REPORT

LAVENDER BAY

64-66 LAVENDER ST & 3-7 MIDDLEMISS ST,
LAVENDER BAY, NSW

AIR QUALITY IMPACT ASSESSMENT
RWDI # 2512833
17 March 2026

SUBMITTED TO

CE Lavender Bay Trust
Level 17/100 Miller Street,
North Sydney NSW 2060

SUBMITTED BY

RWDI Australia Pty Ltd (RWDI)
Suite 602, Level 6, 80 William Street,
Woolloomooloo, NSW 2011
ABN 86 641 303 871

DOCUMENT CONTROL

Version	Status	Date	Prepared By	Reviewed By
A	Draft	24 February 2026	ACH	RR, CAQP
B	Initial	17 March 2026	JL	HK
C	Updated Project Description	17 March 2026	HK	RR, CAQP

NOTE

QUALITY ASSURANCE

RWDI Australia Pty Ltd operates a Quality Management System which complies with the requirements of AS/NZS ISO 9001:2015. This management system has been externally certified by SAI Global and Licence No. QEC 13457 has been issued for the following scope: The provision of consultancy services in acoustic engineering and air quality; and the sale, service, support and installation of acoustic monitoring and related systems and technologies.

TABLE OF CONTENTS

LIST OF APPENDICES

EXECUTIVE SUMMARY

This Air Quality Impact Assessment (AQIA) report has been prepared by RWDI Australia Pty Ltd (RWDI) on behalf of Trustee for CE Lavender Bay Trust. (the Proponent) to support the State Significant Development Application (SSDA) and Planning Proposal for the construction and operation of a residential development on the land at 64 & 66 Lavender Street, Lavender Bay and 3, 5 & 7 Middlemiss Street, Lavender Bay (the Site) for SSD-8679708.

This report assessed the potential dust impacts associated with the construction of the Proposal in accordance with the '*Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*' (EPA, 2022). This report also evaluated the potential impact of vehicle emissions from the Lavender Street on the Proposal.

The EPA does not, at this stage, have specific guidelines to consider dust from construction sites in terms of a risk assessment and management approach. It has developed a guideline entitled '*Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*' (EPA, 2022); however, this guideline considers detailed modelling approaches and is not specifically relevant to construction dust impacts. A detailed modelling approach is not necessary for short-term construction impacts that can be managed. Therefore, a risk-based approach was adopted to assess dust emissions from the construction of the Proposal in accordance with the Environmental Protection UK (EPUK) and Institute of Air Quality Management (IAQM) '*Guidance on the Assessment of Dust from Demolition and Construction*' (EPUK & IAQM, 2024). The assessment concluded that there would be a "Medium" risk of dust impact from demolition, construction and track out activities, whereas "Low" risk with respect to earthwork activities. With the implementation of recommended mitigation measures, air quality impacts can be significantly reduced during the construction of the Proposal.

From an air quality perspective, air contaminant emissions from vehicles travelling on the Lavender Street are the main concern for future residents of the Proposal. A screening model tool developed by Transport of NSW, the Roadside Air Quality Screening Tool (RAQST), was used to assess air quality impacts from peak hour traffic emissions. A worst-case, slow-moving traffic scenario has been adopted for this assessment, assuming a vehicle speed of 10 km/h. Assessments were conducted at distances of 10 m from the road kerb to the development facade.

The level 1 air quality screening assessment indicates that there are no predicted air quality exceedances at distances greater than 10 m from the Lavender Street. The model predicts that the main criteria pollutants does not exceed the criteria throughout the development site from the nearby future vehicular traffic. This report completes the Level 1 air quality screening assessment in support of the Development Application.

Overall, the potential for adverse cumulative air quality effects during construction and operation of the Proposal will be minimal and with the implementation of mitigation measures, the impacts are considered negligible.

1 INTRODUCTION

This Air Quality Impact Assessment (AQIA) has been prepared by RWDI Australia Pty Ltd (RWDI) on behalf of The Trustee for CE Lavender Bay Trust to support the State Significant Development Application (SSDA) (SSD-8679708) and Planning Proposal for the construction and operation of a residential development on the land at 64 & 66 Lavender Street, Lavender Bay and 3, 5 & 7 Middlemiss Street, Lavender Bay (Lot 2/DP19368 and Lot 5/DP431983) (the Site).

1.1 Objectives

This report has been prepared to document the process, objectives, and outcomes of the AQIA for the Proposal. This AQIA provides the following details:

- The existing environment;
- The land zoning of the site and neighbouring area;
- The closest existing sensitive receivers.
- Relevant air quality criteria;
- Construction air quality predictions during the construction of the proposal and assumptions used in the assessment
- Predicted ground-level concentrations from vehicle emissions surrounding the area development; and
- Recommendations to minimise air quality impacts on affected receivers, if required.

The AQIA has been completed with reference to relevant guidelines and policies, namely:

- Air Quality relevant policies and guidelines from 'State Environmental Planning Policy (Transportation and Infrastructure) 2021 (SEPP, 2021);
- Climate Averages Australia, Bureau of Meteorology (BOM, 2025);
- Environmental Protection Authority (EPA) guideline entitled "Approved Methods for the Modelling and Assessment of Air Pollutants in NSW" (NSW EPA, 2022);
- Environmental Protection UK (EPUK) and Institute of Air Quality Management (IAQM) 'Guidance on land-use planning and development control: Planning for air quality 2017 v1.2' (EPUK & IAQM, 2017);
- 'Good Practice Guide for The Assessment and Management of Air Pollution from Road Transport Projects' released by The Clean Air Society of Australia & New Zealand (CASANZ, 2023);
- State of NSW and Environment Protection Authority, Air Emissions in My Community web tool Substance information (NSW EPA, 2013);
- Protection of the Environment Operations Act 1997 No 156 (NSW Parliament, 2023);
- National Environment Protection Council's National Environment Protection (Ambient Air Quality) Measure (NEPC, 2021); and
- NSW Government Department of Planning – 'Development Near Rail Corridors and Busy Roads – Interim Guideline' (DoP, 2008)

This report has been prepared based on the preliminary drawings prepared by SJB Architects dated 06 February 2026.

2 PROJECT DESCRIPTION

2.1 Proposal Location

The site comprises five (5) separate allotments and is located between Middlemiss Street and Lavender Street. The total site area is approximately 2,305 sqm. The site is located on the corner of Lavender Street and Middlemiss Street, Lavender Bay in the North Sydney Local Government Area (LGA). It is located in Milsons Point Town Centre, but also adjacent to the edge of the Lavender Bay Conservation Area, outlined in the North Sydney Development Control Plan 2013 (NSDCP 2013). Lavender Bay is characterised by mixed commercial and residential development, passive and active recreational spaces, and proximity to major road and railway infrastructure The legal descriptions and Site Areas are as mentioned below in Table 2-1:

Table 2-1: Legal Descriptions and Site Areas

Address	Legal Description	Approx Site Areas (sqm)
64 Lavender Street, Lavender Bay	4/DP19368	482
66 Lavender Street, Lavender Bay	SP70601	373
3 Middlemiss Street, Lavender Bay	SP52428	410
5 Middlemiss Street, Lavender Bay	SP52429	485
7 Middlemiss Street, Lavender Bay	SP538	554

The site is currently zoned R4 High Density Residential zone with a maximum height of 12 m and no floor space ratio (FSR) control. The site is located in proximity to the intersection of MU1 Mixed Use, RE1 Public Recreation, R3 Medium Density Residential and R4 High Density Residential zones. The site is located approximately 300m walking distance from Milsons Point train station and 350m walking distance from North Sydney train station. The site is within the low- and mid-rise housing inner area, which is within 400m walking distance of a public entrance to a railways station listed in Schedule 11 of the State Environmental Planning Policy (Housing) 2021 (Housing SEPP).

The site contains five 2-storey residential buildings. No buildings are listed as heritage items, and the Site is not within a heritage conservation area.

The surrounding developments can be listed below as the following:

- To the north-west of the Site: are attached terrace houses, some listed as local heritage items, located along Arthur Street with laneway access via Arthur Lane, which adjoins the north-west boundary of the site.
- To the west of the Site: consists of the low-rise, fine-grain fabric of Lavender Bay. Buildings are predominantly 2-3 storey attached buildings. Despite this predominant typology, there are also a few stand-alone houses and 4-6 storey apartment buildings along Lavender Street. This area has well planted streets and is serviced by a network of laneways.

- To the south-west of the Site: is Clark Park and Wendy Whiteley's Secret Garden, sloped open spaces which extend down to the Lavender Bay rail corridor and foreshore. These spaces are home to large mature trees and provide iconic views across Lavender Bay to Sydney Harbour.
- To the south of the Site: is Milsons Point, marked by high-density mixed-use buildings on the southern edge of Lavender Bay. These block some of the southern harbour views from the site. There are ground floor retail offerings along Lavender Street at the base of these buildings.
- To the east of the Site: and adjoining the eastern boundary, are the now end-of-life Homes NSW sites on 1 Middlemiss Street (Lot 2/DP19368 and Lot 5/DP431983). These lots, consolidated, total a site area of approximately 926 sqm which satisfy the requirement for adjoining land to be at least 900 sqm under clause 6.12 of the NSLEP 2013.

The aerial image of the Site is provided in Figure 2-1 and Figure 2-2 presents the Proposal location and surrounding land zoning.

Figure 2-1: Aerial image of the site (Source: Google Earth)

Figure 2-2: Site Location and Surrounding Land Zoning

2.2 Proposal

The proposed development seeks approval for the rezoning of the Site and development consent for the construction of a residential development. The SSDA specifically involves the following works:

- Demolition of the existing buildings on site.
- Site excavation, and other preparatory site works;
- Construction of a 32 and 22-storey residential flat building including 3% designated affordable housing consisting of approximately a total of 160 dwellings,
- Five levels of basement parking,
- Vehicular access from Lavender Street and loading access from Middlemiss Street,
- A new public accessible open space, including through-site link and site landscaping and
- Site amalgamation,
- Utility and services augmentation as required.

To accommodate the proposed SSDA, a concurrent rezoning is sought to increase the site's maximum building height.

The proposed ground floor site layout and northern elevation are shown in Figure 2-3 and Figure 2-4 respectively.

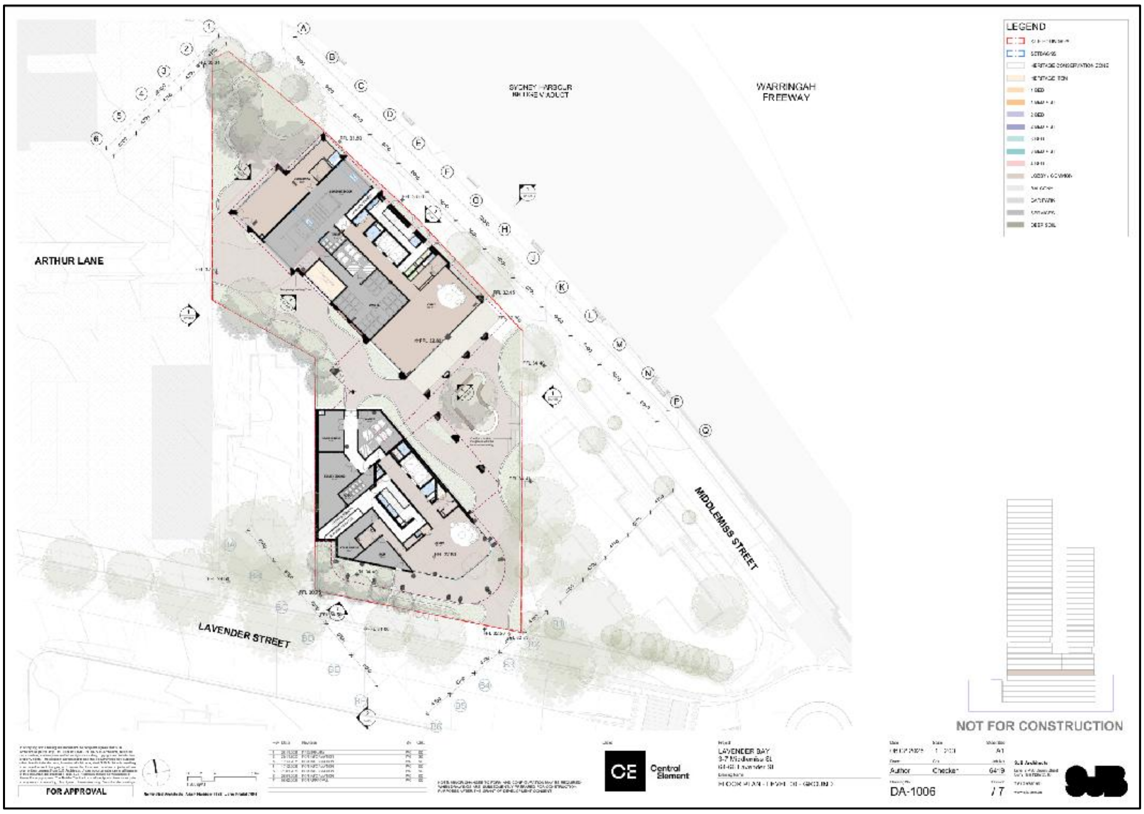

Figure 2-3: Proposed Site Layout – Ground Floor (Source: SJB Architects)

