

# MOOREBANK LOGISTICS PARK

## Moorebank Precinct East: Six-Monthly Operations Compliance Report

Report: #4

Period: November 2021 – May 2022

01 JUNE 2022

# SYDNEY INTERMODAL TERMINAL ALLIANCE

November 2021 – May 2022

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## REVISIONS

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## KEY TERMS AND ACRONYMS

Acronym/Term	Meaning
CNBMP	Container Noise Barrier Management Plan
CoC	Conditions of Consent
DPIE	Department of Planning, Industry and Environment (previously Department of Planning and Environment)
DPI&E	Department of Planning, Industry and Environment
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
MLP	Moorebank Logistics Park
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 6766	Stage 1 of the MPE Concept Approval (MP 10_0193) as approved under SSD 6766. It involves the construction and operation of an IMEX terminal and associated Rail Link.
SSD 7628	Stage 2 of the MPE Concept Approval (MP 10_0193) as approved under SSD 7628. It involves the construction and operation of warehousing and distribution facilities on the MPE site and upgrades to approximately 1.5 kilometres of Moorebank Avenue from approximately 35 metres south of the northern boundary of the MPE site to approximately 185 metres south of the southern MPE site boundary.

## TABLE OF CONTENTS

<b>REVISIONS .....</b>	<b>ii</b>
<b>KEY TERMS AND ACRONYMS .....</b>	<b>iii</b>
<b>LIST OF TABLES.....</b>	<b>v</b>
<b>1 EXECUTIVE SUMMARY.....</b>	<b>6</b>
<b>1 INTRODUCTION .....</b>	<b>7</b>
1.1 Project Overview.....	7
1.2 Project Approvals.....	7
1.3 Scope and Purpose .....	7
<b>2 PROJECT DESCRIPTION .....</b>	<b>8</b>
2.1 Site Location .....	8
2.2 Scope of Works .....	9
2.3 Operational activities undertaken .....	9
2.4 Environmental Monitoring.....	10
2.4.1 Air Quality Monitoring .....	10
2.4.2 Noise Monitoring.....	11
<b>2.4.3 Storm Water Infrastructure and Water Quality Monitoring .....</b>	<b>12</b>
<b>2.4.4 Biodiversity Monitoring .....</b>	<b>12</b>
2.4.5 Biannual Trip and Origin Destination Report.....	13
2.5 Previous Report Actions .....	14
2.6 Incidents .....	14
2.7 Complaints Management.....	14
<b>APPENDIX A - SSD 6766 CONDITIONS OF CONSENT.....</b>	<b>15</b>
<b>APPENDIX B - SSD 7628 CONDITIONS OF CONSENT.....</b>	<b>16</b>
<b>APPENDIX C –AIR QUALITY MONITORING COMPLIANCE REPORT.....</b>	<b>17</b>
<b>APPENDIX D – NOISE MONITORING REPORTS .....</b>	<b>18</b>
<b>APPENDIX E - B106/B43 REPORT .....</b>	<b>19</b>
<b>APPENDIX F – MPE OPERATIONS INCIDENT REGISTER.....</b>	<b>20</b>
<b>APPENDIX G - COMPLIANCE REPORT DECLARATION FORM .....</b>	<b>21</b>



## LIST OF FIGURES

Figure 1 MLP East Precinct Layout – sourced SIMTA MPE OEMP Rev 15 .....	8
Figure 2 - Air quality monitoring locations.....	11

## LIST OF TABLES

Table 1 - MLP East Precinct Biodiversity Recommended actions.....	12
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## 1 EXECUTIVE SUMMARY

In accordance with SSD 7628 Condition of Consent (CoC) C21(c)(iii), a Six-monthly operational compliance report (OCR) must be prepared.

The Department approved the Program for Operational Phase Delivery (POPD) on 21 May 2019 which outlined the staged submission of operational documents under condition A14 of SSD 7628. The Department also considered the combining of strategies, plans or programs to be acceptable, provided that all relevant conditions across both SSD 6766, and SSD 7628 are met.

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 from November 2021 – May 2022.

# 1 INTRODUCTION

## 1.1 Project Overview

Application Number	
<b>Project name:</b>	Moorebank Logistics Park – Operational Area 1 and 2
<b>Proponent</b>	Sydney Intermodal Terminal Alliance (SIMTA) as Logos Property
<b>Site Address</b>	MLP East Precinct site, Moorebank Avenue, Moorebank
<b>Project Phase</b>	Six Monthly Operation Compliance Report (OCR)
<b>Project Activity</b>	Operation of an import-export terminal, rail link and warehouse and distribution facilities and associated infrastructure.
<b>Report date</b>	Thursday, 28 July 2022

## 1.2 Project Approvals

Approval for the construction and operation of the MLP East Precinct was obtained progressively as follows:

- SIMTA Moorebank Intermodal Terminal Facility dated 6 March 2014 (EPBC 2011/6229)
- Moorebank Precinct East (MPE) Concept Approval – 10\_0193
- MPE Stage 1 – SSD 6766
- MPE Stage 2 – SSD 7628
- MPE Stage 2 – SSD 7628 – Subdivision partial development consent
- MPE Stage 2 – SSD 7628\_MOD 1 – Modification 1
- MPE Stage 2 – SSD 7628\_MOD 2 – Modification 2 boundary adjustment and basin 9 design adjustment
- MPE Stage 2 – SSD 7628\_MOD 3 – Modification 3
- MPE Stage 2 – SSD 7628\_MOD 3 – Modification 4

## 1.3 Scope and Purpose

In accordance with SSD 7628 Condition C21 (c) (iii), a Six-Monthly Operation Compliance Report (OCR) is required to outline progress of compliance for all operation requirements against the MPE Stage 1 and Stage 2 approval.

There is no specific requirement under SSD 6676 for the submission of an OCR, however this report has been prepared to address the operational requirements for both SSD 6766 and SSD 7628 and has been prepared in accordance with the requirements of the *Compliance Reporting Post Approval Requirements* (NSW DP&E, June 2018).

## 2 PROJECT DESCRIPTION

### 2.1 Site Location

The Moorebank Logistic Park (MLP) is an integral component of the Freight, Ports and Transport strategies of both the NSW and Commonwealth governments to help manage the challenges of an expected tripling of freight volumes at Port Botany by 2031.

The MLP 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 MLP is divided into an East Precinct and a West Precinct, located east and west of Moorebank Avenue, respectively.

The MLP East Precinct commenced operations in May 2020 and is the subject of this Operation Compliance Report (OCR), while the MLP West Precinct is still currently under construction.



Figure 1 MLP East Precinct Layout – sourced SIMTA MPE OEMP Rev 1



## 2.2 Scope of Works

The main features of the MLP East Precinct include:

- The Import Export (IMEX) Terminal. The IMEX Terminal comprises:
  - Truck processing, holding, and loading areas with an entrance and exit from Moorebank Avenue.
  - Rail loading and container storage areas serviced by container handling equipment
  - An Administration facility and associated car parking with light vehicle access from Moorebank Avenue.
- A Rail Link connecting the IMEX terminal and the Southern Sydney Freight Line (SSFL) traversing Moorebank Avenue, Anzac Creek and Georges River.
- Associated ancillary infrastructure including signage, lighting, landscaping, water management.
- Warehouse and distribution facilities including warehousing up to 21 m in height, typically ranging in size from 20,000 m<sup>2</sup> to 62,000 m<sup>2</sup>. Individual warehouses typically comprise the following:
  - Office and administration facilities
  - Amenities
  - Car parking
  - Truck loading/unloading docks
  - Internal parking for pick-up and delivery vehicles (PUD)
  - Specialised sortation and conveyor equipment
  - Hardstand areas that provide trailer parking spaces, external PUD parking spaces, vehicle manoeuvring areas and access to the main internal site road
  - Signage for business identification purposes, including backlit illuminated signage on each warehouse
  - Internal fit out, comprising racking and storage.
- A freight village including a mix of retail, commercial and light industrial spaces typically up to 15 m in height and varying in size and design.
- An internal road network to enable efficient movement of vehicles, dispatch of freight from the warehouses and transport of containers between the IMEX Terminal and warehouse and distribution facilities.
- Security and Administration offices and demountable.

## 2.3 Operational activities undertaken

Documents can be submitted in stages as permitted by CoC A14 and CoC A15. The application of the operational documents will be staged to take progressive affect across the MLP East Precinct site as construction is completed and operations commences was detailed in the POPD approved by the DPIE on 21 May 2019.

This OCR has been prepared in accordance with the requirements of the Compliance Tracking Program (CTP) to outline progress of compliance for all operation requirements against both SSD 6766 and SSD 7628. This OCR covers the period from November 2022 to May 2022.

The following works have been undertaken:

- Movement and storage of containers in and out of the terminal via rail
- Truck processing, holding, and loading areas.
- Primary and secondary container loading/ unloading areas.
- Transfer of containers between terminal and warehouses vis internal transfer vehicles
- Pickup and delivery of goods to warehouses via truck movements
- Warehouses 1, 3a, 3b, 4a, 4b and 5 are occupied and operational.

- Warehousing and Administrative Activities
- Security, maintenance and monitoring of all infrastructure and equipment related to the above activities.

### Project Compliance Summary

This OCR outlines the progress of compliance for all operational requirements against Project Approvals. Compliance against the project CoC and the Final Compilation of Mitigation Measures (FCMM) are outlined in SSD 6766 Conditions of Consent and SSD 7628 Conditions of Consent, Appendix A and B respectively.

A declaration of compliance is available in **Appendix G**.

## 2.4 Environmental Monitoring

In accordance with the CoC and OEMP, environmental monitoring activities are required to be undertaken for the operation phase of the MPE Stage 1 and 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.

### 2.4.1 Air Quality Monitoring

Results during this reporting period are as follows:

The following summarises the monitoring results for this reporting period:

- No exceedances of the annual average criteria occurred for PM2.5 or PM10.
- There were two exceedances (out of 181 days) of the PM10 24-hour average criteria during the reporting period (about 1%).
  - One exceedance occurred on 11 November 2021 and the other on 6 January 2022.
  - No exceedances corresponded to times when trains were entering/exiting MLP Precinct East.
  - The exceedances coincided with higher readings overnight and during the early morning periods.
  - Investigations at MLP Precinct East upon receipt of the exceedances has not identified significant dust or emissions issues from MLP Precinct East.
  - Both exceedances were recorded at AQM03 which is the monitor located on the western boundary of the site. Causes of the recorded exceedances may be attributed to construction activities relating to MLP Precinct West.
  - No out of hours deliveries for MPW Stage 2 occurred on the observed exceedance days.
- The annual average criteria for NO<sub>2</sub> (0.03 ppm) was consistently exceeded from June 2021 to November 2021 (inclusive) at AQM03 and as of 30 April 2022 the rolling 12-month annual average for this monitor is 0.13 ppm. As discussed in Section 2.4, this monitor has had a low availability throughout this reporting period. The NO<sub>2</sub> data in November 2021 and also during the previous five months has also been significantly higher than in previous reporting period. This has resulted in a rolling NO<sub>2</sub> annual average of 0.037 ppm for all stations, which marginally exceeds the annual criteria of 0.03 ppm. The monitor was taken off site for maintenance and recalibration in November 2021 and when returned in December 2021, after which the recordings appeared to be more normal.
- There were exceedances of the 1-hour average criteria for NO<sub>2</sub> (0.12 ppm) every day between 1 November 2021 and 12 November 2021 for monitor AQM03.
- No exceedance of the dust deposition (insoluble solids) 2 g/m<sup>2</sup>/month (incremental) or 4 g/m<sup>2</sup>/month (cumulative) criteria was observed during the reporting period.
- There were no exceedances of the CO criteria (9.0 ppm) at AQM02 and AQM04

The Six-Monthly Compliance Operational Air Quality reports completed during this period are available in **Appendix C** of this report. Actioning requirements and recommendations raised from the report are consistently being addressed as a part of daily operations.

## 2.4.2 Noise Monitoring

Noise monitoring measurements have been performed, consistent with the requirements of SSD 6766 and SSD 7628 and the Operational Noise and Vibration Management Plan. During this reporting period the following noise measurements were undertaken:

- Continuous Noise Monitoring
- Angle of Attack Rail Noise Report
- Warehouse 1 Noise Mechanical Plant for new tenant

No exceedances of the planning approval noise limits were measured during Year 2 operations. No complaints were received in relation to operational noise levels.

### Results during this reporting period:

In all cases, the measured noise levels were dominated by extraneous noise sources apart from the MLP operations. Noise sources from MLP operations were not audible during any of the measurement periods at all four representative measurement locations. Since MLP noise emissions were not audible, it was not possible to estimate the industrial noise contribution from the MLP facility.

Noise monitoring reports completed during this period are available in **Appendix D** of this report. Actioning requirements and recommendations raised from the report are consistently being addressed as a part of daily operations.

### 2.4.3 Storm Water Infrastructure and Water Quality Monitoring

The baseline monitoring forms the basis for the ongoing Biodiversity Monitoring Strategy (BMS) to assess stream health in accordance with 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 CoC B43 and B44.

Examination of the results from the spring 2021 monitoring event found no evidence of changes in the indicator variables (bed and bank stability, water quality, assemblages of aquatic macroinvertebrates and fish) that could be attributed to the Project works. Thus, in accordance with the Biodiversity Monitoring Strategy, no adaptive management contingency measure was triggered.

Water quality monitoring report and infrastructure inspection reports are available in **Appendix E** of this report. Actioning requirements and recommendations raised from the report are consistently being addressed as a part of daily operations.

The annual independent audit was undertaken in July 2022 by a suitably qualified WSUD professional. The audit verified that the condition of the treatment system(s) was compliant and working as intended, verified that the system(s) has been cleaned adequately, verified there was no excessive build-up of material in the system(s) and identified any issues with the treatment system(s) which require rectification for the system(s) to adequately perform its intended function.

### 2.4.4 Biodiversity Monitoring

The following Biodiversity Monitoring are required to be undertaken in Spring 2021.

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

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

#### Results during this reporting period:

##### **Lands adjoining the Rail Link (BA341 lands)**

- Native vegetation adjoining the Rail Link is in good condition and has a similar condition to what was recorded in last year monitoring event. There has been a minor increase in weeds, however this has been restricted to disturbed areas immediately adjacent to the Rail Link. Weeds are mostly present in areas which were disturbed during construction of the rail link rather than in areas of intact native vegetation that did not experience disturbance. From observations, it is evident that most exotic species within the Rail Link are not able to readily colonise adjacent areas of bushland. This may be due to the low fertility of the naturally occurring sandy soils which are not suitable to exotic species, and high competition from regenerating native species. The weed species *Senecio madagascariensis* (Fireweed) and *Eragrostis curvula* (African Lovegrass) were recorded on the edges of native vegetation, which have potential to infiltrate natural areas. However, neither of these weed species were observed to be degrading the condition of native vegetation during monitoring.
- The number of individuals of the threatened plant species *Grevillea parviflora* subsp. *parviflora* (Small-flower Grevillea) and *Hibbertia puberula* subsp. *puberula* has increased since last year's monitoring event. Individuals of these species appeared to be in a healthy condition with some bearing flowers and seed. The number of *Acacia bynoeana* (Bynoe's Wattle) within the monitored area has experienced a decline with half the number of individuals re-found (3 individuals) during the monitoring event. The individuals re-found did not appear to be in a healthy condition. It is unknown why this species has experienced decline over the past year. There are no signs to suggest current management practices within the Rail Link (or lack) of has negatively impacted on

this species.

#### **Riparian vegetation management (RVMP reporting)**

- Anzac Creek management site was not monitored as no bush regeneration works have occurred in this location to date.
- Georges River management site was monitored.
- Revegetated areas continue to grow and colonise bare areas, specifically on the floodplain and lower batters. The high cover of native species in these areas has suppressed the growth of weeds, however some aggressive weed species were observed and present a risk to the future condition of the area. Some aggressive weed species observed which will require control include *Cardiospermum grandiflorum* (Balloon Vine), *Arundo donax* (Giant Reed) and *Ligustrum sinense* (Small-leaved Privet).
- Areas further from the Georges River which had remnant vegetation and were improved through bush regeneration works including weed control are in a moderate condition. A suite of native species area present which contribute to a moderate to high vegetative cover. Weeds are present in these areas however do not comprise infestations.

#### **Koala management & fencing**

- The condition of perimeter fencing, separating the Wattle Grove offset area from the MPE operation facility, is similar to what was observed during the previous years monitoring event. Over the 2021/2022 monitoring year a number of sections along the perimeter fence and at access gates, which were identified to have holes or facilitate Koala access to the MPE operational facility, were reinforced with additional lengths of Cyclone fencing. Cyclone fencing was approved by Dr. Phillips for being suitable Koala exclusion fencing at the MLP site (Cumberland Ecology 2020).
- No Koala structures (bridges, culverts, refuge posts) have been installed to prevent the movement of Koalas into the MPE operational facility or facilitate the movement of Koala from the Wattle Grove offset area to adjoining areas of suitable habitat in the Holsworthy defence areas.

#### **Feral animals and weeds**

- Four species of feral animal were recorded in Wattle Grove offset area, immediately adjacent to the MPE operational facility including *Lepus europaeus* (Brown Hare), *Felis catus* (Domestic Cat), *Vulpes vulpes* (Red Fox) and *Rattus rattus* (Black Rat). It is expected that these feral animals are using the MPE operational facility when moving around the local landscape.
- *Felis catus* (Domestic Cat) and *Vulpes vulpes* (Red Fox) were captured on camera with prey species (i.e native wildlife). These feral animals are having a direct impact on native wildlife within adjacent bushland areas.

#### **Fauna connectivity**

- Native and feral animals were recorded using the Anzac Creek culvert and moving across the ballast beneath the Rail Link bridge. The fauna furniture at Anzac Creek culverts remains functional.
- The Cyclone mesh fencing beneath the Rail Link bridge is preventing the movement of macropods species and potentially Koala between the Moorebank offset area and riparian vegetation to the south.

#### **Weeds**

- Weed cover across the MPE operation facility is generally low and has been effectively managed across the 2021/2022 monitoring year.
- Works are ongoing within the Rail Link to suppress weeds and promote the germination and establishment of native species following a rehabilitation project undertaken by CPB contractors

## **2.4.5 Biannual Trip and Origin Destination Report**

The BTODR addresses the relevant requirements of the Project Approvals and other guidelines and standards applicable during operations of MPE. 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 BTODR Framework report and enables a comparative assessment of traffic accessing the Site and future growth in operational activities.

All data is a fair and accurate representation of the operational traffic for MPE and its surrounding road network. This data has been collected for the reporting period between November 2021 to May 2022.

The Biannual trip and origin destination report is being completed for this period and will be provided to Secretary for information in accordance with B28.

## 2.5 Previous Report Actions

The previous Six-Monthly Operational Compliance Report had no actions identified. Ongoing actions being tracked will be reported in the next Six-Monthly Operational Compliance Report.

## 2.6 Incidents

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

## 2.7 Complaints Management

No complaints were received relating to MPE operations in this period.

# APPENDIX A - SSD 6766 CONDITIONS OF CONSENT

COMPLIANCE REQUIREMENT	UNIQUE (ID)	COMPLIANCE REQUIREMENT	DEVELOPMENT PHASE	COMPLIANCE STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
SSD 6766	A1	The Applicant shall carry out the development generally in accordance with the: a. State Significant Development Application SSD 6766; b. SIMTA Intermodal Terminal Facility – Stage 1 – Environmental Impact Statement (Hyder Consulting Pty Ltd, May 2014); c. SIMTA Intermodal Terminal Facility – Stage 1 – Response to Submissions (Hyder Consulting Pty Ltd, September 2015); and d. The conditions of this consent.	All	Ongoing	Compliance Monitoring	To the extent it relates to MPE Stage 1.  All sources referred to are included in the project obligations register and OEMP.
SSD 6766	A2	In the event of an inconsistency between: a. the conditions of this approval and any document listed from condition A1(a) to A1(c) inclusive, the conditions of this approval shall prevail to the extent of the inconsistency; and b. any document listed from condition A1(a) to A1(c) inclusive, and any other document listed from condition A1(a) to A1(c) inclusive, the most recent document shall prevail to the extent of the inconsistency.	All	Ongoing	Monitoring Documentation	
SSD 6766	A3	The Applicant shall comply with any reasonable requirement(s) of the Secretary arising from the Department's assessment of: a. any reports, plans or correspondence that are submitted in accordance with this consent; and b. the implementation of any actions or measures contained within these documents.	All	Ongoing	Compliance Monitoring	
SSD 6766	A4	This approval will lapse ten years from the date of this approval unless works the subject of this approval are physically commenced, on or before that lapse date.	All	Compliant	Compliance Monitoring	
SSD 6766	A5	In the event of a dispute between the Applicant and a public authority, in relation to this approval, either party may refer the matter to the Secretary for resolution. The Secretary's resolution of the matter shall be binding on the parties.	All	N/A	CEMP	There have been no disputes within this reporting period.
SSD 6766	A6	Any advice or notice to the consent authority shall be served on the Secretary	All	N/A	CEMP	There have been no notices or advice within this reporting period.
SSD 6766	A7	The applicant shall ensure that all licences, permits, consents and approvals are obtained and maintained as required throughout the life of the development. No condition of this consent removes the obligation of the Applicant to obtain, renew or comply with such licences, permits or approvals. The Applicant shall ensure that a copy of this consent and all relevant environmental licences, permits, consents and approvals are available on the site at all times during the development and made available on the Project Website.	All	Ongoing	CEMP	Required licences, permits, consents and approvals required prior to construction are being progressively obtained. E25 Report to be uploaded to Website once complete MP EPL to be uploaded to Website



SSD 6766	C19	The Applicant shall ensure that the construction and operation of the proposed development will not prevent the existing use of Moorebank Avenue as a public road to a standard commensurate to its current use prior to the development.  Note: temporary closures or part closures and changes to the operation of Moorebank Avenue may occur for limited periods during construction as detailed in the Construction Traffic Management Plan	All	Compliant	CTAMP	The OTAMP was approved 6/12/2019
SSD 6766	G1	Within 6 weeks of commencement of operation, unless otherwise agreed by the Secretary, the Applicant shall undertake road pavement deflection testing of the truck routes as defined by Condition E34(a). If the deflection tests show an increase in deflection as a result of the truck routes associated with construction, the Applicant shall undertake pavement rehabilitation of the affected road pavements to achieve the pavement deflection that existing prior to the commencement of works.	operation	Not Triggered	OTMP	Condition Superseded by email 22/2/2019
SSD 6766	G2	Within 3 months of commencement of operation, unless otherwise agreed by the Secretary, the Applicant shall carry out rectification work to the extent of the damage resulting from the construction works at the Applicant's expense and to the reasonable requirements of the owners.	operation	Not Triggered	OTMP	Condition Superseded by email 22/2/2019
SSD 6766	G3	Within 3 months of commencement of operation, the Applicant shall provide to the Certifying Authority evidence that all easements required by this approval, and other licences, approvals and consents, have been lodged for registration or registered at the NSW Land and Property Information.	operation	Not Triggered	OTMP	No easements exist or are required under the MPE Stg 1 footprint. Easements will be required under MPE Stg 2 footprint (separate to this approval). This will not be triggered under MPE Stg 1.
SSD 6766	G4	Signage shall be installed in accordance with Drawing A3001 Issue C (Terminal – Signage Details) dated 14/04/2015, unless otherwise agreed by the Secretary.	operation	Compliant	Road Pavement Deflection Report	Signages with the Terminal are per approved detailed design drawings
SSD 6766	G5	The quantities of Dangerous Goods present at any time on the site or transported from and to the terminal site shall be kept below the screening threshold quantities listed in the Hazardous and Offensive Development Guidelines Applying SEPP 33, (DP&E 2011). The screening threshold quantities for each Dangerous Goods shall be defined in accordance with Table 1: Screening Methods of Applying SEPP 33.	operation	Ongoing	Road Pavement Deflection Report	No Dangerous Goods have been transported during this reporting period

SSD 6766	G7	<p>The Applicant shall 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 shall capture the noise from each individual train pass by noise generation event, and include information to identify:</p> <ul style="list-style-type: none"> <li>a) Time and date of freight train passbys;</li> <li>b) Imagery or video to enable identification of the rolling stock during day and night;</li> <li>c) LAeq(15hour) and LAeq(9hour) from rail operations; and</li> <li>d) LAF(max) and SEL of individual train passbys, measured in accordance with ISO3095; or</li> <li>e) Other alternative information as agreed with the Secretary.</li> </ul> <p>The results from the noise monitoring system shall be publicly accessible from a website maintained by the Applicant. The noise results from each train shall be available on the website ideally within 24 hours of it passing the monitor. The LAeq(15hour) and LAeq(9hr) results from each day shall be available on the website within 24 hours of the period ending.</p> <p>Prior to the commencement of operation, the applicant shall submit for the approval of the Secretary, 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 rail noise monitoring system shall not operate until the Secretary has approved the proposed monitoring location.</p> <p>The Applicant shall provide an annual report to the Secretary with the results of monitoring for a period of 5 years, or as otherwise agreed with the Secretary, from the commencement of operation of the IMEX terminal. The Secretary shall consider the need for further reporting following a review of the results for year 5.</p>	operation	Compliant	N/A	<p>Covered in Annual Noise Review Report</p> <p>Required in next annual review 2023</p>
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SSD 6766	G7A	<p>The applicant shall install and maintain a wayside angle of attack monitoring system on the rail link at the commencement of operation to continuously monitor the angle of attack to the rail of rolling stock wheels. The system shall capture the angle of attack from a wheel on each axle of every train, and include information to identify:</p> <ul style="list-style-type: none"> <li>a) Time and date of each axle pass by; and</li> <li>b) The identification number of each item of rolling stock.</li> </ul> <p>The results from the angle of attack monitoring system shall be:</p> <ul style="list-style-type: none"> <li>• accessible by train operators from a website maintained by the Applicant. Angle of attack results from each train shall be available on the website within 24 hours of it passing the monitor, unless unforeseen circumstances have occurred.</li> <li>• included in a six-monthly report to the Secretary. The report should at least identify the number of wagons with wheels that exceed the ASA standard angle of attack and the action taken by operators to improve steering performance.</li> </ul> <p>Prior to the commencement of operation, the Applicant shall submit for the approval of the Secretary, justification supporting the appropriateness of the location for angle of attack monitoring, the format of the information to be accessible to operators and the format of the public report.</p> <p>The angle of attack monitoring system shall not operate until the Secretary has approved the proposed monitoring location and reporting arrangements.</p>	operation	Compliant	N/A	Covered in Annual Noise Review Report - June 2022
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SSD 6766	G7B	<p>The Applicant shall:</p> <p>(a) not less than three months and not more than twelve months from commencement of operation, engage an appropriately qualified and experienced acoustic engineer to undertake a night-time noise survey at Glenfield Farm (or an equivalent location if access is denied).</p> <p>(b) the noise survey shall be conducted in accordance with the EPA's Rail Infrastructure Noise Guideline 2013 to determine:</p> <p>(i) the contribution of any new rail traffic travelling to and from the development; and,</p> <p>(ii) the increase in the total rail traffic noise level caused by any new rail traffic to and from the development.</p> <p>(c) the noise survey shall be conducted for not less than 12 contiguous days in the winter months (July, August or September).</p> <p>(d) if as a result of the noise survey there is a sustained increase in the total rail traffic noise level due to the noise level from rail traffic travelling to and from the development of more than 2dB(A) for more than 30% of nights surveyed, the Applicant shall within twelve months, construct a noise barrier along the relevant sections of rail link in accordance with the specifications provided by an appropriately qualified and experienced acoustic engineer so as to limit the increase in the total rail traffic noise level at Glenfield Farm caused by any new rail traffic to and from the development to not exceed 2dB(A).</p> <p>(e) the report of the noise survey including the results and recommendations shall be provided to the Secretary.</p>	operation	Compliant	Best Practice Review (BPR)	<p>The Locomotive Best Practice Review was developed in consultation with EPA and TfNSW and a final document has been issued, with confirmation from both parties that consultation comments have been closed out in the final report.</p> <p>This was approved by DP&amp;E on 17/09/2017</p> <p>The Moorebank Intermodal Terminal Project Best Practice Wagon Report (Condition G6B) was published on 16 April 2019 by Renzo Tonin and is currently in consultation with TfNSW</p> <p>Report submitted in 12 May 2021</p>
SSD 6766	G8	<p>The following measures must be implemented during operation:</p> <p>a) The use of top of rail friction modifiers and automatic rail lubrication equipment in accordance with ASA Standard T HR TR 00111 ST Rail Lubrication, where required; and</p> <p>b) Measures to ensure the rail cross sectional profile is 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.</p>	operation	Ongoing	FCMM Monitoring	Use of Automatic Rail Lubrication Equipment / Maintain Rail Cross Sectional Profile
SSD 6766	G10	Containers must be transferred between the site and Port Botany predominantly by rail, unless where unforeseen circumstances have occurred (e.g. an incident, breakdown, derailment or emergency maintenance on the rail line). The Secretary may at any time request the Applicant to demonstrate that the transport of containers between the site and Port Botany container terminals is by rail. This is to be demonstrated upon request by the Secretary for the prior 12 month period.	operation	Ongoing	N/A	Containers are to be transferred by rail unless there is track maintenance or unforeseen circumstances

