PORT AUTHORITY
OF NEW SOUTH WALES

Eden Cruise Ship Facility
Five-Year Operation Compliance Summary Report

Application number: SSI 7734

2023/2024 Cruise Season and Extended Use

February 2025

Authorised by: Christa Sams, Senior Manager, Environment

Final

Document Status

Revision	Author	Reviewer	Review Date
Final	Francisca Alvarez	Fiona McKay	11 February 2025
Final	Francisca Alvarez	Christa Sams	17 February 2025

Declaration

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

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

A Compliance Report Declaration Form is provided in Appendix B of this document.

Contents

Acronyms and Definitions

Acronym/Term	Definition
BVSC	Bega Valley Shire Council (BVSC)
CCC	Community Consultative Committee.
Complaints	A written or verbal expression of dissatisfaction about an activity, or proposed activity, or failure to act by the Operator, Duty Manager Cruise Operations (DMCO) or anyone else directly or indirectly related to the Facility.
Council	Bega Valley Shire Council.
Commonwealth DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water
NSW DCCEEW	NSW Department of Climate Change, Energy, the Environment and Water (previously part of DPE)
DPE	NSW Department of Planning and Environment (now NSW Department of Planning, Housing and Infrastructure).
DPHI	NSW Department of Planning, Housing and Infrastructure (previously part of DPIE and then DPE)
DPIE	NSW Department of Planning, Industry and Environment (now NSW Department of Planning, Housing and Infrastructure).
Duty Manager Cruise Operations (DMCO)	Manages the operation of the Facility on behalf of the Port Authority of New South Wales (Operator).
EIS	The *Eden Breakwater Wharf Extension State Significant Infrastructure – Environmental Impact Statement*, dated 3 November 2016, submitted to the Secretary seeking approval to carry out the SSI and as revised if required by the Secretary under the EP&A Act.
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW).
EPA	NSW Environment Protection Authority.
EPBC 2016/7828	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Referral Decision, 13 April 2017.
Extended Use	Use of the Facility when not occupied by a cruise ship by fishing vessels, tugs, barges, lines boats, yachts and other vessels with sizes up to 100 metres in length.
Facility	Eden Cruise Ship Facility, including all infrastructure required to allow cruise ships to berth at the extended Eden Breakwater Wharf and land side areas, facilities and services for management of passenger visitation including disembarkation, embarkation and transport.
Infrastructure Approval	Infrastructure Approval (SSI) 7734 issued by the Executive Director, Priority Projects Assessment (as delegate of the Minister for Planning) Department of Planning and Environment under Section 115ZB of the *Environmental Planning and Assessment Act 1979*

Acronym/Term	Definition
	(NSW), (dated 5 July 2017) as modified on 7 November 2018 (MOD 1) and on 21 October 2020 (MOD 2).
MARPOL	International Convention for the Prevention of Pollution from Ships 1973: ▪ As corrected by the Procès-Verbal of Rectification dated 13 June 1978, and ▪ As affected by any amendment made under Article 16 of MARPOL, other than an amendment not accepted by Australia or that has not entered into force in Australia, and ▪ As modified and added to by the Protocol of 1978 relating to the *International Convention for the Prevention of Pollution from Ships*, 1973, as affected by any amendment to that Protocol made under Article VI of the Protocol other than an amendment not accepted by Australia or that has not entered into force in Australia.
MARPOL Annex VI	Regulations for the Prevention of Air Pollution from Ships.
m	Metre.
Minister	NSW Minister for Planning and Public Spaces.
OEMP	Operational Environmental Management Plan.
OCR	Operation Compliance Report, prepared under Conditions A21 and A23.
Operation	The operation of the Facility in accordance with the SSI Infrastructure Approval (whether in full or in part) for its intended purpose
Operator	The Port Authority of New South Wales is the Operator for the Facility and responsible for overall compliance with the OEMP, and the operational aspects of the Infrastructure Approval and EPBC Act Referral Decision.
Proponent	The person/organisation identified as such in Schedule 1 of the SSI approval and any other person carrying out any part of the SSI from time to time.
POEO Act	*Protection of the Environment Operations Act 1997* (NSW).
Relevant Maritime Authority	Harbour Master or authorised officer, as defined in the *Marine Safety Act 1998* (NSW), or authorised officer or inspector under the *Marine Pollution Act 2012* (NSW), the Port Authority of New South Wales.
Secretary	Secretary of the NSW Department of Planning, Housing and Infrastructure (or nominee, whether nominated before or after the date in which the SSI approval was granted).
SSI	The State Significant Infrastructure, as generally described in Schedule 1 of the Infrastructure Approval MOD 1, and carrying out of which is approved under the terms of the approval.

1 Introduction

1.1 Background

The construction and operation of the Eden Cruise Ship Facility (the Facility), which is a State Significant Infrastructure Project (SSI no. 7734) under Division 5.2 of the *Environmental Planning and Assessment Act 1979* (EP&A Act), was approved by the Minister for Planning's delegate under Section 115ZB of the EP&A Act on the 5 July 2017.

The Infrastructure Approval was obtained by the former Department of Industry – Lands & Forestry. Construction of the Facility commenced in August 2017 and was completed in August 2019. The Facility was constructed by the former Department of Industry – Crown Lands. Operation of the Facility and Operational Environmental Management Plan (OEMP) implementation is undertaken by Port Authority. In September 2019 Port Authority of New South Wales (Port Authority) became the operator of the Eden Cruise Facility and holds responsibility for the conditions of approval associated with the operation of the cruise wharf.

The Eden Cruise Ship Facility's SSI approval was modified on 7 November 2018 (MOD 1), on 21 October 2020 (MOD 2) and on 24 May 2024 (MOD 3). The SSI 7734 approval, as modified, is referred to in this report as the Infrastructure Approval. The Project was also subject to a Referral decision under the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth) (EPBC Act), issued by the Commonwealth's Department of the Environment and Energy (DoEE) (now the Commonwealth Department of Climate Change, Energy, the Environment and Water – Commonwealth DCCEEW) dated 13 April 2017 (EPBC 2016/7828).

1.2 OCR and OCSR

This Five-Year Operational Compliance Summary Report (5-Year OCSR) has been prepared for the Eden Cruise Ship Facility (the Facility) by the Operator of the Facility, Port Authority. This is the 5th year of Operational Compliance Report (OCR) reporting.

The 5-Year OCSR has been prepared in accordance with the requirements of Conditions A21 and A23 of the Infrastructure Approval (SSI-7734) and provides a record of the operational compliance of the Facility against approval conditions during the 2023/24 reporting season, and during the 5 years between 2019 to 30 June 2024. This OCR has been prepared in consideration of the Department of Planning, Industry and Environment (DPIE)'s document *Compliance Reporting Post Approval Requirements* (DPIE, May 2020).

This Five-Year OCSR includes the:

- 2023/24 OCR required by Condition A21 and
- 2023/24 Air Quality Operation Monitoring Report required by Condition D12 and D13 (see section 6.3.5 of this 5-Year OCSR).

As required by Condition B6 of the approval, a copy of this OCSR will be made publicly available on Port Authority's website: https://www.portauthoritynsw.com.au/

Applicable conditions related to this 5-Year OCSR are specified in Table 1-1 below.

Table 1-1: Operation Compliance Reporting Requirements

Condition	Condition requirement	Section of Report that addresses the condition
A21	….Operation Compliance Reports must be prepared and submitted to the Secretary for information after the first calendar year of operation, the end of the 2019/20 cruise season and following that, after the end of each cruise season, or within another timeframe agreed with the Secretary	This report

Condition	Condition requirement	Section of Report that addresses the condition
A23	….Operation Compliance Reports must include:	
	(a) a results summary and analysis of environmental monitoring	2.3
	(b) a summary of the Complaints Register required under Condition A28 including the number of any complaints received, a summary of main areas of complaint, action taken, response given and proposed strategies for reducing the recurrence of such complaints	4
	(c) details of any review of, and minor amendments made to the …OEMP	7
	(d) a register of any consistency assessments made to the …OEMP	7
	(e) results of any independent environmental audits and details of any actions taken in response to the recommendations of the audit	5
	(f) a summary of all incidents notified in accordance with Condition A33 and Condition A34 of this approval including actions taken to address the cause or impact of an incident	3
	(g) a Five-Year Operational Compliance Summary Report every five years from commencement of Operation, which includes: i. the name and size of visiting cruise ships and date of visits, ii. the number and nature of complaints in relation to specific cruise ships, iii. results of air quality monitoring and any noise monitoring undertaken to investigate repeated noise complaints, iv. identification of any issues that need to be addressed through revision of the OEMP and/or Sub-plans;	6
	(h) Any other matter relating to compliance with the terms of this approval or as requested by the Secretary.	2.1
B6	A website providing information in relation to the SSI must be established prior to commencement of Construction and maintained for the duration of Construction and Operation. Up-to-date information (excluding confidential commercial information) must be published and maintained on the website or dedicated pages including… e. a current copy of each document required under the terms of this approval and any endorsements, approvals or requirements from the ER and Planning Secretary, all of which must be published prior to the commencement of any works to which they relate or prior to their implementation as the case may be; and	1.2

Condition	Condition requirement	Section of Report that addresses the condition
	f. the outcomes of compliance tracking required under this approval.	
D12	The Air Quality Operation Monitoring Program, as approved by the Planning Secretary, and amended from time to time must be implemented during cruise seasons for five years from commencement of Operation of the SSI or another time period as agreed or directed by the Planning Secretary	6.3
D13	The results of the Air Quality Operation Monitoring Program must be submitted to the Planning Secretary, and relevant regulatory agencies, for information in the form of an Operation Monitoring Report at the frequency identified in the relevant Operation Monitoring Program.	6.3.5

1.3 The Project

The Project involves the construction and operation of the Facility in accordance with the Infrastructure Approval.

The Facility is located within Lot 1 DP1268599, as shown in Figure 1-1. The Facility is at the end of Weecoon Street, Snug Cove, on the northern side of Twofold Bay, within the Port of Eden, Bega Valley Shire Local Government Area (LGA), approximately 40km north of the New South Wales and Victorian border. The Facility is shown in Figure 1-2 and Figure 1-3.

Figure 1-1 Lot boundaries and Berths at Eden Cruise Ship Facility (source: Port Authority of NSW, Bentley maps 2024)

Figure 1-2 Eden Cruise Facility within its context in Snug Cove, Eden (Source: Google maps, 2024)

Figure 1-3 The Pacific Explorer Cruise ship at the Facility (Source: Port Authority of NSW, 2019)

The Facility comprises the Eden Breakwater Wharf and the Wharf Extension (the Wharf), and all associated infrastructure required to allow cruise ships to berth and land side areas, facilities and services for management of passenger visitation including day visit disembarkation, embarkation and transport. Key elements of the Facility include:

- A 220m long Wharf
- Three mooring dolphins and two berthing dolphins
- Landside bollards to restrain the ship's bow
- Minor services (lighting, potable water, and emergency water)
- Navigation aids
- Land-based facilities and services for management of passenger visitation including disembarkation, embarkation and transport locations.

The original Infrastructure Approval allowed for the 'operation of the extended wharf for use by up to 60 cruise ships per annum and associated land-based facilities and services for management of passenger visitation including disembarkation, embarkation and transport'. The Infrastructure Approval enabled cruise ships with lengths up to 325m and about 3,000 persons on board, to berth between 7:00am and 10:00pm (unless extenuating circumstances prevail such as mechanical failure, an on-board emergency or severe weather conditions) alongside the extended Breakwater Wharf so that passengers can embark/disembark directly and safely via the ship's gangway.

MOD 1 of the Infrastructure Approval modified a number of conditions relating to noise and vibration and air quality. These modifications were proposed in consultation with the Community Consultative Committee (CCC) for the Project and the then Department of Planning and Environment (DP&E).

MOD 2 of the Infrastructure Approval allowed other vessels up to 100m in length to remain at berth 24 hours per day when a cruise ship is not at berth and to load/unload, refuel, carry out maintenance and servicing, and embark/disembark passengers between 7:00am and 10:00pm. The use of the berth by other vessels in accordance with MOD 2 is referred to in this OCR as the "Extended Use".

MOD 3 of the Infrastructure Approval allows 24-hour berthing and vessels up to 370m long, removes the 60-vessel yearly limit for cruise ships, and allows for construction of an extra marine dolphin and permanent passenger walkway.

Key personnel responsible for the environmental compliance management are:

- Christa Sams, Senior Manager, Environment csams@portauthoritynsw.com.au
- Francisca Alvarez, Environmental Planning Officer falvarez@portauthoritynsw.com.au

1.4 Cruise ship visits

See section 6.1 for cruise ship visits during the 2023/24 cruise season.

1.5 Non-cruise ship visits

The Infrastructure Approval and the Extended Use OEMP defines 'Extended Use' as 'Use of the Facility when not occupied by a cruise ship by fishing vessels, tugs, barges, lines boats, yachts and other vessels with sizes up to 100 metres in length'.

Typical non-cruise ships to use the Eden Cruise Wharf include periodic visits by navy ships, project cargo vessels for the transport of equipment, parts, etc, offshore oil and gas support vessels and any other types of non-bulk commercial vessels.

Details of berth usage with respect to the Extended Use of the Facility during the 23/24 reporting period are shown below in Table 1-2 below.

Table 1-2: Extended Use of the Facility during the 2023/2024 reporting period

No.	Vessel Name	Length Overall (m)	Vessel type	Arrival	Departure
1	WAMBIRI	33.92	Tug	01/07/2023, 00:30	31/07/2023, 23:30
2	FLINDERS BAY	26.1	Tug	01/07/2023, 00:30	31/07/2023, 23:30
3	FLINDERS BAY	26.1	Tug	01/08/2023, 00:30	31/08/2023, 23:25
4	WAMBIRI	33.92	Tug	01/08/2023, 00:30	31/08/2023, 23:30
5	FLINDERS BAY	26.1	Tug	01/09/2023, 00:30	30/09/2023, 23:30
6	WAMBIRI	33.92	Tug	01/09/2023, 00:30	30/09/2023, 23:30
7	HMAS GASCOYNE	52.5	Navy	03/10/2023, 17:00	06/10/2023, 06:22
8	YOUNG ENDEAVOUR	35	Tall ship	21/01/2024, 11:00	22/01/2024, 06:12
9	HMAS DIAMANTINA	52.5	Navy	08/03/2024, 19:20	11/03/2024, 14:20
10	HMAS DIAMANTINA	52.5	Navy	15/03/2024, 10:10	18/03/2024, 06:10

1.6 Compliance Reporting Period

As per section 6.1, the cruise ship season for 2023/24 is from 23 October 2023 to 28 March 2024. The Extended Use period for 2023/24 is from 1 July 2023 to 30 June 2024, as the Extended Use period includes tugs, and the Harbour Tug is berthed the entire period and only departs the wharf to berth / move vessels coming in and out of Twofold Bay.

This OCR reporting period covers the 2023/24 cruise season and Extended Use period and provides a summary of the previous 4 OCRs (section 6) and therefore covers the period from 1 July 2019 to 30 June 2024.

2 Compliance Status

Table 2-1 provides a list of the Conditions of the Infrastructure Approval relevant to this OCR and Table 2-2 provides the EPBC 2016/7828 condition for the operation of the Facility. Table 2-1 and Table 2-2 provide the compliance status of the conditions, and any relevant details pertaining to the status of that Condition.

In accordance with DPIE (May 2020), the compliance status key is as follows:

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

In summary, during the 2023/24 OCR reporting period:

- There were two non-compliances with the conditions of approval associated with the operation of the Facility:

    - There was no independent environmental audit undertaken in the 2023 calendar year (see Condition A24 in Table 2-1 for further detail).
    - The Air Quality Operation Monitoring Report (in Section 6.3.5 of this Five-Year OCR) will be submitted to the Planning Secretary, and relevant regulatory agencies late, i.e. more than one month following the end of the Cruise Ship Season, being 28 March 2024 (see Condition D13 in Table 2-1 for further detail).
- There was one noise complaint associated with noise from a cruise ship (see Condition E2 in Table 2-1 for further detail).
- There were no incidents causing or threatening to cause material harm to the environment under the *Protection of the Environment Operations Act 1997* (NSW) (POEO Act) and requiring notification.

2.1 Infrastructure Approval (SSI 7734)

Table 2-1: Compliance assessment against SSI 7734 operational conditions

Condition No.	Condition	Status	Details/reference
General			
A1	The SSI must be carried out: a. in compliance with the conditions of this consent; b. in accordance with all written directions of the Planning Secretary; c. generally in accordance with the EIS and Response to Submissions: i. the Eden Breakwater Wharf Extension State Significant Infrastructure – Environmental Impact Statement, dated 3 November 2016, ii. Response to Submissions Report Eden Breakwater Wharf Extension, dated 24 February 2017; and d. generally in accordance with Modification Assessments: i. Eden Breakwater Wharf Extension Modification Request to Infrastructure Approval SSI 7734, dated 2 July 2018; ii. Letter titled “Re: Eden Breakwater Wharf MOD 1 – Response to Submissions – Air Quality and Noise”, dated 17 August 2018. iii. Response to Submission Eden Breakwater Wharf Extension MOD 1 (SSI 7734), dated 3 September 2018; and	Compliant	There has been overall compliance with the conditions of approval during the reporting period (refer to this table for compliance with operational conditions).

Condition No.	Condition	Status	Details/reference
	iv. SSI 7734 MOD 1 – Addendum Modification Report, dated 14 October 2018. v. Eden Cruise Facility Modification 2 to SSI 7734 Extending Use of Cruise Facility to other Vessels, dated July 2020; and vi. Eden Cruise Facility Response to Submissions - Modification 2 to SSI 7734 Extending Use of Cruise Facility to other Vessels, dated August 2020.		
A2	The SSI must be carried out generally in accordance with all procedures, commitments, preventative actions, performance criteria and mitigation measures set out in the documents referred to in conditions A1(c) and A1(d) unless otherwise specified in, or required under, this approval.	Compliant	The operations generally undertaken in accordance with the terms of Condition A2.
A3	The SSI must be carried out in accordance with the terms and conditions of all other approvals, permits and licences.	Compliant	Refer to section 2.2 for the assessment against EPBC Act Referral.
A4	The conditions of this consent and directions of the Planning Secretary prevail to the extent of the inconsistency, ambiguity or conflict between them and a document listed in condition A1(c) or A1(d). In the event of any inconsistency, ambiguity or conflict between any of the documents listed in condition A1(c) and A1(d), the most recent document prevails to the extent of the inconsistency, ambiguity or conflict.	Noted	-
A5	The Proponent must comply with all requirements of the Planning Secretary in relation to: a. the environmental performance of the SSI; b. any document or correspondence; c. any notification given to the Planning Secretary under the terms of this approval;	Not applicable	No Secretary requirements have been imposed on the Facility outside of the Infrastructure Approval.

Condition No.	Condition	Status	Details/reference
	d. any audit of the Construction or Operation of the SSI; e. compliance with the terms of this approval (including anything required to be done under this approval); and f. the carrying out of any additional monitoring or mitigation measures.		
A6	Without limitation, all strategies, plans, programs, reviews, audits, report recommendations, protocols and other documents must be implemented in accordance with all requirements issued by the Planning Secretary from time to time in respect of them.	Not applicable	No Secretary requirements have been imposed on the Facility outside of the Infrastructure Approval.
A7	Where the terms of this approval require consultation with identified parties, details of the consultation undertaken, matters raised by the parties, and how the matters were considered must accompany the strategies, plans, programs, reviews, audits, protocols and the like submitted to the Secretary.	Compliant	Consultation with the Community Consultative Committee (CCC) was carried out during the 2023/24 reporting season. Refer to Condition B1 for details.
A8	This approval lapses five years after the date on which it is granted, unless Construction of the SSI has commenced on or before that date.	Not triggered	
Compliance tracking program			
A17	Construction and Operation Compliance Tracking Programs to monitor compliance with the terms of this approval must be prepared. […] The Operation Compliance Tracking Program must be submitted to the Planning Secretary for approval no later than one month prior to commencement of Operation or within another timeframe agreed with the Planning Secretary.	Compliant	The Operation Compliance Tracking Program was approved by the Secretary delegate in correspondence dated 9 August 2019.

Condition No.	Condition	Status	Details/reference
A18	The […] Operation Compliance Tracking Programs must be implemented for the duration of Construction and Operation, or within another timeframe agreed with the Planning Secretary based on the outcomes of independent audits, Environmental Representative Reports and regular compliance reviews submitted through Compliance Reports.	Compliant	The Operation Compliance Tracking Program has been implemented during the 2023/24 reporting period. This report provides details of compliance.
A19	A […] Pre-Operation Compliance Report must be prepared and submitted to the Planning Secretary for information no later than one month prior to the commencement of ….Operation … or within another timeframe agreed with the Planning Secretary	Compliant	A Pre-Operation Compliance Report was prepared and was first submitted to the Secretary for information on 5 February 2019. Following the update of the OEMP and OEMP Sub-plans, the Pre-Operation Compliance Report was re-submitted for information on 10 July 2019.
A20	[…] Operation must not commence until the […] Pre-Operation Compliance Report […] [has] been submitted to the Planning Secretary.	Compliant	Refer to A19. The Pre-Operation Compliance Report was submitted to the Secretary prior to commencement of Operation.
A21	[…] Operation Compliance Reports must be prepared and submitted to the Planning Secretary for information after the first calendar year of operation, the end of the 2019/2020 cruise season and following that, after the end of each cruise season, or within another timeframe agreed with the Planning Secretary.	Compliant	The first OCR for the Facility was prepared at the end of the 2019/20 cruise season. DPE acknowledged receival of the OCR 2019/20 Cruise Season in correspondence dated 20/7/20 and indicated that "The Department …reviewed the Report and considers it generally satisfied the conditions approval". An OCR was prepared at the end of the 2020/21 cruise season. DPE acknowledged receival of the OCR in correspondence dated 22/8/21 and indicated that "the Department….considers it to generally satisfy conditions A21 and A23". An OCR was prepared at the end of the 2021/22 cruise season. DPE acknowledged receival of the OCR in correspondence dated 18/08/2022 and indicated that "the Department…. considers it to generally satisfy the reporting requirements of the approval".

Condition No.	Condition	Status	Details/reference
			An OCR was prepared at the end of the 2022/23 cruise season and submitted to DPHI on 18 June 2024. DPHI acknowledged receival of the OCR in correspondence dated 26 June 2024 and indicated that the Department "… considers it to generally satisfy the reporting requirements of the approval and the NSW Planning's Compliance Reporting Post Approval Requirements". The current report (this report) is the OCR prepared for the 2023/24 season, contains the Five-Year OCR and will be submitted to the Planning Secretary as required.
Compliance reports			
A22	The […] Pre-Operation Compliance Reports must include: a. details of how the terms of this approval that must be addressed prior to the commencement of […] Operation have been complied with; b. in the event of a non-compliance with the terms of this approval that must be addressed prior to the commencement of […] Operation […], details of the non-compliance and action taken to rectify the non-compliance; and c. the commencement date for […] Operation […].	Compliant	Refer to A19. No non-compliances with the Infrastructure Approval were identified in the Pre-Operation Compliance Report.
A23	[…] Operation Compliance Reports must include: a. a results summary and analysis of environmental monitoring; b. a summary of the Complaints Register required under Condition A28 including the number of any complaints received, a summary of main areas of complaint, action taken, response given and	Compliant	This report. Refer also to Table 1-1. Operation began in 2019/20, which was the 1st OCR. 2023/2024 is the 5th year of OCRs and g) is therefore applicable this OCR reporting year. The Five-Year Operational Compliance Summary Report is presented in Section 6 of this OCR.

Condition No.	Condition	Status	Details/reference
	proposed strategies for reducing the recurrence of such complaints; c. details of any review of, and minor amendments made to, the CEMP or OEMP; d. a register of any consistency assessments undertaken and their status; e. results of any independent environmental audits and details of any actions taken in response to the recommendations of an audit; f. a summary of all incidents notified in accordance with Condition A33 and Condition A34 of this approval including actions taken to address the cause or impact of an incident; g. a Five Year Operational Compliance Summary Report every five years from commencement of Operation, unless otherwise agreed by the Planning Secretary, which includes: i. the name and size of visiting cruise ships and date of visits, ii. the number and nature of complaints in relation to specific cruise ships, iii. results of air quality monitoring and any noise monitoring undertaken to investigate repeated noise complaints, iv. identification of any issues that need to be addressed through revision of the OEMP and/or Sub-plans; and h. any other matter relating to compliance with the terms of this approval or as requested by the Planning Secretary.		

Condition No.	Condition	Status	Details/reference
Compliance Auditing			
A24	Compliance audits of the SSI must be conducted annually, commencing within a year of the commencement of Construction, by an independent, suitably qualified and experienced expert or within another timeframe agreed with the Planning Secretary.	**Non-compliant**	Port Authority wrote to DPE (28 July 2020) to reduce the frequency of compliance audits, based on the performance of the Facility during the 2019/20 cruise season with no non-compliances, incidents or complaints reported (refer 2019/20 OCR) and the Commonwealth ban on cruise ships. DPE agreed (letter dated 26 Oct 2020) that no audits would be required under Condition A24 during the calendar year 2020 or 2021 (subject to cruise ship visits re-commencing in Eden). There were no cruise ship visits during the 2021 calendar year or in the 2021/22 reporting period. An audit was conducted during the 2022 calendar year – see section 5 of this OCR. **No independent environmental audit was undertaken in the 2023 calendar year (non-compliance with condition A24).** Port Authority wrote to the Department, DPHI on 13 August 2024 providing notification of the non-compliance and requesting to alter the frequency of Annual Independent Compliance Audits. DPHI, in a letter dated 7 September 2024, agreed to reduce the frequency of Independent Compliance Audits from Annual to Triennial, with the Project's next Independent Compliance Audit being the 2025 Independent Compliance Audit, and then every three years ongoing.
Complaints register			
A28	A Complaints Register must be maintained for the duration of Construction and Operation.	Compliant	Port Authority maintains a Complaints Register for the operation of the Facility.

Condition No.	Condition	Status	Details/reference
A29	The Complaints Register must be provided to the Planning Secretary upon request, within the timeframe stated in the request.	Not Triggered	The Planning Secretary did not request the Complaints Register during the 2023/24 reporting season.
A30	The following information must be available to facilitate community enquiries and complaints within one (1) month from the date of this approval: a. a 24-hour telephone number for the registration of complaints and enquiries about the SSI; b. a postal address to which written complaints and enquires may be sent; c. an email address to which electronic complaints and enquiries may be transmitted; and d. a mediation system for complaints unable to be resolved. This information must be accessible to all in the community regardless of age, ethnicity, disability or literacy level.	Compliant	Contact details, processes and procedures for the operational phase are in place as per the requirements of this condition and are provided in the approved OEMP and OEMP Sub-plans, and the Extended Use OEMP. See also condition A31 below.
A31	The telephone number, postal address and email address required under Condition A30 of this approval must be published in a newspaper circulating in the local area prior to the commencement of […] Operation. This information must also be provided on the website required under Condition B6 of this approval.	Compliant	The contact information in Condition A31 was published in a local newspaper, the Eden Magnet, prior to the commencement of operation, and is also provided on the Port Authority website. Contact details can be found in the Port Authority website: https://www.portauthoritynsw.com.au
A32	The Complaints Register must record the: a. number of complaints received; b. number of people affected in relation to a complaint;	Compliant	The Port Authority Complaints register incorporates these requirements. One noise complaint was received during the 2023/24 reporting season (see E2 below for further details).

Condition No.	Condition	Status	Details/reference
	c. means by which the complaint was addressed and whether resolution was reached, with or without mediation.		
Incident notification			
A33	The Planning Secretary must be notified as soon as possible and in any event within 24 hours of the Proponent being made aware of any incident.	Not triggered	There were no pollution or environmental incidents during the 2023/24 reporting season.
A34	Notification of an incident under Condition A33 of this approval must include the time and date of the incident, details of the incident and must identify any non-compliance with this approval.	Not triggered	There were no pollution or environmental incidents during the 2023/24 reporting season.
A35	Any requirements of the Planning Secretary or relevant public authority (as determined by the Planning Secretary) to address the cause or impact of an incident reported in accordance with Condition A33 of this approval, must be met within the timeframe determined by the Planning Secretary or relevant public authority.	Not triggered	Not triggered.
A36	If statutory notification is given to the EPA as required under the POEO Act in relation to the SSI, such notification must also be provided to the Planning Secretary within 24 hours after the notification was given to the EPA.	Not triggered	There were no pollution incidents during the 2023/24 reporting season.
A37	The SSI may be […] operated in stages. Where staged […] operation is proposed, a Staging Report […] must be prepared and submitted to the Planning Secretary for information. The Staging Report must be submitted to the Planning Secretary no later than one month before the commencement of […] one month before the commencement of operation of the first of the proposed stages of operation), or within another timeframe agreed with the Planning Secretary.	Not triggered	There is no staged approach for the Operation of the Facility.

Condition No.	Condition	Status	Details/reference
Staging			
Community information, consultation and involvement			
B1	Prior […] the Proponent is required to establish a Community Consultative Committee. The Community Consultative Committee is to be established in accordance with the Department's Community Consultative Committee Guidelines for State Significant Projects, dated November 2016, or from an existing group that can be demonstrated to meet the purposes and objectives of the Guidelines as agreed by the Planning Secretary. The committee is to include representatives from port businesses, maritime user groups, residents surrounding the Port of Eden and the Relevant Maritime Authority and is to operate […] during Operation of the SSI for a period as agreed with the Planning Secretary, but not for less than five years from commencement of operation of the committee.	Compliant	The Community Consultative Committee (CCC) was established in accordance with condition B1 prior to construction and has been active since then during construction and operation. Details are provided in Section 3.3 of the OEMP and OEMP Sub-plans. The CCC met on a quarterly basis during the 2023/24 OCR reporting period and meeting minutes are available on the project website page of the website https://www.portauthoritynsw.com.au
B2	A Report endorsed by the Community Consultative Committee is to be submitted to the Secretary five years after commencement of Operation of the SSI, reporting on whether the purpose of the Committee has been achieved and completed, and recommending a timeframe for continued operation. Where disbandment of the committee is recommended, it is to be replaced with a community-based forum, as provided for in the Community Communication Strategy, operating for the life of the SSI unless otherwise agreed by the Planning Secretary. The Community Consultative Report recommending disbandment must be submitted to the Secretary for consideration and include:	Compliant	The 2023/24 reporting season is within the fifth year of operation. A Five Year CCC Report was prepared by Port Authority, endorsed by the CCC and submitted to the secretary as per Condition B2 within the 2024 calendar year. DPHI acknowledged (through the Major Projects Planning Portal, 9 January 2025) receipt of the 5 Year CCC Report for the Eden Breakwater Wharf Extension and that they had no comments on the document at this time.

Condition No.	Condition	Status	Details/reference
	a. minutes of the Community Consultative Committee meeting documenting member agreement to disbandment; and b. proposed membership of the community-based forum. *Note: the community-based forum must include local residents and may be an existing community liaison group.*		
B3	A Community Communication Strategy must be prepared to provide mechanisms to facilitate communication between the Proponent, the ER, the relevant Council, the Community Consultative Committee and/ or community-based forum, others directly impacted by the SSI during Construction of the SSI and for the life of the Operation of the SSI, unless otherwise agreed by the Secretary	Compliant	A Community Communication Strategy (CCS) was prepared prior to construction and approved by the Secretary in accordance with Condition B4 in correspondence dated 8/8/2017. The CCS was amended as required during construction by the former Department of Industry. The latest version of the CCS (May 2023) was updated by Port Authority as an action from the independent audit (2022) findings; updates were to reflect current conditions and stakeholder context. Updates are to be made in future to the CCS to reflect future conditions and stakeholder context, as a result of the recommendations and changes described in the 5 Year CCC Report for the Eden Breakwater Wharf Extension.
B4	The Community Communication Strategy must be submitted to the Planning Secretary for approval no later than one month prior to commencement of any work (excluding works described in paragraphs (a) to (c) in the definition of Construction) for the purposes of the SSI, or within another timeframe agreed with the Planning Secretary. Work for the purposes of the SSI (excluding works described in paragraphs (a) to (c) in the definition of Construction) must not commence until the Community Communication Strategy has been approved by the Planning Secretary.	Compliant	Refer to condition B3.

Condition No.	Condition	Status	Details/reference
B5	The Community Communication Strategy must: a. identify people to be consulted during Construction and Operation; b. set out procedures and mechanisms for the regular distribution of accessible information about or relevant to the SSI; c. provide for the formation of community-based forums that focus on key environmental management issues for the SSI arising from Compliance Reports; and d. set out procedures and mechanisms: i. through which the community can discuss or provide feedback to the Proponent; ii. through which the Proponent will respond to enquiries or feedback from the community; and iii. to resolve any issues and mediate any disputes that may arise in relation to environmental management and delivery of the SSI.	Compliant	Refer to condition B3.
Provision of electronic information			
B6	A website providing information in relation to the SSI must be established prior to commencement of Construction and maintained for the duration of Construction and Operation. Up-to-date information (excluding confidential commercial information) must be published and maintained on the website or dedicated pages including: a. information on the current implementation status of the SSI; b. a copy of the documents listed in Condition A1 and Condition A2 of this approval, and any	Compliant	Port Authority has established dedicated pages to the Facility in its website (https://www.portauthoritynsw.com.au) including the information required under Condition B6. Note: Construction-related documentation is no longer required to be on the website in accordance with condition B6 as construction of the Facility occurred more than 12 months ago.

Condition No.	Condition	Status	Details/reference
	documentation relating to any modifications made to the SSI or the terms of this approval; c. a copy of this approval in its original form, a current consolidated copy of this approval (that is, including any approved modifications to its terms), and copies of any approval granted by the Minister to a modification of the terms of this approval; d. a copy of each statutory approval, licence or permit required and obtained in relation to the SSI including Commonwealth permits or approvals; e. a current copy of each document required under the terms of this approval and any endorsements, approvals or requirements from the ER and Planning Secretary, all of which must be published prior to the commencement of any works to which they relate or prior to their implementation as the case may be; and f. the outcomes of compliance tracking required under this approval. Information relating solely to construction may be removed from the website 12 months following completion of construction.		
Operational environmental management			
D1	An Operational Management Plan (OEMP) must be prepared to detail how the performance outcomes, commitments and mitigation measures made and identified in the EIS and Submissions Report will be implemented and achieved during Operation.	Compliant	The OEMP addressing D1 and D2 was prepared and approved by the Secretary's nominee in correspondence dated 15 September 2019. The approved and current OEMP (updated after MOD 3) is available on the Port Authority website: https://www.portauthoritynsw.com.au

Condition No.	Condition	Status	Details/reference
D1A	An Extended Use Operational Environmental Management Plan (Extended Use OEMP) must be prepared to detail how the performance outcomes and commitments made and identified in the Eden Cruise Facility Modification 2 to SSI 7734 Extending Use of Cruise Facility to other Vessels and Eden Cruise Facility Response to Submissions - Modification 2 to SSI 7734 Extending Use of Cruise Facility to other Vessels will be implemented and achieved during the Extended Use operations.	Compliant	The Extended Use OEMP was prepared and approved by the Secretary's nominee in correspondence dated 6 November 2020. The approved Extended Use OEMP was available on the Port Authority website; and has now been replaced by the updated approved and current OEMP (updated after MOD 3): https://www.portauthoritynsw.com.au
D2	The OEMP required under Condition D1 must provide: a. a description of management and monitoring activities. Where the OEMP covers activities to be carried out under other approvals, licences and permits, the OEMP must clearly identify which activities are to be carried out under this approval; b. details of environmental policies, guidelines and principles to be followed in the operation of the SSI; c. a list of all the OEMP Sub-plans required in respect of Operation, as set out in Condition D3. d. details of how the Operation of the SSI will be carried out under the OEMP and OEMP Sub-plans to: i. achieve the environmental performance outcomes identified in the EIS/Submissions Report; ii. implement the mitigation measures identified in the EIS/Submissions Report and any additional measures recommended in Compliance Audits or to address any issues identified in the Five Year Operational Compliance Summary Reports;	Compliant	Refer to condition D1.

Condition No.	Condition	Status	Details/reference
	iii. comply with the relevant terms of this approval; and iv. address issues during Operation, as identified through the Community Consultative Committee, community-based forums provided for under Condition B5, Complaints Register or Monitoring Programs, through a process of continual improvement; e. an inspection program detailing the activities to be inspected and frequency of inspections; f. a description of the roles and environmental responsibilities of the Proponent's employees and their relationship with the Relevant Maritime Authority and Council including roles and responsibilities for management of any matters which are to be reported in the Operation Compliance Reports required under Condition A21; g. for training and induction for employees, including contractors and sub-contractors, in relation to environmental and compliance obligations under the terms of this approval; h. a mechanism for communicating the environmental and compliance obligations under this approval to cruise ship operators; and i. for periodic review and update of the OEMP and all associated plans and programs.		
D3	The following OEMP Sub-plans must be prepared in consultation with the relevant government agencies identified for each OEMP Sub-plan, and in consideration of the relevant requirements in this approval and the Proposed Mitigation Measures:	Compliant	The OEMP Sub-plans were prepared and approved by the Secretary's nominee in correspondence dated 15 September 2019.The OEMP and OEMP Sub-plans provide details of the consultation undertaken as part of the preparation of these plans.

<table>
<tr><th>Condition No.</th><th>Condition</th><th>Status</th><th>Details/reference</th></tr>
<tr><td></td><td><table>
<tr><th></th><th>Required OEMP Sub-plan</th><th>Relevant government agencies to be consulted</th></tr>
<tr><td>(a)</td><td>Traffic, Transport and Access</td><td>Council, Relevant Maritime Authority</td></tr>
<tr><td>(b)</td><td>Noise Management</td><td>Council, EPA, Relevant Maritime Authority</td></tr>
<tr><td>(c)</td><td>Air Quality Management</td><td>EPA, Relevant Maritime Authority</td></tr>
</table></td><td></td><td>The approved and current OEMP Sub-plans (updated after MOD 3) are available on the Port Authority website:

https://www.portauthoritynsw.com.au</td></tr>
<tr><td>D4</td><td>The OEMP Sub-plans must include, to the written satisfaction of the Secretary, information requested by an agency to be included in an OEMP Sub-plan, including copies of all correspondence from those agencies.</td><td>Compliant</td><td>Refer to condition D3.</td></tr>
<tr><td>D5</td><td>The OEMP and OEMP Sub-plans and Extended Use OEMP, must be submitted to the Planning Secretary for approval no later than one month prior to the commencement of relevant operations, unless another timeframe is agreed with the Planning Secretary…</td><td>Compliant</td><td>Refer to condition D1 and D3. The OEMP and OEMP Sub-plans were submitted to the Secretary more than one month prior to the commencement of Operations and were approved by the Secretary’s nominee in correspondence dated 15 September 2019.

The Extended Use OEMP was submitted to the Secretary more than one month prior to commencement of Extended Use Operations and was approved by the Secretary’s nominee in correspondence dated 6 November 2020.