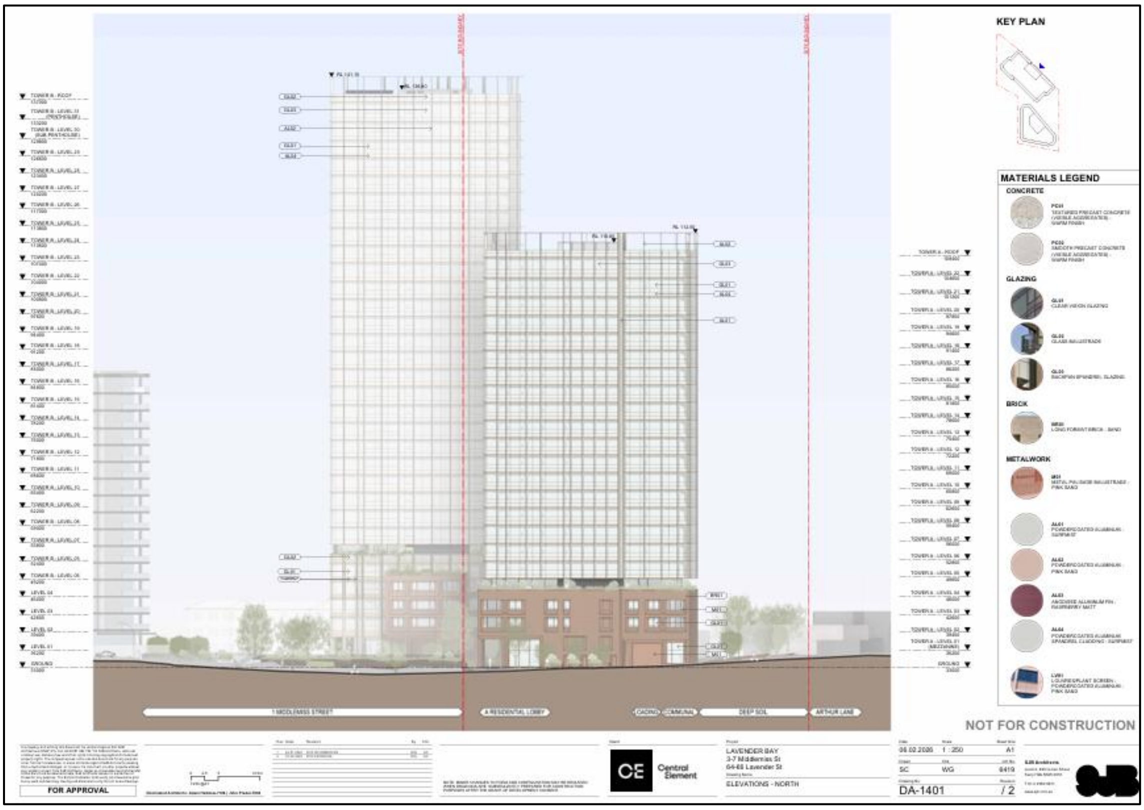

Figure 2-4: Proposed Site – North- Elevations (Source: SJB Architects)

2.3 Potential Sources of Air Contaminant Emissions Associated with the Proposal

Air contaminant emissions are likely to occur during the construction and operation of the Proposal at 64 & 66 Lavender Street, Lavender Bay and 3, 5 & 7 Middlemiss Street, Lavender Bay. The most likely air contaminant sources for construction and operation are discussed in the following sections.

2.3.1 Construction Phase

At the time of preparing this assessment, a detailed construction programme was not developed, but the following stages and typical activities can be expected from this Proposal. A summary of potential construction emissions is provided in Table 2-2.

Table 2-2: Construction Air Quality Emissions

Construction Stage	Key Air Quality Emissions
Demolition/ Land clearing	• Dust emissions from the clearing site and demolition of the existing buildings. • Fugitive dust generated from breaking, dismantling, and removal of concrete, masonry, brick, and other building materials. • Dust emissions from handling, sorting, loading, and temporary stockpiling of demolition debris. • Exhaust emissions from diesel power plant, equipment, and vehicles.
Excavation	• Dust emissions from bulk earthworks. • Exhaust emissions from diesel power plant, equipment, and vehicles. • Potential odour emissions if contaminants are encountered during bulk earthworks. • Topsoil/material handling, including stockpiling, material loading and material haulage
Construction of Structures	• Dust emissions from the construction of various buildings. • Exhaust emissions from diesel power plant, equipment, and vehicles.
Track out Construction of Roads	• Dust emissions from bulk earthworks. • Exhaust emissions from diesel power plant, equipment, and vehicles.

Dust Emissions:

Dust emissions are expected from all the construction stages as identified in Table 2-2.

Dust or airborne particles present in the air at elevated levels can be hazardous to human health or cause a nuisance. Potential health effects of airborne particles are closely related to particle size. The most common particle size distributions considered in air quality studies are:

- $PM_{2.5}$: Particulate matter (PM) consisting of particles less than 2.5 µm (micrometres) in diameter – for assessment against health-based criteria;
- PM_{10}: PM consisting of particles less than 10 µm in diameter – for assessment against health-based criteria;
- TSP: total suspended particulates, generally up to 100 µm in diameter – for assessment against predominantly nuisance-based criteria; and
- Deposited dust particles – for assessment of dust nuisance.

PM_{10} and $PM_{2.5}$ are typically invisible, while larger particulates are typically visible to the naked eye.

During the temporary phase of construction earthwork activities, including the moving of material and truck movements along haul roads (wheel-generated dust), short-term elevated levels of PM_{10} and $PM_{2.5}$ are likely to occur.

Exhaust Emissions:

It is likely that all stages of the construction would involve the use of diesel-fuelled equipment such as excavators, haulage trucks, cranes and light vehicles.

The use of diesel-fuelled equipment generates air pollutants including oxides of nitrogen (NO_x), carbon monoxide (CO) and particulate matter (mainly $PM_{2.5}$). Construction equipment is expected to move around the Site, and resulting exhaust emissions would be discontinuous, transient and mobile.

A qualitative assessment of potential dust emissions impacts is provided in Section 5 and mitigation measures are recommended in Section 6.

Odour:

If air contaminants are encountered during excavation works, odour emissions may occur. At this stage, no air contaminants are expected to be encountered during earthworks and therefore, odour emissions have not been assessed further for the construction phase.

2.3.2 Operational Phase

Potential sources of operational air contaminants from the Proposal would be combustion from increased traffic movements.

A summary of potential operational air contaminant emissions is provided in Table 2-3. A more detailed discussion of each emissions source is provided below.

Table 2-3: Operational Air Contaminant Emissions

Source Type	Key Air Contaminant Emissions
Building Exhaust	• Ducted exhaust from toilets. • Carpark exhaust. • Waste/Garbage exhaust.
Traffic Emissions	• Combustion exhaust emissions including NO_x, and PM. • Fugitive PM emissions from the increase in vehicular traffic on the nearby roads.

Building Exhaust

At this early stage, the specific characteristics of roof top exhaust are not yet confirmed. However, based on the proposed building uses, operational emissions are expected to consist primarily of toilet exhaust, carpark ventilation exhaust, and waste/garbage storage exhaust.

These systems are typically ducted and discharged above ground level or at the rooftop, which promotes atmospheric dispersion and is expected to result in minimal impact on the surrounding environment. Therefore, these building exhaust emissions are not further assessed in this report.

Traffic emissions

Increased patronage to the area due to the Proposal may increase the number of vehicle movements on nearby roads which in turn would increase vehicle emissions.

3 AIR QUALITY CRITERIA

3.1 Introduction

Land-use planning has an important influence on air quality and, therefore, air quality should be a prime consideration for long-term planning, so that land is used and allocated in ways that minimise emissions and reduce the exposure of people to air pollution.

The Environmental Protection Authority (EPA) developed a guideline ("the Approved Methods") that sets out applicable impact assessment criteria for several air pollutants (NSW EPA, 2022). Air quality criteria are benchmarks set to protect the general health and amenity of the community in relation to ambient air quality.

Transport and Infrastructure SEPP 2021 refers to guidelines that must be considered where development has a frontage to classified road is proposed in, or adjacent to, specific roads and railway corridors under Clause 2.119 – Development with Frontage to a Classified Road. The objective of clause is:

1. The objective of this section are:
    - to ensure that new development does not compromise the effective and ongoing operation and function of classified roads, and
    - to prevent or reduce the potential impact of traffic noise and vehicle emissions on development adjacent to classified roads.
2. The consent authority must not grant consent to development on land that has a frontage to a classified road unless it is satisfied that:
    - where practicable and safe, vehicular access to the land is provided by a road other than the classified road, and
    - the safety, efficiency and ongoing operation of the classified road will not be adversely affected by the development as a result of—
        I. the design of the vehicular access to the land, or
        II. the emission of smoke or dust from the development, or
        III. the nature, volume or frequency of vehicles using the classified road to gain access to the land, and
    - the development is of a type that is not sensitive to traffic noise or vehicle emissions, or is appropriately located and designed, or includes measures, to ameliorate potential traffic noise or vehicle emissions within the site of the development arising from the adjacent classified road.

In addition, major roads can impact air quality due to the volume of traffic they carry. Therefore, NSW DoP, 2008 (the Guideline) assists in reducing the health impacts of adverse air quality from road traffic on sensitive adjacent development. The Guideline assists in the planning, design, and assessment of development in, or adjacent to, rail corridors and busy roads.

When air quality should be a design consideration:

- Within 10 m of a congested collector road (traffic speeds of less than 40 km/h at peak hour) or a road grade > 4% or heavy vehicle percentage flows > 5%;
- Within 20 m of a freeway or main road (with more than 2,500 vehicles per hour, moderate congestion levels of less than 5% idle time and average speeds of greater than 40 km/h);

- Within 60 m of an area significantly impacted by existing sources of air pollution (road tunnel portals, major intersection/roundabouts, overpasses, or adjacent major industrial sources); or
- As considered necessary by the approval authority based on consideration of site constraints and associated air quality issues.

Section 4.0 of the guideline provides the following guidance on developments located next to busy roads, which have challenges in terms of how to provide an acceptable level of air quality for the occupants and users of the development. Therefore, the following principles should be taken into consideration during the design stage to achieve improved air quality:

- Minimising the formation of urban canyons that reduce dispersion. Having buildings of different heights interspersed with open areas and setting back the upper stories of multi-level buildings, helps to avoid urban canyons.
- Incorporating an appropriate separation distance between sensitive uses and the road using broad scale site planning principles such as building siting and orientation. The location of living areas, outdoor space and bedrooms and other sensitive uses (such as childcare centres) should be as far as practicable from the major source of air pollution.
- Ventilation design and openable windows should be considered in the design of development located adjacent to roadway emission sources. When the use of mechanical ventilation is proposed, the air intakes should be sited as far as practicable from the major source of air pollution.
- Using vegetative screens, barriers, or earth mounds where appropriate to assist in maintaining local ambient air amenity. Landscaping has the added benefit of improving aesthetics and minimising visual intrusion from an adjacent roadway.

The sections below identify the pollutants of interest in this study and the applicable impact assessment criteria.

3.2 Pollutants of Interest

The primary sources of air emissions in the area immediately surrounding the Proposal are expected to be increase in vehicles travelling on the Lavender Street. Air pollutant emissions emitted by motor vehicle exhausts include:

- Carbon Monoxide (CO);
- Nitrogen Oxides (NO_x);
- Particulate matter less than 2.5 μm in aerodynamic diameter ($PM_{2.5}$);
- Particulate matter less than 10 μm in aerodynamic diameter (PM_{10});
- Sulphur dioxide (SO_2); and
- Volatile Organic Compounds (VOCs).

3.3 Impact Assessment Criteria

Air quality criteria are benchmarks set to protect the general health and amenity of the community in relation to air quality. The criteria presented in the Approved Methods (NSW EPA, 2022) are consistent with the National Environment Protection Council's National Environment Protection (Ambient Air Quality) Measure (NEPC, 2021). The below section summarises the air quality criteria for the pollutants relevant to the study.

3.3.1 Carbon Monoxide

As per NSW EPA 2013, Carbon monoxide (CO) is a colourless, odourless gas and is a product of the incomplete combustion of fuels in motor vehicles. CO can have harmful effects on human health. These effects (which depend on exposure time and concentration in ambient air) are related to the formation of carboxy haemoglobin in the blood, which reduces the capacity of the blood to carry oxygen. People suffering from heart disease are most at risk.

Elevated concentrations of CO in ambient air mainly occur in areas with high traffic density and poor dispersion. Highest concentrations of CO are found at the kerbside with concentrations decreasing rapidly with increasing distance from the road. Table 3-1 summarises the air quality criteria for CO as per NSW EPA the Approved Methods.

Table 3-1: Impact Assessment Criteria – Carbon Monoxide (CO)

Pollutant	Averaging Period	Concentration
Carbon Monoxide (CO)	15 minutes	100 mg/m^3 (87 ppm)
	1 hour	30 mg/m^3 (25 ppm)
	8 hours	10 mg/m^3 (9 ppm)

3.3.2 Nitrogen Dioxide (NO_2)

As per NSW EPA 2013, Oxides of nitrogen (NO_x) mainly consist of nitric oxide (NO) and nitrogen dioxide (NO_2), which are collectively referred to as NO_x. NO is a colourless gas with a sweet odour, while NO_2 is a reddish-brown gas with a biting acrid odour.

The reactive nature of NO_2 makes it a particular concern for human health. It can cause inflammation of the respiratory system and increase susceptibility to respiratory infection. Exposure to elevated concentrations of NO_2 has also been associated with increased mortality, particularly related to respiratory disease, and increased hospital admissions for asthma and heart disease patients.

NO will be converted to NO_2 in the atmosphere after leaving a car exhaust. Table 3-2 summarises the air quality criteria for NO_2 as per NSW EPA the Approved Methods.