SSD 6766	G11	The Applicant shall prepare a six-monthly report to the Secretary with the results of container and vehicle monitoring for a period of 3 years, or as otherwise agreed with the Secretary, from the commencement of operation of the IMEX terminal. The Secretary shall consider the need for further reporting following a review of the results for year 3. The report shall include: a) The number of twenty foot equivalent units dispatched and received during the period; b) A record of heavy vehicle entry by date and approximate time; and c) The number of light vehicles turning right into the terminal site from Moorebank Avenue and turning left from the terminal site onto Moorebank Avenue for a representative day.	operation	Compliant	N/A	Part of BTODR Covered in BTODR report submission August 2022
SSD 6766	G12	All containers handling equipment, purchased after 2019 must meet US EPA Tier 4 or EU Stage IV emission standard or achieve an equivalent emission control performance to those standards listed in this condition.	operation	Ongoing	N/A	
SSD 6766	G13	The Applicant must carry out any activity, or operate any plant, in or on the premises by such practicable means as may be necessary to prevent or minimise air pollution.	operation	Ongoing	N/A	Continuous air monitoring is ongoing
SSD 6766	G14	Heavy road freight vehicles are not permitted to use Moorebank Avenue south of the East Hills Railway corridor. A main gate monitoring system (e.g. CCTV) shall be installed to identify heavy vehicles turning left from the terminal site onto Moorebank Avenue, or turning right from Moorebank Avenue to the terminal site. The Secretary may at any time request the Applicant to provide a heavy vehicle monitoring report for the prior 12 month period.	operation	Compliant	N/A	No heavy road freight vehicle from the project has been identified using the East Hills Railway Corridor

SSD 6766	G15	<p>Within 12 months of the commencement of operation of the project, or as otherwise agreed by the Secretary, the Applicant shall undertake operational noise monitoring to compare actual noise performance of the project against noise performance predicted in the review of noise mitigation measures predicted in documents specified under condition A1 of this approval, and prepare an Operational Noise Report to document this monitoring. The Report shall include, but not necessarily be limited to:</p> <ul style="list-style-type: none"> <li>a) noise monitoring to assess compliance with the operational noise levels predicted in documents specified under condition A1 of this approval;</li> <li>b) a review of the operational noise levels in terms of criteria and noise goals established in the NSW Road Noise Policy (EPA, 2011);</li> <li>c) sleep disturbance impacts compared to those determined in Condition E25;</li> <li>d) 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;</li> <li>e) details of any complaints and enquiries received in relation to operational noise generated by the project between the date of commencement of operation and the date the report was prepared;</li> <li>f) any required recalibrations of the noise model taking into consideration factors such as actual traffic numbers and proportions;</li> <li>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; and</li> <li>h) identification of additional feasible and reasonable measures to those predicted in the documents specified under condition A1 of this approval, that would be implemented with the objective of meeting the criteria outlined in the NSW Road Noise Policy (EPA, 2011), when these measures would be implemented and how their effectiveness would be measured and reported to the Secretary and the EPA.</li> </ul> <p>The Applicant shall provide the Secretary and the EPA with a copy of the Operational Noise Report within 60 days of completing the operational noise monitoring referred to in (a) above or as otherwise agreed by the Secretary.</p>	operation	Compliant		Not triggered
SSD 6766	G16	<p>Within 60 days of commissioning this audit, or as otherwise agreed by the Secretary, the Applicant shall submit a copy of the audit report to the Secretary and relevant public authorities, together with its response to any recommendations contained in the audit report. The audit report and response to any recommendations shall be published on the Project website.</p>	operation	Compliant	N/A	Undertaken on 10 May 2021. Report submitted 28/06/21



# APPENDIX B - SSD 7628 CONDITIONS OF CONSENT

COMPLIANCE REQUIREMENT	UNIQUE (ID)	COMPLIANCE REQUIREMENT	DEVELOPMENT PHASE	COMPLIANCE STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
SSD 7628	A1	In addition to meeting the specific performance measures and criteria established under this consent all reasonable measures must be implemented to prevent, and if prevention is not reasonable, minimise, any harm to the environment that may result from the construction and operation of the development, and any rehabilitation required under this consent.	All	Ongoing	General - Inspection and Audit	
SSD 7628	A2	The development may only be carried out: (a) in compliance with the conditions of this consent; (b) in accordance with all written directions of the Secretary in relation to this consent; (c) in accordance with the EIS, Submissions Report, Consolidated assessment clarification responses, and updated Biodiversity Assessment Report; (d) in accordance with the amended Development Layout Plans and Design Plans, amended WSUD plans and amended architectural plans to be submitted for the Secretary's approval as part of this consent; and (e) in accordance with the management and mitigation measures at APPENDIX B of this consent.	All	Ongoing	General - Inspection and Audit	
SSD 7628	A3	The Secretary may make written directions to the Applicant: (a) as a result of the Department's assessment of any strategy, plan, program, review, audit, notification, report or correspondence submitted under or in relation to this consent; (b) as a result of the Department's assessment of any review, report or audit undertaken or commissioned by the Department regarding compliance with this consent or in relation to an incident (whether notified to the Department or not); and (c) in relation to the implementation of any actions or measures contained in any of the documents listed in condition A2.	All	N/A	General - Inspection and Audit	No written directions to the Applicant have been made by the secretary
SSD 7628	A4	The conditions of this consent and directions of the Secretary prevail to the extent of any inconsistency, ambiguity or conflict between them and a document listed in condition A2(c) or A2(e). In the event of an inconsistency, ambiguity or conflict between any of the documents listed in condition A2(c) and A2(e), the most recent document prevails to the extent of the inconsistency, ambiguity or conflict. For the purpose 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 Secretary and a document, if it is not possible to comply with both the condition or direction and the document.	All	N/A	General - Inspection and Audit	No inconsistencies have been triggered.



SSD 7628	A8	The container freight road volume must not exceed 250,000 TEUs p.a., subject to the exception identified in condition A9, which may only be considered under condition A9 after the facility has been in operation.	Operation	Not triggered		
SSD 7628	A9	The movement of container freight by road may exceed the 250,000 TEU limit p.a. by up to a further 250,000 TEU p.a., if the Secretary is satisfied that traffic monitoring and modelling of the operation of the facility demonstrate that traffic movements resulting from the proposed increase in TEU will achieve the objective of not exceeding the capacity of the transport network.	Operation	Not triggered		
SSD 7628	A10	In determining the TEU limit, the Secretary may take account any roadworks or mitigation measures proposed under a Voluntary Planning Agreement to minimise traffic impacts.	All	Ongoing		
SSD 7628	A11	The maximum GFAs for the following uses apply: (a) 300,000m2 for the warehousing and distribution facilities; and (b) 8,000m2 for the freight village.	Operation	Not triggered	GFA monitoring	
SSD 7628	A12	The warehousing and distribution facilities must only be used for activities associated with freight using the MPE Stage 1 rail intermodal terminal.	Operation	Not triggered		
SSD 7628	A13	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. Prior to occupancy of any freight village tenancy, and every subsequent occupation of these tenancies, details of the tenant and occupation activity is to be submitted to the Secretary demonstrating that the proposed activity complies with this condition.	Operation	Not triggered		
SSD 7628	A14	With the approval of the Secretary, the Applicant may submit any strategy, plan or program required by this consent on a staged basis.	All	Compliant	Documentation Monitoring	The CTP (Rev 5) dated 24 May 2018, was approved by DP&E on 8/06/2018 Document Delivery Strategy (DDS)
SSD 7628	A15	If the submission of any strategy, plan or program is to be staged, then the relevant strategy, plan or program must clearly describe the specific stage of the development to which the strategy, plan or program applies, the relationship of the stage to any future stages and the trigger for updating the strategy, plan or program.	All	Compliant	Documentation Monitoring	The CTP (Rev 5) dated 24 May 2018, was approved by DP&E on 8/06/2018 Document Delivery Strategy (DDS)
SSD 7628	A16	With the approval of the Secretary, any strategy, plan or program required by this consent may be combined	All	Ongoing		CERSEDMP and SWMP
SSD 7628	A17	In seeking the Secretary's approval, a clear relationship must be demonstrated between the strategies, plans or programs that are proposed to be combined.	All	Ongoing		All plans

SSD 7628	A19	Where conditions of this consent require a document to be prepared in consultation with an identified party, the Applicant must: (a) consult with the relevant party prior to submitting the subject document to the Secretary for approval; (b) provide evidence that at least two weeks was provided for the relevant party to comment on the document; and (c) include in the document: (i) details of the consultation undertaken; (ii) a description of how matters raised by those consulted have been resolved to the satisfaction of both the Applicant and the party consulted; and (iii) details of any disagreement remaining between the party consulted and the Applicant and how the Applicant has addressed the matters not resolved.	All	Compliant		Stakeholder consultation outcomes addressed within each management plan.
SSD 7628	A20	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 the obligation for the Applicant to obtain, renew or comply with such licences, permits, approvals and consents.	All	Compliant	Compliance Monitoring of all relevant licences, permits, approvals and consents	CEMP (Rev 4) dated 5 April 2018, approved by DP&E 8/06/2018 Specific licence/permit requirements are addressed in each subplan. Compliance Tracker.
SSD 7628	A30	Unless the Applicant and the applicable authority agree otherwise, the Applicant must: (a) repair, or pay the full costs associated with repairing any public infrastructure that is damaged by carrying out the development; and (b) relocate, or pay the full costs associated with relocating any infrastructure that needs to be relocated as a result of the development.	All	Not triggered	Monitor any damage or rectification required should activities cause damage to public infrastructure.	Records of damage or rectification required should activities cause damage to public infrastructure.
SSD 7628	A32	All plant and equipment used at the 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.	All	Compliant	Monitor all plant and equipment used at the site.	CEMP / Maintenance records
SSD 7628	B1	The Applicant must: (a) prepare each plan, program and other documents in consultation with the specified stakeholders; (b) not commence each phase of the project until the plans, programs and other documents required under this consent are approved by or, where not required to be approved, submitted to the Secretary specified within the timeframes; and (c) implement the most recent version of the required plans and programs approved by the Secretary for the duration of the development.	All	Compliant	Records and revisions of consultation and plans.	Record of consultation included in all plans.

SSD 7628	B28	<p>The Applicant is to prepare a <b>Biannual Trip Origin and Destination Report</b> each six months following commencement of any operation (in a format agreed with TfNSW and RMS) that advises:</p> <p>(a) the number of actual and standard twenty foot equivalent shipping containers despatched and received during the period;</p> <p>(b) the number of days in the period that the truck gate was open for despatching trucks 24 hours a day, 7 days a week and detail any exceptions to this and advise actual hours of operation;</p> <p>(c) records of vehicle numbers accessing the site; and</p> <p>(d) representative vehicle origins and destinations, based on a cordon in the surrounding network.</p> <p>A framework for recording and reporting on the data required for the report, prepared to the satisfaction of TfNSW and RMS, is to be submitted to the Secretary three months prior to the commencement of operation.</p> <p>The report is to be submitted within one month of its preparation throughout operation of the project, starting six months from the commencement of operation, unless otherwise agreed by the Secretary, TfNSW and RMS.</p> <p>The cordon count at (d) above will:</p> <ul style="list-style-type: none"> <li>• apply to all classes of vehicles; and</li> <li>• cover the intermodal terminal, the warehousing facility and any other uses such as the freight village.</li> </ul>	Operation	Compliant		Next required November 21 - May 2022. 22/07/28 - Pending ASON to submit report
SSD 7628	B30	The Applicant must ensure that the <b>Workplace Travel Plan</b> is implemented for the life of the development.	Operation	Ongoing		Approval of the WTP was received by DPIE on 6/12/2019
SSD 7628	B51	The annual independent audit must be undertaken by a suitably qualified WSUD professional. 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		Independent WSUD Audit undertaken on 13/07/2022. Report to be provided to Secretary in August 2022  Required in July 2023
SSD 7628	B54	Best practice reactive and proactive management measures must be implemented to minimise dust generated during all works authorised by this consent.	All	Compliant		Monthly internal air quality reports prepared by Arcadis
SSD 7628	B55	Deposited dust must not exceed an increase of 2g/m <sup>2</sup> /month or maximum of 4g/m <sup>2</sup> /month at the closest off site sensitive receiver.	All	Compliant		Monthly internal air quality reports prepared by Arcadis
SSD 7628	B60	The Applicant must ensure the development does not cause or permit the emission of any offensive odour (as defined in the POEO Act).	All	Ongoing		CEMP/ OEMP
SSD 7628	B61	Equipment must be installed and operated in accordance with best practice to ensure that the development complies with all load limits, air quality criteria, air emission limits and air quality monitoring requirements as specified under this consent.	All	Ongoing		CEMP/ CAQMP
SSD 7628	B64	Continuous <b>noise monitoring</b> at sensitive receivers must be undertaken during early works, fill importation, construction and for at least 12 months following occupation of the entire site.	All	Compliant		continuous noise monitoring is ongoing
SSD 7628	B79	The permitted hours of warehouse and distribution operation are detailed in <b>Table 4</b> .	Operation	Compliant		OEMP

SSD 7628	B80	Noise generated by operation of the development inclusive of MPE Stage 1 operations must not exceed the noise limits in <b>Table 5</b> .	Operation	Ongoing		OEMP
SSD 7628	B85	The Applicant must carry out <b>noise monitoring of mechanical plant and other noisy equipment</b> for a minimum period of one week where valid data is collected following occupation of 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 Secretary within two months of occupation or each tenancy to verify predicted mechanical plant and equipment noise levels.	Operation	Compliant		WH1 - New Tenant completed Required for Future Warehouse 6 and 7
SSD 7628	B86	Within 12 months of occupation of the first warehouse, 50% occupation of the site and 100% occupation of the site, or as otherwise agreed by the Secretary, the Applicant must undertake <b>operational noise monitoring</b> to compare actual noise performance of the project against predicted noise performance, and prepare an <b>Operational Noise Report</b> 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 5; b) a review of the operational noise levels in terms of criteria and noise goals established in the NSW RNP (EPA, 2011); c) sleep disturbance impacts compared to those determined in documents specified under condition A2; 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) details of any complaints and enquiries received in relation to operational noise generated by the project between the date of commencement of operation and the date the report was prepared; g) any required recalibrations of the noise model taking into consideration factors such as actual traffic numbers and heavy vehicle proportions; and h) 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.	Operation	Compliant		Industrial noise assessment report completed as part of 50% occupation of the site submitted 8/6/21  Next required 100% occupation
SSD 7628	B87	The Applicant must provide the Secretary and the EPA with a copy of the Operational Noise Report within 60 days of completing the operational noise monitoring referred to in (a) above or as otherwise agreed by the Secretary.	Operation	Compliant	Required by May 2021	50% - submitted on 8/6/21
SSD 7628	B88	To ensure the operational noise impacts are appropriately managed, the following measures apply: a) use of best practice plant; and b) preparation of a risk assessment to determine if non-tonal reversing alarms can be fitted as a condition of site entry. Alternatively, site design may include traffic flow that does not require or precludes reversing of vehicles <sup>9</sup>	Operation	Not triggered		Not required unless identified by B85

SSD 7628	B89	For the duration of operation heavy road freight vehicles are not permitted to use Moorebank Avenue south of the East Hills Railway corridor. A main gate monitoring system (e.g. CCTV) must be installed to identify heavy vehicles turning left from the terminal site onto Moorebank Avenue, or turning right from Moorebank Avenue to the terminal site. The Secretary may at any time request the Applicant to provide a <b>heavy vehicle monitoring report</b> for the prior 12 month period.	Operation	Compliant		No heavy road freight vehicle from the project have been identified using the East Hills Railway corridor
SSD 7628	B90	For the duration of operation, the Applicant must: a) continue to implement all reasonable and feasible best practice noise mitigation measures; b) continue to investigate ways to reduce the noise generated by the development, including maximum noise levels which may result in sleep disturbance; and c) report on these investigations and the implementation and effectiveness of these measures in the Annual Review to the satisfaction of the Secretary.	Operation	Compliant		Ongoing monitoring. To be reported in the Annual Review. Annual review to be submitted to Secretary
SSD 7628	B121	Waste must be secured and maintained within designated waste storage areas at all times and must not leave the site or be deposited on or otherwise enter neighbouring public or private properties.	Operation	Compliant		No community waste complaints identified. Warehouse tenant have procured Waste Contractor to dispose any waste
SSD 7628	B122	All waste materials removed from the site must only be directed to a waste management facility or premises lawfully permitted to accept the materials.	All	Compliant		
SSD 7628	B123	The Applicant must assess and classify all liquid and non-liquid wastes to be taken off site in accordance with the latest version of EPA's <i>Waste Classification Guidelines Part 1: Classifying Waste</i> (EPA, 2014).	All	Compliant		
SSD 7628	B124	Waste generated outside the site must not be received at the site for storage, treatment, processing, reprocessing, or disposal unless it satisfies these conditions.	All	Compliant		
SSD 7628	B125	The Applicant must retain all sampling and waste classification data for the life of the development in accordance with the requirements of EPA.	All	Compliant		
SSD 7628	B126	The collection of waste generated during operation of the development must be undertaken between 7 am to 10 pm Monday to Friday	Operation	Compliant		Review of Warehouse Waste Registers
SSD 7628	B145	Public road access must comply with section 4.1.3(1) of <i>Planning for Bush Fire Protection 2006</i> except for the requirement for through-access.	All	Compliant		CTP/ BFMP
SSD 7628	B146	The provision of water, electricity and gas must comply with section 4.1.3 of <i>Planning for Bush Fire Protection 2006</i> .	All	Compliant		CTP/ BFMP
SSD 7628	B153	The Applicant must obtain a certificate from a suitable qualified tradesperson, certifying that kitchen, food storage and food preparation areas have been fitted in accordance with Australian Standard AS4674. The Applicant must provide evidence of receipt of the certificate to the satisfaction of the Certifying Authority prior to occupation.	Operation	Not triggered		No Warehouses contain any food storage or food preparation areas
SSD 7628	C5	Overall responsibility of the development, including the freight village environmental management during operation, must be by the entity responsible for the Precinct environmental management.	Operation	Not triggered		OEMP

SSD 7628	C7	<p>The Applicant must ensure that the environmental management plans required under this consent are prepared in accordance with any relevant guidelines, and include:</p> <ul style="list-style-type: none"> <li>(a) detailed baseline data;</li> <li>(b) a description of: <ul style="list-style-type: none"> <li>(i) the relevant statutory requirements (including any relevant approval, licence or lease conditions);</li> <li>(ii) any relevant limits or performance measures/criteria; and</li> <li>(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;</li> </ul> </li> <li>(c) a description of the management measures to be implemented to comply with the relevant statutory requirements, limits or performance measures/criteria;</li> <li>(d) a program to monitor and report on the: <ul style="list-style-type: none"> <li>(i) impacts and environmental performance of the development; and</li> <li>(ii) effectiveness of any management measures (see (c) above);</li> </ul> </li> <li>(e) a contingency plan to manage any unpredicted impacts and their consequences;</li> <li>(f) a program to investigate and implement ways to improve the environmental performance of the development over time;</li> <li>(g) a protocol for managing and reporting any: <ul style="list-style-type: none"> <li>(i) incidents and non-compliances;</li> <li>(ii) complaints;</li> <li>(iii) non-compliances with statutory requirements; and</li> </ul> </li> <li>(h) a protocol for periodic review of the plan.</li> </ul> <p>Note: The Secretary may waive some of these requirements if they are unnecessary or unwarranted for a particular management plan.</p>	All	Ongoing		All management plans
SSD 7628	C9	<p>Within three months of:</p> <ul style="list-style-type: none"> <li>(a) the submission of an annual review under condition C10;</li> <li>(b) the submission of an incident or non-compliance notification under condition C13;</li> <li>(c) the submission of an audit under condition C18;</li> <li>(d) the approval of any modification of the conditions of this consent; or</li> <li>(e) the issue of a direction of the Secretary under condition A2;</li> </ul> <p>the strategies, plans and programs required under this consent must be reviewed, and if necessary to either improve the environmental performance of the development, cater for a modification or comply with a direction, must be revised, to the satisfaction of the Secretary. Where revisions are required, the revised document must be submitted to the Secretary for approval within six weeks of the review.</p> <p>Note: The purpose of this condition is to ensure that strategies, plans and programs are regularly updated to incorporate any measures recommended to improve the environmental performance of the development.</p>	All	Ongoing		CEMP

SSD 7628	C10	<p>Each year, the Applicant must submit a <b>review the environmental performance</b> of the development (including all tenants and occupants) to the to the Department. The review must:</p> <p>(a) describe the development that was carried out in the previous calendar year, and the development that is proposed to be carried out over the next year;</p> <p>(b) include a comprehensive review of the monitoring results and complaints records from the previous year, including a comparison of these against the:</p> <p>(i) the relevant statutory requirements, limits or performance measures/criteria;</p> <p>(ii) requirements of any plan or program required under this consent;</p> <p>(iii) the monitoring results of previous years; and</p> <p>(iv) the relevant predictions in the EIS, Submissions Report, Consolidated assessment clarification responses; Modification Assessment, or conditions of this consent;</p> <p>(c) identify any non-compliance over the previous year, and describe what actions were (or are being) taken to ensure compliance;</p> <p>(d) identify any trends in the monitoring data over the life of the development;</p> <p>(e) identify any discrepancies between the predicted and actual impacts of the development, and analyse the potential cause of any significant discrepancies; and</p> <p>(f) describe what measures will be implemented over the next year to improve the environmental performance of the development.</p> <p>The Applicant must ensure that copies of the Annual Review are submitted to Council and are available to the CCC and any interested person upon request.</p>	All	Complaint		Covered in Aspect's Annual Review Report
SSD 7628	C11	The Department must be notified in writing to <a href="mailto:compliance@planning.nsw.gov.au">compliance@planning.nsw.gov.au</a> 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 if it has one), and set out the location and nature of the incident.	All	Ongoing		CEMP/OEMP
SSD 7628	C12	A written incident notification addressing all requirements for such notification set out in Appendix D of this consent, must also be emailed to the Department at the following address: <a href="mailto:compliance@planning.nsw.gov.au">compliance@planning.nsw.gov.au</a> within 7 days after the Applicant becomes aware of an incident. Notification is required to be given under this condition even if the Applicant fails to give the notification required under condition or, having given such notification, subsequently forms the view that an incident has not occurred.	All	Ongoing		CEMP/OEMP
SSD 7628	C13	Within 30 days of the date on which the incident occurred or as otherwise agreed to by the Secretary the Applicant must provide the Secretary and any relevant public authorities (as determined by the Secretary) with a detailed report on the incident addressing all requirements for such reporting set out in Appendix D of this consent, and such further reports as may be requested.	All	Ongoing		CEMP/OEMP

SSD 7628	C14	Any written requirements of the Secretary or relevant public authority (as determined by the Secretary) which may be given at any point in time, to address the cause or impact of an incident must be complied with and within any timeframe specified by the Secretary or relevant public authority.	All	Ongoing		CEMP/OEMP
SSD 7628	C15	If statutory notification is provided to EPA as required under the POEO Act in relation to the development, such notification must also be provided to the Secretary within 24 hours after the notification was provided to EPA.	All	Ongoing		CEMP/OEMP
SSD 7628	C16	The Department must be notified in writing to compliance@planning.nsw.gov.au within 7 days after the Applicant becomes aware of any non-compliance.	All	Ongoing		CEMP/OEMP
SSD 7628	C17	The 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, the reasons for the non-compliance (if known), and what actions have been, or will be, undertaken to address the non-compliance.	All	Ongoing		CEMP/OEMP
SSD 7628	C18	Within one year of the commencement of any development under this consent, and every three years thereafter, unless the Secretary directs otherwise, the Applicant must commission and pay the full cost of an <b>Independent Environmental Audit (Audit)</b> of the development. Audits must: (a) be led and conducted by a suitably qualified, experienced and independent team of experts whose appointment has been endorsed by the Secretary; (b) be carried out in consultation with the relevant agencies and the CCC; (c) assess the environmental performance of the development (and tenancies) and assess whether it is complying with the relevant requirements in this consent, and any strategy, plan or program required under this consent; and (d) review the adequacy of any approved strategy, plan or program required under this consent; and (e) recommend appropriate measures or actions to improve the environmental performance of the development, and/or any strategy, plan or program required under this consent.	All	Compliant		Undertaken on 10/5/21. Report submitted on 28/6/21. Next due in 2024
SSD 7628	C19	Within three months of commencing an Independent Environmental Audit, or unless otherwise agreed by the Secretary, a copy of the audit report must be submitted to the Secretary, and any other NSW agency that requests it, together with a response to any recommendations contained in the audit report, and a timetable for the implementation of the recommendations. The recommendations must be implemented to the satisfaction of the Secretary.	All	Compliant		Undertaken on 10/5/21. Report submitted on 28/6/21



SSD 7628	C20	<p>At least 48 hours before the commencement of construction until the completion of all works under this consent, including demolition and remediation, the Applicant must:</p> <p>(a) make copies of the following publicly available on its website:</p> <ul style="list-style-type: none"> <li>(i) the documents referred to in condition A2 of this consent;</li> <li>(ii) all current statutory approvals for the development;</li> <li>(iii) all approved strategies, plans and programs required under the conditions of this consent;</li> <li>(iv) regular reporting on the environmental performance of the development in accordance with the reporting arrangements in any plans or programs approved under the conditions of this consent;</li> <li>(v) a comprehensive summary of the monitoring results of the development, reported in accordance with the specifications in any conditions of this consent, or any approved plans and programs;</li> <li>(vi) a summary of the current stage and progress of the development;</li> <li>(vii) contact details to enquire about the development or make a complaint;</li> <li>(viii) a complaints register updated on a monthly basis;</li> <li>(ix) the Annual Reviews of the development;</li> <li>(x) audit reports prepared as part of any independent environmental audit of the development and the Applicant's response to the recommendations in any audit report;</li> <li>(xi) any other matter required by the Secretary; and</li> </ul> <p>(b) keep such information up to date, to the satisfaction of the Secretary.</p>	All	Compliant		<p>The website is being progressively updated as documents are approved for each stage of the construction activities.</p>
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SSD 7628	C21	<p>The Proponent must prepare and implement a <b>Compliance Tracking Program</b> to track compliance with the requirements of this approval. The <b>Compliance Tracking Program</b> must be submitted to the Secretary for approval prior to the commencement of construction.</p> <p>The Compliance Tracking Program must include, but not be limited to:</p> <ul style="list-style-type: none"> <li>(a) provision for the notification of the Secretary prior to the commencement of construction and prior to the commencement of operation of the development (including prior to each stage, where works are being staged);</li> <li>(b) provision for periodic review of the compliance status of the development against the requirements of this approval and the environmental management measures committed to in the documents referred to in condition A2;</li> <li>(c) provision for periodic reporting of compliance status to the Secretary, including but not limited to: <ul style="list-style-type: none"> <li>(i) a <b>Pre-Construction Compliance Report</b> prior to the commencement of construction,</li> <li>(ii) quarterly Construction Compliance Reports, for the duration of construction, and</li> <li>(iii) a <b>Pre-Operation Compliance Report</b> prior to the commencement of operation, and six monthly operational compliance reports;</li> </ul> </li> <li>(d) a program for independent environmental auditing;</li> <li>(e) mechanisms for recording environmental incidents during construction and actions taken in response to those incidents;</li> <li>(f) provision for reporting environmental incidents to the Secretary during construction;</li> <li>(g) procedures for rectifying any non-compliance identified during environmental auditing, review of compliance or incident management; and</li> <li>(h) provision for ensuring all employees, contractors and sub-contractors are aware of, and comply with, the conditions of this approval relevant to their respective activities.</li> </ul>	All	Compliant		This 6 monthly compliance Report
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# APPENDIX C – AIR QUALITY MONITORING COMPLIANCE REPORT