The approved and current OEMP & OEMP Sub-plans (updated after MOD 3) are available on the Port Authority website:

https://www.portauthoritynsw.com.au</td></tr>
<tr><td>D6</td><td>The OEMP and Extended Use OEMP, as approved by the Planning Secretary and amended from time to time, must be implemented for the duration of relevant operations and</td><td>Compliant</td><td>The OEMP has been implemented throughout Operation; in the 2023/24 cruise season and per details in the 2023/24 OCR. The Extended Use</td></tr>
</table>

Condition No.	Condition	Status	Details/reference
	must be made publicly available prior to the commencement of and for the duration of the relevant operations.		OEMP has been implemented throughout the 2023/24 reporting period. The OEMP and Extended Use OEMP were made publicly available prior to commencement of relevant operations. The approved and current OEMP Sub-plans (updated after MOD 3) are available in the Port Authority website: https://www.portauthoritynsw.com.au
Operation monitoring program			
D7	An Air Quality Operation Monitoring Program must be prepared in consultation with the EPA, Council and Relevant Maritime Authority.	Compliant	The Air Quality Operation Monitoring Program (incorporated in the Air Quality OEMP sub-plan) was prepared in consultation with the agencies and was approved by the Secretary's nominee in correspondence dated 15 September 2019. Note: The approved and current Air Quality Management Sub-plan and Air Quality Monitoring Program (updated after MOD 3) are available on the Port Authority website: https://www.portauthoritynsw.com.au
D8	The Air Quality Operation Monitoring Program must provide: a. details of baseline data available; b. details of baseline data to be obtained and when; c. details of all monitoring of the project to be undertaken; d. the parameters of the project to be monitored; e. the frequency of monitoring to be undertaken; f. the trigger for operational monitoring	Compliant	Refer to condition D7. The Air Quality Operational Monitoring Program provided in the Air Quality OEMP Sub-plan addresses the requirements of D8. Note: The approved and current Air Quality Management Sub-plan and Air Quality Monitoring Program (updated after MOD 3) are available on the Port Authority website: https://www.portauthoritynsw.com.au

Condition No.	Condition	Status	Details/reference
	g. the location of monitoring; h. the reporting of monitoring results; i. procedures to identify and implement additional mitigation measures where results of monitoring are unsatisfactory; and j. any consultation to be undertaken in relation to the monitoring programs.		
D9	The Air Quality Operation Monitoring Program must include, to the written satisfaction of the Secretary, information requested by an agency to be included in the Operation Monitoring Program including copies of all correspondence from those agencies.	Compliant	Refer to D7.
D10	The Air Quality Operation Monitoring Program must be submitted to the Planning Secretary for approval at least one month prior to the commencement of Operation or within another timeframe agreed with the Planning Secretary.	Compliant	Refer to D7. The Air Quality Operation Monitoring Program (which is incorporated in the Air Quality OEMP sub-plan) was submitted to the Secretary more than one month prior to the commencement of operation and was approved by the Secretary's nominee in correspondence dated 15 September 2019.
D11	Operation must not commence until the Planning Secretary has approved the required Air Quality Operation Monitoring Program, and all relevant baseline data has been collected.	Compliant	Refer to D7. The Air Quality OEMP Sub-plan (containing baseline air quality data) and Air Quality Operation Monitoring Program were approved by the Secretary's nominee on the 15 September 2019, the inauguration day for operations.
D12	The Air Quality Operation Monitoring Program, as approved by the Planning Secretary, and amended from time to time must be implemented during cruise seasons for five years from commencement of Operation of the SSI or another time period as agreed or directed by the Planning Secretary.	Compliant	See section 2.3 and 6.3 of this OCR. The Air Quality Operational Monitoring Program was implemented during the 2019/20 cruise season as per D12. The monitoring station was run continuously

Condition No.	Condition	Status	Details/reference
	From commencement of Operation to the end of the 2019/2020 cruise season, real-time air quality monitoring results during the cruise season must be available on the website required under Condition B6.		from the 4 September 2019 to the 31 March 2020, including the entire 2019/20 cruise season. Real-time air quality monitoring results were made available on Port Authority's website during the 2019/20 cruise season. Port Authority submitted a letter to the DPE dated 23 March 2020 with an analysis of the air quality monitoring results during the 2019/20 cruise season, a link to the monthly monitoring reports during that season and a recommendation to stop the air quality monitoring program on the basis of the results with no exceedance of the criteria due to cruise ships reported during any cruise ship visits. In a letter dated 5 May 2020, DPE approved the suspension of the air quality monitoring program for the 2020/21 and 2021/22 cruise seasons. On 14 June 2022, Port Authority sought agreement from DPE to continue with the suspension (as 2019/20 monitoring data showed that the local air quality was not impacted by cruise ships of the sizes currently allowed to visit the Facility) until larger ships were allowed to visit the Facility. In that regard, Port Authority noted that it was preparing a modification of the SSI approval (MOD 3) to allow larger cruise ships to visit the Eden Cruise Facility. Port Authority proposed that upon approval of MOD 3, Port Authority would resume the air quality monitoring program for larger cruise ships in order to validate the results of MOD 3 air quality modelling investigations results. Information on MOD 3 is available in the Scoping Report submitted to DPE in April 2022 (https://www.planningportal.nsw.gov.au/major-projects/projects/eden-breakwater-wharf-extension-modification-3). DPE advised on 2 August 2022 that they agreed to the ongoing suspension of the Air Quality Monitoring Program for season 2022/2023 cruise season, with monitoring required to

Condition No.	Condition	Status	Details/reference
			recommence to cover the entire 2023/2024 cruise season. The air quality monitoring program re-commenced in the 2023/24 cruise season. The 2023/24 Air Quality Operation Monitoring Report is included in Section 6.3 of this OCR.
D13	The results of the Air Quality Operation Monitoring Program must be submitted to the Planning Secretary, and relevant regulatory agencies, for information in the form of an Operation Monitoring Report at the frequency identified in the relevant Operation Monitoring Program.	**Non-compliant**	Section 7.1 of the Air Quality Operation Monitoring Program states that the Operation Monitoring Report 'will be prepared and submitted... to the Secretary **one month** after the end of each Cruise Ship Season for the duration of monitoring'. Air quality monitoring was undertaken in the 2019/20 cruise season. The Port Authority submitted the Air Quality Monitoring results to DPE, in the OCR for the 2019/20 cruise season. DPE acknowledged the receival of the Air Quality Monitoring report summary required under Condition D13 in correspondence dated 20 July 2020. In a letter dated 5 May 2020, DPE approved the suspension of the Air Quality Monitoring Program for the 2020/21 and 2021/22 cruise seasons. DPE advised on 2 August 2022 that they agree to the ongoing suspension of the Air Quality Monitoring Program for season 2022/2023 cruise season, The air quality monitoring program re-commenced in the 2023/24 cruise season. The 2023/24 Air Quality Operation Monitoring Report is included in Section 6.3 of this OCR. This OCR will be provided to the Planning Secretary to fulfil the requirements of condition D13. **The 2023/24 Operational Monitoring Report is contained in section 6.3.5 of this 5-Year OCSR, and has been submitted with this 5-Year OCSR, more than one month after the end of the 2023/24**

Condition No.	Condition	Status	Details/reference
			Cruise Ship Season (being 28 March 2024), and is therefore reported as a non-compliance.
D14	Where a relevant OEMP Sub-plan exists, the relevant Air Quality Operation Monitoring Program may be incorporated into that OEMP Sub-plan.	Noted	The Air Quality Operational Monitoring Program was incorporated in the Air Quality OEMP Sub-plan. Note: The approved and current Air Quality Management Sub-plan and Air Quality Monitoring Program (updated after MOD 3) are available on the Port Authority website: https://www.portauthoritynsw.com.au/
Terms of approval			
E1	No cruise ship is permitted to berth before 7:00am or after 10:00pm unless extenuating circumstances prevail such as mechanical failure, an on-board emergency or severe weather conditions. Vessels other than cruise ships up to 100m in length are permitted to remain at berth 24 hours per day when a cruise ship is not at berth.	Compliant	See Section 6.1Table 1-1. Vessels up to 100m in length used the Facility during the 2023/24 OCR reporting period (see Table 6-3 above).
E2	In addition to the performance outcomes, commitments and mitigation measures specified in the EIS and Submissions Report, all reasonably practicable measures must be implemented to minimise noise impacts and the emission of air pollutants during Operation of the SSI.	Compliant	One noise complaint was received during the 2023/24 OCR reporting period. The complaint was made from a member of the Eden CCC in March 2024 following distribution of the meeting minutes, so no action or reasonably practicable measures could be implemented to minimise the noise impacts from the cruise ship when it was in port on 5 February 2024. No pollution complaints were received during the 2023/24 OCR reporting period.
Traffic, transport and access			
E7	The Traffic, Transport and Access OEMP Sub-plan must include detail on the provision of infrastructure, facilities and	Compliant	The Traffic, Transport and Access OEMP Sub-plan that addresses condition E7 was prepared and

Condition No.	Condition	Status	Details/reference
	services to cater for cruise ship passengers and ensure safe access including: a. pedestrian access to Eden Town Centre and Port of Eden retail areas; b. pedestrian access to tourist facilities and other local businesses; c. passenger transport services for visits to local and regional businesses and attractions; d. bus parking bays, waiting areas, shelters, signage and the like at the wharf and at pick up points in the local area; and e. provision of personnel to oversee pedestrian movements on the wharf and surrounding areas during cruise ship visits.		approved by the Secretary's nominee in correspondence dated 15 September 2019. Subsequent to the DPE's approval of the sub-plan, Port Authority identified minor adjustments of the pick-up and drop-off facilities for buses and taxis which would improve passenger safety and access. These minor improvements, which were exempt development under State Environmental Planning Policy (Infrastructure) 2007, were incorporated in a revised version of the Traffic, Transport and Access OEMP Sub-plan. These improvements were discussed with Council during the ongoing consultation prior to operation. The revised Traffic, Transport and Access OEMP Sub-plan was submitted to DPE for information in correspondence dated 10 September 2019. The sub-plan was also submitted to Council. Note: The approved and current Traffic, Transport and Access Sub-plan (updated after MOD 3) is available on the Port Authority website: https://www.portauthoritynsw.com.au
Noise and vibration			
E8	The SSI is to be […] operated to minimise noise impacts on surrounding residents.	Compliant	The Facility has been operated to minimise noise impacts on surrounding residents. Refer also to E17 below.
E17	The Noise Management OEMP Sub-plan must identify measures to reduce noise impacts on Sensitive Receivers including: a. no deck announcements and music from open decks while berthed at the Breakwater Wharf Extension, with the exception of safety announcements;	Compliant	The Noise Management OEMP Sub-plan incorporates measures in accordance with Condition E17. The OEMP Sub-plans were approved by the Secretary's nominee in correspondence dated 15 September 2019. Note: The approved and Noise Management Sub-plan (updated after MOD 3) is available on the Port Authority website:

Condition No.	Condition	Status	Details/reference
	b. ship engine, generator, exhaust and ventilation systems including air conditioning must be maintained and operated efficiently to reduce noise emissions while in the Port of Eden; c. ships must run on the minimum generator/engine power required while at the berth; d. in the event of an overnight berth due to extenuating circumstances, community information and notification; and e. a procedure for management of non-compliant cruise ships including details on proposed actions, timeframes and consequences in the event of non-compliance with (a) to (c) in this condition.		https://www.portauthoritynsw.com.au
E18	Where a complaint is received from a Sensitive Receptor in relation to a specific cruise ship at the Breakwater Wharf Extension, the source and nature of the noise must be investigated while the ship is at berth (unless this is not possible due to the timing of the complaint or imminent departure of the ship), and corrective actions implemented as required. If there are further complaints or the investigation indicates ongoing exceedance of the noise levels predicted in the EIS and Modification Assessments on the return of the cruise ship, future visits must be managed in accordance with the requirements of the Noise Management OEMP Sub-plan and specific actions, timeframes and consequences agreed by the Secretary in the event of repeat non-compliance.	Compliant	One noise complaint was received during the 2023/24 OCR reporting period. The complaint was made from a member of the Eden CCC in March 2024 following distribution of the meeting minutes, so no action or reasonably practicable measures could be implemented to minimise the noise impacts from the cruise ship when it was in port on 5 February 2024.
E19	The SSI is to be operated to: (a) minimise the risk to Sensitive Receivers from adverse health impacts from exposure to cruise ship emissions; (b) support management strategies to reduce exposure; and	Compliant	The Cruise Ship Facility has been operated to comply with the requirements of Condition E19.

Condition No.	Condition	Status	Details/reference
	(c) national environmental protection standards (as revised from time to time) set out in the National Environment Protection (Ambient Air Quality) Measure.		
Air quality			
E20	The OEMP Air Quality Management OEMP Sub-plan must include the following measures to reduce emissions from cruise ships: a. prior to 1 January 2020: i. no more than 20 cruise ship visits to the Breakwater Wharf Extension (which represents the "typical operations" modelled in the Refined SO2 Emission Modelling); and ii. emissions from cruise ships berthed at the Breakwater Wharf Extension must not result in an exceedance of the maximum cumulative SO_2 concentration at the most affected sensitive receiver as predicted in the Refined SO_2 Emission Modelling for "typical operations"; b. from 1 January 2020, cruise ships must meet emission restrictions specified under MARPOL Annex VI, as implemented through the relevant Maritime Acts, or more stringent emission restrictions under these Acts; c. ship engine, generator, exhaust and ventilation systems must be maintained and operated efficiently to reduce air emissions while at berth at the Breakwater Wharf Extension; and d. a procedure for management of non-compliant cruise ships including details on proposed actions,	Compliant	Air Quality Management OEMP Sub-plan addresses the requirements of Condition E20. The OEMP Sub-plans were approved by the Secretary's nominee in correspondence dated 15 September 2019. Refer also to Conditions D12 and D13.

Condition No.	Condition	Status	Details/reference
	timeframes and consequences in the event of non-compliance with (a)ii, (b) and (c) in this condition.		
E21	Unless otherwise agreed with the Planning Secretary, the Operation Monitoring Program required under Condition D7 must, as a minimum, include monitoring of NO_2, SO_2 and $PM_{2.5}$ at the closest potentially impacted sensitive receiver (taking into account prevailing winds) at least two days prior to the arrival of the first three cruise ship of the season, while they are at berth and for at least two days following departure. Where there is less than two days between departure of a cruise ship and arrival of the next cruise ship, monitoring must continue until there is at least two days between ship departures and arrivals.	Compliant	The Air Quality Operational Monitoring Program outlined in the Air Quality OEMP Sub-plan addresses and is compliant with the requirements of Condition E21.
E22	Where a complaint is received from a Sensitive Receiver in relation to a specific cruise ship at the Breakwater Wharf Extension about dark smoke emissions or offensive odours, the source and nature of the dark smoke emission or offensive odour must be investigated while the ship is at berth (unless this is not possible due to the timing of the complaint or imminent departure of the ship) and corrective actions implemented as required. If there are further complaints and the investigation indicates exceedance of emission restrictions (being those restrictions described in Condition E20) on return of the cruise ship, future visits must be managed in accordance with the requirements of the OEMP Air Quality Management Sub-plan and specific actions, timeframes and consequences agreed by the Planning Secretary in the event of repeat non-compliances.	Compliant	The procedure for non-compliant cruise ships is detailed in Section 3.7 of the OEMP. No complaints relating to dark smoke emissions or offensive odours were received during the 2023/24 OCR reporting period.

Condition No.	Condition	Status	Details/reference
Lighting			
E23	All maritime lighting to be implemented as part of the SSI shall have regard to the location of nearby residential dwellings. Lighting impacts shall be minimised to the extent possible and comply with AS 4282:1997 – Control of the Obtrusive Effects of Outdoor Lighting and relevant Australian Standards in the series AS/NZ 1158 – Lighting for Roads and Public Spaces.	Compliant	Lighting requirements are outlined in Section 6 of the OEMP. No complaints related to lighting were received during the 2023/24 OCR reporting period.

2.2 EPBC Act Referral Decision (EPBC 2016/7828)

The Commonwealth's Department of the Environment and Energy made the decision under Sections 75 and 77A of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) that the project was not a controlled action if undertaken in a particular manner (Referral Decision dated 13 April 2017, EPBC 2016/7828). Condition 4(b) of the Referral Decision relate to operations.

Table 2-2 provides details of the EPBC Act Referral Decision relevant to the operational phase of the project.

Table 2-2: Compliance assessment against EPBC 2016/7828

Condition No.	Condition	Status	Details/reference
4(b) and DoI Crown Lands letter 16/01/2019 to Paul Robinson A/General Manager Property, Port Authority of New South Wales	All cruise ships arriving at and departing from the Eden Breakwater wharf must be aware of the potential presence of whales and maintain a suitable speed within the Port of Eden limits to avoid collisions with whales.	Compliant	Note: The speed of 10 knots or less within the port limits was a condition of the Referral Decision (4(a)) for the dredging and construction phase but has been applied in the OEMPs. The OEMP provides the following management action: *Vessels within the Port will adhere to speeds of 10 knots or less, except in circumstances where the Harbour Master or a Pilot considers that a higher speed is necessary to maintain safe navigation in the Port* The Extended Use OEMP has also adopted the speed limit of 10 knots or less, except in circumstances where the Harbour Master or a Pilot considers that a higher speed is necessary to maintain safe navigation in the Port.

2.3 Environmental Monitoring and Visual Surveillance

Condition A23(a) requires a results summary and analysis of environmental monitoring. This includes air, noise and visual monitoring required for the Facility.

Air Quality Monitoring

An Air Quality Operation Monitoring Report is required under Condition D13, which states that the results of the Air Quality Operation Monitoring Program must be submitted to the Planning Secretary, and relevant regulatory agencies, for information in the form of an Operation Monitoring Report at the frequency identified in the relevant Operation Monitoring Program.' Section 7.1 of the Air Quality Operation Monitoring Program states that the Operation Monitoring Report 'will be prepared and submitted... to the Secretary one month after the end of each Cruise Ship Season for the duration of monitoring'.

This OCR will be provided to the Planning Secretary to fulfil the requirements of condition D13.

Details of air quality monitoring undertaken in 2023/24 are included in Section 6.3 of this OCR.

Noise Monitoring

Details of noise monitoring undertaken in 2023/24 are included in Section 6.4 of this OCR.

Visual Monitoring
As required under the OEMP and Extended Use OEMP, environmental inspections were undertaken involving a walk-over of the land-based areas of the Facility. The visual inspections involved surveillance for:

- Visible signs of water or sediment contamination and disturbance
- Any signs of ecological impact
- Unusual noise or emissions to air from Extended Use operations
- Traffic congestion caused by Extended Use operations
- Presence of litter or waste at the wharf
- Presence of chemical containers in un-bunded areas at the wharf

If observations outside of the norm were noticed, recording was by exception.

No environmental issues occurred in 2023/24.

3 Incidents

There were no pollution incidents requiring notification during the 2023/24 reporting period, and no incidents were noted for any previous reporting periods.

4 Complaints

One noise complaint was received during the 2023/24 reporting period. There was a complaint of loud music playing from cruise ship Azamara Journey at Eden on 5 February 2024. The complaint was made from a member of the Eden Cruise Wharf Community Consultative Committee in March 2024 following distribution of the meeting minutes, so no action was taken as the cruise ship had left the port.

No complaints were received for any previous reporting periods.

5 Independent Environmental Audits

As per condition A24, compliance audits of the SSI must be conducted annually within a year of the commencement of Construction, by an independent, suitably qualified and experienced expert or within another timeframe agreed with the Planning Secretary.

2018	A pre-operation compliance audit was undertaken in 2019 by Royal Haskoning DHV (7 August 2019) for the NSW Department of Industry (refer 2019/20 OCR). The pre-operation

	compliance audit reported no non-compliances with the Infrastructure Approval and no actions to be implemented following the pre-operation compliance audit.
2019	No independent environmental audit undertaken. Based on the performance of the Facility during the 2019/20 cruise season with no non-compliances, incidents or complaints reported (refer 2019/20 OCR) and the Commonwealth ban on cruise ships, Port Authority in correspondence dated 28 July 2020, requested DPE to reduce the frequency of compliance audits. DPE, in response correspondence dated 26 Oct 2020, indicated that no independent audits would be required under Condition A24 during the calendar years 2020 and 2021 (subject to cruise ship visits re-commencing in Eden).
2020	No independent environmental audit was undertaken in the 2020 calendar year. The Federal government cruise ship ban to foreign-flagged cruise ships that commenced in March 2020 was in place until the 17 April 2022. As a result, no cruise ships visited the Facility during the 2020/21 and 2021/22 cruise seasons.
2021	No independent environmental audit was undertaken in the 2021 calendar year, as above.
2022	The first cruise ship after the ban arrived at the Eden Wharf on 12 July 2022. The first annual operational Independent Environmental Audit (IEA) was conducted in December 2022 by Julie Dickson of Dickson Environmental Consulting and Audit (DECA) in accordance with the requirements of Conditions A24 to A27. Audit details are provided on our website here: https://www.portauthoritynsw.com.au/media/5677/compliance-audit-operation-eden-cruise-wharf-2022-with-pansw-response-to-findings.pdf As per condition A23(e) the 2022/23 OCR included results of the 2022 (calendar year) independent environmental audit and details of actions taken in response to the recommendations of the audit.
2023	No independent environmental audit was undertaken in the 2023 calendar year.
2024	No independent environmental audit was undertaken in the 2024 calendar year. Port Authority informed the Department (in a letter dated 13 August 2024) that no independent environmental audit was undertaken in the 2023 calendar year, and requested to alter the frequency of Annual Independent Compliance Audits. DPHI (in a letter dated 7 September 2024) agreed to reduce the frequency of Independent Compliance Audits from Annual to Triennial, with the Project's next Independent Compliance Audit being the 2025 Independent Compliance Audit, and then every three years ongoing.

6 Five Year Operational Compliance Summary Report

6.1 Cruise ship visits

The Infrastructure Approval and the OEMP defines a Cruise Ship Season as the period from the arrival of the first cruise ship in the last half of a calendar year until departure of the last cruise ship in the first half of the following calendar year.

The following tables provide a summary of the cruise ships (name, size, date of visits) that visited the Facility during the five-year OCR period.

It is noted that no cruise ships visited the Facility during the 2020/21 and 2021/22 cruise seasons due to the Federal government cruise ship ban (which began in March 2020 and was in place until the 17 April 2022).

2019/2020

Following construction, operation of the Facility commenced with the first cruise visit on the 15 September 2019. The last cruise of the 2019/20 season occurred on the 10 March 2020. Due to the COVID19 crisis no other cruise visits occurred from 10 March 2020 until 17 April 2022.

A total of **18** cruise ship visits to the Facility occurred during the 2019/20 cruise season as shown in Table 6-1.

Table 6-1: Cruise ship visits during the 2019/20 cruise season

No.	Vessel Name	Length Overall (m)	Arrival	Departure
1	PACIFIC EXPLORER	261.3	15/09/2019 8:00	15/09/2019 16:58
2	MAASDAM	219.4	27/09/2019 9:30	27/09/2019 18:15
3	CALEDONIAN SKY	90.6	1/11/2019 7:30	1/11/2019 17:00
4	PACIFIC EXPLORER	261.3	17/11/2019 8:00	17/11/2019 18:46
5	VASCO DA GAMA	219.4	2/12/2019 12:12	2/12/2019 19:00
6	MAASDAM	219.4	24/12/2019 8:18	24/12/2019 16:53
7	NORWEGIAN JEWEL	294.1	24/01/2020 7:42	24/01/2020 15:49
8	PACIFIC ARIA	220	7/02/2020 9:24	7/02/2020 18:01
9	MAASDAM	219.4	15/02/2020 6:36	15/02/2020 16:10
10	SILVER MUSE	212.8	16/02/2020 8:32	16/02/2020 15:55
11	VOYAGER OF THE SEAS	311	18/02/2020 10:06	18/02/2020 16:43
12	EXPLORER DREAM	268	21/02/2020 11:45	21/02/2020 21:58
13	NOORDAM	285.4	24/02/2020 8:12	24/02/2020 16:37
14	SEVEN SEAS NAVIGATOR	170	27/02/2020 7:00	27/02/2020 15:30
15	EXPLORER DREAM	268	28/02/2020 11:09	28/02/2020 21:54
16	VOYAGER OF THE SEAS	311	6/03/2020 10:00	6/03/2020 16:43
17	SEABOURNE ENCORE	210.5	7/03/2020 7:48	7/03/2020 14:18
18	QUEEN ELIZABETH	293	10/03/2020 8:15	10/03/202017:40

2020/2021

No cruise visits to the Facility.

2021/2022

No cruise visits to the Facility.

2022/2023

A total of **31** cruise ships visited the Facility during the 2022/23 cruise season, as shown in

Table 6-2. The cruise ship season for 2022/23 was from 12 July 2022 to 30 March 2023.

Table 6-2: Cruise ship visits during the 2022/23 cruise season

No.	Vessel Name	Length Overall (m)	Arrival	Departure
1	CORAL PRINCESS	294	12/07/2022, 09:12	12/07/2022, 16:32
2	CORAL PRINCESS	294	07/08/2022, 09:30	07/08/2022, 19:48
3	CORAL PRINCESS	294	24/08/2022, 07:00	24/08/2022, 15:44
4	CORAL PRINCESS	294	31/08/2022, 07:06	31/08/2022, 16:52
5	CORAL PRINCESS	294	23/09/2022, 08:00	23/09/2022, 17:00
6	CORAL PRINCESS	294	10/10/2022, 07:06	10/10/2022, 16:14
7	PACIFIC EXPLORER	261.31	21/10/2022, 07:42	22/10/2022, 06:08
8	PACIFIC ADVENTURE	289.51	13/11/2022, 07:23	13/11/2022, 16:00
9	STAR BREEZE	159.4	23/11/2022, 08:30	23/11/2022, 17:50
10	WESTERDAM	285.24	24/11/2022, 08:19	24/11/2022, 16:50
11	PACIFIC ADVENTURE	289.51	04/12/2022, 07:33	04/12/2022, 14:50
12	NOORDAM	285.24	15/12/2022, 07:42	16/12/2022, 08:09
13	NORWEGIAN SPIRIT	268.6	23/12/2022, 07:45	23/12/2022, 15:42
14	AZAMARA QUEST	181	30/12/2022, 09:44	30/12/2022, 15:34
15	SEABOURN ODYSSEY	198.19	05/01/2023, 07:24	05/01/2023, 14:06
16	NORWEGIAN SPIRIT	268.6	14/01/2023, 09:56	14/01/2023, 16:50
17	SILVER WHISPER	186	22/01/2023, 08:10	22/01/2023, 14:48
18	AZAMARA QUEST	181	05/02/2023, 07:12	05/02/2023, 13:48
19	SEABOURN ODYSSEY	198.19	06/02/2023, 07:06	06/02/2023, 13:43
20	NORWEGIAN SPIRIT	268.6	07/02/2023, 10:42	07/02/2023, 16:36
21	NORWEGIAN SPIRIT	268.6	09/02/2023, 07:18	09/02/2023, 15:44
22	VIKING NEPTUNE	228.3	15/02/2023, 07:54	15/02/2023, 15:45
23	QUEEN ELIZABETH	294	16/02/2023, 08:24	16/02/2023, 16:48
24	CELEBRITY ECLIPSE	317.14	01/03/2023, 09:14	01/03/2023, 15:54
25	NORWEGIAN SPIRIT	268.6	03/03/2023, 09:42	03/03/2023, 16:47
26	NORWEGIAN SPIRIT	268.6	05/03/2023, 07:12	05/03/2023, 15:42
27	PACIFIC ADVENTURE	289.51	07/03/2023, 08:15	07/03/2023, 17:00
28	PACIFIC ADVENTURE	289.51	19/03/2023, 07:47	19/03/2023, 16:12
29	SEABOURN ODYSSEY	198.91	20/03/2023, 07:30	20/03/2023, 14:07
30	NORWEGIAN SPIRIT	268.6	27/03/2023, 09:48	27/03/2023, 16:44
31	GRAND PRINCESS	289.52	30/03/2023, 07:44	30/03/2023, 16:06

2023/2024

A total of **37** cruise ships visited the Facility during the 2023/24 cruise season, as shown in Table 6-3. The cruise ship season for 2023/24 was from 23 October 2023 to 28 March 2024.

Table 6-3: Cruise ship visits to the Facility during the 2023/2024 cruise season

No.	Vessel Name	Length Overall (m)	Arrival	Departure
1	BRILLIANCE OF THE SEAS	293.95	23/10/2023, 08:31	23/10/2023, 18:45
2	BRILLIANCE OF THE SEAS	293.95	09/11/2023, 08:36	09/11/2023, 18:24
3	PACIFIC ADVENTURE	289.51	12/11/2023, 07:35	12/11/2023, 16:12
4	PACIFIC ADVENTURE	289.51	02/12/2023, 08:25	02/12/2023, 16:32
5	SEABOURN ODYSSEY	198.19	07/12/2023, 07:10	07/12/2023, 14:02
6	BRILLIANCE OF THE SEAS	293.95	10/12/2023, 07:00	10/12/2023, 15:47
7	SILVER WHISPER	186	13/12/2023, 10:54	13/12/2023, 18:06
8	STAR BREEZE	159.4	19/12/2023, 08:50	19/12/2023, 16:40
9	SILVER MUSE	212.8	22/12/2023, 10:15	22/12/2023, 22:00
10	AZAMARA JOURNEY	181	30/12/2023, 10:42	30/12/2023, 16:07
11	CRYSTAL SYMPHONY	238.01	03/01/2024, 09:58	03/01/2024, 17:04
12	SEABOURN ODYSSEY	198.19	06/01/2024, 07:12	06/01/2024, 13:58
13	DISNEY WONDER	300	07/01/2024, 08:20	07/01/2024, 12:08
14	EUROPA	198.6	09/01/2024, 07:54	09/01/2024, 18:53
15	SILVER WHISPER	186	12/01/2024, 07:54	12/01/2024, 14:57
16	QUEEN ELIZABETH	294	14/01/2024, 08:12	14/01/2024, 16:48
17	NORWEGIAN SPIRIT	268.6	15/01/2024, 10:55	15/01/2024, 16:30
18	NORWEGIAN SPIRIT	268.6	17/01/2024, 07:36	17/01/2024, 15:22
19	DISNEY WONDER	300	22/01/2024, 08:06	22/01/2024, 12:20
20	QUEEN ELIZABETH	294	23/01/2024, 09:00	23/01/2024, 16:50
21	CORAL PRINCESS	294	28/01/2024, 09:00	28/01/2024, 17:45
22	VASCO DA GAMA	219.21	29/01/2024, 15:12	29/01/2024, 21:40
23	DISNEY WONDER	300	03/02/2024, 15:12	03/02/2024, 19:54
24	AZAMARA JOURNEY	181	05/02/2024, 07:12	05/02/2024, 13:54
25	NORWEGIAN SPIRIT	268.6	08/02/2024, 10:27	08/02/2024, 16:27
26	NORWEGIAN SPIRIT	268.6	10/02/2024, 07:35	10/02/2024, 16:45
27	SILVER WHISPER	186	13/02/2024, 08:00	13/02/2024, 15:00
28	VIKING NEPTUNE	228.3	16/02/2024, 07:56	16/02/2024, 15:38

No.	Vessel Name	Length Overall (m)	Arrival	Departure
29	SEABOURN ODYSSEY	198.19	20/02/2024, 07:11	20/02/2024, 14:16
30	AZAMARA ONWARD	181	28/02/2024, 07:30	28/02/2024, 13:50
31	NORWEGIAN SPIRIT	268.6	03/03/2024, 10:24	03/03/2024, 16:30
32	NORWEGIAN SPIRIT	268.6	05/03/2024, 07:22	05/03/2024, 15:30
33	CELEBRITY EDGE	306	08/03/2024, 08:42	08/03/2024, 16:44
34	GRAND PRINCESS	289.516	12/03/2024, 07:18	12/03/2024, 16:52
35	CRYSTAL SERENITY	250	18/03/2024, 08:15	18/03/2024, 16:50
36	NORWEGIAN SPIRIT	268.6	27/03/2024, 10:20	27/03/2024, 16:28
37	RESILIENT LADY	277.079	28/03/2024, 10:20	28/03/2024, 17:53

6.2 Cruise ship complaints

As per condition A23(g), the following provides a summary of complaints (number and nature) in relation to specific cruise ships, received in the Five-Year OCR reporting period.

Table 6-4: Complaints & incidents during the Five Year OCR reporting period

Year	Number of complaints received	Details of complaints & incidents
2019/20	Nil.	No complaints were received during the 2019/20 cruise season. There were no incidents requiring notification during the 2019/20 cruise season. There were no other matters relating to compliance with the terms of the approval or requested by the Secretary during the 2019/20 cruise season.
2020/21	Nil	No complaints were received during the 2020/21 reporting period. There were no pollution incidents requiring notification during the 2020/21 reporting period.
2021/22	Nil	No complaints were received during the 2021/22 reporting period. There were no pollution incidents requiring notification during the 2021/22 reporting period.
2022/23	Nil	No complaints were received during the 2022/23 reporting period. There were no pollution incidents requiring notification during the 2022/23 reporting period.
2023/24	One	One noise complaint was received during the 2023/24 reporting period. There was a complaint of loud music playing from cruise ship Azamara Journey at Eden on 5 February 2024. The complaint was made from a member of the Eden Cruise Wharf Community Consultative Committee in March 2024 following distribution of the meeting minutes. As the complaint was made after the ship had left, no action was taken as the cruise ship had left the port.

Year	Number of complaints received	Details of complaints & incidents
		There were no pollution incidents requiring notification during the 2023/24 reporting period.

6.3 Air Quality Monitoring

As per condition A23(g), the Five-Year Operational Compliance Summary Report includes results of air quality monitoring for the five years from 1 July 2019 to 30 June 2024.

As per condition D13, the results of the Air Quality Operation Monitoring Program must be submitted to the Planning Secretary, and relevant regulatory agencies, for information in the form of an Operation Monitoring Report at the frequency identified in the relevant Operation Monitoring Program.

This Section presents the Air Quality Monitoring report summary prepared under Condition D13 and the Air Quality OEMP Sub-plan for the 2019/20 and 2023/24 cruise seasons.

6.3.1 2019/2020 Air Quality Operational Monitoring Report

The Air Quality Operational Monitoring Program was implemented from the commencement of operations and during the 2019/20 cruise season as per D12. The monitoring station was run continuously from 4 September 2019 to 31 March 2020, including the entire 2019/20 cruise season.

In accordance with the Air Quality Management OEMP Sub-plan, an operation monitoring report is to be submitted after the end of each Cruise Ship season presenting air quality data collected, any noncompliance and corresponding correction actions and any recommendations.

Monthly air quality monitoring reports for the 2019/20 cruise season were prepared and made available on the Port Authority website (as required under condition D12 and D13)). Ongoing real time air quality monitoring data (including both cruise ship days and non-cruise ships days during the 2019/20 cruise season), as well as information showing the presence of cruise shipping at the Eden Cruise Wharf, was shown on the website during the 2019/20 cruise season and is provided in the monthly reports.

The monthly reports prepared and made available in the Port Authority website include:

- Port of Eden: Air Quality and Meteorological Monitoring Report - September 2019
- Port of Eden: Air Quality and Meteorological Monitoring Report - October 2019
- Port of Eden: Air Quality and Meteorological Monitoring Report - November 2019
- Port of Eden: Air Quality and Meteorological Monitoring Report - December 2019
- Port of Eden: Air Quality and Meteorological Monitoring Report - January 2020
- Port of Eden: Air Quality and Meteorological Monitoring Report - February 2020
- Port of Eden: Air Quality and Meteorological Monitoring Report - March 2020

The air quality monitoring reports present ambient air quality monitoring data from an air quality monitoring station installed at By Street, Eden, located in the immediate vicinity of the Eden Cruise Wharf. The station monitors sulphur dioxide (SO_2), particulate matter less than 2.5 micrometres in aerodynamic diameter ($PM_{2.5}$), nitrogen dioxide (NO_2) and meteorological parameters including wind speed and direction in accordance with Conditions D7 and E21.

In summary, the air quality monitoring reports for the 2019/20 cruise season indicated the following:

- No exceedances of the 10-minute average air quality criterion for SO_2 were recorded at any time during the reporting period.

- No exceedances of the 1-hour air quality criterion for SO_2 were recorded at any time during the reporting period.
- No exceedances of the 24-hour average air quality criterion for SO_2 were recorded at any time during the reporting period
- No exceedances of the 1-hour air quality criterion for NO_2 were recorded at any time during the reporting period.
- No exceedances of the NSW EPA 24-hour $PM_{2.5}$ concentration criterion (25 µg/m3) directly caused by cruise ships.
- The 24-hour PM2.5 criterion was exceeded multiple days during the bushfires in November 2019, December 2019 and January 2020. One of these exceedances occurred during one cruise ship day (1 November 2019). However, it was concluded that the multiple exceedances of the $PM_{2.5}$ that occurred during the reporting period were caused by bushfires, including that on the 1 November 2019, and these exceedances were also recorded at other ambient air quality monitoring stations in the region.
- The data also showed that typically there are no significant differences in air quality during cruise days and non-cruise days, or between air quality data at the Facility and other regional air quality monitoring stations.

It is noted that SO_2 data could not be collected for the month of March due to equipment failure and COVID19 related travel restrictions which negated the ability to fix the problem prior to cessation of monitoring.

6.3.2 2020/2021 Air quality monitoring program suspended

Port Authority submitted a letter to the DPIE dated 23 March 2020 with an analysis of the air quality monitoring results during the 2019/20 cruise season, a link to the monthly monitoring reports during that season and a recommendation to stop the air quality monitoring program on the basis of the results.

In a letter dated 5 May 2020, DPIE approved the suspension of the air quality monitoring program for the 2020/21 and 2021/22 cruise seasons (refer also to D12 in Table 2-1).

6.3.3 2021/2022 Air quality monitoring program suspended

In a letter dated 5 May 2020, DPIE approved the suspension of the air quality monitoring program for the 2020/21 and 2021/22 cruise seasons (refer also to D12 in Table 2-1).

6.3.4 2022/2023 Air quality monitoring program suspended

The Planning Secretary agreed, in a DPE letter dated 2 August 2022, to the ongoing suspension of the Air Quality Monitoring Program for season 2022/2023, with monitoring required to recommence to cover the 2023/2024 cruise season.

6.3.5 2023/24 Air Quality Operational Monitoring Report

As per condition D13, the results of the Air Quality Operation Monitoring Program must be submitted to the Planning Secretary, and relevant regulatory agencies, for information in the form of an Operation Monitoring Report at the frequency identified in the relevant Operation Monitoring Program.

Section 7.1 of the Air Quality Management OEMP Sub-plan required an Operation Monitoring Report to be prepared and submitted to the Secretary one month after the end of each Cruise Ship season for the duration of monitoring, with the monitoring report to present the air quality data collected, any non-compliance and corresponding corrective actions required, updates to the Air Quality OEMP Sub-plan and any recommendations.

As per condition D13 and section 7.1 of the Air Quality Management OEMP Sub-plan, this report (section 6.3.5 of the 5-Year OCR) will be made available to the Secretary, and any other regulatory agency if required.

Air quality data collected

The cruise ship season for 2023/24 was from 23 October 2023 to 28 March 2024. Ongoing real time air quality monitoring data (including both cruise ship days and non-cruise ships days) at the Eden Cruise Wharf, was collected from 19 January 2024 to 19 April 2024 and is provided in the attached monthly reports (see Appendix A).

Air quality data was unable to be collected for the months of October, November and December 2023, due to delays in engaging a suitably qualified consultant and resource constraints (e.g., availability of specialised equipment and distance of Eden from available consultants).

The implementation of the Air Quality Operation Monitoring Program was also impacted by technical issues with the air quality monitoring station including equipment failure and required maintenance periods which resulted in loss of data, as well as performance-related issues with the consultant including delays to commencement of monitoring and reporting.

The following monthly air quality monitoring reports for the 2023/24 cruise season were prepared and are attached in Appendix A:

- Monthly Ambient Air Quality Monitoring Report, Ektimo, January 2024 (report no. R016315)
- Monthly Ambient Air Quality Monitoring Report, Ektimo, February 2024 (report no. R016315-1)
- Monthly Ambient Air Quality Monitoring Report, Ektimo, March 2024 (report no. R016315-2)
- Monthly Ambient Air Quality Monitoring Report, Ektimo, April 2024 (report no. R016315-3)

Non-compliances, corrective actions, recommendations

The air quality monitoring reports present ambient air quality monitoring data from an ambient air quality monitoring station (AAQMS) installed at 8 By Street, Eden, located in the immediate vicinity of the Eden Cruise Wharf. The station monitored SO_2, $PM_{2.5}$, NO_2 and meteorological parameters including wind speed and direction in accordance with Conditions D7 and E21.

Condition E21 states that

> *"Unless otherwise agreed with the Planning Secretary, the Operation Monitoring Program required under Condition D7 must, as a minimum, include monitoring of NO_2, SO_2 and $PM_{2.5}$ at the closest potentially impacted sensitive receiver (taking into account prevailing winds) at least two days prior to the arrival of the first three cruise ship of the season, while they are at berth and for at least two days following departure. Where there is less than two days between departure of a cruise ship and arrival of the next cruise ship, monitoring must continue until there is at least two days between ship departures and arrivals."*

In summary, the air quality monitoring reports for the 2023/24 cruise season indicated no exceedances in the following:

- NO_2
  - 1-hour air quality criterion

- SO_2
  - 10-minute average air quality criterion.
  - 1-hour air quality criterion.
  - 24-hour average air quality criterion.
- $PM_{2.5}$
  - 24-hour average air quality criterion.

Hence there were no non-compliances in relation to air quality concentration exceedances.

However, a number of unavoidable issues with the monitoring equipment resulted in data limitations and losses, as noted above and as detailed below (see Appendix A for further information):

- January:
  - $PM_{2.5}$ data not available for January 2024 period due to instrument failure.
  - Less than 75% of NO_2 and SO_2 hourly averages available for 19/01/024 due to commencement of data collection at 10:15am, and data removed after validation. Note this was not a cruise ship day so relevant data was not affected.
  - Less than 75% of NO_2 and SO_2 hourly averages available for 22/01/024 and 23/01/024 due to logger error. 22/01/024 and 23/01/024 were cruise ship days hence this resulted in partial data loss for one visit during January.
- February:
  - $PM_{2.5}$ data not available for February 2024 period due to instrument failure.
  - Less than 75% of NO_2 and SO_2 hourly averages available for 14/02/24, 15/02/24, 19/02/24 and 20/02/24 due to logger error. 20/02/2024 was a cruise ship day hence this resulted in partial data loss for one visit during February.
  - Less than 75% of NO_2 and SO_2 hourly averages available for 28/02/024 and 29/02/024 due to data removal after validation. 28/02/2024 was a cruise ship day hence this resulted in partial data loss for a further visit during February.
- March:
  - Less than 75% of all parameters' hourly averages available for 26/03/024 and 27/03/24 due to logger error. Data excluded from daily averages. 27/03/2024 was a cruise ship day hence this resulted in partial data loss for one visit during March.
  - SO_2 data removed from 01/03/2024 and 11/03/2024 due to invalid data. 01/03/2024 and 11/03/2024 were not cruise ship days so relevant data was not affected.
  - $PM_{2.5}$ data not available from 01/03/2024 to 14/03/2024 01:00.
- April:
  - Less than 75% of all parameters' hourly averages available for 11/04/24 (logger error). Data excluded from daily averages. 11/04/24 was not a cruise ship day so relevant data was not affected.
  - Less than 75% of all parameters' hourly averages available for 19/04/24 due to completion of data collection at 06:00. Data excluded from daily averages. 19/04/24 was not a cruise ship day so relevant data was not affected.

Despite the loss of periods of data during the monitoring program undertaken (with a maximum of two visits lost during February, and one in January and March) it is considered that the available data sufficiently indicated the air quality criterion were not exceeded.

Following completion of the air quality monitoring program, an evaluation of the issues and loss of data was considered in the preparing the specification and contract for future monitoring programs, including the requirement for monitoring of larger vessels in accordance with approval for MOD3. This is to ensure the maximum amount of data is collected in future for evaluation of air quality impacts.

6.4 Noise Monitoring

As per condition A23(g), this Five-Year Operational Compliance Summary Report includes results of noise monitoring undertaken to investigate noise complaints for the five years from 1 July 2019 to 30 June 2024.

2019/2020

Noise monitoring as per procedures in the Noise OEMP Sub-Plan was not required during the 2019/20 cruise season.

There were no complaints or noise incidents requiring investigation and/or noise monitoring during the 2019/20 cruise season.

Port Authority voluntarily undertook attended noise monitoring during the first cruise ship visit on the 15 September 2019 (ERM, December 2019). Noise monitoring was undertaken at locations representative of the potentially most affected residences. Ship noise level contributions were determined in the absence of any influential extraneous noise emission source/s not associated with site operations. The noise monitoring report showed that cruise ship noise levels were consistent with the noise modelling prepared for the EIS. Noise modelling results at the nearest noise-sensitive receptors were within 2 dB of measured levels on the 15 September 2019.

2020/2021

Noise monitoring as per procedures in the Noise OEMP Sub-Plan was not required during the 2020/21 cruise season.

There were no complaints or noise incidents requiring investigation and/or noise monitoring during the 2020/21 cruise season.

2021/2022

Noise monitoring as per procedures in the Noise OEMP Sub-Plan was not required during the 2021/22 cruise season.

There were no complaints or noise incidents requiring investigation and/or noise monitoring during the 2021/22 cruise season.

2022/2023

Noise monitoring as per procedures in the Noise OEMP Sub-Plan was not required during the 2022/23 cruise season.

There were no complaints or noise incidents requiring investigation and/or noise monitoring during the 2022/23 cruise season.

2023/24

There was one noise complaint made during the 2023/24 cruise season. There was a complaint of loud music playing from cruise ship Azamara Journey at Eden on 5 February 2024. The complaint was made from a member of the Eden Cruise Wharf Community Consultative Committee in March 2024 following distribution of the meeting minutes, so no action could be taken as the cruise ship had left the port.

Noise monitoring as per procedures in the Noise OEMP Sub-Plan was not required during the 2023/24 cruise season.

7 OEMP Reviews and Consistency Assessments

The OEMP and OEMP Sub-plans, and the Extended Use OEMP were prepared and approved by the Secretary's nominee in accordance with the Infrastructure Approval in correspondence dated 15 September 2019 and 6 November 2020 respectively.

No reviews of the OEMPs or consistency assessment were undertaken during any of the reporting years in the five-year OCR reporting period (1 July 2019 to 30 June 2024).

The OEMP was combined with the Extended Use OEMP and updated at the end of 2024 to incorporate consolidated conditions updated with MOD 3. OEMP Sub-Plans were also updated and new OEMP Sub-Plans prepared as required.

The approved OEMP and OEMP Sub-plans (updated after MOD 3) are available in the Port Authority website: https://www.portauthoritynsw.com.au/port-of-eden/port-services-facilities/eden-cruise-wharf/

Appendix A Air Quality Monitoring Reports

Ektimo

Port Authority of New South Wales

Monthly Ambient Air Quality Monitoring Report

January 2024

Report Number: R016315

Document Information

Client Name:	Port Authority of New South Wales
Report Number:	R016315
Date of Issue:	12 September 2024
Attention:	Miguel Frohlich
Address:	Level 4, 20 Windmill St Walsh Bay, NSW 2000
Testing Laboratory:	Ektimo Pty Ltd, ABN 86 600 381 413

Report Authorisation

Hamid Sokhan
Instrumentation Manager

NATA Accredited Laboratory
No. 14601

Please note that only numerical results pertaining to measurements conducted directly by Ektimo are covered by Ektimo's terms of NATA accreditation as described in the Test Methods table. This does not include calculations that use data supplied by third-parties, comments, conclusions, or recommendations based upon the results. Refer to 'Test Methods' for full details of testing covered by NATA accreditation.

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Executive Summary

Ektimo was engaged by Port Authority of New South Wales to commission and operate an ambient air quality monitoring station (AAQMS) at 8 By Street Eden, NSW. The air quality monitoring is required in accordance with Port Authority's State Significant Infrastructure (SSI) Approval No. 7734 for the operation of the Eden Cruise Facility.

Conditions D7 to D14 of the SSI Approval No. 7734 required the preparation of an Air Quality Operation Monitoring Program. Condition E21 of the SSI Approval No. 7734 stated the following:

"*Unless otherwise agreed with the Planning Secretary, the Operation Monitoring Program required under Condition D7 must, as a minimum, include monitoring of NO_2, SO_2 and $PM_{2.5}$ at the closest potentially impacted sensitive receiver (taking into account prevailing winds) at least two days prior to the arrival of the first three cruise ships of the season, while they are at berth and for at least two days following departure. Where there is less than two days between departure of a cruise ship and arrival of the next cruise ship, monitoring must continue until there is at least two days between ship departures and arrivals*."

In light of the conditions mentioned above, the results of the Air Quality Operation Monitoring Program are summarised below for the month of January 2024. More detailed results can be found in Section 4 of this report.

Table 1. Data Summary

Indicator/ Pollutant	Days successfully logged	Averaging Period	Jan 2024 Average	Regulatory Reference Criteria	% of criteria	Data Points Logged	Averaging Period Exceedances	% of Data Points Exceeding Criteria
NO_2	10 of 13 days	Hourly (1 hour)	0.48 ppb	80 ppb	0.6%	266	**0**	0%
SO_2	10 of 13 days	10 minute	0.52 ppb	250 ppb	0.21%	1,056	**0**	0%
		Hourly (1 hour)	0.15 ppb	100 ppb	0.2%	268	**0**	0%
		Daily (24 hour)	0.20 ppb	20 ppb	1.0%	10	**0**	0%
$PM_{2.5}$	0 of 13 days	Daily (24 hour)	--- µg/m^3	25 µg/m³	---	0	**---**	---

Notes:

1. $PM_{2.5}$ data not available for January 2024 period due to instrument failure.
2. Less than 75 % (<18 hours per 24 hours) of NO_2 and SO_2 hourly averages available for 19/01/2024 due to commencement of data collection at 10:15, and data removed after data validation.
   Less than 75 % (<18 hours per 24 hours) of NO_2 *and* SO_2 hourly averages available for 22/01/24 and 23/01/2024 due to logger error.
   Refer to data exceptions for further details.

1 Introduction

1.1 Project Background

Port Authority of New South Wales has requested Ektimo to install and operate one fixed air quality monitoring station at 8 By Street, Eden NSW to allow monitoring and management of ambient air emissions.