Table 3-2: Impact Assessment Criteria – Nitrogen Dioxide (NO_2)

Pollutant	Averaging Period	Concentration
Nitrogen Dioxide (NO_2)	1 hour	164 µg/m^3 (8 pphm)
	Annual	31 µg/m^3 (1.5 pphm)

Note pphm = parts per hundred million

3.3.3 Particulate Matter (PM)

As per NSW EPA 2013, particulate matter refers to matter suspended in ambient air, including solid particles, liquid droplets and aggregates of particles and liquids. The term "particulate matter" refers to a category of airborne particles, typically less than 30 microns (µm) in diameter and ranging down to 0.1 µm and is termed total suspended particulate (TSP). Emissions of particulate matter less than 10 µm and 2.5 µm in diameter (referred to as PM_{10} and $PM_{2.5}$ respectively) are considered important pollutants due to their ability to penetrate into the respiratory system.

In the case of the $PM_{2.5}$ category, recent health research has shown that this penetration can occur deep into the lungs. Potential adverse health impacts associated with exposure to PM_{10} and $PM_{2.5}$ include impact on cardiovascular health. People with heart or lung diseases, children and older adults are the most likely to be affected by exposure to particle pollution.

Combustion sources such as road transport are the major sources of PM_{10} and $PM_{2.5}$ emissions. Table 3-3 summarises the air quality criteria for PM_{10} and $PM_{2.5}$ as per NSW EPA the Approved Methods.

Table 3-3: Impact Assessment Criteria – Particulate Matter

Pollutant	Averaging Period	Concentration
Particulate Matter (PM_{10})	24 hours	50 µg/m³
	Annual	25 µg/m³
Particulate Matter ($PM_{2.5}$)	24 hours	25 µg/m³
	Annual	8 µg/m³

3.3.4 Sulphur Dioxide (SO_2)

As per NSW EPA 2013, sulphur dioxide (SO_2) is a colourless gas with a pungent irritating smell. SO_2 emissions can mix with water vapour to form acids (acid rain) that can damage vegetation, alter the mineral content in soils, and corrode materials. Current scientific evidence links short-term exposure to SO_2 (ranging from 5 minutes to 24 hours) with an array of adverse respiratory effects including bronchoconstriction and increased asthma symptoms. Studies show a connection between short-term exposure and increased visits to emergency departments and hospital admissions for respiratory illnesses, particularly in at-risk populations including children, the elderly, and asthmatics.

The main sources of SO_2 in the air are industries that process materials containing sulphur (i.e. wood pulping, paper manufacturing, metal refining and smelting, textile bleaching, wineries etc.). SO_2 is also present in motor vehicle emissions, however since Australian fuels are relatively low in sulphur, high ambient concentrations are not common. Table 3-4 summarises the air quality criteria for SO_2 as per NSW EPA the Approved Methods.

Table 3-4: Impact Assessment Criteria – Sulphur Dioxide (SO_2)

Pollutant	Averaging Period	Concentration
Sulphur Dioxide (SO_2)	1 hour	215 µg/m³ (7.5 pphm)
	24 hours	57 µg/m³ (2 pphm)

3.3.5 Volatile Organic Compounds (VOCs)

As per NSW EPA 2013, VOCs can simply be considered as the sum of hydrocarbons (excluding methane) and oxygenated hydrocarbons. VOCs are emitted by a wide range of both natural and human-made sources including trees and grass, aerosols and solvents, paints, road transport and residential wood heaters. VOCs that are often typical of these sources include Benzene, Toluene, Ethylbenzene and Xylenes (often referred to as 'BTEX').

VOCs have a range of health impacts including irritation of the eyes, nose and throat, headaches, and damage to the organs and central nervous system. Benzene is a known carcinogen, and a key VOC linked with the combustion of motor vehicle fuels.

Table 3-5 summarises the air quality criteria for the 4 VOCs known as BTEX (Benzene, Toluene, Ethylbenzene and Xylene), as per NSW EPA the Approved Methods.

Table 3-5: Impact Assessment Criteria – BTEX

Pollutant	Averaging Period	Concentration
Benzene	1 hour	29 µg/m³ (7.5 pphm)
Toluene	1 hour	360 µg/m³ (7.5 pphm)
Ethylbenzene	1 hour	8,000 µg/m³ (7.5 pphm)
Xylene	1 hour	190 µg/m³ (7.5 pphm)

4 EXISTING ENVIRONMENT

4.1 Local Meteorology

Meteorological conditions strongly influence air quality. Most significantly, wind speed, wind direction, temperature, relative humidity and rainfall affect the dispersion of air pollutants. The following sub-sections discuss the local meteorology near the Proposal site.

4.1.1 Long-Term Climate

Long-term meteorological data for the area surrounding the site is available from the Sydney Airport AMO (Site Number: 066037) operated by the Bureau of Meteorology (BoM). The Sydney Airport AMO is located approximately 6 km southwest of the Site and records wind speed, wind direction, temperature, humidity and rainfall. Long-term climate statistics are presented in Table 4-1. Temperature data recorded at the Sydney Airport AMO indicate that January is the hottest month of the year, with a mean daily maximum temperature of 26.7°C. July is the coolest month with a mean daily minimum temperature of 7.4°C. June is the wettest month with an average rainfall of 124 mm falling over 9 days. There are, on average, 96 rain days per year, delivering 1100 mm of rain.

Table 4-1: Climate Averages for Sydney Airport AMO

Obs.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
9am Mean Observations													
Temp (°C)	22.4	22.3	21.1	18.2	14.6	11.9	10.8	12.5	15.7	18.4	19.9	21.6	17.4
Hum (%)	70	73	73	71	73	74	71	65	62	61	64	66	69
Mean Wind Speed (km/h)	14.4	13.8	12.9	12.9	12.6	13.4	13.3	14.4	15.5	16.3	16.0	14.8	14.2
3pm Mean Observations													
Temp (°C)	24.8	24.8	23.9	21.7	19.0	16.6	16.1	17.2	19.0	20.7	22.1	23.9	20.8
Hum (%)	60	63	61	59	58	57	52	49	51	54	56	58	57
Mean Wind Speed (km/h)	24.1	23.0	21.0	19.3	17.1	17.8	18.2	20.8	23.1	24.6	25.3	25.2	21.6
Minimum and Maximum Temperatures													
Min (°C)	19.0	19.2	17.7	14.4	11.1	8.8	7.4	8.4	10.7	13.5	15.6	17.7	13.6
Max (°C)	26.7	26.5	25.5	23.1	20.2	17.7	17.2	18.5	20.8	22.8	24.3	26.0	22.4
Rainfall													
Rain (mm)	94.7	117.6	122.9	107.8	98.5	124.1	72.5	77.6	60.4	70.7	80.6	73.0	1100.1
Rain (days)	8.3	8.6	9.6	8.5	8.3	8.7	6.8	6.8	6.8	7.8	8.2	7.8	96.2

Figure 4-1 presents the annual wind-roses for 9 am and 3 pm from the Sydney Airport AMO (from 1939 to 2025). The wind-rose diagram indicates a notable emphasis of north-westerly and westerly winds at 9 am and south-southeasterly and north-easterly winds at 3 pm.

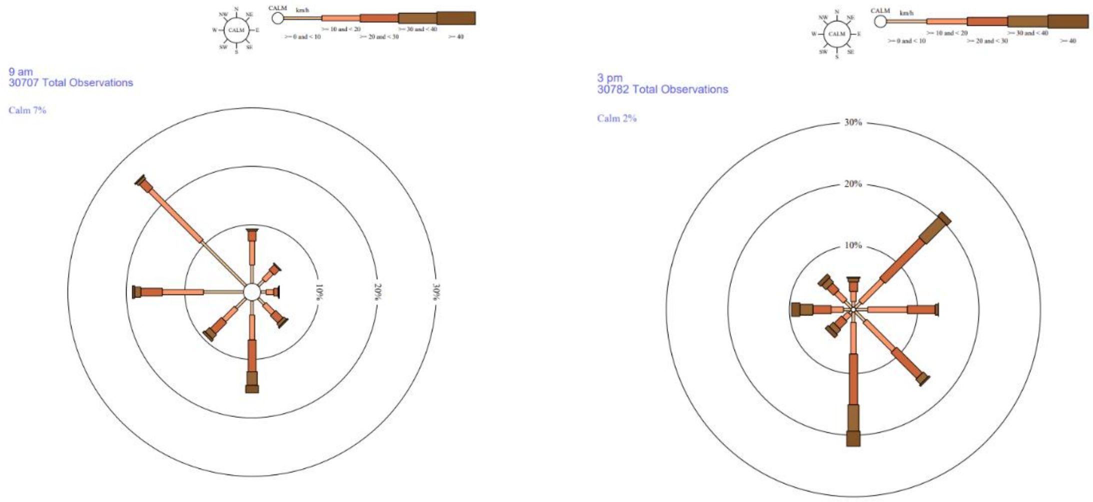

Figure 4-1: Sydney Airport AMO 9 am and 3 pm Annual Wind Roses – Wind Speed in km/h (01 April 1939 to 10 Aug 2025)

4.1.2 Wind

The dispersion of dust emissions is primarily influenced by the following meteorological factors:

- Wind speed and direction;
- Wind profile and turbulence intensity (which are affected by terrain);
- Temperature gradient, which affects atmospheric stability and is determined from wind speed, cloud cover and solar radiation; and
- Mixing height, which is the depth of the atmospheric boundary layer, where most of the dispersion occurs.

Wind speed and atmospheric stability are examined with respect to flow direction to investigate typical flow regimes and directions of poor dispersion.

Observations of wind speed and direction recorded at Sydney Airport AMO AWS – Station# 066037, have been used to describe typical wind patterns in the area surrounding the Proposal.

Figure 4-2 to Figure 4-7 show the annual and seasonal “wind rose” plots from Sydney Airport AMO AWS for the period from 2019 to 2023. As can be seen, winds from the north-west, northeast, west and south octants are most common in the annual wind roses.

