noise level had dropped. The supervisor also explained to the CCC member that ongoing toolbox talks with contractors/drivers on the need to keep noise levels down, especially with the use of horns and closing tailgates. The CCC member agreed that everyone was doing their best to keep noise levels down.	Closed
04/11/2020	Road user	Truck driver behaviour: A road user complained about an interaction with a truck driver on Moorebank Avenue. The project team investigated the complaint and dashcam footage was inconclusive in terms of the account of the incident. The project team also discussed with the truck driver the importance of always ensuring road safety and road rules are adhered to when entering and leaving site. The project team apologised the road user for any concerns	Closed

		caused by the incident.	
22/10/2020	CCC member	Noise: A CCC member complained about noisy night work. The project team acknowledge the CCC member's concerns and advised that they have amended the work methodology in response to his expressing dissatisfaction with the level of out-of-hours work noise. The team advised they have moved the out-of-hours work to a section of the site located further away from homes in Casula. In addition, the project team also introduced additional noise monitoring to help confirm noise sources. Feedback from the CCC member indicated that this eliminated the noise issues he had been experiencing.	Closed
20/10/2020	CCC member	Dust: A CCC member complained about dust coming up from the northern end of MPW. The project team investigated the complaint and informed the CCC member they could not conclusively identify any work that caused the dust complaint reported. The project team organised additional street sweeping and dust suppression vehicles to mitigate any possible dust issues.	Closed
15/10/2020	Community member	A resident in Casula complained about construction noise. The project team acknowledge the resident's concerns and advised that they have amended the work methodology in response to residents expressing dissatisfaction with the level of out-of-hours work noise. The team did this by relocating the out-of-hours work to a section of the site located further away from homes in Casula. In addition, the project team also introduced additional noise monitoring to help confirm noise sources.	Closed
14/10/2020	Community member	Noise: Two residents in Casula complained that they could hear loud metallic bangs at night. The project team acknowledged the residents' concerns and advised that the "banging" noises were determined to be caused by tipper trucks' tailgates delivering crushed sandstone to the site during extended hours. The team reiterated to drivers that they should take care to ensure their tailgates closed as quietly as possible after they deposited their load on-site. In addition, the project team relocated the out-of-hours work to a section of the site further away from homes in Casula and introduced additional noise monitoring. Feedback from the community indicated that this eliminated the noise issues they had been experiencing.	Closed
09/10/2020	Community member	Noise: A resident in Wattle Grove complained that he could hear hydraulic excavator or similar making loud noises at night. The project team investigated the complaint and informed the resident that there had not been any night-time activity on the site other than out-of-hours deliveries of crushed sandstone to Moorebank Precinct.	Closed
24/09/2020	Neighbour	Traffic lights: A representative of the Department of Defence complained about the traffic light timing at the intersection of Moorebank Ave and Frank Partridge Drive. Roads and Maritime Services advised that the signals operate on an auto-sensor system.	Closed