Table 2. AAQMS location

Site	GPS Coordinates
8 By Street, NSW	-37.073486, 149.910502

Air quality parameters to be monitored by Ektimo are concentrations of:

- Nitric oxide (NO)
- Nitrogen dioxide (NO_2)
- Nitrogen oxides (NOx)
- Sulfur dioxide (SO_2)
- Particulate matter less than 2.5µm ($PM_{2.5}$)

In addition to weather conditions recorded by Ektimo:

- Wind speed
- Wind direction
- Temperature
- Relative humidity

1.2 Project Objective

Ektimo's objective (to support Port Authority of New South Wales' objective) was to perform continuous monitoring of ambient air quality and to report these on a monthly basis for the project duration as outlined below:

Quantify, on a monthly basis (per calendar month), averages of:

- SO_2 & $PM_{2.5}$ (daily (*24hr*))
- NO, NO_2, NOx, SO_2 (hourly)
- SO_2 (10 minute)

1.3 Regulatory Reference Criteria

The air quality criteria for the project were outlined in the Eden Cruise Facility Project's Air Quality Operational Environmental Management Plan (OEMP) Sub-Plan, which predicted the most affected sensitive receiver and maximum cumulative SO_2 concentrations for 'typical operations'.

Reporting on monthly air quality includes comparison of the data against the *National Environment Protection (Ambient Air Quality) Measure 2021* **(NEPM-AAQ)** standards and the maximum cumulative SO_2 concentration at the most affected sensitive receiver as predicted in the Refined SO_2 Emission Modelling for "typical operations" **(Eden Typical Operations Criteria**), as outlined in the Air Quality OEMP Sub-Plan.

Table 3. NEPM-AAQ & Eden Typical Operations Criteria

Indicator/Pollutant	Averaging Period	Maximum Concentration Standard/Objective	Reference
NO_2	Hourly (1 hour)	0.08 ppm (80 ppb)	NEPM-AAQ
SO_2	10-minute	0.25 ppm (250 ppb)	Eden Typical Operations Criteria
	Hourly (1 hour)	0.10 ppm (100 ppb)	NEPM AAQ
	Hourly (1 hour)	0.20 ppm (200 ppb)	Eden Typical Operations Criteria
	Daily (24 hour)	0.20 ppm (20 ppb)	NEPM AAQ
	Daily (24 hour)	0.80 ppm (80 ppb)	Eden Typical Operations Criteria
$PM_{2.5}$	Daily (24 hour)	25 µg/m³	NEPM AAQ

NEPM- AAQ – https://www.legislation.gov.au/F2007B01142/latest/versions

2 Monitoring Methodology

Ambient air monitoring was carried out in accordance with the following methods;

Table 4. Monitoring Methodology

Test Method	Parameter	Description
AS3580.5.1:2023	NO, NO_2, NOx	Methods for Sampling and Analysis of Ambient Air – Determination of Oxides of Nitrogen – Direct Reading Instrumental Method.
AS 3580.4.1:2023	SO_2	Methods for Sampling and Analysis of Ambient Air – Determination of Sulfur Dioxide – Direct Reading Instrumental Method.
AS 3580. 9.12:2022	$PM_{2.5}$	Methods for Sampling and Analysis of Ambient Air - Determination of Suspended Particulate Matter – $PM_{2.5}$ Beta Attenuation Monitors.
AS3580.14:2014	Weather	Methods for Sampling and Analysis of Ambient Air – Part 14: Meteorological Monitoring for Ambient Air Quality Monitoring Applications
AS3580.1.1:2016	AAQMS Siting	Methods for Sampling and Analysis of Ambient Air – Guide to Siting Air Monitoring Equipment.
AS 3580.19:2020	Data Validation & Reporting	Methods for Sampling and Analysis of Ambient Air – Method 19: Ambient Air Quality Data Validation and Reporting.

3 Monitoring Equipment

A summary of the deployed monitoring equipment is outlined below.

Table 5. Monitoring Equipment

Parameter	Monitoring Equipment
$PM_{2.5}$	Met One BAM 1020
NO, NO_2, NOx	Airpointer A-HTV1S070000 M100C1F1
SO_2	Airpointer 2-11A
Weather	Vaisala WXT530

Note: *Detailed Monitoring Equipment Specifications can be seen in Appendix 4.*

4 Monitoring Results, Daily

4.1 NO, NO_2, NO_x, SO_2, & $PM_{2.5}$ Results (Daily - 24 hour concentrations)

The following table details the average daily (24 hour) concentrations for NO, NO_2, NOx, SO_2, $PM_{2.5}$ with the relevant NEPM-AAQ/ Eden Typical Operations Criteria. Refer to Appendix 1 for NO_2, SO_2, and $PM_{2.5}$ charts.

Table 6. NO, NO_2, NO_x, SO_2, $PM_{2.5}$ Result

Date/Time	NO (ppb)	NO_2 (ppb)	NOx (ppb)	SO_2 (ppb)	$PM_{2.5}$ (µg/m³)
19/01/2024	---	---	---	---	---
20/01/2024	0.14	0.47	0.61	-0.51	---
21/01/2024	0.31	0.69	1.0	1.2	---
22/01/2024	---	---	---	---	---
23/01/2024	---	---	---	---	---
24/01/2024	0.28	0.75	1.04	-0.23	---
25/01/2024	0.28	0.70	0.98	-0.14	---
26/01/2024	0.14	0.47	0.62	0.25	---
27/01/2024	0.13	0.39	0.52	0.33	---
28/01/2024	0.37	0.40	0.77	0.31	---
29/01/2024	0.17	0.42	0.59	0.29	---
30/01/2024	0.13	0.46	0.59	0.29	---
31/01/2024	0.14	0.39	0.53	0.24	---
Maximum	**0.37**	**0.8**	**1.0**	**1.18**	**---**
Minimum	**0.13**	**0.39**	**0.52**	**-0.51**	**---**
Average	**0.21**	**0.51**	**0.72**	**0.20**	**---**
Standard Deviation	**0.09**	**0.14**	**0.20**	**0.43**	**---**
NEPM-AAQ Criteria (Daily average)				20	25
Exceedances				0	0
Eden Typical Operations Criteria (Daily average)				80	
Exceedances				0	

Notes:

1. Dates highlighted in yellow correspond to days "Cruise Vessels" in port.
   Red highlighting indicates days "Non-Cruise" Vessels in port
   Blue highlighting indicates both vessel types in port.
2. Please note, raw hourly and 10-minute concentrations are reported separately in Excel® format.
3. Data corrections, if required, were performed during the data validation process as per AS methods (see section 2 for methodology)
3. $PM_{2.5}$ data not available for January 2024 period due to instrument failure.
4. Less than 75 % (<18 hours per 24 hours) of NO_2 and SO_2 hourly averages available for 19/01/2024 due to commencement of data collection at 10:15, and data removed after data validation.
   Less than 75 % (<18 hours per 24 hours) of NO_2 *and* SO_2 hourly averages available for 22/01/24 and 23/01/2024 due to logger error.
   Refer to data exceptions for further details.

5 Monitoring Results, Hourly, 10-minute

Note: Results in the following tables may include values below the formal detection limit of the analyser. These values are raw statistical calculations.

5.1 NO, NO_2, NOx, SO_2 (Hourly concentrations)

Table 7. NO, NO2, NOx, SO_2 (Hourly concentrations)

Date/Time	NO (ppb)	NO_2 (ppb)	NOx (ppb)	SO_2 (ppb)
Maximum	**6.3**	**2.6**	**7.9**	**12.4**
Minimum	**-0.7**	**-1.4**	**-2.1**	**-0.9**
Average	**0.3**	**0.5**	**0.8**	**0.2**
Standard Deviation	**0.5**	**0.4**	**0.8**	**1.3**
NEPM-AAQ & ERS Criteria (Daily average)		80		100
Exceedances		0		0
Eden Typical Operations Criteria				200
Exceedances				0

5.2 SO_2 (10-minute concentrations)

Table 8. SO_2 (10-minute concentrations)

	SO_2 (ppb)
Maximum	**73.2**
Minimum	**0.0**
Average	**0.5**
Standard Deviation	**3.0**
Eden Typical Operations Criteria (10 minute average)	250
Exceedances	0

6 Weather Results

The following table detail the minimum, maximum and average daily (24 hour) weather data recorded

Table 9. Daily (24 hour) Weather Results

Date/Time	Wind speed (m/sec)	Wind Direction (°)	Temperature at 2m (°C)	Relative humidity (%)
19/01/2024	---	---	---	---
20/01/2024	3.0	189	21	75
21/01/2024	2.1	6.9	21	72
22/01/2024	---	---	---	---
23/01/2024	---	---	---	---
24/01/2024	1.2	194	23	66
25/01/2024	0.5	200	20	79
26/01/2024	2.9	11	20	71
27/01/2024	0.1	273	18	62
28/01/2024	0.4	219	20	66
29/01/2024	1.4	199	22	72
30/01/2024	1.1	356	21	70
31/01/2024	2.2	6.9	20	---
Maximum	**3.0**	**-**	**23**	**79**
Minimum	**0.10**	**-**	**18**	**62**
Average	**1.5**	**-**	**21**	**70**
Standard Deviation	**1.0**	**-**	**1.2**	**4.8**

Wind speed averages calculated using vector averaging.

Notes:

1. Dates highlighted in yellow correspond to days “Cruise Vessels” in port.
   Red highlighting indicates days “Non-Cruise” Vessels in port.
   Blue highlighting indicates both vessel types in port.

2. Less than 75 % (<18 hours per 24 hours) of NO_2 and SO_2 hourly averages available for 19/01/2024 due to commencement of data collection at 10:15, and data removed after data validation.
   Less than 75 % (<18 hours per 24 hours) of NO_2 *and* SO_2 hourly averages available for 22/01/24 and 23/01/2024 due to logger error.
   Refer to data exceptions for further details.

Refer to Appendix 2 for weather charts.

7 SO_2 and NO_2 levels compared with Vessel Movements

Port Authority provided vessel movement records for the monthly monitoring period covered by this report. Vessel movements were compared with measured analyte concentrations and prevailing wind direction to identify possible links between elevated analyte concentrations and vessel movement.

Table 10 below shows the arrival/departure times for each vessel along with the corresponding 10-minute average SO_2 concentration. Additionally, it includes the 10-minute average SO_2 concentrations for the 10 minutes preceding and following each arrival/departure.

Figure 1 details the continuous 1-minute and 10-minute average SO_2 concentrations measured compared with the recorded times of vessel arrivals/departures, as indicated in Table 10.

There was a spike in SO_2 from 21/01/2024 13:10 to 21/01/2024 13:30 and again 21/01/2024 16:00 to 21/01/2024 16:20 with the 10-minute average peaking at 33.8 ppb and 73.2 ppb respectively.
This coincides with the time "Young Endeavour" was in port. Young Endeavour is however a "sail ship" (i.e., not a cruise ship) so is unlikely to be the source of the spike in SO_2 during this period, it is however equipped with standby combustion engines that may have been used for manoeuvring in the port.

As can be seen in sections 4 and 5, SO_2 levels were lower than all the relevant criteria for the entire testing period.

Average NO_2 concentrations were also well below the relevant criteria during the entire duration of the testing period.

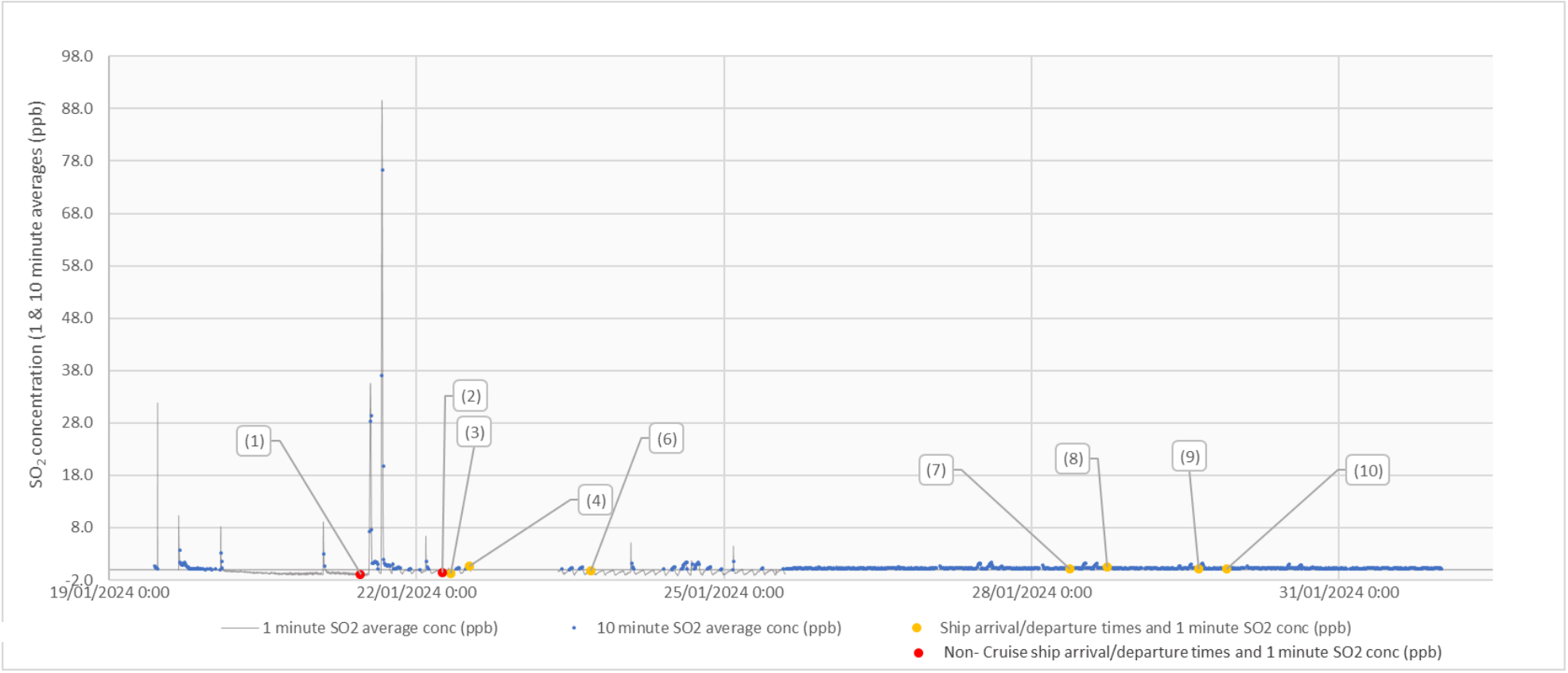
As shown in Image 2, Appendix 5, the Eden Cruise Wharf is situated West of the AQMS Station. Considering this, Section 9.2, Daily Windroses details the 24-hour Windrose for each day that vessels were active in the Port along with corresponding daily average SO_2 concentration.

Table 10. Recorded Vessel movement times March 2024 (provided by Port Authority NSW) compared to monitoring data.

	Date/Time	Arrival /Departure	Vessel	10-minute average period SO_2 value (ppb)	Previous 10-minute average period SO_2 value (ppb)	Post 10-minute average period SO_2 value (ppb)
(1)	21/01/2024, 11:00	Arrival	Young Endeavour	*No data*	*No data*	*No data*
(2)	22/01/2024, 06:12	Departure	Young Endeavour	*No data*	*No data*	*No data*
(3)	22/01/2024, 08:06	Arrival	Disney Wonder	*No data*	*No data*	*No data*
(4)	22/01/2024, 12:20	Departure	Disney Wonder	**0.59**	0.58	0.72
(5)	23/01/2024, 09:00	Arrival	Queen Elizabeth	*No data*	*No data*	*No data*
(6)	23/01/2024, 16:50	Departure	Queen Elizabeth	*No data*	*No data*	*No data*
(7)	28/01/2024,09:00	Arrival	Coral Princess	**0.19**	0.20	0.20
(8)	28/01/2024,17:45	Departure	Coral Princess	**0.43**	0.30	0.42
(9)	29/01/2024, 15:12	Arrival	Vasco da Gama	**0.29**	0.16	0.52
(10)	29/01/2024, 21:40	Departure	Vasco da Gama	**0.11**	0.09	0.12

Notes:

1. *Vessels highlighted in red are 'Non-Cruise' ships*
2. *"No data" above indicates less than 75% (<8 minutes per 10 minutes) available for the averaging period.*



Numbers in chart above correspond to Table 10, indicating Vessel name and departure/arrival time.

Figure 1. Vessel Arrival/Departure VS SO_2 Concentrations

8 Quality Assurance & Quality Control (QA/QC)

Ektimo is accredited by the National Association of Testing Authorities (NATA) for the sampling and analysis of air pollutants. Unless otherwise stated test methods used are accredited with the National Association of Testing Authorities. For full details, search for Ektimo at NATA's website www.nata.com.au.

Ektimo is accredited by NATA to ISO/IEC 17025 - Testing. ISO/IEC 17025 - Testing requires that a laboratory have adequate equipment to perform the testing, as well as laboratory personnel with the competence to perform the testing. This quality assurance system is administered and maintained by the Quality Director. NATA is a member of APAC (Asia Pacific Accreditation Co-operation) and of ILAC (International Laboratory Accreditation Co-operation). Through mutual recognition arrangements with these organisations, NATA accreditation is recognised worldwide.

8.1 Maintenance Checks and Calibrations

Maintenance checks and calibrations for the period can be seen in the table below.

Table 11. Maintenance Checks and Calibrations

Monitoring Equipment	Parameter	Equipment ID (or SN)	Type of Calibration/ Check	Date of Calibration(s) / Check(s)
NOx Analyser	NOx	EKT0047	Initial	19/01/2024
SO_2 Analyser	SO_2	EKT0050	Initial	19/01/2024

NOTES:

1. As the BAM was out of service at that time, no checks or calibrations were performed.

2. A leak check of the NOx and SO_2 analysers will be performed at the decomissioning stage of the project as per AS 3580.5.1:2023 and AS 3580.4.1:2023.

8.2 Monthly Data Capture

The station is equipped with a local data logger to collect data from the AAQMS and weather station and store it in the logger memory. Data is automatically transferred to a secure cloud-based service every 1 minute. This cloud-based platform is known as '*Ektimo Live'* and it enables real time access and visualisation of the data collected.

Calculated Data Capture is the proportion of data periods successfully logged out of the theoretical maximum during the period. In a monthly period, you might expect the following maximum (in a 30-day month);

- 720 Hourly Averages
- 30 Daily Averages

Data capture is calculated before data validation.

Table 12. NO, NO_2, NO_x, SO_2, $PM_{2.5}$, Monthly Data Capture

	NO, NO_2, NOx (%)	SO_2 (%)	PM2.5 (%)
Data Capture	92	92	0

$PM_{2.5}$ data not available for January 2024 period due to instrument failure.

Table 13. Weather Monthly Data Capture

	Wind speed (%)	Wind Direction (%)	Relative humidity (%)	Temperature at 2m (%)
Data Capture	92.0	92.0	92.0	92.0

8.3 Data Validation & Exceptions

Data validation is performed as per *AS 3580.19:2020 Methods for Sampling and Analysis of Ambient Air – Method 19: Ambient Air Quality Data Validation and Reporting*.

Periods where data has been deemed invalid and removed from all calculations can be seen below.

Individual daily and hourly averages are also automatically invalid if there has been data loss due to equipment malfunction, calibration and/or maintenance which results in less than 75% of data for any averaging period.

Table 14. Data Exceptions

Start Date/Time	End Date/Time	Parameter	Details of Outage or Required Change	Comments	Person Making Changes
19/01/2024 10:15	19/01/2024 10:45	NOx	Anomolous high negative reading (NO_2)	NOx data removed	ADo
19/01/2024 11:34	19/01/2024 12:29	NOx	Anomolous high negative reading (NO_2)	NOx data removed	ADo
19/01/2024 11:33	19/01/2024 16:08	SO_2	Sudden anomolous spike in SO_2	SO_2 data removed	ADo
19/01/2024 16:08	19/01/2024 16:24	Weather data	Sudden anomolous spike in Weather data	weather data removed	ADo
19/01/2024 16:08	19/01/2024 17:17	NOx	Anomolous high negative reading (NO2)	NOx data removed	ADo
22/01/2024 12:42	23/01/2024 9:10	All data	Logger error	No data available	ADo
24/01/2024 15:58	24/01/2024 15:59	Weather data	Logger error	Weater data removed	ADo
24/01/2024 15:59	24/01/2024 16:00	NOx	Anomolous NOx data	NOx data removed	ADo
24/01/2024 19:17	24/01/2024 20:56	NOx	Constant negative NO_2 concentrations (less than -2ppb contributing to -2ppb hourly average -screening criteria)	NOx data removed	ADO
25/01/2024 9:29	25/01/2024 9:30	Weather data	Anomolous data	Weather data removed	ADo
25/01/2024 9:30	25/01/2024 9:32	NOx	Anomolous data	NOx data removed	ADo
25/01/2024 9:41	25/01/2024 9:42	NOx	High negative reading (NO2)	NOx data removed	ADo
28/01/2024 9:47	28/01/2024 10:00	NOx SO_2	High negative reading (NO_2). SO_2 spike disregarded	NOx SO2 data removed	ADo
29/01/2024 14:19	29/01/2024 14:20	NOx, weather data	Sudden negative spike	NOx, weather dataremoved	ADo
29/01/2024 14:20	29/01/2024 14:22	NOx	High (NO_2) spike questionable	NOx data removed	ADo

note. NOx Calibration Data Removed

21/01/2024 12:58:00 AM -- 21/01/2024 1:16:00 AM, 22/01/2024 12:57:00 AM -- 22/01/2024 1:16:00 AM, 24/01/2024 12:58:00 AM -- 24/01/2024 1:16:00 AM, 25/01/2024 12:58:00 AM -- 25/01/2024 1:22:00 AM, 26/01/2024 1:51:00 AM -- 26/01/2024 2:06:00 AM, 27/01/2024 1:51:00 AM -- 27/01/2024 2:06:00 AM, 28/01/2024 1:51:00 AM -- 28/01/2024 2:06:00 AM, 29/01/2024 1:51:00 AM -- 29/01/2024 2:06:00 AM, 30/01/2024 1:51:00 AM -- 30/01/2024 2:06:00 AM, 31/01/2024 1:51:00 AM -- 31/01/2024 2:06:00 AM,

note. SO2 Calibration Data Removed

26/01/2024 1:51:00 AM -- 26/01/2024 2:18:00 AM, 27/01/2024 1:51:00 AM -- 27/01/2024 2:27:00 AM, 28/01/2024 1:51:00 AM -- 28/01/2024 2:27:00 AM, 29/01/2024 1:51:00 AM -- 29/01/2024 2:27:00 AM, 30/01/2024 1:50:00 AM -- 30/01/2024 2:26:00 AM, 31/01/2024 1:51:00 AM -- 31/01/2024 2:27:00 AM,

9 Definitions

The following symbols and abbreviations may be used in this test report:

<	Less than
>	Greater than
≥	Greater than or equal to
% v/v	Volume to volume ratio, dry or wet basis
~	Approximately
<	Less than
>	Greater than
≥	Greater than or equal to
µg/m³	Micrograms per cubic meter
AAQMS	Ambient air quality monitoring station
AS	Australian Standard
BAM	Beta attenuation monitor for measuring PM10 & PM2.5
Data Capture	The proportion of data periods successfully logged out of the theoretical maximum possible number (100%)
Data Exception	Missing or invalid data as per AS3580.19:2020.
EPA	Environment Protection Authority
NA	Not applicable
NATA	National Association of Testing Authorities
NEPM-AAQ	National Environment Protection (Ambient Air Quality) Measure
NO	Nitric oxide
NO_2	Nitrogen dioxide
CO	Carbon monoxide
O_3	Ozone
SO_2	Sulfur dioxide
$PM_{2.5}$	Particulate matter with an equivalent aerodynamic diameter less than 2.5 microns (PM2.5)
PM_{10}	Particulate matter with an equivalent aerodynamic diameter less than 10 microns (PM10)
VOC	Volatile organic compound. A carbon-based chemical compound with a vapour pressure of at least 0.010 kPa at 25°C or having a corresponding volatility under the given conditions of use. VOCs may contain oxygen, nitrogen and other elements. VOCs do not include carbon monoxide, carbon dioxide, carbonic acid, metallic carbides and carbonate salts.
ppb	Parts per billion
ppm	Parts per million
STP	Standard temperature and pressure. Gas volumes and concentrations are expressed on a dry basis at 0 °C, at discharge oxygen concentration and an absolute pressure of 101.325 kPa.
TM	Test method

Ektimo

Appendix 1. NO_2, CO, SO_2, $PM_{2.5}$ Charts

Daily (24 hourly) Average $PM_{2.5}$

No data available for January 2024

Figure 2. Daily (24 Hour) Average $PM_{2.5}$

Hourly Average NO_2

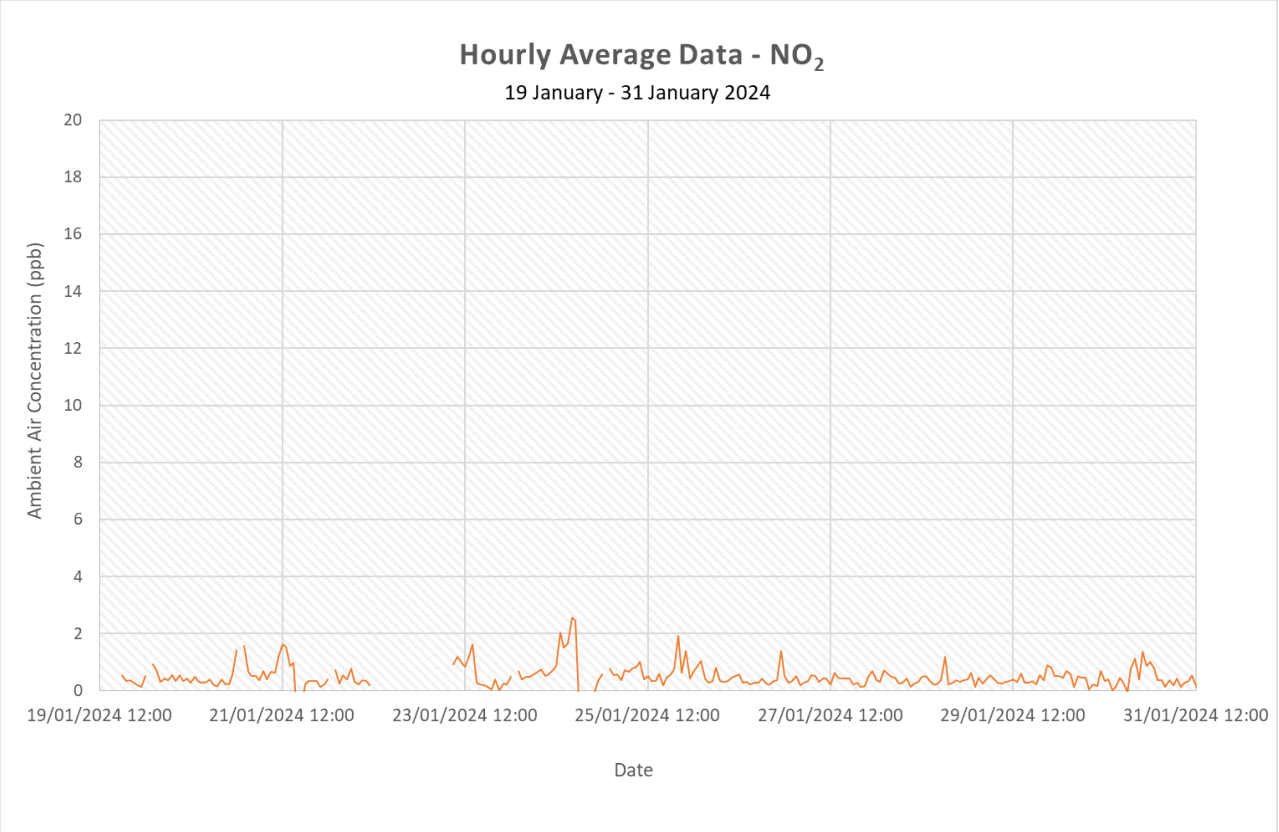


Figure 3. 8 Hourly Average NO_2

10 Minute Average SO_2

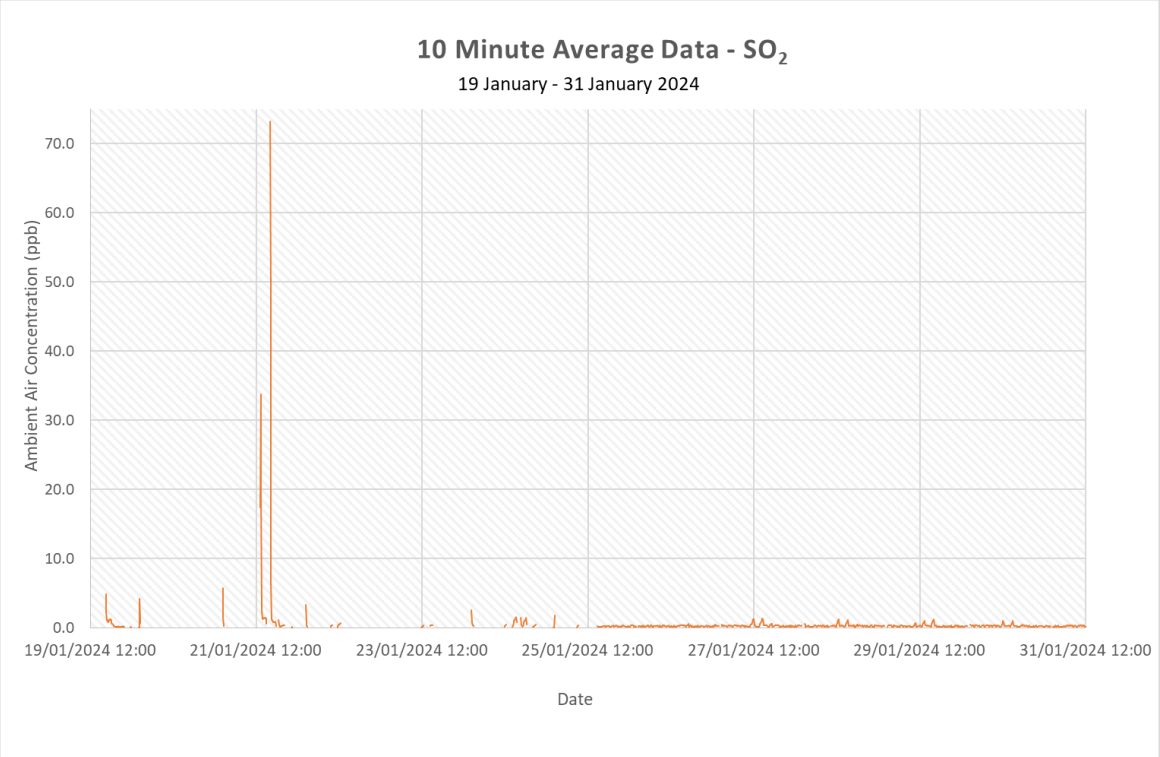


Figure 4. 10 Minute Average SO_2

Hourly Average SO_2

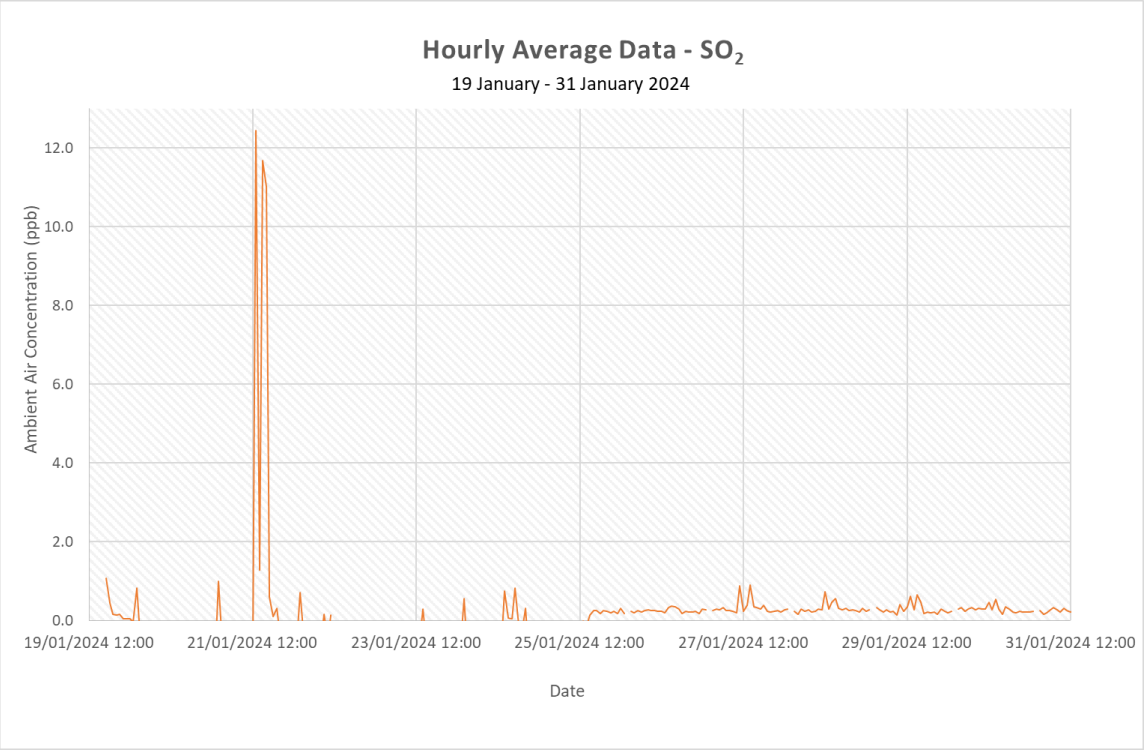


Figure 5. Hourly Average SO_2

Daily (24 Hourly) SO_2

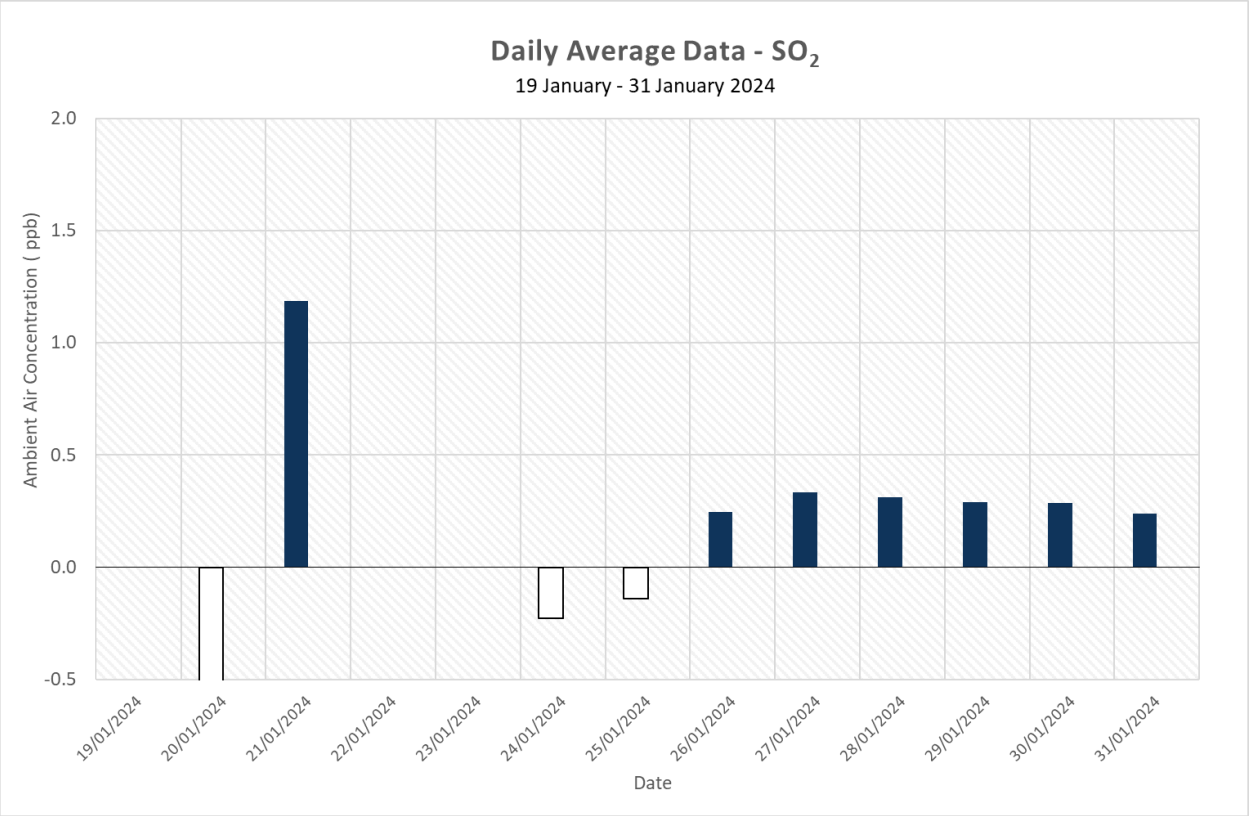


Figure 6. Daily (24 Hour) Average SO_2

Appendix 2. Weather Charts

9.1 Monthly Windrose

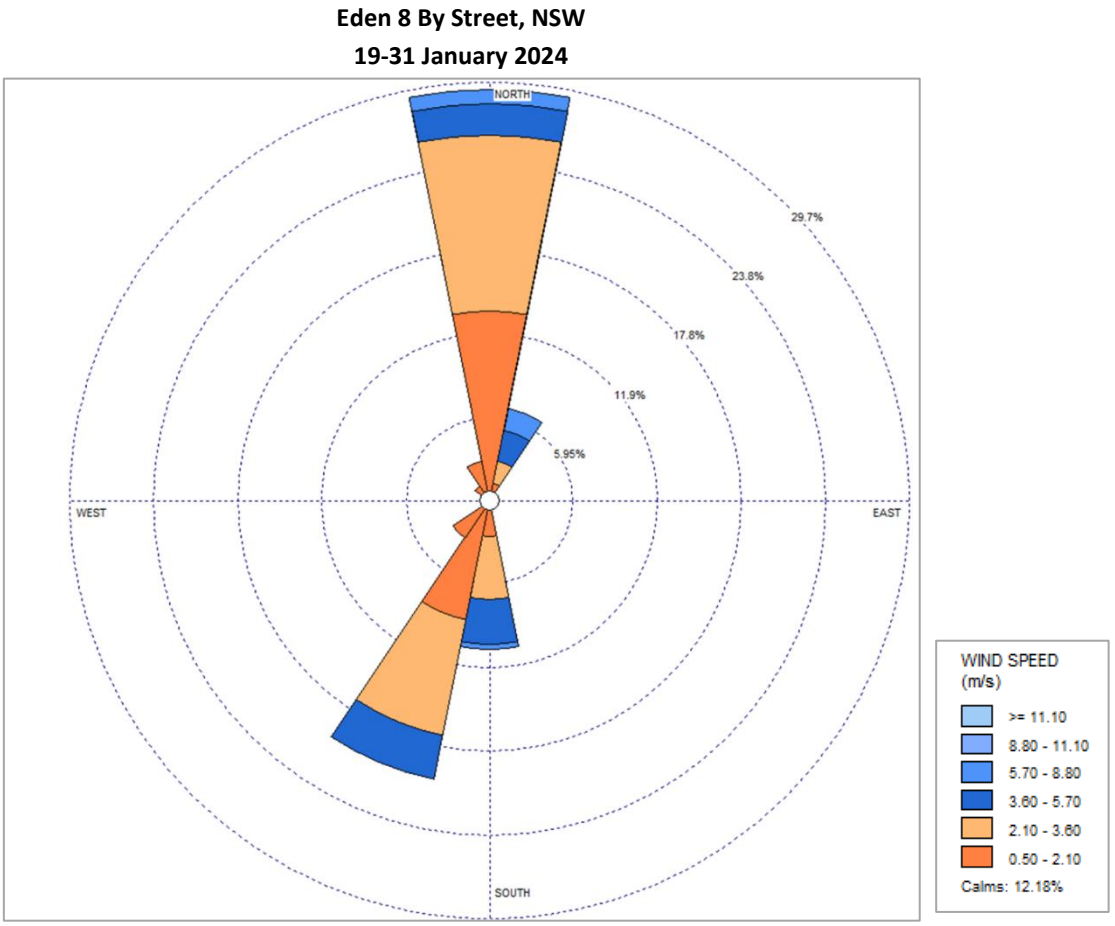
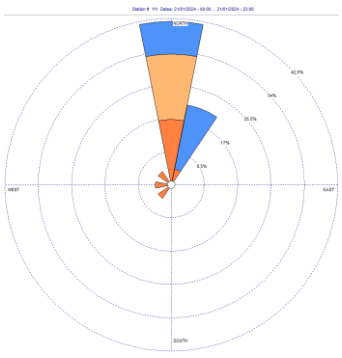


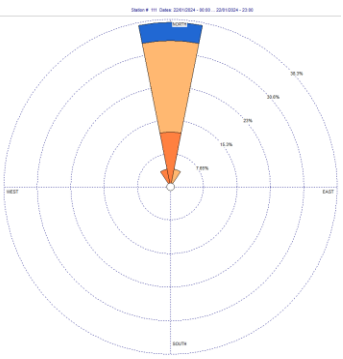
Figure 7. Monthly Wind Rose

9.2 Daily Windroses

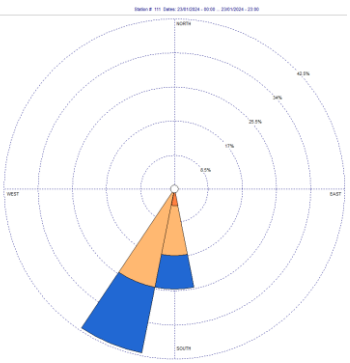
The following Daily Windroses correspond to days when vessels were berthed at Port of Eden.
The daily average concentration of SO_2 (ppb) is also noted in brackets for each day.