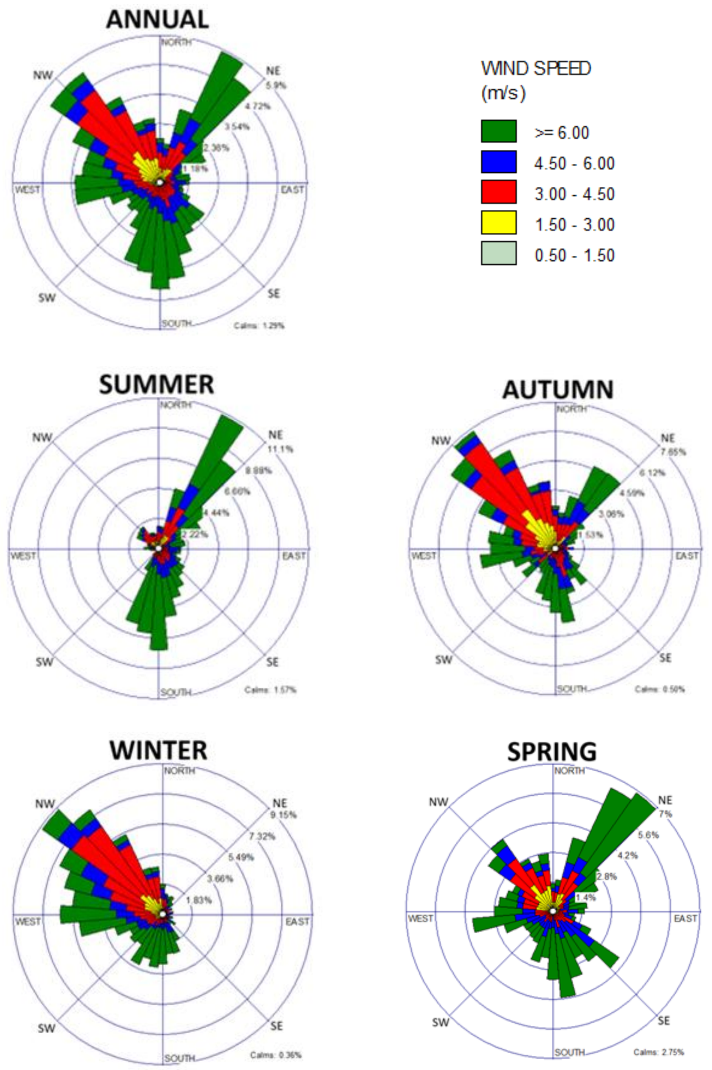

Figure 4-2: Sydney Airport AMO AWS Wind Roses, 2019

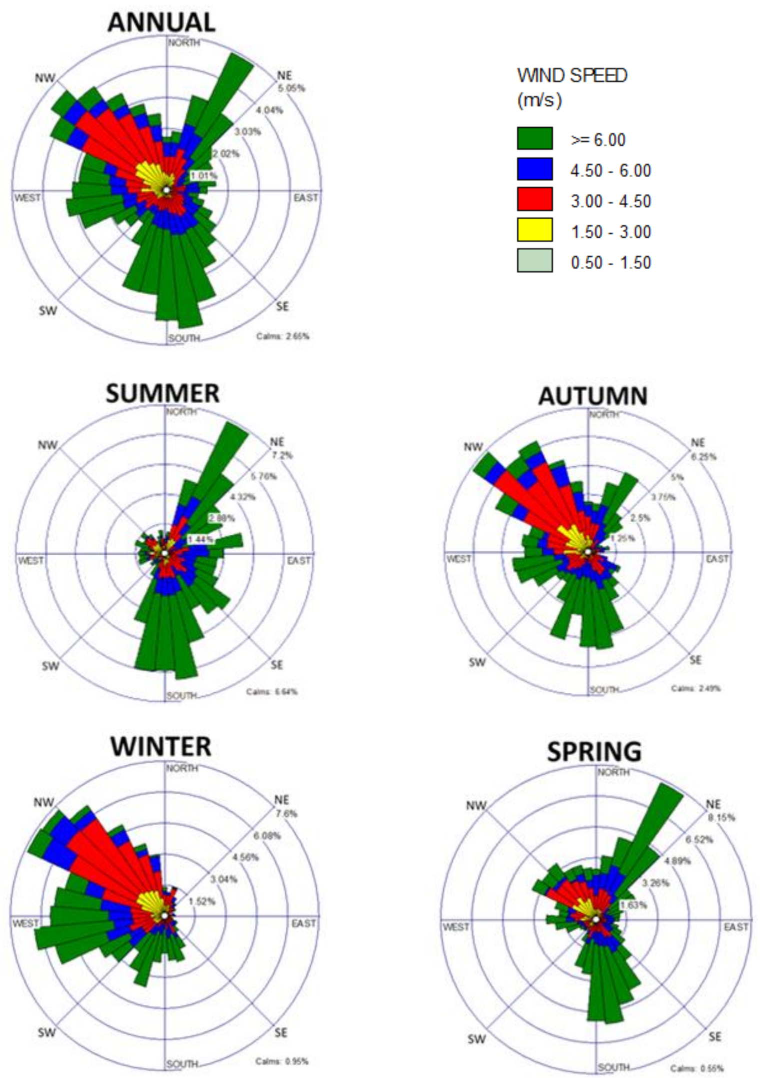

Figure 4-3: Sydney Airport AMO AWS Wind Roses, 2020

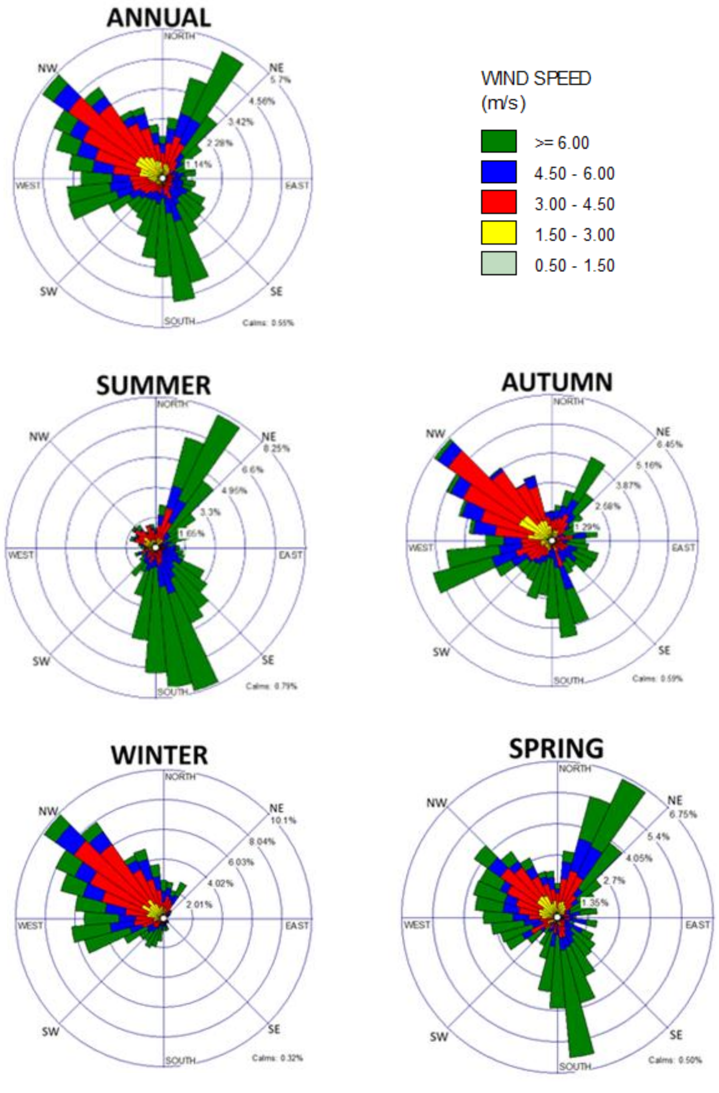

Figure 4-4: Sydney Airport AMO AWS Wind Roses, 2021

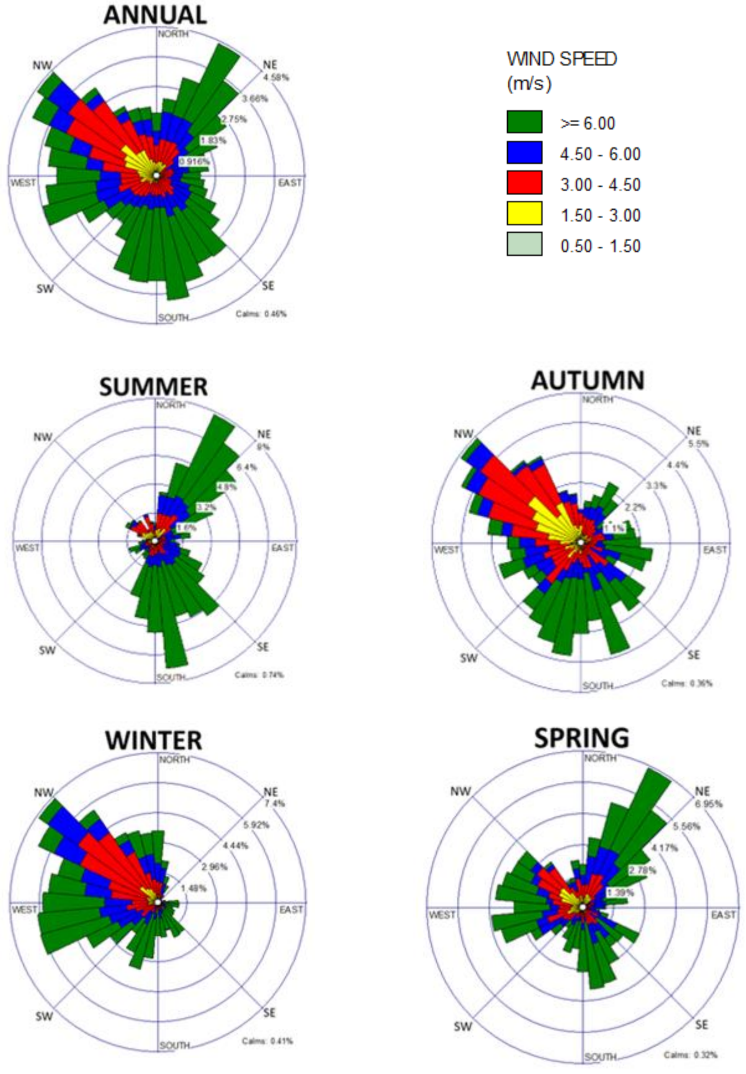

Figure 4-5: Sydney Airport AMO AWS Wind Roses, 2022

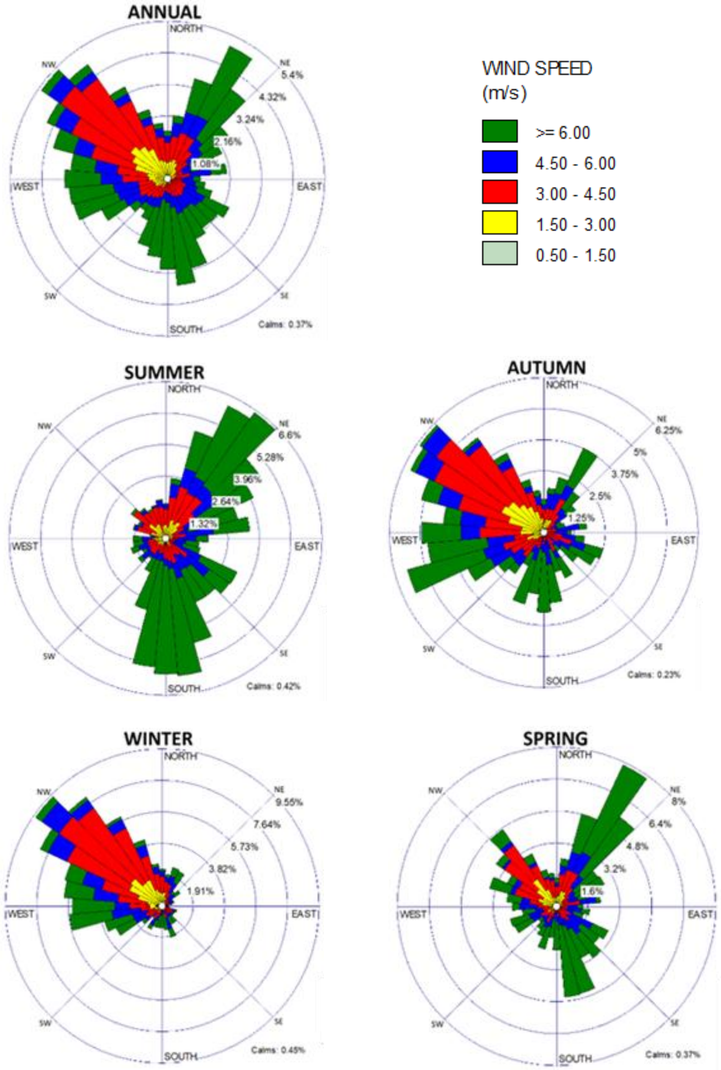

Figure 4-6: Sydney Airport AMO AWS Wind Roses, 2023

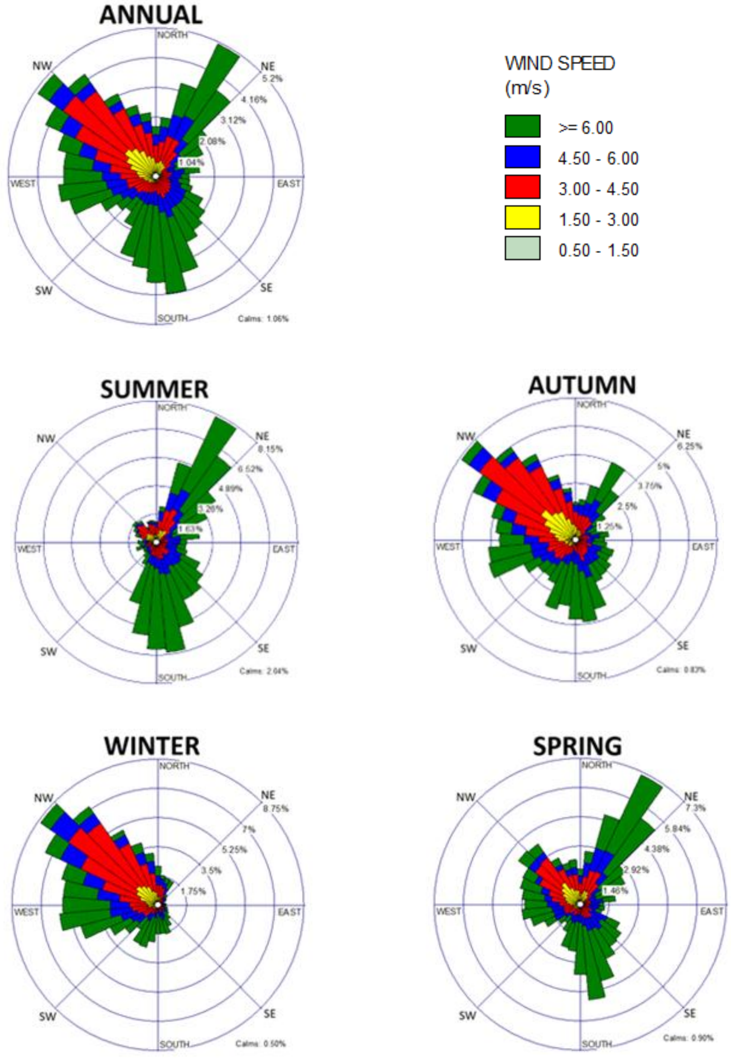

Figure 4-7: Sydney Airport AMO AWS Wind Roses, 2019 - 2023

4.2 Local Ambient Air Quality

No site-specific data are available to determine the existing concentrations of air pollutants near the Proposal. Data on existing background pollution concentrations were obtained from the NSW Department of Planning and Environment (DPE) air quality monitoring network. The DPE operates a network of AQMS across NSW. The nearest AQMS measuring the selected pollutants is located approximately 100m east of the Proposal, at the Bradfield Highways AQMS which is on the highway and concentrations are assessed to be higher due to continuous movement of traffics. The Bradfield Highways AQMS station commissioned in 2018 and is part of the East Sydney air quality monitoring region.

The following air pollutants are currently measured at Bradfield Highways AQMS:

- Particulate matter less than 2.5 µm in aerodynamic diameter ($PM_{2.5}$);
- Particulate matter less than 10 µm in aerodynamic diameter (PM_{10});
- Oxides of nitrogen (NO_2);
- Carbon monoxide (CO) and
- Sulphur dioxide (SO_2)

A summary of the ambient air quality monitoring data collected over the five-year period from 2021-2025 at Bradfield Highways AQMS is presented in Table 4-3. It also presents the applicable air quality criteria for each pollutant of interest.

