Augusta Street Warehouse and Distribution Centre

Air Quality Impact Assessment

The Trustee for Huntingwood Property Trust

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Basis of Report

This report has been prepared by SLR Consulting Australia Pty Ltd (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with The Trustee for Huntingwood Property Trust (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

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E.4 Summary

1.0 Introduction

SLR Consulting Australia Pty Ltd (SLR) has been commissioned by The Trustee for Huntingwood Property Trust to prepare this report in accordance with the technical requirements of the Secretary's Environmental Assessment Requirements (SEARs), and in support of the State Significant Development Application (SSD- 36138263) for the proposed Augusta Street warehouse and distribution centre (the Project) at Augusta Street, Blacktown (the Site).

This report assesses the potential construction and operational air quality impacts associated with the Project and has been prepared to accompany the State Significant Development (SSD) application for the proposal.

1.1 Secretary's Environmental Assessment Requirements

The Planning Secretary's Environmental Assessment Requirements (SEARs) relating to air quality issues for the project are as follows:

> ***Air Quality***
>
> *Identify significant air emission sources at the proposed development (during construction and operation), assess their potential to cause adverse off-site impacts, and detail proposed management and mitigation measures that would be implemented. Where air emissions during operation have the potential to cause adverse off-site impacts, provide a quantitative air quality impact assessment prepared in accordance with the relevant NSW Environment Protection Authority (EPA) guidelines.*

Table 1 summarises the requirements and where the requirement is addressed in this report.

Table 1 Regulatory Requirements – Air Quality

Requirement	Addressed
Identify significant air emission sources at the proposed development (during construction and operation).	**Section 2.2**
Assess [significant air emission sources] potential to cause adverse off-site impacts.	**Section 6.0**
Detail proposed management and mitigation measures that would be implemented.	**Section 6.1.5**
Where air emissions during operation have the potential to cause adverse off-site impacts, provide a quantitative air quality impact assessment prepared in accordance with the relevant NSW Environment Protection Authority (EPA) guidelines.	**N/A**

2.0 Project Overview

2.1 Project Location and Site Features

The Site is located at Augusta Street, Huntingwood East, within the Blacktown local government area (LGA). The Site comprises multiple parcels of land and is legally described as:

- Lot 1 DP835264
- Lots 218-219 DP457024
- Lot 2151 DP135859
- Lot 2 DP516449
- Lot 163-164, 168-188 and 216 DP8716
- Lot 1 DP119616
- Lots 4-6 DP226294
- Lots 50-52 DP1144623
- Lot 7 DP803359
- Lots 6-10 DP801210
- Lot 4 DP585492
- Lot 4 DP583442
- Lot 2 DP1263824.

The Site is identified in **Figure 1.**Key features of the site are as follows:

- The Site has frontage to the Great Western Highway and the Western Motorway of approximately 940 metres (m) and frontage to Flushcombe Road of approximately 250 m. Augusta Street dissects part of the western portion of the site and is vested to Blacktown Council.
- Access to the Site is currently available from Augusta Street which connects to Flushcombe Road to the west. Flushcombe Road intersects with the Great Western Highway, providing east-west access to the metropolitan road network, with right-in and right-out movements available via the existing signalised intersection.
- The eastern part of the Site slopes to the west, while the western part of the Site slopes to the east, with the central low point at Blacktown Creek adjacent to the easement for water supply.
- The Site is affected by multiple easements and restrictions including:
    - Multiple easements up to 30 metres wide for transmission lines along the southern part of the Site. The Site features high voltage power lines along the southern side.
    - A 10 m wide easement for water supply which runs north-south within the central part of the site, with associated 9 m wide and 3 m wide easements for construction purposes
- Lot 164 in DP8716 is identified as being owned by Amplitel as the land accommodates a Telstra mobile telecommunications facility which is proposed to be relocated.

- The Site has been cleared but is undeveloped with scattered trees across the western boundary and southern boundaries and in the north-eastern corner. Blacktown Creek runs north-south through the central part of the Site with riparian vegetation along the corridor.

Key features of the locality:

- The Site is approximately 34 kilometres (km) west of the Sydney CBD and approximately 3.3 km south of the Blacktown commercial centre.
- The region features a mix of land uses, including residential and employment-generating activities. The Huntingwood and Pemulwuy industrial estates are located to the west and south-east.
- The Prospect Reservoir is approximately 1 km south of the Site adjacent to the Western Sydney Parklands.

The surrounding locality is described as follows:

- North: The Site adjoins the Great Western Highway. The land further to the north primarily comprises residential development including detached single and double storey dwellings. A small natural reserve known as Timbertop Reserve separates the residential development and associated landscaping.
- East: The land immediately to the east of the Site is vacant. The Prospect Highway is located further east, providing access to the M4 Motorway and Great Western Highway. St Bartholomew's Church and Cemetery is located on the eastern side of the Prospect Highway.
- South: The M4 Motorway runs along the southern boundary of the Site, with boundary landscaping providing visual screening of the site. The land on the opposite side of the Motorway comprises recreational and entertainment facilities in the form of a water park and a drive-in movie theatre.
- West: The land to the west comprises an animal holding facility and industrial development, characterised by large warehouse buildings.

Figure 1 Site Location

2.1 Project Description

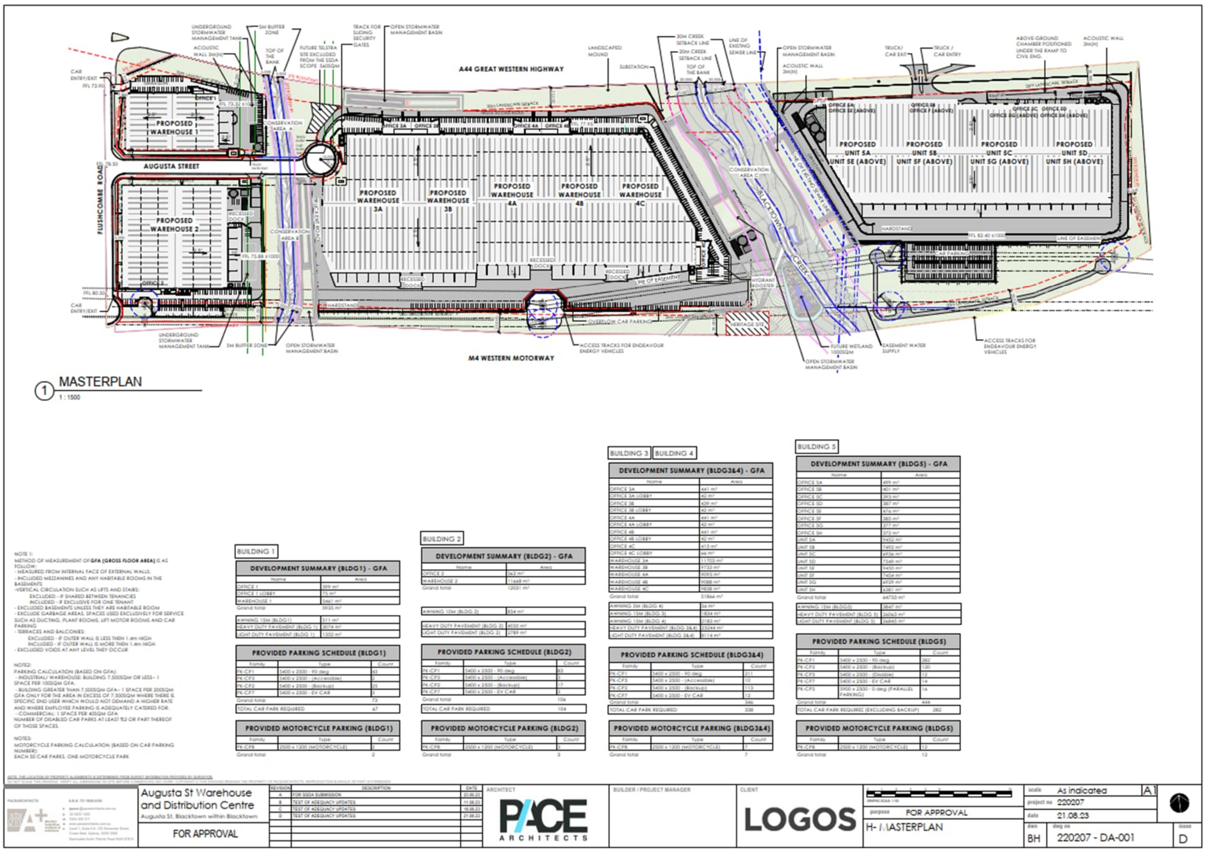
The proposed SSDA seeks approval to redevelop the Site to accommodate a warehouse and distribution centre use inclusive of the following:

- Site establishment works, including tree removal, minor excavation / bulk earthworks.
- Construction and operation of four (4) new warehouse buildings comprising a multi-level warehouse building on the eastern portion of the Site and three single storey warehouse buildings on the western portion of the Site. The warehouse buildings will include ancillary office space and indicative warehouse fit out works including warehouse racking.
- The warehouse and distribution tenancies are proposed to be operated 24 hours per day, 7 days per week.

- Other associated works including landscaping, at-grade car parking and general site improvements.
- Business and building identification signage including wayfinding signage.
- Vehicle access provided via Augusta Street and a new proposed access from the Great Western Highway
- Lot consolidation of properties.

The Site is intersected by two conservation areas, which includes Blacktown Creek. Warehouse 1 and Warehouse 2 will be located on the west of the conservation areas, accessible via Flushcombe Road and Augusta Street. Warehouse 3 and Warehouse 4 will be located between the conservation areas, accessible via Augusta Street. Warehouse 5 will be on the east of the conservation areas, to the east of Blacktown Creek, and will be accessible via the Great Western Highway. **Figure 2** illustrates the proposed layout of the Project.

Figure 2 Proposed Development



Source: Pace Architects 2023

2.2 Potential Sources of Emissions to Air

2.2.1 Demolition

SLR understands that demolition of the existing structures is proposed to be completed under a separate Complying Development Certificate and is therefore not considered in this assessment.

2.2.2 Construction phase

The main air quality issue associated with construction works relates to emissions of fugitive dust. The potential for dust to be emitted during the construction works will be directly influenced by the nature of the activities being performed at any given time. Generally, the activities that are most likely to lead to short-term emissions of dust, include:

- Grading
- Loading and unloading of materials
- Wheel-generated dust and combustion emissions from construction equipment
- Wheel-generated dust from trucks travelling on unpaved surfaces
- Wind erosion of exposed surfaces.

Temporary elevations in local dust levels are most likely to occur when construction activities are undertaken during periods of low rainfall and/or windy conditions. The impact of elevated dust emissions is dependent upon the potential for particulates to become and remain airborne prior to being deposited as dust or experienced as an ambient particulate concentration.

A number of environmental factors may affect the generation and dispersion of dust emissions, including:

- Wind direction - determines whether dust and suspended particles are transported in the direction of the sensitive receptors.
- Wind speed - determines the potential suspension and drift resistance of particles.
- Surface type - more erodible surface material types have an increased soil or dust erosion potential.
- Surface material moisture - increased surface material moisture reduces soil or dust erosion potential.
- Other external factors such as current works being undertaken by others outside of the defined Project boundaries and current climatic (dry) weather conditions.
- Rainfall or dew - rainfall or heavy dew that wets the surface of the soil reduces the risk of dust generation.

Where diesel-powered mobile machinery and vehicles are being used, localised elevations in ambient concentrations of combustion-related pollutants may also occur, however any potential for the relevant impact assessment criteria for these pollutants to be exceeded at surrounding sensitive areas will be minimal. Fugitive dust emissions are generally considered to have the greatest potential to give rise to downwind air quality impacts at construction sites and combustion emissions during construction have not been considered further.

2.2.3 Operational phase

During the operational phase, the main source of air emissions would be emissions of products of fuel combustion and particulate matter (from brake and tyre wear as well as re-entrainment of road dust) associated with the trucks and other vehicles entering and leaving or idling at the Site during loading/unloading operations. It is assumed that no refuelling or power generation will occur on site.

Emissions associated with the combustion of fuel (diesel, petrol, etc.) in road vehicles will include carbon monoxide (CO), oxides of nitrogen (NO_x), particulate matter (PM_{10} and $PM_{2.5}$), sulfur dioxide (SO_2) and volatile organic compounds (VOCs). The exact rate and composition of air pollutant emissions from road vehicles is a function of a number of factors, including the type, size and age of the vehicles, the type of fuel combusted, number and speed of vehicles and the road gradient.

There are 951 parking spaces in total available across the ground and lower ground floors of the warehouse development. The amount of traffic movements related to the Site is anticipated to be 675 vehicles per hour (vph) for both AM and PM peak movements with an average of 10% heavy vehicles anticipated for the proposed development. Predicted peak hour traffic generation rates and anticipated to be 350 vph for warehouse 1 to 4 and 325 vph for Warehouse 5 (see **Appendix A** for detailed AM and PM traffic generation rates[1]).

Existing traffic counts for the Great Western Highway are provided in the traffic assessment report prepared for the Project (CBRK 2023). According to this report, the total existing AM and PM peak traffic volumes (inclusive of eastbound and westbound traffic) east of Flushcombe Road are 6,095 vph and 6,995 vph respectively. Therefore, the traffic from the Site is estimated to be approximately 11.1% of the AM peak traffic and 9.7% of the PM peak traffic.

Mechanical plant at the Site is understood to be limited to air-conditioning equipment and extraction fans and no air emission generating plant (such as combustion plant, diesel generators, gas/ diesel fired water heaters, etc.) are proposed. Further, this report assumes that the Site would be used for general warehousing and distribution activities only and no emission generating activities would occur within the warehouses. If uses with potential to generate significant air quality emissions are proposed at later stages, then an updated site-specific air quality impact assessment may be required.