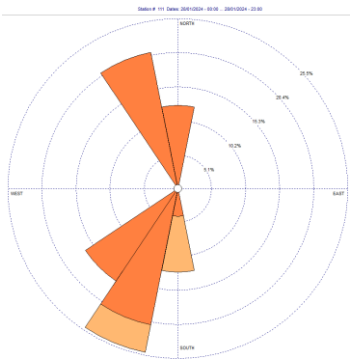
21/01/24 (SO_2 1.2 ppb)



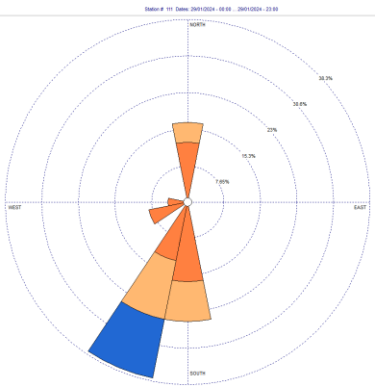
22/01/24 (NA)



23/01/24 (NA)



28/01/24 (SO_2 0.31ppb)



29/01/24 (SO_2 0.29 ppb)

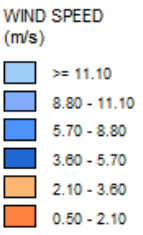


Figure 8. Daily Wind Roses

9.3 Weather Charts

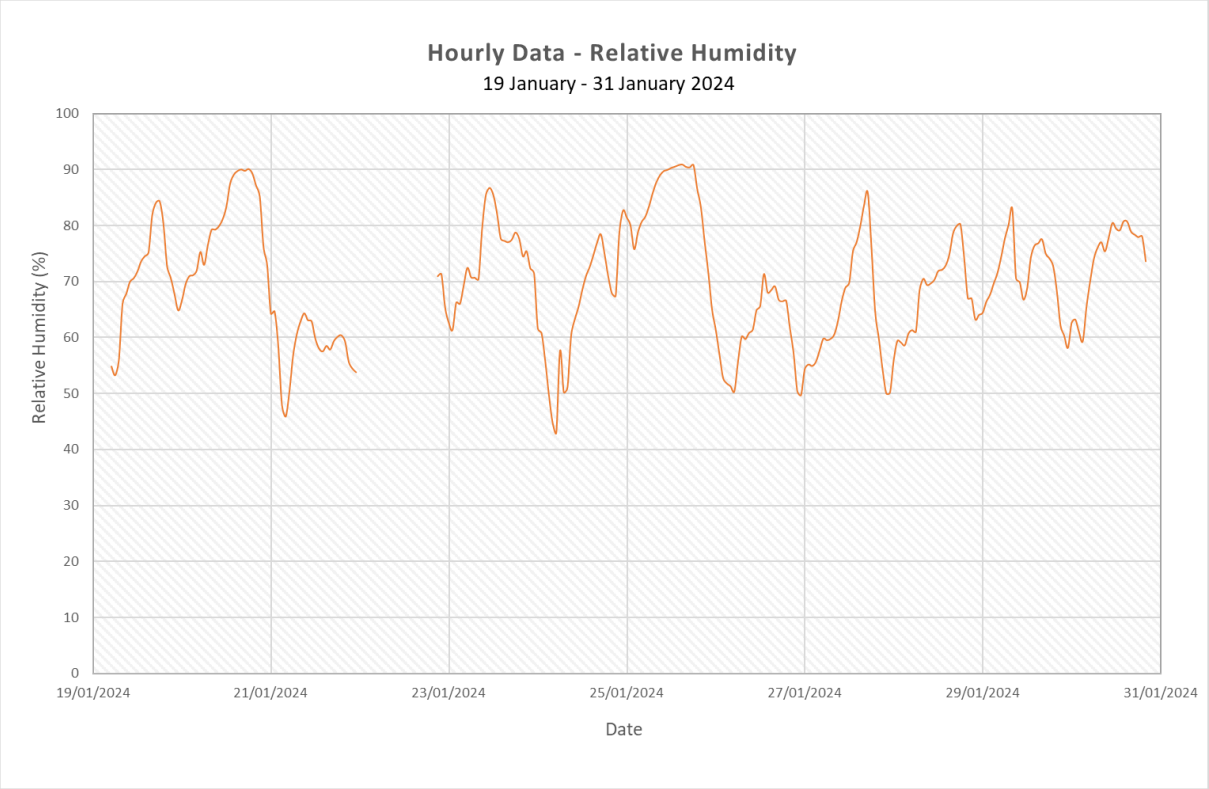


Figure 9. Hourly Relative Humidity

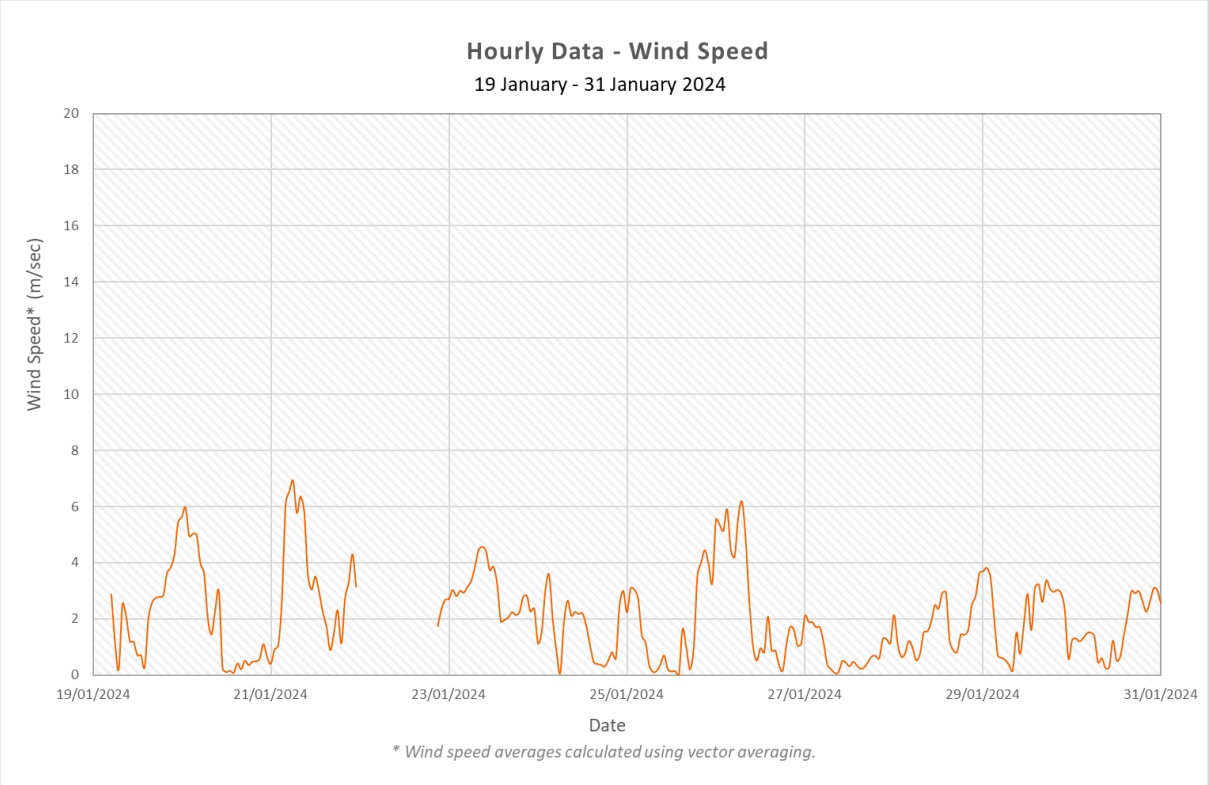


Figure 10. Hourly Wind Speed.

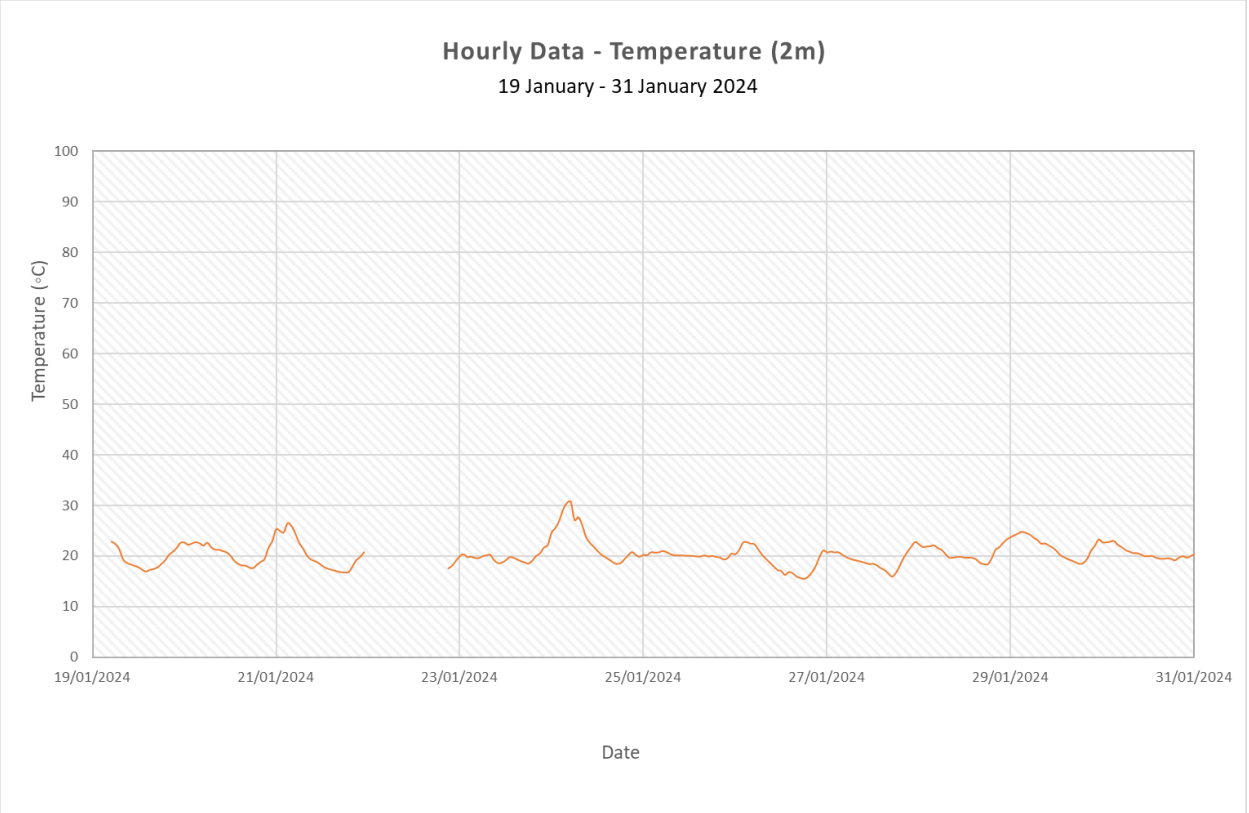


Figure 11. Hourly Temperature (2m)

Appendix 4. Monitoring Equipment Specifications

Table 15. Monitoring Equipment Specifications

Parameter	Manufacturer	Model	Specification Units	Operating Range	Accuracy	Detection Threshold	Resolution	Error / Drift	Sample rate
$PM_{2.5}$	Met One	BAM - 1020	µg/m^3	0 - 1,000 µg/m^3	Exceeds US-EPA Class III $PM_{2.5}$ FEM standards for additive and multiplicative bias.	4.8 µg/m^3	0.1 µg/m^3	NA	16.7 L/min
NOx	Airpointer	A-HTV1S070000 M100C1F1	ppb	up to 20ppm	1%of read ingor1ppb (whichever is greater) @<500ppb	0.4ppb	NA	<0.4ppb (zero) 1% of reading >100ppb (span) 24hrs	1000ml/min
SO_2	Airpointer	2-11A	ppb	up to 10ppm	1% of reading or 1ppb (whichever is greater) @<500ppb	0.5 ppb	NA	<1ppb (zero) 1% of reading >100ppb (span) 24hrs	500ml/min
Wind direction	Vaisala	WXT530	degree (°)	0 - 360°	±3.0° at 10 m/s	NA	1°	NA	NA
Wind speed	Vaisala	WXT530	m/s	0 - 60 m/s	±3 % at 10 m/s	NA	0.1 m/s	NA	NA
Relative Humidity	Vaisala	WXT530	%	0 - 100 %RH	±3 %RH at 0 - 90 %RH ±5 %RH at 90 - 100 %RH	0.1 %RH	0.1 %RH	NA	NA
Temperature	Vaisala	WXT530	°C	-52 - 60 °C	±0.3 °C	NA	0.1 °C	NA	NA

Appendix 5. Ambient Air Quality Monitoring Station (AAQMS) Locations and Siting.

AAQMS & Weather Station Location

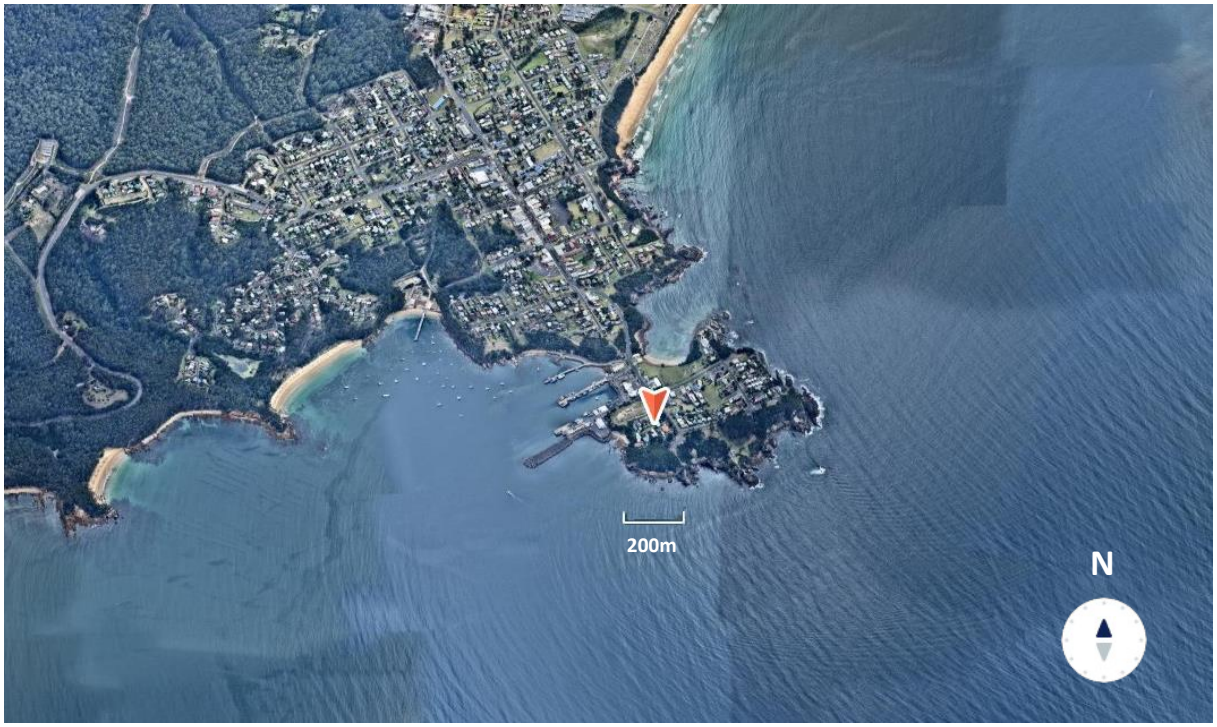


Image 1. Port Eden AAQMS Location, 8 By Street

Image 2. Port Eden AAQMS Location, 8 By street (zoomed in)

Appendix 6. AAQMS Image.

Image 3. AAQMS , 8 by Street Port Eden

Appendix 7. Location Siting and Compliance

AAQMS were assessed in accordance with the siting requirements of AS3580.1.1.

Compliance with the siting requirements of AS3580.1.1 are summarised in the following tables.

Ektimo	Initial Station Siting
Client name	Port Authority of New South Wales
Job number	R016315
Date of Installation	18/01/2024
Ektimo Staff	Hamid Sokhan
Site Location	8 By St, Eden NSW 2551
Latitude	-37.073486
Longitude	149.910502
Equipment type	Ambient Air Quality Monitoring System
Station type	Neighbourhood
Australian Standard AAQMS Siting Criteria Compliance	**(✓,✗ or na)**
Inlet height above ground level 2 m - 5 m	✓
Twice the height of nearby obstacle above the inlet ≤ Dw	✗
Inlet 10 m from drip line of trees	✓
Greater than 50 m from road (≤ 10,000 vehicles/day)	✗
10 m from object with height exceeding 2 m below the inlet height	✗
Clear sky angle 120° above inlet	✓
Unrestricted 270° airflow around inlter	✓
No extraneaous sources nearby	✓
Wind speed and wind direction	
Anemometer height above ground level 10 m	✗
Distance obstruction (≥ 10 times obstruction height)	✗
Temperature & relative humidity	
Sensor height above ground level 2 m	✓
Distance to obstruction (≥ 4 times obstruction height)	✗

Table 16. Location Siting Assessment

Ektimo

ektimo.com.au
1300 364 005

MELBOURNE (Head Office)
26 Redland Drive
Mitcham
VIC 3132
AUSTRALIA

SYDNEY
6/78 Reserve Road
Artarmon
NSW 2064
AUSTRALIA

WOLLONGONG
1/251 Princes Highway
Unanderra
NSW 2526
AUSTRALIA

PERTH
52 Cooper Road
Cockburn Central
WA 6164
AUSTRALIA

BRISBANE
3/109 Riverside Place
Morningside
QLD 4170
AUSTRALIA

Ektimo

Port Authority of New South Wales

Monthly Ambient Air Quality Monitoring Report

February 2024

Report Number: R016315-1

Document Information

Client Name:	Port Authority of New South Wales
Report Number:	R016315-1
Date of Issue:	12 September 2024
Attention:	Miguel Frohlich
Address:	Level 4, 20 Windmill St Walsh Bay, NSW 2000
Testing Laboratory:	Ektimo Pty Ltd, ABN 86 600 381 413

Report Authorisation

Hamid Sokhan
Instrumentation Manager

NATA Accredited Laboratory
No. 14601

Please note that only numerical results pertaining to measurements conducted directly by Ektimo are covered by Ektimo's terms of NATA accreditation as described in the Test Methods table. This does not include calculations that use data supplied by third-parties, comments, conclusions, or recommendations based upon the results. Refer to 'Test Methods' for full details of testing covered by NATA accreditation.

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Executive Summary

Ektimo was engaged by Port Authority of New South Wales to commission and operate an ambient air quality monitoring station (AAQMS) at 8 By Street Eden, NSW. The air quality monitoring is required in accordance with Port Authority's State Significant Infrastructure (SSI) Approval No. 7734 for the operation of the Eden Cruise Facility.

Conditions D7 to D14 of the SSI Approval No. 7734 required the preparation of an Air Quality Operation Monitoring Program. Condition E21 of the SSI Approval No. 7734 stated the following:

"*Unless otherwise agreed with the Planning Secretary, the Operation Monitoring Program required under Condition D7 must, as a minimum, include monitoring of NO_2, SO_2 and $PM_{2.5}$ at the closest potentially impacted sensitive receiver (taking into account prevailing winds) at least two days prior to the arrival of the first three cruise ships of the season, while they are at berth and for at least two days following departure. Where there is less than two days between departure of a cruise ship and arrival of the next cruise ship, monitoring must continue until there is at least two days between ship departures and arrivals*."

In light of the conditions mentioned above, the results of the Air Quality Operation Monitoring Program are summarised below for the month of February 2024. More detailed results can be found in Section 4 of this report.

Table 1. Data Summary

Indicator/ Pollutant	Days successfully logged	Averaging Period	February 2024 Average	Regulatory Reference Criteria	% of criteria	Data Points Logged	Averaging Period Exceedances	% of Data Points Exceeding Criteria
NO_2	23 of 29 days	Hourly (1 hour)	0.86 ppb	80 ppb	1.1%	608	**0**	0%
SO_2	23 of 29 days	10 minute	0.26 ppb	250 ppb	0.10%	3,578	**0**	0%
		Hourly (1 hour)	0.26 ppb	100 ppb	0.3%	591	**0**	0%
		Daily (24 hour)	0.26 ppb	20 ppb	1.3%	23	**0**	0%
$PM_{2.5}$	0 of 29 days	Daily (24 hour)	--- µg/m^3	25 µg/m³	---	0	**---**	---

Notes:

1. $PM_{2.5}$ data not available for February 2024 period due to instrument failure.
2. Less than 75 % (<18 hours per 24 hours) of NO_2 and SO_2 hourly averages available for 14/02/24, 15/02/24, 19/02/24, and 20/02/24 due to logger error.

   Less than 75 % (<18 hours per 24 hours) of NO_2 and SO_2 hourly averages available for 28/02/24 and 29/02/24 due to data removal after validation.

   Refer to data exceptions for further details.

1 Introduction

1.1 Project Background

Port Authority of New South Wales has requested Ektimo to install and operate one fixed air quality monitoring station at 8 By Street, Eden NSW to allow monitoring and management of ambient air emissions.

Table 2. AAQMS location

Site	GPS Coordinates
8 By Street, NSW	-37.073486, 149.910502

Air quality parameters to be monitored by Ektimo are concentrations of:

- Nitric oxide (NO)
- Nitrogen dioxide (NO_2)
- Nitrogen oxides (NOx)
- Sulfur dioxide (SO_2)
- Particulate matter less than 2.5µm ($PM_{2.5}$)

In addition to weather conditions recorded by Ektimo:

- Wind speed
- Wind direction
- Temperature
- Relative humidity

1.2 Project Objective

Ektimo's objective (to support Port Authority of New South Wales' objective) was to perform continuous monitoring of ambient air quality and to report these on a monthly basis for the project duration as outlined below:

Quantify, on a monthly basis (per calendar month), averages of:

- SO_2 & $PM_{2.5}$ (daily (*24hr*))
- NO, NO_2, NOx, SO_2 (hourly)
- SO_2 (10 minute)

1.3 Regulatory Reference Criteria

The air quality criteria for the project were outlined in the Eden Cruise Facility Project's Air Quality Operational Environmental Management Plan (OEMP) Sub-Plan, which predicted the most affected sensitive receiver and maximum cumulative SO_2 concentrations for 'typical operations'.

Reporting on monthly air quality includes comparison of the data against the *National Environment Protection (Ambient Air Quality) Measure 2021* **(NEPM-AAQ)** standards and the maximum cumulative SO_2 concentration at the most affected sensitive receiver as predicted in the Refined SO_2 Emission Modelling for "typical operations" **(Eden Typical Operations Criteria**), as outlined in the Air Quality OEMP Sub-Plan.

Table 3. NEPM-AAQ & Eden Typical Operations Criteria

Indicator/Pollutant	Averaging Period	Maximum Concentration Standard/Objective	Reference
NO_2	Hourly (1 hour)	0.08 ppm (80 ppb)	NEPM-AAQ
SO_2	10-minute	0.25 ppm (250 ppb)	Eden Typical Operations Criteria
	Hourly (1 hour)	0.10 ppm (100 ppb)	NEPM AAQ
	Hourly (1 hour)	0.20 ppm (200 ppb)	Eden Typical Operations Criteria
	Daily (24 hour)	0.20 ppm (20 ppb)	NEPM AAQ
	Daily (24 hour)	0.80 ppm (80 ppb)	Eden Typical Operations Criteria
$PM_{2.5}$	Daily (24 hour)	25 µg/m³	NEPM AAQ

NEPM- AAQ – https://www.legislation.gov.au/F2007B01142/latest/versions

2 Monitoring Methodology

Ambient air monitoring was carried out in accordance with the following methods:

Table 4. Monitoring Methodology

Test Method	Parameter	Description
AS3580.5.1:2023	NO, NO_2, NOx	Methods for Sampling and Analysis of Ambient Air – Determination of Oxides of Nitrogen – Direct Reading Instrumental Method.
AS 3580.4.1:2023	SO_2	Methods for Sampling and Analysis of Ambient Air – Determination of Sulfur Dioxide – Direct Reading Instrumental Method.
AS3580.9.12:2022	$PM_{2.5}$	Method for Sampling and Analysis of Ambient Air – Determination of Suspended Particulate Matter – $PM_{2.5}$ Beta Attenuation Monitors.
AS3580.14:2014	Weather	Methods for Sampling and Analysis of Ambient Air – Part 14: Meteorological Monitoring for Ambient Air Quality Monitoring Applications
AS3580.1.1:2016	AAQMS Siting	Methods for Sampling and Analysis of Ambient Air – Guide to Siting Air Monitoring Equipment.
AS 3580.19:2020	Data Validation & Reporting	Methods for Sampling and Analysis of Ambient Air – Method 19: Ambient Air Quality Data Validation and Reporting.

3 Monitoring Equipment

A summary of the deployed monitoring equipment is outlined below.

Table 5. Monitoring Equipment

Parameter	Monitoring Equipment
$PM_{2.5}$	Met One BAM 1020
NO, NO_2, NOx	Airpointer A-HTV1S070000 M100C1F1
SO_2	Airpointer 2-11A
Weather	Vaisala WXT530

Note: *Detailed Monitoring Equipment Specifications can be seen in Appendix 4.*

4 Monitoring Results, Daily

4.1 NO, NO_2, NO_x, SO_2, & $PM_{2.5}$ Results (Daily - 24-hour concentrations)

The following table details the average daily (24 hour) concentrations for NO, NO_2, NOx, SO_2, $PM_{2.5}$ with the relevant NEPM-AAQ/ Eden Typical Operations Criteria. Refer to Appendix 1 for NO_2, SO_2, and $PM_{2.5}$ charts.

Table 6. NO, NO_2, NO_x, SO_2, $PM_{2.5}$ Results

Date/Time	NO (ppb)	NO_2 (ppb)	NOx (ppb)	SO_2 (ppb)	$PM_{2.5}$ (µg/m³)
1/02/2024	0.25	0.67	0.93	0.28	---
2/02/2024	0.3	0.6	0.8	0.31	---
3/02/2024	0.3	0.6	0.8	0.25	---
4/02/2024	0.2	0.6	0.8	0.26	---
5/02/2024	0.5	1.1	1.6	0.25	---
6/02/2024	0.1	0.2	0.3	0.26	---
7/02/2024	0.1	0.2	0.3	0.23	---
8/02/2024	0.6	0.7	1.3	0.25	---
9/02/2024	0.1	0.3	0.5	0.28	---
10/02/2024	0.2	0.4	0.5	0.25	---
11/02/2024	0.1	0.3	0.4	0.26	---
12/02/2024	0.2	0.5	0.7	0.25	---
13/02/2024	0.6	1.0	1.5	0.30	---
14/02/2024	---	---	---	---	---
15/02/2024	---	---	---	---	---
16/02/2024	0.36	1.1	1.5	0.27	---
17/02/2024	0.2	1.2	1.5	0.24	---
18/02/2024	0.07	0.63	0.71	0.24	---
19/02/2024	---	---	---	---	---
20/02/2024	---	---	---	---	---
21/02/2024	0.18	1.0	1.2	0.25	---
22/02/2024	0.22	1.2	1.4	0.26	---
23/02/2024	0.30	1.8	2.1	0.25	---
24/02/2024	0.12	1.3	1.4	0.26	---
25/02/2024	0.19	1.5	1.7	0.25	---
26/02/2024	0.07	1.1	1.2	0.25	---
27/02/2024	0.21	1.7	1.9	0.25	---
28/02/2024	---	---	---	---	---
29/02/2024	---	---	---	---	---
Maximum	**0.56**	**1.8**	**2.1**	**0.31**	**---**
Minimum	**0.05**	**0.20**	**0.26**	**0.23**	**---**
Average	**0.23**	**0.86**	**1.09**	**0.26**	**---**
Standard Deviation	**0.14**	**0.46**	**0.52**	**0.019**	**---**
NEPM-AAQ Criteria (Daily average)				20	25
Exceedances				0	0
Eden Typical Operations Criteria (Daily average)				80	
Exceedances				0	

Notes:

1. Dates highlighted in yellow correspond to days "Cruise Vessels" in port.
   Red highlighting indicates days "Non-Cruise" Vessels in port
   Blue highlighting indicates both vessel types in port.
2. Please note, raw hourly and 10-minute concentrations are reported separately in Excel® format.
3. Data corrections, if required, were performed during the data validation process as per AS methods (see section 2 for methodology)
4. $PM_{2.5}$ data not available for February 2024 period due to instrument failure.
5. Less than 75 % (<18 hours per 24 hours) of NO_2 and SO_2 hourly averages available for 14/02/24, 15/02/24, 19/02/24, and 20/02/24 due to logger error.

   Less than 75 % (<18 hours per 24 hours) of NO_2 and SO_2 hourly averages available for 28/02/24 and 29/02/24 due to data removal after validation.

   Refer to data exceptions for further details.

5 Monitoring Results, Hourly, 10-minute

Note: Results in the following tables may include values below the formal detection limit of the analyser. These values are raw statistical calculations.

5.1 NO, NO_2, NOx, SO_2 (Hourly concentrations)

Table 7. NO, NO2, NOx, SO_2 (Hourly concentrations)

Date/Time	NO (ppb)	NO_2 (ppb)	NOx (ppb)	SO_2 (ppb)
Maximum	**12.5**	**8.7**	**18.5**	**0.74**
Minimum	**-0.2**	**-1.7**	**-1.75**	**0.14**
Average	**0.26**	**0.90**	**1.16**	**0.26**
Standard Deviation	**0.64**	**1.00**	**1.5**	**0.06**
NEPM-AAQ & ERS Criteria (Daily average)		80		100
Exceedances		0		0
Eden Typical Operations Criteria (Hourly average)				200
Exceedances				0

5.2 SO_2 (10-minute concentrations)

Table 8. SO_2 (10-minute concentrations)

	SO_2 (ppb)
Maximum	**2.8**
Minimum	**0.06**
Average	**0.26**
Standard Deviation	**0.11**
Eden Typical Operations Criteria (10 minute average)	250
Exceedances	0

6 Weather Results

The following table detail the minimum, maximum and average daily (24 hour) weather data recorded

Table 9. Daily (24 hour) Weather Results

Date/Time	Wind speed (m/sec)	Wind Direction (°)	Temperature at 2m (°C)	Relative humidity %
1/02/2024	0.5	208.2	18.6	71.6
2/02/2024	2.0	7.7	20.9	55.4
3/02/2024	1.3	201.9	19.3	72.5
4/02/2024	1.7	200.5	22.6	79.1
5/02/2024	1.1	145.8	23.8	68.8
6/02/2024	3.2	9.3	17.6	68.0
7/02/2024	0.7	0.1	18.1	61.3
8/02/2024	0.8	200.4	19.1	63.0
9/02/2024	1.2	357.3	19.6	67.5
10/02/2024	0.8	13.2	18.3	72.7
11/02/2024	3.6	184.1	20.3	67.2
12/02/2024	2.8	189.5	22.0	72.3
13/02/2024	2.7	182.8	23.2	75.6
14/02/2024	---	---	---	---
15/02/2024	---	---	---	---
16/02/2024	1.1	192.3	21.1	73.3
17/02/2024	0.3	329.6	22.3	79.7
18/02/2024	1.6	3.7	20.7	81.6
19/02/2024	---	---	---	---
20/02/2024	---	---	---	---
21/02/2024	2.5	193.7	22.5	78.5
22/02/2024	2.6	192.5	22.6	77.0
23/02/2024	2.5	7.7	20.9	75.0
24/02/2024	1.8	7.4	19.0	57.6
25/02/2024	1.6	198.0	19.6	72.6
26/02/2024	3.0	5.7	20.6	64.3
27/02/2024	2.9	191.3	19.4	72.3
28/02/2024	4.1	187.2	22.8	75.6
29/02/2024	0.9	359.7	22.6	76.3
Maximum	**4.1**	**-**	**24**	**82**
Minimum	**0.26**	**-**	**18**	**55**
Average	**1.9**	**-**	**21**	**71**
Standard Deviation	**1.0**	**-**	**1.8**	**6.7**

Wind speed averages calculated using vector averaging.

Notes:

1. Dates highlighted in yellow correspond to days "Cruise Vessels" in port.
   Red highlighting indicates days "Non-Cruise" Vessels in port.
   Blue highlighting indicates both vessel types in port.

2. Less than 75 % (<18 hours per 24 hours) of NO_2 and SO_2 hourly averages available for 14/02/24, 15/02/24, 19/02/24, and 20/02/24 due to logger error.

   Less than 75 % (<18 hours per 24 hours) of NO_2 and SO_2 hourly averages available for 28/02/24 and 29/02/24 due to data removal after validation.

   Refer to data exceptions for further details. Refer to Appendix 2 for weather charts.

7 SO_2 and NO_2 levels compared with Vessel Movements

Port Authority provided vessel movement records for the monthly monitoring period covered by this report. Vessel movements were compared with measured analyte concentrations and prevailing wind direction to identify possible links between elevated analyte concentrations and vessel movement.

Table 10 below shows the arrival/departure times for each vessel along with the corresponding 10-minute average SO_2 concentration. Additionally, it includes the 10-minute average SO_2 concentrations for the 10 minutes preceding and following each arrival/departure.

Figure 1 details the continuous 1-minute and 10-minute measured SO_2 concentrations measured compared with the recorded times of vessel arrivals /departures, as shown below in Table 10.

As can be seen in sections 4 and 5, SO_2 levels were lower than all the relevant criteria for the entire testing period.

Average NO_2 concentrations were also below the relevant criteria during the entire duration of the testing period.

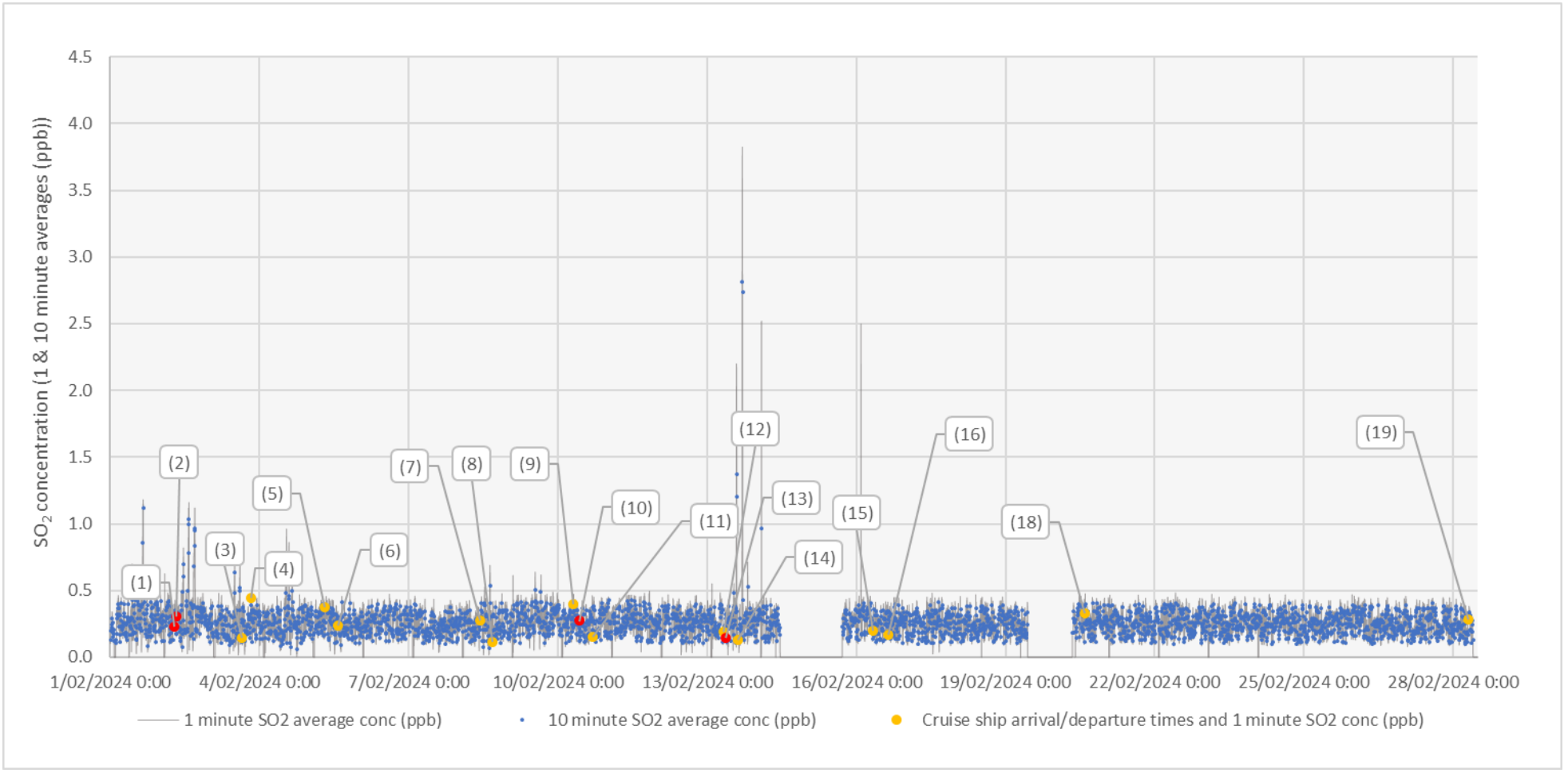
As shown in Image 2, Appendix 5, the Eden Cruise Wharf is situated West of the AQMS Station. Considering this, Section 9.2, Daily Windroses details the 24-hour Windrose for each day that vessels were active in the Port along with corresponding daily average SO_2 concentration.

Table 10. Recorded Vessel movement times February 2024 (provided by Port Authority NSW) compared to monitoring data.

	Date/Time	Arrival /Departure	Vessel	10-minute average period SO_2 value (ppb)	Previous 10-minute average period SO_2 value (ppb)	Post 10-minute average period SO_2 value (ppb)
(1)	02/02/2024, 07:00	Arrival	STATESMAN	**0.32**	*0.34*	*0.28*
(2)	02/02/2024, 08:00	Departure	STATESMAN	**0.21**	*0.18*	*0.32*
(3)	03/02/2024, 15:12	Arrival	DISNEY WONDER	**0.26**	*0.16*	*0.29*
(4)	03/02/2024, 19:54	Departure	DISNEY WONDER	**0.39**	*0.33*	*0.35*
(5)	05/02/2024, 07:12	Arrival	AZAMARA JOURNEY	**0.35**	*0.27*	*0.16*
(6)	05/02/2024, 13:54	Departure	AZAMARA JOURNEY	**0.25**	*0.31*	*0.22*
(7)	08/02/2024, 10:27	Arrival	NORWEGIAN SPIRIT	**0.25**	*0.21*	*0.26*
(8)	08/02/2024, 16:27	Departure	NORWEGIAN SPIRIT	**0.11**	*0.16*	*0.31*
(9)	10/02/2024, 07:35	Arrival	NORWEGIAN SPIRIT	**0.35**	*0.34*	*0.24*
(10)	10/02/2024, 10:30	Arrival	ANDALUCIA	**0.21**	*0.12*	*0.25*
(11)	10/02/2024, 16:45	Departure	NORWEGIAN SPIRIT	**0.20**	*0.37*	*0.20*
(12)	13/02/2024, 08:00	Arrival	SILVER WHISPER	**0.22**	*0.15*	*0.18*
(13)	13/02/2024, 09:06	Departure	ANDALUCIA	**0.17**	*0.32*	*0.13*
(14)	13/02/2024, 15:00	Departure	SILVER WHISPER	**0.15**	*0.12*	*0.14*
(15)	16/02/2024, 07:56	Arrival	VIKING NEPTUNE	**0.19**	*0.14*	*0.24*
(16)	16/02/2024, 15:38	Departure	VIKING NEPTUNE	**0.16**	*0.28*	*0.25*
(17)	20/02/2024, 07:11	Arrival	SEABOURN ODYSSEY	*No data*	*no data*	*No data*
(18)	20/02/2024, 14:16	Departure	SEABOURN ODYSSEY	**0.38**	*0.34*	*0.40*
(19)	28/02/2024, 07:30	Arrival	AZAMARA ONWARD	**0.30**	*0.31*	*0.30*
(20)	28/02/2024, 13:50	Departure	AZAMARA ONWARD	*No data*	*No data*	*No data*
(21)	29/02/2024, 07:10	Arrival	MAJESTIC PRINCESS	*No data*	*No data*	*No data*
(22)	29/02/2024, 16:10	Departure	MAJESTIC PRINCESS	*No data*	*No data*	*No data*

Notes:

1. *Vessels highlighted in red are 'Non-Cruise' ships*
2. *"No data" above indicates less than 75% (<8 minutes per 10 minutes) available for the averaging period.*



Numbers in chart above correspond to Table 10, indicating Vessel name and departure/arrival time.

Figure 1. Vessel Arrival/Departure VS SO_2 Concentrations

8 Quality Assurance & Quality Control (QA/QC)

Ektimo is accredited by the National Association of Testing Authorities (NATA) for the sampling and analysis of air pollutants. Unless otherwise stated test methods used are accredited with the National Association of Testing Authorities. For full details, search for Ektimo at NATA's website www.nata.com.au.

Ektimo is accredited by NATA to ISO/IEC 17025 - Testing. ISO/IEC 17025 - Testing requires that a laboratory have adequate equipment to perform the testing, as well as laboratory personnel with the competence to perform the testing. This quality assurance system is administered and maintained by the Quality Director. NATA is a member of APAC (Asia Pacific Accreditation Co-operation) and of ILAC (International Laboratory Accreditation Co-operation). Through mutual recognition arrangements with these organisations, NATA accreditation is recognised worldwide.

8.1 Maintenance Checks and Calibrations

Maintenance checks and calibrations for the period can be seen in the table below.

Table 11. Maintenance Checks and Calibrations

Monitoring Equipment	Parameter	Equipment ID (or SN)	Type of Calibration/ Check	Date of Calibration(s) / Check(s)
NOx Analyser	NOx	EKT0047	Monthly	28/02/2024
SO_2 Analyser	SO_2	EKT0050	Monthly	28/02/2024

NOTES:

1. As the BAM was out of service at that time, no checks or calibrations were performed.

2. The span drift of the NO readings during the post span check on the 28/02/2024 was +3%FS. No adjustment was required as per AS 3580.19:2020 requirements.

3. The span drift of the NOx readings during the post span check was -57%FS. A linear adjustment between pre and post span drift checks was performed accordingly.

4. NO_2 values were adjusted using the same linear regression, calculating NO_2 as the difference between NOx and NO.

5. The span drift of the SO_2 readings during the post span check +18%FS. A conservative approach was taken by not adjusting the SO_2 values down.

6. A leak check of the NOx and SO_2 analysers will be performed at the decomissioning stage of the project as per AS 3580.5.1:2023 and AS 3580.4.1:2023.

8.2 Monthly Data Capture

The station is equipped with a local data logger to collect data from the AAQMS and weather station and store it in the logger memory. Data is automatically transferred to a secure cloud-based service every 1 minute. This cloud-based platform is known as '*Ektimo Live'* and it enables real time access and visualisation of the data collected.

Calculated Data Capture is the proportion of data periods successfully logged out of the theoretical maximum during the period. In a monthly period, you might expect the following maximum (in a 30-day month);

- 720 Hourly Averages
- 30 Daily Averages

Data capture is calculated before data validation.

Table 12. NO, NO_2, NO_x, SO_2, $PM_{2.5}$, Monthly Data Capture

	NO, NO_2, NOx (%)	SO_2 (%)	PM2.5 (%)
Data Capture	87	86	0

Table 13. Weather Monthly Data Capture

	Wind speed (%)	Wind Direction (%)	Relative humidity (%)	Temperature at 2m (%)
Data Capture	92.6	92.6	92.6	92.6

8.3 Data Validation & Exceptions

Data validation is performed as per *AS 3580.19:2020 Methods for Sampling and Analysis of Ambient Air – Method 19: Ambient Air Quality Data Validation and Reporting*.

Periods where data has been deemed invalid and removed from all calculations can be seen below.

Individual daily and hourly averages are also automatically invalid if there has been data loss due to equipment malfunction, calibration and/or maintenance which results in less than 75% of data for any averaging period.