		Complainant was provided RMS details to advise of traffic delays that may require adjustment to the signaling.	
24/09/2020	Community member	Noise: A resident in Casula complained about the noise generated by nightworks. The project team investigated and informed the resident that the noise was caused by trucks delivering crushed sandstone to the site during extended hours. The project team apologised for the inconvenience caused and reminded the contractor of the importance of minimising the noise created by this work.	Closed
21/09/2020	CCC member	Noise: A CCC member complained about noisy night work, including jackhammering. The project team investigated and confirmed that no work of high-impact nature caused the excessive noise claimed. The only work which used plant machinery and a bulldozer was the ongoing importation of materials to site.	Closed
15/09/2020	Community member via DPIE	Dust: A community member complained via DPIE about rubbish and sand on Moorebank Avenue. The project team organised additional street sweeping and dust suppression.	Closed
02/09/2020	Community member	Noise: A resident in Casula complained that he could hear loud metallic bangs at night. The project team investigated the complaint and informed the resident that the noise was likely caused by a truck's tailgate closing after it delivered crushed sandstone to the site during extended hours. The project team apologised for the inconvenience caused and reminded the contractor of the importance of minimising the noise created by this work.	Closed
02/09/2020	Community member	Vehicle Damage: A motorist reported that a pothole on Moorebank Avenue caused damaged to her car. The project team investigated the complaint and discovered that the pothole was within the section of the road owned and managed by the Department of Defence. The complainant was directed to DoD to discuss further.	Closed
26/08/2020	CCC member	Noise: A CCC member complained about loud metallic bangs from trucks' tailgate while unloading crushed sandstone to site. The project team investigated the complaint and believed that the noise might have been caused by a truck's tailgate closing after it had tipped its load. The project team reminded the contractor of the importance of this work being carried out more quietly in future and has also been carrying out noise monitoring of this work.	Closed
25/08/2020	Community member	Environmental impacts: A resident in Casula complained about the height of the proposed Woolworths warehousing on MPW affecting the view from his backyard. The project team advised the resident the proposal was open for public consultation and directed him to the online information link to provide a submission detailing his concerns.	Closed
24/08/2020	Community	Condition of road:	Closed

	member	A member of the community complained about her vehicle being damaged by the pothole in Moorebank Avenue south of the East Hills rail line. The project team investigated the complaint and discovered that the pothole is in the area owned and managed by Department of Defence and advised her to raise her concerns with DoD.	
18/08/2020	CCC member via DPIE	Environmental impacts: CCC member complained via DPIE that the colour scheme of the IMEX crane located on the Moorebank Precinct East site is considered visually intrusive. The project team confirmed to the complainant that this is the final colour scheme of the equipment.	Closed
17/08/2020	Community member	Condition of road: A community member complained about a pothole in Moorebank Avenue. The project team investigated the location of the pothole and found that it is in the area owned and managed by Department of Defence and advised the resident to contact the DoD.	Closed
27/05/2020	CCC member	Noise: CCC member noted that noise was audible until 8.30 pm on 26/5 as trucks delivered materials to the worksite. Project team confirmed that this is permitted by project approvals.	Closed
20/04/2020	CCC member	Lighting: CCC member asked that on-site lighting be trimmed down as one unit is directing light towards his home. Project team adjusted the relevant lighting, including light shields and further engaged with complainant to ensure temporary lighting units were not placed in locations that directed light towards his home.	Closed
13/03/2020	Community member via DPIE	Vegetation: Resident claimed that Aboriginal Scar trees were being removed from site. Project team confirmed and provided evidence that this had not occurred.	Closed
10/03/2020	Community member via Liverpool City Council	Condition of road: Local resident observed potholes on Moorebank Ave near Anzac Avenue and wanted the potholes repaired. Project team worked with LCC to identify and repair potholes.	Closed
24/02/2020	Community member	Environmental impacts: Request that traffic controllers stop feeding bread to the cockatoos. Personnel ceased doing so immediately.	Closed
18/02/2020	Local business	General construction: Noting runoff of water from site detention basins following 450mm rainfall storm event. Project team confirmed that this is in line with project approvals.	Closed
22/01/2020	Community member	General construction: Stacked containers wall fell during supercell storm. Project team reduced height of stack and altered stacking method to further reinforce the noise wall.	Closed
22/01/2020	Community member	General construction: Stacked containers wall fell during supercell storm. Project team reduced height of stack and altered stacking method	Closed