2.3 Pollutants of Concern

As identified in **Section 2.2**, the key air pollutants of interest are considered to be particulate matter from construction works, and wheel-generated dust and products of fuel combustion from operations.

The following sections outline the potential health and amenity issues associated with particulate matter and products of fuel combustion, while **Section 4** identifies the relevant air quality assessment criteria.

Particulate Matter

Airborne contaminants that can be inhaled directly into the lungs can be classified on the basis of their physical properties as gases, vapours or particulate matter. In common usage, the terms “dust” and “particulates” are often used interchangeably. The health effects of particulate matter are strongly influenced by the size of the airborne particles. Smaller particles can penetrate further into the respiratory tract, with the smallest particles having a greater impact on human health as they penetrate to the gas exchange areas of the lungs. Larger particles primarily cause nuisance associated with coarse particles settling on surfaces.

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 called total suspended particulate (TSP). Particulate matter with an aerodynamic diameter of 10 microns or less is

[1] The TRAQ assessment (Appendix E), which informed the operational risk assessment (provided in Section 6.2), was based on traffic data from an early revision of the traffic assessment. Appendix A provides the detailed traffic data for this revision of the traffic assessment which assumed a total of 660 vph during the peak hour (40 vph for warehouse 1 to 4 and 320 vph for Warehouse 5). The 2.3% increase in traffic generation rates from 660 vph to 675 vph is not anticipated to have any significant impact on the incremental air quality impacts associated from vehicle emissions and as such changes the outcomes of the operational risk assessment (provided in Section 6.2) is not deemed to be likely.

referred to as PM_{10}. The PM_{10} size fraction is sufficiently small to penetrate the large airways of the lungs, while $PM_{2.5}$ (2.5 microns or less) particulates are generally small enough to be drawn in and deposited into the deepest portions of the lungs. Potential adverse health impacts associated with exposure to PM_{10} and $PM_{2.5}$ include increased mortality from cardiovascular and respiratory diseases, chronic obstructive pulmonary disease and heart disease, and reduced lung capacity in asthmatic children.

Nuisance Dust

In addition, nuisance impacts need also to be considered, mainly in relation to deposited dust. Dust can cause nuisance by settling on surfaces and possessions, affecting visibility and contaminating tank water supplies. High rates of dust deposition can also adversely affect vegetation by blanketing leaf surfaces.

Products of Combustion

Emissions associated with road traffic and the combustion of fossil fuels (diesel, petrol, AVGAS etc.) will include carbon monoxide (CO), oxides of nitrogen (NO_x), particulate matter (PM_{10} and $PM_{2.5}$), sulfur dioxide (SO_2) and volatile organic compounds (VOCs).

CO is an odourless, colourless gas formed from the incomplete burning of fuels in motor vehicles. It can be a common pollutant at the roadside and highest concentrations are found at the kerbside with concentrations decreasing rapidly with increasing distance from the road. CO in urban areas results almost entirely from vehicle emissions and its spatial distribution follows that of traffic flow. The incomplete combustion of fuel in diesel powered vehicles can generate particulate in the form of black soot.

Oxides of nitrogen (NO_x) is a general term used to describe any mixture of nitrogen oxides formed during combustion. In atmospheric chemistry, NO_x generally refers to the total concentration of nitric oxide (NO) and nitrogen dioxide (NO_2). NO is a colourless and odourless gas that does not significantly affect human health. However, in the presence of oxygen, NO can be oxidised to NO_2 which can have significant health effects including damage to the respiratory tract and increased susceptibility to respiratory infections and asthma. NO will be converted to NO_2 soon after leaving the engine exhaust.

Engine exhausts can contain emissions of sulfur dioxide (SO_2) due to impurities in the fuel. The sulfur content in diesel fuel has significantly reduced over the years ambient SO_2 concentrations in Australian cities are typically well below regulatory criteria.

Volatile organic compounds (VOCs) may be emitted as a result of the incomplete combustion of fuel. VOC emissions are reducing significantly due to the improved combustion processes offered by modern engines.

3.0 Relevant Legislation, Policy and Guidance

The following Air Quality Policy and Guidance documents have been referenced within this assessment and have been used to identify the relevant air quality criteria.

3.1 Protection of the Environment Operations (POEO) Act 1997 & Amendment Act 2011

The POEO Act (and Amendment Act 2011) is a key piece of environment protection legislation administered by the EPA group which enables and establishes instruments for setting environmental standards, goals, protocols and guidelines.

The following sections of the POEO Act are of general relevance to the Site:

- Section 126 of the POEO Act requires that materials (e.g. raw ingredients and waste storage/disposal at the Site) are managed in a proper and efficient manner to prevent air pollution (e.g. odour).
- Section 128 of the POEO Act states:

1. The occupier of a premises must not carry out any activity or operate any plant in or on the premises in such a manner to cause or permit the emission at any point specified in or determined in accordance with the regulation of air impurities in excess of [the standard of concentration and/or the rate] prescribed by the regulations in respect of any such activity or any such plant.
2. Where neither such a standard nor rate has been so prescribed, the occupier of any premises must carry on activity, or operate any plant, in or on the premises by such practicable means as may be necessary to prevent or minimise air pollution.

3.2 Protection of the Environment Operations (Clean Air) Regulation 2022

The POEO (Clean Air) Regulation 2022 (the Regulation) is the core regulatory instrument for air quality issues in NSW. In relation to industry, the Regulation:

- sets maximum limits on emissions from activities and plant for a number of substances; and
- restricts the use of high sulphur liquid fuel.

3.3 NSW Environment Protection Authority Air Quality Policy and Guidance

The EPA is the NSW regulatory authority responsible for air quality regulation and associated activities.

NSW Environment Protection Authority document, Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (hereafter 'the Approved Methods') (NSW EPA 2022) , lists the statutory methods for modelling and assessing air pollutants from stationary sources and specifies criteria which reflect the environmental outcomes adopted by the EPA. The Approved Methods are referred to in the POEO (Clean Air) Regulation 2022 for assessment of impacts of air pollutants. The air quality criteria set out in the Approved Methods have been reproduced and discussed in **Section 6.2.**

3.4 Local Air Quality Toolkit

The Local Government Air Quality Toolkit (AQ Toolkit) has been developed by the EPA to assist local government in their management of air quality issues and provides guidelines for air quality management and for the use of air pollution control techniques. Relevant AQ Toolkit air quality guidance notes include:

- Dust from urban construction sites (NSW EPA, 2007a); and
- Construction sites (NSW EPA, 2007b).

3.5 Ambient Air Quality Criteria

State air quality guidelines specified by the NSW Environmental Protection Agency (EPA) for the pollutants identified in **Section 2.3** are published in the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (NSW EPA 2022) [hereafter 'Approved Methods']. The ground level air quality impact assessment criteria listed in **Section 7** of the Approved Methods have been established by NSW EPA to achieve appropriate environmental outcomes and to minimise risks to human health. They have been derived from a range of sources and are the defining ambient air quality criteria for NSW and are considered to be appropriate for use in this assessment.

The impact assessment criteria listed in the Approved Methods for relevant pollutants are shown in **Table 2**.

Table 2 NSW EPA Impact Assessment Criteria for Air Quality Assessment

Pollutant	Averaging Period	Ambient Air Quality Criterion	
		µg/m^3	pphm
Total suspended particulate (TSP)	Annual	90	-
Particulate matter less than 10 microns (PM_{10})	24-Hour	50	-
	Annual	25	-
Particulate matter less than 2.5 microns ($PM_{2.5}$)	24-Hour	25	-
	Annual	8	-
Nitrogen dioxide (NO_2)	1-hour	164	8
	Annual	31	1.5
Carbon monoxide (CO)	15-minutes	100,000	8,700
	1-hour	30,000	2,500
	8-hour	10,000	900
Sulfur dioxide (SO_2)	1-hour	286[a]	10
	24-hour	57	2
Benzene	1-hour	29	0.9
Toluene	1-hour	360	9
Ethylbenzene	1-hour	8,000	180
Xylenes	1-hour	190	4
Deposited dust	Annual	2 g/m^2/month (maximum increase in deposited dust level) 4 g/m^2/month (maximum total deposited dust level)	

a. This impact assessment criterion applies to assessments prepared before 1 January 2025.
b. pphm = Parts per hundred million.

4.0 Receiving Environment

4.1 Surrounding Land Use and Sensitive Receptors

The Site is currently subject to the land use and development control provisions of the State Environmental Planning Policy (SEPP - Industry and Employment) 2021. **Figure 3** illustrates the surrounding land zoning as specified in SEPP 2021. The Site and the areas immediately to its west are zoned General industrial (IN1). Small areas of Light industrial (IN-1), Infrastructure (SP2), Environmental Conservation (C2), and Public Recreation (RE1) zones are located immediately north of the Site with areas zoned as Low Density Residential (R2) located to within 100 m of the Site. Large, unzoned areas located to the south and southwest of the Site are subject to State Environmental Planning Policy (Western Sydney Parklands) 2021 (WSP SEPP). Current uses for these areas include water park (south), warehousing (west) and parklands (south and west).

The nearest residential areas are located approximately 70 m north of the site on the northern side of the Great Western Highway. There are industrial receptors on neighbouring lots to the east and west, and Raging Waters Sydney is located approximately 400 m to the south. The nearest receivers are shown in **Figure 4.**

Figure 3 Zoning of Surrounding Land

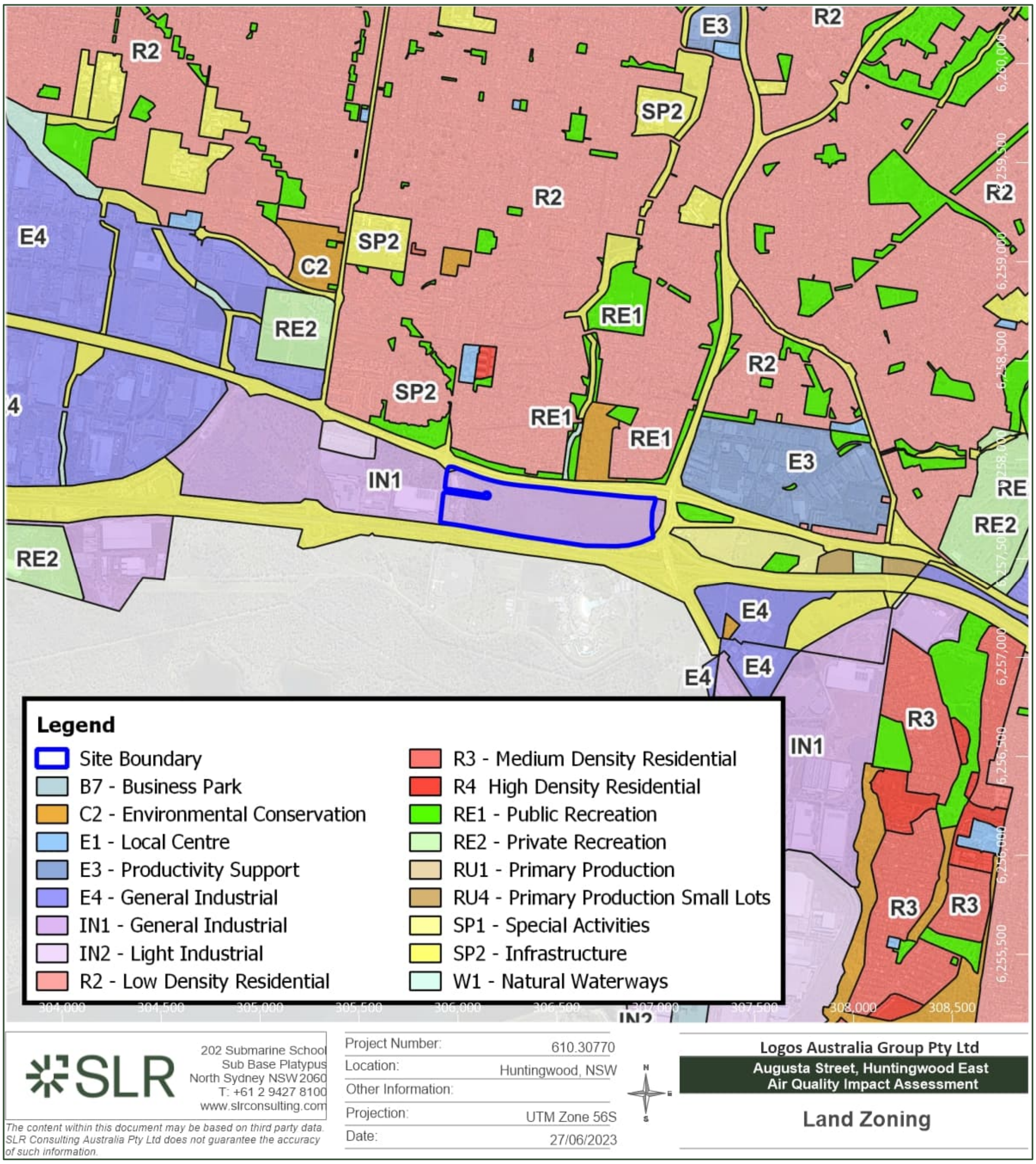
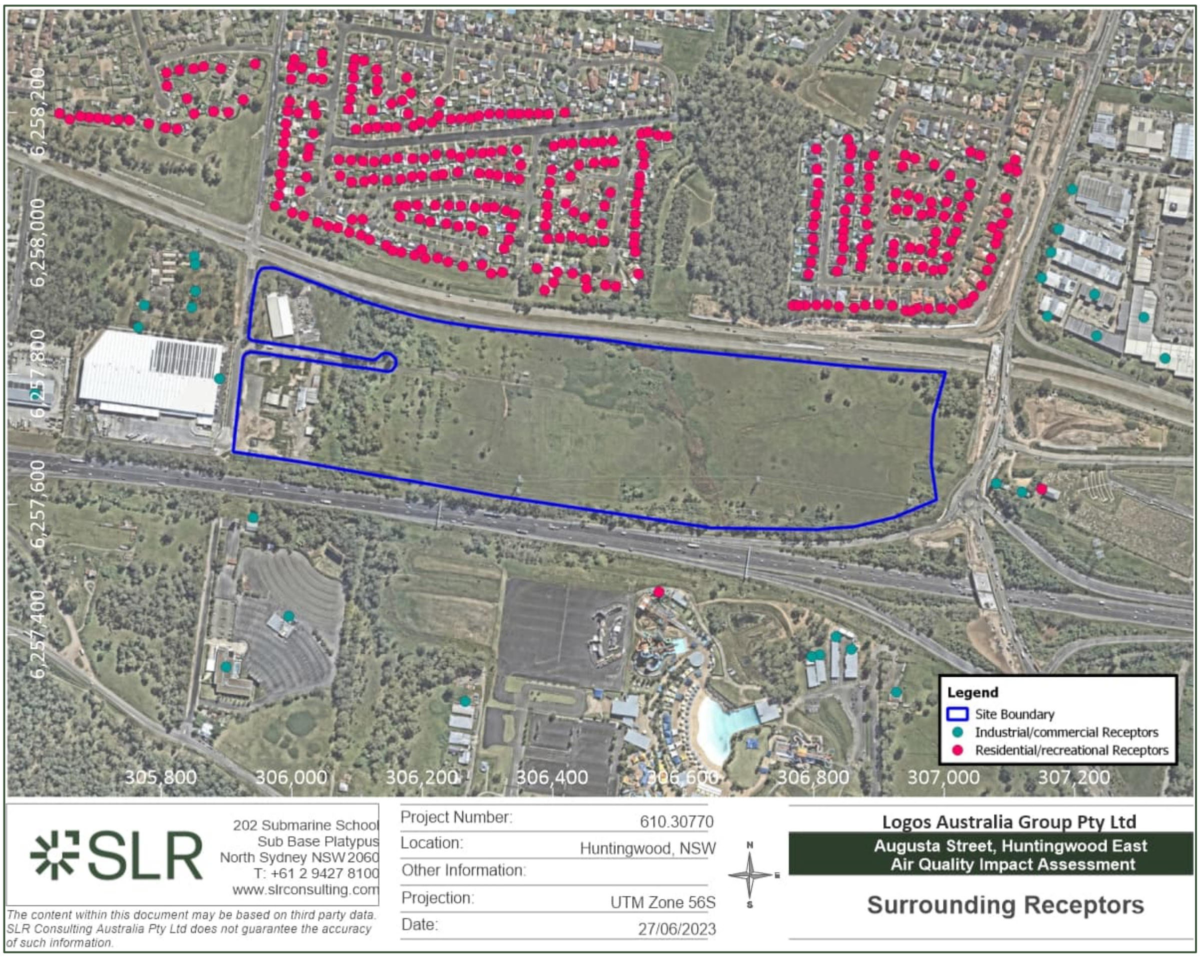