Table 4-2: Ambient Air Quality Monitoring Concentrations in Proximity to the Proposal (Bradfield Highways AQMS)

Pollutant	Averaging Period	Concentration					Impact Criteria
		2021	2022	2023	2024	2025	
Particulate matter ≤2.5 µm (PM2.5)	24-hours[1]	40.7 µg/m³	16.1 µg/m³	60.5 µg/m³	21.6 µg/m³	34 µg/m³	25 µg/m³
	Annual[2]	6.7 µg/m³	5.4 µg/m³	8.3 µg/m³	8.5 µg/m³	7.9 µg/m³	8 µg/m³
Particulate matter ≤10 µm (PM10)	24-hours[1]	46 µg/m³	31.4 µg/m3	70.5 µg/m³	45.8 µg/m³	56.2 µg/m³	50 µg/m³
	Annual[2]	14.6 µg/m³	12.7 µg/m³	17.7 µg/m³	19.8 µg/m³	19.5 µg/m³	25 µg/m³
Carbon Monoxide (CO)	1-hour[1]	1.4 ppm	1.4 ppm	1.2 ppm	1.3 ppm	1.9 ppm	25 ppm
Nitrogen Dioxide (NO_2)	1-hour[1]	6.5 pphm	6.6 pphm	6.8 pphm	5.9 pphm	7.2 pphm	8 pphm
	Annual[2]	1.9 pphm	1.8 pphm	1.9 pphm	1.9 pphm	1.6 pphm	1.5 pphm
Sulphur Dioxide (SO_2)	1-hour[1]	1.5 pphm	1.9 pphm	1.8 pphm	1.4 pphm	1.7 pphm	7.5 pphm
	24-hours[1]	0.3 pphm	0.4 pphm	0.7 pphm	0.4 pphm	0.5 pphm	2 pphm

Note: 1. Maximum of 1-Hour or 24-hour Data over the year
2. Average of 1-Hour Data over the year

Table 4-3: Ambient Air Quality Monitoring Concentrations in Proximity to the Proposal (Bradfield Highways AQMS)

As seen in Table 4-3, existing background PM concentrations are high, and exceedances of the 24-hour average $PM_{2.5}$ criterion were recorded in 2021, 2023 and 2025. Exceedances of the 24-hour average PM_{10} criteria were recorded in 2023 and 2025. Exceedances of the annual average $PM_{2.5}$ criteria were recorded in 2023 and 2024. A review of the available compliance monitoring reports indicates that the exceedances were primarily due to exceptional events such as bushfire emergencies, dust storms and hazard reduction burns.

Background NO_2 concentrations are less than the Impact criteria values and SO_2 background concentrations about a third of the impact criteria.

Figure 4-8 to Figure 4-12 graphically present the air pollutant data recorded at Bradfield Highway AQMS for the calendar years 2021 – 2025. As can be seen from Figure 4-10 through to Figure 4-11, ambient concentrations of CO, and SO_2 were well below their respective criteria for that period.

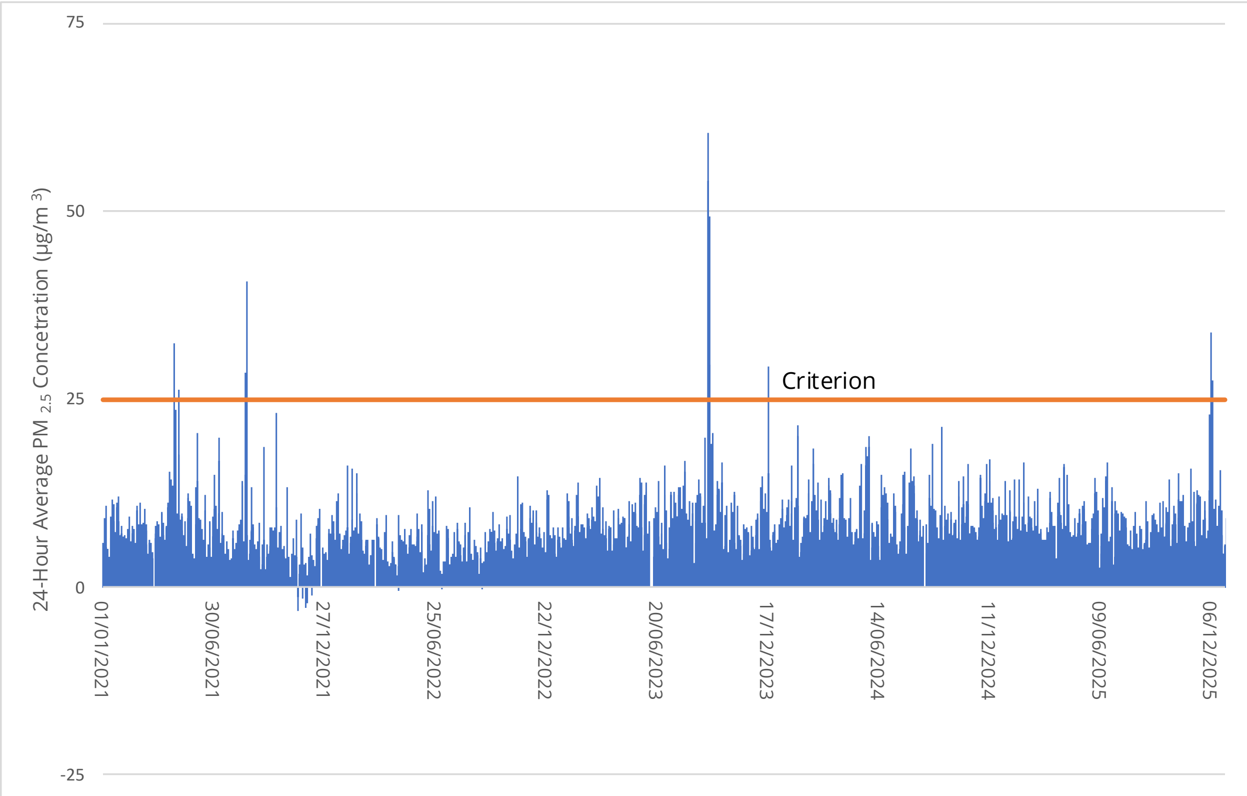

Figure 4-8: 24-Hour Average $PM_{2.5}$ Concentrations at Bradfield Highway AQMS (2021-2025)

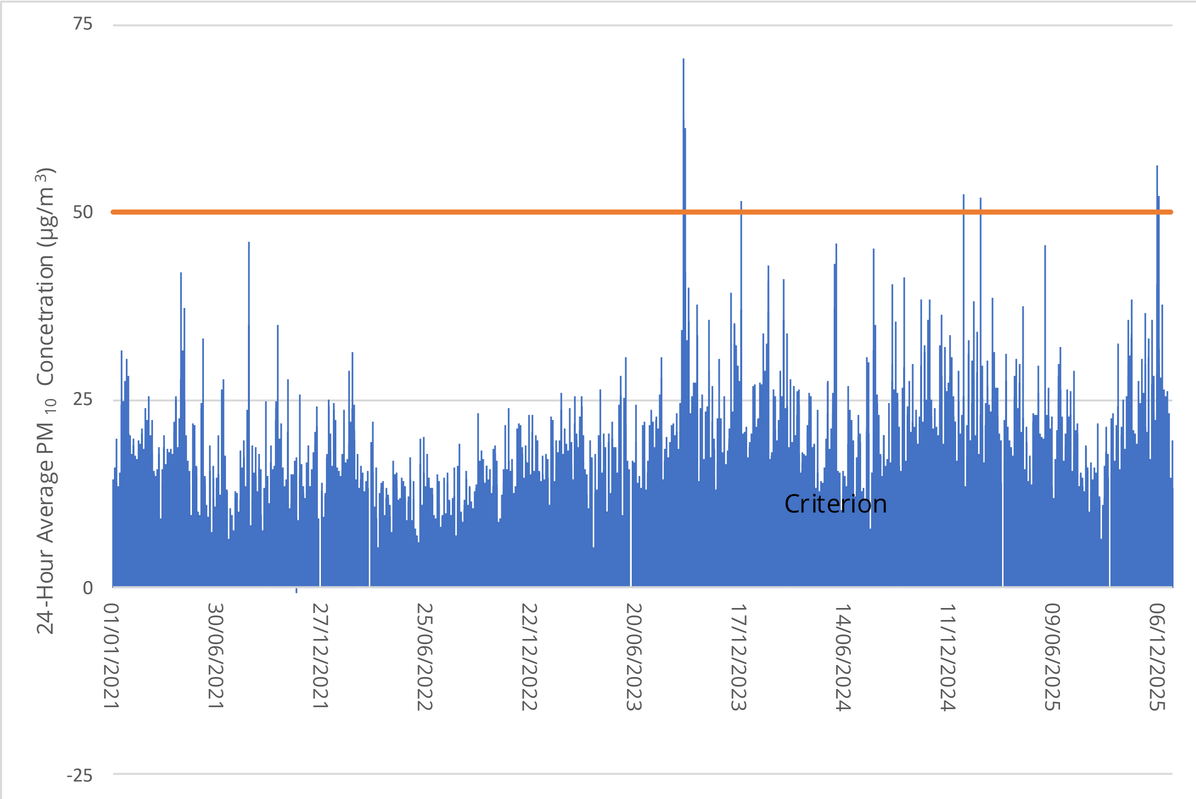

Figure 4-9: 24-Hour Average PM_{10} Concentrations at Bradfield Highway AQMS (2021-2025)

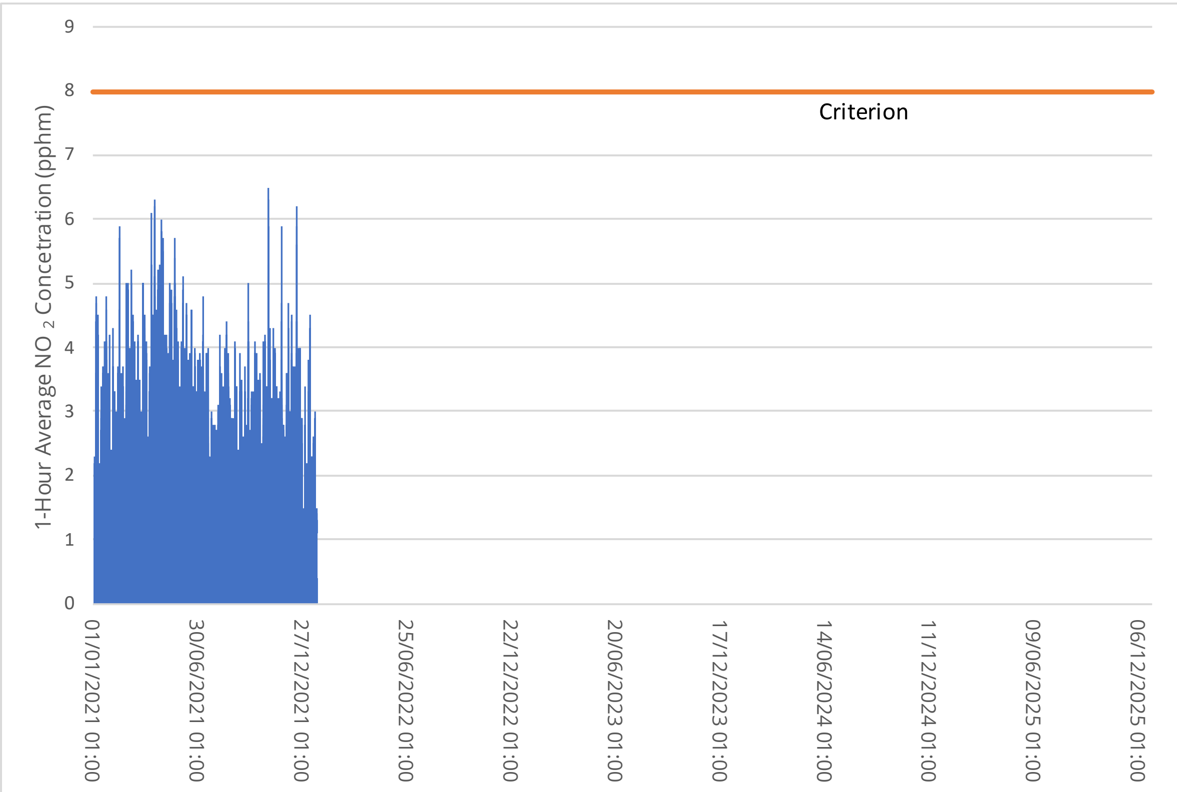

Figure 4-10: 1-Hour Average NO_2 Concentrations at Bradfield Highway AQMS (2021-2025)

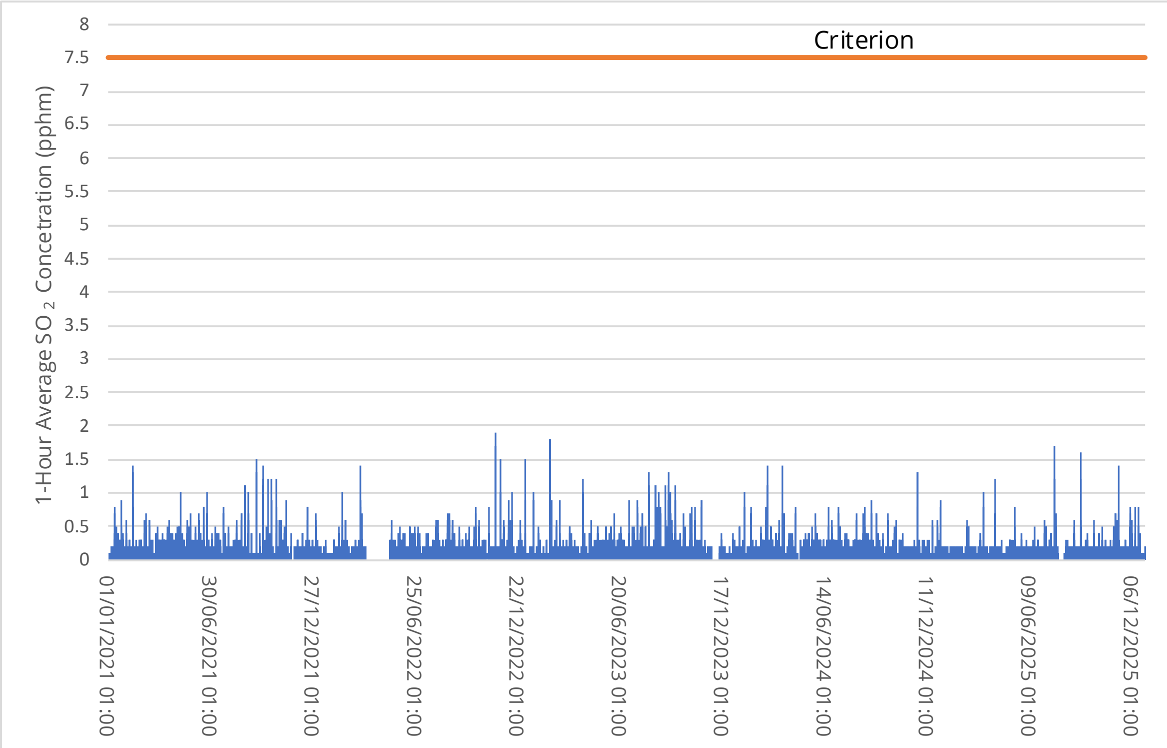

Figure 4-11: 1-Hour Average SO_2 Concentrations at Bradfield Highway AQMS (2021 - 2025)