# MOOREBANK LOGISTICS PARK – PRECINCT EAST

Operational Air Quality Six Monthly Compliance Report #4  
November 2021 – April 2022

06 JUNE 2022



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# MOOREBANK LOGISTICS PARK – PRECINCT EAST

## Operational Air Quality Six Monthly Compliance Report #4

November 2021 – April 2022

**Author** [Redacted] [Redacted]

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**Checker** [Redacted] [Redacted]

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**Approver** [Redacted] [Redacted]

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**Report No**      PREC-ARC-EN-RPT-0013

**Date**            6/06/2022

**Revision Text**    001

This report has been prepared for Tactical Group in accordance with the terms and conditions of appointment for MLP East Precinct Operational Air Monitoring Program dated 20 December 2019. 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
000	2/06/2022	Submitted draft to client for review	[Redacted]	[Redacted]
001	6/06/2022	Final submitted to client	[Redacted]	[Redacted]

# CONTENTS

<b>1 INTRODUCTION</b> .....	<b>1</b>
1.1 Background.....	1
1.2 Site operation.....	1
1.3 Purpose of the report.....	2
1.4 Reporting period.....	2
1.5 Limitations .....	2
<b>2 OVERVIEW</b> .....	<b>3</b>
2.1 Air quality monitors .....	3
2.2 Dust deposition gauges.....	3
2.3 Monitoring locations.....	3
2.4 Air quality monitoring station availability .....	6
<b>3 WEATHER</b> .....	<b>7</b>
<b>3.1 Meteorological Conditions</b> .....	<b>7</b>
3.1.1 Prevailing wind conditions .....	7
3.1.2 Meteorological wind data availability .....	7
3.1.3 Observed wind data .....	7
3.1.4 Ambient temperature and rainfall .....	8
<b>3.2 Ambient Air Quality</b> .....	<b>8</b>
<b>4 MONITORING RESULTS</b> .....	<b>10</b>
<b>4.1 Air quality criteria</b> .....	<b>10</b>
4.1.1 Criteria for PM <sub>2.5</sub> , PM <sub>10</sub> , NO <sub>2</sub> and CO .....	10
4.1.2 Dust deposition .....	10
<b>4.2 Dust deposition gauge results</b> .....	<b>11</b>
<b>4.3 Continuous monitor results</b> .....	<b>11</b>
4.3.1 Annual exceedances.....	11
4.3.2 24-hour exceedances.....	12
4.3.3 NO <sub>2</sub> 1-hour exceedances .....	12
4.3.4 CO 8-hour exceedances.....	12
<b>4.4 Complaints</b> .....	<b>13</b>
<b>4.5 Ad-hoc monitoring</b> .....	<b>13</b>
<b>5 CONCLUSION</b> .....	<b>14</b>
<b>APPENDIX A</b> .....	<b>15</b>

## LIST OF TABLES

Table 2-1: Monitoring station availability (%).....	6
Table 3-1: Temperature and rainfall recorded at the Bankstown Airport AWS .....	8
Table 4-1: Monitoring criteria (applied from June 2021) .....	10
Table 4-2 Dust deposition criteria.....	10
Table 4-3 Dust deposition (insoluble solids g/m <sup>2</sup> /month) results from November 2021 to April 2022..	11
Table 4-4: Summary of exceedances of the PM <sub>10</sub> 50 µg/m <sup>3</sup> /day limit.....	12

## LIST OF FIGURES

Figure 2-1: Continuous real-time air quality monitors (Source: Arcadis, 2020).....	4
Figure 2-2 Location of Dust Deposition Gauges (Source: SERS, May 2022).....	5
Figure 3-1: Wind roses (March and April 2022) .....	8
Figure 3-2: Air quality categories .....	9



# 1 INTRODUCTION

## 1.1 Background

The Moorebank Logistics Park – Precinct East Operational Air Quality Monitoring Programme Framework (OAQMPF) provides a framework to monitor air quality during operation of the Moorebank Logistic Park (MLP) Precinct East and has been developed to support the implementation of the Operational Air Quality Management Plan (OAQMP) monitoring and reporting requirements. The OAQMP 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 Precinct East (MPE) 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 [ $PM_{10}$ <sup>1</sup> and nitrogen dioxide ( $NO_2$ )].
- MPE 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.

## 1.2 Site operation

The MLP Operational Environmental Management Plan (OEMP) and sub-plans are applicable to the entire MLP Precinct East. The MLP Precinct East operates 24 hours, 7 days a week, and currently includes operation of the IMEX terminal, Rail Link, Warehouse 1, Warehouse 3, Warehouse 4, and Warehouse 5. No construction has occurred on MPE Stage 2 since December 2020, and the locations of Warehouses 6-8 have been left as compacted pads. If there are any construction related activities, these would be undertaken during standard working hours.

Moorebank Precinct West (MPW) Stage 2 is located west of Moorebank Avenue and is currently under construction. MPW Stage 2 is a separate project and operates under a different approval (SSD 7709) to MLP Precinct East. MPW Stage 2 has been granted approval to receive imported material outside of standard construction hours. During the reporting period, material was imported to the site outside of standard construction hours on the following dates:

- 1/11/2021 – 5/11/2021
- 8/11/2021
- 15/11/2021 – 19/11/2021
- 29/11/2021 – 30/11/2021

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<sup>1</sup>  $PM_{10}$  - Particles with a diameter of 10 micrometres or less, which are small enough to pass through the throat and nose and enter the lungs

- 1/12/2021-3/12/2021
- 8/12/2021-10/12/2021
- 13/12/2021-16/12/2021
- 14/02/2022-18/02/2022.

No material was imported to the site outside of normal hours during January, March and April.

From May 2021, the installed dust deposition gauges (DDG) were managed and monitored by Site Environmental and Remediation Services (SERS). The locations of the air quality monitors and DDGs are shown on Figure 2-1 and Figure 2-2 respectively, with the locations selected so that the activities for both MLP Precinct East and MPW Stage 2 can be captured.

### 1.3 Purpose of the report

This six-monthly air quality report has been prepared to meet reporting requirements of the CoC as outlined in Section 5 of the OAQMPF.

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 (Section 4.2, 4.3 and 4.4)
- A high-level overview of the dust deposition data, which is provided by SERS (Section 4.2).
- Conclusions and recommendations based on the 6-month's data (Section 5)
- Summarised data in graphs and tables (Appendix A).

### 1.4 Reporting period

The MLP Precinct East operations commenced on 13 May 2020.

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 November 2021 to 30 April 2022 (inclusive) to inform the six-monthly operational compliance reports required for the life of the project. This report will be the fourth report for MLP Precinct East since operations began in May 2020.

### 1.5 Limitations

All findings contained in this report are based on downloaded monitoring data at the time of writing the report and information relating to air quality provided by Tactical Group and SERS. Arcadis do not take responsibility for the accuracy or limitations of the downloaded and provided data.

## 2 OVERVIEW

### 2.1 Air quality monitors

The dust and air quality monitoring system installed at the MLP East Precinct comprises four Cairnet air quality units integrated with Sentinel™ software, which is hosted in the cloud. The system has been provided by EMS Brüel & Kjaer.

The Cairnet unit measures the following dust and air quality parameters:

- NO<sub>2</sub> (range: 0-25 ppb)
- PM<sub>10</sub>
- PM<sub>2.5</sub> (range: 0-1000 µg/m<sup>3</sup>)
- CO (installed since March 2020).

### 2.2 Dust deposition gauges

Seven DDG which are provided and serviced by SERS, are located around MLP East Precinct.

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

### 2.3 Monitoring locations

The locations of the continuous air quality monitoring stations are identified on Figure 2-1 and the DDG locations are shown on Figure 2-2. For this reporting period, the site boundary was considered to be representative of the closest receptors (including the adjacent commercial premises).

The locations of the continuous air quality monitors means the construction and operation activities for both MLP Precinct East and MPW Stage 2 have been captured.

DDG locations were also chosen so that a true representation of dust generated from site operation activity of MLP Precinct East could be established and to a slightly lesser extent, the construction activities of MPW Stage 2.

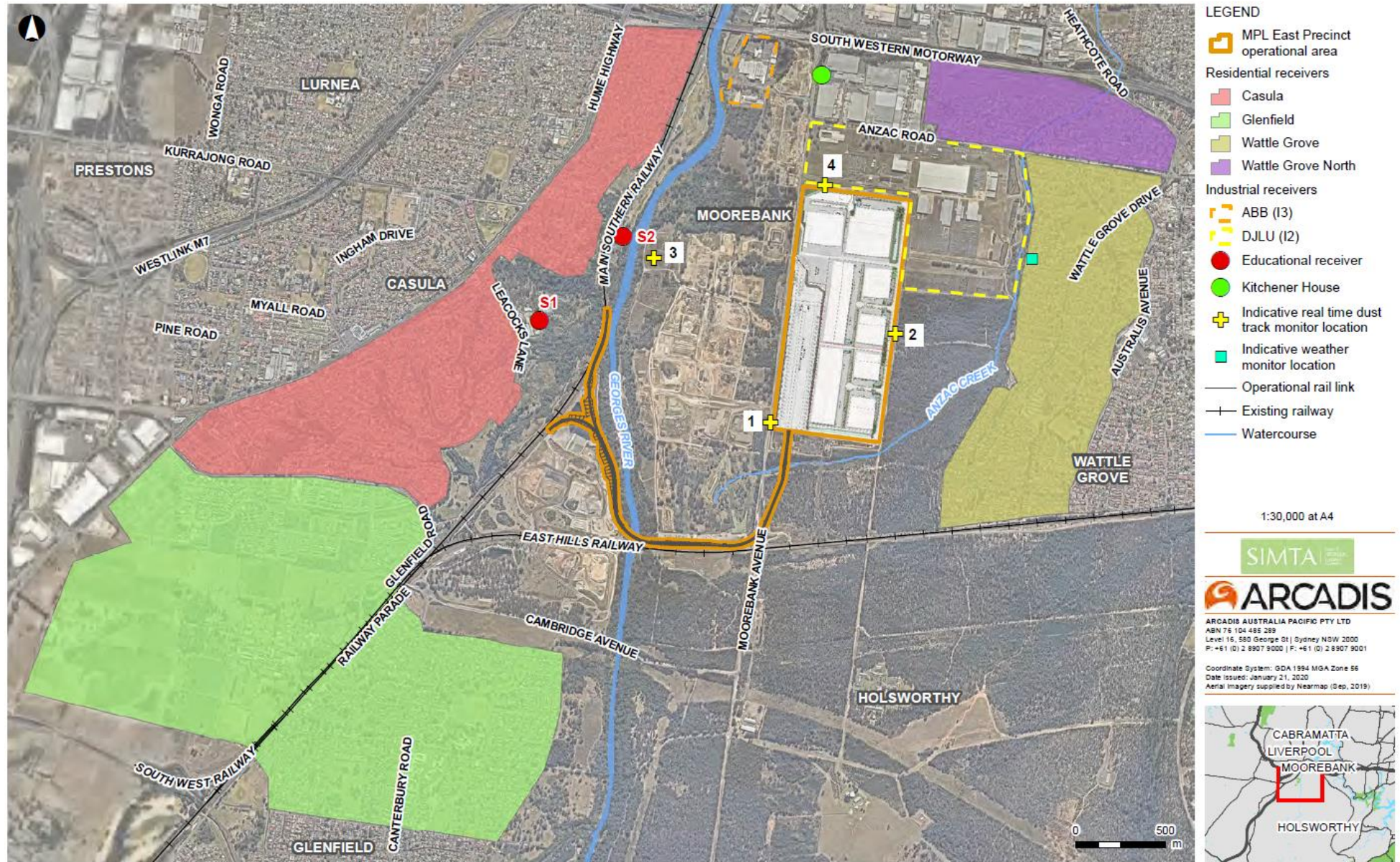


Figure 2-1: Continuous real-time air quality monitors (Source: Arcadis, 2020)



Figure 1: Site Layout

Head Office: 281 Newcastle Street Northbridge WA 6003 Postal: PO Box 377 Northbridge Perth WA 6865 T: +61 8 92202000 F: +61 8 92202010 E: admin@sers.net.au W: www.sers.net.au	Job No: 162536 Client: Knight Frank Address: Moorebank Avenue	Scale: 1:7,000 Original size: A3 Imagery from: 15/04/2020 Source: Nearmaps	Date drawn: 10/09/2022 Revision: 1 Drawn by: SP Checked by: BD	Legend ● Dust Trak ● DDG
	© This plan must not be reproduced without the permission of SERS File: N:\A SERS\GIS\Projects\ MXD\			

Figure 2-2 Location of Dust Deposition Gauges (Source: SERS, May 2022)

## 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	November 2021	December 2021	January 2022	February 2022	March 2022	April 2022	Average	Calibration <sup>#</sup>
AQM01	100	100	100	100	100	100	100	Feb 2021 <sup>^</sup>
AQM02	100	100	100	100	100	100	100	Jan/Feb 2021
AQM03	39	37	99	50 <sup>^^</sup>	0	0	38	Feb 2021 <sup>^</sup>
AQM04	98	100	100	100	100	100	100	Jan/Feb 2021

<sup>#</sup>Latest calibration date. Gauges were not calibrated for particulate matter.

<sup>^</sup>CO was not calibrated, only NO<sub>2</sub>.

<sup>^^</sup>AQM03 stopped recording data from 16 February 2022.

AQM03 has had a low availability throughout this reporting period. The monitor was taken offsite on 13 November 2021 for maintenance and recalibration and data was recorded from 20 December 2021 to 16 February 2022. However, no data has been recorded since 16 February 2022.

It is recommended that this monitor is maintained more frequently, and more promptly once availability of data becomes an issue, or even placed in another location if it is being impacted by external factors such as vandalism.

## 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. The prevailing wind speed and direction is normally obtained from a weather monitor located in Wattle Grove (around 500 metres east of MLP Precinct East). From November 2021 to February 2022 the weather monitor appeared to be faulty, so the Bankstown Airport Automatic Weather Station (AWS) was used as a reference station during this time. The prevailing wind speed and direction is discussed in more detail below.

#### 3.1.2 Meteorological wind data availability

From October 2021 to February 2022 (inclusive), the weather monitor in Wattle Grove appeared to be faulty as records indicated prevailing wind direction and speed for each month was from only one direction and only one speed and appeared misaligned when referenced to the Bankstown Airport AWS. For the purposes of the months where the weather data at Wattle Grove was absent or faulty, the Bankstown Airport AWS data was referenced instead. This weather station is considered representative of conditions at the site.

#### 3.1.3 Observed wind data

##### 3.1.3.1 Bankstown Airport AWS

The data from the Bankstown Airport AWS for the November 2021 to February 2022 period is summarised below:

- Wind direction at 9 am was generally from the south, while 3 pm wind direction was generally from the east.
- Wind speeds at 9 am ranged from 2.7 m/s to 3.3 m/s (light breeze) and at 3 pm ranged from 5.1 m/s to 5.9 m/s (gentle to moderate breeze).

##### 3.1.3.2 Wattle Grove weather monitor

Figure 3-1 shows the wind roses of recorded wind speed and direction data from a weather monitor located in Wattle Grove for March 2022 and April 2022.

- The recorded average wind pattern during March 2022 and April 2022 was dominated by mainly northerly and westerly airflows as shown in Figure 3-1.
- Average recorded wind speed during the reporting period were generally low, around 0.5 m/s, indicating generally “calm” (i.e., winds less than 0.5 m/s) to “light air” conditions<sup>2</sup> (i.e., winds between 0.5-1.5 m/s).

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<sup>2</sup> Descriptions are based on the Beaufort Wind Scale <https://www.weather.gov/mfl/beaufort>

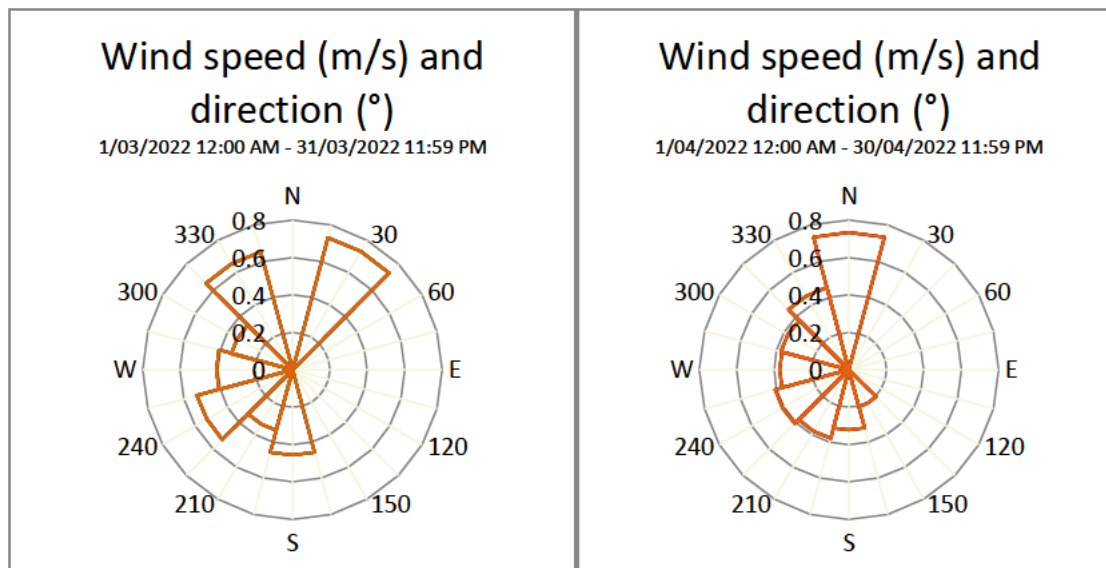


Figure 3-1: Wind roses (March and April 2022)

### 3.1.4 Ambient temperature and rainfall

Monthly mean temperatures (minimum and maximum) and rainfall (long-term monthly average and total) recorded at the Bankstown Airport AWS for the reporting period are summarised in Table 3-1.

Table 3-1: Temperature and rainfall recorded at the Bankstown Airport AWS

Month	Mean minimum temperature (°C)	Mean maximum temperature (°C)	Total rainfall (mm)	Long-term monthly average rainfall (mm)
November 2021	15.1	23.1	151.2	76.3
December 2021	16.9	26.9	69.0	67.2
January 2022	20.0	28.1	155.4	90.5
February 2022	18.1	27.1	285.4	110.7
March 2022	17.6	24.9	640.2	104.7
April 2022	14.3	23.7	156.4	82.3

For example: [Bankstown, NSW - April 2022 - Daily Weather Observations \(bom.gov.au\)](https://www.bom.gov.au/australia/nsw/bankstown/)

## 3.2 Ambient Air Quality

Since November 2020, the Department of Planning and Environment (DPE) has implemented 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. DPE 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 range from 'Good' to 'Extremely Poor' and are summarised in Figure 3-2<sup>3</sup>.

			Air quality categories (AQC)				
Air pollutant	Averaging period	Units	GOOD	FAIR	POOR	VERY POOR	EXTREMELY POOR
Ozone O <sub>3</sub>	1-hour	pphm	<6.7	6.7–10.0	10.0–15.0	15.0–20.0	20.0 and above
	4-hour rolling	pphm	<5.4	5.4–8.0	8.0–12.0	12.0–16.0	16.0 and above
Nitrogen dioxide NO <sub>2</sub>	1-hour	pphm	<8	8–12	12–18	18–24	24 and above
Visibility Neph	1-hour	bsp	<1.5	1.5–3.0	3.0–6.0	6.0–18.0	18.0 and above
Carbon monoxide CO	8-hour rolling	ppm	<6.0	6.0–9.0	9.0–13.5	13.5–18.0	18.0 and above
Sulfur dioxide SO <sub>2</sub>	1-hour	pphm	<13.3	13.3–20.0	20.0–30.0	30.0–40.0	40.0 and above
Particulate matter < 10 µm PM <sub>10</sub>	1-hour	µg/m <sup>3</sup>	<50	50–100	100–200	200–600	600 and above
Particulate matter < 2.5 µm PM <sub>2.5</sub>	1-hour	µg/m <sup>3</sup>	<25	25–50	50–100	100–300	300 and above

Figure 3-2: Air quality categories

The PM<sub>10</sub>, PM<sub>2.5</sub>, NO<sub>2</sub> and CO air quality data from the Liverpool<sup>4</sup> monitoring station was reviewed for the six-month reporting period. Below is a summary of the review:

- The AQC monthly average for particulates (PM<sub>10</sub> and PM<sub>2.5</sub>) is derived from 1 hour average for each month. Based on the AQC metric, the baseline air quality for the Liverpool area between November 2021 and 30 April 2022 was rated as 'Good' every day, with the exception of Tuesday 2 November 2021 which was rated as 'Very Poor' for PM<sub>10</sub> when 82.8 µg/m<sup>3</sup> was recorded.
- The NO<sub>2</sub> (ppm) maximum 1 hourly average data and CO (ppm) maximum rolling 8 hourly average data remained in the 'Good' category throughout the six-month reporting period.
- Visibility was reported as 'Good' every day between November 2021 and 30 April 2022, with the exception of Tuesday 2 November 2021 where visibility was rated 'Fair' (2.82 10<sup>-4</sup>m<sup>-1</sup>), which coincided with the "Very Poor" PM<sub>10</sub> rating recorded on the same day.

<sup>3</sup> <https://www.environment.nsw.gov.au/topics/air/understanding-air-quality-data/air-quality-categories>

<sup>4</sup> Data download facility | NSW Dept of Planning, Industry and Environment

## 4 MONITORING RESULTS

### 4.1 Air quality criteria

#### 4.1.1 Criteria for PM<sub>2.5</sub>, PM<sub>10</sub>, NO<sub>2</sub> and CO

Monitoring data has been summarised into tables and graphs for PM<sub>2.5</sub>, PM<sub>10</sub>, NO<sub>2</sub> and CO and are provided in Appendix A.

The National Environment Protection Measure for Ambient Air (Air NEPM)<sup>5</sup> has established new national standards for assessment of air quality for NO<sub>2</sub> and CO, which came into effect 13 May 2021. These criteria are detailed in Table 4-1. The air quality data at MLP Precinct East 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 <sub>2.5</sub>	24-hour average	25 µg/m <sup>3</sup>
	Annual average	8 µg/m <sup>3</sup>
PM <sub>10</sub>	24-hour average	50 µg/m <sup>3</sup>
	Annual average	25 µg/m <sup>3</sup>
NO <sub>2</sub>	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<sub>2.5</sub> will change to 20 µg/m<sup>3</sup> for the 24-hour averaging period and 7 µg/m<sup>3</sup> for the annual average.

#### 4.1.2 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.

DPIE 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 <sup>2</sup> /month (incremental)	4 g/m <sup>2</sup> /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.

<sup>5</sup> <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 1 November 2021 to 1 May 2022 as provided by SERS is shown in Table 4-3.

Table 4-3 Dust deposition (insoluble solids g/m<sup>2</sup>/month) results from November 2021 to April 2022

Analysis Insoluble solids (g/m <sup>2</sup> /month)	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
November 2021	1.9	0.3	0.4	3.5	0.6	1.0	0.3
December 2021	1.2	0.8	0.6	1.9	1.0	1.1	0.3
January 2022	0.4	<0.1	0.3	0.2	0.1	0.1	0.1
February 2022	0.2	<0.1	0.1	0.9	<0.1	<0.1	<0.1
March 2022	0.5	0.2	<0.1	0.2	0.2	<0.1	<0.1
April 2022	0.5	0.2	<0.1	0.2	0.2	<0.1	<0.1

Bold/grey indicates an exceedance of the criteria.

As shown in Table 4-3, there were no exceedances of the dust deposition (insoluble solids) 2 g/m<sup>2</sup>/month (incremental) and 4 g/m<sup>2</sup>/month (cumulative) criteria between 1 November 2021 and 30 April 2022.

## 4.3 Continuous monitor results

### 4.3.1 Annual exceedances

Continuous air quality monitoring for operations commenced on 13 May 2020 and therefore a full year of data is available to review the annual exceedances. The combined rolling average for monitoring during this reporting period is shown in tables and charts provided in Appendix A.

The following sections summarise the results for this reporting period.

#### 4.3.1.1 PM<sub>2.5</sub> and PM<sub>10</sub> Monitoring

The combined rolling average has been below the annual average criteria for PM<sub>2.5</sub> and PM<sub>10</sub> from November 2021 to April 2022.

#### 4.3.1.2 NO<sub>2</sub> Monitoring

The annual average criteria for NO<sub>2</sub> (0.03 ppm) was consistently exceeded from June 2021 to November 2021 (inclusive) at AQM03 and as of 30 April 2022 the rolling 12-month annual average for this monitor is 0.13 ppm.

As discussed in Section 2.4, this monitor has had a low availability throughout this reporting period. The NO<sub>2</sub> data in November 2021 and also during the previous five months has also been significantly higher than in previous reporting period (See Appendix A 3). This has resulted in a rolling NO<sub>2</sub> annual average of 0.037 ppm for all stations, which marginally exceeds the annual criteria of 0.03 ppm.

## 4.3.2 24-hour exceedances

### 4.3.2.1 PM<sub>2.5</sub> Monitoring

No exceedance of the 25 µg/m<sup>3</sup>/day limit for PM<sub>2.5</sub> was recorded during the six months between November 2021 and April 2022.

### 4.3.2.2 PM<sub>10</sub> Monitoring

Two exceedances of the 50 µg/m<sup>3</sup>/day limit for PM<sub>10</sub> were recorded during the 6-month reporting period. These are summarised in Table 4-4.

The table includes the 24-hour average for PM<sub>10</sub> recorded at the Liverpool monitoring station for comparison and includes analysis of the exceedance.

It should be noted that AQM03 stopped recording data from 13 November 2021 to 20 December 2021, during which time the monitor was taken off site for maintenance and/or recalibration.

Table 4-4: Summary of exceedances of the PM<sub>10</sub> 50 µg/m<sup>3</sup>/day limit

Date of exceedance	AQM01 µg/m <sup>3</sup>	AQM02 µg/m <sup>3</sup>	AQM03 µg/m <sup>3</sup>	AQM04 µg/m <sup>3</sup>	Liverpool average <sup>6</sup>	Analysis of exceedance	Train operation
11/11/2021	-	-	106.3	-	17.1	Analysis of monitoring data identified that the high 24-hour average correlated to higher PM <sub>10</sub> readings that occurred between 2 am and 7 am.	Four trains arrived/departed the terminal on 11 November 2021; however, all trains were recorded outside of the hours of the 2 am to 7 am period.
6/01/2022	-	-	63.9	-	25.9	Analysis of monitoring data identified that the high 24-hour average correlated to higher PM <sub>10</sub> readings that occurred between 12 am and 10 am.	Five trains arrived/departed the terminal on 6 January 2022; however, all trains were recorded outside of the hours between 12 am and 10 am.

<https://www.environment.nsw.gov.au/topics/air/monitoring-air-quality/sydney/monitoring-stations/liverpool>

## 4.3.3 NO<sub>2</sub> 1-hour exceedances

AQM03 recorded above the NO<sub>2</sub> 1-hour criteria (0.12 ppm / 120 ppb) every day between 1 November 2021 and 12 November 2021. Recordings fluctuated between 236 ppb and 244 ppb each day. The monitor was taken offsite for maintenance and recalibration after 12 November 2021 and returned on 20 December 2021, where recordings were below criteria.

None of the other stations recorded any exceedances between November 2021 and April 2022.

## 4.3.4 CO 8-hour exceedances

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

<sup>6</sup> 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)

#### **4.4 Complaints**

No complaints in relation to air quality were received in the 6-month reporting period.

#### **4.5 Ad-hoc monitoring**

No ad-hoc monitoring was undertaken between 1 November 2021 and 30 April 2022.

## 5 CONCLUSION

This six-monthly operational air quality report covers the period November 2021 to April 2022.