Figure 4 Surrounding Receptors



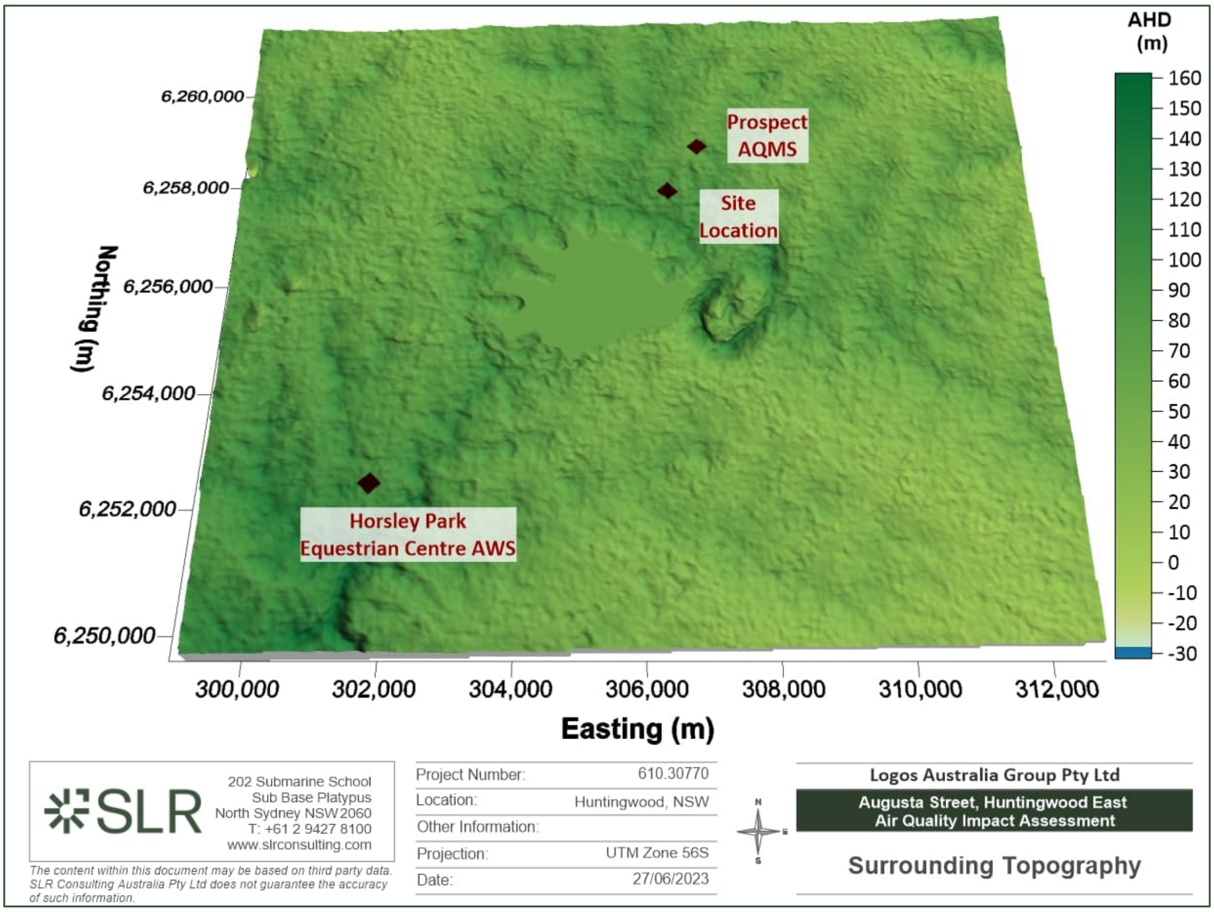
4.2 Local Topography

Topography is important in air quality studies as local atmospheric dispersion can be influenced by night-time katabatic (downhill) drainage flows from elevated terrain or channelling effects in valleys or gullies.

A three-dimensional representation of the region surrounding the Site is shown in **Figure 5**. The topography of the local area ranges from an approximate elevation of 70 m to 90 m Australian Height Datum (AHD). The locations of Horsley Park Equestrian Centre automatic weather station (AWS; refer **Section 4.3**) and Prospect air quality monitoring station (AQMS; refer **Section 4.5**) are also indicated.

The topography of the Site and its immediate surrounds is slightly undulating, with the eastern part of the site sloping to the west and the western part of the site sloping to the east, with the central low point at Blacktown Creek adjacent to the easement for water supply. There are open areas of land to the south and east. A large water body (Prospect Reservoir) is located approximately 1 km to the south.

Figure 5 Local Topographical Features



4.3 Local Meteorological Conditions

Local wind speed and direction influence the dispersion of air pollutants. Wind speed determines both the distance of downwind transport and the rate of dilution as a result of 'plume' stretching. Wind direction, and the variability in wind direction, determines the general path pollutants will follow and the extent of crosswind spreading. Surface roughness (characterised by features such as the topography of the land and the presence of buildings, structures and trees) will also influence dispersion.

The Bureau of Meteorology (BoM) maintains and publishes data from weather stations across Australia. The closest such station recording long term wind speed and wind direction data is the Horsley Park Equestrian Centre AWS (Station ID 67119), located approximately 7 kilometres (km) southwest of the Site. It is noted that considering the relatively complex terrain between the Site and this AWS (see **Figure 5**), wind conditions at the Site may be slightly different from those recorded by the AWS.

Annual and seasonal wind roses for the years 2018-2022 (inclusive), compiled from data recorded by the Horsley Park Equestrian Centre AWS is presented in **Figure 6**. Wind roses show the frequency of occurrence of winds by direction and strength. The bars correspond to the 16 compass points (degrees from North). The bar at the top of each wind rose diagram represents winds blowing from the north (i.e. northerly winds), and so on. The length of the bar represents the frequency of occurrence of winds from that direction, and the widths of the bar sections correspond to wind speed categories, the narrowest representing the lightest winds. Thus it is possible to visualise how often winds of a certain direction and strength occur over a long period, either for all hours of the day, or for particular periods during the day.

The annual wind rose indicates that the predominant wind directions in the area are from the southwest. Calm wind conditions (wind speed less than 0.5 m/s) were observed to occur approximately 19.7% of the time throughout the investigated period. The average seasonal wind roses for the years 2018-2022 indicate that:

- In summer, winds are mostly gentle (between 1.5 m/s and 5.5 m/s) predominantly from the southeast quadrant, with very few winds from the northwest quadrant. Calms were recorded 17.3% of the time.
- In autumn, winds are light to gentle (between 0.5 m/s and 5.5 m/s) predominantly from the southwest direction, with very few winds from the northeast. Calms were recorded 23% of the time.
- In winter, winds are mostly light to gentle (between 0.5 m/s and 5.5 m/s) and are from the southwest direction, with very few winds from the eastern quadrant. Calms were recorded 20.3% of the time.
- In spring, winds are mostly light to gentle (between 0.5 m/s and 5.5 m/s) and blow from all directions with the majority blowing from the southwest. Calms were recorded 18.3% of the time.

As identified in **Section 4.1** the majority of existing sensitive receptors are located north of the Site boundary as residential receptors, but other types of sensitive receptors are in all located directions. Winds between the south, southeast and southwest directions, which would blow air emissions from the Site towards the nearest existing residences to the north, occur approximately 40% of the time.

Wind erosion of dust from exposed surfaces is usually initiated when wind speeds exceed the threshold friction velocity for a given surface or material, however a general rule of thumb is that wind erosion can be expected to occur above 5.5 m/s. The frequency of wind speeds for the period of 2018-2022 is presented in **Figure 7**. The plot shows that wind speeds exceeding 5.5 m/s for the period 2018-2022 at Horsley Park Equestrian Centre AWS occurred approximately 2.9% of the time.

Figure 6 Horsley Park Equestrian Centre AWS Annual and Seasonal Wind Roses 2018-2022