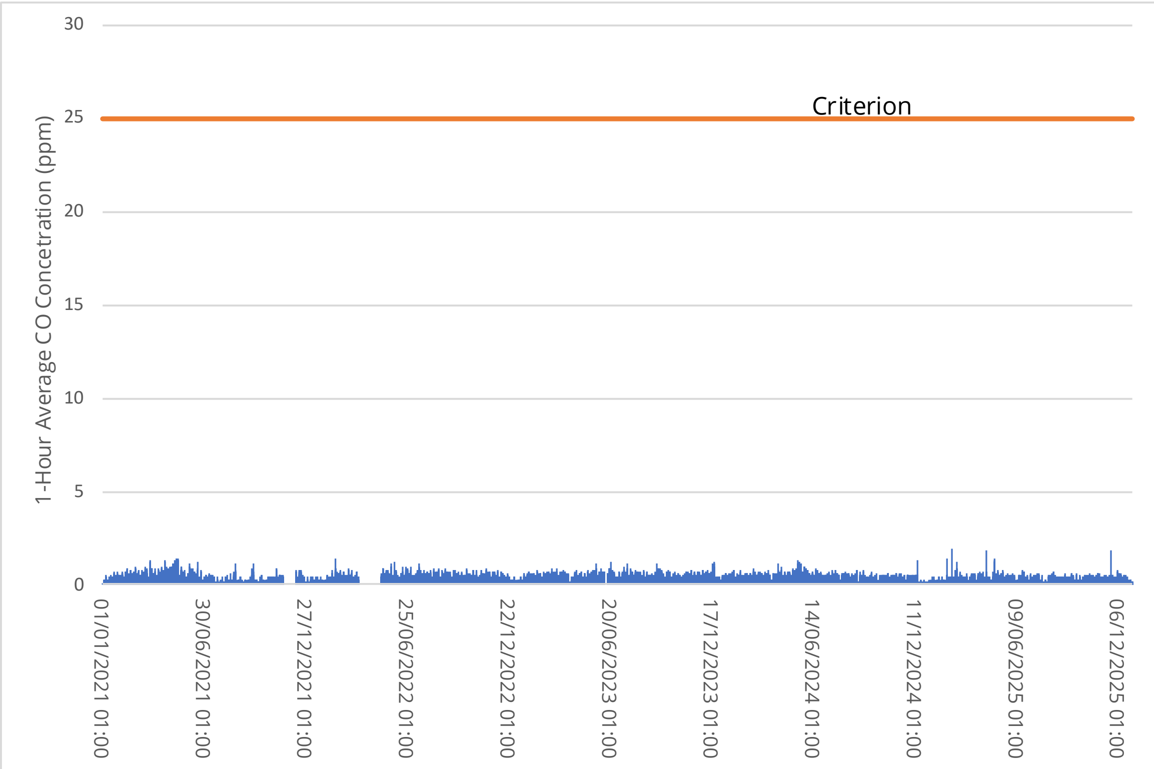

Figure 4-12: 1-Hour Average CO Concentrations at Bradfield Highway AQMS (2021 - 2025)

5 ASSESSMENT OF AIR QUALITY DURING CONSTRUCTION WORKS

5.1 Assessment Methodology

The EPA does not provide guidance specific to dust from construction sites in terms of a risk assessment and management approach. It has developed a guideline, the Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (NSW EPA, 2022). However, this guideline considers detailed modelling approaches and is not specifically relevant to construction dust impacts. A detailed modelling approach is not necessary for short-term construction impacts that can be managed.

A risk-based approach has, however, been developed in the UK by the IAQM as per the guideline EPUK & IAQM (2024). This approach has been widely used for performing qualitative assessments of dust emissions from construction sites and has been used in NSW by RWDI and other consultants. Furthermore, it has been accepted as a suitable approach in the absence of any guidance by Australian regulatory authorities. This section presents a qualitative assessment of potential air quality impacts associated with the proposed works and has been conducted in general accordance with the methodology described in the IAQM Guideline.

This approach presents the risk of dust soiling and human health impacts associated with four types of activities that occur on construction sites (demolition, earthworks, construction and trackout) and involves the following steps:

- Step 1: Screen the need for a detailed assessment.
- Step 2: Assess the risk of dust impacts arising, based on:
  - the potential magnitude of dust emissions from the works; and
  - the sensitivity of the surrounding area.
- Step 3: Identify site-specific mitigation.
- Step 4: Consider the significance of residual impacts, after the implementation of mitigation measures.

For this assessment, the process outlined above will be applied to the worst-case on-site and off-site activities that are likely to result in the highest generation of dust. This approach will result in a conservative assessment of the potential risks for human health and dust soiling impacts.

The construction and excavation phase (and associated trackout) of the Proposal is considered to have the greatest potential to generate short-term high levels of dust. This report focuses on the assessment of this worst-case scenario.

5.2 Risk Assessment of Dust Impacts from Proposed Construction Works

The following qualitative risk assessment of potential dust impacts has been conducted for the proposed construction works.

5.2.1 Step 1 – Screen the Need for a Detailed Assessment

The IAQM guidance recommends that a risk assessment of potential dust impacts from construction activities be undertaken when human receptors are located within:

- 250 m of the boundary of the site; or
- 50 m of the route(s) used by construction vehicles on public roads up to 250 m from the site entrance(s).

The addresses for the sensitive receptors near the site are included in Table 5-1.

Table 5-1: Representative Sensitive Receptors

Receptor	Address	Receiver Type	Distance to Site (m)	UTM Coordinates (Zone 56 H)	
				X (m E)	Y (m S)
R1	1 Middlemiss Street Lavender Bay	Residential	< 20	334,421	6,253,768
C2	2/118 Alfred Street South Milsons Point	Commercial	35	334,420	6,253,710
C3	61 Lavender Street Milsons Point	Commercial	30	334,386	6,253,727
C4	55 Lavender Street Milsons Point	Commercial	30	334,354	6,253,742
R5	62 Lavender Street Lavender Bay	Residential	< 20	334,369	6,253,786
R6	29 Arthur Street Lavender Bay	Residential	20	334,363	6,253,841
RC7	Alfred Street South Milsons Point	Recreational	80	334,467	6,253,694
RC8	Lavender Street Lavender Bay	Recreational	75	334,305	6,253,763
R9	46 Lavender Street Lavender Bay	Residential	50	334,338	6,253,815
R10	46 Lavender Street Lavender Bay	Residential	80	334,292	6,253,813

As can be seen in Figure 5-1, the nearest residential receivers are located within 250 m of the proposed site and therefore, an assessment of dust impacts is considered necessary under the guideline.

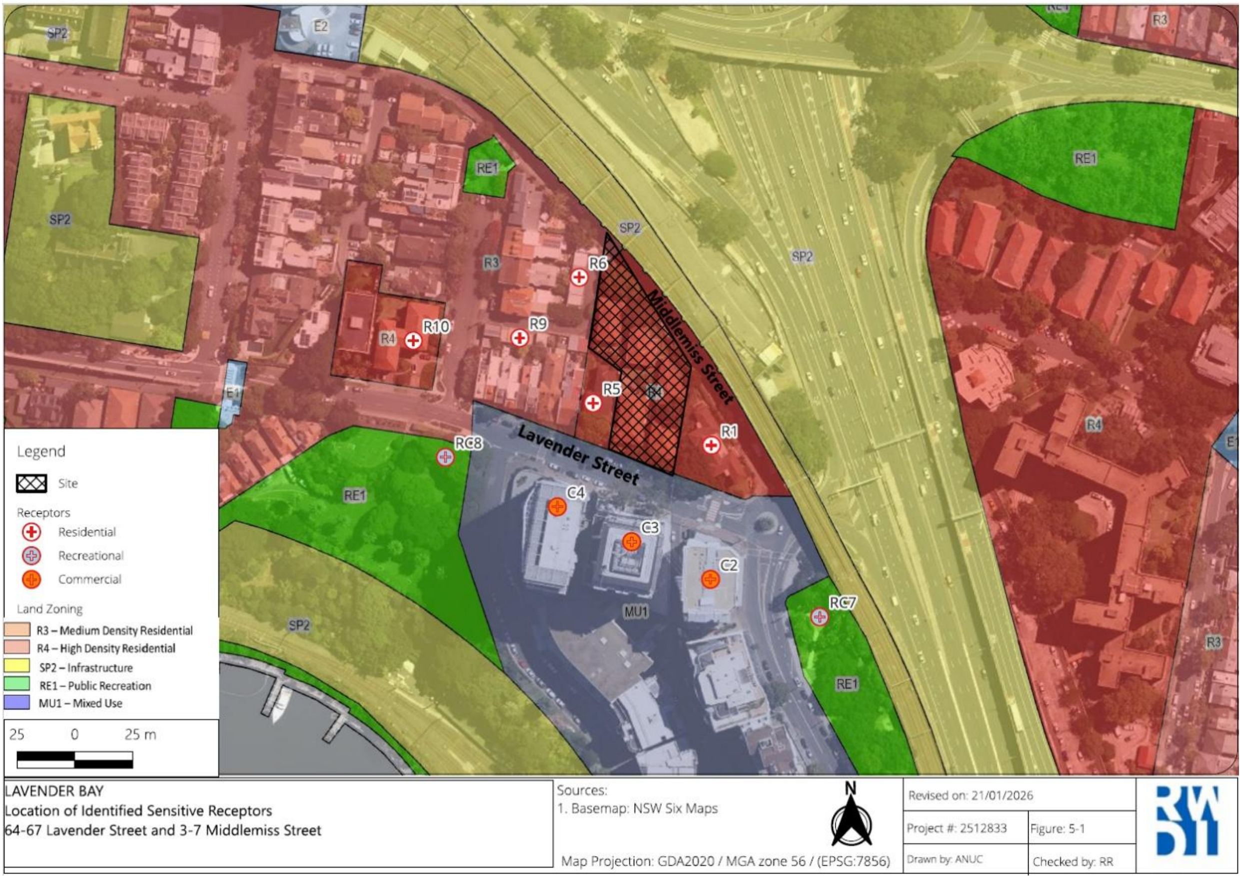

Figure 5-1: Locations of Identified Sensitive Receptors

5.2.2 Step 2A – Potential Dust Emission Magnitude

5.2.2.1 Demolition

In accordance with the IAQM guidance (Section 7, Step 2: Assess the Risk of Dust Impacts), dust emission magnitudes from demolition may be defined as:

- Large: Total building volume >75,000 m^3, potentially dusty construction material (e.g., concrete), on-site crushing and screening, demolition activities >12 m above ground level;
- Medium: Total building volume 12,000 m^3 – 75,000 m^3, potentially dusty construction material, demolition activities 6-12 m above ground level; and
- Small: Total building volume <12,000 m^3, construction material with low potential for dust release (e.g., metal cladding or timber), demolition activities <6 m above ground, demolition during wetter months.

The demolished building volume is more than 12,000 m^3 and less than 75,000 m^3 and demolition activities are between 6 - 12 m above ground. The potential magnitude of demolition is therefore assessed as **Medium**.

5.2.2.2 Earthworks

Dust emission magnitudes from earthworks may be defined as:

- Large: Total site area > Total site area >110,000 m^2, potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds >6 m in height;
- Medium: Total site area 18,000 -110,000 m^2, moderately dusty soil type (e.g., silt), 5 -10 heavy earth moving vehicles active at any one time, formation of bunds 3-6 m in height; and
- Small: Total site area <18,000 m^2, soil type with large grain (e.g., sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <3 m in height.

The area affected by the proposed earthworks is more than 18,000 m^2 but less than 110,000m^2, and at any one time, 5-10 heavy earth moving vehicles would be active. It is therefore conservatively assumed that the potential magnitude of earthworks is **Medium**.

5.2.2.3 Construction

The key issues when determining the potential dust emission magnitude during the construction phase include the size of the building(s)/infrastructure, method of construction, construction materials and duration of build. The dust emission magnitude from construction activities can be defined as:

- Large: Total building volume >75,000 m^3, on site concrete batching, sand blasting;
- Medium: Total building volume 12,000 m^3 – 75,000 m^3, potentially dusty construction material (e.g., concrete), on site concrete batching; and
- Small: Total building volume <12,000 m^3, construction material with low potential for dust release (e.g., metal cladding or timber).