The following summarises the monitoring results for this reporting period:

- No exceedances of the annual average criteria occurred for PM<sub>2.5</sub> or PM<sub>10</sub>.
- There were two exceedances (out of 181 days) of the PM<sub>10</sub> 24-hour average criteria during the reporting period (about 1%).
  - One exceedance occurred on 11 November 2021 and the other on 6 January 2022.
  - No exceedances corresponded to times when trains were entering/exiting MLP Precinct East.
  - The exceedances coincided with higher readings overnight and during the early morning periods.
  - Investigations at MLP Precinct East upon receipt of the exceedances has not identified significant dust or emissions issues from MLP Precinct East.
  - Both exceedances were recorded at AQM03 which is the monitor located on the western boundary of the site. Causes of the recorded exceedances may be attributed to construction activities relating to MLP Precinct West.
  - No out of hours deliveries for MPW Stage 2 occurred on the observed exceedance days.
- No exceedance of the dust deposition (insoluble solids) 2 g/m<sup>2</sup>/month (incremental) or 4 g/m<sup>2</sup>/month (cumulative) criteria was observed during the reporting period.
- The annual average criteria for NO<sub>2</sub> (0.03 ppm) was consistently exceeded from June 2021 to November 2021 (inclusive) at AQM03 and as of 30 April 2022 the rolling 12-month annual average for this monitor is 0.13 ppm. As discussed in Section 2.4, this monitor has had a low availability throughout this reporting period. The NO<sub>2</sub> data in November 2021 and also during the previous five months has also been significantly higher than in previous reporting period. This has resulted in a rolling NO<sub>2</sub> annual average of 0.037 ppm for all stations, which marginally exceeds the annual criteria of 0.03 ppm. The monitor was taken off site for maintenance and recalibration in November 2021 and when returned in December 2021, after which the recordings appeared to be more normal.
- There were exceedances of the 1-hour average criteria for NO<sub>2</sub> (0.12 ppm) every day between 1 November 2021 and 12 November 2021 for monitor AQM03.
- AQM03 has had a low availability throughout this reporting period. The monitor was taken offsite on 13 November 2021 for maintenance and recalibration and data was recorded from 20 December 2021 to 16 February 2022. However, no data (PM, NO<sub>2</sub> or CO) has been recorded from 16 February 2022 to 30 April 2022.
- There were no exceedances of the CO criteria (9.0 ppm) at AQM02 and AQM04.
- The weather monitor located in Wattle Grove appeared to be faulty (wind direction and speed were the same each month) from October 2021 to February 2022. Readings in March and April 2022 appeared to be more normal, particularly when referenced to the Bankstown AWS.
- It is recommended that the operation of monitor AQM03 is investigated as soon as possible to determine whether there is a malfunction, incorrect calibration, vandalism, or isolated source of exceedance in proximity to the monitor. If there is an issue with the monitor, it should be rectified as soon as possible as to not impede air quality results for MPE.

## APPENDIX A

Appendix A 1: Rolling particulate data (PM<sub>2.5</sub>)

Month	Average AQM01	Average AQM02	Average AQM03	Average AQM04	Months Average All stations	Rolling annual average All stations	Annual average criteria	Comments
	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	
May 2021	1.3	4.5	0.0	0.8	1.7	3.8	8.0	No exceedance of annual average criteria.
June 2021	1.0	4.5	8.1	1.7	3.8	3.8	8.0	No exceedance of annual average criteria. AQM03 only began recording data from 15 June 2021 and recorded consistently high values.
July 2021	1.3	4.8	18.6	2.8	6.9	3.9	8.0	No exceedance of annual average criteria. AQM03 recorded consistently high values.
August 2021	0.4	1.8	6.9	1.2	2.6	3.9	8.0	No exceedance of annual average criteria.
September 2021	0.7	2.3	6.3	1.4	2.7	3.7	8.0	No exceedance of annual average criteria.
October 2021	0.8	2.5	7.5	1.6	3.1	3.6	8.0	No exceedance of annual average criteria.
November 2021	0.8	3.4	9.1	2.4	3.9	3.7	8.0	No exceedance of annual average criteria. AQM03 was only operational for 39% of November. The monitor was removed from site on 13 November 2021 for maintenance and/or calibration.
December 2021	0.5	2.5	2.4	2.1	1.9	3.3	8.0	No exceedance of annual average criteria. AQM03 was only operational for 37% of December. The monitor started recording data from 20 December 2021.
January 2022	0.8	3.6	8.5	3.1	4.0	3.4	8.0	No exceedance of annual average criteria.
February 2022	0.8	3.3	8.5	3.1	3.9	3.4	8.0	No exceedance of annual average criteria. AQM03 was not operational from 16 February 2022.

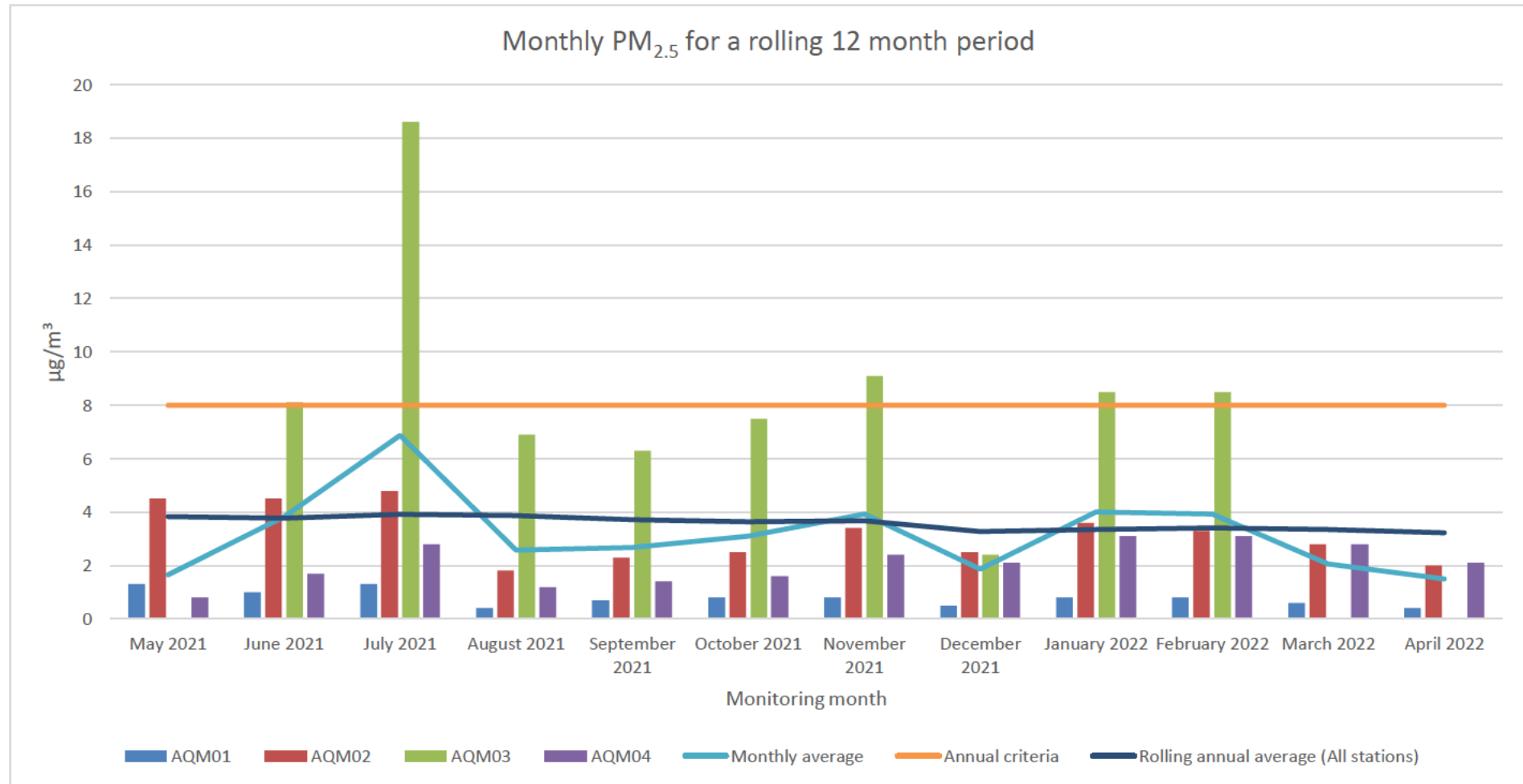


MLP East Precinct Operational Air Quality Six Monthly Compliance Report #4 – November 2021 to April 2022

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	
March 2022	0.6	2.8	<b>No reading</b>	2.8	2.1	3.3	8.0	No exceedance of annual average criteria. AQM03 has not been operational since 16 February 2022.
April 2022	0.4	2.0	<b>No reading</b>	2.1	1.5	3.2	8.0	No exceedance of annual average criteria. AQM03 has not been operational since 16 February 2022.
<b>Rolling 12 month average</b>	0.8	3.2	7.6	2.1	-	-	8.0	No exceedance of annual average criteria.
<b>All months<sup>^</sup></b>	1.3	4.6	5.2	3.3	3.6	-	8.0	No exceedance of annual average criteria.

Bold/grey indicates an exceedance of the criteria.

<sup>^</sup> All months since May 2020



Monthly PM<sub>2.5</sub> over 12 months including the 6-months for this report

Appendix A 2: Rolling annual particulate data (PM<sub>10</sub>)

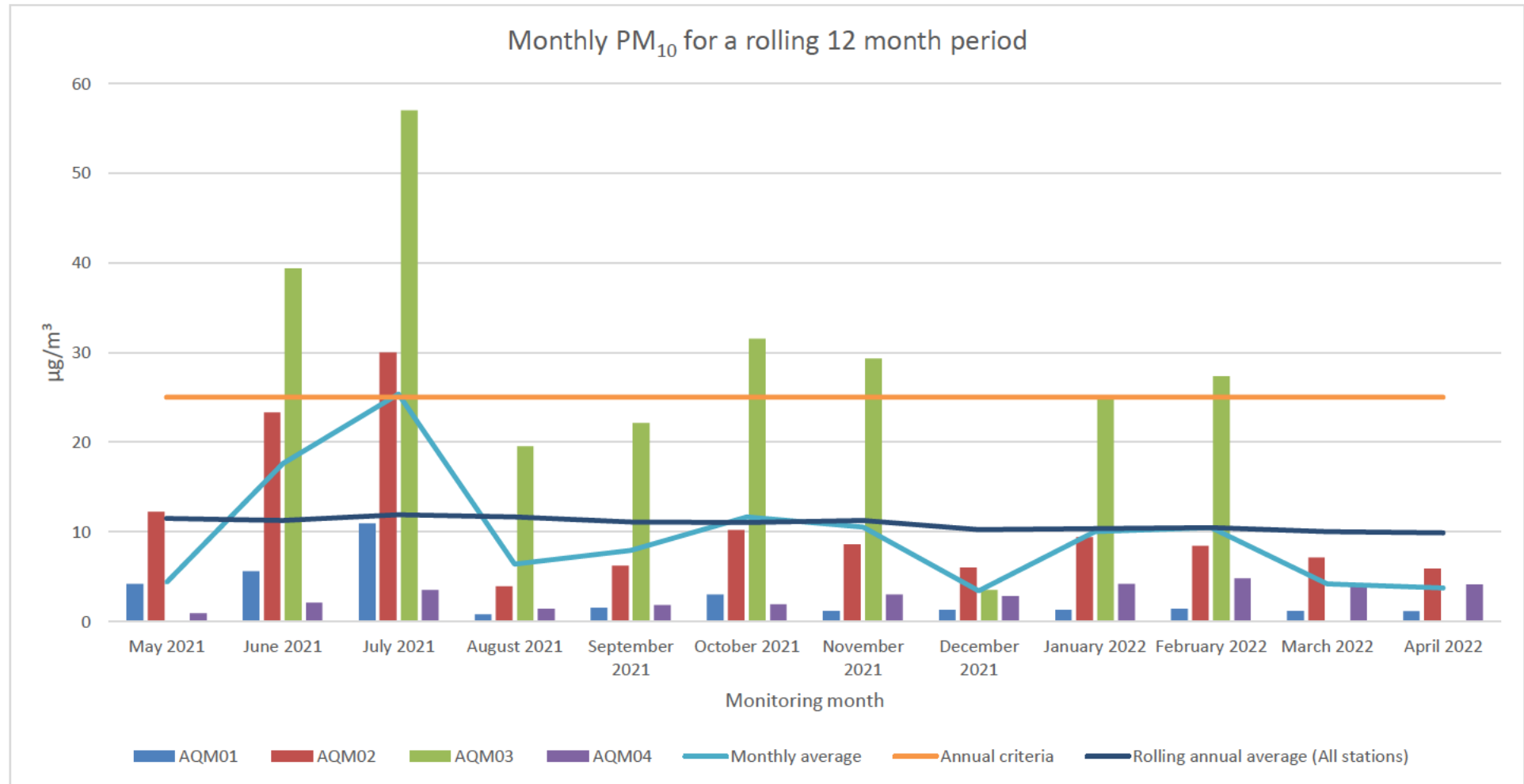
Month	Average AQM01	Average AQM02	Average AQM03	Average AQM04	Months Average All stations	Rolling annual average All stations	Annual average criteria	Comments
	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	
May 2021	4.2	12.2	0.0	0.9	4.3	11.1	25.0	No exceedance of annual average criteria. AQM03 and AQM04 were operational for a limited time during the reporting period.
June 2021	5.6	23.3	<b>39.4</b>	2.1	17.6	11.3	25.0	No exceedance of annual average criteria. AQM03 only began recording data from 15 June 2021 and recorded consistently high values.
July 2021	10.9	<b>30.0</b>	<b>57.0</b>	3.5	<b>25.4</b>	11.9	25.0	No exceedance of annual average criteria. AQM03 recorded consistently high values.
August 2021	0.8	3.9	19.5	1.4	6.4	11.7	25.0	No exceedance of annual average criteria.
September 2021	1.5	6.2	22.1	1.8	7.9	11.1	25.0	No exceedance of annual average criteria.
October 2021	3.0	10.2	<b>31.5</b>	1.9	11.7	11.1	25.0	No exceedance of annual average criteria.
November 2021	1.2	8.6	<b>29.3</b>	3.0	10.5	11.2	25.0	No exceedance of annual average criteria. AQM03 was only operational for 39% of November and was removed from site on 13 November 2021 for maintenance and/or calibration
December 2021	1.3	6.0	3.5	2.8	3.4	10.2	25.0	No exceedance of annual average criteria. AQM03 was only operational for 37% of December. The monitor started recording data from 20 December 2021.
January 2022	1.3	9.4	<b>25.1</b>	4.2	10.0	10.4	25.0	No exceedance of annual average criteria.
February 2022	1.4	8.4	<b>27.3</b>	4.8	10.5	10.5	25.0	No exceedance of annual average criteria. AQM03 was not operational from 16 February 2022.

MLP East Precinct Operational Air Quality Six Monthly Compliance Report #4 – November 2021 to April 2022

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	
March 2022	1.2	7.1	<b>No reading</b>	4.2	4.2	10.0	25.0	No exceedance of annual average criteria. AQM03 has not been operational since 16 February 2022.
April 2022	1.1	5.9	<b>No reading</b>	4.1	3.7	9.9	25.0	No exceedance of annual average criteria. AQM03 has not been operational since 16 February 2022.
<b>Rolling 12 month average</b>	2.8	10.9	25.5	2.9	-	-	25.0	No exceedance of annual average criteria.
All months <sup>^</sup>	3.6	14.8	17.8	6.8	10.8	-	25.0	No exceedance of annual average criteria.

Bold/grey indicates an exceedance of the criteria.

<sup>^</sup> All months since May 2020



Monthly PM<sub>10</sub> over 12 months including the 6-months for this report

Appendix A 3: Rolling monthly and annual particulate data (NO<sub>2</sub>)

Month	Average AQM01	Average AQM02	Average AQM03	Average AQM04	Months Average All stations	Rolling annual average All stations	Annual average criteria	Comments
	ppb	ppb	ppb	ppb	ppb	ppb	ppm / ppb*	
May 2021	9.5	8.5	4.5	10.1	8.2	7.2	0.03 / 30.0	No exceedance of annual average criteria. AQM03 and AQM04 were operational for a limited time during the reporting period.
June 2021	10.1	9.4	<b>204.6</b>	11.2	<b>58.8</b>	12.0	0.03 / 30.0	No exceedance of annual average criteria. AQM03 did not record NO <sub>2</sub> data from 3-9 June 2021 and then again from 10-15 June 2021. AQM03 recorded consistently high NO <sub>2</sub> values from 15-30 June 2021.
July 2021	8.9	9.2	<b>238.1</b>	10.9	<b>66.8</b>	17.5	0.03 / 30.0	No exceedance of annual average criteria. AQM03 recorded consistently high values.
August 2021	8.0	9.1	<b>238.1</b>	10.3	<b>66.4</b>	22.8	0.03 / 30.0	No exceedance of annual average criteria for all sites. However, AQM03 has exceeded the rolling annual average.
September 2021	8.7	9.2	<b>238.1</b>	10.8	<b>66.7</b>	28.1	0.03 / 30.0	No exceedance of annual average criteria for all sites. However, AQM03 has exceeded the rolling annual average.
October 2021	8.5	9.0	<b>238.1</b>	11.0	<b>66.7</b>	<b>33.5</b>	0.03 / 30.0	The annual average criteria for all sites has been exceeded. AQM03 has exceeded the rolling 12-month average.
November 2021	7.7	8.3	<b>238.1</b>	9.0	<b>65.8</b>	<b>38.7</b>	0.03 / 30.0	The annual average criteria for all sites has been exceeded. AQM03 has exceeded the rolling 12-month average.
December 2021	7.6	8.7	3.9	9.2	7.4	<b>38.6</b>	0.03 / 30.0	The annual average criteria for all sites has been exceeded. AQM03 has exceeded the rolling 12-month average.
January 2022	6.6	7.5	3.5	8.2	6.5	<b>38.0</b>	0.03 / 30.0	The annual average criteria for all sites has been exceeded. AQM03 has exceeded the rolling 12-month average.

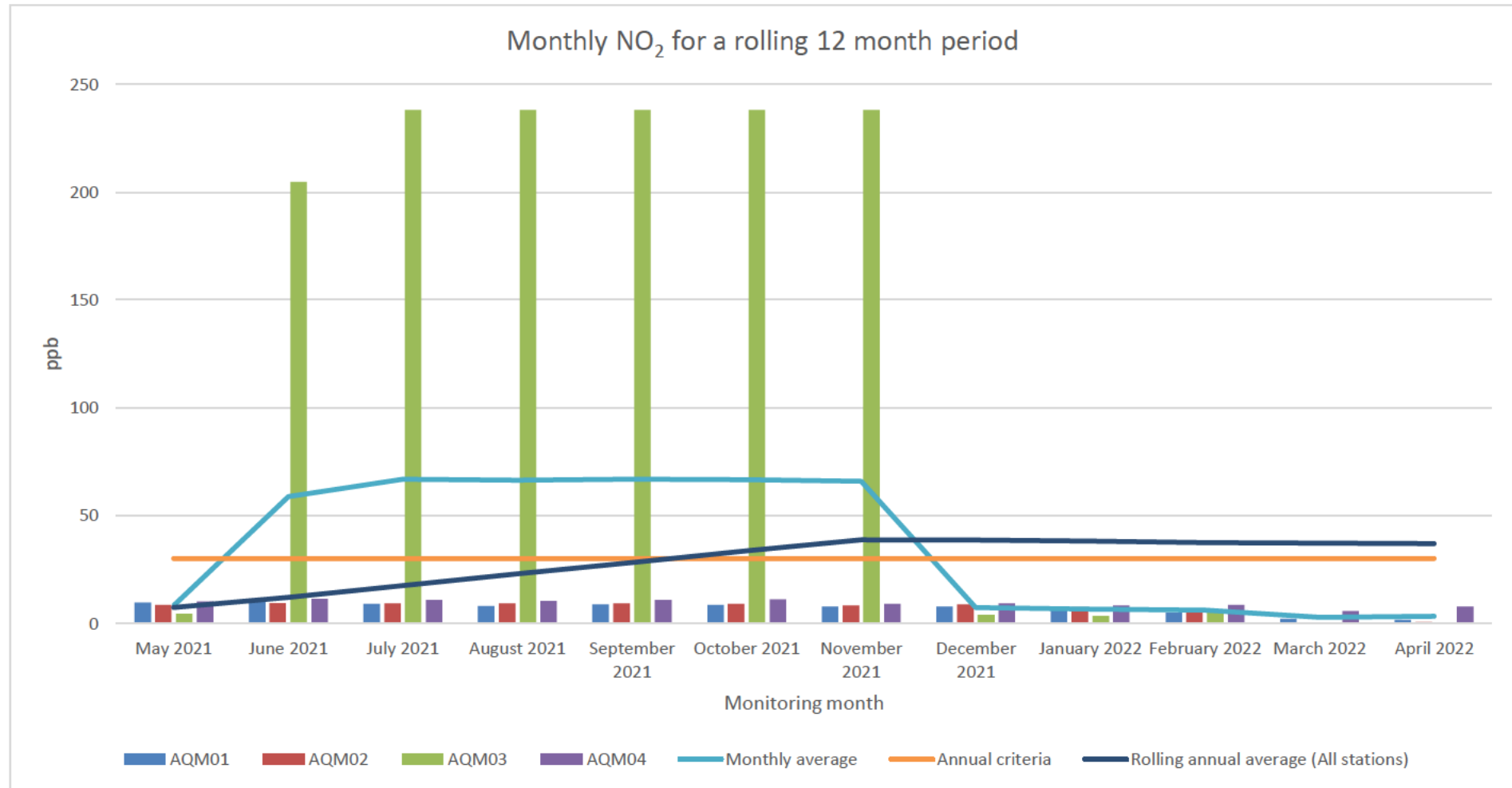
MLP East Precinct Operational Air Quality Six Monthly Compliance Report #4 – November 2021 to April 2022

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*	
February 2022	4.8	5.0	5.6	8.5	6.0	<b>37.3</b>	0.03 / 30.0	AQM03 was not operational from 16 February 2022. The annual average criteria for all sites has been exceeded. AQM03 has exceeded the rolling 12-month average.
March 2022	2.1	0.4	<b>No reading</b>	5.7	2.7	<b>37.1</b>	0.03 / 30.0	AQM03 has not been operational since 16 February 2022. The annual average criteria for all sites has been exceeded. AQM03 has exceeded the rolling 12-month average.
April 2022	1.6	0.5	<b>No reading</b>	7.6	3.2	<b>36.8</b>	0.03 / 30.0	AQM03 has not been operational since 16 February 2022. The annual average criteria for all sites has been exceeded. AQM03 has exceeded the rolling 12-month average.
<b>Rolling 12 month average</b>	0.007 ppm / 7.0 ppb	0.007 ppm / 7.1 ppb	<b>0.141 ppm / 141.3 ppb</b>	0.009 ppm / 9.4 ppb	-	-	0.03 / 30.0	Exceedance of annual average criteria for all sites. AQM03 has exceeded the rolling 12-month average.
<b>All months^</b>	0.005 ppm / 5.2 ppb	0.007 ppm / 6.7 ppb	<b>0.068 ppm / 68.2 ppb</b>	0.011 ppm / 11.1 ppb	0.022 ppm / 22.3 ppb	-	0.03 ppm / 30.0 ppb	No exceedance of average criteria for all sites for all months. However, AQM03 has exceeded the annual average for the period since monitoring began.

Bold/grey indicates an exceedance of the criteria.

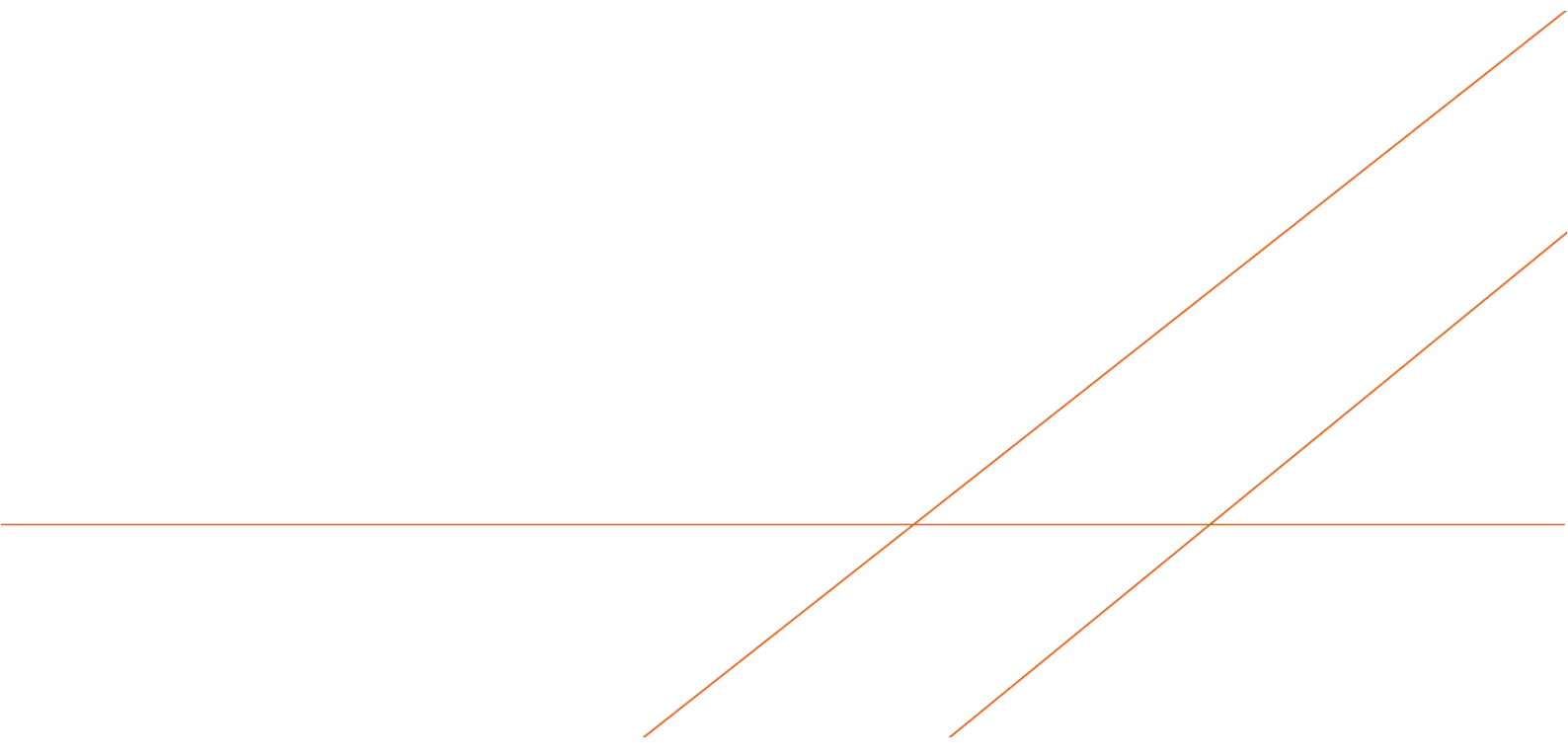
\*Results are shown in ppb due to reporting output, however the criteria is set in ppm and therefore the equivalent criteria in ppb is also shown.

^ All months since May 2020



Monthly NO<sub>2</sub> over 12 months including the 6-months for this report







# APPENDIX D – NOISE MONITORING REPORTS

# MOOREBANK INTERMODAL TERMINAL

## Six Monthly Review of AoA - May 2022

18 May 2022

Tactical Group

TL116-05F17 AoA Report May 2022 (r0).docx

## Document details

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Attention:	Marvin Do

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We have derived data in this report from information sourced from the Client (if any) and/or available in the public domain at the time or times outlined in this report. The passage of time, manifestation of latent conditions or impacts of future events may require further examination and re-evaluation of the data, findings, observations and conclusions expressed in this report.

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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## Contents

1	Introduction	1
1.1	Project overview	1
2	Compliance Matrix	2
3	Rail link angle of attack (AoA) monitoring	5
3.1	AoA monitoring results for current six-month period	5
4	Conclusion	7
APPENDIX A	Glossary of terminology	8

### List of tables

Table 1	Compliance matrix	3
---------	-------------------	---

### List of figures

Figure 1	Maximum AoA value for each train passby	6
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# 1 Introduction

## 1.1 Project overview

The Sydney Intermodal Terminal Alliance (SIMTA) received approval for the construction and operation of Stages 1 and 2 of the Moorebank Precinct East (MPE) Project (SSD 6766 and SSD 7628 respectively), which together comprise the two stages of development under the MPE Concept Approval (MP10\_0193).

This report has been prepared to address the requirements of Approval Condition G7A of SSD 6766, which requires the submission of a six-monthly report to the Secretary, which identifies the number of wagons with wheels that exceed the ASA standard angle of attack and the action taken by operators to improve steering performance.