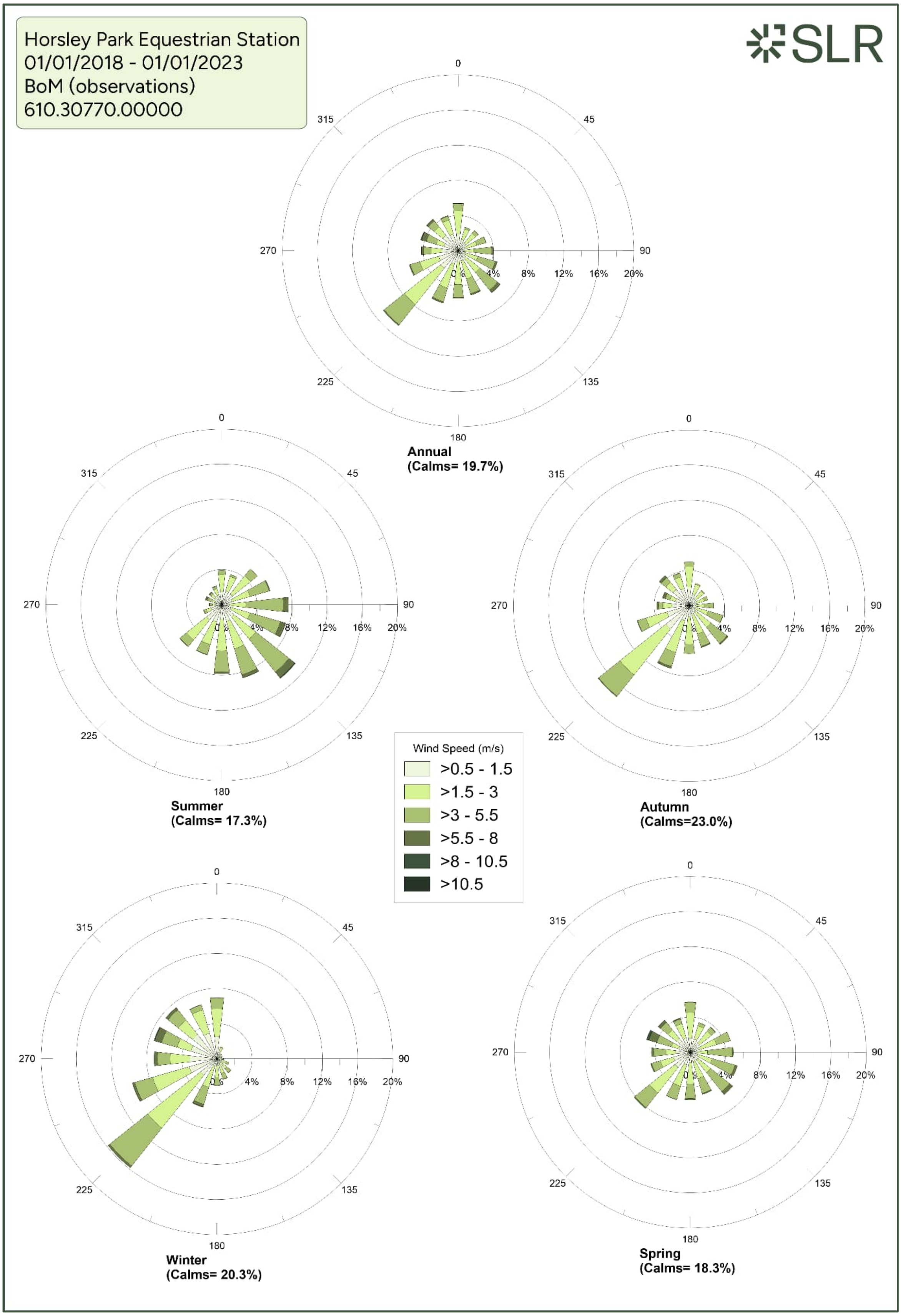
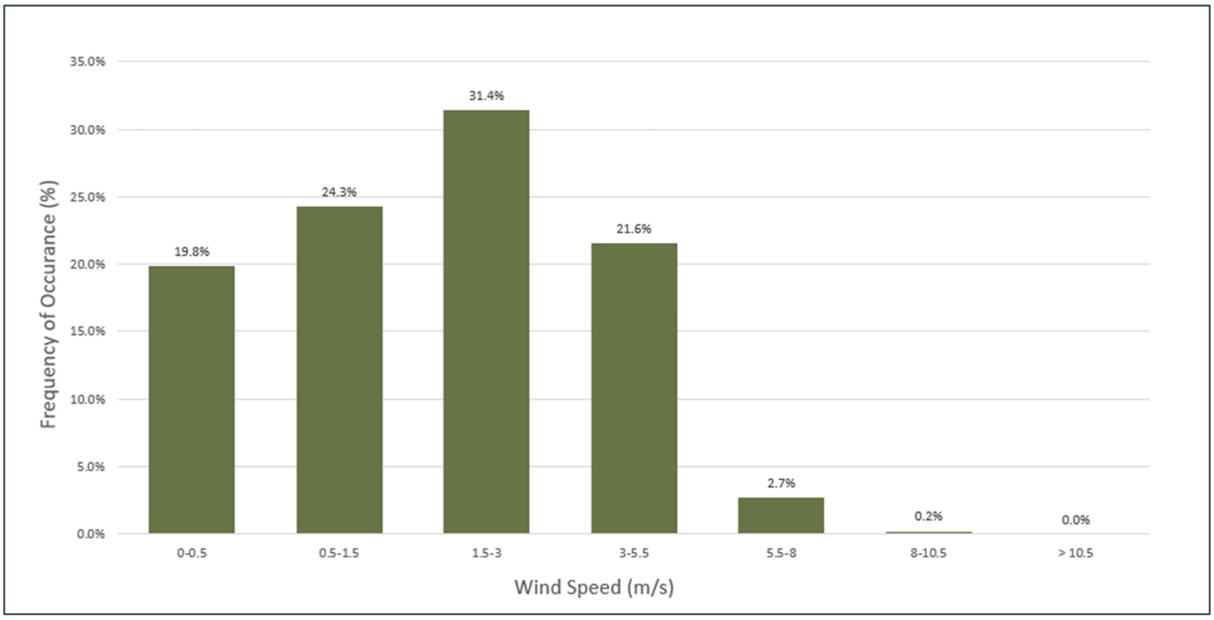


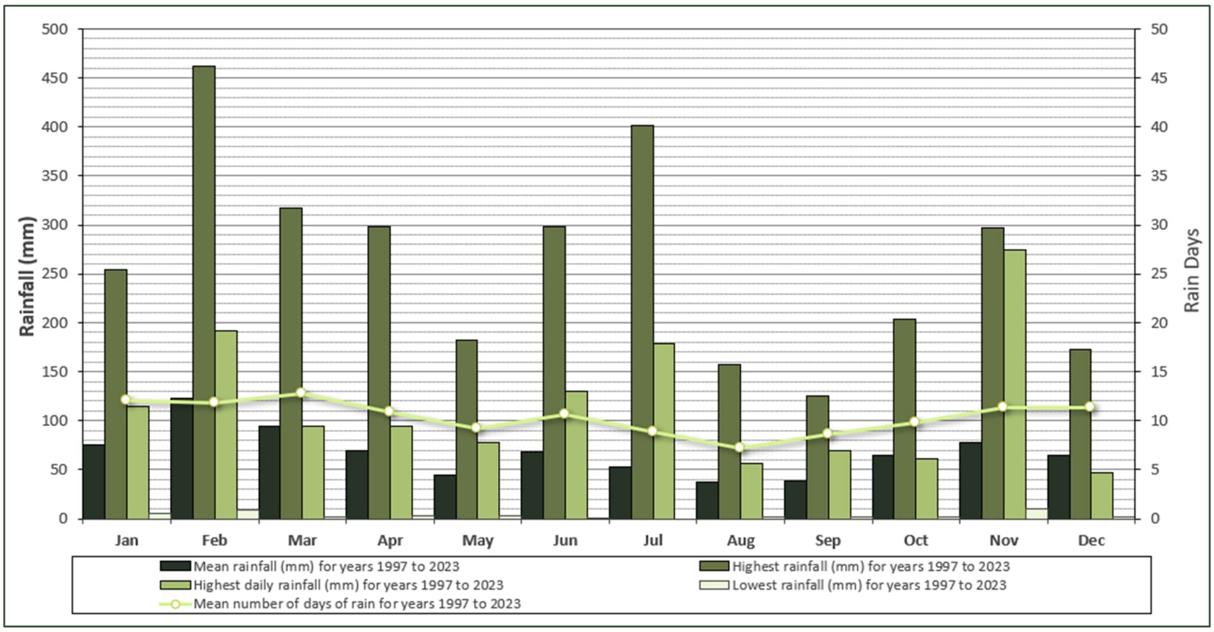
Figure 7 Wind Speed Frequency Chart for Horsley Park Equestrian Centre AWS – 2018-2022



Rainfall

Dry periods (no rainfall) have a greater risk of generating fugitive dust emissions as moisture binds dust particles together. The long-term monthly rainfall averages recorded by the Horsley Park Equestrian Centre AWS rain gauge are shown in **Figure 8**. Generally, rainfall is lowest in the mid-winter to mid spring period.

Figure 8 Long term Mean Rainfall for Horsley Park Equestrian Centre AWS – 2011-2023



4.4 Other Local Air Emission Sources

Other sources of air emissions and odour in the surrounding area with the potential to result in cumulative impacts with emissions from the construction and operation of the expansion, as identified from the site visit and a desktop review of aerial imagery, are as follows:

- Traffic emissions from the surrounding road network, including the M4 Western Motorway (M4) and Westlink (M7), and the Eastern Creek racetrack. There are several logistics/distribution centres in the area which will also generate potentially significant local traffic movements.

4.5 Review of Ambient Air Quality Monitoring Data

Air quality monitoring is performed by the NSW Department of Planning and Environment (DPE) at a number of monitoring stations across NSW. The closest station to the Site is the Prospect AQMS, located approximately 860 m to the north of the Site at 68 m AHD (**Figure 5**). The Prospect AQMS data has a high level of completeness for all years (2018-2022) and is in very close proximity to the Site with a difference of 10-20 m in elevation. The Prospect AQMS is considered sufficiently representative to use for describing background air quality. The following air pollutants are monitored at the Prospect AQMS and are presented in this section:

- NO_2
- CO
- SO_2
- Fine particles as $PM_{2.5}$ and PM_{10}

A summary of the monitored pollutant concentrations for the last five years (2018-2022) is presented in **Table 3** and the data are presented graphically in Figure 9 to **Figure 15**.

Table 3 Summary of Air Quality Monitoring Data at Prospect AQMS (2018-2022)

Pollutant	PM_{10}		$PM_{2.5}$		NO_2		CO		SO_2	
Averaging Period	**Maximum 24-hour (µg/m³)**	**Annual (µg/m³)**	**Maximum 24-hour (µg/m³)**	**Annual (µg/m³)**	**Maximum 1-hour (µg/m³)**	**Annual (µg/m³)**	**Maximum 1-hour (mg/m³)**	**Maximum 8-hour (mg/m³)**	**Maximum 1-hour (µg/m³)**	**24-hour (µg/m³)**
2018	113.3[1] (8)[2]	21.8	47.5 (4)	8.2	104.6	18.7	1.6	1.4	71.5	14.3
2019	182.8 (25)	25.8	134.1 (25)	11.0	100.5	17.7	6.9	3.5	60.1	11.4
2020	245.8 (10)	20.1	70.8 (13)	8.4	88.2	15.1	2.6	2.3	51.5	11.4
2021	44.6	17.1	37.3 (2)	6.8	88.2	14.9	1.6	1.3	42.9	8.6
2022	29.2	12.0	18.2	4.7	86.1	13.1	1.6	1.1	48.6	8.6
Average	123.1	19.3	61.6	7.8	93.5	15.9	2.9	1.9	54.9	10.9
Criterion	50	25	25	8	164	31	30	10	286	57

1. Numbers in brackets represent number of exceedances of relevant criteria recorded each year
2. Red text indicates exceedances of the relevant criterion.

A review of the Prospect AQMS data shows that exceedances of the 24-hour average PM_{10} criterion were recorded in three years (2018 - 2020) and exceedances of the 24-hour average $PM_{2.5}$ criterion were recorded by in four years (2018 – 2021). A review of these exceedances recorded indicates that they were associated with natural events such as bushfires, dust storms, or hazard reduction burns. The NSW Department of Planning and Environment released an 'Air quality special statement spring-summer 2019-20' in November 2020 (NSW DPE 2020) stating that the bushfire season resulted in extreme air pollution and all regions of the monitoring network recorded extended periods of poor air quality.

Ambient concentrations of the gaseous pollutants SO_2, NO_2, and CO were all well below the relevant criteria for all years investigated.

Figure 9 Measured 24-Hour Average PM_{10} Concentrations at Prospect AQMS (2018-2022)

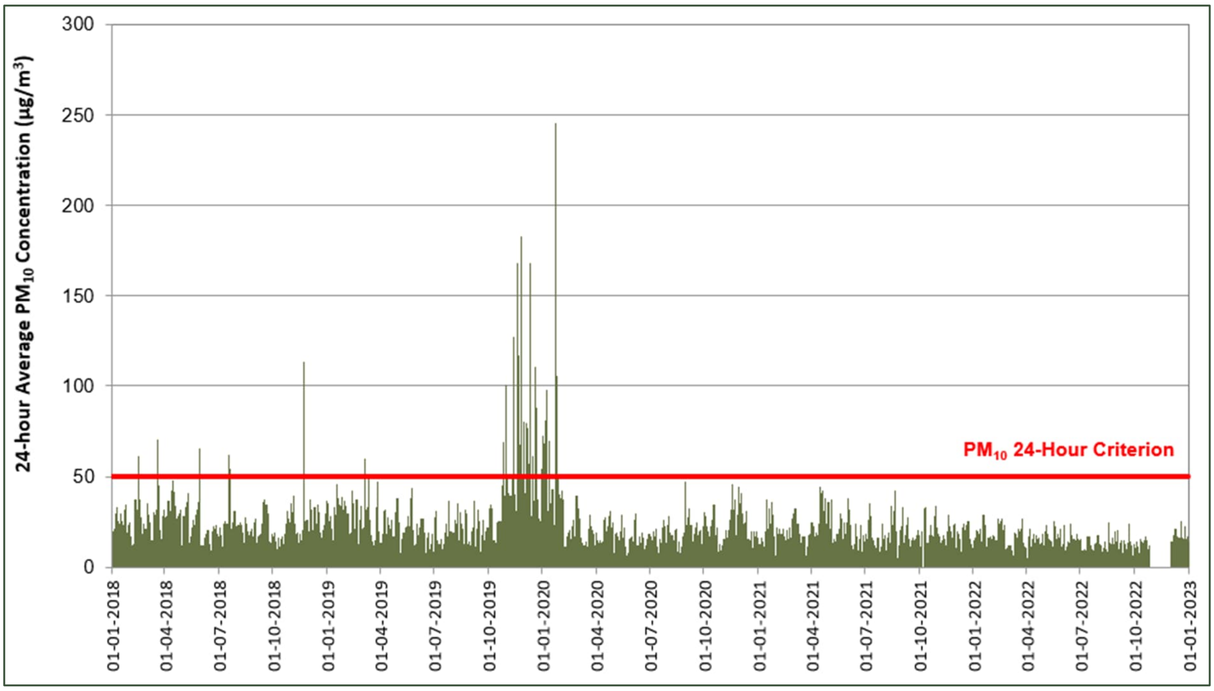


Figure 10 Measured 24-Hour Average $PM_{2.5}$ Concentrations at Prospect AQMS (2018-2022)