		to further reinforce the noise wall.	
2019 Complaints			
Date received	Complainant	Nature of complaint	Status
27/11/2019	RAID via DPIE	Dust: RAID member claimed dust that had settled on outdoor furniture was produced by project construction. No further evidence was able to be supplied.	Closed
25/11/2019	Local business	Condition of road: Roadside bollards damaged by turning truck. Project team repaired bollards.	Closed
25/10/2019	Community member via DPIE	Dust: Resident noted dust issues affecting his home and pool, as well as Moorebank Avenue. Project team noted dust mitigation and management protocols that are in place.	Closed
11/10/2019	Road user	Condition of road: Three pot holes on the road approaching the bridge on Cambridge Ave, Moorebank. Project team reported potholes to road owner.	Closed
7/09/2019	Road user	Vehicle damage: Road user reported that her vehicle was damaged by site fencing during heavy wind. Investigation by relevant insurance agency determined that the damage had been existing on the vehicle.	Closed
2/09/2019	Community member	Dust: Resident noted dust issues affecting his home. Project team noted dust mitigation and management protocols that are in place.	Closed
21/08/2019	Community member	Noise: Complainant reported excessive night-time noise over three nights, which they believed to have been caused by project construction. Project team confirmed that construction took place on only two of the three dates, and that the activities reported as occurring around 2am had concluded by midnight. Project team was able to ascertain that MS Motorway roadworks were also carried out on the dates in question.	Closed
21/08/2019	Community member	Noise: Complainant reported excessive night-time noise, which they believed to have been caused by project construction. Project team confirmed that construction took place on the reported date, with MS Motorway roadworks also carried out on the date in question.	Closed
20/08/2019	Community member	Noise: Complainant reported excessive night-time noise, which they believed to have been caused by project construction. Project team confirmed that construction took place on the reported date, with MS Motorway roadworks also carried out on the date in question.	Closed
17/08/2019	Community member	Noise: Complainant reported excessive night-time noise, which they believed to have been caused by project construction. Project team confirmed that construction took place on the reported date, with MS Motorway roadworks also carried out on the date in question.	Closed
16/08/2019	Community member	Noise: Complainant reported excessive night-time noise, which they	Closed

		believed to have been caused by project construction. Project team confirmed that construction took place on the reported date, with MS Motorway roadworks also carried out on the date in question.	
18/07/2019	Community member	Water use: Repeat of 9/7/19 complaint, project team reiterated that water use was legal, approved, paid for and only took place when captured rainwater was unavailable.	Closed
16/07/2019	Community member	Truck movements: Resident noted heavy vehicle use of Anzac Road in exceedance of weight limit. Was unable to provide any registration number or other identifying features of the vehicles he witnessed.	Closed
9/07/2019	Community member	Water use: Complainant witnessed project water suppression tankers filling up from Sydney Water pumping station and alleged water was being stolen. Project team confirmed that this was approved under licence by Sydney Water, that the water was paid for and that mains refilling only took place when project water basins were empty.	Closed
2/07/2019	Local business	Condition of road: Complainant noted dirt "tracking" from worksite onto Bapaume Road and dirt in drains from site runoff. Project team cleaned Bapaume Road with street sweeper, improved site features to reduce tracking, cleaned gutters and pumped out roadside drains.	Closed
28/06/2019	Community member	Water use: Complainant witnessed project water suppression tankers filling up from Sydney Water pumping station. Project team confirmed that this was approved under licence by Sydney Water and that mains refilling only took place when project water basins were empty.	Closed
20/05/2019	Community member via DPIE	Noise: Complainant reported hearing an 'evacuation warning siren'. Project team was unable to identify a source of the noise within the worksite.	Closed
9/04/2019	Road user via Transport for NSW	Condition of road: Road user reported a "lip" in the road surface above the new rail underpass. Project team confirmed this was not the final road surface and that a weekend road closure to apply the final surface was upcoming.	Closed
3/04/2019	RAID via Liverpool City Council	Condition of road: Complainant reported localised flooding on the road along Moorebank Ave and its effect on road users. Project team worked with Liverpool City Council to clear drains, and confirmed that a new drainage system delivered with the Moorebank Ave upgrade would resolve this issue.	Closed
15/03/2019	Community member	Consultation: Complaint about lack of notification for upcoming helicopter movements. Project team confirmed that a letterbox notification was delivered across an area twice the size of that required by approval condition and the complainant resided outside that area. Also advised that all project notifications are made available on the	Closed