Table 14. Data Exceptions

Start Date/Time	End Date/Time	Parameter	Details of Outage or Required Change	Comments	Person Making Changes
3/02/2024 5:50	3/02/2024 5:50	NOx	Anolomolous High negative reading (NO_2)	NOx data removed	ADo
3/02/2024 17:55	3/02/2024 17:55	NOx	Anomolous NOx reading suspected instrument error	NOx data removed	ADo
3/02/2024 18:44	3/02/2024 18:44	NOx	Anolomolous High negative reading (NO_2)	NOx data removed	ADo
3/02/2024 19:06	3/02/2024 19:07	NOx	Anomolous NOx reading suspected instrument error	NOx data removed	ADo
4/02/2024 6:08	4/02/2024 6:10	NOx	Instrument Error	NOx data removed	ADo
5/02/2024 10:32	5/02/2024 10:45	NOx	Unusual constant negative values	NOx data removed	ADo
8/02/2024 10:34	8/02/2024 10:34	NOx	Sudden large step up in NO with negative NO_2	NOx data removed	ADo
17/02/2024 23:26	17/02/2024 23:56	NOx	Constant negative NO2 concentrations (less than -2ppb contributing to -2ppb hourly average -screening criteria)	NOx data removed	ADo
18/02/2024 12:26	18/02/2024 12:27	all data	Instrument Error	all data removed	ADo
23/02/2024 8:18	23/02/2024 8:18	NOx	Sudden large step up in NO with negative NO_2	NOx data removed	ADo
27/02/2024 14:30	27/02/2024 14:31	NOx	Sudden large step up in NO with negative NO_2	NOx data removed	ADo
28/02/2024 10:09	28/02/2024 10:10	Weather data	Eratic weather readings, logger error	weather data removed	ADo
28/02/2024 10:17	28/02/2024 10:17	Weather data	Eratic weather readings, logger error	weather data removed	ADo
28/2/2024 various*		Weather data	Eratic weather readings, logger error	weather data removed	ADo
28/02/2024 9:39	28/02/2024 13:02	NOx SO2	Logger error erroneous data	NOx ,SO_2 data removed	ADo
28/02/2024 15:19	29/02/2024 1:50	NOx	Constant negative NO_2 concentrations (less than -2ppb contributing to -2ppb hourly average -screening criteria)	NOx data removed	ADo
28/02/2024 13:03	29/02/2024 23:59	SO2	Unusual significantly elevated SO_2 concentrations as well as constant negative SO_2 concentrations (less than -2ppb contributing to -2ppb hourly average -screening criteria)	SO2 data removed	ADo
29/02/2024 2:19	29/02/2024 6:43	NOx	Eratic NOx readings, logger error	NOx data removed	ADo
29/02/2024 7:21	29/02/2024 7:44	NOx	Eratic NOx readings, logger error	NOx data removed	ADo
29/02/2024 11:19	29/02/2024 13:06	NOx	Constant negative NO_2 concentrations (less than -2ppb contributing to -2ppb hourly average -screening criteria)	NOx data removed	ADo
29/02/2024 13:34	29/02/2024 23:59	NOx	Constant negative NO_2 concentrations (less than -2ppb contributing to -2ppb hourly average -screening criteria)	NOx data removed	ADo

**** Weather Data Removed 28 February***

28/02/2024 10:09:00 AM -- 28/02/2024 10:10:00 AM, 28/02/2024 10:17:00 AM -- 28/02/2024 10:17:00 AM, 28/02/2024 10:28:00 AM -- 28/02/2024 10:29:00 AM, 28/02/2024 10:32:00 AM -- 28/02/2024 10:33:00 AM, 28/02/2024 10:40:00 AM -- 28/02/2024 10:40:00 AM, 28/02/2024 10:45:00 AM -- 28/02/2024 10:45:00 AM, 28/02/2024 10:52:00 AM -- 28/02/2024 10:52:00 AM, 28/02/2024 10:58:00 AM -- 28/02/2024 11:02:00 AM, 28/02/2024 11:07:00 AM -- 28/02/2024 11:08:00 AM, 28/02/2024 11:13:00 AM -- 28/02/2024 11:14:00 AM, 28/02/2024 11:18:00 AM -- 28/02/2024 11:18:00 AM, 28/02/2024 11:29:00 AM -- 28/02/2024 11:30:00 AM, 28/02/2024 11:40:00 AM -- 28/02/2024 11:41:00 AM, 28/02/2024 11:49:00 AM -- 28/02/2024 11:50:00 AM,

note. NOx Calibration Data Removed

1/02/2024 1:51:00 AM -- 1/02/2024 2:13:00 AM, 2/02/2024 1:51:00 AM -- 2/02/2024 2:10:00 AM, 3/02/2024 1:51:00 AM -- 3/02/2024 2:10:00 AM, 4/02/2024 1:51:00 AM -- 4/02/2024 2:10:00 AM, 5/02/2024 1:51:00 AM -- 5/02/2024 2:10:00 AM, 6/02/2024 1:51:00 AM -- 6/02/2024 2:10:00 AM, 7/02/2024 1:51:00 AM -- 7/02/2024 2:10:00 AM, 8/02/2024 1:50:00 AM -- 8/02/2024 2:10:00 AM, 9/02/2024 1:51:00 AM -- 9/02/2024 2:10:00 AM, 10/02/2024 1:51:00 AM -- 10/02/2024 2:10:00 AM, 11/02/2024 1:51:00 AM -- 11/02/2024 2:10:00 AM,

note. SO2 Calibration Data Removed

1/02/2024 1:51:00 AM -- 1/02/2024 2:30:00 AM, 2/02/2024 1:51:00 AM -- 2/02/2024 2:16:00 AM, 3/02/2024 1:51:00 AM -- 3/02/2024 2:34:00 AM, 4/02/2024 1:51:00 AM -- 4/02/2024 2:24:00 AM, 5/02/2024 1:51:00 AM -- 5/02/2024 2:28:00 AM, 6/02/2024 1:51:00 AM -- 6/02/2024 2:17:00 AM, 7/02/2024 1:51:00 AM -- 7/02/2024 2:26:00 AM, 8/02/2024 1:50:00 AM -- 8/02/2024 2:25:00 AM, 9/02/2024 1:51:00 AM -- 9/02/2024 2:16:00 AM, 10/02/2024 1:51:00 AM -- '10/02/2024 2:10:00 AM, 11/02/2024 1:51:00 AM -- 11/02/2024 2:16:00 AM, 12/02/2024 1:51:00 AM -- 12/02/2024 2:15:00 AM, 13/02/2024 1:51:00 AM -- 13/02/2024 2:20:00 AM,

9 Definitions

The following symbols and abbreviations may be used in this test report:

<	Less than
>	Greater than
≥	Greater than or equal to
% v/v	Volume to volume ratio, dry or wet basis
~	Approximately
<	Less than
>	Greater than
≥	Greater than or equal to
µg/m³	Micrograms per cubic meter
AAQMS	Ambient air quality monitoring station
AS	Australian Standard
BAM	Beta attenuation monitor for measuring PM10 & PM2.5
Data Capture	The proportion of data periods successfully logged out of the theoretical maximum possible number (100%)
Data Exception	Missing or invalid data as per AS3580.19:2020.
EPA	Environment Protection Authority
NA	Not applicable
NATA	National Association of Testing Authorities
NEPM-AAQ	National Environment Protection (Ambient Air Quality) Measure
NO	Nitric oxide
NO_2	Nitrogen dioxide
CO	Carbon monoxide
O_3	Ozone
SO_2	Sulfur dioxide
$PM_{2.5}$	Particulate matter with an equivalent aerodynamic diameter less than 2.5 microns (PM2.5)
PM_{10}	Particulate matter with an equivalent aerodynamic diameter less than 10 microns (PM10)
VOC	Volatile organic compound. A carbon-based chemical compound with a vapour pressure of at least 0.010 kPa at 25°C or having a corresponding volatility under the given conditions of use. VOCs may contain oxygen, nitrogen and other elements. VOCs do not include carbon monoxide, carbon dioxide, carbonic acid, metallic carbides and carbonate salts.
ppb	Parts per billion
ppm	Parts per million
STP	Standard temperature and pressure. Gas volumes and concentrations are expressed on a dry basis at 0 °C, at discharge oxygen concentration and an absolute pressure of 101.325 kPa.
TM	Test method

Appendix 1. NO_2, CO, SO_2, $PM_{2.5}$ Charts

Daily (24 hourly) Average $PM_{2.5}$

No data for February 2024

Figure 2. Daily (24 Hour) Average $PM_{2.5}$

Hourly Average NO_2

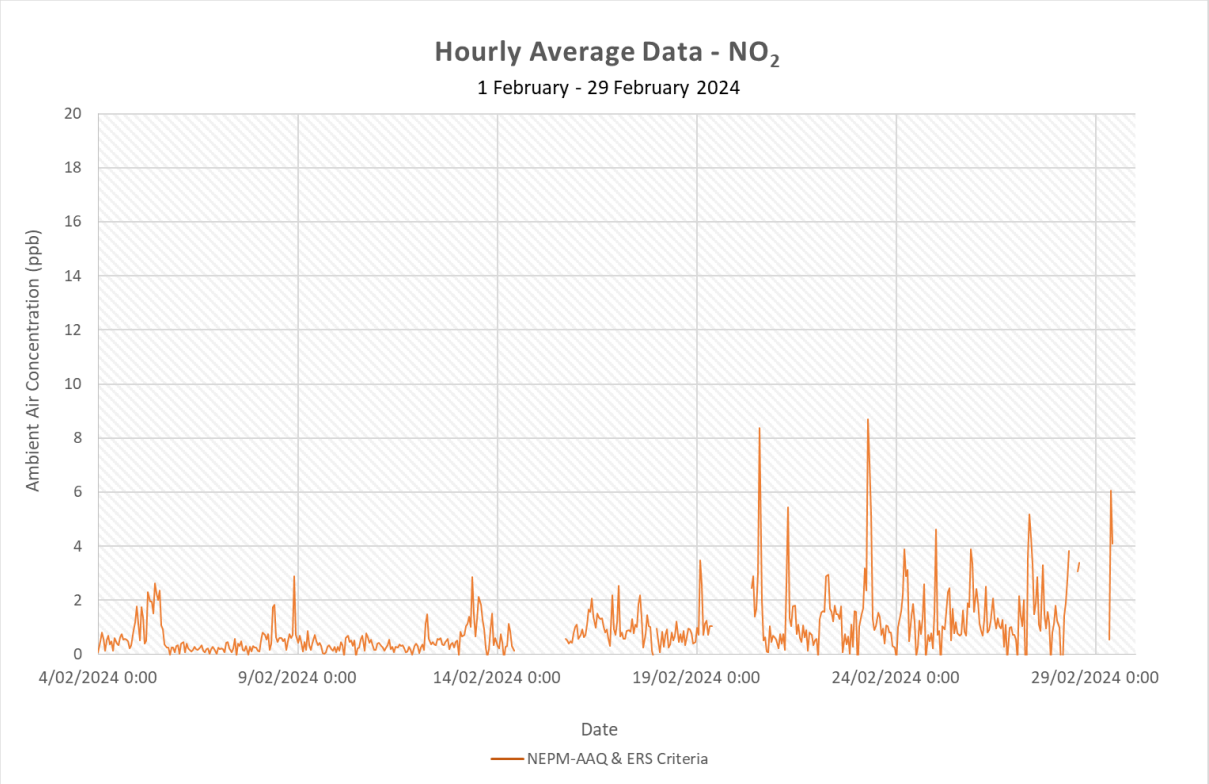


Figure 3. 8 Hourly Average NO_2

10 Minute Average SO_2

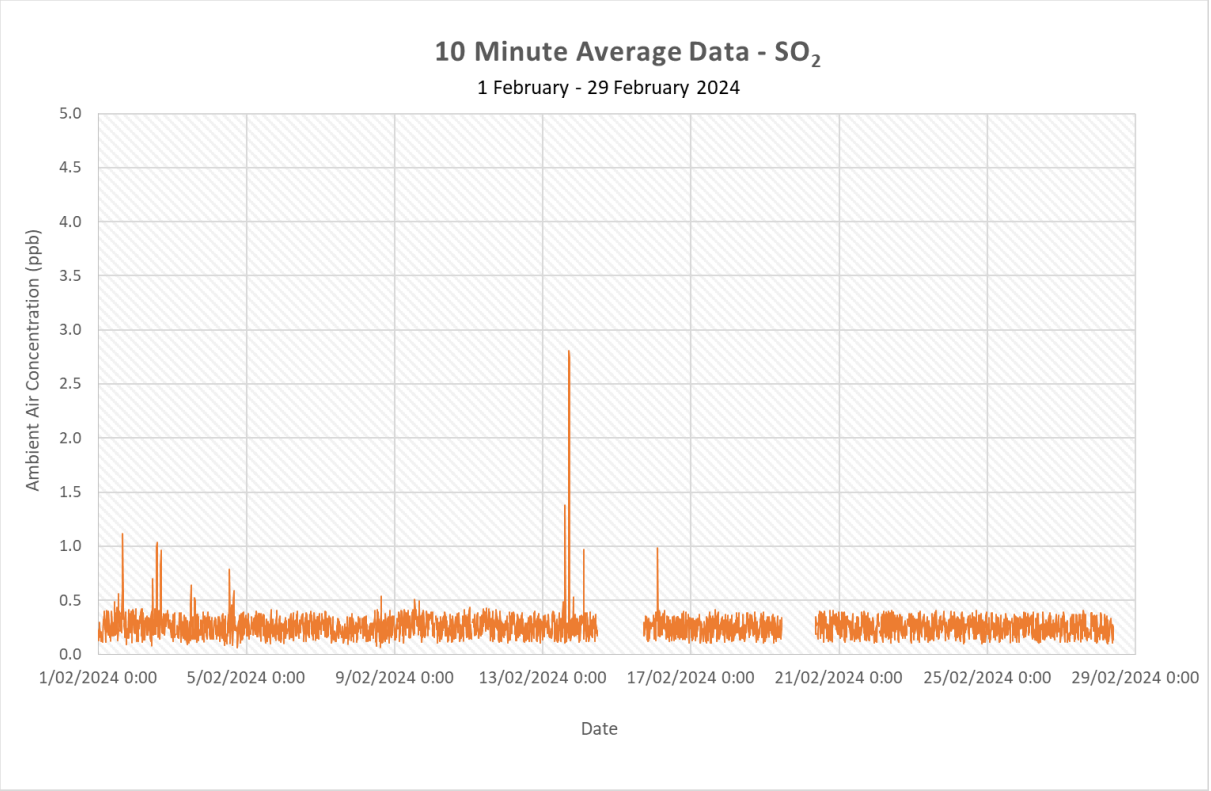


Figure 4. 10 Minute Average SO_2

Hourly Average SO_2

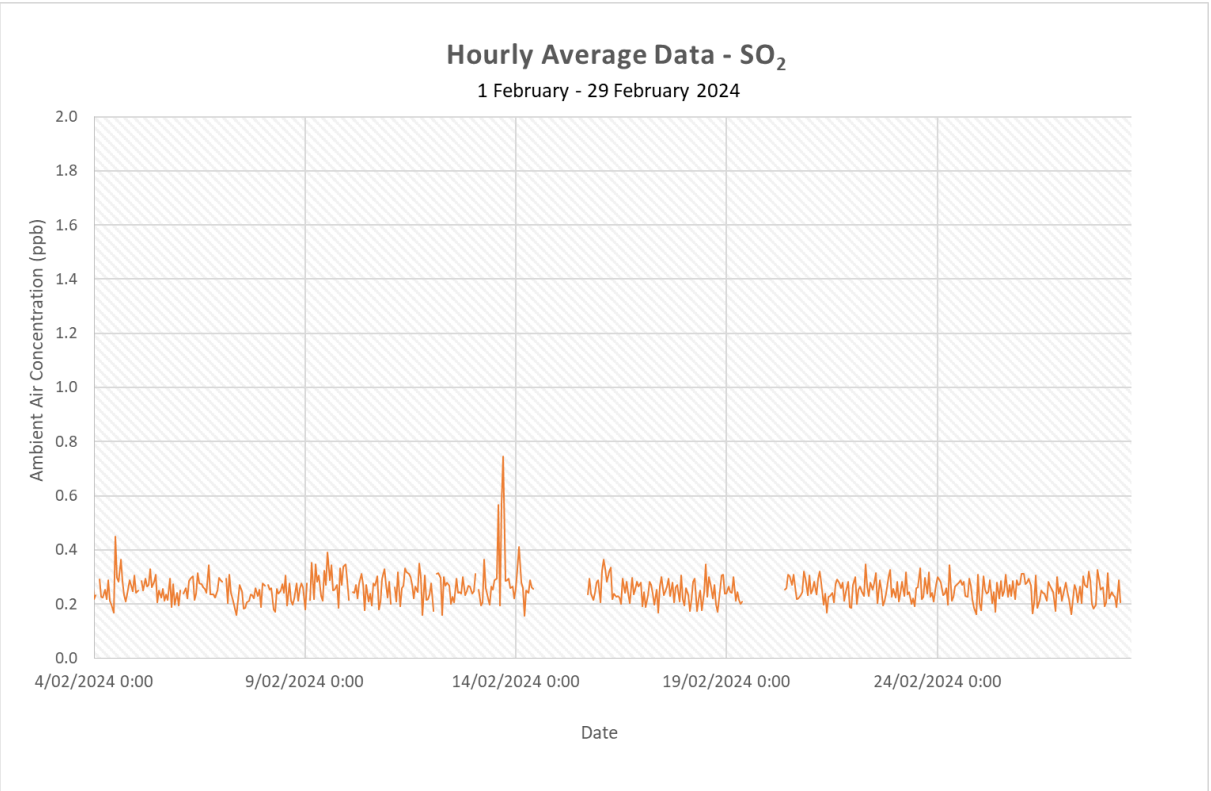


Figure 5. Hourly Average SO_2

Daily (24 Hourly) SO_2

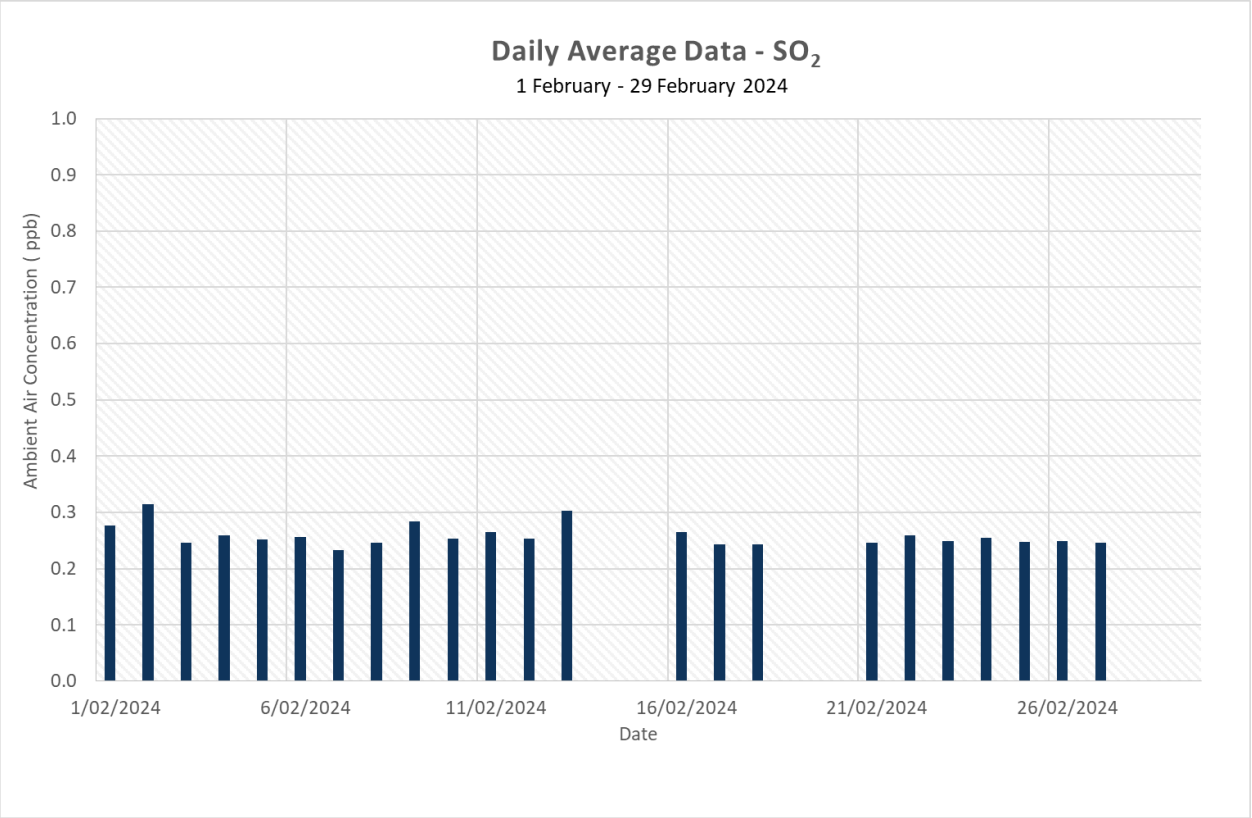


Figure 6. Daily (24 Hour) Average SO_2

Ektimo

Appendix 2. Weather Charts

9.1 Monthly Windrose

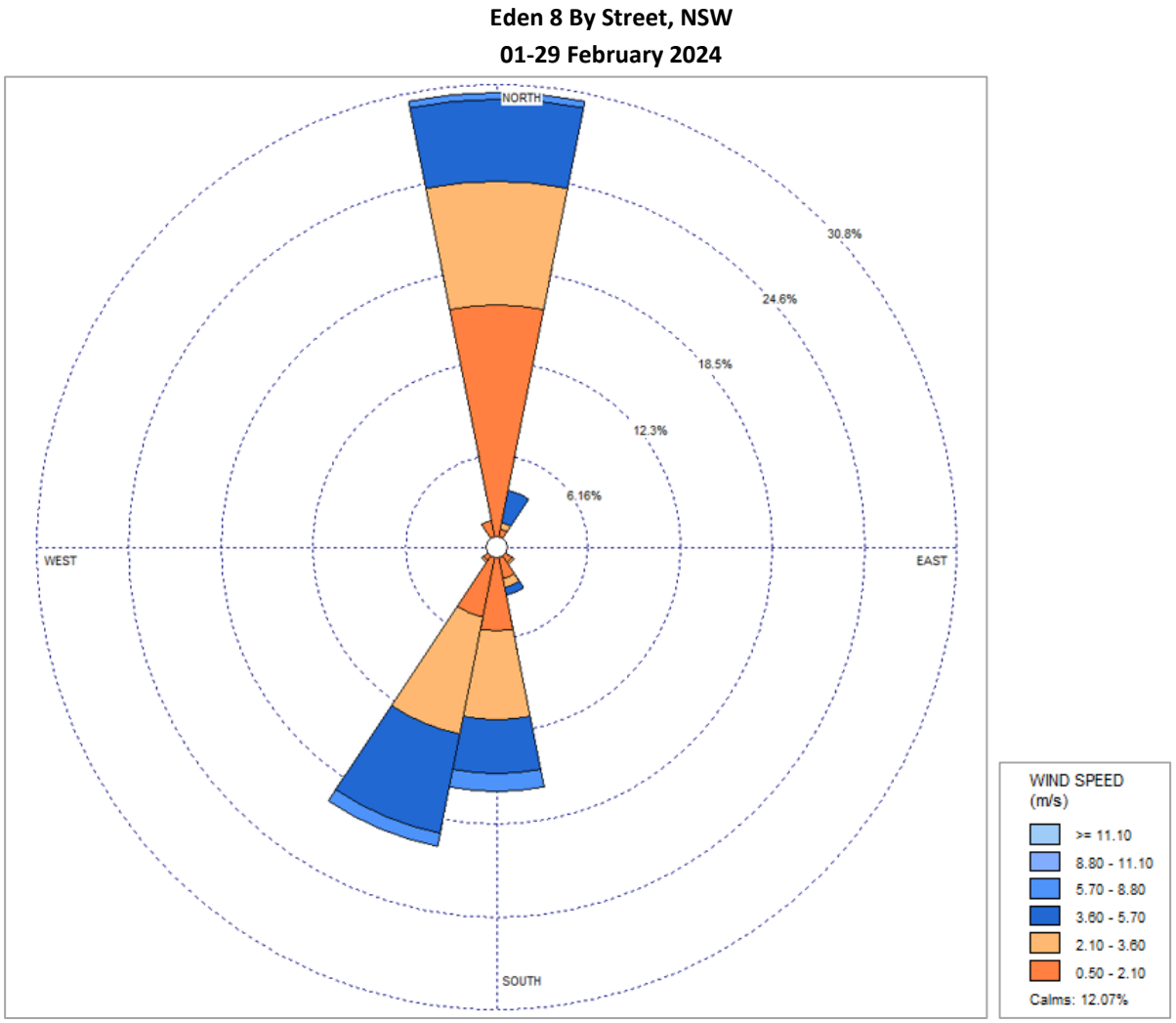
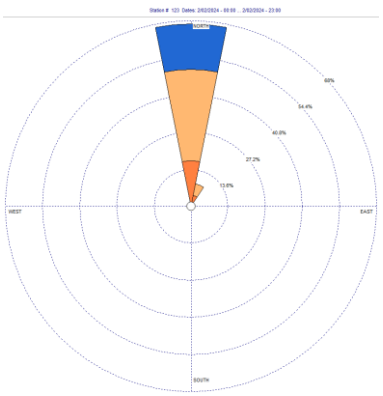


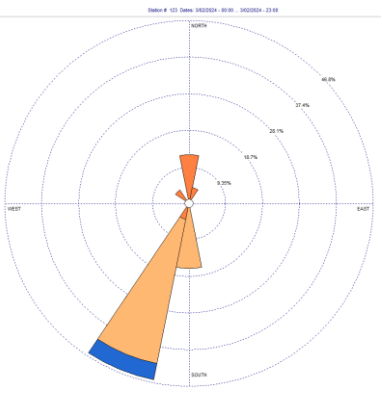
Figure 7. Monthly Wind Rose

9.2 Daily Windroses

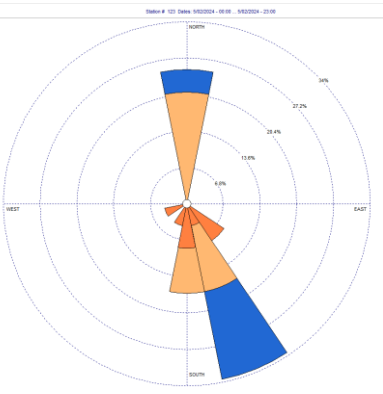
The following Daily windroses correspond to days when Ships were berthed at port of Eden.
The daily average concentration of SO_2 (ppb) is also noted in brackets for each day.



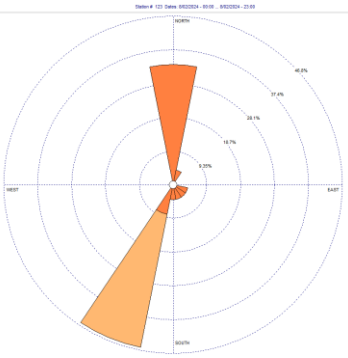
02/02/24 (SO_2 0.31 ppb)



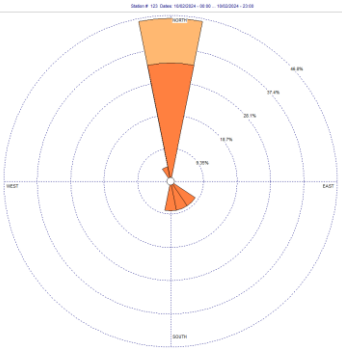
03/02/24 (SO_2 0.25 ppb)



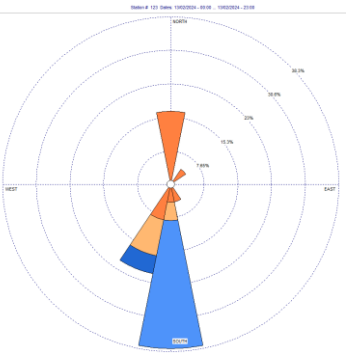
05/02/24 (SO_2 0.25 ppb)



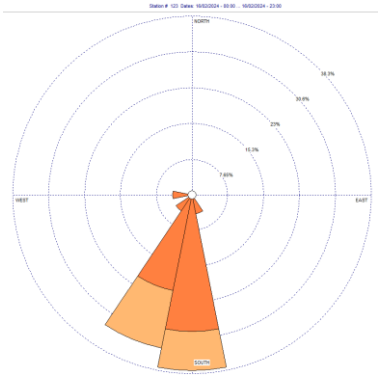
8/02/24 (SO_2 0.25 ppb)



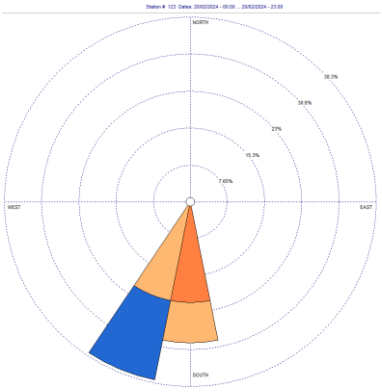
10/02/24 (SO_2 0.25 ppb)



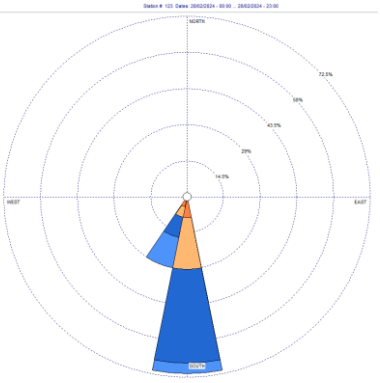
13/02/24 (SO_2 0.30 ppb)



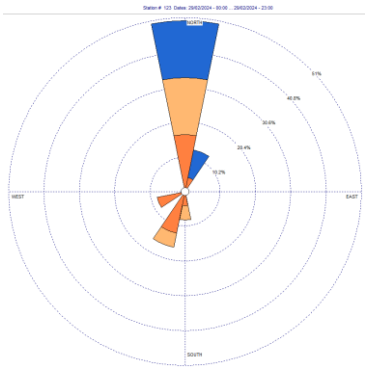
16/02/24 (SO_2 0.27 ppb)



20/02/24 (NA)



28/02/24 (NA)



29/02/24 (NA)

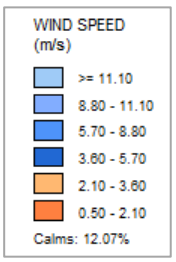


Figure 8. Daily Wind Roses

9.3 Weather Charts

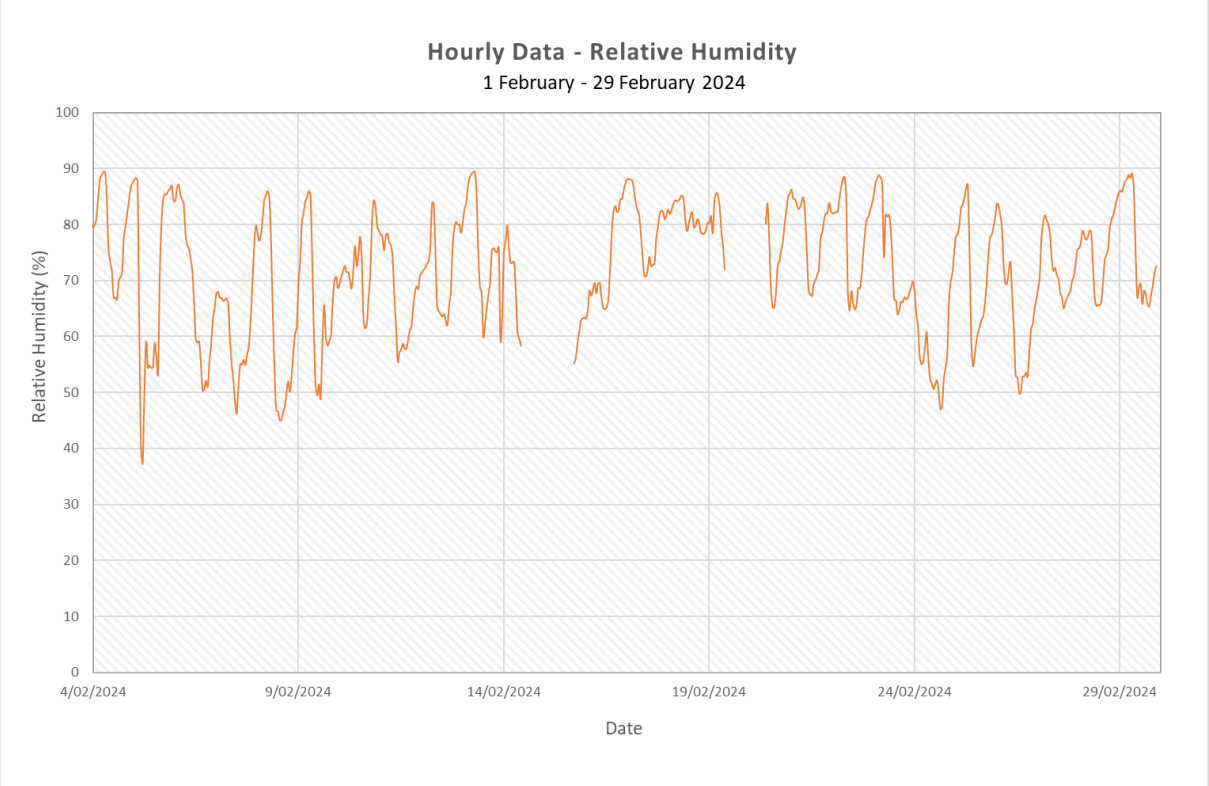


Figure 9. Hourly Relative Humidity

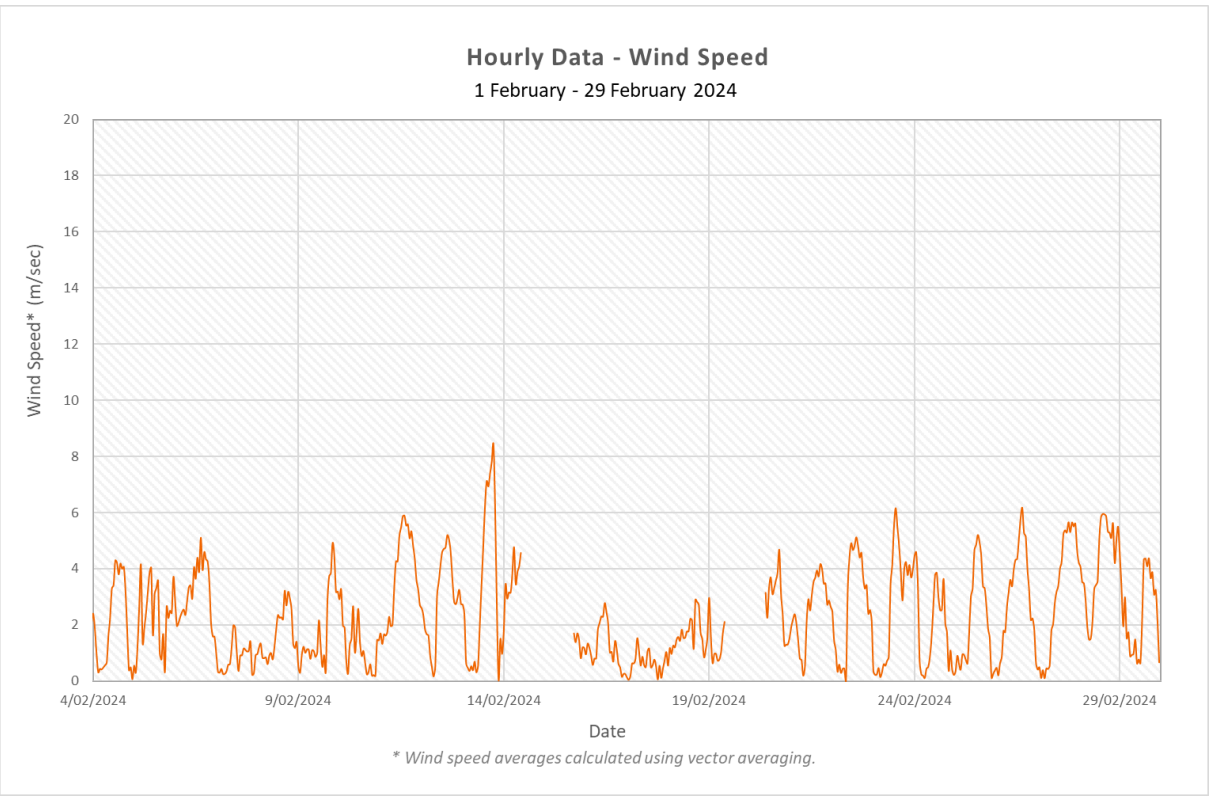


Figure 10. Hourly Wind Speed.

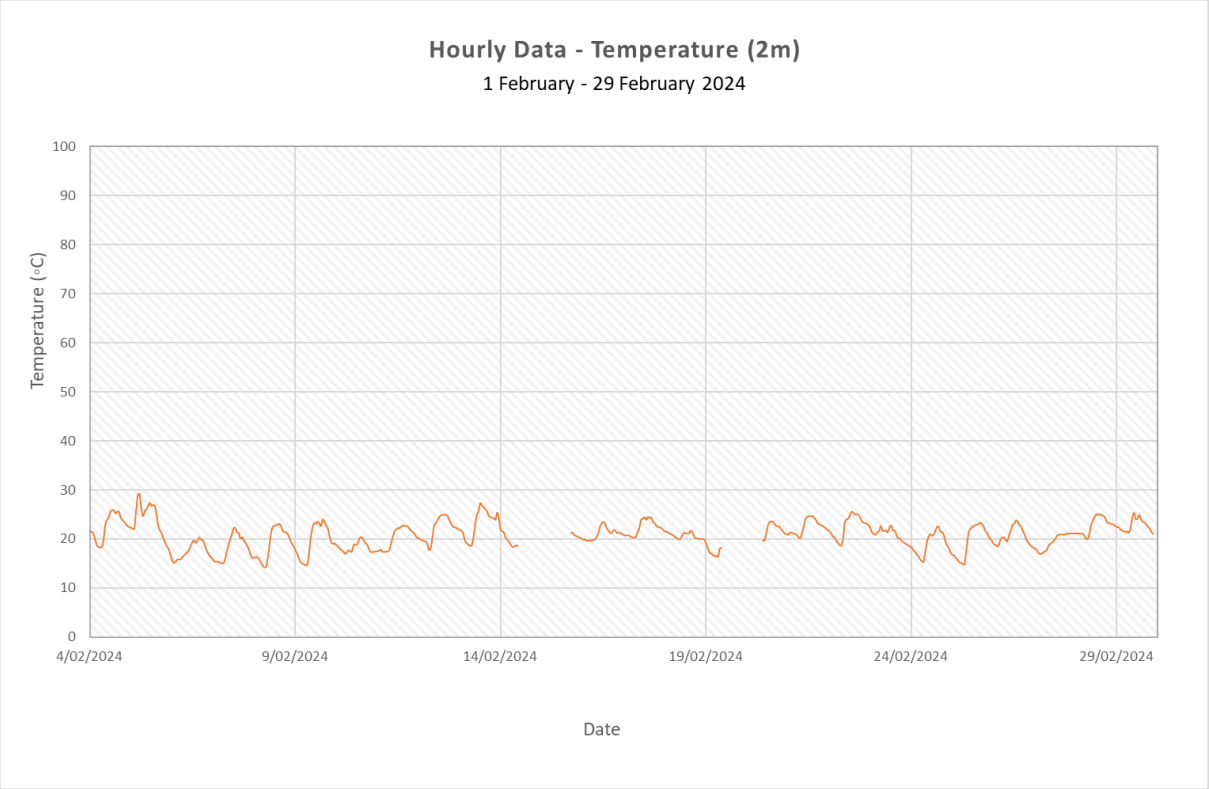


Figure 11. Hourly Temperature (2m)

Appendix 4. Monitoring Equipment Specifications

Table 15. Monitoring Equipment Specifications

Parameter	Manufacturer	Model	Specification Units	Operating Range	Accuracy	Detection Threshold	Resolution	Error / Drift	Sample rate
$PM_{2.5}$	Met One	BAM - 1020	µg/m^3	0 - 1,000 µg/m^3	Exceeds US-EPA Class III $PM_{2.5}$ FEM standards for additive and multiplicative bias.	4.8 µg/m³	0.1 µg/m³	NA	16.7 L/min
NOx	Airpointer	A-HTV1S070000 M100C1F1	ppb	up to 20ppm	1%of read ingor1ppb (whichever is greater) @<500ppb	0.4ppb	NA	<0.4ppb (zero) 1% of reading >100ppb (span) 24hrs	1000ml/min
SO_2	Airpointer	2-11A	ppb	up to 10ppm	1% of reading or 1ppb (whichever is greater) @<500ppb	0.5 ppb	NA	<1ppb (zero) 1% of reading >100ppb (span) 24hrs	500ml/min
Wind direction	Vaisala	WXT530	degree (°)	0 - 360°	±3.0° at 10 m/s	NA	1°	NA	NA
Wind speed	Vaisala	WXT530	m/s	0 - 60 m/s	±3 % at 10 m/s	NA	0.1 m/s	NA	NA
Relative Humidity	Vaisala	WXT530	%	0 - 100 %RH	±3 %RH at 0 - 90 %RH ±5 %RH at 90 - 100 %RH	0.1 %RH	0.1 %RH	NA	NA
Temperature	Vaisala	WXT530	°C	-52 - 60 °C	±0.3 °C	NA	0.1 °C	NA	NA

Appendix 5. Ambient Air Quality Monitoring Station (AAQMS) Locations and Siting.

AAQMS & Weather Station Location

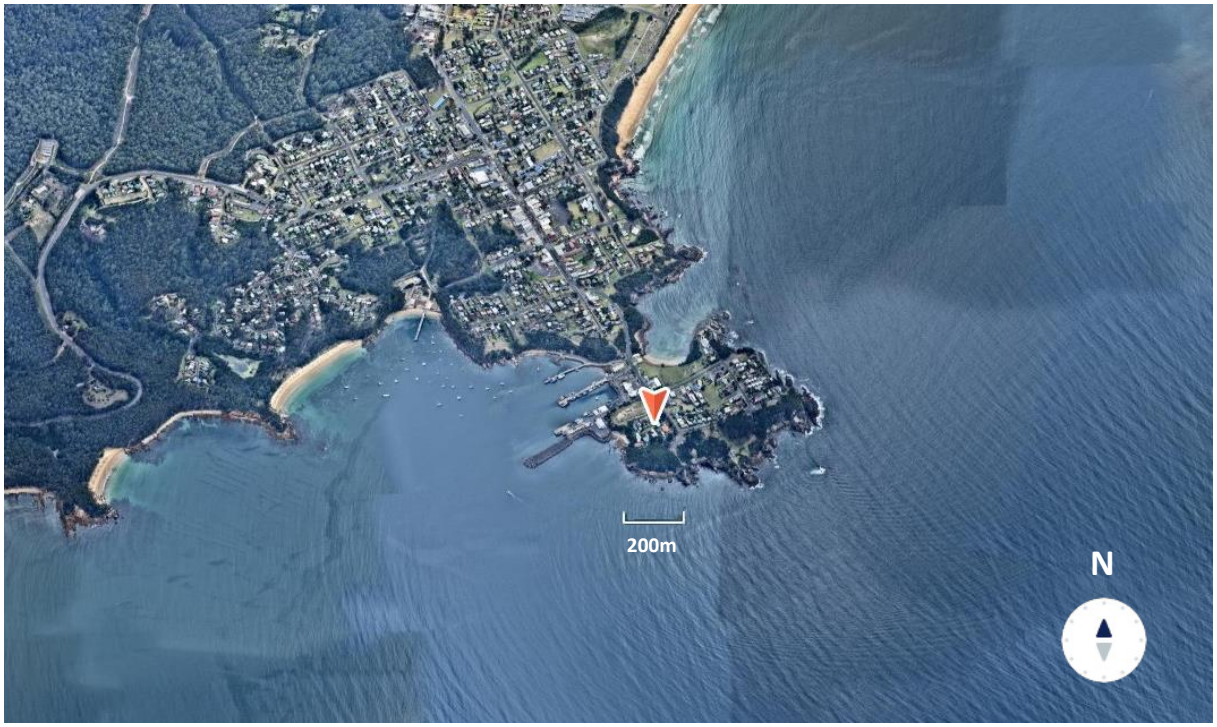


Image 1. Port Eden AAQMS Location, 8 By Street

Image 2. Port Eden AAQMS Location, 8 By street (zoomed in)

Appendix 6. AAQMS Image.

Image 3. AAQMS , 8 by Street Port Eden

Appendix 7. Location Siting and Compliance

AAQMS were assessed in accordance with the siting requirements of AS3580.1.1.

Compliance with the siting requirements of AS3580.1.1 are summarised in the following tables.

Table 16. Location Siting Assessment

Ektimo	Initial Station Siting
Client name	Port Authority of New South Wales
Job number	R016315
Date of Installation	18/01/2024
Ektimo Staff	Hamid Sokhan
Site Location	8 By St, Eden NSW 2551
Latitude	-37.073486
Longitude	149.910502
Equipment type	Ambient Air Quality Monitoring System
Station type	Neighbourhood
Australian Standard AAQMS Siting Criteria Compliance	**(✓,✗ or na)**
Inlet height above ground level 2 m - 5 m	✓
Twice the height of nearby obstacle above the inlet ≤ Dw	✗
Inlet 10 m from drip line of trees	✓
Greater than 50 m from road (≤ 10,000 vehicles/day)	✗
10 m from object with height exceeding 2 m below the inlet height	✗
Clear sky angle 120° above inlet	✓
Unrestricted 270° airflow around inlter	✓
No extraneaous sources nearby	✓
Wind speed and wind direction	
Anemometer height above ground level 10 m	✗
Distance obstruction (≥ 10 times obstruction height)	✗
Temperature & relative humidity	
Sensor height above ground level 2 m	✓
Distance to obstruction (≥ 4 times obstruction height)	✗

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Port Authority of New South Wales

Monthly Ambient Air Quality Monitoring Report

March 2024

Report Number: R016315-2

Document Information

Client Name:	Port Authority of New South Wales
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Report Authorisation

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NATA Accredited Laboratory
No. 14601

Please note that only numerical results pertaining to measurements conducted directly by Ektimo are covered by Ektimo's terms of NATA accreditation as described in the Test Methods table. This does not include calculations that use data supplied by third-parties, comments, conclusions, or recommendations based upon the results. Refer to 'Test Methods' for full details of testing covered by NATA accreditation.

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Executive Summary

Ektimo was engaged by Port Authority of New South Wales to commission and operate an ambient air quality monitoring station (AAQMS) at 8 By Street Eden, NSW. The air quality monitoring is required in accordance with Port Authority's State Significant Infrastructure (SSI) Approval No. 7734 for the operation of the Eden Cruise Facility.

Conditions D7 to D14 of the SSI Approval No. 7734 required the preparation of an Air Quality Operation Monitoring Program. Condition E21 of the SSI Approval No. 7734 stated the following:

"*Unless otherwise agreed with the Planning Secretary, the Operation Monitoring Program required under Condition D7 must, as a minimum, include monitoring of NO_2, SO_2 and $PM_{2.5}$ at the closest potentially impacted sensitive receiver (taking into account prevailing winds) at least two days prior to the arrival of the first three cruise ship of the season, while they are at berth and for at least two days following departure. Where there is less than two days between departure of a cruise ship and arrival of the next cruise ship, monitoring must continue until there is at least two days between ship departures and arrivals*."

In light of the conditions mentioned above, the results of the Air Quality Operation Monitoring Program are summarised below for the month of March 2024. More detailed results can be found in Section 4 of this report.