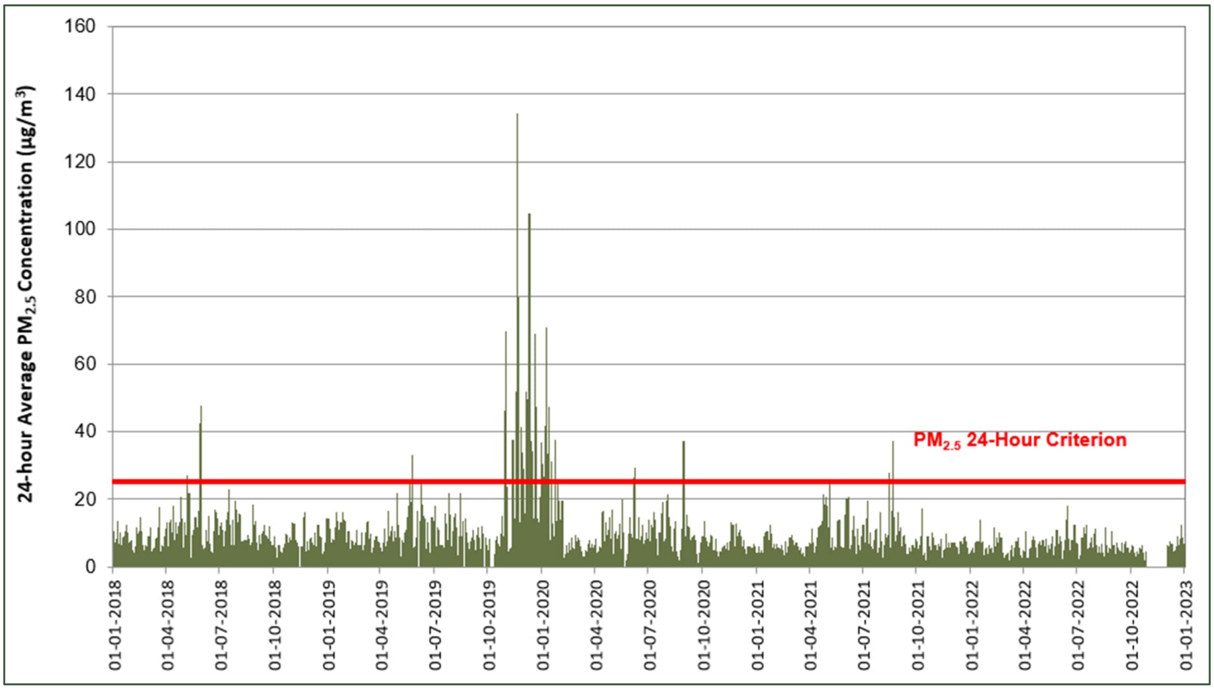


Figure 11 Measured Daily Maximum 1-Hour Average NO_2 Concentrations at Prospect AQMS (2018-2022)

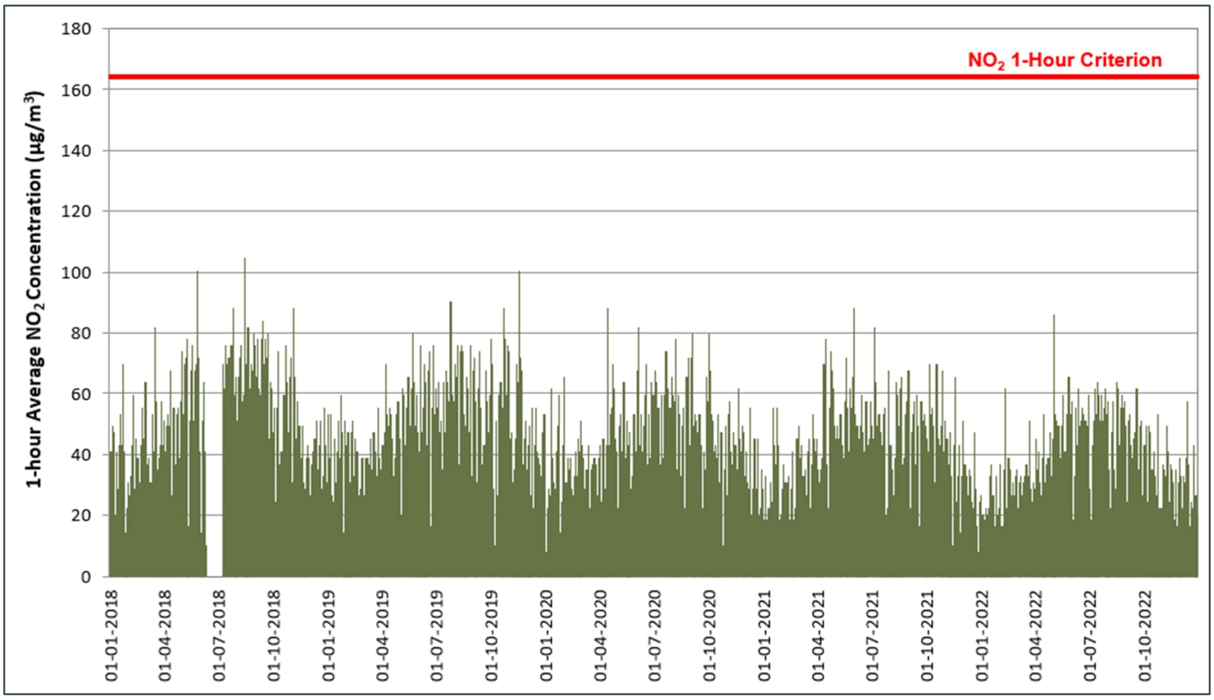


Figure 12 Measured Daily Maximum 1-Hour Average CO Concentrations at Prospect AQMS (2018-2022)

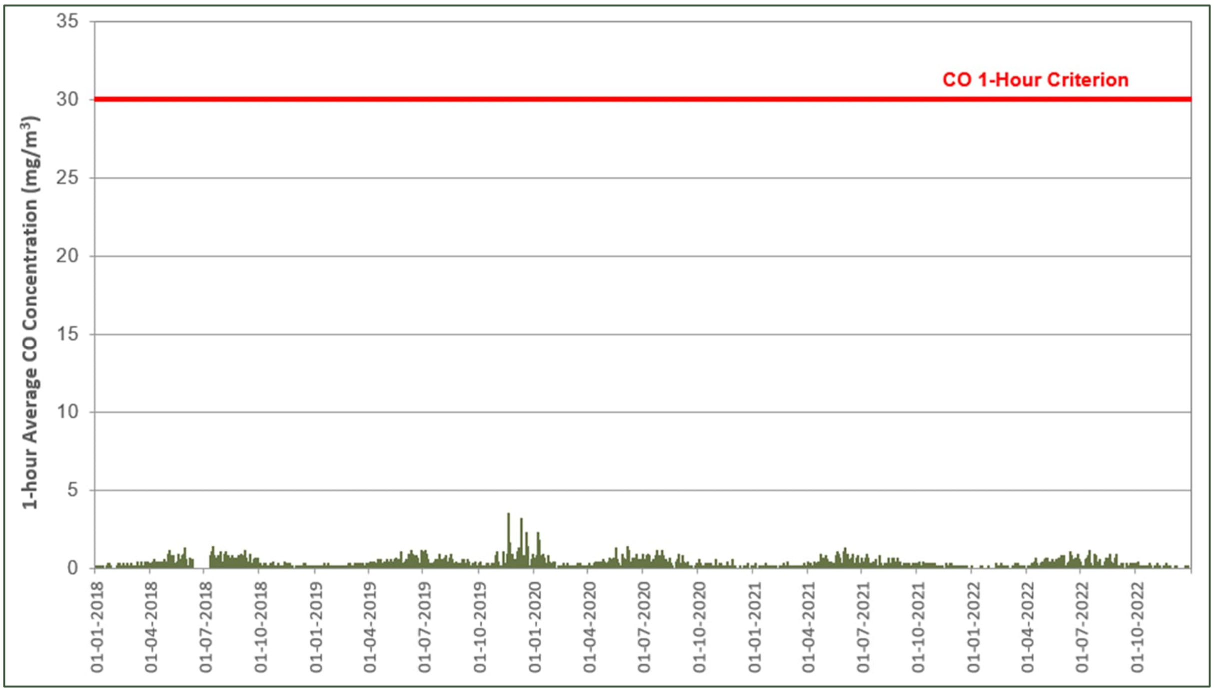


Figure 13 Measured 8-Hour Maximum CO Concentrations at Prospect AQMS (2018-2022)

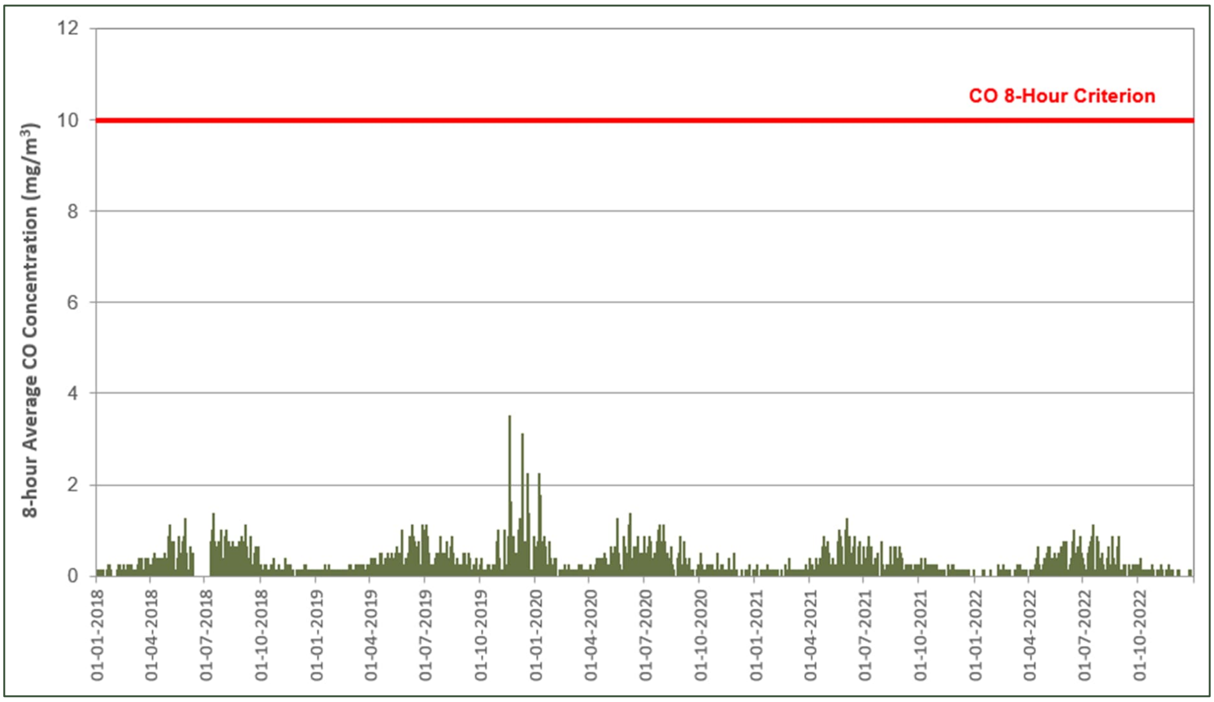


Figure 14 Measured Daily Maximum 1-Hour Average SO_2 Concentrations at Prospect AQMS (2018-2022)