		project website.	
15/02/2019	Community member	Noise: Complainant reported noise being produced on-site before 7am start of works. Project team reminded contractors about noise requirements and ensuring staff arrival noise was minimised.	Closed
2018 Complaints			
Date received	Complainant	Nature of complaint	Status
23/11/2018	Road user	Condition of road: Road user reported a near-miss on Moorebank Avenue attributed to vehicle swerving to avoid a pothole. Project team arranged repair of pothole.	Closed
6/11/2018	Community member	Worker behaviour: Complainant reported contractor parking on property. Project team reminded work crews of respectful interface with neighbours and community.	Closed
5/11/2018	Community member	Truck movements: Resident noted heavy vehicle use of Anzac Road in exceedance of weight limit. Provided vehicle details and sub- contractor was reminded of approved truck travel routes.	Closed
25/10/2018	Road user	Vehicle damage and condition of road: Road user reported that two tyres on his vehicle were burst by Moorebank Ave pothole. Project team arranged reimbursement of the cost of two new tyres.	Closed
22/10/2018	Road user via Liverpool City Council	Vehicle damage: Liverpool City Council received advice of damage to two vehicles caused by Moorebank Ave road surface. Project team referred complainants to relevant insurance agency.	Closed
19/10/2018	Community member via Sydney Trains	Truck movements: Trucks producing dust and blocking entry to Sydney Trains maintenance facility. Project team met with Sydney Trains, erected signage advising trucks not to stop in designated areas and increased dust suppression on entry road.	Closed
3/10/2018	Road user	Condition of road: Cyclist advised of dissatisfaction with arrangements for cyclists on Moorebank Avenue during construction and identified safety hazard of damaged signposts. Project team confirmed that footpath that had closed was not a cycle path and use by cyclists was not legally permitted. Project team advised of the approved method for cyclists to navigate during construction, including using road traffic lanes as permitted by the road rules, and ensured dangerous signposts were removed.	Closed
21/9/2018	Local business	Condition of road: Roadside bollards damaged by turning truck. Project team repaired bollards.	Closed
10/9/2018	Community member	General project: Complainant expressing disgust in the SIMTA project and asking to see proof of approvals from the Land and Environment Court. Project team provided relevant approvals.	Closed
27/8/2018	Community member	Dust: Reiteration of earlier complaint.	Closed

24/8/2018	Community member via DPIE	Environmental impacts: Resident raised concerns about vegetation clearing beside Moorebank Avenue and asked whether approval had been sought. Project team confirmed this work had been approved and provided relevant approval documents.	Closed
23/8/2018	Road user	Condition of road: Complaint about dust and debris on Moorebank Ave. Project team advised of systems in place to manage dust/dirt and regular sweeping of the road surface. Project team reviewed dust suppression measures as a result of this and two other complaints and introduced an additional mitigation measure - spraying a polymer binder to seal dirt that would remain exposed long-term.	Closed
23/8/2018	Community member	Condition of road: Complaint about dust and debris on Moorebank Ave. Project team advised of systems to manage dust/dirt and regular sweeping. Project team reviewed suppression measures as a result of this and two other complaints and introduced an additional mitigation measure - spraying a polymer binder to seal dirt that would remain exposed long-term.	Closed
21/8/2018	Community member	Dust: Complainant reported his house and car were being regularly made dirty by dust caused by construction and sought compensation for cleaning that he had been carrying out. Project team reviewed dust suppression measures as a result of this and two other complaints and introduced an additional mitigation measure - spraying a polymer binder to seal dirt that would remain exposed long-term.	Closed
8/8/2018	Road user	Traffic: Complainant reporting delays on Moorebank Ave caused by the management of project's traffic control. Traffic controllers were advised to ensure priority was given to vehicles travelling on Moorebank Ave during peak periods.	Closed
6/8/2018	Community member	Damage to property: Concrete slurry was left. Construction team cleaned this.	Closed
12/7/2018	Community member	Noise: Casula resident complaint about beeping noises before 7am. Project team confirmed no site vehicles have reversing "beepers" fitted, and reminded crews to arrive quietly.	Closed
2/7/2018	Community member	Condition of road: Resident advised on Moorebank Ave potholes. Project team organised for road to be repaired.	Closed
26/6/2018	Community member via Liverpool City Council	General construction: Temporary reinstatement of footpath with asphalt viewed by pedestrian as insufficient. Requested better permanent surface. This was provided after construction was completed in the area.	Closed
17/6/2018	Community member	Truck movements: Resident had observed trucks parking alongside Anzac Road so drivers could frequent take-away food store. Also noted exceedance of Anzac Rd weight limit and claimed vehicles were parking in a No Stopping zone. Project team investigated and confirmed that roadside parking in the relevant section of Anzac Rd was legal, but ensured truck drivers were reminded not to block footpath when parking and	Closed