Appendix A contains a glossary of acoustic terms used in this report.

## 2 Compliance Matrix

Table 1 provides a summary of the Approval Conditions which relate to this report.

**Table 1 Compliance matrix**

Condition ID	Condition	Comments on compliance	Reference for further information
<b>SSD 6766</b>			
G7	<p>The Applicant shall 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 shall capture the noise from each individual train passby noise generation event, and include information to identify:</p> <ul style="list-style-type: none"> <li>a) Time and date of freight train passbys;</li> <li>b) Imagery or video to enable identification of the rolling stock during day and night;</li> <li>c) <math>L_{Aeq(15hour)}</math> and <math>L_{Aeq(9hour)}</math> from rail operations; and</li> <li>d) <math>L_{AF(max)}</math> and SEL of individual train passbys, measured in accordance with ISO3095; or</li> <li>e) Other alternative information as agreed with, or required by, the Secretary.</li> </ul> <p>The results from the noise monitoring system, shall be publicly accessible from a website maintained by the Applicant. The noise results from each train shall be available on the website within 24 hours of it passing the monitor, unless unforeseen circumstances (i.e a system malfunction) have occurred. The <math>L_{Aeq(15hour)}</math> and <math>L_{Aeq(9hr)}</math> results from each day shall be available on the website within 24 hours of the period ending.</p> <p>Prior to the commencement of operation, the Applicant shall submit for the approval of the Secretary, 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 rail noise monitoring system shall not operate until the Secretary has approved the proposed monitoring location.</p> <p>The Applicant shall provide an annual report to the Secretary with the results of monitoring for a period of 5 years, or as otherwise agreed with the Secretary, from the commencement of operation of the IMEX terminal. The Secretary shall consider the need for further reporting following a review of the results for year 5.</p>	<p>This condition is not directly related to this report. It is referenced herein on the basis that noise levels from the rail noise monitoring system provides information that may correlate with the Angle of Attack measurement results.</p>	<p><a href="https://simta.com.au/wordpress/wp-content/uploads/2019/12/TJ741-04F04-AoA-and-Functional-Spec-for-Permanent-Noise-Monitor-r9_redacted.pdf">https://simta.com.au/wordpress/wp-content/uploads/2019/12/TJ741-04F04-AoA-and-Functional-Spec-for-Permanent-Noise-Monitor-r9_redacted.pdf</a></p> <p><a href="https://moorebanknoisemonitor-emsbk.trackiq.net/NoiseMonitor/">https://moorebanknoisemonitor-emsbk.trackiq.net/NoiseMonitor/</a></p>



Condition ID	Condition	Comments on compliance	Reference for further information
G7A	<p>The applicant shall install and maintain a wayside angle of attack monitoring system on the rail link at the commencement of operation to continuously monitor the angle of attack to the rail of rolling stock wheels.</p> <p>The system shall capture the angle of attack from a wheel on each axle of every train, and include information to identify:</p> <ol style="list-style-type: none"> <li>a) Time and date of each axle passby; and</li> <li>b) The identification number of each item of rolling stock.</li> </ol> <p>The results from the angle of attack monitoring system shall be:</p> <ul style="list-style-type: none"> <li>• accessible by train operators from a website maintained by the Applicant.</li> </ul> <p>Angle of attack results from each train shall be available on the website within 24 hours of it passing the monitor, unless unforeseen circumstances have occurred.</p> <ul style="list-style-type: none"> <li>• included in a six-monthly report to the Secretary. The report should at least identify the number of wagons with wheels that exceed the ASA standard angle of attack and the action taken by operators to improve steering performance.</li> </ul> <p>Prior to the commencement of operation, the Applicant shall submit for the approval of the Secretary, justification supporting the appropriateness of the location for angle of attack monitoring, the format of the information to be accessible to operators and the format of the public report. The angle of attack monitoring system shall not operate until the Secretary has approved the proposed monitoring location and reporting arrangements.</p>	<p>An Angle of Attack (AoA) monitoring system was installed on the new rail link in May 2020. The monitoring system captures the AoA of each axle passby and compares the measured values with the acceptable value in the applicable Asset Standards Authority minimum operating standard.</p> <p>The AoA values for each axle are available to operators in accordance with the approval condition.</p> <p>A Functional and Performance Specification for the permanent noise monitoring system and angle of attack monitoring system was prepared for approval by the Secretary before the rail link commissioning.</p> <p>A summary of the AoA noise monitoring results for the current six month period is provided in Section 3.1. The monitoring identified 15 trains where the maximum AoA value exceeded the alarm level. None of these events resulted in elevated noise levels at the permanent noise monitoring location.</p> <p>The majority of these were viewed as one-off instances, occurring irregularly.</p>	Section 3

### 3 Rail link angle of attack (AoA) monitoring

The performance of wagon bogies and their ability to negotiate small radius curves without generating curve squeal, is assessed in terms of the angle of attack (AoA) of the wheelset. Acceptable AoA values are defined in Section 2.7.1 of Asset Standards Authority Standard T HR RS 00400 ST<sup>1</sup> and are a function of the curve radius and wheel base.

An AoA measurement system was installed on the rail link and partially commissioned on 13 May 2020. The system was fully commissioned on 9 July 2020 at the same time as the permanent noise monitoring system. The AoA system is installed on the eastern track.

Justification supporting the appropriateness of the proposed monitoring location is provided in the *Functional and Performance Specification for Permanent Noise Monitor and Proposed Noise and AoA Monitoring Locations*<sup>2</sup>, and was approved by the Secretary.

This report provides a summary of the AoA measurement data for the period between 26 October 2021 and 28 April 2022. In accordance with the requirements of the SSD 6766 Condition G7A, the AoA of a wheel of each axle of each train is captured by the measurement system. This data is accessible by train operators on a website maintained by QUBE.

Below is a summary of the monitoring results.

#### 3.1 AoA monitoring results for current six-month period

This report covers rail movements between 26 October 2021 and 28 April 2022. A summary of the key statistics is provided below:

- Number of valid train passby events – **252**
- Number of train passby events where the measure AoA values on one or more axles were above the acceptable level defined in Section 2.7.1 of Asset Standards Authority Standard T HR RS 00400 ST – **15** (representing 6% of passbys).

A summary of the maximum AoA value measured for each train is provided in Figure 1. The results show that the maximum AoA value is typically less than 10 mrad. Fifteen train passbys had maximum AoA values greater than the established alarm level of approximately 19 mrad. The majority of these were viewed as one-off instances, occurring irregularly. The cluster of AoA exceedances between 23/2/2022 and 2/3/2022 were reviewed and determined to be from three different train consists.

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<sup>1</sup> Transport for NSW Asset Standards Authority T HR RS 00400 ST *RSU 400 Series – Minimum Operating Standards for Rolling Stock – Freight Vehicle Specific Interface Requirements* Version 2.0 dated 24 August 2017

<sup>2</sup> Renzo Tonin & Associates Report TJ741-04F04 AoA and Functional Spec for Permanent Noise Monitor (r8) – available [https://simta.com.au/wordpress/wp-content/uploads/2019/12/TJ741-04F04-AoA-and-Functional-Spec-for-Permanent-Noise-Monitor-r9\\_redacted.pdf](https://simta.com.au/wordpress/wp-content/uploads/2019/12/TJ741-04F04-AoA-and-Functional-Spec-for-Permanent-Noise-Monitor-r9_redacted.pdf)



## 4 Conclusion

This report has been prepared to address the requirements of Approval Condition G7A of SSD 6766, which requires the submission of a six-monthly report to the Secretary, which identifies the number of wagons with wheels that exceed the ASA standard angle of attack and the action taken by operators to improve steering performance.

For rail movements between 26 October 2021 and 28 April 2022, fifteen train passbys had maximum AoA values greater than the established alarm level of approximately 19 mrad. The majority of these were viewed as one-off instances, occurring irregularly. None of these events resulted in elevated noise levels at the permanent noise monitoring location [i.e. where the calculated  $L_{Aeq(9hour)}$  noise levels at 30 m were above 60 dB(A)].

## 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.

Absorption Coefficient $\alpha$	The absorption coefficient of a material, usually measured for each octave or third-octave band and ranging between zero and one. For example, a value of 0.85 for an octave band means that 85% of the sound energy within that octave band is absorbed on coming into contact with the material. Conversely, a low value below about 0.1 means the material is acoustically reflective.
Adverse weather	Weather effects that enhance noise (particularly wind and temperature inversions) occurring at a site for a significant period of time. In the NSW INP this occurs when wind occurs for more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of nights in winter.
Air-borne noise	Noise which is fundamentally transmitted by way of the air and can be attenuated by the use of barriers and walls placed physically between the noise source and receiver.
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.
AoA	Angle of Attack - As the wheels on a bogie negotiate a tight curve, the leading wheelset typically presents an Angle-of-Attack (AoA) to the rail. The AoA of a leading wheelset with good steering performance can be calculated from $AoA = \text{wheelbase (m)} / \text{curve radius (m)}$ . AoA is normally measured in milliradian (mrad).
Amenity	A desirable or useful feature or facility of a building or place.
AS	Australian Standard
ASA	Asset Standards Authority
Assessment period	The time period in which an assessment is made. e.g. Day 7am-10pm & Night 10pm-7am.
Assessment Point	A location at which a noise or vibration measurement is taken or estimated.
Attenuation	The reduction in the level of sound or vibration.
Audible Range	The limits of frequency which are audible or heard as sound. The normal hearing in young adults detects ranges from 20 Hz to 20 kHz, although some people can detect sound with frequencies outside these limits.
A-weighting	A filter applied to the sound recording made by a microphone to approximate the response of the human ear.
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. 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 LA90 noise level if measured as an overall level or an L90 noise level when measured in octave or third-octave bands.
Barrier (Noise)	A natural or constructed physical barrier which impedes the propagation of sound and includes fences, walls, earth mounds or berms and buildings.
Berm	Earth or overburden mound.
Buffer	An area of land between a source and a noise-sensitive receiver and may be an open space or a noise-tolerant land use.
Bund	A bund is an embankment or wall of brick, stone, concrete or other impervious material, which may form part or all of the perimeter of a compound.
BS	British Standard

CoRTN	United Kingdom Department of Environment entitled "Calculation of Road Traffic Noise (1988)"		
Decibel [dB]	The units that sound is measured in. The following are examples of the decibel readings of common sounds in our environment:		
	threshold of hearing	0 dB	The faintest sound we can hear, defined as 20 micro Pascal
		10 dB	Human breathing
	almost silent	20 dB	
		30 dB	Quiet bedroom or in a quiet national park location
	generally quiet	40 dB	Library
		50 dB	Typical office space or ambience in the city at night
	moderately loud	60 dB	CBD mall at lunch time
		70 dB	The sound of a car passing on the street
	loud	80 dB	Loud music played at home
		90 dB	The sound of a truck passing on the street
	very loud	100 dB	Indoor rock band concert
		110 dB	Operating a chainsaw or jackhammer
	extremely loud	120 dB	Jet plane take-off at 100m away
130 dB			
threshold of pain	140 dB	Military jet take-off at 25m away	
dB(A)	A-weighted decibel. 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 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. The dB(C) level is not widely used but has some applications.		
Diffraction	The distortion of sound waves caused when passing tangentially around solid objects.		
DIN	German Standard		
ECRTN	Environmental Criteria for Road Traffic Noise, NSW, 1999		
ENMM	Environmental Noise Management Manual, Roads and Maritime Services (Transport for NSW)		
EPA	Environment Protection Authority		
Field Test	A test of the sound insulation performance in-situ. See also 'Laboratory Test' The sound insulation performance between building spaces can be measured by conducting a field test, for example, early during the construction stage or on completion. A field test is conducted in a non-ideal acoustic environment. It is generally not possible to measure the performance of an individual building element accurately as the results can be affected by numerous field conditions.		
Fluctuating Noise	Noise that varies continuously to an appreciable extent over the period of observation.		
Free-field	An environment in which there are no acoustic reflective surfaces. Free field noise measurements are carried out outdoors at least 3.5m from any acoustic reflecting structures other than the ground.		
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.		

Ground-borne noise	Vibration propagated through the ground and then radiated as noise by vibrating building elements such as wall and floor surfaces. This noise is more noticeable in rooms that are well insulated from other airborne noise. An example would be vibration transmitted from an underground rail line radiating as sound in a bedroom of a building located above.
Habitable Area	Includes a bedroom, living room, lounge room, music room, television room, kitchen, dining room, sewing room, study, playroom, family room, home theatre and sunroom. Excludes a bathroom, laundry, water closet, pantry, walk-in wardrobe, corridor, hallway, lobby, photographic darkroom, clothes drying room, and other spaces of a specialised nature occupied neither frequently nor for extended periods.
Heavy Vehicle	A truck, transporter or other vehicle with a gross weight above a specified level (for example: over 8 tonnes).
IGANRIP	Interim Guideline for the Assessment of Noise from Rail Infrastructure Projects, NSW DEC 2007
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.
INP	NSW Industrial Noise Policy, EPA 1999
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.
Intrusive noise	Refers to noise that intrudes above the background level by more than 5 dB(A).
ISEPP	State Environmental Planning Policy (Infrastructure), NSW, 2007
ISEPP Guideline	Development Near Rail Corridors and Busy Roads - Interim Guideline, NSW Department of Planning, December 2008
L1	The sound pressure level that is exceeded for 1% of the time for which the given sound is measured.
L10	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
L10(1hr)	The L10 level measured over a 1 hour period.
L10(18hr)	The arithmetic average of the L10(1hr) levels for the 18 hour period between 6am and 12 midnight on a normal working day.
L90	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).
LAeq or Leq	The "equivalent noise level" is the summation of noise events and integrated over a selected period of time, which would produce the same energy as a fluctuating sound level. When A-weighted, this is written as the LAeq.
LAeq(1hr)	The LAeq noise level for a one-hour period. In the context of the NSW EPA's Road Noise Policy it represents the highest tenth percentile hourly A-weighted Leq during the period 7am to 10pm, or 10pm to 7am (whichever is relevant).
LAeq(8hr)	The LAeq noise level for the period 10pm to 6am.
LAeq(9hr)	The LAeq noise level for the period 10pm to 7am.
LAeq(15hr)	The LAeq noise level for the period 7am to 10pm.
LAeq (24hr)	The LAeq noise level during a 24 hour period, usually from midnight to midnight.
Lmax	The maximum sound pressure level measured over a given period. When A-weighted, this is usually written as the Lmax.
Lmin	The minimum sound pressure level measured over a given period. When A-weighted, this is usually written as the Lmin.
Loudness	A rise of 10 dB in sound level corresponds approximately to a doubling of subjective loudness. That is, a sound of 85 dB is twice as loud as a sound of 75 dB which is twice as loud as a sound of 65 dB and so on. That is, the sound of 85 dB is four times or 400% the loudness of a sound of 65 dB.

Microphone	An electro-acoustic transducer which receives an acoustic signal and delivers a corresponding electric signal.
MPE	Moorebank Precinct East
NCA	Noise Catchment Area. An area of study within which the noise environment is substantially constant.
NCG	Noise Criteria Guideline, Roads and Maritime Services (Transport for NSW)
NMG	Noise Mitigation Guideline, Roads and Maritime Services (Transport for NSW)
Noise	Unwanted sound
Pre-construction	Work in respect of the proposed project that includes design, survey, acquisitions, fencing, investigative drilling or excavation, building/road dilapidation surveys, minor clearing (except where threatened species, populations or ecological communities would be affected), establishing ancillary facilities such as site compounds, or other relevant activities determined to have minimal environmental impact (e.g. minor access roads).
Reflection	Sound wave reflected from a solid object obscuring its path.
RING	Rail Infrastructure Noise Guideline, NSW, May 2013
RMS	Root Mean Square value representing the average value of a signal.
Rw	Weighted Sound Reduction Index A measure of the sound insulation performance of a building element. It is measured in very controlled conditions in a laboratory. The term supersedes the value STC which was used in older versions of the Building Code of Australia. Rw is measured and calculated using the procedure in ISO 717-1. The related field measurement is the DnT,w. The higher the value the better the acoustic performance of the building element.
R'w	Weighted Apparent Sound Reduction Index. As for Rw but measured in-situ and therefore subject to the inherent accuracies involved in such a measurement. The higher the value the better the acoustic performance of the building element.
RNP	Road Noise Policy, NSW, March 2011
Sabine	A measure of the total acoustic absorption provided by a material. It is the product of the Absorption Coefficient (alpha) and the surface area of the material (m2). For example, a material with alpha = 0.65 and a surface area of 8.2m2 would have 0.65 x 8.2 = 5.33 Sabine. Sabine is usually calculated for each individual octave band (or third-octave).
SEL	Sound Exposure Level (SEL) is the constant sound level which, if maintained for a period of 1 second would have the same acoustic energy as the measured noise event. SEL noise measurements are useful as they can be converted to obtain Leq sound levels over any period of time and can be used for predicting noise at various locations.
Sound	A fluctuation of air pressure which is propagated as a wave through air.
Sound absorption	The ability of a material to absorb sound energy by conversion to thermal energy.
Sound Insulation	Sound insulation refers to the ability of a construction or building element to limit noise transmission through the building element. The sound insulation of a material can be described by the Rw and the sound insulation between two rooms can be described by the DnT,w.
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 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 of 1 pico watt.
Sound pressure level	The level of noise, usually expressed in decibels, as measured by a standard sound level meter with a microphone referenced to 20 micro Pascal.
Spoil	Soil or materials arising from excavation activities.



SSFL	Southern Sydney Freight Line
STC	<p>Sound Transmission Class</p> <p>A measure of the sound insulation performance of a building element. It is measured in controlled conditions in a laboratory.</p> <p>The term has been superseded by Rw.</p>
Structure-borne Noise	<p>Audible noise generated by vibration induced in the ground and/or a structure. Vibration can be generated by impact or by solid contact with a vibrating machine.</p> <p>Structure-borne noise cannot be attenuated by barriers or walls but requires the isolation of the vibration source itself. This can be achieved using a resilient element placed between the vibration source and its support such as rubber, neoprene or springs or by physical separation (using an air gap for example).</p> <p>Examples of structure-borne noise include the noise of trains in underground tunnels heard to a listener above the ground, the sound of footsteps on the floor above a listener and the sound of a lift car passing in a shaft. See also 'Impact Noise'.</p>
Tonal Noise	Sound containing a prominent frequency and characterised by a definite pitch.
Transmission Loss	<p>The sound level difference between one room or area and another, usually of sound transmitted through an intervening partition or wall. Also the vibration level difference between one point and another.</p> <p>For example, if the sound level on one side of a wall is 100dB and 65dB on the other side, it is said that the transmission loss of the wall is 35dB. If the transmission loss is normalised or standardised, it then becomes the Rw or R'w or DnT,w.</p>
Wheelbase	The wheelbase is the distance between the centres of the front and rear wheels on a 2-axle bogie.



# APPENDIX E - B106/B43 REPORT

# **MOOREBANK PRECINCT EAST STAGE 2: BIODIVERSITY MONITORING IN ANZAC CREEK**

**AUTUMN 2021 SURVEY**



**Final Report Prepared for  
ARCADIS**

**22 July 2021**

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## EXECUTIVE SUMMARY

### Introduction

The Sydney Intermodal Terminal Alliance (SIMTA) received approval for the construction and operation of Stage 2 (the Project) of the Moorebank Precinct East (MPE) Project, which comprises the second stage of development under the MPE Concept Approval (MP10\_0193) and approved under Development Approval SSD 7628.

The MPE site, including the Project site, is located approximately 27 km south-west of the Sydney Central Business District (CBD) and approximately 26 km west of Port Botany and includes the former Defence National Storage and Distribution Centre (DNSDC) site. The MPE site is situated within the Liverpool Local Government Area (LGA), in Sydney's South West subregion, approximately 2.5 km from the Liverpool City Centre.

The MPE Project involves the development of an intermodal facility including warehouse and distribution facilities, freight village (ancillary site and operational services), stormwater infrastructure, landscaping, servicing and associated works on the eastern side of Moorebank Avenue. Stage 2 of the MPE Project (MPES2) involves the construction and operation of warehousing and distribution facilities on the MPE site and upgrades to approximately 2.1 kilometres of Moorebank Avenue.

A Baseline Aquatic Ecological Monitoring Program (BAEMP) was developed by Biosis Pty Ltd for Arcadis in March 2018, to address CoC B106. The purpose of the BAEMP was to establish baseline stream health and water quality conditions within selected sites along Anzac Creek prior to commencement of Early Works. This was undertaken in autumn 2018.

The baseline monitoring forms the basis for the ongoing Biodiversity Monitoring Strategy (BMS) to assess stream health in accordance with 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 CoC B43 and B44.

BIO-ANALYSIS Pty Ltd was commissioned by Arcadis on behalf of Tactical Group to assess stream health and water quality at six monitoring sites along Anzac Creek (the Study Area) in autumn 2021, in accordance with the BMS to satisfy the CoC B43, B44 and B106.

## **Methods**

The BMS required that stream health monitoring focus on four main indicators:

- Aquatic habitat, including riparian habitat, aquatic macrophytes and fish habitat;
- Surface water quality and sediment characteristics;
- Aquatic macroinvertebrates sampled using the Australian River Assessment System (AUSRIVAS) protocol;
- Fish sampled using a backpack electro-fisher.

The results of the autumn 2021 monitoring events were compared with those obtained in autumn 2018 (baseline), spring 2018, autumn 2019, spring 2019, autumn 2020 and spring 2020 (during construction). There has been no construction on the MPES2 since December 2020. Warehouses 1, 3, 4 and 5 are now operational and the location of Warehouses 6-8 have been left as compacted pads. Any water sheets off into the sediment (SED) Basins and discharges into Anzac Creek (via DP5 and DP7).

## **Results**

Within the study area, Anzac Creek is mostly ephemeral with the exception of a relatively large pool downstream of the Project area (Site AQ12), opposite Wattle Grove. Sites downstream of the refuge pool have appeared to be in a more degraded state than those further upstream. At the time of the autumn 2021 monitoring events, the condition of aquatic habitat appeared similar to that observed by previous surveys, in that the majority of the creek appeared stable and not subject to significant erosional processes.

The noxious plant, Alligator Weed, continues to be abundant at the most upstream site (Site AQ1), although large gaps have appeared in the floating canopy. Leaves and stems of Alligator Weed at Site AQ1 appeared unhealthy in November 2020, coinciding with large numbers of adult Flea Beetles (*Arcola malloi*) observed on the plants. Flea Beetles have commonly been used to control floating mats of Alligator Weed in some areas of Australia and overseas. Alligator Weed growing along the creek bank appeared healthy, most likely due to the inability of Flea beetles to establish in terrestrial habitats.

The popular aquarium plant, *Egeria densa* (Egeria), collected within the large refuge pool (Site AQ12) in spring 2020, was not observed by the autumn 2021 surveys. Infestations of Egeria have been shown to displace native species of other submerged plants in shallow, nutrient-rich, slow-moving or stationary water.

Water quality within Anzac Creek is influenced by various types of human-related disturbance. This was evident in several indicators (reduced dissolved oxygen levels, elevated nitrogen, aluminium and copper) being outside recommended guideline values for the protection of aquatic life, prior to commencement of the Project. While the Project may also be influencing water quality within the creek, it has not been possible to distinguish from pre-existing water quality conditions.

Concentrations of lead in sediments collected in the upstream reaches of Anzac Creek (Site AQ1) have consistently exceeded the guideline value (50 mg/kg) but not background concentrations (91 mg/kg). Investigations done prior to commencement of the Project reported isolated areas impacted by lead (JBS&G, 2016).

PFOA (perfluoro-octanoic acid) and PFOS (perfluorooctance sulphonate) have been detected in water and sediment samples collected throughout the survey period, but concentrations remain similar to baseline values and within the recommended Australian-derived guidelines for water and soil.

Low diversity of aquatic macroinvertebrates, Australian River Assessment System (AUSRIVAS) and Stream Invertebrate Grade Number Average Level (SIGNAL2) scores were also indicative of a site suffering from one or more forms of human impact. Despite this, some pollution tolerant taxa were identified, including mayfly and caddis fly families, which suggests that the effect of poor water quality within Anzac Creek is limited. Comparison of the AUSRIVAS and SIGNAL2 scores between the baseline and construction phase indicate an overall stability in aquatic health.

Altogether, eight species of fish have been collected from within the refuge pool: three native species of gudgeon, two native species of eel and three introduced species (*Gambusia*, Goldfish and Oriental weatherloach), confirming that the creek does provide some habitat for native species of fish. All of the species caught are common within NSW. No threatened species of fish listed under the *NSW Fisheries Management Act, 1994* or the *Environment Protection and Biodiversity Conservation Act, 1999* have been recorded.

### **Conclusions**

Examination of results from the 2021 autumn survey found no measurable changes in the indicator variables examined in relation to the findings of historical surveys and the BAEMP survey that could be attributed to the Project works. Thus, in accordance with the BMS, no adaptive management contingency measure was triggered.

### **Recommendations**

It is recommended that Land managers focus on containment and on-going suppression of the Alligator Weed infestation at Site AQ1. Signage and public information at popular points of entry by the public to the creek and other local waterways may reduce the chance of unintentional human-assisted introductions (e.g. by using live bait, or by being released by aquaria).



## TABLE OF CONTENTS

EXECUTIVE SUMMARY .....	3
1.0 INTRODUCTION.....	9
2.0 METHODS.....	11
2.1 Study Area.....	11
2.2 Sampling Dates .....	12
2.3 Performance Measures and Indicators .....	12
2.4 Field Methods.....	14
2.4.1 Visual Stream Assessments.....	14
2.4.2 Surface Water Quality & Sediment Monitoring .....	15
2.4.3 Aquatic Macroinvertebrates .....	16
2.4.5 Data Analysis .....	17
2.4.6 Quality Assurance/Quality Control (QA/QC).....	18
3.0 RESULTS.....	19
3.1 Aquatic Habitat Characteristics.....	19
3.2 Water & Sediment Characteristics .....	26
3.2.1 Water Quality .....	26
3.2.2 Sediment Characteristics .....	34
3.3 Aquatic Macroinvertebrates .....	40
3.4 Fish.....	43
5.0 DISCUSSION .....	46
5.1 Aquatic Habitat & Environmental Conditions .....	46
5.2 Aquatic Macroinvertebrates .....	47
5.3 Fish.....	48
6.0 CONCLUSION & RECOMMENDATIONS .....	49
7.0 REFERENCES.....	49
APPENDICES.....	53
Appendix 1 - GPS positions (UTMs) for stream monitoring sites (autumn 2021).....	54
Appendix 2 – Visual Assessment Scores .....	54
Appendix 3 - Macroinvertebrate taxa collected at Site AQ12 in autumn 2021 using the NSW AUSRIVAS protocol.....	56

## List of Tables

Table 1. Date and information on aquatic ecology monitoring completed for the Project.....	12
Table 2. Assessment types recommended for each monitoring site (Biosis, 2018).....	13
Table 3. Indicator variables and adaptive management contingency measures.....	14
Table 4. Mean (+ SE) physico-chemical water quality and nutrient values recorded at the time of the Baseline (autumn 2018, $n = 1$ ) and the autumn 2021 ( $n = 3$ ) surveys and the appropriate Default Trigger Values (DTV). Values highlighted in bold type indicate where results were outside the recommended DTV.....	28
Table 5. Summary of dissolved metal compound results for Site AQ12 in autumn 2018 (Baseline), autumn and spring 2019, autumn and spring 2020 ( $n = 1$ ).....	29
Table 6. Summary of BTEX and perfluorinated compound results ( $n = 1$ ).....	32
Table 10. Fish collected at Site AQ12 between autumn 2018 and spring 2019 <sup>#</sup> , spring 2020 and autumn 2021.....	44

## List of Figures

Figure 1. Project Location.....	10
Figure 2. Rainfall (mm) measured at Bankstown Rainfall Station (66137) between 1 January and 30 June 2021.....	20
Figure 3. OE50 Taxa Scores and their respective Band Scores (B-D) for AUSRIVAS samples collected from edge habitat at Site AQ12 since autumn 2018.....	41
Figure 4. Quadrant diagram showing SIGNAL 2 results for Site AQ12 sampled in Anzac Creek since autumn 2018.....	42

## 1.0 INTRODUCTION

The Sydney Intermodal Terminal Alliance (SIMTA) received approval for the construction and operation of Stage 2 (the Project) of the Moorebank Precinct East (MPE) Project, which comprises the second stage of development under the MPE Concept Approval (MP10\_0193) and approved under Development Approval SSD 7628.