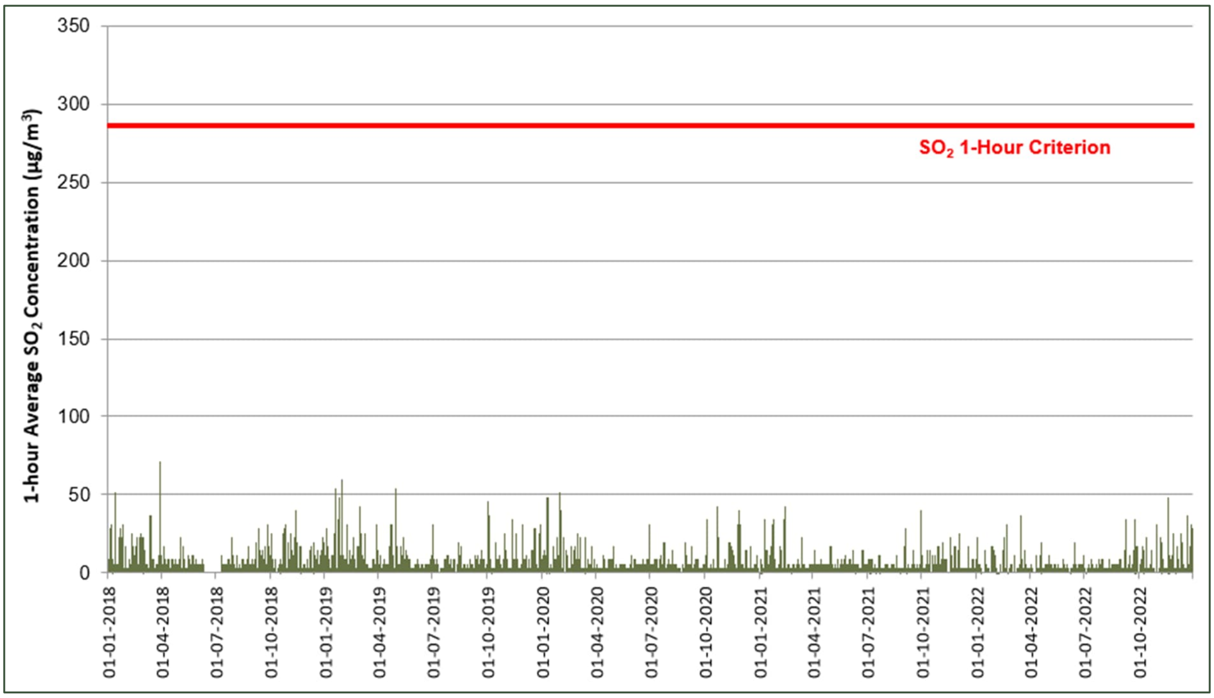
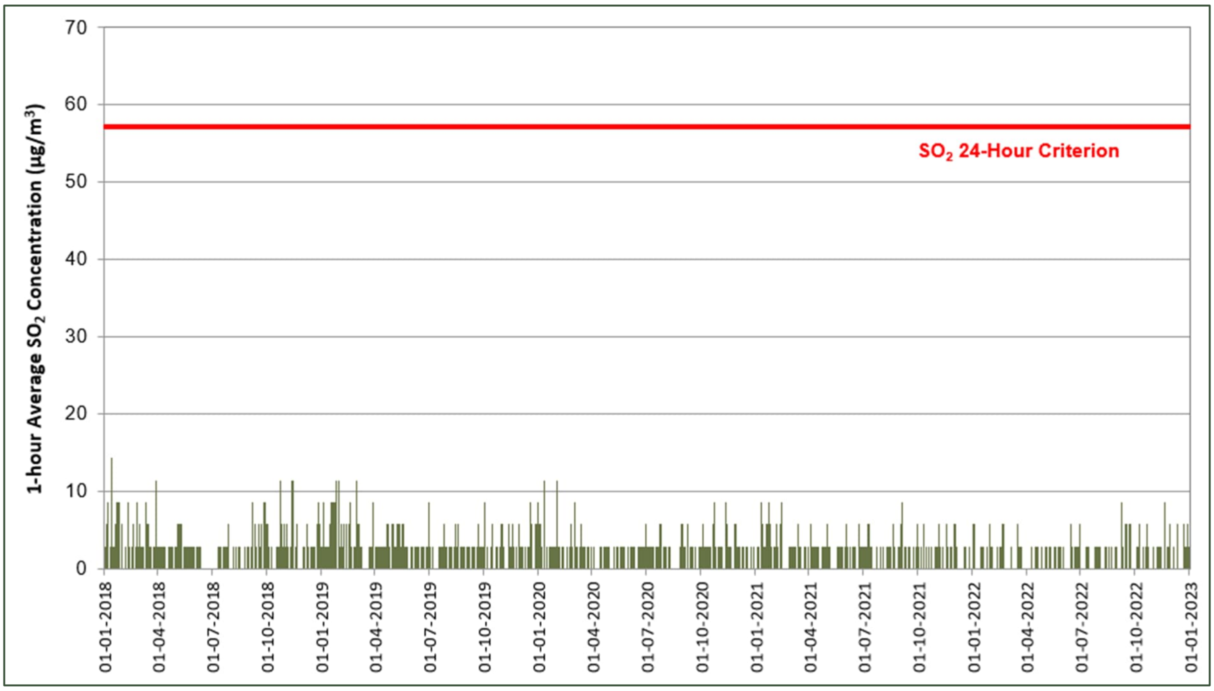


Figure 15 Measured 24-Hour Maximum SO_2 Concentrations at Prospect AQMS (2018-2022)



5.0 Assessment Methodology

SLR has performed a risk-based assessment of both construction and operational impacts based on the information available, to identify activities that have the potential for off-site air quality impacts if not adequately controlled, so that appropriate mitigation measures can be identified and incorporated into the Project design and relevant environmental management plans.

Based on SLR's experience, for almost all construction activities, provided effective mitigation is adopted, the residual air quality impact will be insignificant. The adopted quantitative assessment approach identifies the appropriate mitigation measures based on the level of risk during each phase of the construction works and is therefore deemed to be a more appropriate methodology than quantitative modelling.

5.1 Construction Phase

For the assessment of construction phase impacts, the IAQM Guidance on the Assessment of Dust from Demolition and Construction, developed in the United Kingdom by the Institute of Air Quality Management (IAQM 2014) has been used to provide a qualitative assessment method (see **Appendix B** for full methodology). The IAQM method uses a four-step process for assessing potential dust impacts from construction activities:

- Step 1: Screening based on distance to the nearest sensitive receptor; whereby the sensitivity to dust deposition and human health impacts of the identified sensitive receptors is determined.
- Step 2: Assess risk of dust effects from activities based on:
  - the scale and nature of the works, which determines the potential dust emission magnitude; and
  - the sensitivity of the area surrounding dust-generating activities.
- Step 3: Determine site-specific mitigation for remaining activities with greater than negligible effects (additional general mitigation measures are in **Appendix C**).
- Step 4: Assess significance of remaining activities after management measures have been considered.

5.2 Operational phase

A semi-quantitative risk-based assessment approach has been adopted for the proposed operational activities at the Site (see **Appendix D** for full methodology) to determine if emissions during operation have the potential to cause adverse off-site impacts requiring a detailed quantitative air quality impact assessment.

The risk-based operational assessment methodology takes account of a range of impact descriptors, including the following:

- Nature of Impact: does the impact result in an adverse or beneficial environment?
- Sensitivity: how sensitive is the receiving environment to the anticipated impacts? This may be applied to the sensitivity of the environment in a regional context or specific receptor locations.
- Magnitude: what is the anticipated scale of the impact?

The key potential air quality issue identified for the operational phase of the Project is emissions of combustion products and particulate matter from vehicles travelling along the Great Western Highway and Flushcombe Road. To assess the potential air quality impacts of the Project from vehicular emissions on surrounding sensitive receptors, the Tool for

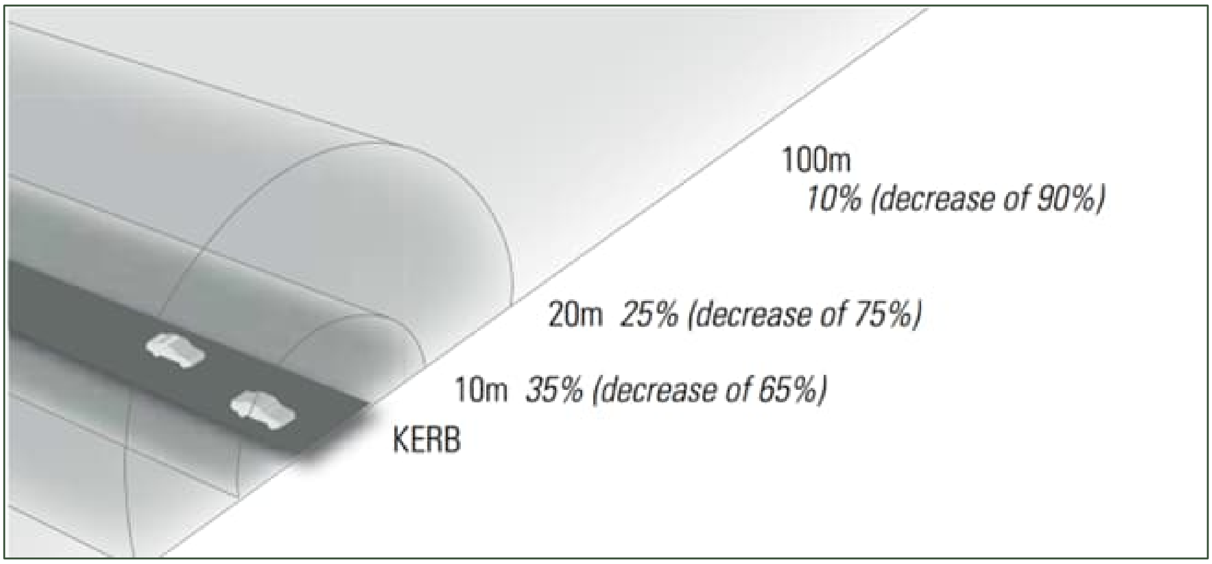
Roadside Air Quality (TRAQ) assessment tool developed by Roads and Maritime Services (RMS) (now TfNSW) has been used as part of the risk-based approach adopted for the operational phase air quality assessment.

TRAQ is a US-EPA CALINE 4 based modelling tool designed for the first-pass screening of air quality impacts associated with new or existing roads. TRAQ uses worst-case scenarios to determine whether or not a more detailed assessment is required. TRAQ is considered to provide conservative predictions of potential incremental impacts. The model has been used extensively in NSW and is currently accepted by regulatory agencies as an appropriate conservative screening-level model for predicting near field ground level pollutant concentrations from traffic. Details of the TRAQ methodology are provided in **Appendix E**.

The integration of sensitivity with impact magnitude is used to derive the predicted significance of the changes to ambient air quality due to the proposed operations. Given the nature of the operations proposed to be performed at the Site, and the limited design data currently available, it is considered that this approach is appropriate to identify those key activities that have the potential to give rise to off-site air quality impacts, in order that recommended mitigation measures may be identified. If appropriate, these recommendations may include further detailed modelling assessment of key activities to confirm that the proposed mitigation measures will ensure compliance with relevant air quality criteria, once detailed design data is available.

It is noted that the TRAQ model is only capable of modelling single road strings, not complex road networks, and as such single road strings with the highest traffic volumes located closest to sensitive receptors were modelled and internal site road were excluded. However, as incremental impacts from road emissions significantly decrease with increases in distance, the incremental contribution of vehicles travelling along the internal Site roads is not expected to affect the findings of the risk assessment. The reduction in incremental impacts from road emissions with distance is illustrated in below in Figure 4.4 of the NSW Department of Planning's Development near rail corridors and busy roads interim guideline (replicated below as **Figure 16** of this report). According to this guideline, under unfavourable dispersion conditions of temperature inversion and light winds pollutant concentrations drop by around 90% within 100m of the kerbside. It is noted that most internal site roads and car parking areas are located over 100 metres from nearby receptors.

Figure 16 Percentage of Pollutant Concentration Shown Relative to Kerbside Concentration of 100%



Source: (NSW Department of Planning 2008)

6.0 Assessment of Air Quality Impacts

6.1 Assessment of Construction Emissions

The key potential air pollution and amenity issues associated with fugitive dust emissions from the proposed activities during the construction works at the Site are:

- Annoyance due to dust deposition (soiling of surfaces) and visible dust plumes
- Elevated suspended particulate concentrations (PM_{10}).

Modelling of dust from construction activities is generally not considered appropriate, as emission rates can vary significantly depending on a combination of the activity and prevailing meteorological conditions (i.e., rainfall and wind speed), which cannot be reliably predicted. The following sections therefore present a qualitative assessment of the potential risks to air quality associated with dust from construction activities at the Project.

6.1.1 Step 1 – Screening Based on Separation Distance

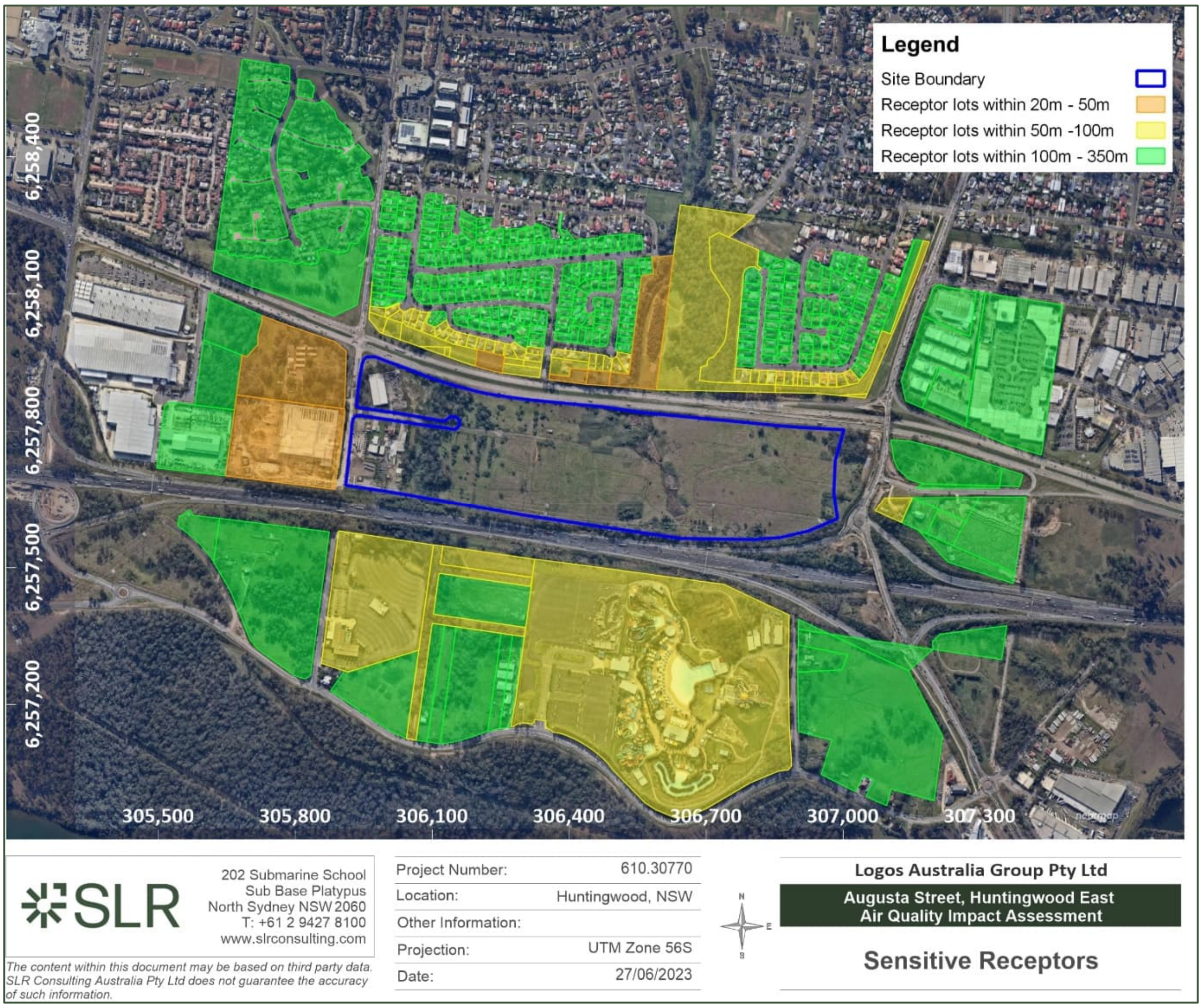
As noted in **Section 4.1**, the nearest sensitive receptor (residential) is located approximately 70 m from the nearest Site boundary.