Table 1. Data Summary

Indicator/ Pollutant	Days successfully logged	Averaging Period	March 2024 Average	Regulatory Reference Criteria	% of criteria	Data Points Logged	Averaging Period Exceedances	% of Data Points Exceeding Criteria
NO_2	29 of 31 days	Hourly (1 hour)	-0.78 ppb	80 ppb	0%	691	**0**	0%
SO_2	18 of 31 days	10 minute	0.51 ppb	250 ppb	0.2%	2,697	**0**	0%
		Hourly (1 hour)	0.51 ppb	100 ppb	0.5%	447	**0**	0%
		Daily (24 hour)	0.56 ppb	20 ppb	2.8%	18	**0**	0%
$PM_{2.5}$	16 of 31 days	Daily (24 hour)	7.2 µg/m^3	25 µg/m^3	29%	16	**0**	0%

Notes:

1. Less than 75 % (<18 hours per 24 hours) of NO_2, SO_2 and $PM_{2.5}$ hourly averages available for 26/03/24 and 27/03/24 to due to logger error. Data excluded from daily averages.
2. SO_2 Data removed from 01/03/2024 to 11/03/24 due to invalid data.
3. $PM_{2.5}$ data not available from 01/03/2024 00:00 to 14/03/24 01:00.

1 Introduction

1.1 Project Background

Port Authority of New South Wales has requested Ektimo to install and operate one fixed air quality monitoring station at 8 By Street, Eden NSW to allow monitoring and management of ambient air emissions.

Table 2. AAQMS location

Site	GPS Coordinates
8 By Street, NSW	-37.073486, 149.910502

Air quality parameters to be monitored by Ektimo are concentrations of;

- Nitric oxide (NO)
- Nitrogen dioxide (NO_2)
- Nitrogen oxides (NOx)
- Sulfur dioxide (SO_2)
- Particulate matter less than 2.5µm ($PM_{2.5}$)

In addition to weather conditions recorded by Ektimo;

- Wind speed
- Wind direction
- Temperature
- Relative humidity

1.2 Project Objective

Ektimo's objective (to support Port Authority of New South Wales' objective) was to perform continuous monitoring of ambient air quality and to report these on a monthly basis for the project duration as outlined below;

Quantify, on a monthly basis (per calendar month), averages of;

- SO_2 & $PM_{2.5}$ (daily (*24hr*))
- NO, NO_2, NOx, SO_2 (hourly)
- SO_2 (10 minute)

1.3 Regulatory Reference Criteria

The air quality criteria for the project were outlined in the Eden Cruise Facility Project's Air Quality Operational Environmental Management Plan (OEMP) Sub-Plan, which predicted the most affected sensitive receiver and maximum cumulative SO_2 concentrations for 'typical operations'.

Reporting on monthly air quality includes comparison of the data against the *National Environment Protection (Ambient Air Quality) Measure 2021* **(NEPM-AAQ)** standards and the maximum cumulative SO_2 concentration at the most affected sensitive receiver as predicted in the Refined SO_2 Emission Modelling for "typical operations" **(Eden Typical Operations Criteria**), as outlined in the Air Quality OEMP Sub-Plan.

Table 3. NEPM-AAQ & Eden Typical Operations Criteria

Indicator/Pollutant	Averaging Period	Maximum Concentration Standard/Objective	Reference
NO_2	Hourly (1 hour)	0.08 ppm (80 ppb)	NEPM-AAQ
SO_2	10 minute	0.25 ppm (250 ppb)	Eden Typical Operations Criteria
	Hourly (1 hour)	0.10 ppm (100 ppb)	NEPM AAQ
	Hourly (1 hour)	0.20 ppm (200 ppb)	Eden Typical Operations Criteria
	Daily (24 hour)	0.20 ppm (20 ppb)	NEPM AAQ
	Daily (24 hour)	0.08 ppm (80 ppb)	Eden Typical Operations Criteria
$PM_{2.5}$	Daily (24 hour)	25 µg/m³	NEPM AAQ

NEPM- AAQ – https://www.legislation.gov.au/F2007B01142/latest/versions

2 Monitoring Methodology

Ambient air monitoring was carried out in accordance with the following methods;

Table 4. Monitoring Methodology

Test Method	Parameter	Description
AS3580.5.1:2023	NO, NO_2, NOx	Methods for Sampling and Analysis of Ambient Air – Determination of Oxides of Nitrogen – Direct Reading Instrumental Method.
AS 3580.4.1:2023	SO_2	Methods for Sampling and Analysis of Ambient Air – Determination of Sulfur Dioxide – Direct Reading Instrumental Method.
NA	$PM_{2.5}$	NA
AS3580.14:2014	Weather	Methods for Sampling and Analysis of Ambient Air – Part 14: Meteorological Monitoring for Ambient Air Quality Monitoring Applications
AS3580.1.1:2016	AAQMS Siting	Methods for Sampling and Analysis of Ambient Air – Guide to Siting Air Monitoring Equipment.
AS 3580.19:2020	Data Validation & Reporting	Methods for Sampling and Analysis of Ambient Air – Method 19: Ambient Air Quality Data Validation and Reporting.

**Note. Ektimo's NATA accreditation does not cover the FDS-17 $PM_{2.5}$ analyser method.*

3 Monitoring Equipment

A summary of the deployed monitoring equipment is outlined below.

Table 5. Monitoring Equipment

Parameter	Monitoring Equipment
$PM_{2.5}$	Dr Fodisch, FDS-17
NO, NO_2, NOx	Airpointer A-HTV1S070000 M100C1F1
SO_2	Airpointer 2-11A
Weather	Vaisala WXT530

Note: *Detailed Monitoring Equipment Specifications can be seen in Appendix 4.*

4 Monitoring Results, Daily

4.1 NO, NO_2, NO_x, SO_2, & $PM_{2.5}$ Results (Daily - 24-hour concentrations)

The following table details the concentrations for NO, NO_2, NOx, SO_2, $PM_{2.5}$ with the relevant NEPM-AAQ/ Eden Typical Operations Criteria. Refer to Appendix 1 for NO_2, SO_2, and $PM_{2.5}$ charts.

Table 6. NO, NO_2, NO_x, SO_2, $PM_{2.5}$ Results

Date/Time	NO (ppb)	NO_2 (ppb)	NOx (ppb)	SO_2 (ppb)	$PM_{2.5}$ (µg/m³)
1/03/2024	-1.52	-0.93	-2.45	---	---
2/03/2024	-1.7	-1.5	-3.2	---	---
3/03/2024	-1.7	-1.3	-3.0	---	---
4/03/2024	-1.8	-1.3	-3.1	---	---
5/03/2024	-1.2	-0.5	-1.7	---	---
6/03/2024	-0.9	0.1	-0.8	---	---
7/03/2024	-1.6	-1.0	-2.6	---	---
8/03/2024	-0.6	-0.5	-1.1	---	---
9/03/2024	-1.4	-1.1	-2.6	---	---
10/03/2024	-1.0	-0.4	-1.4	---	---
11/03/2024	0.2	0.8	1.1	---	---
12/03/2024	7.4	3.6	10.9	2.08	---
13/03/2024	-0.8	-0.1	-0.9	1.04	---
14/03/2024	-1.6	-0.8	-2.4	0.4	8.2
15/03/2024	-1.3	-0.9	-2.1	0.5	6.8
16/03/2024	-1.39	-1.1	-2.5	0.44	5.2
17/03/2024	-1.3	-0.9	-2.2	0.33	5.1
18/03/2024	-0.36	-0.74	-1.09	0.36	7.8
19/03/2024	-1.3	-0.9	-2.2	0.55	15.1
20/03/2024	-1.73	-0.8	-2.6	0.24	6.3
21/03/2024	-1.70	-1.1	-2.8	0.49	5.2
22/03/2024	-1.35	-0.9	-2.3	0.28	4.9
23/03/2024	-1.90	-0.9	-2.8	0.47	5.5
24/03/2024	-1.92	-0.9	-2.8	0.49	4.9
25/03/2024	-1.94	-0.8	-2.7	0.50	6.1
26/03/2024	---	---	---	---	---
27/03/2024	---	---	---	---	---
28/03/2024	-2.0	-1.5	-3.5	0.3	5.0
29/03/2024	-1.8	-1.6	-3.5	0.3	7.2
30/03/2024	-1.8	-1.7	-3.5	0.7	8.3
31/03/2024	-1.9	-1.6	-3.5	0.6	12.8
Maximum	**7.36**	**3.6**	**10.9**	**2.08**	**15**
Minimum	**-2.00**	**-1.68**	**-3.51**	**0.24**	**5**
Average	**-1.10**	**-0.73**	**-1.83**	**0.56**	**7.2**
Standard Deviation	**1.68**	**0.97**	**2.61**	**0.409**	**2.8**
NEPM-AAQ Criteria (Daily average)				20	25
Exceedances				0	0
Eden Typical Operations Criteria (Daily average)				80	
Exceedances				0	

Notes:

1. Dates highlighted in yellow correspond to days "Cruise Vessels" in port.
   Red highlighting indicates days "Non-Cruise" Vessels in port
   Blue highlighting indicates both vessel types in port.
2. $PM_{2.5}$ results corrected to 0°C and 101.3 kPa as per AS3580.9.12:2022
3. Please note, hourly and 10-minute average concentrations are reported separately in Excel® format.
4. Data corrections, if required, were performed during the data validation process as per AS methods (see section 2 for methodology).
5. Less than 75 % (<18 hours per 24 hours) of NO_2, SO_2 and $PM_{2.5}$ hourly averages available for 26/03/24 and 27/03/24 to due to logger error. Data excluded from daily averages.
6. SO_2 Data removed from 01/03/2024 to 11/03/24 due to invalid data.
7. $PM_{2.5}$ data not available from 01/03/2024 to 14/03/24 01:00.

5 Hourly and 10-minute Monitoring Results

Results in the following tables may include values below the formal detection limit of the analyser. These values are raw statistical calculations.

5.1 NO, NO_2, NOx, SO_2 (Hourly average concentrations)

Table 7. NO, NO_2, NOx, SO_2 (Hourly concentrations)

	NO (ppb)	NO_2 (ppb)	NOx (ppb)	SO_2 (ppb)
Maximum	**27.5**	**21.6**	**45.8**	**4.14**
Minimum	**-2.9**	**-3.2**	**-5.8**	**-1.19**
Average	**-1.3**	**-0.78**	**-2.0**	**0.51**
Standard Deviation	**2.05**	**1.70**	**3.6**	**0.63**
NEPM-AAQ Criteria (Hourly average)		80		100
Exceedances		0		0
Eden Typical Operations Criteria (Hourly average)				200
Exceedances				0

5.2 SO_2 (10-minute average concentrations)

Table 8. SO_2 (10-minute concentrations)

	SO_2 (ppb)
Maximum	**9.7**
Minimum	**-1.31**
Average	**0.51**
Standard Deviation	**0.67**
Eden Typical Operations Criteria (10 minute average)	250
Exceedances	0

6 Weather Results

The following table details the weather daily averages.

Table 9. Daily (24 hour) Weather Results

Date/Time	Wind speed (m/sec)	Wind Direction (°)	Temperature at 2m (°C)	Relative humidity %
1/03/2024	1.1	194.9	21.1	74.8
2/03/2024	3.3	7.4	20.0	65.2
3/03/2024	2.3	6.7	19.5	57.6
4/03/2024	2.3	6.8	17.4	53.9
5/03/2024	2.1	195.3	17.9	67.3
6/03/2024	0.2	269.5	20.5	76.1
7/03/2024	1.7	7.5	21.0	63.5
8/03/2024	2.4	199.8	21.7	80.8
9/03/2024	3.8	190.9	23.7	75.8
10/03/2024	2.7	186.8	22.9	72.0
11/03/2024	1.8	187.5	21.2	75.4
12/03/2024	0.5	356.0	22.0	70.8
13/03/2024	1.2	192.3	21.5	81.5
14/03/2024	1.5	5.9	19.5	82.9
15/03/2024	0.4	7.3	18.3	72.4
16/03/2024	1.4	193.5	18.1	70.0
17/03/2024	1.6	184.7	19.0	77.6
18/03/2024	2.6	200.1	19.9	83.1
19/03/2024	3.4	188.1	21.2	82.1
20/03/2024	3.3	10.3	17.1	68.7
21/03/2024	0.4	336.8	15.5	60.5
22/03/2024	0.9	196.5	15.5	74.9
23/03/2024	0.7	4.0	17.1	69.9
24/03/2024	0.2	340.8	16.9	70.8
25/03/2024	0.4	342.0	17.7	70.4
26/03/2024	---	---	---	---
27/03/2024	---	---	---	59.3
28/03/2024	0.9	3.8	17.6	68.5
29/03/2024	1.6	193.8	18.8	76.1
30/03/2024	0.2	302.7	18.9	80.2
31/03/2024	0.2	242.4	18.9	77.2
Maximum	**3.8**	**-**	**24**	**83**
Minimum	**0.17**	**-**	**15**	**54**
Average	**1.6**	**-**	**19**	**72**
Standard Deviation	**1.1**	**-**	**2.1**	**7.6**

Wind speed averages calculated using vector averaging.

Notes:

1. Dates highlighted in yellow correspond to days “Cruise Vessels” in port.
   Red highlighting indicates days “Non-Cruise” Vessels in port.
   Blue highlighting indicates both vessel types in port.
2. Less than 75 % (<18 hours per 24 hours) hourly averages available for 26/03/24 and 27/03/24 to due to logger error. Data excluded from daily averages.
3. Refer to Appendix 2 for weather charts.

7 SO_2, NO_2 & $PM_{2.5}$ levels compared with Vessel Movements

Port Authority provided vessel movement records for the monthly monitoring period covered by this report. Vessel movements were compared with measured analyte concentrations and prevailing wind direction to identify possible links between elevated analyte concentrations and vessel movement.

Table 10 below shows the arrival/departure times for each vessel along with the corresponding 10-minute average SO_2 concentration. Additionally, it includes the 10-minute average SO_2 concentrations for the 10 minutes preceding and following each arrival/departure.

Figure 1 details the continuous 1-minute and 10-minute average SO_2 concentrations measured compared with the recorded times of vessel arrivals/departures, as indicated in Table 10.

There was a spike in SO_2 from 12/03/2024 08:30 to 12/03/2024 19:00 with the 10-minute average peaking at 9.73 ppb between 08:30 and 08:40.

This coincides with the time “Grand Princess” was in port.

As can be seen in section 4 & 5, SO_2 levels were lower than all the relevant criteria for the entire testing period.

Average NO_2 and $PM_{2.5}$ concentrations were also below the relevant criteria during the entire duration of the testing period.

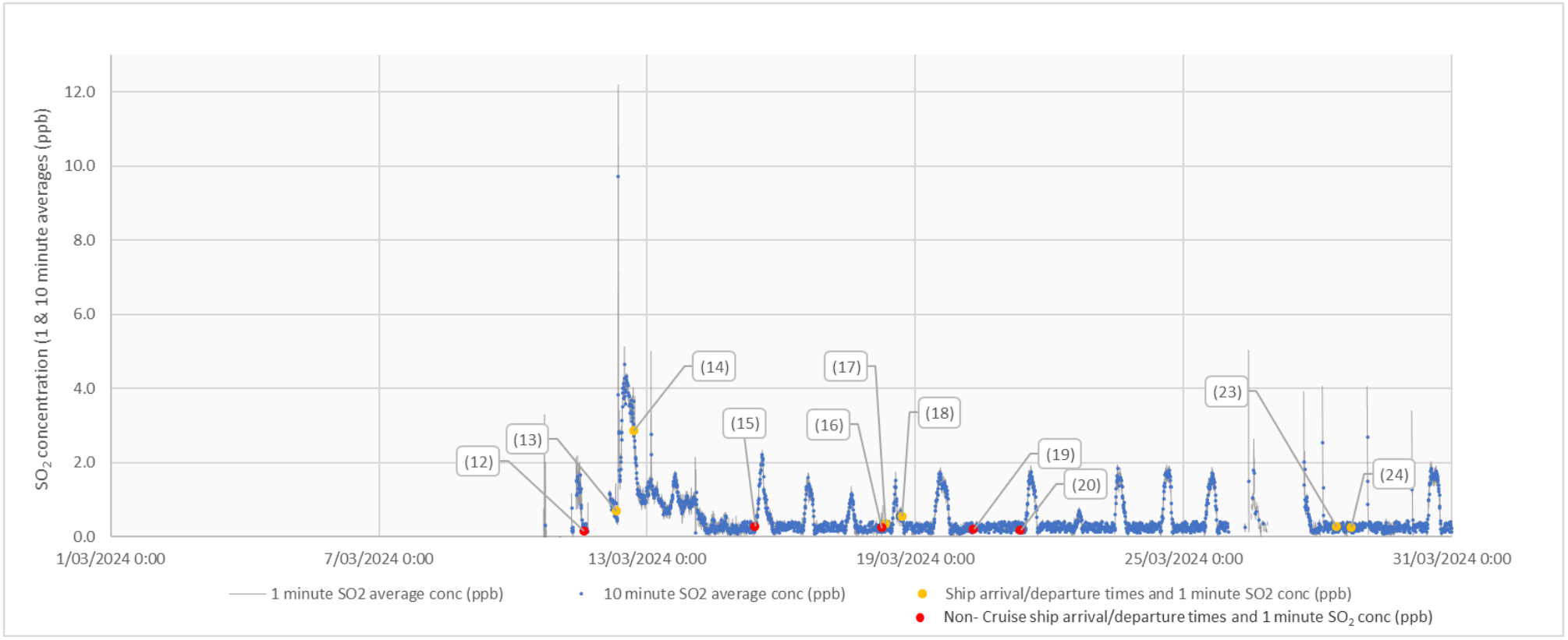
As shown in Image 2, Appendix 5, the Eden Cruise Wharf is situated West of the AQMS Station. Considering this, Section 9.2, Daily Windroses details the 24-hour Windrose for each day that vessels were active in the Port along with corresponding daily average SO_2 concentration.

Table 10. Recorded Vessel movement times March 2024 (provided by Port Authority NSW) compared to monitoring data.

	Date/Time	Arrival /Departure	Vessel	10 minute average period SO_2 value (ppb)	Previous 10 minute average period SO_2 value (ppb)	Post 10 minute average period SO_2 value (ppb)
(1)	03/03/2024, 10:24	Arrival	NORWEGIAN SPIRIT	No data	No data	No data
(2)	03/03/2024, 16:30	Departure	NORWEGIAN SPIRIT	No data	No data	No data
(3)	04/03/2024, 07:54	Arrival	P T FORTITUDE	No data	No data	No data
(4)	04/03/2024, 07:54	Arrival	BOUGAINVILLE	No data	No data	No data
(5)	05/03/2024, 07:22	Arrival	NORWEGIAN SPIRIT	No data	No data	No data
(6)	05/03/2024, 15:30	Departure	NORWEGIAN SPIRIT	No data	No data	No data
(7)	06/03/2024, 06:12	Departure	P T FORTITUDE	No data	No data	No data
(8)	06/03/2024, 06:23	Departure	BOUGAINVILLE	No data	No data	No data
(9)	08/03/2024, 08:42	Arrival	CELEBRITY EDGE	No data	No data	No data
(10)	08/03/2024, 16:44	Departure	CELEBRITY EDGE	No data	No data	No data
(11)	08/03/2024, 19:20	Arrival	HMAS DIAMANTINA	No data	No data	No data
(12)	11/03/2024, 14:20	Departure	HMAS DIAMANTINA	0.24	0.28	0.15
(13)	12/03/2024, 07:18	Arrival	GRAND PRINCESS	0.91	0.92	0.62
(14)	12/03/2024, 16:52	Departure	GRAND PRINCESS	2.71	3.04	2.58
(15)	15/03/2024, 10:10	Arrival	HMAS DIAMANTINA	0.25	0.21	0.27
(16)	18/03/2024, 06:10	Departure	HMAS DIAMANTINA	0.34	0.31	0.13
(17)	18/03/2024, 08:15	Arrival	CRYSTAL SERENITY	*0.37*	*0.26*	*0.36*
(18)	18/03/2024, 16:50	Departure	CRYSTAL SERENITY	0.54	0.54	0.45
(19)	20/03/2024, 07:25	Arrival	ALLANKAY	0.18	0.28	0.22
(20)	21/03/2024, 08:40	Departure	ALLANKAY	*0.24*	*0.35*	*0.19*
(21)	27/03/2024, 10:20	Arrival	NORWEGIAN SPIRIT	No data	No data	No data
(22)	27/03/2024, 16:28	Departure	NORWEGIAN SPIRIT	No data	No data	No data
(23)	28/03/2024, 10:20	Arrival	RESILIENT LADY	*0.18*	*0.13*	*0.28*
(24)	28/03/2024, 17:53	Departure	RESILIENT LADY	*0.22*	*0.36*	*0.24*

Notes:

1. *Vessels highlighted in red are 'Non-Cruise' ships*
2. *“No data” above indicates less than 75% (<8 minutes per 10 minutes) available for the averaging period.*



Numbers in chart above correspond to Table 10 (previous page), indicating Vessel name and departure/arrival time.

Figure 1. Vessel Arrival/Departure VS SO_2 Concentrations

8 Quality Assurance & Quality Control (QA/QC)

Ektimo is accredited by the National Association of Testing Authorities (NATA) for the sampling and analysis of air pollutants. Unless otherwise stated test methods used are accredited with the National Association of Testing Authorities. For full details, search for Ektimo at NATA's website www.nata.com.au.

Ektimo is accredited by NATA to ISO/IEC 17025 - Testing. ISO/IEC 17025 - Testing requires that a laboratory have adequate equipment to perform the testing, as well as laboratory personnel with the competence to perform the testing. This quality assurance system is administered and maintained by the Quality Director. NATA is a member of APAC (Asia Pacific Accreditation Co-operation) and of ILAC (International Laboratory Accreditation Co-operation). Through mutual recognition arrangements with these organisations, NATA accreditation is recognised worldwide.

8.1 Maintenance Checks and Calibrations

Maintenance checks and calibrations for the period can be seen in the table below.

Table 11. Maintenance Checks and Calibrations

Monitoring Equipment	Parameter	Equipment ID (or SN)	Type of Calibration/ Check	Date of Calibration(s)/ Check(s)
FDS-17	$PM_{2.5}$	19015	NA	NA
NOx Analyser	NOx	EKT0135	Monthly	11/03/2024
SO_2 Analyser	SO_2	EKT0135	Monthly	11/03/2024

NOTES:

1. The span drift of the NOx readings during post span check on the 11/03/2024 at 8:36 was -3.3% FS. A linear adjustment between pre (29/02/2024 16:33) and post span drift checks was performed accordingly.

2. The span drift of the NOx readings during post span check on the 01/05/2024 at 11:46 was +38.8% FS . A linear adjustment between pre (11/03/2024 9:39) and post span drift checks was performed accordingly.

3. The NO_2 values were also adjusted using the same linear factors as NO_2 is calculated by the difference between NOx and NO.

4. The span drift of the SO_2 readings during the post span check on the 26/03/2024 10:51 was +4.75% FS. A conservative approach was taken by not adjusting the SO_2 values down.

8.2 Monthly Data Capture

The station is equipped with a local data logger to collect data from the AAQMS and weather station and store it in the logger memory. Data is automatically transferred to a secure cloud-based service every 1 minute. This cloud-based platform is known as '*Ektimo Live'* and it enables real time access and visualisation of the data collected.

Calculated Data Capture is the proportion of data periods successfully logged out of the theoretical maximum during the period. In a monthly period, you might expect the following maximum (in a 30-day month);

- 720 Hourly Averages
- 30 Daily Averages

Data capture is calculated before data validation.

Table 12. NO, NO_2, NO_x, SO_2, $PM_{2.5}$, Monthly Data Capture

	NO, NO_2, NOx (%)	SO_2 (%)	PM2.5 (%)
Data Capture	95.7	95.9	61.4

Table 13. Weather Monthly Data Capture

	Wind speed (%)	Wind Direction (%)	Relative humidity (%)	Temperature at 2m (%)
Data Capture	92.6	92.6	95.8	95.8

8.3 Data Validation & Exceptions

Data validation is performed as per *AS 3580.19:2020 Methods for Sampling and Analysis of Ambient Air – Method 19: Ambient Air Quality Data Validation and Reporting*.

Periods where data has been deemed invalid and removed from all calculations can be seen below.

Individual daily and hourly averages are also automatically invalid if there has been data loss due to equipment malfunction, calibration and/or maintenance which results in less than 75% of data for any averaging period.

Table 14. Data Exceptions

Start Date/Time	End Date/Time	Parameter	Comments	Details of Outage or Required Change	Person Making Changes
1/03/2024 0:00	10/03/2024 16:26	SO_2	Reocurring Pattern of gradual increase and decrease each 24 hours, suggesting compromised data	SO_2 removed	ADo
1/03/2024 0:00	11/03/2024 17:51	$PM_{2.5}$	no data available	no $PM_{2.5}$	ADo
1/03/2024 0:26	11/03/2024 14:21	Relative humidity and temperature	151 instances of zero readings	151 minutes of Relative humidity and temperature removed	ADo
1/03/2024 13:49	1/03/2024 14:05	NOx	Erroneous spike (fault)	NOx removed	ADo
3/03/2024 8:40	3/03/2024 9:36	NOx	6 minutes of Suddent negative spike (~ -3000ppb)	NOx removed 6 minutes removed	ADo
3/03/2024 8:40	3/03/2024 8:42	Wind speed, Relative humidity and temperature	Sudden extreme values deemed impossible	Wind speed, Relative humidity and temperature removed	ADo
3/03/2024 9:04	3/03/2024 9:06	Wind speed, Relative humidity and temperature	Sudden extreme values deemed impossible	Wind speed, Relative humidity and temperature removed	ADo
3/03/2024 9:34	3/03/2024 9:36	Wind speed, Relative humidity and temperature	Sudden extreme values deemed impossible	Wind speed, Relative humidity and temperature removed	ADo
3/03/2024 9:35	3/03/2024 9:37	NOx	Spike in NO with large negative spike in NO_2	NOx removed	ADo
3/03/2024 10:08	3/03/2024 10:15	NOx	Null value recorded	NOx removed	
3/03/2024 10:08	3/03/2024 10:16	Wind speed, Relative humidity and temperature	6 minutes of Sudden extreme values deemed impossible	6 minutes of Wind speed, Relative humidity and temperature removed	ADo
3/03/2024 16:46	3/03/2024 17:01	NOx	Erroneous spike (fault)	NOx removed	ADo
11/03/2024 2:36	11/03/2024 7:18	SO_2	After calibration elevated SO2 concentrations, reliablilty questioned	SO_2 removed	ADo
11/03/2024 8:18	11/03/2024 11:36	Relative humidity and temperature	Anomalous values logged	Relative humidity and temperature removed	ADo
11/03/2024 8:18	11/03/2024 11:36	Windspeed	repeating value, logger error	Windspeed removed	ADo
11/03/2024 8:27	11/03/2024 9:49	NOx & SO_2	Onsite maintenance	Nox/SO_2 removed	ADo
11/03/2024 8:29	11/03/2024 8:30	NOx	Spike in No with large negative spike in NO2	NOx removed	ADo
11/03/2024 9:23	11/03/2024 9:25	NOx	spike in NO with large negative spike in NO_2	NOx removed	ADo
11/03/2024 16:15	12/03/2024 3:39	SO_2	Sudden step change in SO2 levels deemed not valid	SO_2 removed	ADo
11/03/2024 17:51	14/03/2024 1:56	PM2.5	large gradual peak after installation of FDS-17 (data deemed unstable)	$PM_{2.5}$ removed	ADo

Continued overpage

Start Date/Time	End Date/Time	Parameter	Comments	Details of Outage or Required Change	Person Making Changes
12/03/2024 3:38	12/03/2024 3:43	Wind speed, Relative humidity and temperature	3 minutes of Sudden extreme values deemed impossible	3 minutes of Wind speed, Relative humidity and temperature removed	ADo
12/03/2024 3:39	12/03/2024 3:46	NOx	Erroneous spike (fault)	NOx removed	ADo
12/03/2024 8:14	12/03/2024 8:39	NOx	Spike in No with large negative spike in NO_2	NOx removed	ADo
12/03/2024 13:00	12/03/2024 17:03	NOx	Progressive spike up to 5,000ppb (13:00-14:13), followed by progressive negative spike down to -3,000ppb (14:14-17:03))	Nox removed	ADo
12/03/2024 19:12	12/03/2024 19:51	NOx	Constant negative NO_2 concentrations (less than -2ppb contributing to -2ppb hourly average -screening criteria)	NOx removed	ADo
13/03/2024 1:46	13/03/2024 1:56	NOx	spike in No with large negative spike in NO_2	NOx removed	ADo
13/03/2024 5:35	13/03/2024 5:46	All data	Repeated null value	all data removed	ADo
13/03/2024 15:15	13/03/2024 17:09	NOx	Constant negative NO_2 concentrations (less than -2ppb contributing to -2ppb hourly average -screening criteria)	NOx removed	ADo
21/03/2024 12:13	21/03/2024 12:14	All data	Repeated null value	all data removed	ADo
26/03/2024 9:06	26/03/2024 9:09	Temperature	Dropped to zero for 2 minutes	2 minutes of relative temperature data removed	ADo
26/03/2024 9:18	26/03/2024 11:00	NOx & SO_2	Analysers unstable (jumping between high positive and negative values)	NOx & SO_2 removed	ADo
26/03/2024 9:27	26/03/2024 10:15	Wind speed, Relative humidity and temperature	3 minutes of Sudden extreme values deemed impossible	4 minutes of Wind speed, Relative humidity and temperature removed	ADo
26/03/2024 13:27	26/03/2024 13:29	Relative humidity	Dropped to zero for 2 minutes	2 minutes of relative humidity data removed	ADo
26/03/2024 13:46	26/03/2024 13:47	NOx	Spike in NO with negative spike in NO_2	NOx removed	ADo
26/03/2024 13:58	26/03/2024 14:03	NOx	3 minutes removed (spike in NO with negative spike in NO_2)	NOx removed	ADo
26/03/2024 23:47	27/03/2024 14:19	All	Data taker error	All values removed	ADo
26/03/2024 23:47	27/03/2024 16:36	SO_2	Repeated values (logger error)	SO_2 removed	ADo
26/03/2024 23:47	27/03/2024 11:49	All weather data: Wind speed, wind direction, relative humidity and temperature	Consecutive identical values	Weather data removed	ADo
27/03/2024 14:14	27/03/2024 16:26	NOx	After logger restarted elevated values logged	NOx removed	ADo

9 Definitions

The following symbols and abbreviations may be used in this test report:

<	Less than
>	Greater than
≥	Greater than or equal to
% v/v	Volume to volume ratio, dry or wet basis
~	Approximately
<	Less than
>	Greater than
≥	Greater than or equal to
µg/m³	Micrograms per cubic meter
AAQMS	Ambient air quality monitoring station
AS	Australian Standard
BAM	Beta attenuation monitor for measuring PM10 & PM2.5
Data Capture	The proportion of data periods successfully logged out of the theoretical maximum possible number (100%)
Data Exception	Missing or invalid data as per AS3580.19:2020.
EPA	Environment Protection Authority
NA	Not applicable
NATA	National Association of Testing Authorities
NEPM-AAQ	National Environment Protection (Ambient Air Quality) Measure
NO	Nitric oxide
NO_2	Nitrogen dioxide
CO	Carbon monoxide
O_3	Ozone
SO_2	Sulfur dioxide
$PM_{2.5}$	Particulate matter with an equivalent aerodynamic diameter less than 2.5 microns (PM2.5)
PM_{10}	Particulate matter with an equivalent aerodynamic diameter less than 10 microns (PM10)
VOC	Volatile organic compound. A carbon-based chemical compound with a vapour pressure of at least 0.010 kPa at 25°C or having a corresponding volatility under the given conditions of use. VOCs may contain oxygen, nitrogen and other elements. VOCs do not include carbon monoxide, carbon dioxide, carbonic acid, metallic carbides and carbonate salts.
ppb	Parts per billion
ppm	Parts per million
STP	Standard temperature and pressure. Gas volumes and concentrations are expressed on a dry basis at 0 °C, at discharge oxygen concentration and an absolute pressure of 101.325 kPa.
TM	Test method

Appendix 1. NO_2, CO, SO_2, $PM_{2.5}$ Charts

Daily (24 hourly) Average $PM_{2.5}$

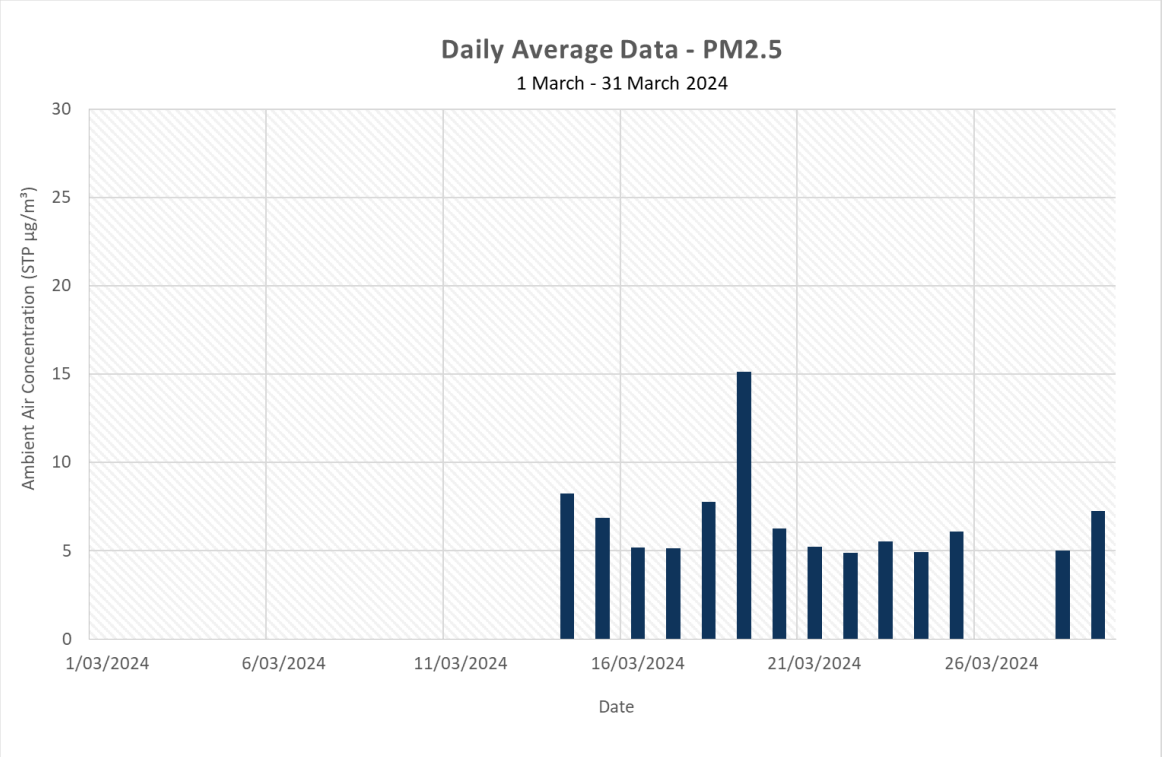


Figure 2. Daily (24 Hour) Average $PM_{2.5}$

Hourly Average NO_2

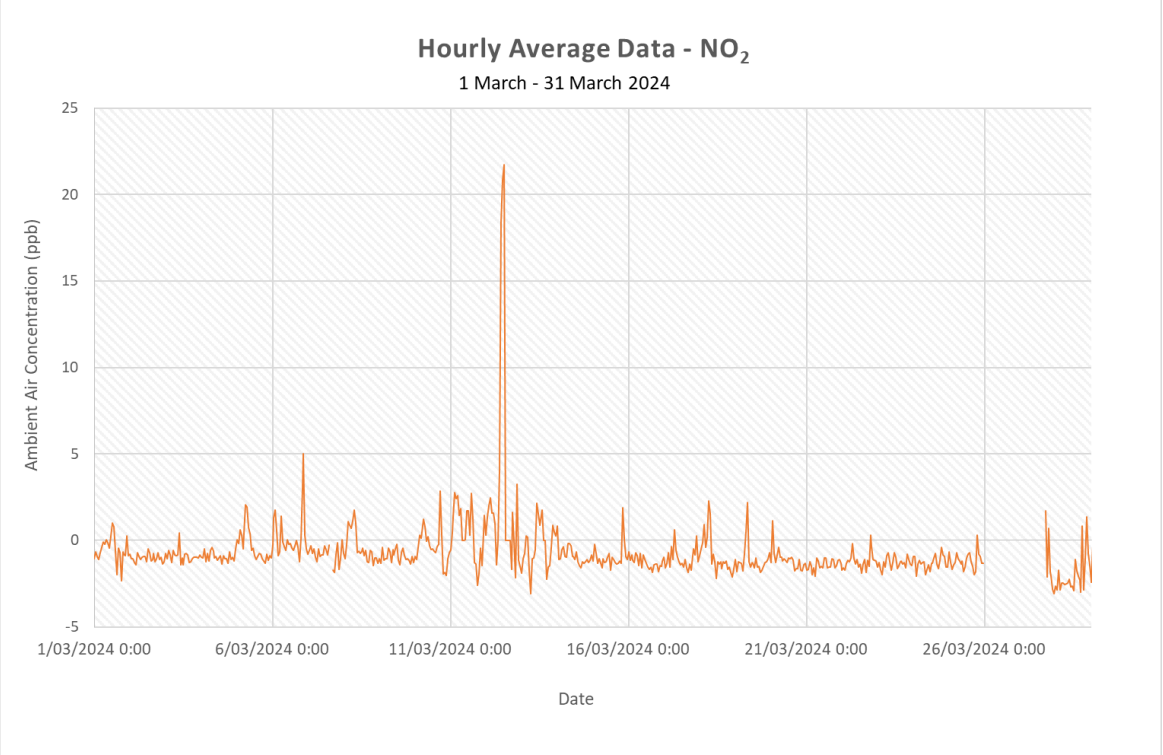


Figure 3. Hourly Average NO_2

10 Minute Average SO_2

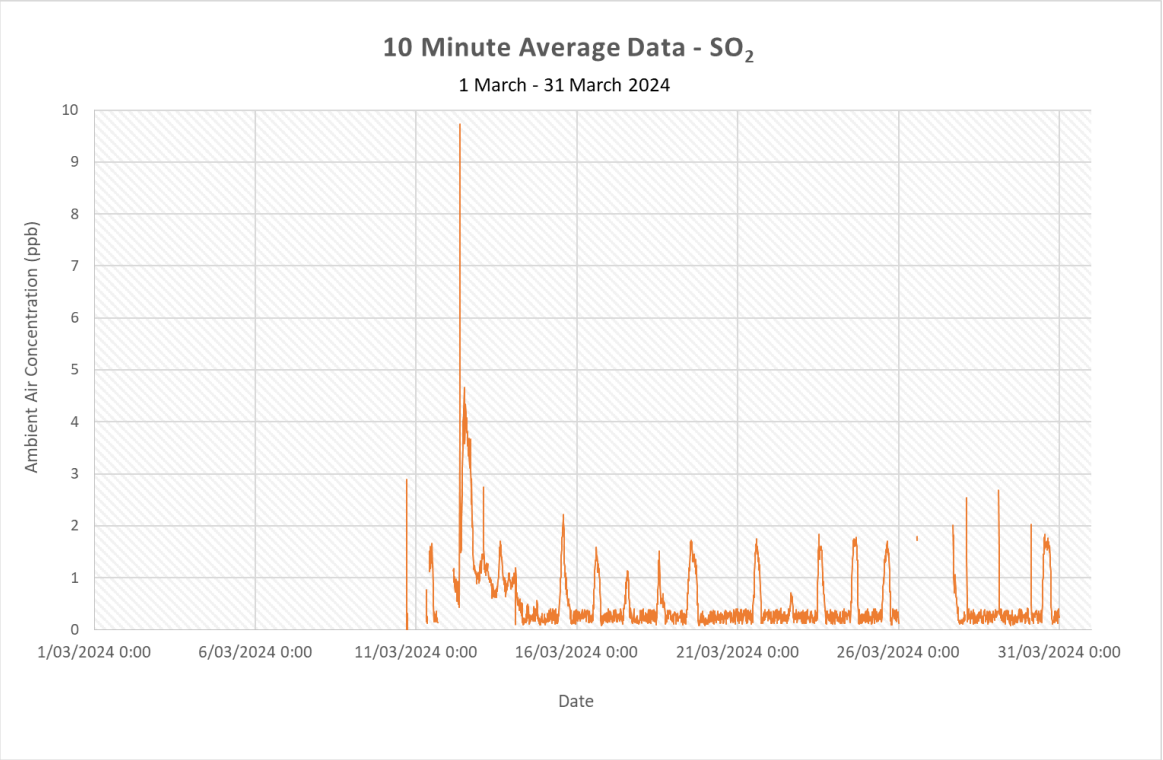


Figure 4. 10 Minute Average SO_2

Hourly Average SO_2

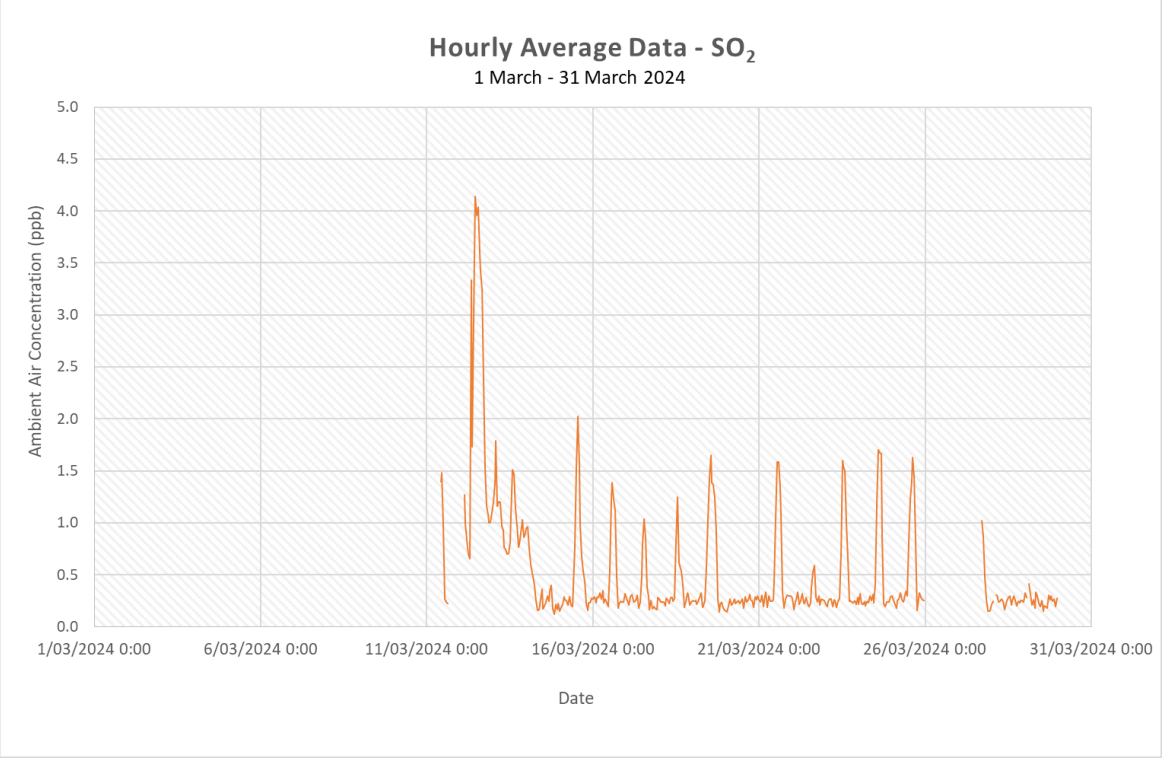


Figure 5. Hourly Average SO_2

Daily (24 Hourly) SO_2

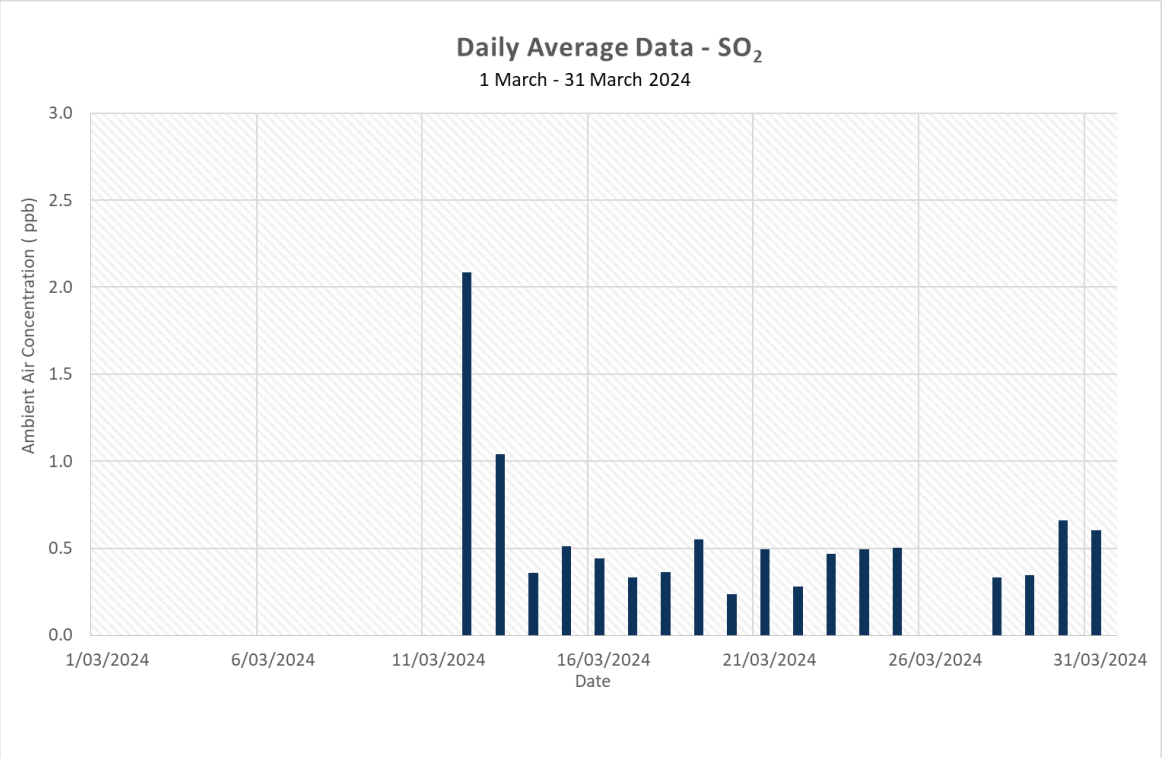


Figure 6. Daily (24 Hour) Average SO_2

Appendix 2. Weather Charts

9.1 Monthly Windrose

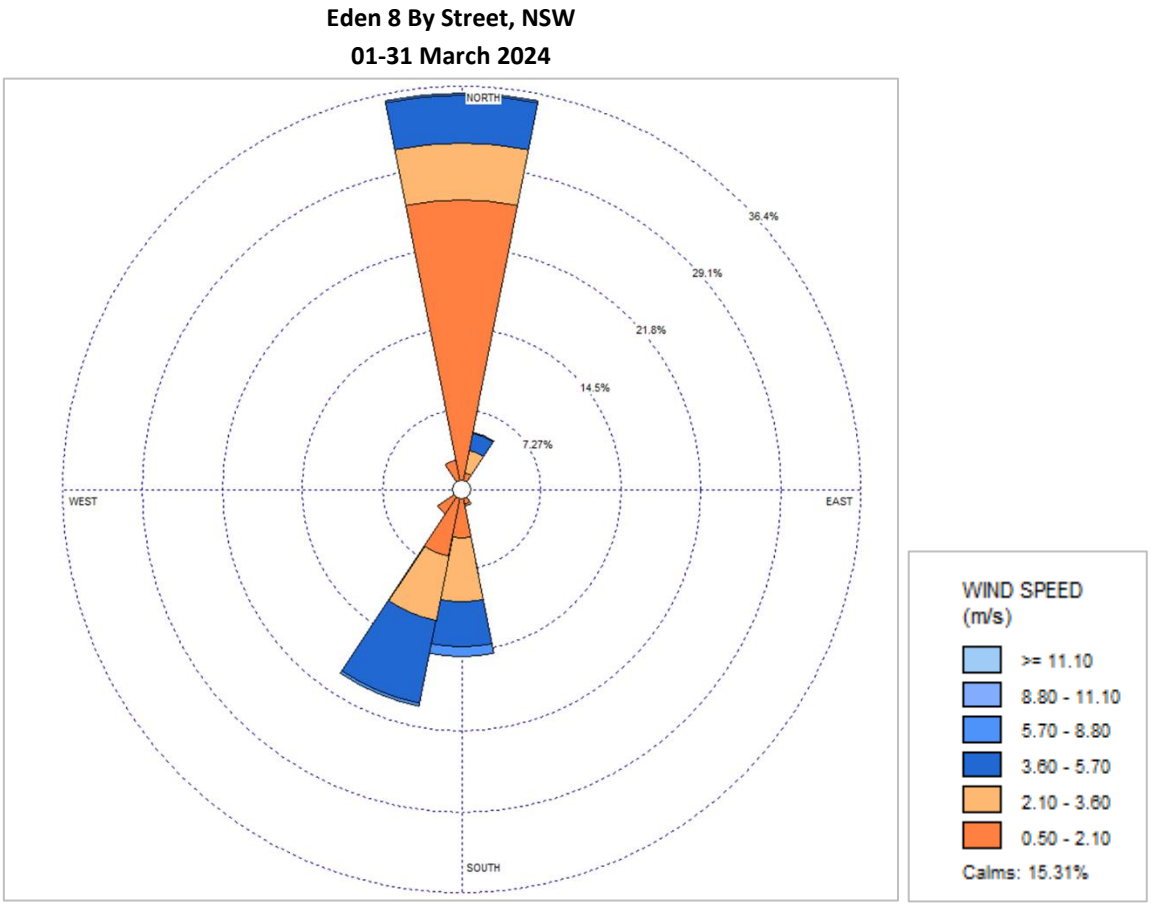
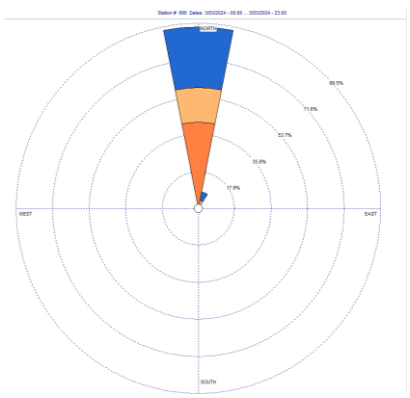