		that Anzac Rd past fire station carried a weight limit.	
28/5/2018	Community member	General project: General Concerns around the amount of trucks that will be on local roads in the coming years. Complainant commented that the trucks are too noisy, and she believes they are speeding, especially on her street. Project team advised of project benefits around reduction of heavy vehicle movements and investigated claim re truck speeding on complainant's street. Complainant lives on the northern side of Moorebank in an area not used by project vehicles.	Closed
28/5/2018	Community member	General project: Caller advised that she received a letter re Moorebank Intermodal Terminal Facility and she would like more information. Resident lives on Junction Rd, Moorebank, and has many concerns around traffic and project works impacting on Junction Rd. Project team provided additional information on project.	Closed
24/5/2018	Local business	Truck movements: Complaint about trucks parking on nature strip outside business's premises. Nature strip was fenced off to ensure trucks were unable to park at that location.	Closed
16/5/2018	Road user	Vehicle damage: Complainant's vehicle was sprayed with a substance from a project vehicle. Project team arranged repair of the vehicle.	Closed
4/4/2018	Community member	General project: Complainant generally opposes the project. Project team noted the complaint.	Closed
2/3/2018	Community member	Dust: Caller advised of large plume of dust going high into the air, viewed from Casula. Project team spoke with demolition crews and was unable to identify cause or confirm this was related to the project.	Closed
1/3/2018	Community member	Environmental impacts: A resident advised they had provided EPA with photos of what they say is a sediment control incident. Project team liaised with EPA to resolve matter.	Closed
21/2/2018	Community member	Lighting: Report that temporary traffic lights are left on all night. Project team resolved.	Closed
16/2/2018	Community member via OPIE	Noise: Resident alleged that loud banging noise was audible at Sam. Project team confirmed no work was underway on site at that time.	Closed
8/2/2018	Community member	General project: Complaint made about ignoring community feedback. Project team noted this complaint.	Closed
5/2/2018	Community member	Traffic: Complainant reporting delays on Moorebank Ave caused by the management of project's traffic control. Traffic controllers were advised to ensure priority was given to vehicles travelling on Moorebank Ave during peak periods.	Closed
19/1/2018	Community	Noise:	Closed

	member via OPIE	Resident alleged that loud banging noise was audible at 4.25am. Project team confirmed no work was underway on site at that time.	
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APPENDIX H – BIODIVERSITY (FLORA AND FAUNA MONITORING REPORTS)

Ongoing internal reporting. No submission required under SSD 7709

APPENDIX I - BTODR REPORTING

No attachments. To be submitted separately

APPENDIX J - MPE OPERATIONS INCIDENT REGISTER

No incidents registered in this period.

APPENDIX K - 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	Monday, 30 December 2024

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.

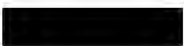
Notes:

- 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

APPENDIX K - COMPLIANCE REPORT DECLARATION

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	
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