The IAQM screening criteria for further assessment is the presence of a ‘human receptor’ within:

- 350 m of the boundary of the Site; or
- 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the Site entrance(s).

As ‘human receptors’ are present within 350 m of the boundary of the Site, and 50 m of the route(s) used by construction vehicles in on a public highway up to 500m from the Site (Great Western Highway), further assessment is required and has been completed (refer to Step 2, Step 3 and Step 4 below). The density of sensitive receptors in the vicinity of the Site is shown in **Figure 17**. This figure shows any receptors within the buffer distances used in the IAQM method to show where all, or part, of the receptor lot is within the defined buffer distance. There are no relevant receptor lots within the 20 m buffer distance.

Figure 17 Sensitive Receptor Lots Within Buffer Distances



6.1.2 Step 2a – Assessment of Scale and Nature of the Works

Based upon the above assumptions and the IAQM definitions presented in **Appendix B**, the dust emission magnitudes for each phase of the construction works have been categorised as presented in **Table 4**.

Table 4 Categorisation of Dust Emission Magnitude

Activity	Dust Emission Magnitude	Basis
Earthworks	Large	**IAQM Definition:** Total site area greater than 10,000 m^2, potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size), more than 10 heavy earth moving vehicles active at any one time, formation of bunds greater than 8 m in height, total material moved more than 100,000 t. **Relevance to this Project:** *Total area of the Site requiring earthworks is expected to be approximately 232,216 m^2. It is assumed that any contaminated material will be identified and appropriately treated/removed.*
Construction	Large	**IAQM Definition:** Total building volume >100, 000 m^3, on site concrete batching, sandblasting **Relevance to this Project:** *The total building footprint to be constructed is approximately 78,888 m^2 with two storey buildings. Considering this the total building volume is estimated to exceed 100,000 m^3.*
Trackout	Large	**IAQM Definition:** More than 50 heavy vehicle movements per day (in any one day), surface materials with a high potential for dust generation, greater than 100 m of unpaved road length. **Relevance to this Project:** *It is estimated that more than 50 heavy vehicles movements per day will occur during the peak construction period.*

6.1.3 Step 2b – Assessment of Area Sensitivity

Receptor Sensitivity

According to the IAQM, only the highest level of area sensitivity from the table needs to be considered. Based on the criteria listed in **Table B-1** in **Appendix B**, the sensitivity of the identified residential receptors in this study is concluded to be *high* for health impacts and *high* for dust soiling, as they are located where people may be reasonably expected to be present continuously as part of the normal pattern of land use and the users can reasonably expect a high level as amenity, such as residential receptors.

The number of receptors within each buffer distance from the Site is shown **Table 5**.

Table 5 Number of Sensitive Receptors Within Buffer Distances and their IAQM Guided Sensitivity

Buffer Distance (m)	Number of Receptors	Receptor Sensitivity to Dust Soiling	Receptor Sensitivity to Health Impacts
<20	0	Low	Low
<50	3	Low	Low
<100	44	High	High
<350	385	High	High

Sensitivity of an Area

The number of receptors within each buffer distance from the Site is shown in **Table 6**.

Table 6 Number of Sensitive Receptors Within Buffer Distances and their IAQM Guided Sensitivity for the Area

Buffer Distance (m)	Number of Receptors	Overall Receptor Sensitivity	Area Sensitivity to Dust Soiling	Area Sensitivity to Health Impact
<20	0	High	N/A	N/A
<50	3		Low	Low
<100	44		Low	Low
<350	385		Low	Low

Based on the classifications shown in **Table B2** and **Table B3** in **Appendix B**, the sensitivity of the area to both dust soiling and health effects may be classified as *low*. This categorisation has been made taking into account the individual receptor sensitivities derived above, the 5-year mean background PM_{10} concentration of 19.3 µg/m^3 recorded at Prospect AQMS (see **Section 4.5)** and the existing number of sensitive receptors present in the vicinity of the Site (i.e. between 10 to 100 within 20 m).

6.1.4 Step 2c – Risk Assessment

Given the sensitivity of the general area is classified as *low* for dust soiling and for health effects, and the dust emission magnitudes for the various construction phase activities as shown in **Table 4**, the resulting risk of air quality impacts is as presented in **Table 7.**

Table 7 Preliminary Risk of Air Quality Impacts from Construction Activities (Uncontrolled)

Impact	Sensitivity of Area	Dust Emission Magnitude			Preliminary Risk		
		Earthworks	Construction	Trackout	Earthworks	Construction	Trackout
Dust Soiling	Low	Large	Large	Large	Low Risk	Low Risk	Low Risk
Human Health	Low				Low Risk	Low Risk	Low Risk

The results indicate that there is a *low* risk of adverse dust soiling and human health impacts occurring at the off-site sensitive receptor locations during the earthworks, and construction phases or from trackout, if no mitigation measures were to be applied to control emissions during the construction works.

6.1.5 Step 3 - Mitigation Measures

A reappraisal of the predicted unmitigated air quality impacts on sensitive receptors has been performed to demonstrate the opportunity for minimising risks associated with the use of mitigation strategies. These are termed 'residual impacts'. **Appendix C** lists the general mitigation measures designated by the IAQM for a development shown to have a low risk of adverse impacts.

Additional mitigation measures targeting potential impacts from earthworks, construction and trackout recommended by the IAQM which should reduce the risk impacts. These measures are designated as *highly recommended* (H) or *desirable* (D) by the dust IAQM method. For almost all construction activity, the dust IAQM method notes that the aim should be to prevent significant effects on receptors through the use of effective mitigation and experience shows that this is normally possible. Appropriate site-specific construction mitigation measures are recommended to be included in a Construction Air Quality Management Plan (CAQMP).

Table 8 Mitigation Measures Specific to Earthworks

Activity	Highly recommended or Desirable
Re-vegetate or cover (using hessian, mulches or trackifiers) earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.	Not required but good practice
Only remove the cover in small areas during work and not all at once.	Not required but good practice
H = Highly recommended; D = Desirable	

Table 9 Mitigation Measures Specific to Construction

Activity	Highly recommended or Desirable
Avoid scabbling (roughening of concrete surfaces) if possible.	D

Activity	Highly recommended or Desirable
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.	D
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.	Not required but good practice
For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust.	Not required but good practice
H = Highly recommended; D = Desirable	

Table 10 Mitigation Measures Specific to Trackout

Activity	Highly recommended or Desirable
Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use.	D
Avoid dry sweeping of large areas.	D
Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.	D
Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).	D
Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.	Not required but good practice
Access gates to be located at least 10 m from receptors where possible.	Not required but good practice
H = Highly recommended; D = Desirable	

6.1.6 Step 4 - Residual Impacts

A reappraisal of the predicted unmitigated air quality impacts on sensitive receptors has been performed to demonstrate the opportunity for minimising risks associated with the use of mitigation strategies. These are termed ‘residual impacts’. The results of the reappraisal are presented below in **Table 11**.

Table 11 Residual Risk of Air Quality Impacts from Construction

Impact	Sensitivity of Area	Residual Risk		
		Earthworks	**Construction**	**Trackout**
Dust Soiling	High	Negligible	Negligible	Negligible
Human Health	High	Negligible	Negligible	Negligible

The mitigated effects for the earthworks, and construction phases and from trackout are anticipated to be dust deposition and human health *negligible* respectively.

For almost all construction activity, the dust IAQM method notes that the aim should be to prevent significant effects on receptors through the use of effective mitigation and experience shows that this is normally possible. Hence the residual effect will normally be *negligible*.

6.1.7 Cumulative Impacts

Cumulative impacts are more likely to occur where there are similar emitting developments in proximity. **Table 12** following lists developments that are approved or likely future developments whose construction and operation may contribute to cumulative air quality impacts.

Table 12 Approved or likely future developments in proximity to the Site

Address	DA Reference	Development Description	Current Status
Approved			
65 Huntingwood Drive, Huntingwood	SSD-17352813	Huntingwood Processing Facility Expansion - construction and operation of a new Arnott's food processing (bakery) facility, new additional ancillary structures including ingredient silo building, processing building and storage building	Approved 1 July 2022
24 Healy Circuit, Huntingwood	SPP-19-00014	Demolition of the existing warehouse facility and construction of a data centre including car parking and amenities	Approved 26 March 2020
90 Peter Brock Drive, Eastern Creek	SPP-19-00009	Partial demolition of an existing data centre and the construction of an eight-storey extension and associated works	Approved 16 November 2020
421-427 Flushcombe Road, Blacktown	DA20-00119	Construction and operation of a warehouse and distribution centre to operate 24 hours per day, 7 days a week	Approved July 2022
170 Reservoir Road Arndell Park	SPP-20-02086	Construction of 9 x 3-7 storey seniors housing development including a Residential Aged Care Facility which will deliver 480 self-contained dwellings & 160 residential aged care facility beds. 628 car parking spaces within the	Approved June 2022

Address	DA Reference	Development Description	Current Status
		basement level. 2 x community centres. Pool facility. Indicative network of streets, public & private communal open space, and through-site links.	
44 Clunies Ross Street, Prospect	SSD 10399	Prospect Logistics Estate - comprising construction, fit out, and operation of five warehouses, offices, a café, and associated infrastructure with a combined gross floor area of 95,150 square metres (m2)	Mod 4 Approved April 2023 Approved July 2021
Likely Future Development			
Lot 7, LHIBH, 165 Wallgrove Road and 475 Ferrers Road, Eastern Creek	SSD 34991713	Construction of a warehouse and distribution centre with ancillary office floor space that has a total FSR of 0.64:1 and 206 parking spaces.	Under assessment
554-562 Reservoir Road Prospect	SSD-9577613	Americold Prospect Expansion comprising Construction of a new cold storage building (southern expansion) and ancillary staging areas, upgrades and amendments to vehicles accessways and car parking areas, new plant rooms, new entry gate and other minor amendments associated with the ongoing use and operation of the site	Response to Submissions
51 Huntingwood Drive	SSD-41589232	Construction and operational use of a 7-storey data centre with car park	Response to Submissions

The risk of cumulative impacts can be reduced by strong adherence to a Construction Air Quality Management Plan (CAQMP), which may include mitigation measure such as those listed in **Section 6.1.5**. The potential impacts from the proposed development for construction are unlikely to cause significant adverse effects, especially if all construction sites in proximity are using adequate mitigation measures. It is recommended that any CAQMP includes communication with surrounding construction sites where possible to avoid scheduling of dusty activities at the same time.

6.2 Assessment of Operational Emissions

As discussed in **Section 2.2.3** air quality issues associated with the proposed operations are expected to include traffic-related emissions of products of combustion and particulate matter associated with vehicles accessing and idling at the Site.

Emissions from operational phase traffic will be of a similar nature to existing emissions from traffic travelling along the surrounding road network. Given the scale of on-site vehicle parking and anticipated traffic generation rates, it is considered that the emissions generated due to the combustion of fuel in light and heavy vehicles generated by Project operations are small compared to the emissions generated by traffic on the surrounding road network (see **Section 2.2.3**)

To assess the risk of air emissions from the Project impacting on surrounding sensitive receptors during the operational phase, the following risk based qualitative assessment approach has been adopted.

The risk-based assessment takes account of a range of impact descriptors, including the following:

- **Nature of Impact**: does the impact result in an adverse, neutral or beneficial environment?

  The nature of impact is anticipated to be **adverse** to the environment.

- **Receptor Sensitivity**: how sensitive is the receiving environment to the anticipated impacts?

  There are a large number of residential and recreational receptors to the north and a number of commercial and industrial receptors in all other directions. In terms of the methodology in **Appendix D**, the sensitivity of the residential receptors to emissions from the Site should be considered **high**.

- **Magnitude**: what is the anticipated scale of the impact?

  In order to predict offsite air quality impacts associated with the Project, a first-pass screening of the potential air quality impacts associated with the Project operations was done using TRAQ and the daily traffic numbers summarised in **Section 2.2.3** and detailed in **Appendix E**.

Three scenarios have been assessed for three sections of the Great Western Highway to determine the magnitude of potential impacts from the proposed operations:

- Scenario 1: Vehicles travelling on the Great Western Highway West of Flushcombe Road (AM peak)
- Scenario 2: Vehicles travelling east of Flushcombe Road and west of the Warehouse 5 entrance (AM peak)
- Scenario 3: Vehicles travelling on the Great Western Highway East of the Warehouse 5 entrance (PM peak)

The scenarios have been selected to ensure peak emissions from the operation of the Project at the nearest sensitive receptors have been assessed.

The traffic volumes used for the assessment are shown in **Table 13**.