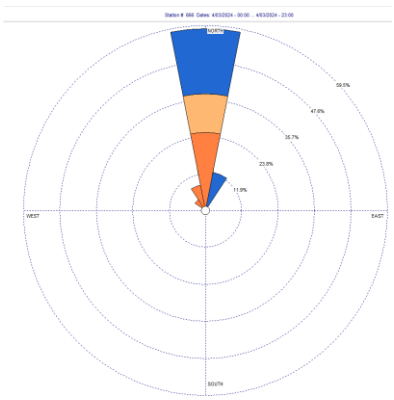
Figure 7. Monthly Wind Rose

9.2 Daily Windroses

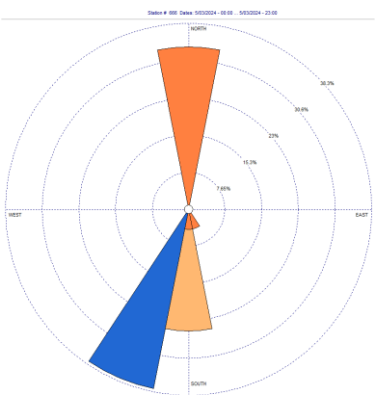
The following Daily windroses correspond to days Ships were berthed at port of Eden.
The daily average concentration of SO_2 (ppb) is also noted in brackets for each day.



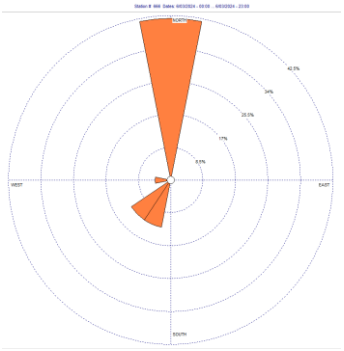
03/03/24 (NA)



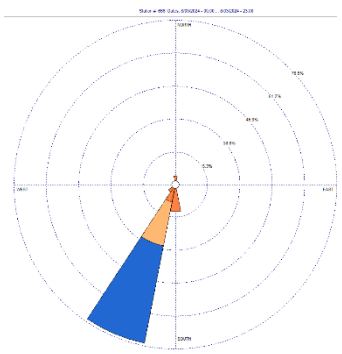
04/03/24 (NA)



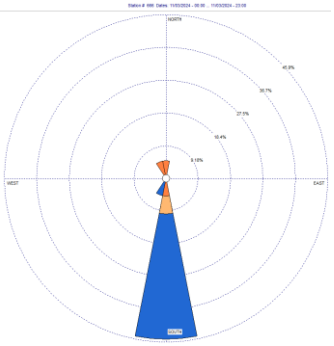
05/03/24 (NA)



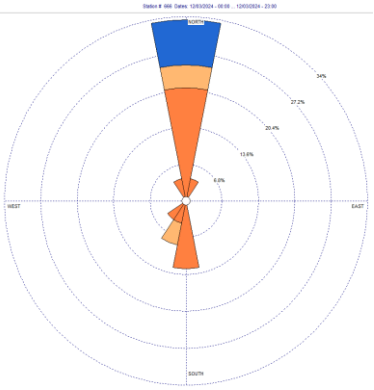
06/03/24 (NA)



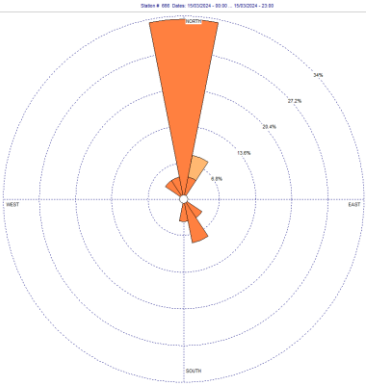
08/03/24 (NA)



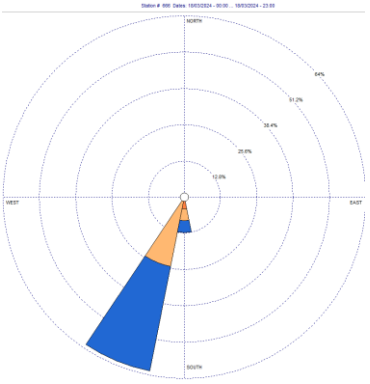
11/03/24 (NA)



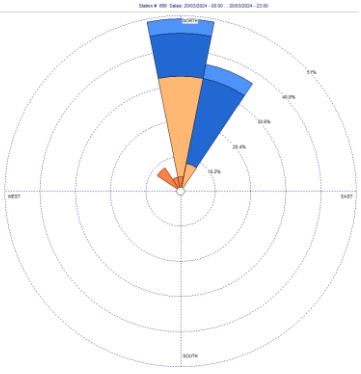
12/03/24 (SO2 2.08 ppb)



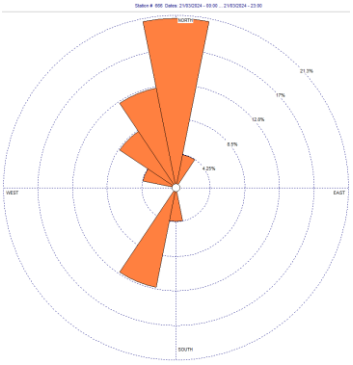
15/03/24 (SO2 0.5 ppb)



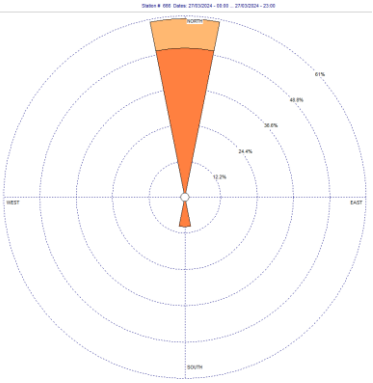
18/03/2/24 (SO2 0.36 ppb)



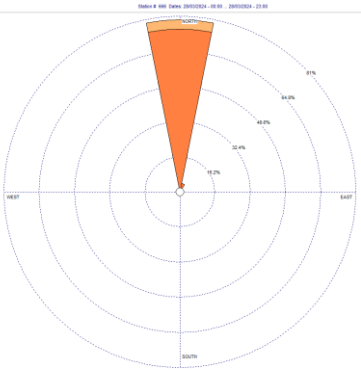
20/03/2/24 (SO2 0.24 ppb)



21/03/2/24 (SO2 0.49 ppb)



27/03/2/24 (NA)



28/03/2/24 (SO2 0.3ppb)

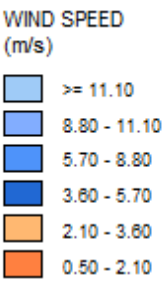


Figure 8. Daily Wind Roses

9.3 Weather Charts

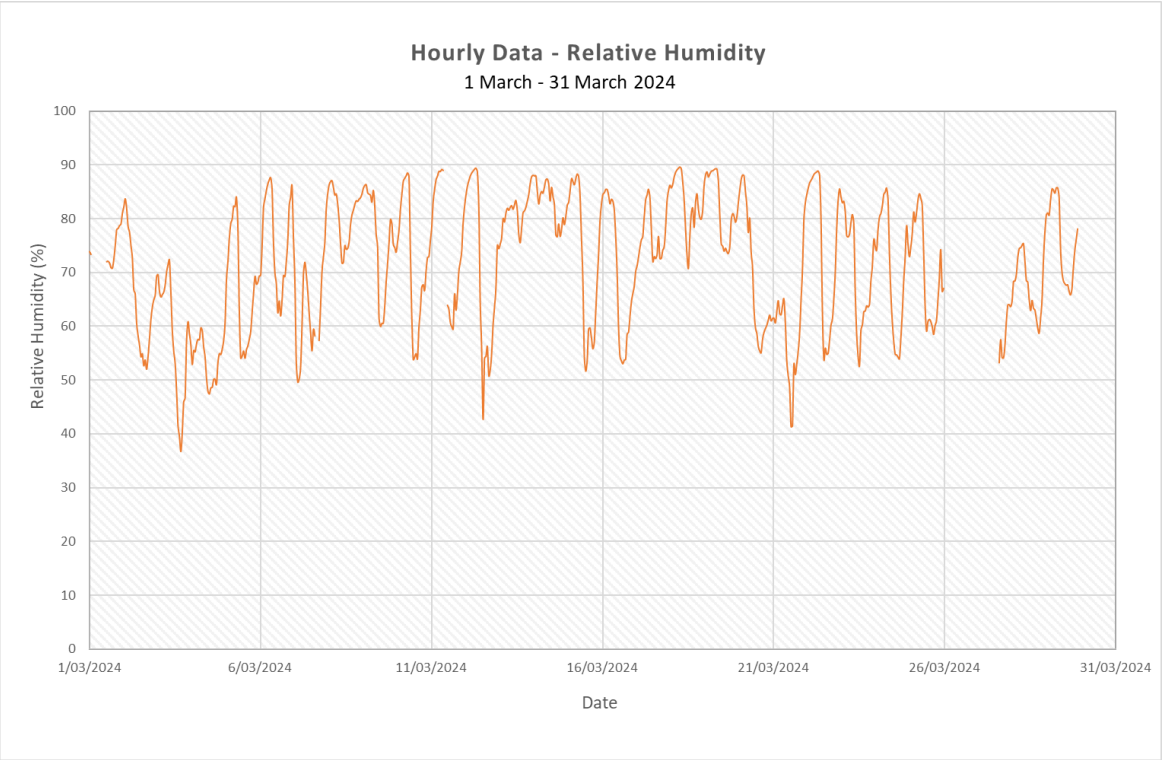


Figure 9. Hourly Relative Humidity

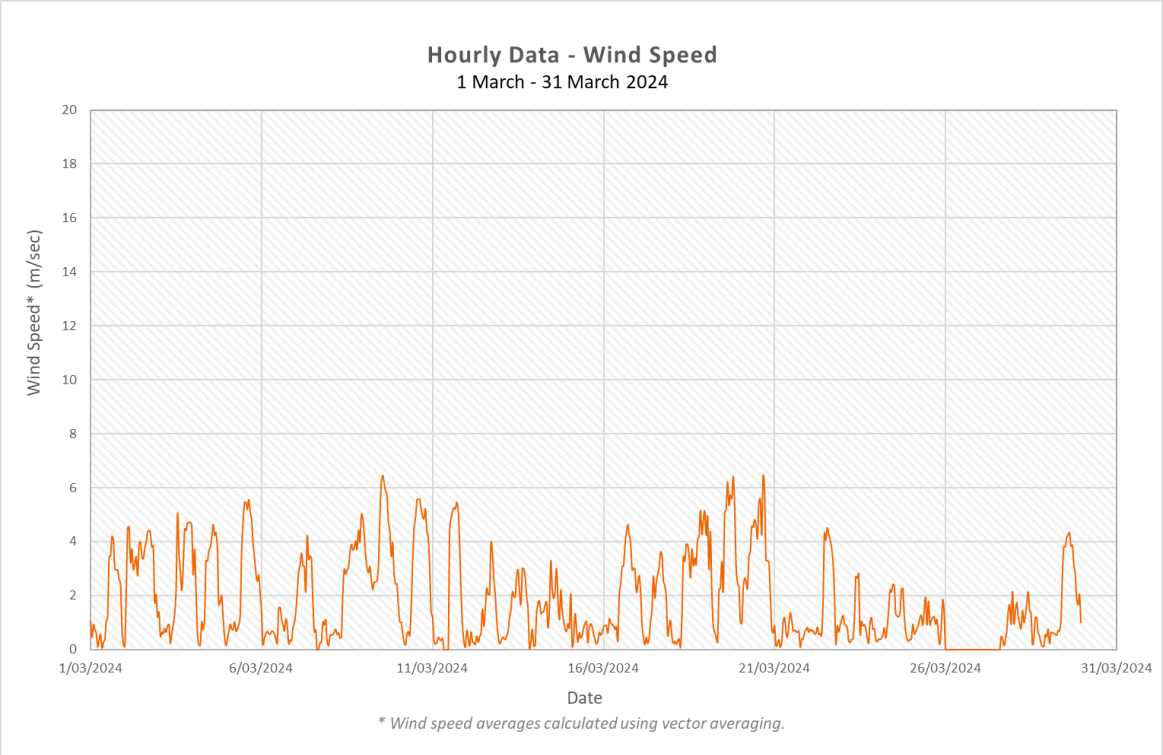


Figure 10. Hourly Wind Speed.

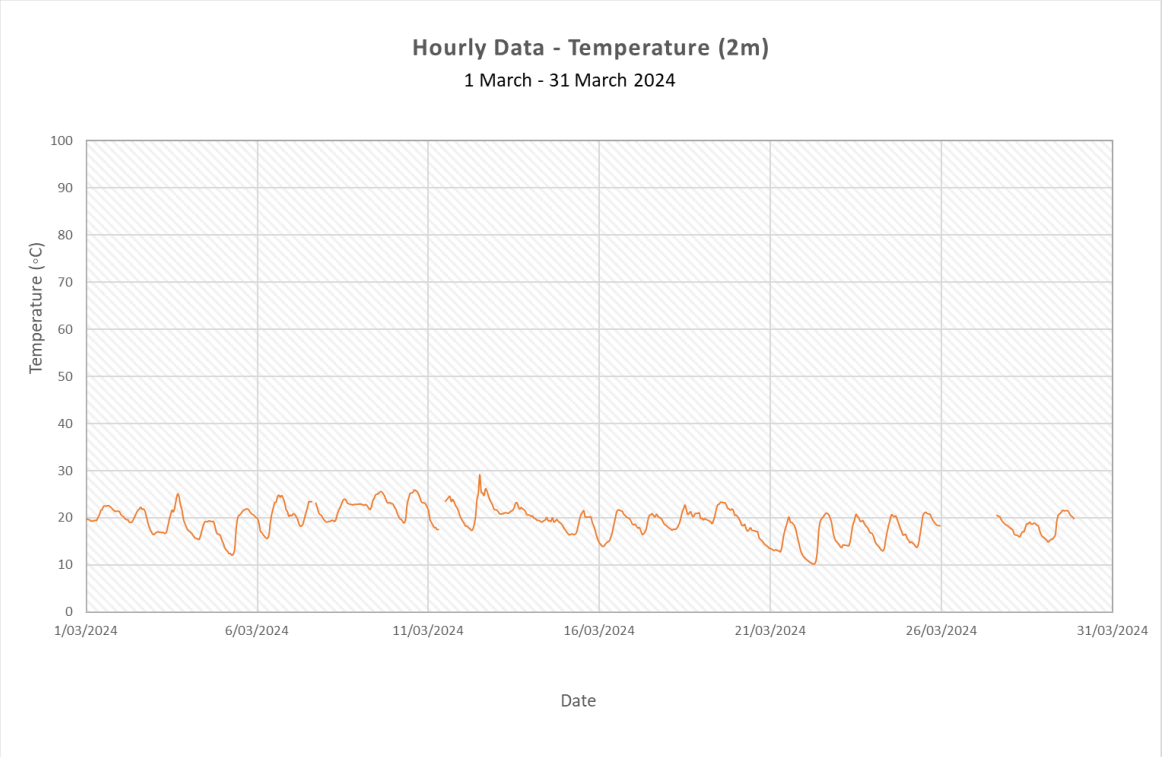


Figure 11. Hourly Temperature (2m)

Ektimo

Appendix 4. Monitoring Equipment Specifications

Table 15. Monitoring Equipment Specifications

Parameter	Manufacturer	Model	Specification Units	Operating Range	Accuracy	Detection Threshold	Resolution	Error / Drift	Sample rate
$PM_{2.5}$	Dr Fodisch	FDS-17	µg/m3	2...2000 µg/m³.	For concentrations greater than 100 µg/m³, the accuracy is ±15%. less than 100 µg/m³, the accuracy is ±15 µg/m³	2 µg/m³	NA	NA	(2 l/min).
NOx	Airpointer	A-HTV1S070000 M100C1F1	ppb	up to 20ppm	1%of read ingor1ppb (whichever is greater) @<500ppb	0.4ppb	NA	<0.4ppb (zero) 1% of reading >100ppb (span) 24hrs	1000ml/min
SO_2	FPI	AQMS-500	ppb	0 - 500 ppb	< 1% Linearity: <1% F.S.	0.5 ppb	NA	≤1 ppb for Zero (24hours) ≤5 ppb for Span (24hours)	350-1000 sccm
Wind direction	Vaisala	WXT530	degree (°)	0 - 360°	±3.0° at 10 m/s	NA	1°	NA	NA
Wind speed	Vaisala	WXT530	m/s	0 - 60 m/s	±3 % at 10 m/s	NA	0.1 m/s	NA	NA
Relative Humidity	Vaisala	WXT530	%	0 - 100 %RH	±3 %RH at 0 - 90 %RH ±5 %RH at 90 - 100 %RH	0.1 %RH	0.1 %RH	NA	NA
Temperature	Vaisala	WXT530	°C	-52 - 60 °C	±0.3 °C	NA	0.1 °C	NA	NA

Appendix 5. Ambient Air Quality Monitoring Station (AAQMS) Locations and Siting.

AAQMS & Weather Station Location

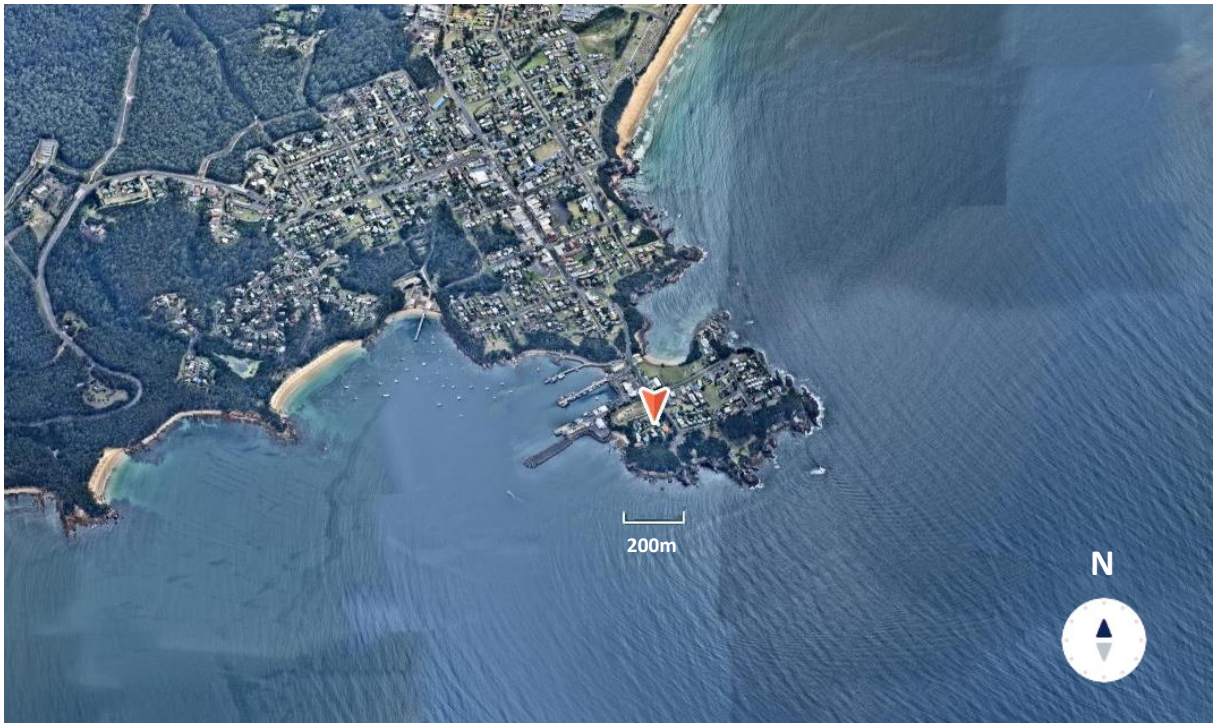


Image 1. Port Eden AAQMS Location, 8 By Street

Image 2. Port Eden AAQMS Location, 8 By street (zoomed in)

Appendix 6. AAQMS Image.

Image 3. AAQMS, 8 by Street Port Eden

Appendix 7. Location Siting and Compliance

AAQMS were assessed in accordance with the siting requirements of AS3580.1.1.

Compliance with the siting requirements of AS3580.1.1 are summarised in the following tables.

Table 16. Location Siting Assessment

Ektimo	Initial Station Siting
Client name	Port Authority of New South Wales
Job number	R016315
Date of Installation	18/01/2024
Ektimo Staff	Hamid Sokhan
Site Location	8 By St, Eden NSW 2551
Latitude	-37.073486
Longitude	149.910502
Equipment type	Ambient Air Quality Monitoring System
Station type	Neighbourhood
Australian Standard AAQMS Siting Criteria Compliance	**(✓,✗ or na)**
Inlet height above ground level 2 m - 5 m	✓
Twice the height of nearby obstacle above the inlet ≤ Dw	✗
Inlet 10 m from drip line of trees	✓
Greater than 50 m from road (≤ 10,000 vehicles/day)	✗
10 m from object with height exceeding 2 m below the inlet height	✗
Clear sky angle 120° above inlet	✓
Unrestricted 270° airflow around inlter	✓
No extraneaous sources nearby	✓
Wind speed and wind direction	
Anemometer height above ground level 10 m	✗
Distance obstruction (≥ 10 times obstruction height)	✗
Temperature & relative humidity	
Sensor height above ground level 2 m	✓
Distance to obstruction (≥ 4 times obstruction height)	✗

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Ektimo

Port Authority of New South Wales

Monthly Ambient Air Quality Monitoring Report

April 2024

Report Number: R016315-3

Document Information

Client Name:	Port Authority of New South Wales
Report Number:	R016315-3
Date of Issue:	12 September 2024
Attention:	Miguel Frohlich
Address:	Level 4, 20 Windmill St Walsh Bay, NSW 2000
Testing Laboratory:	Ektimo Pty Ltd, ABN 86 600 381 413

Report Authorisation

Hamid Sokhan
Instrumentation Manager

NATA Accredited Laboratory
No. 14601

Please note that only numerical results pertaining to measurements conducted directly by Ektimo are covered by Ektimo's terms of NATA accreditation as described in the Test Methods table. This does not include calculations that use data supplied by third-parties, comments, conclusions, or recommendations based upon the results. Refer to 'Test Methods' for full details of testing covered by NATA accreditation.

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Executive Summary

Ektimo was engaged by Port Authority of New South Wales to commission and operate an ambient air quality monitoring station (AAQMS) at 8 By Street Eden, NSW. The air quality monitoring is required in accordance with Port Authority's State Significant Infrastructure (SSI) Approval No. 7734 for the operation of the Eden Cruise Facility.

Conditions D7 to D14 of the SSI Approval No. 7734 required the preparation of an Air Quality Operation Monitoring Program. Condition E21 of the SSI Approval No. 7734 stated the following:

"*Unless otherwise agreed with the Planning Secretary, the Operation Monitoring Program required under Condition D7 must, as a minimum, include monitoring of NO_2, SO_2 and $PM_{2.5}$ at the closest potentially impacted sensitive receiver (taking into account prevailing winds) at least two days prior to the arrival of the first three cruise ship of the season, while they are at berth and for at least two days following departure. Where there is less than two days between departure of a cruise ship and arrival of the next cruise ship, monitoring must continue until there is at least two days between ship departures and arrivals*."
In light of the conditions mentioned above, the results of the Air Quality Operation Monitoring Program are summarised below for 19 days of April 2024. More detailed results can be found in Section 4 of this report.

Table 1. Data Summary

Indicator/ Pollutant	Days successfully logged	Averaging Period	April 2024 Average	Regulatory Reference Criteria	% of criteria	Data Points Logged	Averaging Period Exceedances	% of Data Points Exceeding Criteria
NO_2	17 of 19 days	Hourly (1 hour)	-1.6 ppb	80 ppb	0.0%	418	**0**	0%
SO_2	17 of 19 days	10 minute	0.35 ppb	250 ppb	0.14%	2,481	**0**	0%
		Hourly (1 hour)	0.34 ppb	100 ppb	0.3%	411	**0**	0%
		Daily (24 hour)	0.37 ppb	20 ppb	1.8%	17	**0**	0%
$PM_{2.5}$	17 of 19 days	Daily (24 hour)	6.1 µg/m^3	25 µg/m³	24%	17	**0**	0%

Notes:

1. Monitoring ended on 19/04/24 at 06:00.
2. Less than 75 % (<18 hours per 24 hours) of all parameters hourly averages available for 11/04/24 (logger error). Data excluded from Daily averages.

   Less than 75 % (<18 hours per 24 hours) of all parameters hourly averages available for 19/04/24 due to completion of data collection at 06:00.
   Data excluded from Daily averages.

1 Introduction

1.1 Project Background

Port Authority of New South Wales has requested Ektimo to install and operate one fixed air quality monitoring station at 8 By Street, Eden NSW to allow monitoring and management of ambient air emissions.

Table 2. AAQMS location

Site	GPS Coordinates
8 By Street, NSW	-37.073486, 149.910502

Air quality parameters to be monitored by Ektimo are concentrations of:

- Nitric oxide (NO)
- Nitrogen dioxide (NO_2)
- Nitrogen oxides (NOx)
- Sulfur dioxide (SO_2)
- Particulate matter less than 2.5µm ($PM_{2.5}$)

In addition to weather conditions recorded by Ektimo:

- Wind speed
- Wind direction
- Temperature
- Relative humidity

1.2 Project Objective

Ektimo's objective (to support Port Authority of New South Wales' objective) was to perform continuous monitoring of ambient air quality and to report these on a monthly basis for the project duration as outlined below:

Quantify, on a monthly basis (per calendar month), averages of:

- SO_2 & $PM_{2.5}$ (daily (*24hr*))
- NO, NO_2, NOx, SO_2 (hourly)
- SO_2 (10 minute)

1.3 Regulatory Reference Criteria

The air quality criteria for the project were outlined in the Eden Cruise Facility Project's Air Quality Operational Environmental Management Plan (OEMP) Sub-Plan, which predicted the most affected sensitive receiver and maximum cumulative SO_2 concentrations for 'typical operations'.

Reporting on monthly air quality includes comparison of the data against the *National Environment Protection (Ambient Air Quality) Measure 2021* **(NEPM-AAQ)** standards and the maximum cumulative SO_2 concentration at the most affected sensitive receiver as predicted in the Refined SO_2 Emission Modelling for "typical operations" **(Eden Typical Operations Criteria**), as outlined in the Air Quality OEMP Sub-Plan.

Table 3. NEPM-AAQ & Eden Typical Operations Criteria

Indicator/Pollutant	Averaging Period	Maximum Concentration Standard/Objective	Reference
NO_2	Hourly (1 hour)	0.08 ppm (80 ppb)	NEPM-AAQ
SO_2	10-minute	0.25 ppm (250 ppb)	Eden Typical Operations Criteria
	Hourly (1 hour)	0.10 ppm (100 ppb)	NEPM AAQ
	Hourly (1 hour)	0.20 ppm (200 ppb)	Eden Typical Operations Criteria
	Daily (24 hour)	0.20 ppm (20 ppb)	NEPM AAQ
	Daily (24 hour)	0.08 ppm (80 ppb)	Eden Typical Operations Criteria
$PM_{2.5}$	Daily (24 hour)	25 µg/m³	NEPM AAQ

NEPM- AAQ – https://www.legislation.gov.au/F2007B01142/latest/versions

2 Monitoring Methodology

Ambient air monitoring was carried out in accordance with the following methods;

Table 4. Monitoring Methodology

Test Method	Parameter	Description
AS3580.5.1:2023	NO, NO_2, NOx	Methods for Sampling and Analysis of Ambient Air – Determination of Oxides of Nitrogen – Direct Reading Instrumental Method.
AS 3580.4.1:2023	SO_2	Methods for Sampling and Analysis of Ambient Air – Determination of Sulfur Dioxide – Direct Reading Instrumental Method.
NA	$PM_{2.5}$	NA
AS3580.14:2014	Weather	Methods for Sampling and Analysis of Ambient Air – Part 14: Meteorological Monitoring for Ambient Air Quality Monitoring Applications
AS3580.1.1:2016	AAQMS Siting	Methods for Sampling and Analysis of Ambient Air – Guide to Siting Air Monitoring Equipment.
AS 3580.19:2020	Data Validation & Reporting	Methods for Sampling and Analysis of Ambient Air – Method 19: Ambient Air Quality Data Validation and Reporting.

**Note: Ektimo's NATA accreditation does not cover the FDS-17 $PM_{2.5}$ analyser method*

3 Monitoring Equipment

A summary of the deployed monitoring equipment is outlined below.

Table 5. Monitoring Equipment

Parameter	Monitoring Equipment
$PM_{2.5}$	Dr Fodisch, FDS-17
NO, NO_2, NOx	Airpointer A-HTV1S070000 M100C1F1
SO_2	Airpointer 2-11A
Weather	Vaisala WXT530

Note: *Detailed Monitoring Equipment Specifications can be seen in Appendix 4.*

4 Monitoring Results, Daily

4.1 NO, NO_2, NO_x, SO_2, & $PM_{2.5}$ Results (Daily - 24-hour concentrations))

The following table details the average daily concentrations for NO, NO_2, NOx, SO_2, $PM_{2.5}$ with the relevant NEPM-AAQ/ Eden Typical Operations Criteria. Refer to Appendix 1 for NO_2, SO_2, and $PM_{2.5}$ charts.

Table 6. NO, NO_2, NO_x, SO_2, $PM_{2.5}$ Results

Date/Time	NO (ppb)	NO_2 (ppb)	NOx (ppb)	SO_2 (ppb)	$PM_{2.5}$ (µg/m³)
1/04/2024	-2.0	-1.6	-3.6	0.6	11.1
2/04/2024	-1.8	-1.2	-2.9	0.5	7.2
3/04/2024	-2.0	-1.7	-3.6	0.4	3.1
4/04/2024	-2.2	-1.9	-4.2	0.3	5.4
5/04/2024	-2.2	-1.8	-4.0	0.5	4.2
6/04/2024	-2.1	-1.7	-3.7	0.3	12.9
7/04/2024	-1.7	-1.4	-3.0	0.4	13.4
8/04/2024	-2.0	-1.6	-3.5	0.5	6.5
9/04/2024	-2.3	-1.9	-4.2	0.2	3.1
10/04/2024	-2.5	-1.9	-4.3	0.3	3.5
11/04/2024	---	---	---	---	---
12/04/2024	-2.3	-1.7	-3.9	0.4	5.6
13/04/2024	-2.3	-1.5	-3.9	0.3	4.8
14/04/2024	-2.3	-1.5	-3.8	0.4	5.8
15/04/2024	-2.0	-1.7	-3.7	0.4	5.3
16/04/2024	-2.5	-1.5	-4.0	0.4	4.4
17/04/2024	-2.5	-1.6	-4.1	0.3	3.7
18/04/2024	-2.4	-1.7	-4.1	0.2	3.9
19/04/2024	---	---	---	---	---
Maximum	**-1.67**	**-1.2**	**-2.9**	**0.57**	**13**
Minimum	**-2.47**	**-1.92**	**-4.35**	**0.24**	**3**
Average	**-2.17**	**-1.64**	**-3.79**	**0.37**	**6.1**
Standard Deviation	**0.23**	**0.18**	**0.38**	**0.091**	**3.2**
NEPM-AAQ Criteria (Daily average)				20	25
Exceedances				0	0
Eden Typical Operations Criteria (Daily average)				80	
Exceedances				0	

Notes:

1. Dates highlighted in yellow correspond to days “Cruise Vessels” in port.
   Red highlighting indicates days “Non-Cruise” Vessels in port
   Blue highlighting indicates both vessel types in port.
2. $PM_{2.5}$ results corrected to 0°C and 101.3 kPa as per AS3580.9.12:2022.
3. Please note, hourly and 10-minute concentrations are reported separately in Excel® format.
4. Data corrections, if required, were performed during the data validation process as per AS methods (see section 2 for methodology).
5. Less than 75 % (<18 hours per 24 hours) of all parameters hourly averages available for 11/04/24 (logger error).
   Less than 75 % (<18 hours per 24 hours) of all parameters hourly averages available for 19/04/24 due to completion of data collection at 06:00.

5 Monitoring Results, Hourly, 10-minute

Results in the following tables may include values below the formal detection limit of the analyser. These values are raw statistical calculations.

5.1 NO, NO_2, NOx, SO_2 (Hourly average concentrations)

Table 7. NO, NO_2, NOx, SO_2 (Hourly concentrations)

	NO (ppb)	NO_2 (ppb)	NOx (ppb)	SO_2 (ppb)
Maximum	**3.0**	**2.9**	**5.9**	**2.2**
Minimum	**-3.4**	**-2.8**	**-5.5**	**0.1**
Average	**-2.2**	**-1.6**	**-3.8**	**0.3**
Standard Deviation	**0.62**	**0.65**	**1.2**	**0.3**
NEPM-AAQ Criteria (Hourly average)		80		100
Exceedances		0		0
Eden Typical Operations Criteria (Hourly average)				200
Exceedances				0

5.2 SO_2 (10-minute concentrations)

Table 8. SO_2 (10-minute concentrations)

	SO_2 (ppb)
Maximum	**2.3**
Minimum	**0.08**
Average	**0.3**
Standard Deviation	**0.3**
Eden Typical Operations Criteria (10 minute average)	250
Exceedances	0

6 Weather Results

The following table detail the minimum, maximum and average daily (24 hour) weather data recorded.

Table 9. Daily (24 hour) Weather Results

Date/Time	Wind speed (m/sec)	Wind Direction (°)	Temperature at 2m (°C)	Relative humidity (%)
1/04/2024	1.2	198.7	20.6	77.3
2/04/2024	0.3	31.6	21.4	64.1
3/04/2024	1.8	8.1	18.1	59.5
4/04/2024	0.7	2.7	17.4	65.4
5/04/2024	0.3	29.5	18.3	71.6
6/04/2024	1.2	192.5	18.5	79.4
7/04/2024	0.2	325.1	17.8	83.0
8/04/2024	0.3	350.4	17.5	75.3
9/04/2024	2.3	2.7	14.2	70.9
10/04/2024	2.5	5.6	15.9	66.1
11/04/2024	---	---	---	---
12/04/2024	0.3	338.6	16.0	71.1
13/04/2024	0.3	353.6	16.6	72.1
14/04/2024	0.2	281.1	17.2	75.2
15/04/2024	0.4	339.4	17.4	75.1
16/04/2024	0.9	359.1	17.5	70.3
17/04/2024	0.4	356.8	16.6	71.6
18/04/2024	1.5	3.5	16.0	69.8
19/04/2024	---	---	---	---
Maximum	**2.5**	**-**	**21**	**83**
Minimum	**0.17**	**-**	**14**	**59**
Average	**0.9**	**-**	**17**	**72**
Standard Deviation	**0.7**	**-**	**1.6**	**5.6**

Wind speed averages calculated using vector averaging.

Notes:

1. Dates highlighted in yellow correspond to days “Cruise Vessels” in port.
   Red highlighting indicates days “Non-Cruise” Vessels in port.
   Blue highlighting indicates both vessel types in port.
2. Logging for project ended 06:00 19/04/24.
   All parameters less than 75 % (<18 hours per 24 hours) of hourly data available for 11/04/24 (logger error) and 19/04/24. Data excluded from daily averages
3. Refer to Appendix 2 for weather charts.

7 SO_2, NO_2 & $PM_{2.5}$ levels compared with Vessel Movements

Port Authority provided vessel movement records for the monthly monitoring period covered by this report. Vessel movements were compared with measured analyte concentrations and prevailing wind direction to identify possible links between elevated analyte concentrations and vessel movement.

Table 10 below shows the arrival/departure times for each vessel along with the corresponding 10-minute average SO_2 concentration. Additionally, it includes the 10-minute average SO_2 concentrations for the 10 minutes preceding and following each arrival/departure.

Figure 1 details the continuous 1-minute and 10-minute average SO_2 concentrations measured compared with the recorded times of vessel arrivals/departures, as indicated in Table 10.

As can be seen in sections 4 and 5, SO_2 levels were lower than all the relevant criteria for the entire testing period.

Average NO_2 and $PM_{2.5}$ concentrations were also below the relevant criteria during the entire duration of the testing period.

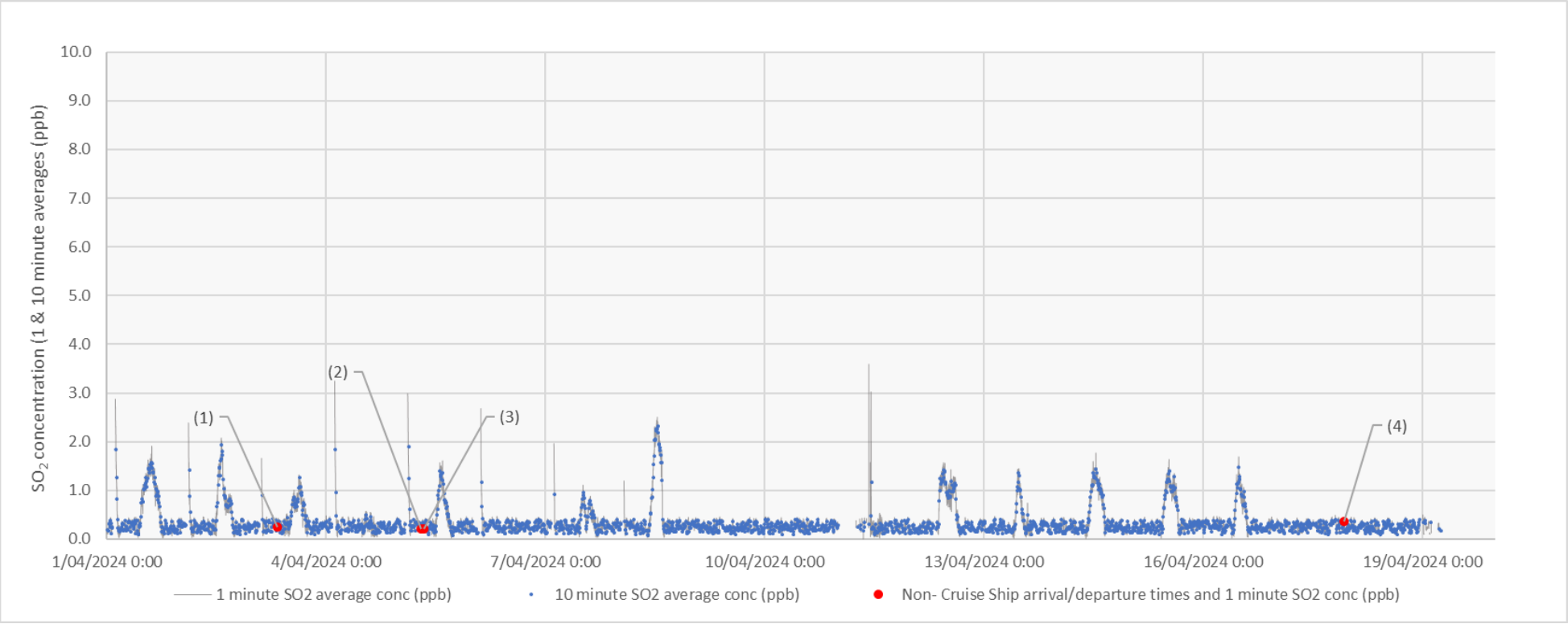
As shown in Image 2, Appendix 5, the Eden Cruise Wharf is situated West of the AQMS Station. Considering this, Section 9.2, Daily Windroses details the 24-hour Windrose for each day that vessels were active in the Port along with corresponding daily average SO_2 concentration.