The MPE site, including the Project site, is located approximately 27 km south-west of the Sydney Central Business District (CBD) and approximately 26 km west of Port Botany and includes the former Defence National Storage and Distribution Centre (DNSDC) site. The MPE site is situated within the Liverpool Local Government Area (LGA), in Sydney's South West subregion, approximately 2.5 km from the Liverpool City Centre.

The MPE Project involves the development of an intermodal facility including warehouse and distribution facilities, freight village (ancillary site and operational services), stormwater infrastructure, landscaping, servicing and associated works on the eastern side of Moorebank Avenue. Stage 2 of the MPE Project involves the construction and operation of warehousing and distribution facilities on the MPE site and upgrades to approximately 2.1 kilometres of Moorebank Avenue. There has been no construction on the MPES2 since December 2020. Warehouses 1, 3, 4 and 5 are now operational and the location of Warehouses 6-8 have been left as are compacted pads. Any water sheets off into the sediment (SED) Basins and discharges into Anzac Creek (via DP5 and DP7).

BIO-ANALYSIS Pty Ltd has been commissioned by Arcadis on behalf of Tactical Group to assess stream health and water quality along Anzac Creek (the Study Area) in autumn 2021. Monitoring is to be done in accordance with a Biodiversity Monitoring Strategy (BMS) developed by Biosis (2018) to satisfy the Minister's Conditions of Consent (CoC) B106. The BMS also includes the Stormwater Monitoring Strategy required by CoC B43 and B44.

The primary aim of monitoring is to determine whether any change in stream health or water quality occur throughout the life of the MPE Stage 2 (MPES2) Project in accordance with the BMS and to ascertain whether these changes can be attributed to the Project works. Sampling commenced in autumn 2018 (Biosis, 2018).



Figure 1: Project Location

## 2.0 METHODS

### 2.1 Study Area

Anzac Creek is a small tributary of the Georges River, and lies entirely within the Liverpool Local Government Area. The catchment covers an area of approximately 10.6 km<sup>2</sup> (Figure 1).

The headwaters of Anzac Creek lie within the Commonwealth Department of Defence Lands in Moorebank. The creek is approximately 4 km long and highly urbanised: it flows past the suburb of Wattle Grove, underneath the M5 and Heathcote Road intersection, through the Moorebank Industrial Area and underneath Newbridge Road.

While predominantly ephemeral, Anzac Creek has been noted to hold permanent water in isolated pools (Arcadis, 2016). An unnamed first order tributary of Anzac Creek flows from south to north along the eastern boundary of the MPE Project area (GHD, 2016).

Surface water from the MPES2 site is expected to enter Anzac Creek as licensed discharge between Site AQ4 and AQ8 (Figure 1). It was also considered likely that runoff from some areas of the MPES2 site would be collected by a vegetated dam situated within Commonwealth Department of Defence land (Biosis, 2018). Flow from this dam enters Anzac Creek upstream of Site AQ14 via a culvert (Figure 1).

## 2.2 Sampling Dates

The dates and phases of the stream health monitoring program for the MPES2 Project are outlined in Table 1.

**Table 1. Date and information on aquatic ecology monitoring completed for the Project.**

Project Phase	Event	Dates	Comments
Baseline	Autumn 2018	12&19 April 2018	Only one Baseline survey was able to be sampled in autumn 2018, due to the May 2018 bushfire.
Construction	Spring 2018	6&12 December 2018	
Construction	Autumn 2019	14&30 May 2019	Construction of culvert upstream of Site AQ1 largely completed on 30 May 2019. Site AQ12 was inaccessible to undertake Survey 2 due to restricted access.
Construction	Spring 2019	24 September 2019 21 November 2019	Warehouses 3 and 4 under construction. Moorebank Ave upgrade works ongoing.
Construction /Operation	Autumn 2020	25 May 2020 2 September 2020	Sampling required for the autumn 2020 survey season was unable to commence until late May 2020 due to COVID-19 related delays. The second survey was further delayed due to the time taken to receive parts required to repair the Electrofisher. Warehouses 3 and 4 were operational whilst Warehouse 5 was under construction. Moorebank Ave upgrade works ongoing.
Construction /Operation	Spring 2020	11&30 November 2020	Warehouses 3, 4 and 5 were operational. No further warehouses were being constructed at the time of monitoring
Construction /Operation	Autumn 2021	28 April 2021 11 June 2021	There has been no construction on the MPES2 since December 2020. Warehouses 3, 4 and 5 are now operational and the location of Warehouses 6-8 have been left as compacted pads. Any water sheets off into the SED Basin and discharges into ANZAC Creek (via DP5 and DP7).

## 2.3 Performance Measures and Indicators

No instream or riparian works are being undertaken as part of the Project. Alteration to hydrology (increased stormwater inputs from both the stormwater network and surface flows from increases in non-permeable surfaces) and earthworks that have the potential to mobilise sediments into Anzac Creek were identified as potential impacts associated with the construction phase of the project (Biosis, 2018).

Biosis (2018) indicated that increased stormwater inputs to Anzac Creek could result in:

- Bed and bank scour as a result of increased volume and velocity of water during rainfall events;
- Alterations in vegetation structure as a result of altered hydrological regime;
- Introduction of sediments and pollutants via stormwater, with common pollutants including nitrogen, phosphorous, copper, aluminium and zinc.

Water Sensitive Urban Design (WSUD) measures such as onsite detention basins and rainwater gardens were incorporated into designs for the Project to mitigate impacts. A key outcome of this monitoring program was to determine whether these measures functioned as intended. Six monitoring sites (Sites AQ1, AQ4, AQ8, AQ12, AQ13 and AQ14; Figure 1) are to be assessed in accordance with the BMS to satisfy the CoC B43, B44 and B106. The assessment types to be applied at each site are outlined in Table 2.

Should an indicator variable deteriorate below the range for its baseline value, a stream health investigation protocol is to be initiated under the BAEMPs Adaptive Management Plan (Table 3).

Baseline values are presented in Table 4 and Table 5 (Section 3: Results).

**Table 2. Assessment types recommended for each monitoring site (Biosis, 2018).**

Assessment Type	Assessment Protocol/ Indicator Variable	AQ1	AQ4	AQ8	AQ12	AQ13	AQ14
<b>Visual</b>	DPI Classification	√	√	√	√	√	√
	NSW AUSRIVAS	√	√	√	√	√	√
	HABSCORE	√	√	√	√	√	√
	Ephemeral Stream Assessment	√	√	√	√	√	√
<b>Surface Water &amp; Sediment Quality Monitoring</b>	<i>In situ</i> water quality				√		
	Nutrient, dissolved metal & PFAS				√		
	Sediment & PFAS	√	√				√
<b>Aquatic Macroinvertebrates</b>	NSW AUSRIVAS & Signal2				√		
<b>Fish</b>	Assemblage structure				√		

**Table 3. Indicator variables and adaptive management contingency measures.**

<b>Result</b>	<b>Potential Problem</b>	<b>Contingency measure</b>
<b>Increases in results of water quality parameters</b>	Introduction or exacerbation of pollutants entering Anzac Creek.	Identify source and undertake corrective measures.
<b>Reduction in results of biological monitoring</b>	Subtle effects of construction and operation are influencing stream health within Anzac Creek.	Identify components causing decline. Assess feasibility of suitable corrective actions. If corrective measures can be implemented, these aspects are to be the focus of future monitoring.  If corrective measures cannot be implemented, regulatory authority to be notified of change.
<b>Increase scour of bed and banks of waterways</b>	Reduction in bed and bank stability or loss of instream vegetation.	Identify point source/s of increased flow velocities or changes in stream hydraulics and discuss with project engineers to determine best methods for flow reduction or rectification of stream hydraulics

## 2.4 Field Methods

To fulfil the requirements of the BMS, monitoring is to be undertaken at 6 sites along Anzac Creek (Figure 1) four times annually during the pre-construction and construction phases of the Project, with the frequency reduced to twice annually during the operational phase of the Project. Surveys should take place during autumn and spring (Biosis, 2018). Sites are to be assessed using the methods outlined below, in accordance with Table 2.

### 2.4.1 Visual Stream Assessments

A visual assessment was undertaken at each site regardless of the availability of aquatic habitat (i.e. wet or dry). The condition of aquatic habitat at each site was assessed according to the *NSW Department of Primary Industries Policy and Guidelines for Fish Habitat Conservation and Management* (DPI NSW, 2013). The two key indices were habitat *type* and *class*.



Information on stream characteristics was recorded at each site in accordance with the New South Wales (NSW) Australian River Assessment System (AUSRIVAS) protocol (Turak et al., 2004). Characteristics recorded included a visual assessment of surrounding landforms, instream features, presence, extent and type of aquatic vegetation, stream substratum, potential areas of refuge during low flow periods, presence of fish habitat, presence of barriers to fish movement, indicators of point source and diffuse pollution.

HABSCORE assessments were also completed at each site, based on the presence and condition of pool substrate characteristics, pool variability, channel flow status, bank vegetation and stability, width of riparian zone, and epifaunal substrate/cover. The *CSIRO Ephemeral Stream Assessment* guideline was also used to provide an assessment of the geomorphic integrity of each site and to identify the processes operating within each site.

Each site was photographed and the locations recorded with a hand-held GPS (satellite-based Global Positioning System).

#### **2.4.2 Surface Water Quality & Sediment Monitoring**

Where sufficient amounts of water are present, *in situ* water quality was measured using a Yeo-Kal 611 probe. Physico-chemical properties measured included electrical conductivity ( $\mu\text{S}/\text{cm}$ ), dissolved oxygen (% saturation and mg/L), pH (pH units), temperature ( $^{\circ}\text{C}$ ) and turbidity (NTU). Three replicate measures of each variable were collected from just below the water surface at each site.

Alkalinity was also determined in the field at Site AQ12, using a CHEMetrics' total alkalinity field kit.

As required by the BMS, water chemical and sediment sampling were undertaken for a range of nutrients, metals and hydrocarbons:

- Total Phosphorus (surface water only);
- Total Kjeldahl Nitrogen (TKN) (Total Organic Nitrogen + Total Ammonia) (surface water only);
- Total Nitrogen (TKN + (Nitrate + Nitrite) (surface water only);
- Dissolved metals (standard 19 relevant to aquatic assessment) (surface water);

- Total metals (standard 19 relevant to aquatic assessment) (sediment only);
- Total petroleum hydrocarbons, BTEX (benzene, toluene, ethylbenzene, trimethylbenzenes and three xylene isomers) hydrocarbons;
- PFAS: Poly-fluoroalkyl substances (including Perfluorohexane sulfonate PFHxS).

Samples were sent to the National Measurement Institute (NMI) laboratory (a NATA accredited laboratory) for analysis.

### ***Construction Discharges***

Construction discharge records (i.e. dewatering permits) were requested from contractors from the MPES2 Project in order to assess water quality and quantity performance for construction discharges, as required by the Stormwater Monitoring Program, CoC B44(a). Records were requested for the time period between the 1 December 2020 and 11 June 2021.

### **2.4.3 Aquatic Macroinvertebrates**

Aquatic macroinvertebrates were required to be collected by the BMS at Site AQ12 (Biosis, 2018) using the NSW AUSRIVAS protocol (Turak et al., 2004). Biosis (2018) considered this large pool provides reliable and valuable aquatic habitat.

Stream edge habitats were sampled using a 250 µm dip net.

The contents of each net sample were placed into a white sorting tray and animals collected for a minimum period of 30 minutes. Thereafter, removals were done in 10-minute periods, up to a total of one hour (Turak et al., 2004). If no new taxa were found within a 10-minute period, removals ceased (Turak et al., 2004).

The animals collected were placed inside a labelled container and preserved with 70 % alcohol.

In the laboratory, taxa were identified to family level with the exception of Acarina (to order), Chironomidae (to sub-family), Nematoda (to phylum), Nemertea (to phylum), Oligochaeta (to class), Ostracoda (to subclass) and Polychaeta (to class). Some families of Anisoptera (dragonfly larvae) were identified to species, because they could potentially include threatened aquatic species.

#### **2.4.4 Fish Community Survey**

Fish sampling is done at Site AQ12 using a Smith Root LR-24 backpack electrofisher. The Electrofisher is used to stun fish in open water, around the edge of the pool, around snags and aquatic vegetation and any overhanging banks. All fish caught are identified and the length of up to 30 individuals of each species measured. Incidental observations such as evidence of disease are also noted before native fish species are subsequently returned to the water.

#### **2.4.5 Data Analysis**

Water quality measurements were used to assess health of the aquatic ecosystem by comparison with guideline values recommended by ANZECC<sup>1</sup> and ARMCANZ<sup>2</sup> (2000) for the protection of lowland streams (i.e. systems at < 150 m altitude) in south-east Australia.

For aquatic macroinvertebrates, data was analysed using the appropriate AUSRIVAS predictive models developed for NSW. The ecological health of a waterway is assessed by comparing the macroinvertebrates collected at a site (i.e. Observed) to those predicted to occur (Expected) if the site is in an undisturbed or 'reference' condition.

The principal outputs of the AUSRIVAS model include:

- Observed to Expected ratio (OE50): the ratio of the number of macroinvertebrate families collected at a site which had a predicted probability of occurrence of greater than 50 % (i.e. Observed) to the sum of the probabilities of all of the families predicted with greater than a 50 % chance of occurrence (i.e. Expected) (Ransom et al., 2004);

---

<sup>1</sup> ANZECC – Australian and New Zealand Environment and Conservation Council

<sup>2</sup> ARMCANZ – Agriculture and Resource Management Council of Australia and New Zealand

- **BAND:** for each model, the OE50 taxa ratios are divided into bands representing different levels of impairment. Band X represents a more diverse assemblage of macroinvertebrates than control sites; Band A is considered equivalent to reference condition; Band B represents sites below reference condition (i.e. significantly impaired); Band C represents sites well below reference condition (i.e. severely impaired); and Band D represents impoverished sites (i.e. extremely impaired) (Ransom et al., 2004).

The SIGNAL2 biotic index (Stream Invertebrate Grade Number Average level) developed by Chessman (2003) was also used to give an indication of water quality at the sites sampled. The SIGNAL score for a macroinvertebrate sample is calculated by averaging the pollution sensitivity grade numbers of the families present, which may range from 10 (most sensitive) to 1 (most tolerant). The SIGNAL2 scores from samples collected between autumn 2018 and autumn 2021 are presented graphically to provide an indication of changes over time.

#### **2.4.6 Quality Assurance/Quality Control (QA/QC)**

Data collected in the field was checked for accuracy and completeness before leaving each site. In the office, field data and other records were incorporated into appropriate excel data sheets and checked. Spreadsheets were locked prior to analysis to prevent accidental overwrites or corruption.

In the laboratory, macroinvertebrate samples were identified by an appropriately qualified staff member. Data for each sample were entered into an excel spreadsheet and then checked.

## 3.0 RESULTS

For the autumn 2021 monitoring event, sites were sampled on 28 April (Survey 1) and 11 June 2021 (Survey 2). Each site was approximately 100 m in length with their GPS coordinates listed in Appendix A. Collections of fish and macroinvertebrates were completed in accordance with Section 37 of the *NSW Fisheries Management Act 1994* using Scientific Collection Permit Number P03/0032(B) and NSW Agriculture, Animal Research Authority Care and Ethics Certificate of Approval Number 03/2445.

### 3.1 Aquatic Habitat Characteristics

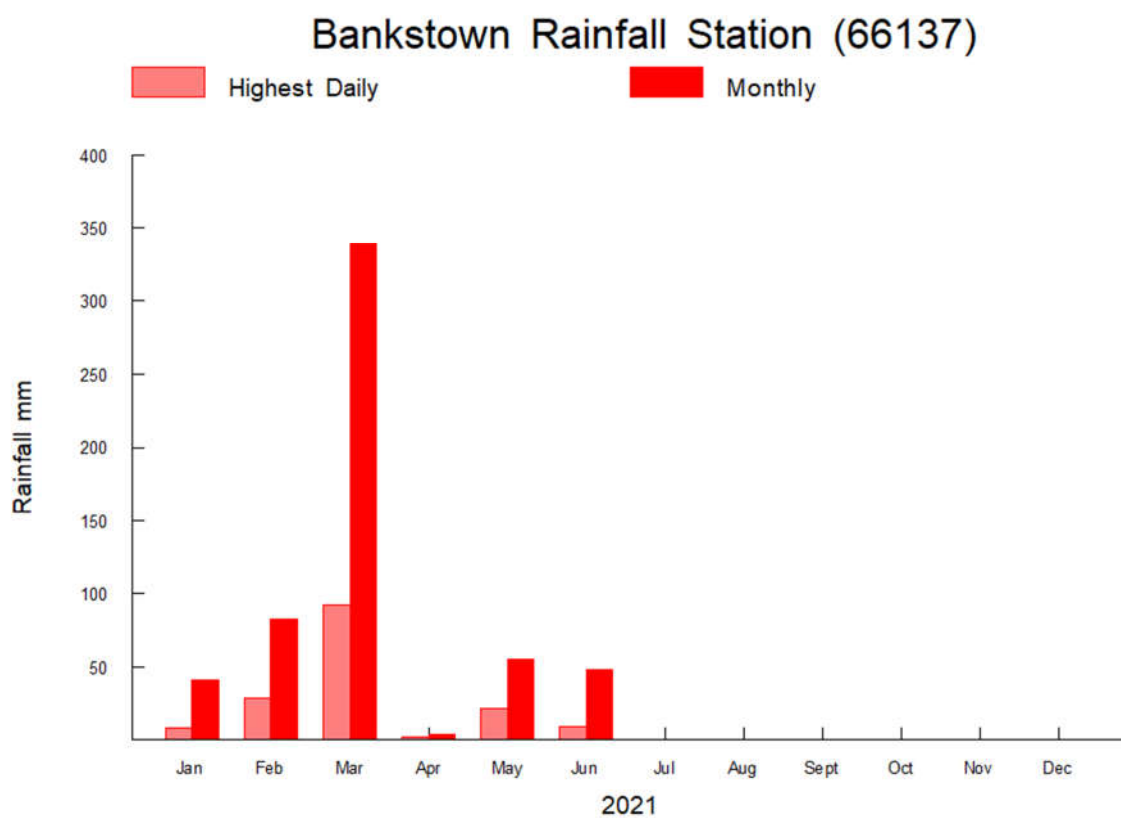
The section of Anzac Creek within the study area is not mapped as Key Fish Habitat (KFH) under the NSW DPI Key Fish Habitat mapping for the Sydney LGA (DPI 2007; Appendix A). Nevertheless, this section of Anzac Creek is ranked as TYPE 1 KFH according to the DPI (2013) classification scheme due to the presence of native aquatic plants and snags.

According to the waterway CLASS scheme, a permanent pool with freshwater aquatic vegetation situated at Site AQ12 is considered CLASS 2 KFH. The remaining reaches of Anzac Creek within the Study Area are considered to be CLASS 3 KFH despite the presence of aquatic vegetation, due to the ephemeral nature of any pools that are present (DPI, 2013).

Vegetation within the channel and banks of Anzac Creek has been classified as Parramatta Red Gum woodland in high condition (GHD, 2016).

Within the two months prior to the 2021 autumn Survey 1 and 2021 autumn Survey 2, a total of 343.4 mm and 71.6 mm rainfall was recorded respectively by the meteorological station situated near Bankstown Airport (Station ID: 66137) (Figure 2).

No construction occurred between 1 December 2020 and 28 June 2021. No controlled discharges from the MPES2 Project site to Anzac Creek were reported.



**Figure 2. Rainfall (mm) measured at Bankstown Rainfall Station (66137) between 1 January and 30 June 2021.**

### Site AQ1

Site AQ1 is situated approximately 750 m downstream of the source of Anzac Creek (Figure 1), and approximately 100 m downstream of a culvert built across Anzac Creek as part of the MPE Stage 1 project (Plate 1). The culvert is composed of box culverts to a length of 15 m and supports one rail track and a maintenance access footway. Construction of the culvert was completed by CPB and handed over to the proponent, Qube, in July 2019.

There was no flowing water at the time of the autumn 2021 surveys but the channel was almost full-to-bank (up to approximately 0.4 m deep) (Plates 1&2). The active channel zone at this site (up to approximately 5 m wide) remains stable (i.e. no signs of active erosion), mostly due to dense cover of the shallow, relatively narrow stream channel by emergent macrophytes and the relatively intact woody riparian vegetation (Appendix 2). The channel consisted of fine sediment.

Slender Knotweed (*Persicaria cf. decipiens*) had colonised a large proportion of aquatic habitat previously dominated by the noxious plant, Alligator Weed (*Alternanthera philoxeroides*) (Plates 1&2). The stems and leaves of Alligator Weed growing within the stream channel appeared unhealthy and gaps had formed within the floating canopy since the spring 2020 survey (Plates 1 and 2). Alligator Weed growing along the creek bank however, appeared healthy.

Other species of aquatic plant observed at Site AQ1 included Typha (*Typha* sp.), Marsh Club-rush (*Bolboschoenus fluviatilis*) and Water Primrose (*Ludwigia peploides* ssp. *montevidensis*). The tree canopy was mostly comprised by *Melaleuca* spp. and *Eucalyptus* spp. (Plates 1&2).

### Site AQ4

Site AQ4 is situated approximately 400 m downstream of Site AQ1 (Figure 1).

The stream channel at Site AQ4 has occasionally been dry, including at the time of the Baseline survey (i.e. autumn 2018). Since the autumn 2020 surveys, surface water has been observed along the study reach (up to approximately 0.4 m deep), including in autumn 2021 (Plates 3&4). Flow was observed at the downstream end of the culvert under the dirt road,

connecting the upstream and downstream reaches of Site AQ4. Water clarity was considered good at the time of the autumn 2021 surveys (Plate 3).

Since the baseline survey, stands of the emergent macrophyte, Jointed Twig Rush (*Baumea articulata*) and Twig Rush (*Baumea rubiginosa*) have formed across the downstream reaches of stream channel (Plate 4). Jointed Twig Rush, Slender Knotweed and Frog's Mouth (*Philydrum lanuginosum*) are common in the upstream reaches (Plate 4).

The active channel zone, composed of fine sediments, was up to approximately 4 m wide (Plates 3&4). No indicators of significant erosion were observed suggesting that Anzac Creek continues to be relatively stable at this site (Appendix 2).



Plate 3: AQ4 – View upstream (11/06/21)

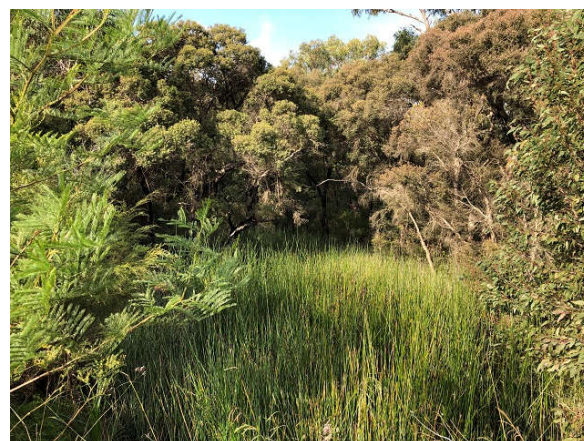


Plate 4: AQ4 – View downstream (28/04/21)

### Site AQ8

Site AQ8 is situated approximately 1 km downstream of Site AQ4 (Figure 1). At the time of Surveys 1 and 2, surface water (up to 20 cm deep) was present in small, isolated depressions along the study reach (Plates 5&6). There was no apparent flow along the study reach. Similar to previous surveys, the downstream end of the study reach was mostly colonised by a dense stand of Common Reed/Phragmites (*Phragmites australis*). Stands of Heron Bristle Sedge (*Chorizandra cymbaria*), Jointed Twig Rush and Tall Spikerush (*Eleocharis sphacelata*) dominated plant assemblages within the upstream reach, with occasional Frogsmouth (*Philydrum lanuginosum*), Slender Knotweed and the introduced species, Umbrella Sedge (*Cyperus eragrostis*), present throughout (Plates 5&6). Riparian vegetation was dominated by *Casuarina* trees.



The stream channel at Site AQ8 (up to approximately 20 m wide) continues to be classified as stable, mostly due to dense cover by emergent macrophytes in addition to a relatively intact, woody riparian zone (Appendix 2).



Plate 5: Site AQ8 – view upstream (28/04/21)



Plate 6: Site AQ8 – view downstream (11/06/21)

### Site AQ12

Site AQ12 is situated approximately 750 km downstream of Site AQ8 (Figure 1). Similar to the findings of biodiversity surveys done since autumn 2018, a large pool (approximately 20 m wide) and a relatively diverse assemblage of aquatic plants were present (Plates 7&8). The pool substratum was composed primarily of fine sediment with a considerable cover of detritus.

Water level in the pool was up to approximately 0.9 m deep and flow was apparent at the relatively narrow, downstream end of the pool at the time of Survey 2. Water clarity was considered good at the time of both surveys. Extensive cover by vegetation within the riparian zone contributes stability to the pool edges at Site AQ12 (Appendix 2).

Riparian vegetation included Casuarina, Eucalyptus and Melaleuca trees and Spiny-head Mat-rush/Basket Grass (*Lomdandra longifolia*) (Plates 7&8).

The submerged macrophyte species, Ribbonweed (*Vallisneria* sp.) and *Potamogeton ochreatus* were common, in addition to Slender Knotweed and dense stands of Typha, Phragmites and Tall Spike Rush (Plate 7). *Nymphoides geminata* (Entire Marshwort), with mostly floating leaves, was common close to the shore.

*Egeria (Egeria densa)*, which was collected close to the left-bank (facing downstream) of the pool for the first time since sampling commenced (i.e. autumn 2018) in spring 2020, was not detected in autumn 2021.



Plate 7: Site AQ12 – view upstream (28/04/21)



Plate 8: Site AQ12 – view downstream (28/04/21)

### Site AQ13

Site AQ13 is situated approximately 200 m downstream of Site AQ12 (Figure 1). This site is located approximately 150 m downstream from an overflow channel that enters the creek from Wattle Grove.

Standing water to a depth of approximately 0.4 m was present at Site AQ13 at the time of the Survey 1 (Plate 9). Similar to the findings of previous surveys, fine sediments within the stream channel appeared to be covered by a thin layer of an iron floc (Plate 9). Beneath the iron floc to approximately 2 cm, sediments appeared dark black, which suggests that they were anoxic (i.e. depleted of dissolved oxygen).

At the time of the second autumn 2021 survey, flow was apparent at Site AQ13 and there was little evidence of an iron floc (Plate 10). The upper layers of the sediment profile appeared anoxic (Plate 10). Water quality at Site AQ13 appeared poor due to the presence of anoxic sediments and iron floc (Plates 9&10).

A large proportion of the stream channel and edges were colonised by Typha and Slender Knotweed. River Clubrush (*Schoenoplectus validus*) and Whorled Pennywort/Shield

Pennywort (*Hydrocotyle cf verticillata*) were also common. The stream channel appeared stable (Appendix 2).



Plate 9: Site AQ13 – view downstream (28/04/21)



Plate 10: Site AQ13 – view upstream (11/06/21)

#### Site AQ14

Site AQ14 is situated approximately 150 m downstream of Site AQ13 and immediately downstream of the culvert that links the dam within Commonwealth Department of Defence Lands to Anzac Creek (Figure 1). Similar to Site AQ13, the channel consisted of loose sediments with an anoxic layer. Some flow was present at the time of Survey 2, but not Survey 1.

Typha, Slender Knotweed, River Clubrush and Whorled Pennywort/Shield Pennywort were common (Plates 11&12). This section of Anzac Creek remains mostly stable due to dense instream vegetation and vegetated banks (Appendix 2).



Plate 11: Site AQ14 – view upstream (28/04/21)



Plate 12: Site AQ14 – view downstream (11/06/21)

## 3.2 Water & Sediment Characteristics

### 3.2.1 Water Quality

Physico-chemical measurements were collected at Site AQ12 in accordance with the requirements of the BMS (cf Biosis, 2018) and at sampling sites where sufficient water was present to submerge a water quality instrument probe. The data were compared to the default trigger values (DTV) recommended by ANZECC/ARMCANZ (2000) for the protection of slightly disturbed lowland river ecosystems in southeast Australia (Table 4).