The constructed building volume is more than 75,000 m^3 therefore, the potential magnitude of construction is assessed as **Large**.

5.2.2.4 Track out

Dust emission magnitudes from track out associated with haulage activities may be defined as:

- Large: >50 heavy vehicle (>3.5 t) outward movements per day, potentially dusty surface material (e.g. high clay content), unpaved road length >100 m;
- Medium: 20-50 heavy vehicle (>3.5 t) outward movements per day, moderately dusty surface material (e.g. high clay content), unpaved road length 50-100 m; and
- Small: <20 heavy vehicle (>3.5 t) outward movements per day, surface material with low potential for dust release, unpaved road length <50 m.

Track out is expected to result in between 20 and 50 heavy vehicle movements per day leaving the site (this would not occur for the entire duration), and all on-site haulage would include unpaved sections of road less than 50 m long. The potential magnitude of Track out is therefore assessed as **Medium**.

5.2.2.5 Summary of Dust Emission Magnitudes

The estimated dust emission magnitudes are summarized in Table 5-2:

Table 5-2: Summary of Dust Emission Magnitudes

Activity	Dust Emission Magnitude
Demolition	Medium
Earthworks	Medium
Construction	Large
Trackout	Medium

5.2.3 Step 2B – Sensitivity of Surrounding Area

The sensitivity of the surrounding area to dust impacts considers several factors, including:

- specific receptor sensitivities;
- the number of receptors and their proximity to the works;
- existing background dust concentrations; and
- site-specific factors that may reduce impacts, such as trees that may reduce wind-blown dust.

The following subsections provide the descriptions for sensitivities of different types of receptors to dust soiling and human health effects.

5.2.3.1 Dust Soiling Effects

High sensitivity receptor:

- Users can reasonably expect an enjoyment of a high level of amenity; or
- the appearance, aesthetics or value of their property would be diminished by soiling; and the people or property would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land.
- Indicative examples include dwellings, museum, and other culturally important collections, medium- and long-term car parks and car showrooms.

Medium sensitivity receptor:

- Users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home; or
- the appearance, aesthetics or value of their property could be diminished by soiling; or
- the people or property would not reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land.
- Indicative examples include parks and places of work.

Low sensitivity receptor:

- The enjoyment of amenity would not reasonably be expected; or
- property would not reasonably be expected to be diminished in appearance, aesthetics, or value by soiling; or
- there is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land.
- Indicative examples include playing fields, farmland (unless commercially sensitive horticultural), footpaths, short term car parks, and roads.

5.2.3.2 Human Health Effects

For the sensitivity of people to the health effects of PM_{10}, the IAQM provides the following assessment criteria.

High sensitivity receptor:

- Locations where members of the public are exposed over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day).
- Indicative examples include residential properties. Hospitals, schools, and residential care homes should also be considered as having equal sensitivity to residential areas for the purposes of this assessment.

Medium sensitivity receptor:

- Locations where the people exposed are workers, and exposure is over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day).
- Indicative examples may include office and shop workers but will generally not include workers occupationally exposed to PM_{10}, as protection is covered by Health and Safety at Work legislation.

Low sensitivity receptor:

- Locations where human exposure is transient.
- Indicative examples include public footpaths, playing fields, parks and shopping streets.

5.2.3.3 Summary of Sensitivities of Surrounding Area

In accordance with the IAQM guideline, the following receptor sensitivities have been determined:

Residential/Commercial Receivers:

- **High** sensitivity to dust soiling and human health.

Recreational Receivers:

- **Medium** sensitivity to dust soiling and human health

Considering the above receptor sensitivities, Table 5-3 and Table 5-4 have been reproduced from the IAQM (only showing the "high" receptor sensitivity) to determine the sensitivity of the area. For human health impacts, the mean background PM_{10} concentration of 19.5 µg/m^3 was chosen from Table 4-3.

Table 5-3: Area Sensitivity Decision Matrix – Dust Soiling

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)			
		<20	<50	<100	<250
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	> 1	Medium	Low	Low	Low
Low	> 1	Low	Low	Low	Low

Residential/Commercial Receivers

Recreational Receivers

Table 5-4: Area Sensitivity Decision Matrix – Human Health

Receptor Sensitivity	Annual Mean PM_{10} Concentration[1]	No. of Receptors	Distance from the Source (m)			
			<20	<50	<100	<250
High	> 20 µg/m³	>100	High	High	High	Medium
		10-100	High	High	Medium	Low
		1-10	High	Medium	Low	Low
	17.5 - 20 µg/m³	>100	High	High	Medium	Low
		10-100	High	Medium	Low	Low
		1-10	High	Medium	Low	Low
	15 – 17.5 µg/m³	>100	High	Medium	Low	Low
		10-100	High	Medium	Low	Low
		1-10	Medium	Low	Low	Low
	< 15 µg/m³	>100	Medium	Low	Low	Low
		10-100	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Medium	> 20 µg/m³	>10	High	Medium	Low	Low
		1-10	Medium	Low	Low	Low
	17.5 - 20 µg/m³	>10	Medium	Low	Low	Low
		1-10	Low	Low	Low	Low
	15 – 17.5 µg/m³	>10	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
	< 15 µg/m³	>10	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Low	-	≥ 1	Low	Low	Low	Low

Residential/Commercial Receivers

Recreational Receivers

Note 1: The PM_{10} values have been adjusted from the IAQM guidance according to the ratio between the Australian and UK annual mean standards (25 and 40 µg/m³ respectively). There is some inherent uncertainty in this adjustment. The upper PM_{10} threshold in the IAQM guidance is based on an annual mean concentration at which an exceedance of the UK's 24-hour objective of 50 µg/m³ is likely, allowing for 35 exceedances per year. In other words, for the UK the annual average approximately corresponds to the 90th percentile of the 24-hour values. However, there are far fewer allowed exceedances in Australia and New Zealand and therefore, there is no direct comparison. Nevertheless, experience with the adjusted values has shown that they work reasonably well for Australian conditions. The values are also taken to be appropriate for New Zealand. Although New Zealand has a lower annual mean guideline than the Australian standard, the 24-hour standards are numerically equivalent.

The sensitivity of the surrounding area (for all identified receivers) is summarized in Table 5-5.

Table 5-5: Summary of Surrounding Area Sensitivity

Potential Impact	Sensitivity of the Surrounding Area			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	Medium	Medium	Medium	Medium
Human Health	Medium	Medium	Medium	Medium

5.2.4 Step 2C – Define the Risk of Impacts

To define the risk of impacts, the dust emission magnitude ("Medium and Low" for this Site) is combined with the sensitivity of the area, as per Table 5-6, Table 5-7, Table 5-8 and Table 5-9 for demolition, earthworks, construction and trackout, respectively.

Table 5-6: Risk of Dust Impacts – Demolition

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible

Table 5-7: Risk of Dust Impacts – Earthworks

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table 5-8: Risk of Dust Impacts – Construction

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table 5-9: Risk of Dust Impacts – Trackout

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

In accordance with Table 5-6 through Table 5-9, demolition, earthwork, construction and trackout activities are considered to have Medium risk of dust soiling and human health impacts. It is important to note that the above risks assume that dust mitigation measures are not implemented.

5.2.5 Step 3 – Site-Specific Mitigation

The IAQM guidance document identifies a range of appropriate dust mitigation measures that should be implemented as a function of the risk of impacts. These measures are presented in Section 6.

5.2.6 Step 4 – Significance of Residual Impacts

In accordance with the IAQM guidance document, the final step in the assessment is to determine the significance of any residual impacts, following the implementation of mitigation measures. To this end, the guidance states:

> *For almost all construction activity, the aim should be to prevent significant effects on receptors through the use of effective mitigation. Experience shows that this is normally possible. Hence the residual effect will normally be "not significant".*

Based on the proposed works, and the advice in the IAQM guidance document, it is considered unlikely that these works would result in unacceptable air quality impacts. However, the mitigation measures outlined in Section 6 should be considered to implement best management practises.

6 RECOMMENDED MITIGATION AND MANAGEMENT

6.1 Construction Dust Mitigation Measures

The assessment of potential dust impacts from the proposed construction activities indicate that the Proposal will have a **medium risk** for demolition, earthwork, construction and track out activities if dust mitigation measures are not implemented.

To ensure best practice management, the following mitigation measures are recommended so that construction dust impacts are minimised.

- **Communications:**
  - Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.
  - Display the name and contact details of the Responsible Person accountable for air quality and dust issues on the site boundary.
  - Display the head or regional office contact information.
  - Develop and implement a Dust Management Plan (DMP) that considers, as a minimum, the measures identified herein.
- **Site Management:**
  - Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.
  - Make the complaints log available to relevant authorities (Council, EPA, etc).
  - Record exceptional incidents that cause dust and/or air emissions, on or off site, and the actions taken to resolve the situation in the logbook.
  - Hold regular liaison meetings with other high risk construction sites within 250 m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised.
- **Monitoring:**
  - Undertake daily on-site and off-site inspections at nearby receptors to monitor dust. Record inspection results and make available to relevant authorities. This should include regular dust soiling checks of surfaces such as street furniture, cars, and windows. Continuous real-time dust monitoring is not necessary for the Proposal.
  - Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked.
  - Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
- **Preparing & Maintaining the Site:**
  - Plan site layout so that dust generating activities are located as far away as possible from receptors.
  - Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.

  - Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period.
  - Avoid site runoff of water or mud.
  - Keep site fencing, barriers and scaffolding clean using wet methods.
  - Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If being re-used, keep materials covered or contained in a way which prevents dust, for example dust suppression.
  - Cover, seed, or fence stockpiles to prevent wind erosion.
- **Construction Vehicles and Sustainable Travel:**
  - Ensure all vehicles switch off engines when stationary – no idling vehicles.
  - Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable.
  - Impose and signpost a maximum-speed-limit of 25 km/h on surfaced and 15 km/h on unsurfaced haul roads and work areas (if long haul routes are required, these speeds may be increased with suitable additional control measures provided).
  - Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.
  - Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).
- **Measures for General Construction Activities:**
  - Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems
  - Ensure an adequate water supply on the site for effective dust/PM suppression/mitigation, using non-potable water where possible and appropriate.
  - Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate
  - Ensure equipment is readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.
- **Measures Specific to Demolition:**
  - Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust).
  - Ensure effective water suppression is used during demolition operations. Handheld sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition, high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.
  - Avoid explosive blasting, using appropriate manual or mechanical alternatives.
  - Bag and remove any biological debris or damp down such material before demolition.
- **Measures Specific to Earthworks:**
  - Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.
  - Only remove the cover in small areas during work and not all at once.
- **Measures Specific to Construction:**
  - Avoid scabbling (roughening of concrete surfaces) if possible.

- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.
- Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.
- For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust.

- **Measures Specific to Haulage:**
  - Use water-assisted dust sweeper(s) on the access and local roads, as necessary.
  - Avoid dry sweeping of large areas.
  - Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
  - Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.
  - Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).
  - Access gates to be located at least 10 m from receptors where possible.

7 ASSESSMENT OF AIR QUALITY DURING OPERATION PHASE

7.1 Assessment Methodology

As mentioned previously in this assessment, in terms of air quality, the operation of the Proposal would generate additional traffic movements along Lavender Street and Middlemiss Street.

The emissions would be of a similar nature to those already emitted by road traffic along the nearby road network. Moreover, as per Section 4.1, winds most frequently blow from the north-westerly to westerly winds at 9 am and south-easterly, easterly and north-easterly winds at 3 PM. North-westerly winds, would be able to carry emissions towards the sensitive receptors but are not anticipated to have a substantial impact.

Guidance in EPUK & IAQM (2017) was followed to estimate the contribution of the three main pollutants from the operation of the Proposal. Specifically, Table 6.3 from the guideline (reproduced as Table 7-1 below) was applied.

Table 7-1: Impacts Descriptors for Individual Receptors

Long term average Concentration at receptor in assessment year	% Change in concentration relative to Air Quality Assessment Level (AQAL)			
	1	2-5	6-10	>10
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76-94% of AQAL	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

Explanation

1. AQAL = Air Quality Assessment Level, which may be an air quality objective, EU limit or target value, or an Environment Agency 'Environmental Assessment Level (EAL)'.
2. The Table is intended to be used by rounding the change in percentage pollutant concentration to whole numbers, which then makes it clearer which cell the impact falls within. The user is encouraged to treat the numbers with recognition of their likely accuracy and not assume a false level of precision. Changes of 0%, i.e. less than 0.5%, will be described as Negligible.
3. The Table is only designed to be used with annual mean concentrations.
4. Descriptors for individual receptors only; the overall significance is determined using professional judgement (see Chapter 7). For example, a 'moderate' adverse impact at one receptor may not mean that the overall impact has a significant effect. Other factors need to be considered.
5. When defining the concentration as a percentage of the AQAL, use the 'without scheme' concentration where there is a decrease in pollutant concentration and the 'with scheme;' concentration for an increase.
6. The total concentration categories reflect the degree of potential harm by reference to the AQAL value. At exposure less than 75% of this value, i.e. well below, the degree of harm is likely to be small. As the exposure approaches and exceeds the AQAL, the degree of harm increases. This change naturally becomes more important when the result is an exposure that is approximately equal to, or greater than the AQAL.
7. It is unwise to ascribe too much accuracy to incremental changes or background concentrations, and this is especially important when total concentrations are close to the AQAL. For a given year in the future, it is impossible to define the new total concentration without recognising the inherent uncertainty, which is why there is a category that has a range around the AQAL, rather than being exactly equal to it.