Table 10. Recorded Vessel movement times March 2024 (provided by Port Authority NSW) compared to monitoring data.

	Date/Time	Arrival /Departure	Vessel	10-minute average period SO_2 value (ppb)	Previous 10 minute average period SO_2 value (ppb)	Post 10 minute average period SO_2 value (ppb)
(1)	03/04/2024, 07:48	Arrival	DL Tulip	0.33	0.39	0.24
(2)	05/04/2024, 07:10	Arrival	Statesman	0.23	0.28	0.20
(3)	05/04/2024, 08:00	Departure	Statesman	0.27	0.30	0.24
(4)	17/04/2024, 22:12	Departure	DL Tulip	0.36	0.31	0.19

Note:

1. *Vessels highlighted in red are 'Non-Cruise' ships.*
2. *No cruise vessel movement for Eden for April logging period from 01 to 19 April 2024. Only "non-cruise" activity.*
3. *06/04/2024 at 10:00, DL Tulip moved to the Inner Anchorage (EDIA). It then went back to the Eden Multi-Purpose (Navy) Whard (EDNAV) on 09/04/2024 at 20:18.*



Numbers in chart above correspond to Table 10 (previous page), indicating Vessel name and departure/arrival time.

Figure 1. Vessel Arrival/Departure VS SO_2 Concentrations

8 Quality Assurance & Quality Control (QA/QC)

Ektimo is accredited by the National Association of Testing Authorities (NATA) for the sampling and analysis of air pollutants. Unless otherwise stated test methods used are accredited with the National Association of Testing Authorities. For full details, search for Ektimo at NATA's website www.nata.com.au.

Ektimo is accredited by NATA to ISO/IEC 17025 - Testing. ISO/IEC 17025 - Testing requires that a laboratory have adequate equipment to perform the testing, as well as laboratory personnel with the competence to perform the testing. This quality assurance system is administered and maintained by the Quality Director. NATA is a member of APAC (Asia Pacific Accreditation Co-operation) and of ILAC (International Laboratory Accreditation Co-operation). Through mutual recognition arrangements with these organisations, NATA accreditation is recognised worldwide.

8.1 Maintenance Checks and Calibrations

Maintenance checks and calibrations for the period can be seen in the table below.

Table 11. Maintenance Checks and Calibrations

Monitoring Equipment	Parameter	Equipment ID (or SN)	Type of Calibration/ Check	Date of Calibration(s)/ Check(s)
FDS-17	$PM_{2.5}$	19015	NA	NA
NOx Analyser	NOx	EKT0135	3 Monthly	01/05/2024
SO_2 Analyser	SO_2	EKT0135	3 Monthly	01/05/2024

NOTES:

1. The span drift of the NOx readings during post span check on the 01/05/2024 at 11:46 was +38.8% FS . A linear adjustment between pre (11/03/2024 9:39) and post span drift checks was performed accordingly.

2. NO_2 values were adjusted using the same linear regression, calculating NO_2 as the difference between NOx and NO.

3. The span drift of the SO_2 readings during the post span check on the 26/03/2024 10:51 was +4.75% FS. A conservative approach was taken by not adjusting the SO_2 values down.

8.2 Monthly Data Capture

The station is equipped with a local data logger to collect data from the AAQMS and weather station and store it in the logger memory. Data is automatically transferred to a secure cloud-based service every 1 minute. This cloud-based platform is known as '*Ektimo Live'* and it enables real time access and visualisation of the data collected.

Calculated Data Capture is the proportion of data periods successfully logged out of the theoretical maximum during the period. In a monthly period, you might expect the following maximum (in a 30-day month);

- 720 Hourly Averages
- 30 Daily Averages

Data capture is calculated before data validation.

Table 12. NO, NO_2, NO_x, SO_2, $PM_{2.5}$, Monthly Data Capture

	NO, NO_2, NOx (%)	SO_2 (%)	$PM_{2.5}$ (%)
Data Capture	97.2	97.2	97.2

Table 13. Weather Monthly Data Capture

	Wind speed (%)	Wind Direction (%)	Relative humidity (%)	Temperature at 2m (%)
Data Capture	97.2	97.2	97.2	97.2

8.3 Data Validation & Exceptions

Data validation is performed as per *AS 3580.19:2020 Methods for Sampling and Analysis of Ambient Air – Method 19: Ambient Air Quality Data Validation and Reporting*.

Periods where data has been deemed invalid and removed from all calculations can be seen below.

Individual daily and hourly averages are also automatically invalid if there has been data loss due to equipment malfunction, calibration and/or maintenance which results in less than 75% of data for any averaging period.

Table 14. Data Exceptions

Start Date/Time	End Date/Time	Parameter	Comments	Details of Outage or Required Change	Person Making Changes
7/04/2024 7:34	7/04/2024 7:38	Windspeed, NOx, tempertaure, relative humidity	Sudden spikes down to -9999 (Null value)	Erroneous Windspeed, NOx, tempertaure, relative humidity data removed	ADo
7/04/2024 7:56	7/04/2024 7:58	Windspeed, NOx, tempertaure, relative humidity	Sudden spikes down to -8888 (Null value)	Erroneous Windspeed, NOx, tempertaure, relative humidity data removed	ADo
7/04/2024 7:45	7/04/2024 7:56	NOx	Repeating values, assumed logger error	NOx removed	ADo
7/04/2024 6:22	7/04/2024 6:25	Windspeed, NOx, tempertaure, relative humidity	Sudden spikes down to -9999 (Null value)	Erroneous Windspeed, NOx, tempertaure, relative humidity data removed	ADo
11/04/2024 10:22	11/04/2024 10:26	Windspeed, NOx, tempertaure, relative humidity	Sudden spikes down to -9999 (Null value)	Erroneous Windspeed, NOx, tempertaure, relative humidity data removed	ADo
11/04/2024 17:49	11/04/2024 17:52	Windspeed, NOx, tempertaure, relative humidity	Sudden spikes down to -9999 (Null value)	Erroneous Windspeed, NOx, tempertaure, relative humidity data removed	ADo
11/04/2024 7:27	11/04/2024 7:29	Wind speed, temperature	"0" values	Wind speed, temperature data removed	ADo

Note: NOx Calibration Data Removed

1/04/2024 1:51:00 AM -- 1/04/2024 2:08:00 AM, 2/04/2024 1:51:00 AM -- 2/04/2024 2:08:00 AM, 3/04/2024 1:51:00 AM -- 3/04/2024 2:07:00 AM, 4/04/2024 1:51:00 AM -- 4/04/2024 2:08:00 AM, 5/04/2024 1:51:00 AM -- 5/04/2024 2:08:00 AM, 6/04/2024 1:51:00 AM -- 6/04/2024 2:08:00 AM, 8/04/2024 12:51:00 AM -- 8/04/2024 1:08:00 AM, 11/04/2024 10:12:00 AM -- 11/04/2024 10:38:00 AM

Note: SO_2 Calibration Data Removed

1/04/2024 1:51:00 AM -- 1/04/2024 2:45:00 AM, 2/04/2024 1:51:00 AM -- 2/04/2024 2:45:00 AM, 3/04/2024 1:51:00 AM -- 3/04/2024 2:45:00 AM, 4/04/2024 1:51:00 AM -- 4/04/2024 2:45:00 AM, 5/04/2024 1:51:00 AM -- 5/04/2024 2:45:00 AM, 6/04/2024 1:51:00 AM -- 6/04/2024 2:45:00 AM, 7/04/2024 1:51:00 AM -- 7/04/2024 2:45:00 AM, 8/04/2024 12:51:00 AM -- 8/04/2024 1:45:00 AM, 11/04/2024 10:12:00 AM -- 11/04/2024 10:38:00 AM

9 Definitions

The following symbols and abbreviations may be used in this test report:

<	Less than
>	Greater than
≥	Greater than or equal to
% v/v	Volume to volume ratio, dry or wet basis
~	Approximately
<	Less than
>	Greater than
≥	Greater than or equal to
µg/m^3	Micrograms per cubic meter
AAQMS	Ambient air quality monitoring station
AS	Australian Standard
BAM	Beta attenuation monitor for measuring PM10 & PM2.5
Data Capture	The proportion of data periods successfully logged out of the theoretical maximum possible number (100%)
Data Exception	Missing or invalid data as per AS3580.19:2020.
EPA	Environment Protection Authority
NA	Not applicable
NATA	National Association of Testing Authorities
NEPM-AAQ	National Environment Protection (Ambient Air Quality) Measure
NO	Nitric oxide
NO_2	Nitrogen dioxide
CO	Carbon monoxide
O_3	Ozone
SO_2	Sulfur dioxide
$PM_{2.5}$	Particulate matter with an equivalent aerodynamic diameter less than 2.5 microns (PM2.5)
PM_{10}	Particulate matter with an equivalent aerodynamic diameter less than 10 microns (PM10)
VOC	Volatile organic compound. A carbon-based chemical compound with a vapour pressure of at least 0.010 kPa at 25°C or having a corresponding volatility under the given conditions of use. VOCs may contain oxygen, nitrogen and other elements. VOCs do not include carbon monoxide, carbon dioxide, carbonic acid, metallic carbides and carbonate salts.
ppb	Parts per billion
ppm	Parts per million
STP	Standard temperature and pressure. Gas volumes and concentrations are expressed on a dry basis at 0 °C, at discharge oxygen concentration and an absolute pressure of 101.325 kPa.
TM	Test method

Appendix 1. NO_2, CO, SO_2, $PM_{2.5}$ Charts

Daily (24 hourly) Average $PM_{2.5}$

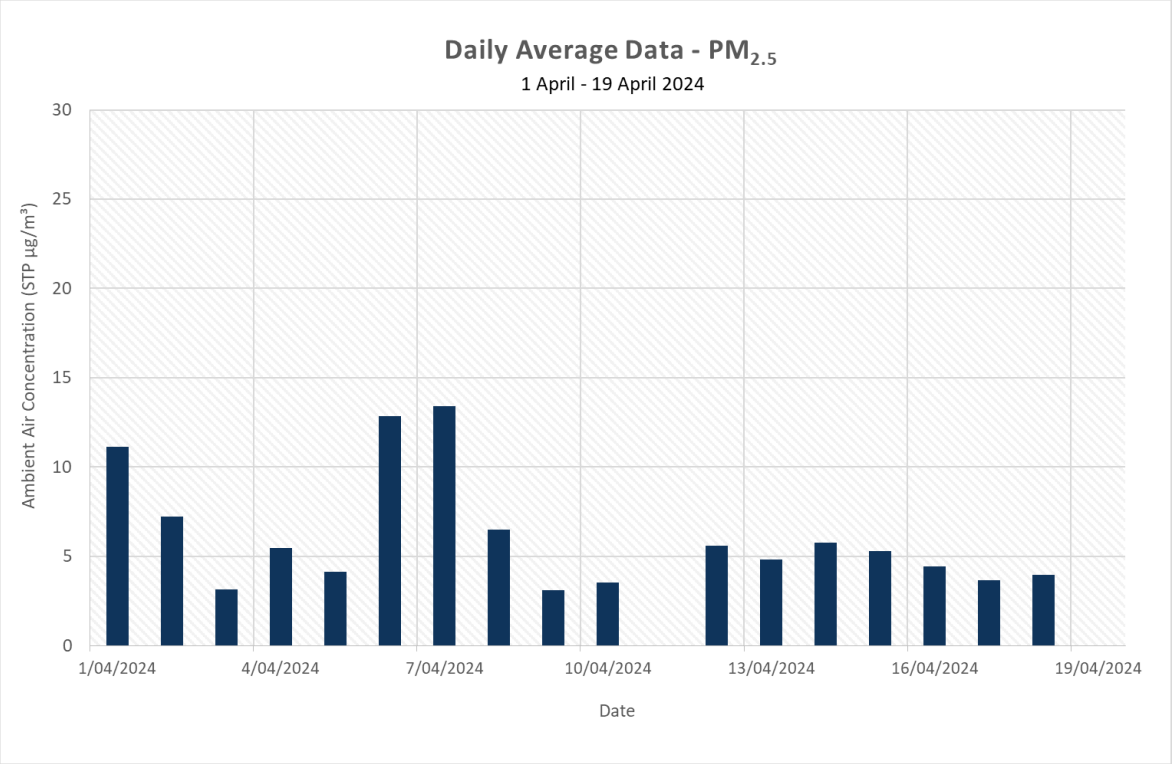


Figure 2. Daily (24 Hour) Average $PM_{2.5}$

Hourly Average NO_2

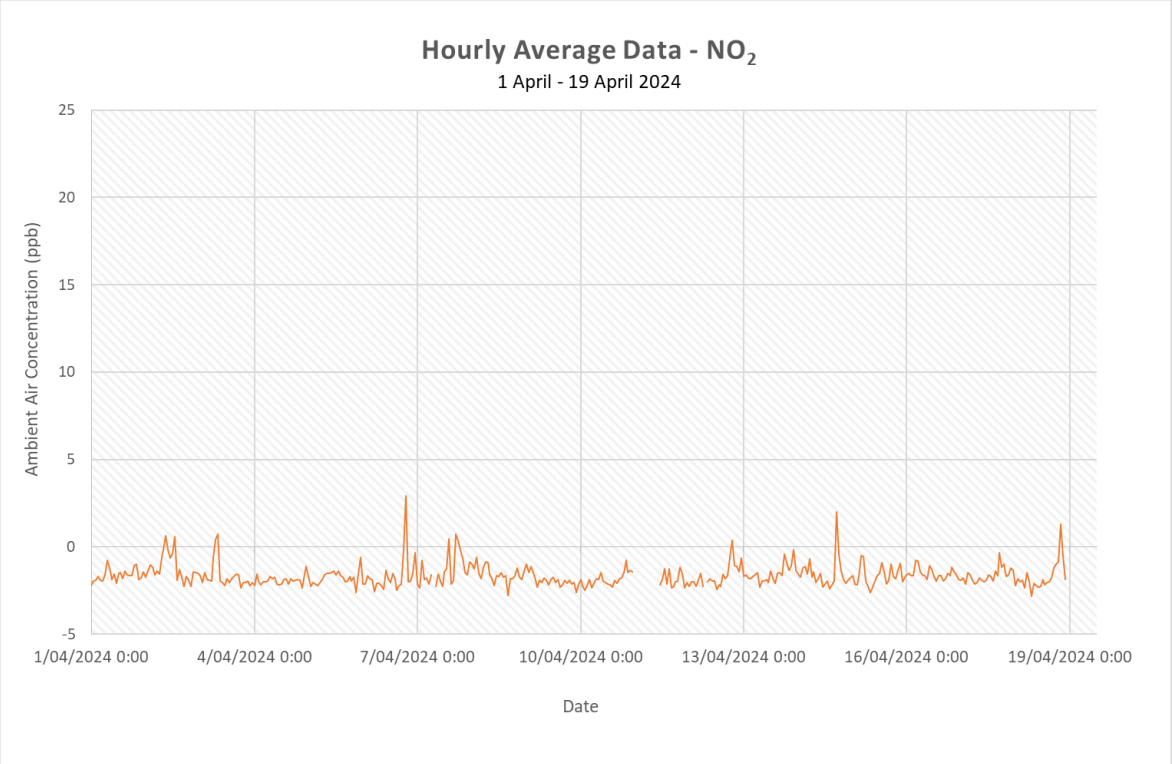


Figure 3. Hourly Average NO_2

10-Minute Average SO_2

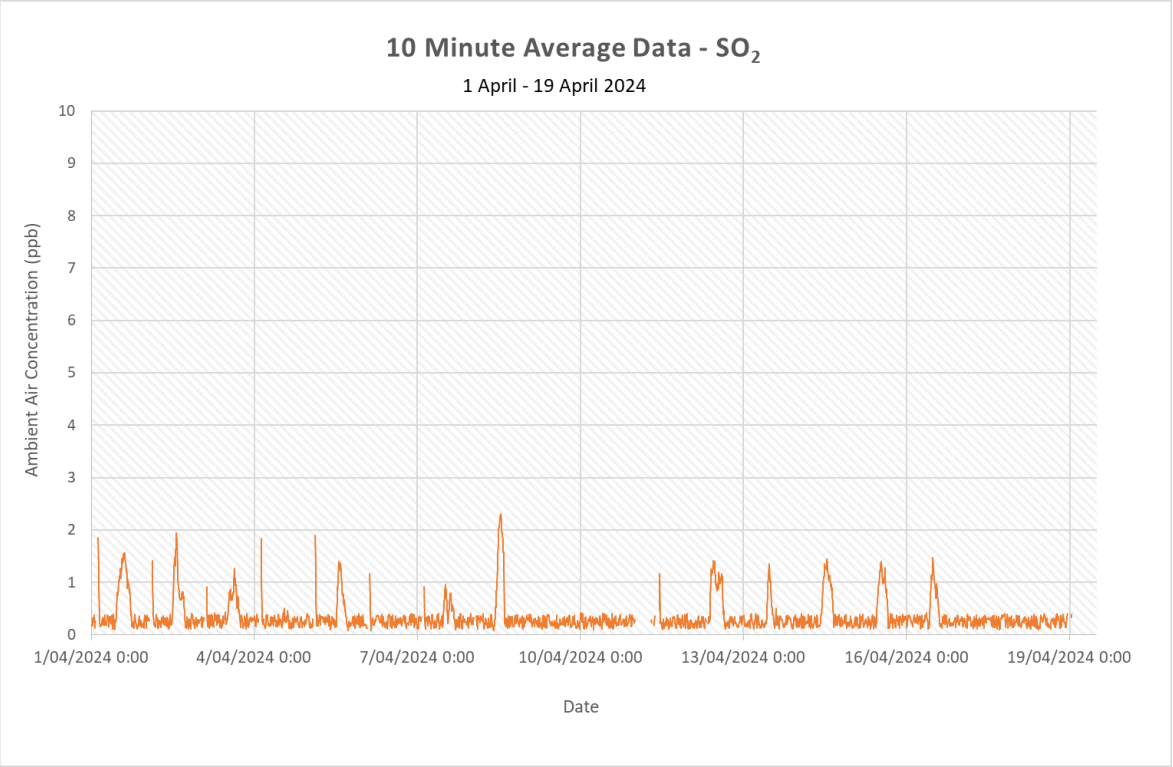


Figure 4. 10-Minute Average SO_2

Hourly Average SO_2

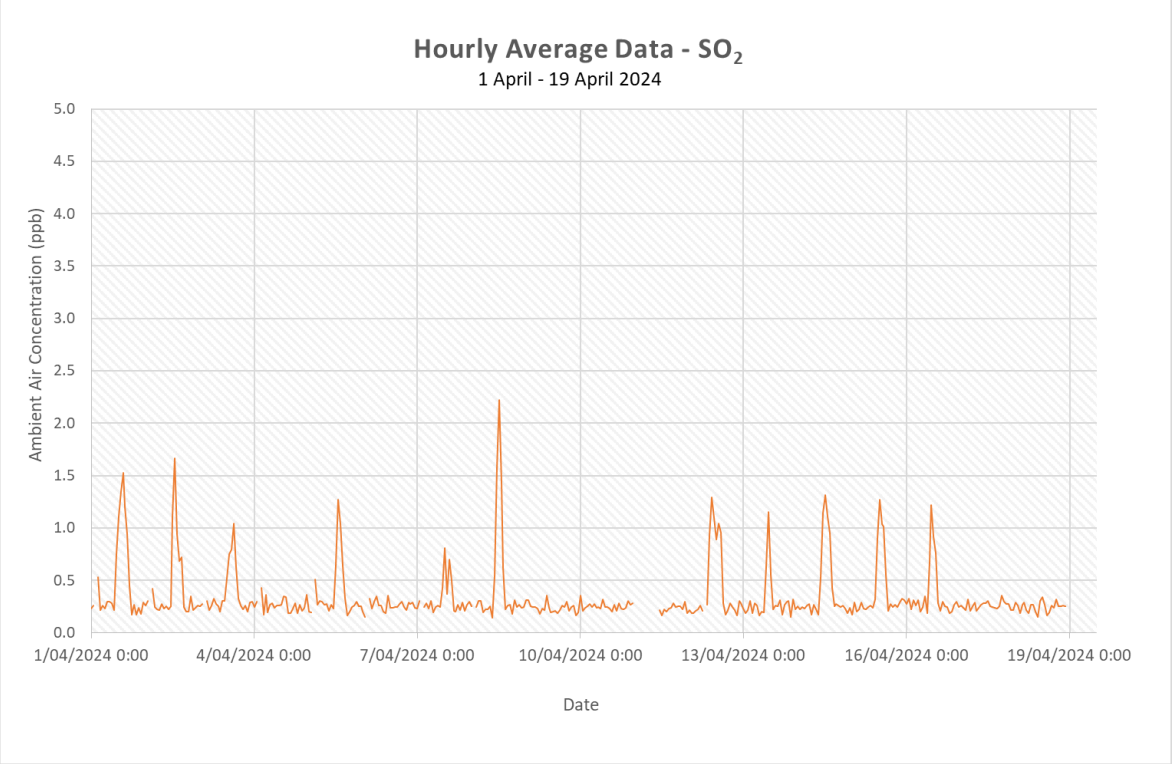


Figure 5. Hourly Average SO_2

Daily (24 Hourly) SO_2

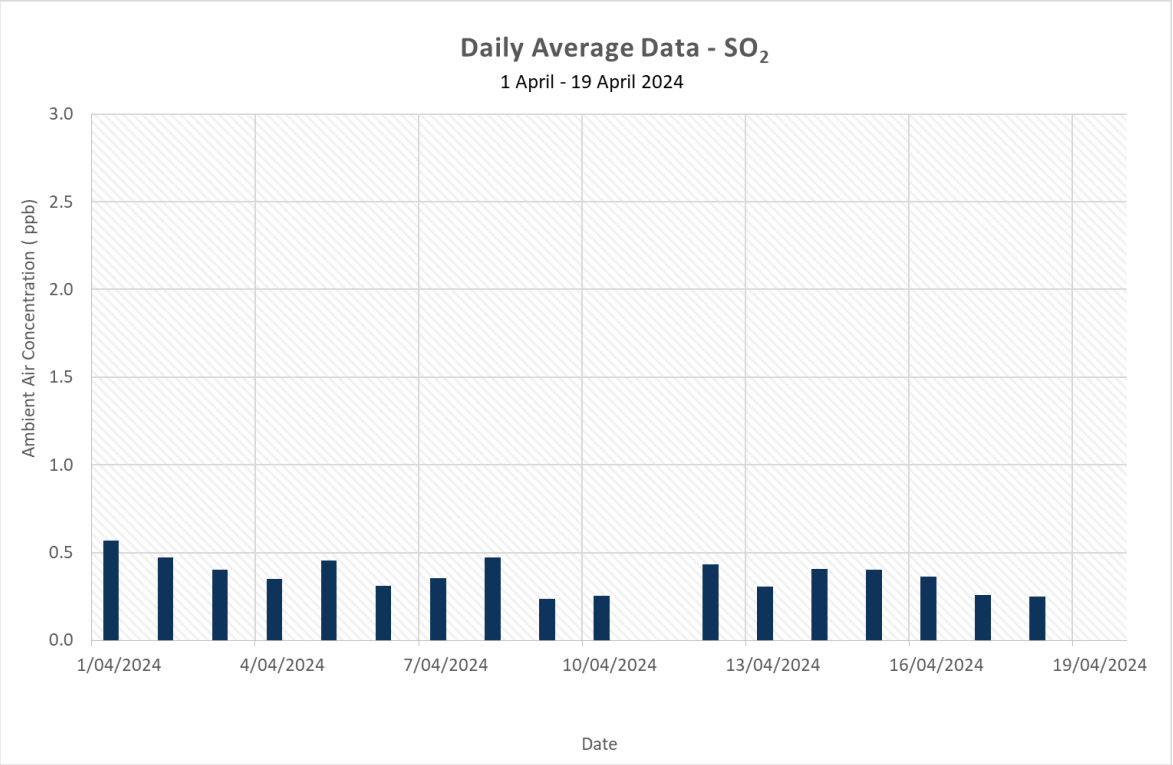


Figure 6. Daily (24 Hour) Average SO_2

Appendix 2. Weather Charts

9.1 Monthly Windrose

Eden 8 By Street, NSW
01-19 April 2024

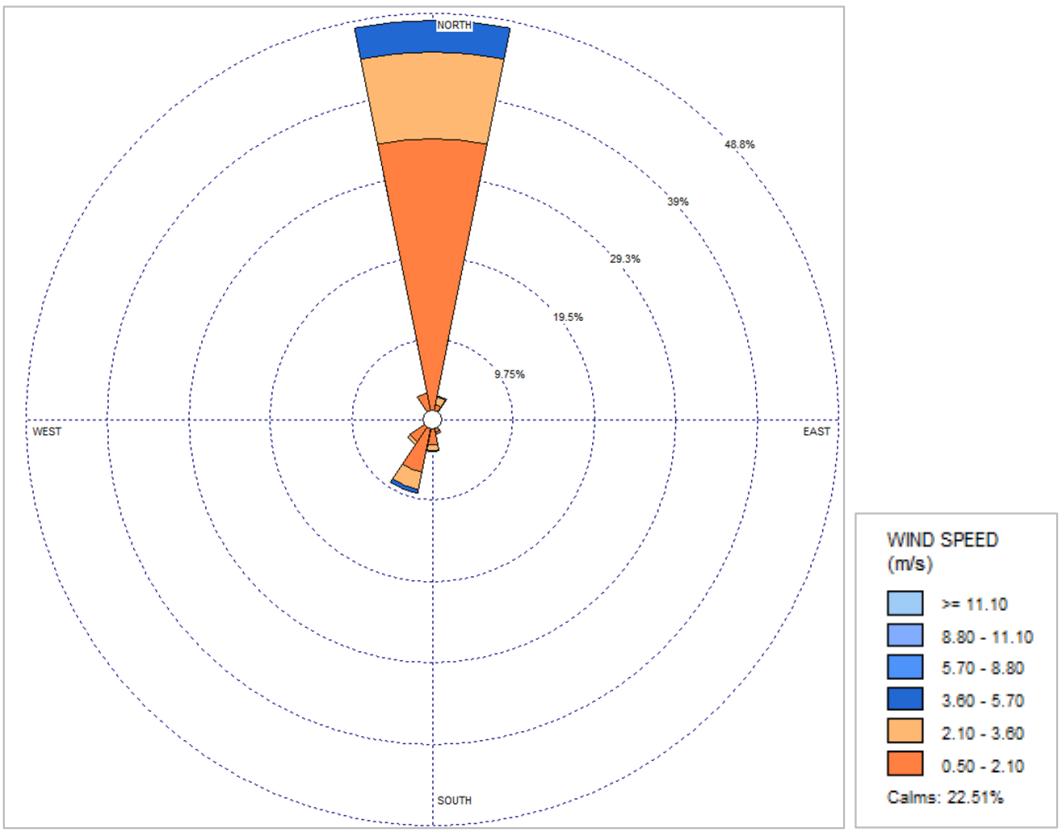
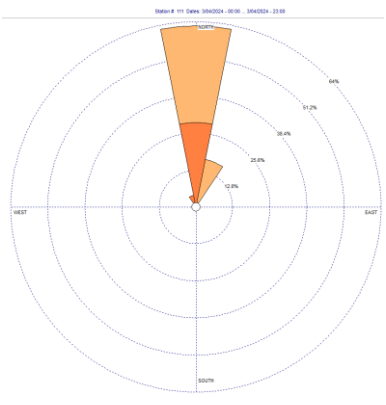


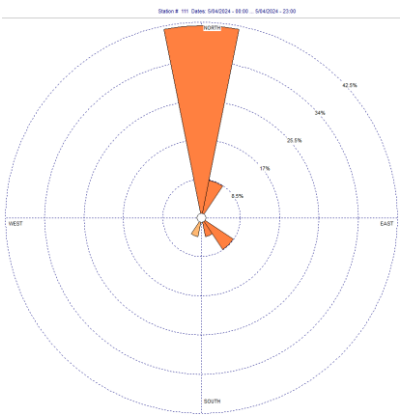
Figure 7. Monthly Wind Rose

9.2 Daily Windroses

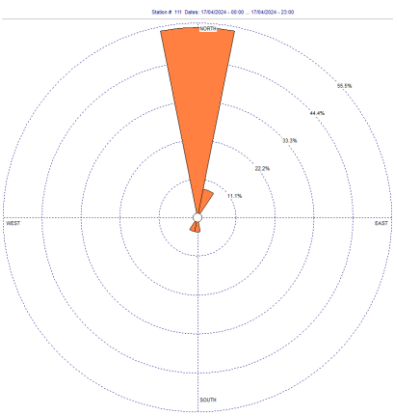
The following Daily Windroses correspond to days Ships were berthed at port of Eden.
The daily average concentration of SO_2 (ppb) is also noted in brackets for each day.



03/04/24 (0.4ppb)



05/04/24 (0.5ppb)



17/04/24 (0.26ppb)

9.3 Weather Charts

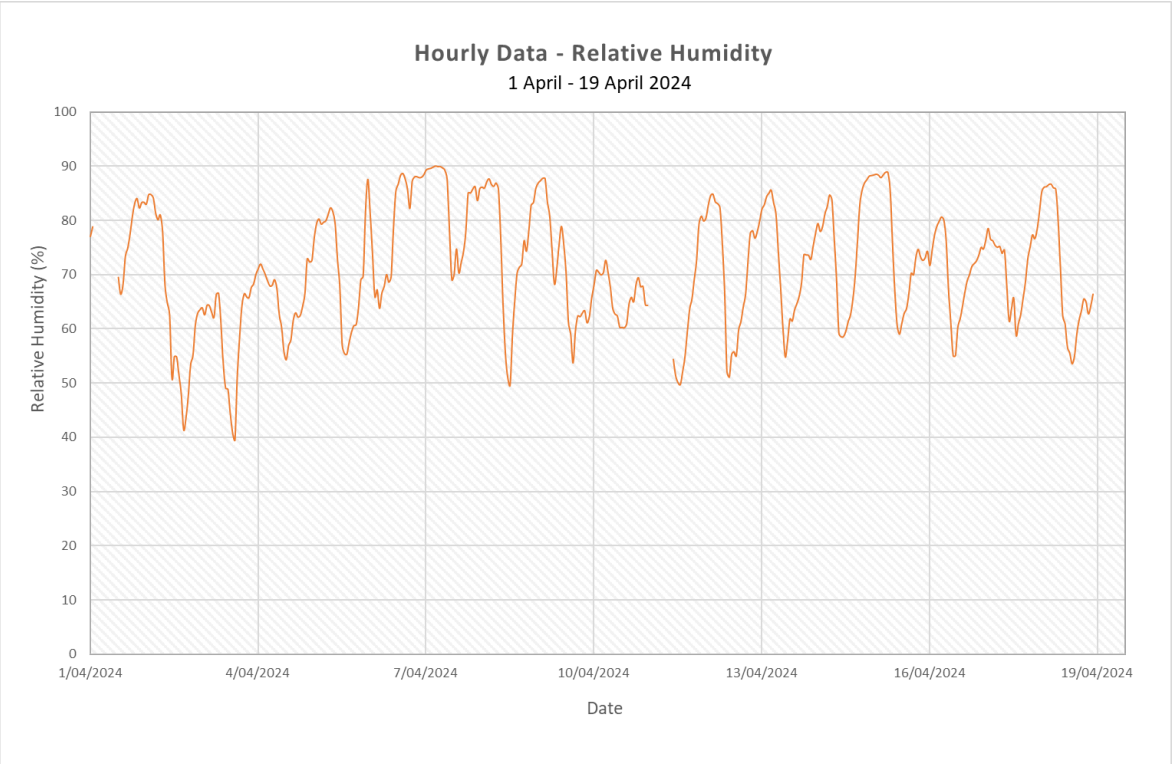


Figure 8. Hourly Relative Humidity

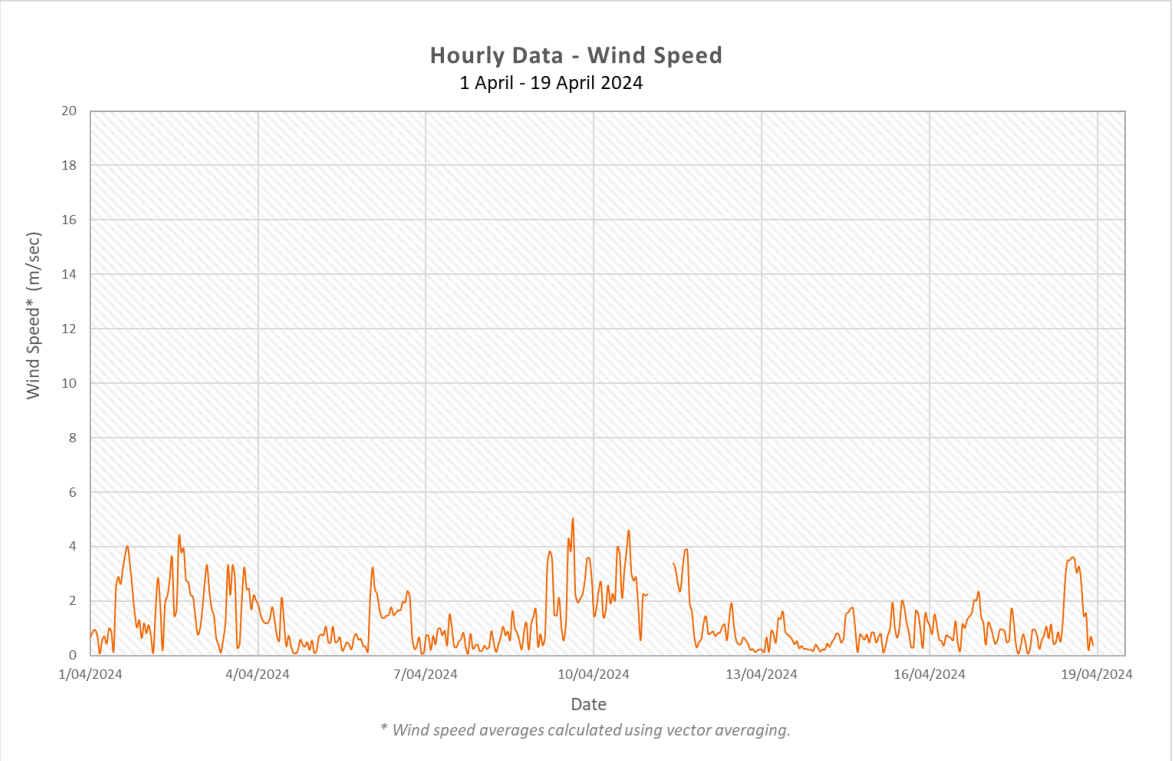


Figure 9. Hourly Wind Speed.

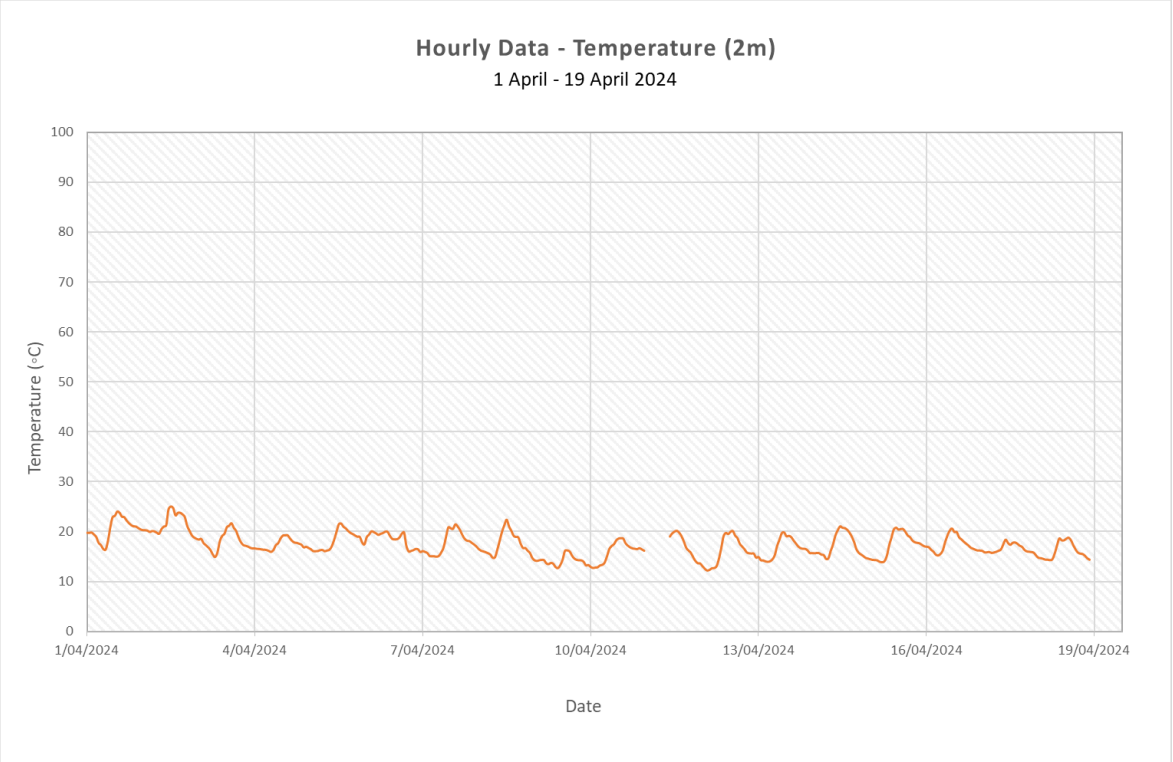


Figure 10. Hourly Temperature (2m)

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Appendix 4. Monitoring Equipment Specifications

Table 15. Monitoring Equipment Specifications

Parameter	Manufacturer	Model	Specification Units	Operating Range	Accuracy	Detection Threshold	Resolution	Error / Drift	Sample rate
$PM_{2.5}$	Dr Fodisch	FDS-17	µg/m3	2...2000 µg/m³.	For concentrations greater than 100 µg/m³, the accuracy is ±15%. less than 100 µg/m³, the accuracy is ±15 µg/m³	2 µg/m³	NA	NA	(2 l/min).
NOx	Airpointer	A-HTV1S070000 M100C1F1	ppb	up to 20ppm	1%of read ingor1ppb (whichever is greater) @<500ppb	0.4ppb	NA	<0.4ppb (zero) 1% of reading >100ppb (span) 24hrs	1000ml/min
SO_2	FPI	AQMS-500	ppb	0 - 500 ppb	< 1% Linearity: <1% F.S.	0.5 ppb	NA	≤1 ppb for Zero (24hours) ≤5 ppb for Span (24hours)	350-1000 sccm
Wind direction	Vaisala	WXT530	degree (°)	0 - 360°	±3.0° at 10 m/s	NA	1°	NA	NA
Wind speed	Vaisala	WXT530	m/s	0 - 60 m/s	±3 % at 10 m/s	NA	0.1 m/s	NA	NA
Relative Humidity	Vaisala	WXT530	%	0 - 100 %RH	±3 %RH at 0 - 90 %RH ±5 %RH at 90 - 100 %RH	0.1 %RH	0.1 %RH	NA	NA
Temperature	Vaisala	WXT530	°C	-52 - 60 °C	±0.3 °C	NA	0.1 °C	NA	NA

Ektimo

Appendix 5. Ambient Air Quality Monitoring Station (AAQMS) Locations and Siting.

AAQMS & Weather Station Location

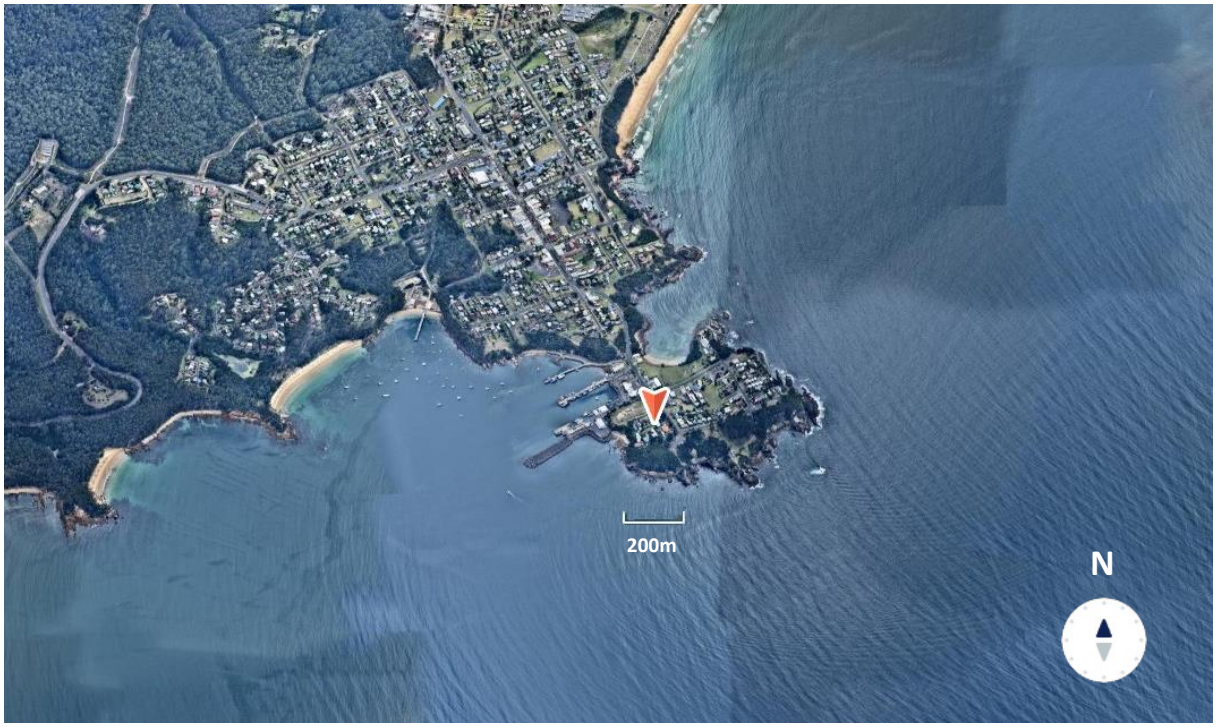

Image 1. Port Eden AAQMS Location, 8 By Street

Image 2. Port Eden AAQMS Location, 8 By street (zoomed in)

Appendix 6. AAQMS Image.

Image 3. AAQMS , 8 by Street Port Eden

Appendix 7. Location Siting and Compliance

AAQMS were assessed in accordance with the siting requirements of AS3580.1.1.

Compliance with the siting requirements of AS3580.1.1 are summarised in the following tables.

Table 16. Location Siting Assessment

Ektimo	Initial Station Siting
Client name	Port Authority of New South Wales
Job number	R016315
Date of Installation	18/01/2024
Ektimo Staff	Hamid Sokhan
Site Location	8 By St, Eden NSW 2551
Latitude	-37.073486
Longitude	149.910502
Equipment type	Ambient Air Quality Monitoring System
Station type	Neighbourhood
Australian Standard AAQMS Siting Criteria Compliance	**(✓,✗ or na)**
Inlet height above ground level 2 m - 5 m	✓
Twice the height of nearby obstacle above the inlet ≤ Dw	✗
Inlet 10 m from drip line of trees	✓
Greater than 50 m from road (≤ 10,000 vehicles/day)	✗
10 m from object with height exceeding 2 m below the inlet height	✗
Clear sky angle 120° above inlet	✓
Unrestricted 270° airflow around inlter	✓
No extraneaous sources nearby	✓
Wind speed and wind direction	
Anemometer height above ground level 10 m	✗
Distance obstruction (≥ 10 times obstruction height)	✗
Temperature & relative humidity	
Sensor height above ground level 2 m	✓
Distance to obstruction (≥ 4 times obstruction height)	✗

Ektimo

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Cockburn Central
WA 6164
AUSTRALIA

BRISBANE
3/109 Riverside Place
Morningside
QLD 4170
AUSTRALIA

Appendix B Compliance Report Declaration Form

Compliance Report Declaration Form	
Project Name	Eden Cruise Ship Facility
Project Application Number	SSI 7734
Description of Project	Eden Breakwater Wharf and the Wharf Extension, and all associated infrastructure
Project Address	Weecoon Street, Snug Cove, Eden
Proponent	Port Authority of NSW
Title of Compliance Report	Operation Compliance Report
Date	17/02/2025

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

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

Notes:

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

Name of Authorised Reporting Officer	Christa Sams
Title	Senior Manager, Environment
Signature	
Qualification	BEng (Env)
Company	Port Authority of NSW
Company Address	Level 4, 20 Windmill St, Walsh Bay, NSW 2000

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