Results from this investigation (2021 autumn survey 1 and 2021 autumn survey 2) indicated that:

- Water temperature ranged from 7.1 to 16.0 °C;
- pH (range = 6.5 to 7.7) was within the recommended DTV;
- Conductivity (range = 219 to 305  $\mu\text{S}/\text{cm}$ ) was within the recommended DTVs at all of the sites sampled;
- The majority of dissolved oxygen (DO) measurements (range = 2 to 85 % saturation) were below the lower DTV, particularly at Site AQ13 at the time of Survey 1;
- The majority of turbidity levels were outside the recommended DTVs at the sites sampled in autumn 2021, with the exception of Site AQ12 at the time of Survey 2 (turbidity = 33 NTU);
- Concentrations of total phosphorous (range = <0.05 to 0.06 mg/L) were marginally above the recommended DTV (0.05 mg/L) at Site AQ12 at the time of Survey 1;
- Total nitrogen concentrations exceeded the upper DTV (0.5 mg/L) at Site AQ12;
- Results for Total Kjeldahl Nitrogen (TKN) (Total Organic Nitrogen + Ammonia) were the same as for Total Nitrogen (TKN + Nitrate + Nitrite) at the time of Survey 1, indicating that the source of nitrogen within the refuge pool was most likely organic (e.g. algae or decomposing plant material) rather than inorganic (e.g. fertilizer) (Table 4).

Most notably, the majority of dissolved oxygen measurements collected at Site AQ12 were below the lower limit of the ANZECC/ARMCANZ (2000) range, including at the time of the baseline survey (Table 4). Nitrogen levels commonly exceeded the upper limit (Table 4).

A range of toxicants have also been measured in water between autumn 2018 (baseline) and autumn 2021 (during construction) within the vicinity of Site AQ12 (Table 5&6) in accordance with the BMS (cf Biosis, 2018).

Results indicate that:

- Aluminium has commonly exceeded the DTV (80 µg/L) (i.e. 9 of 11 surveys, including at the time of the baseline survey: 260 µg/L), including in autumn 2021 (Survey 1: 150 µg/L; Survey 2: 1,260 µg/L) (Table 5);
- Cadmium exceeded the DTV (0.4 µg/L) at Site AQ12 in autumn 2019 (Survey 1: 0.49 µg/L; Survey 2: 0.41 µg/L) and autumn 2021 Survey 1 (3.8 µg/L) (Table 5);
- Copper has commonly exceeded the DTV (1.8 µg/L) (i.e. 7 of 11 surveys, including the baseline survey: 2 µg/L), including in autumn 2021 (Survey 1: 2.1 µg/L; Survey 2: 3.3 µg/L) (Table 5);
- BTEX compounds and total recoverable hydrocarbons have not been detected (Table 6);
- PFOA (perfluoro-octanoic acid) and PFOS (perfluorooctance sulphonate) have been detected but continue to be within the recommended DTVs (Table 6).

**Table 4.** Mean ( $\pm$  SE) physico-chemical water quality and nutrient values recorded at the time of the Baseline (autumn 2018,  $n = 1$ ) and the autumn 2021 ( $n = 3$ ) surveys and the appropriate Default Trigger Values (DTV). Values highlighted in bold type indicate where results were outside the recommended DTV.

Indicator Variable	DTV*	Baseline <sup>A</sup>	Survey 1 (24/04/21)					
			AQ1	AQ4	AQ8	AQ12	AQ13	AQ14
Temperature °C ( $n = 3$ )	-	-	15.7 (0.0)	15.8 (0.1)	N/R	15.5 (0.0)	14.7 (0.0)	16.0 (0.0)
pH ( $n = 3$ )	<b>6.5-8.0</b>	7.01	6.6 (0.0)	6.8 (0.0)	N/R	6.8 (0.0)	6.5 (0.0)	6.7 (0.0)
Conductivity ( $\mu$ S/cm) ( $n = 3$ )	<b>125-2200</b>	354	243.7 (0.3)	289.0 (0.6)	N/R	268.0 (0.0)	305.0 (0.0)	302.0 (0.0)
Dissolved Oxygen (%) ( $n = 3$ )	<b>85-110</b>	<b>62</b>	<b>52.2</b> (0.2)	<b>22.4</b> (0.2)	N/R	<b>64.6</b> (0.6)	<b>1.7</b> (0.1)	<b>53.6</b> (0.3)
Turbidity (NTU) ( $n = 3$ )	<b>6-50</b>	<b>91</b>	<b>3.8</b> (0.1)	9.7 (2.5)	N/R	5.2 (0.1)	9.2 (0.2)	12.9 (0.0)
Alkalinity (mg/L) ( $n = 1$ )	-	-	N/R	N/R	N/R	40	N/R	N/R
Total Phosphorous (mg/L) ( $n = 1$ )	<b>0.05</b>	<b>0.58</b>	N/R	N/R	N/R	0.06	N/R	N/R
Total Nitrogen (mg/L) ( $n = 1$ )	<b>0.5</b>	<b>8.2</b>	N/R	N/R	N/R	0.54	N/R	N/R
Total Kjeldahl (mg/L) ( $n = 1$ )	-	-	N/R	N/R	N/R	0.54	N/R	N/R
Indicator Variable	DTV*	Baseline	Survey 2 (11/06/21)					
			AQ1	AQ4	AQ8	AQ12	AQ13	AQ14
Temperature °C ( $n = 3$ )	-	-	7.1 (0.0)	8.8 (0.0)	9.1 (0.0)	8.7 (0.2)	10.1 (0.0)	10.0 (0.0)
pH ( $n = 3$ )	<b>6.5-8.0</b>	7.01	7.3 (0.0)	7.3 (0.0)	7.4 (0.0)	7.7 (0.1)	7.3 (0.0)	7.6 (0.0)
Conductivity ( $\mu$ S/cm) ( $n = 3$ )	<b>125-2200</b>	354	281.0 (0.0)	222.0 (0.0)	218.7 (0.3)	116.0 (3.1)	159.7 (0.3)	181.7 (0.3)
Dissolved Oxygen (%) ( $n = 3$ )	<b>85-110</b>	<b>62</b>	<b>66.2</b> (0.2)	<b>76.1</b> (0.2)	84.7 (0.1)	<b>64.5</b> (3.9)	<b>73.8</b> (0.3)	<b>76.2</b> (0.1)
Turbidity (NTU) ( $n = 3$ )	<b>6-50</b>	<b>91</b>	<b>4.5</b> (0.2)	<b>0.1</b> (0.0)	<b>2.2</b> (0.1)	33.4 (0.9)	<b>71.5</b> (0.2)	15.2 (0.5)
Alkalinity (mg/L) ( $n = 1$ )	-	-	N/R	N/R	N/R	22	N/R	N/R
Total Phosphorous (mg/L) ( $n = 1$ )	<b>0.05</b>	<b>0.58</b>	N/R	N/R	N/R	<0.05	N/R	N/R
Total Nitrogen (mg/L) ( $n = 1$ )	<b>0.5</b>	<b>8.2</b>	N/R	N/R	N/R	<b>0.64</b>	N/R	N/R
Total Kjeldahl (mg/L) ( $n = 1$ )	-	-	N/R	N/R	N/R	0.46	N/R	N/R

\*ANZECC/ARMCANZ (2000) – slightly disturbed systems

<sup>A</sup> Baseline values for pH, conductivity, dissolved oxygen and turbidity were obtained from Site AQ12, whilst baseline data for phosphorous and total nitrogen were obtained from Site AQ11 (Biosis, 2018)

I/A: Insufficient Aquatic Habitat; N/R: Not Required

**Table 5.** Summary of dissolved metal compound results for Site AQ12 in autumn 2018 (Baseline), autumn and spring 2019, autumn and spring 2020 ( $n = 1$ ).

Indicator Variable	DTV* ( $\mu\text{g/L}$ )	Baseline Site AQ11	Autumn 2019 Site AQ12		Spring 2019 Site AQ12	
		April 2018	14/05/19	30/05/19	24/09/19	21/11/19
Aluminium pH >6.5	80	260	150	68	2730	280
Aluminium pH <6.5	-	-	-	-	-	-
Arsenic Total ( $\mu\text{g/L}$ )	42	<1	<1	<1	1.1	<1
Barium	-	2	55	34	21	32
Beryllium	-	<1	<1	<1	<1	<1
Boron	680	<50	20	17	14	14
Cadmium ( $\mu\text{g/L}$ )	0.4	<0.1	0.49	0.41	<0.1	<0.1
Chromium	6	<1	<1	<1	2.3	<1
Cobalt	-	<1	<1	<1	<1	<1
Copper ( $\mu\text{g/L}$ )	1.8	2	2	1.1	3	2.3
Iron	-	450	300	100	1650	900
Lead ( $\mu\text{g/L}$ )	5.6	<1	<1	<1	2.6	<1
Manganese	2500	3	33	6.2	60	47
Mercury ( $\mu\text{g/L}$ )	1.9 <sup>A</sup>	<0.1	<0.1	<0.1	0.12	<0.1
Molybdenum	-	<1	<1	<1	<1	<1
Nickel ( $\mu\text{g/L}$ )	13	<1	<1	N/R	1.7	1.1
Selenium Total	18	<10	<2	<1	<1	<1
Strontium	-	52	120	120	73	53
Vanadium	-	<10	<1	<1	3.8	1.4
Zinc ( $\mu\text{g/L}$ )	15	<5	6.8	N/R	13	14

\*ANZECC/ARMCANZ (2000) – slightly disturbed systems (90% species protection)

<sup>A</sup> = inorganic mercury; N/R: not recorded

**Table 5 (Cont'd).** Summary of dissolved metal compound results for Site AQ12 ( $n = 1$ ).

Indicator Variable	DTV* (µg/L)	Baseline Site AQ11	Autumn 2020 Site AQ12		Spring 2020 Site AQ12	
		April 2018	25/05/20	2/09/20	11/11/20	30/11/20
Aluminium pH >6.5	80	260	230	70	230	100
Aluminium pH <6.5	-	-	-	-	-	-
Arsenic Total (µg/L)	42	<1	<1	<1	<1	<1
Barium	-	2	31	19	36	39
Beryllium	-	<1	<1	<1	<1	<1
Boron	680	<50	21	<5	32	31
Cadmium (µg/L)	0.4	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium	6	<1	<1	<1	<1	<1
Cobalt	-	<1	<1	<1	<1	<1
Copper (µg/L)	1.8	2	1.9	<1	2	1.3
Iron	-	450	620	270	460	280
Lead (µg/L)	5.6	<1	1.5	<1	<1	<1
Manganese	2500	3	19	8.8	6.9	12
Mercury (µg/L)	1.9 <sup>A</sup>	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	-	<1	1.3	<1	<1	1.1
Nickel (µg/L)	13	<1	1.1	<1	1.1	<1
Selenium Total	18	<10	<1	<1	<1	<1
Strontium	-	52	120	140	120	130
Vanadium	-	<10	<1	<1	<1	<1
Zinc (µg/L)	15	<5	8.5	3.6	5.7	2.9

\*ANZECC/ARMCANZ (2000) – slightly disturbed systems (90% species protection)

<sup>A</sup> = inorganic mercury; N/R: not recorded



**Table 5 (Cont'd).** Summary of dissolved metal compound results for Site AQ12 ( $n = 1$ ).

Indicator Variable	DTV* ( $\mu\text{g/L}$ )	Baseline Site AQ11	Autumn 2021 Site AQ12	
		April 2018	28/04/21	11/06/21
Aluminium pH >6.5	80	260	150	1260
Aluminium pH <6.5	-	-		
Arsenic Total ( $\mu\text{g/L}$ )	42	<1	<1	<1
Barium	-	2	39	29
Beryllium	-	<1	<1	<1
Boron	680	<50	31	20
Cadmium ( $\mu\text{g/L}$ )	0.4	<0.1	<0.1	3.8
Chromium	6	<1	<1	<1
Cobalt	-	<1	<1	<1
Copper ( $\mu\text{g/L}$ )	1.8	2	1.3	2.1
Iron	-	450	280	160
Lead ( $\mu\text{g/L}$ )	5.6	<1	<1	<1
Manganese	2500	3	12	6.9
Mercury ( $\mu\text{g/L}$ )	1.9 <sup>A</sup>	<0.1	<0.1	<0.1
Molybdenum	-	<1	1.1	<1
Nickel ( $\mu\text{g/L}$ )	13	<1	<1	1.1
Selenium Total	18	<10	<1	<1
Strontium	-	52	130	130
Vanadium	-	<10	<1	<1
Zinc ( $\mu\text{g/L}$ )	15	<5	2.9	9

\*ANZECC/ARMCANZ (2000) – slightly disturbed systems (90% species protection)

<sup>A</sup> = inorganic mercury; N/R: not recorded

**Table 6.** Summary of BTEX and perfluorinated compound results ( $n = 1$ ).

Indicator Variable	DTV* (µg/L)	Baseline Site AQ11	Spring 2018 Site AQ12		Autumn 2019 Site AQ12	
		April 2018	6/12/18	12/12/18	14/05/19	30/05/19
<b>BTEXN (µg/L)</b>						
Benzene (µg/L)	1300	<1	<1	<1	<1	<1
Toluene (µg/L)	-	<2	<1	<1	<1	<1
Ethylbenzene (µg/L)	-	<2	<1	<1	<1	<1
Ortho-Xylene (µg/L)	470	<2	<1	<1	<1	<1
<b>Perfluorinated Compounds (µg/L)</b>						
PFHxS (µg/L)	-	0.02	0.02	0.12	0.039	0.039
PFOS (µg/L)	0.13	0.03	0.043	0.070	0.068	0.069
PFOA (µg/L)	220	<0.01	<0.01	0.011	0.011	0.010
<b>Sum of PFHxS and PFOS</b>	-	0.05	0.063	0.19	0.107	0.108
<b>Sum of PFAS (WA DER List)<sup>B</sup></b>	-	0.05	0.128 <sup>C</sup>	0.185 <sup>C</sup>	0.188 <sup>C</sup>	0.19 <sup>C</sup>
Indicator Variable	DTV* (µg/L)	Baseline Site AQ11	Spring 2019 Site AQ12		Autumn 2020 Site AQ12	
		April 2018	24/9/19	21/11/19	25/5/20	2/9/20
<b>BTEXN (µg/L)</b>						
Benzene (µg/L)	1300	<1	<1	<1	<1	<1
Toluene (µg/L)	-	<2	<1	<1	<1	<1
Ethylbenzene (µg/L)	-	<2	<1	<1	<1	<1
Ortho-Xylene (µg/L)	470	<2	<1	<1	<1	<1
<b>Perfluorinated Compounds (µg/L)</b>						
PFHxS (µg/L)	-	0.02	0.091	0.025	0.044	0.068
PFOS (µg/L)	0.13	0.03	0.084	0.057	0.055	0.076
PFOA (µg/L)	220	<0.01	<0.01	0.013	<0.01	<0.01
<b>Sum of PFHxS and PFOS</b>	-	0.05	0.175	0.082	0.099	0.144
<b>Sum of PFAS (WA DER List)<sup>B</sup></b>	-	0.05	0.252 <sup>C</sup>	0.164 <sup>C</sup>	0.178 <sup>C</sup>	0.219 <sup>C</sup>

\*BTEXN: ANZECC/ARMCANZ (2000) – slightly disturbed systems (90% species protection); PFAS suite: DEE (2016) – Freshwater (95 % species protection – slightly to moderately disturbed ecosystems).

<sup>B</sup> = PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTS and 8:2 FTS.

<sup>C</sup> For any site, where a value has been recorded as less than the detection limit, it was assigned a value of half the detection limit in order to calculate the mean (e.g. <0.02 taken as 0.01).

Table 6 (Cont'd).

Indicator Variable	DTV* (µg/L)	Baseline Site AQ11	Spring 2020 Site AQ12		Autumn 2021 Site AQ12	
		April 2018	11/11/20	30/11/20	28/04/21	11/06/21
Benzene (µg/L)	1300	<1	<1	<1	<1	<1
Toluene (µg/L)	-	<2	<1	<1	<1	<1
Ethylbenzene (µg/L)	-	<2	<1	<1	<1	<1
Ortho-Xylene (µg/L)	470	<2	<1	<1	<1	<1
PFHxS (µg/L)	-	0.02	0.026	0.041	0.065	0.011
PFOS (µg/L)	0.13	0.03	0.054	0.062	0.065	<0.02
PFOA (µg/L)	220	<0.01	0.005 <sup>C</sup>	0.014	<0.01	<0.01
<b>Sum of PFHxS and PFOS</b>	-	0.05	0.080	0.103	0.13	0.021 <sup>C</sup>
<b>Sum of PFAS (WA DER List)<sup>B</sup></b>	-	0.05	0.151 <sup>C</sup>	0.196 <sup>C</sup>	0.222 <sup>C</sup>	0.086 <sup>C</sup>

\*BTEXN: ANZECC/ARMCANZ (2000) – slightly disturbed systems (90% species protection); PFAS suite: DEE (2016) – Freshwater (95 % species protection – slightly to moderately disturbed ecosystems).

<sup>B</sup> = PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTS and 8:2 FTS.

<sup>C</sup> For any site, where a value has been recorded as less than the detection limit, it was assigned a value of half the detection limit in order to calculate the mean (e.g. <0.02 taken as 0.01).

### 3.2.2 Sediment Characteristics

Sediment samples have been collected at Site AQ1, AQ4, AQ14 between autumn 2018 (baseline) and autumn 2021 (during construction) (Table 7&8).

Results indicate that:

- With the exception of lead at Site AQ1, concentrations of the variables examined were consistently within the recommended guideline values;
- The majority of measurements of lead at AQ1 (range = 30 to 130 mg/kg) have exceeded the threshold limit (50 mg/kg) detailed in the Interim Sediment Quality Guidelines (ISQG) (ANZECC/ARMCANZ 2000), including at the time of the baseline (91 mg/kg) survey;
- A spike in barium was detected at Site AQ14 in autumn 2019 (Survey 1: 902 mg/kg) but not subsequently. There are no guideline criteria for barium in sediments or water (ANZECC/ARMCANZ 2000);
- PFOS has consistently been detected at the sites sampled (range = <0.002 to 0.044 mg/kg) but concentrations continue to be below the recommended guideline value for Urban Residential/Public Open Spaces (32 mg/kg) as well as National Parks/Areas with High Ecological Values (6.6 mg/L);
- PFAS (range = 0.0005 to 0.0483 mg/kg) measured at each site continues to be similar to baseline values and below the recommended guideline value for Urban Residential/Public Open Spaces (29 mg/kg) and National Parks/Areas with High Ecological Values (1.0 mg/L) (Tables 7&8).

**Table 7.** Mean ( $\pm$  SE) sediment metal results (mg/L) for surveys done between autumn 2018 ( $n = 1$ ) and autumn 2021 ( $n = 2$ ).

Indicator Variable	Trigger Value*	Baseline (Autumn 2018)			Autumn 2019			Spring 2019		
		AQ1	AQ4	AQ14	AQ1	AQ4	AQ14	AQ1	AQ4	AQ14
Aluminium	-	-	-	-	26,800	24,300 (700)	2,295 (365)	-	-	-
Antimony	-	-	-	-	<0.5	<0.5 (0)	<0.5 (0)	-	-	-
Arsenic	20	<5	<5	<5	4	6 (0.9)	1 (0.2)	3.90 (0.6)	2.75 (0.5)	2.65 (0.3)
Barium	-	110	60	<10	100	66 (4.5)	455 (447)	135 (15)	76.5 (7.5)	29.5 (1.5)
Beryllium	-	<1	1	<1	0.96	1.2 (0.0)	<0.5 (0)	1.20 (0.1)	1.01 (0.1)	<0.5 (0.00)
Boron	-	<50	<50	<50	2.9	0.8 (0.3)	<1 (0)	<1.0 (0.0)	<1.0 (0.0)	<1.0 (0.0)
Cadmium	1.5	<1	<1	<1	<0.5	<0.5 (0)	<0.5 (0)	0.43 <sup>A</sup> (0.2)	<0.5 (0.0)	<0.5 (0.0)
Chromium	80	23	21	3	21	23 (2.0)	3 (0.4)	21.0 (2.0)	13.5 (0.5)	6.3 (0.7)
Cobalt	-	8	6	<2	9	8 (1.9)	1 (0.1)	-	-	-
Copper	65	31	12	<5	28	11 (2.1)	2 (0.3)	30.0 (5.0)	6.1 (1.7)	9.0 (1.0)
Lead	50	91	44	<5	72	35 (0.0)	4 (0.2)	78.0 (32.0)	21.5 (0.5)	12.0 (1.0)
Manganese	-	45	69	16	32	80 (2.0)	7 (0.8)	85.0 (55.0)	50.0 (15.0)	32.5 (12.5)
Mercury	0.15	<0.1	<0.1	<0.1	<0.2	<0.2 (0)	<0.2 (0)	<0.2 (0.0)	<0.2 (0.0)	<0.2 (0.0)
Molybdenum	-	-	-	-	2.2	1.0 (0.4)	<0.5 (0)	-	-	-
Nickel	21	14	9	<2	16	9 (0.0)	1 (0.0)	20.5 (0.5)	10.6 (1.4)	3.85 (0.2)
Selenium Total	-	<5	<5	<5	1	1 (0.0)	<0.5 (0)	2.65 (1.4)	1.59 (0.9)	0.63 <sup>A</sup> (0.4)
Strontium	-	-	-	-	23	17 (4.5)	1 (0.1)	-	-	-
Vanadium	-	48	54	10	36	60 (9.5)	9 (0.9)	-	-	-
Zinc	200	93	96	17	100	64 (4.0)	14 (1.5)	119 (61.5)	29 (17.5)	74 (17.0)

\*Interim Sediment Quality Guideline – Low (Trigger value) (ANZECC/ARMCANZ 2000)

<sup>A</sup> For any site, where a value has been recorded as less than the detection limit, it was assigned a value of half the detection limit in order to calculate the mean (e.g. <0.02 taken as 0.01)

NB Aluminium, Antimony, Molybdenum, Strontium and Vanadium were not tested for by the Spring 2019 surveys because they were not required by the BMS (cf Biosis, 2018)

Table 7 (Cont'd).

Indicator Variable	Trigger Value*	Baseline (Autumn 2018)			Autumn 2020			Spring 2020		
		AQ1	AQ4	AQ1	AQ1	AQ4	AQ14	AQ1	AQ4	AQ14
Aluminium	-	-	-	-	-	-	-	-	-	-
Antimony	-	-	-	-	-	-	-	-	-	-
Arsenic	20	<5	<5	<5	1.90 (0.2)	3.4 (0.4)	5.1 (3.1)	1.90 (0.4)	3.4 (1.2)	2.4 (0.3)
Barium	-	110	60	<10	83 (15)	63.5 (3.5)	41.3 (31.7)	87.0 (33.0)	69.5 (9.5)	37.5 (9.5)
Beryllium	-	<1	1	<1	0.72 (0.1)	0.98 (0.0)	0.5 (0.3)	0.71 (0.2)	0.79 (0.1)	<0.5 (0.0)
Boron	-	<50	<50	<50	0.85 (0.4)	0.5 (0.0)	0.5 (0.0)	1.95 (0.4)	1.25 (0.2)	0.75
Cadmium	1.5	<1	<1	<1	0.25 (0.0)	0.25 (0.0)	0.3 (0.0)	<0.05 (0.0)	<0.5 (0.0)	1.0 <sup>B</sup> (0.5)
Chromium	80	23	21	3	14.5 (0.5)	18.5 (0.5)	12.9 (8.2)	13.5 (3.5)	13.0 (0.0)	6.2 (0.3)
Cobalt	-	8	6	<2	-	-	-	-	-	-
Copper	65	31	12	<5	16.5 (0.5)	11.0 (2.0)	16.7 (12.3)	16.5 (6.5)	7.9 (0.2)	7.2 (1.2)
Lead	50	91	44	<5	71 (5.0)	33.5 (3.5)	23.5 (15.6)	53.5 (10.5)	26.0 (1.0)	11.5 (0.5)
Manganese	-	45	69	16	38.5 (0.5)	66.5 (10.5)	49.5 (38.5)	56.5 (16.5)	52.5 (4.5)	31.0 (3.0)
Mercury	0.15	<0.1	<0.1	<0.1	0.10 (0.0)	0.10 (0.0)	0.1 (0.0)	<0.2 (0.0)	<0.2 (0.0)	<0.2 (0.0)
Molybdenum	-	-	-	-	-	-	-	-	-	-
Nickel	21	14	9	<2	10.7 (1.3)	8.65 (0.5)	5.4 (3.3)	11.5 (2.6)	6.5 (0.5)	2.8 (0.6)
Selenium Total	-	<5	<5	<5	0.70 (0.0)	0.44 (0.2)	0.6 (0.4)	0.63 <sup>B</sup> (0.4)	0.40 <sup>B</sup> (0.2)	<0.5 (0.0)
Strontium	-	-	-	-	-	-	-	-	-	-
Vanadium	-	48	54	10	25 (1.0)	41 (2.0)	36.0 (21)	23 (5.0)	32 (5.5)	19.0 (1.0)
Zinc	200	93	96	17	78 (6.0)	144 (46.5)	111.0 (79)	86 (24)	58 (6.0)	45.5 (19.5)

\*Interim Sediment Quality Guideline – Low (Trigger value) (ANZECC/ARMCANZ 2000)

<sup>A</sup> For any site, where a value has been recorded as less than the detection limit, it was assigned a value of half the detection limit in order to calculate the mean (eg. <0.02 taken as 0.01)

NB Aluminium, Antimony, Molybdenum, Strontium and Vanadium were not tested for by the Spring 2019 surveys because they were not required by the BMS (cf Biosis, 2018)

Table 7 (Cont'd).

Indicator Variable	Trigger Value*	Baseline (Autumn 2018)			Autumn 2021					
		AQ1	AQ4	AQ1	AQ1	AQ4	AQ14			
Aluminium	-	-	-	-	-	-	-			
Antimony	-	-	-	-	-	-	-			
Arsenic	20	<5	<5	<5	3.65 (1.3)	6.10 (0.0)	4.30 (0.8)			
Barium	-	110	60	<10	116.5(23.5)	99.5 (10.5)	68.0 (5.0)			
Beryllium	-	<1	1	<1	1.20 (0.2)	0.87 (0.1)	0.50 <sup>A</sup> (0.2)			
Boron	-	<50	<50	<50	2.00 (0.9)	1.75 <sup>A</sup> (1.3)	1.40 <sup>A</sup> (0.9)			
Cadmium	1.5	<1	<1	<1	0.41 <sup>A</sup> (0.2)	<0.5 (0.0)	<0.5 (0.0)			
Chromium	80	23	21	3	24 (7.0)	24.5 (1.5)	13.0 (2.0)			
Cobalt	-	8	6	<2	-	-	-			
Copper	65	31	12	<5	23 (8.0)	13.5 (1.5)	12.75 (3.3)			
Lead	50	91	44	<5	80 (50)	31.5 (2.5)	27.5 (7.5)			
Manganese	-	45	69	16	28 (8)	150 (40)	46 (5)			
Mercury	0.15	<0.1	<0.1	<0.1	<0.2 (0.0)	<0.2 (0.0)	<0.2 (0.0)			
Molybdenum	-	-	-	-	-	-	-			
Nickel	21	14	9	<2	17.5 (3.5)	9.75 (2.3)	5.85 (1.4)			
Selenium Total	-	<5	<5	<5	1.20 (0.00)	0.88 (0.00)	0.41 (0.2)			
Strontium	-	-	-	-	-	-	-			
Vanadium	-	48	54	10	10 (13)	56 (2.0)	31 (3.0)			
Zinc	200	93	96	17	92 (68)	77 (14.0)	94.5 (35.5)			

\*Interim Sediment Quality Guideline – Low (Trigger value) (ANZECC/ARMCANZ 2000)

<sup>A</sup> For any site, where a value has been recorded as less than the detection limit, it was assigned a value of half the detection limit in order to calculate the mean (eg. <0.02 taken as 0.01)

NB Aluminium, Antimony, Molybdenum, Strontium and Vanadium were not tested for by the Spring 2019 surveys because they were not required by the BMS (cf Biosis, 2018)

**Table 8.** Mean ( $\pm$  SE) sediment results for perfluorinated compounds between autumn 2018 ( $n = 1$ ) and autumn 2021 ( $n = 2$ ).