Source: EPUK & IAQM (2017)

The NSW EPA's 'Approved Methods' (NSW EPA 2022) outlines the approach to Air Quality Impact Assessment, using two 'Levels':

- Level 1: a simple 'screening' assessment using worst-case modelling assumptions.
- Level 2: a detailed assessment using refined modelling techniques and site-specific input data.

If a Level 1 assessment demonstrates that adverse impacts will not occur, then there is no need to progress to Level 2. This assessment is based on a Level 1 screening assessment of the primary source of air emissions surrounding the development i.e. increase in vehicle traffic mainly along Lavender Street to the west of the Site whereas the Middlemiss Street traffic is considered to be minimal. Modelling of emissions from vehicles travelling along Lavender Street was conducted using the NSW Roadside Air Quality Screening Tool RAQST, which is the recommended model for use in roadside air quality studies in NSW.

7.2 Emission Sources and Pollutants

Traffic emissions from vehicles travelling along the Lavender Street have the most potential to significantly impact air quality in the Study Area.

Atmospheric pollutants emitted from road traffic include NO_X, $PM_{2.5}$, PM_{10}, SO_2 and VOCs. Due to the introduction of lead-replacement fuels in 2002, emissions of lead from motor vehicles are no longer considered to be significant and therefore, not included in this assessment. Similarly, due to the introduction of low sulphur fuels in 2009, motor vehicles are no longer significant sources of SO_2. Also, the emissions of CO and VOCs are no longer a concern from current vehicles fleets, given the relatively low level of CO and VOC emissions from vehicles, it is thus considered appropriate to assume that CO, SO_2 and VOC emissions from road traffic are highly unlikely to result in any exceedances of the relevant criteria. Hence, CO, SO_2 and VOC traffic emissions have not been considered further in this assessment.

7.3 Screening-Level Assumptions

From an air quality perspective, air contaminant emissions from vehicles travelling on the Lavender Street are the main concern for the nearby sensitive receptors and Study Area.

At a screening level (called "level 1 assessment" in NSW EPA, 2022), air quality impacts are modelled as a function of distance from the road for worst cases of emissions, background concentrations and meteorological conditions. In other words, the impact of vehicles travelling on the Lavender Street on receptors is solely a function of the distance that air contaminant emissions travel from the road to the receptors. The screening model does not consider more complex flow phenomena such as turbulence, wake effects, channelling or containment.

The RAQST uses a single dispersion function to represent all meteorological conditions. The function was derived using the CALINE 4 model, based on conservative assumptions. An empirical approach is used to calculate NO_2 concentrations.

The RAQST uses the number of lanes of traffic (either one, two, three or four lanes per direction), the road type, the average road gradient, the width of any median strip, and the width of each lane. For each lane, the RAQST calculates emissions based on the corresponding traffic data (volume, composition and speed).

7.4 Traffic Volume

The south of the Site is the Lavender Street which is a 2-lane commercial arterial road with a speed limit of 40 km/hr. The residential receptors are at a distance less than 20 m and the Proposal is 10 m from Lavender Street.

The traffic volumes were obtained from the client dated 7 January 2026 for the development of site at 64 & 66 Lavender Street, Lavender Bay and 3, 5 & 7 Middlemiss Street, Lavender Bay. The existing traffic volumes on Lavender Street are up to 250 vehicles per hour at the busiest time of the day and with the inclusion of the Proposal, an increase of 30-40 vehicles were anticipated per hour.

The traffic movement volumes along Lavender Street during the morning and afternoon peaks periods reveal relatively slow-moving traffic with minor stoppages due to roundabout operation and turning/parking manoeuvres.

For the worst-case scenarios, observed peak-hour traffic volume of approximately 290 vehicles per hour corresponds for slow-moving traffic (10 kmph).

Table 7-2 summarizes the traffic-related input parameters to the RAQST.

Table 7-2: RAQST Traffic and Related Input Parameters for Modelling Year 2025

Parameter	Value
Lanes per Direction	1
Road Type	Residential
Road Gradient	0.0%
Median Strip Width	0
Lane Width	3.5 m
Traffic Speed	Slow Moving Traffic 10 km/hr

7.5 Assessment of Air Quality Impacts

Modelling of emissions from vehicles travelling along the Lavender Street was conducted using the RAQST screening model from the kerb of the road to the development site. The modelling results are attached in Appendix A of this report for traffic.

The air quality impact assessment using RAQST tool was performed for 10 m from the site for a slow-moving traffic of 10kmph.

Table 7-3 presents the air quality impact on the Proposal from vehicles travelling along Lavender Street at a distance of 10 m from the road for vehicles moving with a speed of 10km/hr (worst-case).

Table 7-3: Cumulative Air Quality Impact at 10 m from Road Kerb Level along Lavender Street

Pollutant	Predicated concentration (due to roadway)	Ambient Pollutant Concentration (Background)	Total Combined Concentration	EPA Criteria	Compliance?
Nitrogen Dioxide (NO_2) – 1 Hour µg/m³	Not Applicable	Not Applicable	89.8	164	Yes
Nitrogen Dioxide (NO_2) – Annual µg/m³	17.8	1.3	19.0	31	Yes
Particulate matter ≤10 µm (PM_{10}) - 24 Hour µg/m³	48.7	0.6	49.3	50	Yes
Particulate matter ≤10 µm (PM_{10}) - Annual µg/m³	19.5	0.2	19.7	25	Yes
Particulate matter ≤2.5 µm ($PM_{2.5}$) - 24 Hour µg/m³	16.6	0.4	17.1	25	Yes
Particulate matter ≤2.5 µm ($PM_{2.5}$) - Annual µg/m³	7.8	0.2	8	8	Yes

The review of Screening level (Level 1) model results in and Appendix A indicates the following:

- The cumulative 1-hour and annual NO_2 concentration does not exceed the criteria throughout the development site.
- The cumulative 24-hour and annual PM_{10} and $PM_{2.5}$ concentration also does not exceed the criteria throughout the development site at 10m from the site.

Overall, the preliminary assessment show that there are no substantial air quality impacts on the Proposal site from the Lavender Street.

8 CONCLUSION

RWDI was engaged by The Trustee for CE Lavender Bay Trust to support the Development Application (DA) for the construction and operation of a residential development on the land at 64 & 66 Lavender Street, Lavender Bay and 3, 5 & 7 Middlemiss Street, Lavender Bay (the Site).

A risk-based approach in accordance with the IAQM guidance was adopted to assess dust emissions from the construction of the Site. The assessment concluded that there would be a Medium risk of dust impacts from demolition, earthwork, construction and trackout. Mitigation measures to minimise potential air quality impacts during the construction were recommended. Assuming the recommended mitigation measures are implemented, no significant air quality impacts are expected to occur during the construction of the Proposal.

From an air quality perspective, air contaminant emissions from vehicles travelling along the Lavender Street are the main concern for future residents of the Proposal. A screening model tool developed by Transport of NSW, the Roadside Air Quality Screening Tool (RAQST), was used to assess air quality impacts from vehicle traffic emissions for peak hour traffic. A slow-moving worst-case scenario with vehicle speed of 10 km/h.

There are no predicted air quality exceedances at a distance greater than 10 m from the Lavender Street. The model predicts that the main criteria pollutants does not exceed the criteria throughout the development site from the nearby future vehicular traffic. This report completes the Level 1 air quality screening assessment in support of the SSDA.

9 REFERENCES

BoM (Bureau of Meteorology), 2024: Climate Averages Australia. Accessible at: http://www.bom.gov.au/climate/data/

DOP, 2008: "NSW Government Department of Planning – 'Development Near Rail Corridors and Busy Roads – Interim Guideline". Accessible at: https://www.planning.nsw.gov.au/sites/default/files/2023-03/development-near-rail-corridors-and-busy-roads-interim-guideline.pdf

EPUK (Environmental Protection UK) & IAQM (Institute of Air Quality Management), 2017: "Guidance on land-use planning and development control: Planning for air quality 2017 v1.2". Accessible at: https://iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf

NEPC (National Environment Protection Council), 2021: "National Environment Protection Council's (NEPC), National Environment Protection (Ambient Air Quality) Measure. Variation to the Ambient Air Quality NEPM – 2021". Accessible at: https://www.nepc.gov.au/nepms/ambient-air-quality

NSW EPA (New South Wales Environmental Protection Authority), 2008/2013: "Air Emissions Inventory for the Greater Metropolitan Region in NSW". Accessible at: https://www.epa.nsw.gov.au/your-environment/air/air-emissions-inventory

NSW EPA, 2013: "State of NSW and Environment Protection Authority, Air Emissions in My Community web tool Substance information". Accessible at: https://www.transport.nsw.gov.au/system/files/media/documents/2023/130841AEsubstance.pdf

NSW EPA (New South Wales Environmental Protection Authority), 2022: "Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (2022)". Accessible at: https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/air/22p3963-approved-methods-for-modelling-and-assessment-of-air-pollutants.pdf?la=en&hash=79991C3AD2F7A1FAEC34EBAA857E7D0CCDDD1B24

RAQST (The Roadside Air Quality Screening Tool), Version 1.1, 2024: Assessing air quality impacts from surface roads. Accessible at: https://www.transport.nsw.gov.au/operations/roads-and-waterways/environment-and-heritage/air-quality/assessing-air-quality-impacts

State Environmental Planning Policy (Infrastructure), 2021 (SEPP, 2021): "Air Quality relevant policies and guidelines from SEEP". Accessible at: https://legislation.nsw.gov.au/view/html/inforce/current/epi-2007-0641

10 STATEMENT OF LIMITATIONS

This report entitled ***Lavender Bay** – Air Quality Impact Assessment*, dated 17 March 2026, was prepared by RWDI Australia Pty Ltd ("RWDI") for CE Lavender Bay Trust ("Client"). The findings and conclusions presented in this report have been prepared for the Client and are specific to the project described herein ("Proposal"). The conclusions and recommendations contained in this report are based on the information available to RWDI when this report was prepared. Because the contents of this report may not reflect the final design of the Proposal or subsequent changes made after the date of this report, RWDI recommends that it be retained by Client during the final stages of the project to verify that the results and recommendations provided in this report have been correctly interpreted in the final design of the Proposal.

The conclusions and recommendations contained in this report have also been made for the specific purpose(s) set out herein. Should the Client or any other third party utilise the report and/or implement the conclusions and recommendations contained therein for any other purpose or project without the involvement of RWDI, the Client or such third party assumes any and all risk of any and all consequences arising from such use and RWDI accepts no responsibility for any liability, loss, or damage of any kind suffered by Client or any other third party arising therefrom.

Finally, it is imperative that the Client and/or any party relying on the conclusions and recommendations in this report carefully review the stated assumptions contained herein and to understand the different factors which may impact the conclusions and recommendations provided.

APPENDIX A

EMISSION INVENTORY – RAQST Assessment Traffic Emissions

User input

1. General set-up

† Changing parameters in bold will reset traffic data.

Assessment year†	**2025**
Electric vehicle projections	YES

2. Road characteristics

Lanes per direction†	**1**
Road type†	**Residential**
Road gradient in direction A	0.1%
Median strip width (m)	0
Lane width (m)	3.5

3. Traffic data - general

Level for traffic composition†	**Level 1**
Fill with default composition†	**NO**
Traffic period†	**Peak hour**
Traffic speed (km/h)	10
Peak hour traffic as % of AADT‡	10%

‡ Used to calculate peak-hour traffic if only AADT is known.

4. Traffic data - by lane

Direction	Lane	Road gradient	Traffic volume (peak hour - vph)
A	Lane A1 ►	0.1%	145
B	◄ Lane B1	-0.1%	145

5. Background concentrations

(a) Values from DPE monitoring stations (2021 only)

Background site for NO_X	Default
Background site for PM_{10}	Default
Background site for $PM_{2.5}$	Default
1-hour metric for NO_X	Maximum
24-hour metric for PM_{10}	Maximum
24-hour metric for $PM_{2.5}$	Maximum

(b) User-defined values (overrides DPE data)

Apply user-defined values			YES
	NOx (μg/m^3)	PM_{10} (μg/m^3)	$PM_{2.5}$ (μg/m^3)
1-hour	84.1	-	-
24-hour	-	48.7	16.6
Annual	33.2	19.5	7.8

6. Closest receptor

Distance from kerb of lane A1 (m)	10

Results - concentrations at receptor

Pollutant	Averaging period	Air quality criterion (µg/m^3)	Predicted concentration (µg/m^3) Background	Predicted concentration (µg/m^3) Road	Predicted concentration (µg/m^3) Total	Predicted concentration as % of criterion Background	Predicted concentration as % of criterion Road	Predicted concentration as % of criterion Total	Compliance of total with criterion	Total <90% of criterion	Impact assessment result
NO_X	1-hour	-	84.1	19.8	103.9	Not applicable			Not applicable		
	Annual	-	33.2	4.0	37.2						
NO_2	1-hour	**164**	Not applicable		**89.8**	Not applicable		*55%*	Yes	Yes	Not applicable
	Annual	**31**	17.8	1.3	**19.0**	*57%*	*4%*	*61%*	Yes	Yes	Negligible
PM_{10}	24-hour	**50**	48.7	0.6	**49.3**	*97%*	*1%*	*99%*	Yes	No	Not applicable
	Annual	**25**	19.5	0.2	**19.7**	*78%*	*1%*	*79%*	Yes	Yes	Negligible
$PM_{2.5}$	24-hour	**25**	16.6	0.4	**17.1**	*67%*	*2%*	*68%*	Yes	Yes	Not applicable
	Annual	**8**	7.8	0.2	**8.0**	*98%*	*2%*	*100%*	Yes	No	Moderate

Summary

Does not comply with all air quality criteria.

Potential impact is moderate.

Recommendation

Seek advice on whether a detailed assessment should be conducted.