Indicator Variable	Trigger Value*	Baseline (Autumn 2018)			Spring 2018			Autumn 2019		
		AQ1	AQ4	AQ14	AQ1	AQ4	AQ14	AQ1 <sup>C</sup>	AQ4	AQ14
<b>Perfluorinated compound (mg/kg)</b>										
PFHxS	-	0.0036	0.0007	<0.0002	0.0023 (0.00)	<0.001 (0.00)	<0.001 (0.00)	0.0037	<0.001 (0.00)	<0.001 (0.00)
PFOS	32	0.0444	0.0061	0.0005	0.0310 (0.01)	0.0049 (0.00)	<0.002 (0.00)	0.0220	0.0085 (0.01)	<0.002 (0.00)
PFOA	29	-	-	-	<0.001 (0.00)	<0.001 (0.00)	<0.001 (0.00)	<0.001	<0.001 (0.00)	<0.001 (0.00)
Sum of PFHxS and PFOS	-	0.0480	0.0068	0.0005	0.0333 (0.01)	0.0055 <sup>B</sup> (0.00)	0.002 <sup>B</sup> (0.00)	0.0257	0.0090 <sup>B</sup> (0.01)	0.0015 <sup>B</sup> (0.00)
Sum of PFAS (WA DER List) <sup>A,B</sup>	-	0.0483	0.0068	0.0005	0.0369 <sup>B</sup> (0.01)	0.0096 <sup>B</sup> (0.00)	0.0058 <sup>B</sup> (0.00)	0.0329	0.0150 <sup>B</sup> (0.01)	0.0075 <sup>B</sup> (0.00)
Indicator Variable	Trigger Value*	Baseline (Autumn 2018)			Spring 2019			Autumn 2020		
		AQ1	AQ4	AQ14	AQ1	AQ4	AQ14	AQ1	AQ4	AQ14
<b>Perfluorinated compound (mg/kg)</b>										
PFHxS	-	0.0036	0.0007	<0.0002	0.0016 (0.00)	<0.001 (0.00)	<0.001 (0.00)	0.0005 (0.00)	0.0005 (0.00)	0.0005 (0.00)
PFOS	32	0.0444	0.0061	0.0005	0.0075 (0.01)	0.0062 (0.00)	0.0028 (0.00)	0.0115 (0.00)	0.0015 (0.00)	0.0052 (0.00)
PFOA	29	-	-	-	<0.001 (0.00)	<0.001 (0.00)	<0.001 (0.00)	<0.001 (0.00)	<0.001 (0.00)	<0.001 (0.00)
Sum of PFHxS and PFOS	-	0.0480	0.0068	0.0005	0.0231 (0.08)	0.0067 <sup>B</sup> (0.00)	0.0033 <sup>B</sup> (0.00)	0.0120 (0.00)	0.0020 (0.00)	0.0057 (0.00)
Sum of PFAS (WA DER List) <sup>A,B</sup>	-	0.0483	0.0068	0.0005	0.0281 <sup>B</sup> (0.08)	0.0117 <sup>B</sup> (0.00)	0.0083 <sup>B</sup> (0.00)	0.0170 (0.00)	0.0070 (0.00)	0.0107 (0.00)

\*DEE (2016) - Urban residential/public open spaces

<sup>A</sup> = PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTS and 8:2 FTS

<sup>B</sup> For any site, where a value has been recorded as less than the detection limit, it was assigned a value of half the detection limit in order to calculate the mean (e.g. <0.02 taken as 0.01), the Sum of PFHxS and PFOS and the Sum of PFAS.

<sup>C</sup> Only one survey was undertaken at Site AQ1 in autumn 2019.



Table 8 (Cont'd).

Indicator Variable	Trigger Value*	Baseline (Autumn 2018)			Spring 2020			Autumn 2021		
		AQ1	AQ4	AQ14	AQ1	AQ4	AQ14	AQ1 <sup>C</sup>	AQ4	AQ14
<b>Perfluorinated compound (mg/kg)</b>										
PFHxS	-	0.0036	0.0007	<0.0002	<0.001 (0.00)	<0.001 (0.00)	<0.001 (0.00)	<0.001 <sup>B</sup> (0.00)	<0.001 (0.00)	<0.001 (0.00)
PFOS	32	0.0444	0.0061	0.0005	0.0070 (0.00)	0.0022 <sup>B</sup> (0.00)	<0.002 (0.00)	0.016 (0.004)	0.006 (0.002)	0.004 (0.003)
PFOA	29	-	-	-	<0.001 (0.00)	<0.001 (0.00)	<0.001 (0.00)	<0.001 (0.00)	<0.001 (0.00)	<0.001 (0.00)
<b>Sum of PFHxS and PFOS</b>	-	0.0480	0.0068	0.0005	0.0075 <sup>B</sup> (0.00)	0.0032 <sup>B</sup> (0.00)	0.0015 <sup>B</sup> (0.00)	0.0164 <sup>B</sup> (0.003)	0.0069 <sup>B</sup> (0.002)	0.0042 <sup>B</sup> (0.003)
<b>Sum of PFAS (WA DER List) <sup>A,B</sup></b>	-	0.0483	0.0068	0.0005	0.0125 <sup>B</sup> (0.00)	0.0082 <sup>B</sup> (0.00)	0.0065 <sup>B</sup> (0.00)	0.021 <sup>B</sup> (0.003)	0.0119 <sup>B</sup> (0.002)	0.0090 <sup>B</sup> (0.003)

\*DEE (2016) - Urban residential/public open spaces

<sup>A</sup> = PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTS and 8:2 FTS

<sup>B</sup> For any site, where a value has been recorded as less than the detection limit, it was assigned a value of half the detection limit in order to calculate the mean (e.g. <0.02 taken as 0.01), the Sum of PFHxS and PFOS and the Sum of PFAS.

<sup>C</sup> Only one survey was undertaken at Site AQ1 in autumn 2019.

### 3.3 Aquatic Macroinvertebrates

A total of 17 taxon were identified from edge habitat samples collected at Site AQ12 in autumn 2021 (Survey 1: 13 taxon; Survey 2: 12 taxon) (Table 11, Appendix 3). Nine taxa, Chironominae (True flies), Caenidae (Mayflies), Ceratopogonidae (Biting Midges) Coenagrionidae (Damselflies), Leptoceridae (Caddis Flies), Leptophlebiidae (Mayflies), Libellulidae (Dragonflies), the introduced freshwater snail family, Physidae, and a segmented worm were collected on both sampling occasions (Appendix 3).

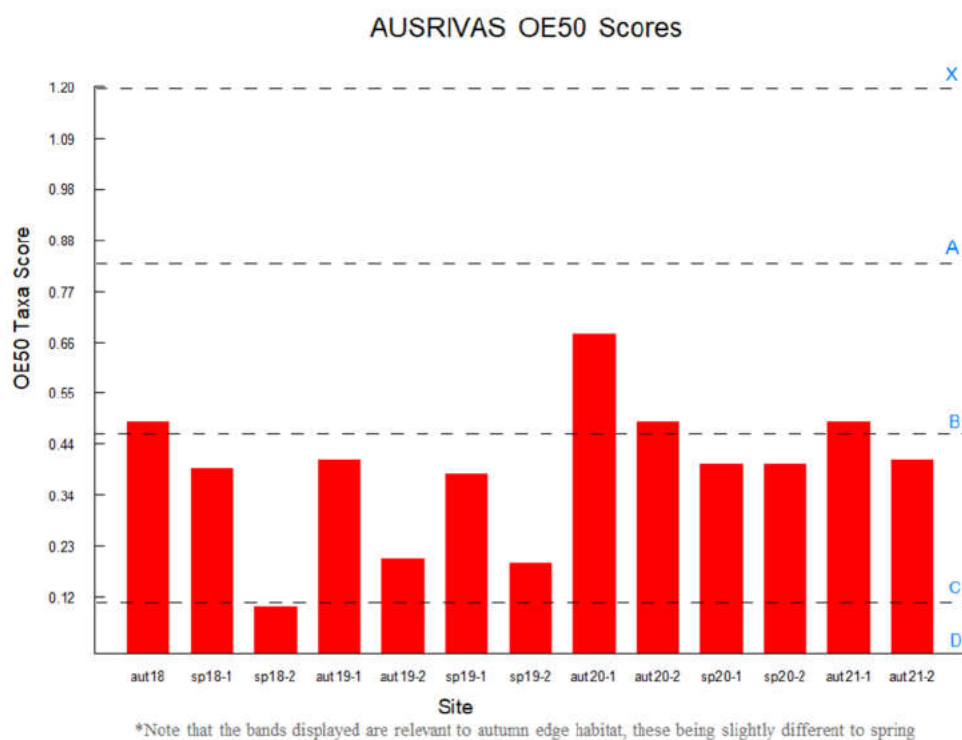
In autumn 2021, the OE50 scores ranged between 0.41 (Survey 2) and 0.49 (Survey 1), indicating that the macroinvertebrate assemblage at Site AQ12 was severely impaired (Band C) in June 2021 and significantly impaired (Band B) in April 2021 relative to reference sites selected by the AUSRIVAS model (Table 11, Figure 3). The most recent OE50 scores were similar to the score obtained by the Baseline survey (autumn 2018: 0.49) and scores from previous autumn surveys (Figure 3).

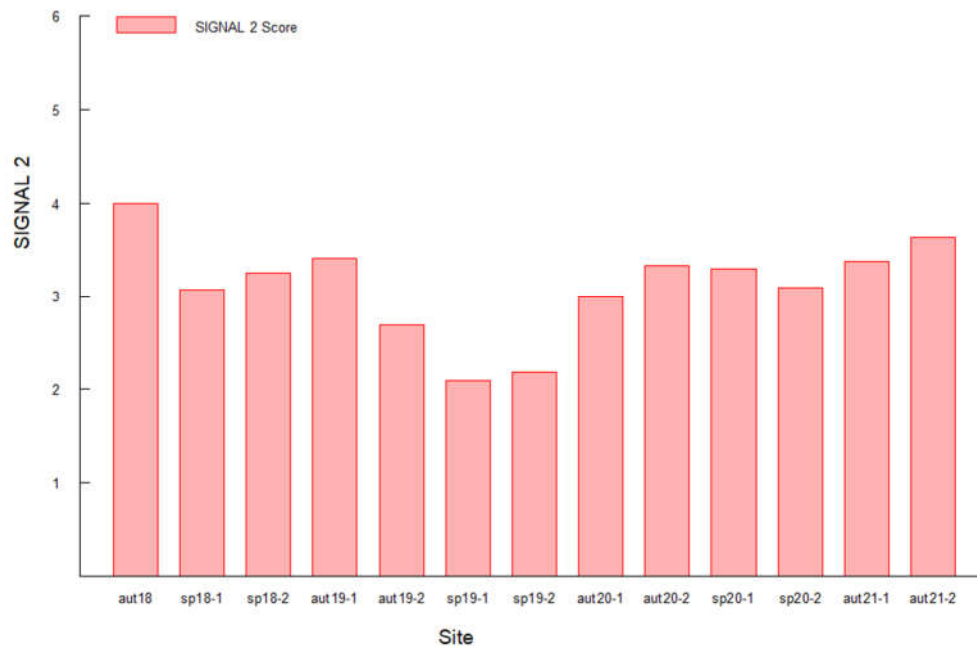
Similar to the findings of the previous survey, taxon with  $> 0.86$  probability of occurrence but not collected at the Anzac Creek site were the aquatic beetle family, Dytiscidae, and the aquatic bug family, Veliidae, on both sampling occasions.

SIGNAL 2 scores obtained for Site AQ12 have changed little over time and indicate that the macroinvertebrate assemblage at AQ12 has been dominated by pollution-tolerant taxa since the commencement of sampling in autumn 2018 (Table 11, Figure 4).

**Table 9.** Total number of taxa, AUSRIVAS & SIGNAL 2 outputs for Site AQ12 ( $n = 1$ ).

Survey	No Taxa	SIGNAL-2	OE50	Band
Autumn 2018	13	4.00	0.49	B
Spring 2018 – Survey 1	9	3.25	0.39	C
Spring 2018 – Survey 2	5	3.07	0.10	D
Autumn 2019 – Survey 1	10	2.69	0.41	C
Autumn 2019 – Survey 2	8	3.41	0.20	C
Spring 2019 – Survey 1	11	2.09	0.38	C
Spring 2019 – Survey 2	11	2.18	0.19	D
Autumn 2020 – Survey 1	19	3.00	0.68	B
Autumn 2020 – Survey 2	13	3.33	0.49	B
Spring 2020 – Survey 1	10	3.10	0.40	C
Spring 2020 – Survey 2	13	3.33	0.40	C
Autumn 2021 – Survey 1	13	3.38	0.49	B
Autumn 2021 – Survey 2	12	3.64	0.41	C

**Figure 3.** OE50 Taxa Scores and their respective Band Scores (B-D) for AUSRIVAS samples collected from edge habitat at Site AQ12 since autumn 2018.



**Figure 4. Quadrant diagram showing SIGNAL 2 results for Site AQ12 sampled in Anzac Creek since autumn 2018.**

### 3.4 Fish

Four species of fish (including two introduced species) were observed while electro-fishing at Site AQ12 in autumn 2021 (Table 10). *Gambusia* (*Gambusia holbrooki*) were common and also caught in dip nets used to sample aquatic macroinvertebrates in autumn 2021 (Table 6). Short-finned eels (*Anguilla australis*) (<30 cm in length), a Long-finned eel (*Anguilla reinhardtii*) (<40cm in length) and one individual of the introduced species, Goldfish (*Carassius auratus*) were also collected (Table 10).

In total, eight species of fish, including three introduced species, have been collected since sampling commenced in autumn 2018 (Table 10). All of the species caught are common within NSW (McDowall, 1996; DPI 2006; Howell and Creese, 2010). No threatened species of fish listed under the *NSW Fisheries Management Act, 1994* or the *Environment Protection and Biodiversity Conservation Act, 1999* were recorded.



**Plate 13:** Juvenile Goldfish collected at Site AQ12 (28/04/2021).

**Table 7. Fish collected at Site AQ12 between autumn 2018 and spring 2019<sup>#</sup>, spring 2020 and autumn 2021.**

Species	Common Name	Aut-18 (Biosis, 2018)	Sp-18	Aut-19	Sp-19	Sp-20	Aut-21
<i>Anguilla reinhardtii</i>	Long-finned eel	2	3	2	-	4	1
<i>Anguilla australis</i>	Short-finned eel	-	13	-	9	13	2
<i>Gobiomorphus australis</i>	Striped gudgeon	28	8	3	2	-	-
<i>Carassius auratus</i> *	Goldfish	-	2	-	-	-	1
<i>Gambusia holbrooki</i> *	Gambusia	328	100's	10's	10's	100's	100's
<i>Hypseleotris compressa</i>	Empire gudgeon	13	-	-	-	-	-
<i>Misgurnus anguillicaudatus</i> *	Oriental weatherloach	-	-	-	1	-	-
<i>Hypseleotris cf galii</i>	Firetail gudgeon	-	-	-	1	1	-

\*Introduced species; <sup>#</sup>Fish were unable to be sampled at Site AQ12 within the autumn 2020 survey period due to instrument malfunction.

### 3.5 Limitations

- Only one Baseline survey was able to be sampled in autumn 2018, due to the May 2018 bushfire (Biosis, 2018);
- Due to restricted access through the construction worksite, it was not possible to access Site AQ1 on 30 May 2019 to undertake the 2019 autumn survey 2. Whilst the collection of replicate samples at each site provides important measures of variability in habitat characteristics and concentrations of toxicants, the results from Survey 1 and subsequent surveys were within the range of results collected by the Baseline survey. Therefore, it is considered that the missing sample did not detract from being able to interpret the findings of the 2019 autumn sampling event, and that the intent and outcomes of the MPES2 monitoring survey were achieved;
- Sampling required for the 2020 autumn event was unable to commence until late May 2020 due to COVID-19 related delays. The 2020 autumn survey 2 was further delayed due to repairs required to the Electrofisher;
- Water quality measurements collected during the biological sampling only provide a snapshot of quality at the time of sampling under the prevailing flow conditions;
- In the absence of external reference sites (i.e. similar sites but in systems not subject to the Projects activities), it is not possible to account for changes in the variable examined that may occur naturally at a broader regional scale.

## 5.0 DISCUSSION

There has been no construction on MPES2 since December 2020. Warehouses 1, 3, 4 and 5 are now operational and the location of Warehouses 6-8 have been left as compacted pads. Any water sheets off into the SED Basin and discharges into Anzac Creek (via DP5 and DP7).

### 5.1 Aquatic Habitat & Environmental Conditions

Similar to the findings of the spring 2020 surveys, areas of standing water were present at the study sites and flow was apparent along some reaches. The majority of Anzac Creek displayed stable environments in autumn 2021, including at the downstream end of the refuge pool where an area of active erosion from overbank flows was evident in autumn 2020. The area has mostly been recolonised by exotic grasses.

The noxious plant, Alligator Weed, continues to be abundant at the most upstream site (Site AQ1), although large gaps have appeared in the floating canopy. Leaves and stems of Alligator Weed at Site AQ1 appeared unhealthy in November 2020, coinciding with large numbers of adult Flea Beetles (*Arcola malloi*) observed on the plants. Flea Beetles have commonly been used to control floating mats of Alligator Weed in some areas of Australia and overseas (van Oosterhout, 2007; DPI, 2019). Alligator Weed growing along the creek bank however, appeared healthy, most likely due to the inability of Flea beetles to establish in terrestrial habitats (Julien and Bourne, 1988).

The popular aquarium plant, *Egeria densa* (Egeria), collected within the large refuge pool (Site AQ12) in spring 2020, was not observed by the autumn 2021 surveys. Egeria is a submerged aquatic plant that thrives in shallow, nutrient-rich, slow-moving or stationary water (Sainty and Jacobs, 2003). Infestations of Egeria have been shown to displace native species of other submerged plants (e.g. Roberts et al., 1999), and are common in the Georges River near its confluence with Anzac Creek. Signage and public information at popular points of entry by the public to waterways, including near the refuge pool, may reduce the chance of unintentional human-assisted introductions of species such as Egeria from aquaria.



Water quality within Anzac Creek is influenced by various types of anthropogenic disturbance. This is evident in several indicators (reduced dissolved oxygen levels, elevated nitrogen, aluminium and copper) being outside recommended guideline values for the protection of aquatic life, including prior to commencement of the Project. ALS (2011) and Biosis (2018) attributed these impacts to historical contributions from Commonwealth Department of Defence Lands, industrial and urban run-off, among others. While the Project may also be influencing water quality within the creek, measures of water quality sampled in autumn 2021 were generally comparable to those measured previously. It has not been possible to distinguish elevated measures of selected indicators from pre-existing influences, which interact with local rainfall, flow and other discharges to Anzac Creek.

Concentrations of lead in sediments collected at the most upstream site sampled on Anzac Creek (Site AQ1) have consistently exceeded the guideline value (50 mg/kg). Notably, investigations done prior to commencement of development of the MPES2 site reported isolated areas impacted by lead (JBS&G, 2016). The levels recorded at Site AQ1 do not appear to have increased significantly since the BAEMP survey (91 mg/kg) in 2018. Levels do not appear to have increased at sites sampled downstream of Site AQ1 and remain below the threshold limit detailed in the Interim Sediment Quality Guidelines (ISQG) (ANZECC/ARMCANZ 2000).

PFOA (perfluoro-octanoic acid) and PFOS (perfluorooctane sulphonate) have been detected in water and sediment samples collected by the construction phase survey's but concentrations remain similar to Baseline values and within the recommended Australian-derived guidelines for water and soil.

## **5.2 Aquatic Macroinvertebrates**

The macroinvertebrate assemblage supported by the refuge pool appears to experience some degree of environmental stress. This is evident in the OE50 Taxa Scores and Bands, which have generally been indicative of a macroinvertebrate assemblage that is less diverse compared to reference sites selected by the AUSRIVAS model. Low values of the SIGNAL 2 score and the number of macroinvertebrate types were also indicative of a site suffering from one or more forms of human impact. Despite this, some pollution sensitive taxa were also

identified, including caddis fly and mayfly families, which suggests that the effect of poor water quality within Anzac Creek is limited.

Intermittent flow along Anzac Creek and elevated nitrogen levels measured within the refuge pool are likely to have contributed to the lower stream health ratings. Increased nutrients often promote algal growth and dense stands of aquatic plants, which can facilitate oxygen depletion within the water column and at the sediment-water interface (by increasing the organic content of bottom sediments) (Lake, 2011; Vilas et al., 2017). Generally, more pollution tolerant, lentic (i.e. standing water) taxa replace sensitive and flow-requiring taxa, like the Leptophlebiidae, in edge habitats (Boulton, 2003; Lake, 2003).

Also notable was that several individuals (10's to 100's) of the introduced fish, *Gambusia* (*Gambusia holbrooki*), were observed by the current and the previous surveys. Alien species, particularly *Gambusia*, commonly thrive in disturbed habitats and still waters (McDowall 1996), especially when pre-existing fish assemblages are depauperate (Ross 1991, Stanford et al. 1996). Predation by *Gambusia* is listed as a Key Threatening Process by the NSW *Biodiversity Conservation Act 2016*, because of known effects on frogs, freshwater fishes and aquatic macroinvertebrates, among others.

### 5.3 Fish

On the whole, species composition of the fish assemblage sampled in autumn 2021 was similar to previous surveys. No threatened species of fish listed under the *NSW Fisheries Management Act, 1994* or the *Environment Protection and Biodiversity Conservation Act, 1999* were recorded.

Eels have commonly been caught at the refuge pool opposite Wattle Grove since sampling commenced in autumn 2018, as well as three native species of gudgeon, confirming that the creek provides some habitat for native species of fish. All of the species caught are common within NSW (McDowall, 1996; DPI 2006; Howell and Creese, 2010).

## 6.0 CONCLUSION & RECOMMENDATIONS

Examination of the results from the autumn 2021 monitoring event found no evidence of changes in the indicator variables (bed and bank stability, water quality, assemblages of aquatic macroinvertebrates and fish) that could be attributed to the Project works. Thus, in accordance with the Biodiversity Monitoring Strategy, no adaptive management contingency measure was triggered.

The following recommendations have been made to ensure continuity of the program and to add value to stream health monitoring and management:

- Sampling of the stream health monitoring in spring 2021, using the methods employed for baseline, construction and operation phase surveys;
- In relation to Alligator weed, the “Regional Recommended Measure” applicable to the area is “Land managers prevent spread from their land where feasible” and “Land managers mitigate the risk of new weeds being introduced to their land. Land managers reduce the impact on priority assets” (DPI, 2018). It is recommended that Land managers focus on containment and on-going suppression of the Alligator Weed infestation at Site AQ1. The Flea beetle is useful for on-going suppression of aquatic infestations in core areas. Eradication however, requires regular physical removal of below-ground or underwater material, including within the riparian zone;
- Development of Plans of Management for the control of Alligator weed, Egeria and other introduced species. For instance, public education may reduce the chance of unintentional human-assisted introductions (e.g. by using live bait, or by being released by aquaria).

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## **APPENDICES**

**Appendix 1 - GPS positions (UTMs) for stream monitoring sites (autumn 2021).**

Site Code	Easting	Northing
AQ1	308131	6240235
AQ4	308556	6240283
AQ8	309214	6240809
AQ12	309385	6241601
AQ13	309377	6241726
AQ14	309369	6241879

Datum: WGS 84, Zone 56H

**Appendix 2 – Visual Assessment Scores****Appendix 2a – Ephemeral stream assessment results**

	Autumn 2018		Spring 2018		Autumn 2019	
Site	Score (%)	Category	Score (%)	Category	Score (%)	Category
AQ1	88	Very Stable	75	Stable	80	Stable
AQ4	88	Very Stable	75	Stable	78	Stable
AQ8	91	Very Stable	93	Very Stable	93	Very Stable
	Spring 2019		Autumn 2020		Spring 2020	
Site	Score (%)	Category	Score (%)	Category	Score (%)	Category
AQ1	88	Very Stable	90	Very Stable	90	Very Stable
AQ4	80	Stable	88	Very Stable	89	Very Stable
AQ8	92	Very Stable	93	Very Stable	93	Very Stable
	Autumn 2021					
Site	Score (%)	Category				
AQ1	80	Very Stable				
AQ4	89	Stable				
AQ8	93	Very Stable				



## Appendix 2b – HABSCORE assessment results

	Autumn 2018		Spring 2018		Autumn 2019	
Site	Score (%)	Category	Score (%)	Category	Score (%)	Category
AQ1	27	Marginal	29	Marginal	32	Marginal
AQ4	28	Marginal	25	Marginal	25	Marginal
AQ8	41	Marginal	38	Marginal	38	Marginal
AQ12	55	Suboptimal	51	Suboptimal	53	Suboptimal
AQ13	21	Poor	23	Poor	21	Poor
AQ14	22	Poor	23	Poor	22	Poor
	Spring 2019		Autumn 2020		Spring 2020	
Site	Score (%)	Category	Score (%)	Category	Score (%)	Category
AQ1	30	Marginal	32	Marginal	27	Marginal
AQ4	26	Marginal	29	Marginal	28	Marginal
AQ8	41	Marginal	41	Marginal	41	Marginal
AQ12	51	Suboptimal	50	Suboptimal	53	Suboptimal
AQ13	19	Poor	21	Poor	22	Poor
AQ14	21	Poor	22	Poor	23	Poor
	Autumn 2021					
Site	Score (%)	Category				
AQ1	29	Marginal				
AQ4	36	Marginal				
AQ8	41	Marginal				
AQ12	55	Suboptimal				
AQ13	23	Poor				
AQ14	24	Poor				

**Appendix 3 - Macroinvertebrate taxa collected at Site AQ12 in autumn 2021 using the NSW AUSRIVAS protocol.**

<b>Taxa</b>	<b>Survey 1 (28 April 2021)</b>	<b>Survey 2 (11 June 2021)</b>
Acarina	7	>22
Annelida	1	0
Chironomidae - Chironominae	12	8
Chironomidae (L.) - Tanypodinae	2	0
Baetidae	0	1
Caenidae	10	3
Ceratopogonidae (L.)	1	2
Coenagrionidae	6	8
Corixidae	0	1
Hirudinea	1	0
Leptoceridae	6	11
Leptophlebiidae	1	1
Libellulidae	2	6
Lymnaeidae	1	0
Physidae	9	4
Pleidae	0	1
Sialidae	0	1
<b>Number of Taxa</b>	<b>13</b>	<b>12</b>



# APPENDIX F – MPE OPERATIONS INCIDENT REGISTER



# APPENDIX G - COMPLIANCE REPORT DECLARATION FORM

## COMPLIANCE REPORT DECLARATION

<b>Project Name</b>	Moorebank Logistics Park (MLP) – East Precinct
<b>Project Application Number</b>	SSD 6766 & SSD 7628
<b>Description of Project</b>	Moorebank Logistics Park 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 MLP 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.
<b>Project Address</b>	Moorebank Logistics Park, Moorebank, NSW, 2170
<b>Proponent</b>	Qube Holdings Limited (ACN: 149 723 053)
<b>Title of Compliance Report</b>	Moorebank Logistics Park East Precinct – Operation Compliance Report
<b>Date</b>	Thursday, 28 July 2022

I declare that I have reviewed relevant evidence and prepared the contents of the attached Compliance Report and to the best of my knowledge:

- the Compliance Report has been prepared in accordance with all relevant conditions of consent;
- the Compliance Report has been prepared in accordance with the Compliance Reporting Post Approval Requirements;
- the findings of the Compliance Report are reported truthfully, accurately and completely.
- due diligence and professional judgement have been exercised in preparing the Compliance Report; and
- the Compliance Report is an accurate summary of the compliance status of the development.

### Notes:

- Under section 10.6 of the Environmental Planning and Assessment Act 1979 a person must not include false or misleading information (or provide information for inclusion in) a report of monitoring data or an audit report produced to the Minister in connection with an audit if the person knows that the information is false or misleading in a material respect. The proponent of an approved project must not fail to include information in (or provide information for inclusion in) a report of monitoring data or an audit report produced to the Minister in connection with an audit if the person knows that the information is materially relevant to the monitoring or audit. The maximum penalty is, in the case of a corporation, \$1 million and for an individual, \$250,000; and
- The Crimes Act 1900 contains other offences relating to false and misleading information: section 307B (giving false or misleading information – maximum penalty 2 years' imprisonment or 200 penalty units, or both).

<b>Name of Authorised Reporting Officer</b>	[REDACTED]
<b>Title</b>	MD Possum Environmental Consulting
<b>Signature</b>	[REDACTED]
<b>Qualification</b>	Bachelor of Science – Environmental Science
<b>Company</b>	Possum Environmental Consulting
<b>Company Address</b>	2 Carole Avenue, Baulkham Hills NSW 2153