Table 13 Operational traffic assumptions for risk assessment

Direction	Scenario 1	Scenario 2	Scenario 3
Eastbound	210	160	235
Westbound	55	145	220
Total	**275**	**205**	**455**

The results (provided in **Appendix E**) indicate that the predicted impact from the Project is below 3% of the relevant criteria at the receptor distance (for all pollutants and scenarios modelled).

Given the above, the magnitude of offsite impact from the Project is considered to be negligible at the nearest sensitive receptors.

Given the high sensitivity of the potentially affected receptors and the negligible magnitude of the potential dust impact of the operations, the potential impact significance for the local receptors is concluded to be of neutral significance (see **Table 14**).

Table 14 Impact Significance Dust Impacts –Operational Traffic

Magnitude / Sensitivity	Substantial Magnitude	Moderate Magnitude	Slight Magnitude	Negligible Magnitude
Very High Sensitivity	Major Significance	Major/ Intermediate Significance	Intermediate Significance	Neutral Significance
High Sensitivity	Major/ Intermediate Significance	Intermediate Significance	Intermediate/Minor Significance	Neutral Significance
Medium Sensitivity	Intermediate Significance	Intermediate/Minor Significance	Minor Significance	Neutral Significance
Low Sensitivity	Intermediate/Minor Significance	Minor Significance	Minor/Neutral Significance	Neutral Significance

It is noted that this assessment is based on the operations described in this report only. If at the development stage, other uses are proposed with potential to generate air quality emissions, then an updated site-specific air quality impact assessment should be prepared.

6.2.1 Mitigation measures

In the event that vehicles idle at the Site for significant periods of time, emissions may be more than anticipated in this report; however, these emissions can be managed through appropriate signage and training to ensure that drivers turn off engines if they are parked at the site for extended periods (e.g. more than 2 minutes).

7.0 Closure

SLR Consulting Australia Pty Ltd (SLR) has been commissioned by The Trustee for Huntingwood Property Trust to undertake an air quality impact assessment of a proposed industrial estate including a multi level warehouse (the Project) located at Augusta Street, Huntingwood East.

This report summarises the potential construction and operational air quality impacts associated with the Project and has been prepared to accompany the State Significant Development (SSD) application for the proposal.

The main potential sources of air emissions were identified as particulate matter impacts during the construction phase and products of combustion during the operational phase of the Project.

The potential for off-site dust impacts during construction phase was assessed using a qualitative risk-based approach prescribed by the IAQM. The results of this assessment indicate that dust impacts due to the construction works can be adequately managed with the implementation of site-specific mitigation measures, and that the residual impacts are likely to be of negligible risk for the surrounding receptors during the construction phase.

The air quality assessment adopted a semi quantitative approach to determine if there is a risk of adverse off-site impacts and requirement for a detailed assessment (in accordance with the SEARs requirements). A quantitative TRAQ assessment was completed to support the semi-quantitative risk assessment. The TRAQ assessment found that the incremental impact associated with the vehicles travelling along the roads closest to the nearby sensitive receptors was negligible at the closest receptors such that project vehicles are unlikely to result in any measurable increase in cumulative air quality impacts at the nearest sensitive receptors. Given this, a detailed assessment was not deemed to be required.

Given that the incremental concentrations predicted by TRAQ for the project-related vehicle movements are negligible, SLR concludes that the Project would not result in any measurable increase in cumulative air quality impacts at the nearest sensitive receptors, and air quality is not considered to be a constraint for the proposal.

In summary, with proper mitigation measures in place, air quality at the surrounding receptors should not be considered as a constraint during the construction and operation of the Project.

8.0 References

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9.0 Feedback

At SLR, we are committed to delivering professional quality service to our clients. We are constantly looking for ways to improve the quality of our deliverables and our service to our clients. Client feedback is a valuable tool in helping us prioritise services and resources according to our client needs.

To achieve this, your feedback on the team’s performance, deliverables and service are valuable and SLR welcome all feedback via https://www.slrconsulting.com/en/feedback. We recognise the value of your time and we will make a $10 donation to our 2023 Charity Partner - Lifeline, for every completed form.

Appendix A Predicted Traffic Generation Rates

Augusta Street Warehouse and Distribution Centre

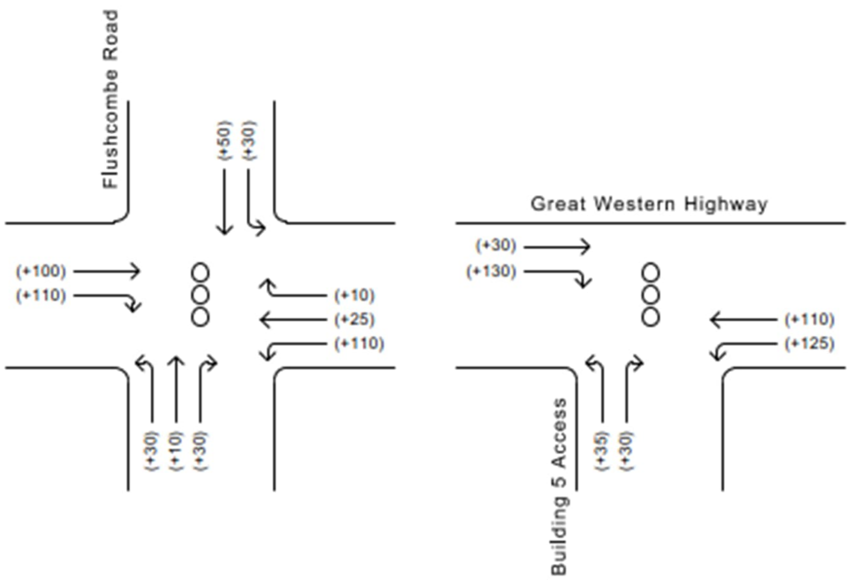
Air Quality Impact Assessment

The Trustee for Huntingwood Property Trust

SLR Project No.: 610.30299.00100

8 September 2023

11916 - Huntingwood



LEGEND

(+10) - Additional Development Traffic
- Traffic Signals

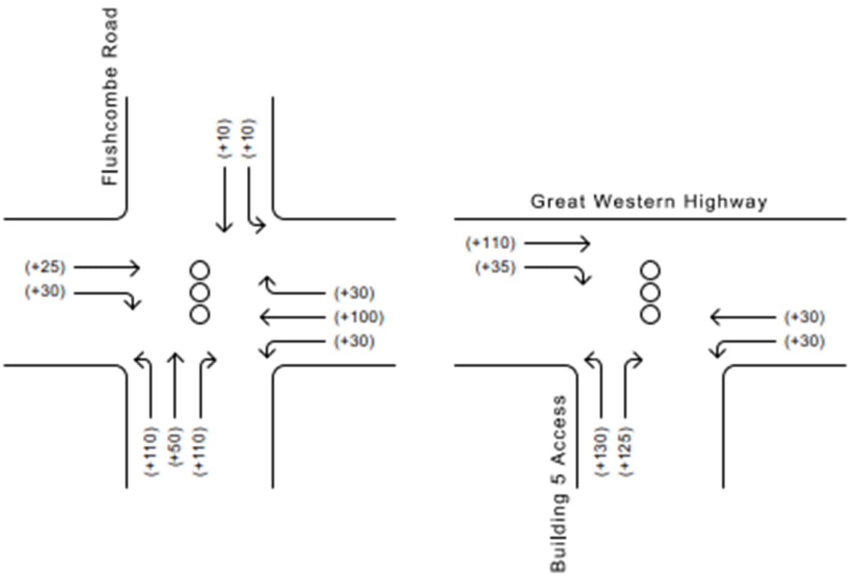
Weekday morning development traffic

Colston Budd Rogers & Kafes Pty Ltd

DRAWN BY CBRK Pty Ltd_mc Ref: 11916 16.06.2023

Figure 1

11916 - Huntingwood



LEGEND

(+10) - Additional Development Traffic

- Traffic Signals

Weekday afternoon development traffic

Colston Budd Rogers & Kafes Pty Ltd

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Figure 2

Appendix B Construction Phase Risk Assessment Methodology

Augusta Street Warehouse and Distribution Centre

Air Quality Impact Assessment

The Trustee for Huntingwood Property Trust

SLR Project No.: 610.30299.00100

8 September 2023

B.1 Step 1 – Screening Based on Separation Distance

The Step 1 screening criteria provided by the IAQM guidance suggests screening out any assessment of impacts from construction activities where sensitive receptors are located more than 350 m from the boundary of the Project Site and more than 50 m from the route used by construction vehicles on public roads up to than 500 m from the Project Site entrance. This step is noted as having deliberately been chosen to be conservative and will require assessments for most projects.

B.2 Step 2a – Assessment of Scale and Nature of the Works

Step 2a of the assessment provides "dust emissions magnitudes" for each of four dust generating activities; demolition, earthworks, construction, and track-out (the movement of site material onto public roads by vehicles). The magnitudes are: *Large*; *Medium*; or *Small*, with suggested definitions for each category. The definitions given in the IAQM guidance for earthworks, construction activities and track-out, which are most relevant to this Development, are as follows:

Demolition *(Any activity involved with the removal of an existing structure [or structures]. This may also be referred to as de-construction, specifically when a building is to be removed a small part at a time)*:

- ***Large***: Total building volume >50,000 m^3, potentially dusty construction material (e.g. concrete), on-site crushing and screening, demolition activities >20 m above ground level;
- ***Medium***: Total building volume 20,000 m^3 – 50,000 m^3, potentially dusty construction material, demolition activities 10-20 m above ground level; and
- ***Small***: Total building volume <20,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <10m above ground, demolition during wetter months.

Earthworks (Covers the processes of soil-stripping, ground-levelling, excavation and landscaping):

- ***Large***: Total site area greater than 10,000 m^2, potentially dusty soil type (eg clay, which will be prone to suspension when dry due to small particle size), more than 10 heavy earth moving vehicles active at any one time, formation of bunds greater than 8 m in height, total material moved more than 100,000 t.
- ***Medium***: Total site area 2,500 m^2 to 10,000 m^2, moderately dusty soil type (eg silt), 5 to 10 heavy earth moving vehicles active at any one time, formation of bunds 4 m to 8 m in height, total material moved 20,000 t to 100,000 t.
- ***Small***: Total site area less than 2,500 m^2, soil type with large grain size (eg sand), less than five heavy earth moving vehicles active at any one time, formation of bunds less than 4 m in height, total material moved less than 20,000 t, earthworks during wetter months.

Construction (Any activity involved with the provision of a new structure (or structures), its modification or refurbishment. A structure will include a residential dwelling, office building, retail outlet, road, etc):

- ***Large***: Total building volume greater than 100,000 m^3, piling, on site concrete batching; sandblasting.
- ***Medium***: Total building volume 25,000 m^3 to 100,000 m^3, potentially dusty construction material (eg concrete), piling, on site concrete batching.
- ***Small***: Total building volume less than 25,000 m^3, construction material with low potential for dust release (eg metal cladding or timber).

Track-out (The transport of dust and dirt from the construction / demolition site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network):

- ***Large***: More than 50 heavy vehicle movements per day, surface materials with a high potential for dust generation, greater than 100 m of unpaved road length.
- ***Medium***: Between 10 and 50 heavy vehicle movements per day, surface materials with a moderate potential for dust generation, between 50 m and 100 m of unpaved road length.
- ***Small***: Less than 10 heavy vehicle movements per day, surface materials with a low potential for dust generation, less than 50 m of unpaved road length.

In order to provide a conservative assessment of potential impacts, it has been assumed that if at least one of the parameters specified in the 'large' definition is satisfied, the works are classified as large, and so on.

B.3 Step 2b – Assessment of the Sensitivity of the Area

- Step 2b of the assessment process requires the sensitivity of the area to be defined. The sensitivity of the area takes into account:
- The specific sensitivities that identified sensitive receptors have to dust deposition and human health impacts;
- The proximity and number of those receptors;
- In the case of PM_{10}, the local background concentration; and
- Other site-specific factors, such as whether there are natural shelters such as trees to reduce the risk of wind-blown dust.
- Individual receptors are classified as having *high*, *medium* or *low* sensitivity to dust deposition and human health impacts (ecological receptors are not addressed using this approach). The IAQM method provides guidance on the sensitivity of different receptor types to dust soiling and health effects as summarised in **Table A-1**. It is noted that user expectations of amenity levels (dust soiling) is dependent on existing deposition levels.

Table B-1 IAQM Guidance for Categorising Receptor Sensitivity

Value	High Sensitivity Receptor	Medium Sensitivity Receptor	Low Sensitivity Receptor
Dust soiling	Users can reasonably expect 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.	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	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

Value	High Sensitivity Receptor	Medium Sensitivity Receptor	Low Sensitivity Receptor
		continuously or regularly for extended periods as part of the normal pattern of use of the land.	of time as part of the normal pattern of use of the land.
	Examples: Dwellings, museums, medium- and long-term car parks and car showrooms.	Examples: Parks and places of work.	Examples: Playing fields, farmland (unless commercially sensitive horticultural), footpaths, short term car parks and roads.
Health effects	Locations where 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).	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).	Locations where human exposure is transient.
	Examples: Residential properties, hospitals, schools and residential care homes.	Examples: Office and shop workers, but will generally not include workers occupationally exposed to PM_{10}.	Examples: Public footpaths, playing fields, parks and shopping street.

According to the IAQM methods, the sensitivity of the identified individual receptors (as described above) is then used to assess the *sensitivity of the area* surrounding the active construction area, taking into account the proximity and number of those receptors, and the local background PM_{10} concentration (in the case of potential health impacts) and other site-specific factors. Additional factors to consider when determining the sensitivity of the area include:

- Any history of dust generating activities in the area;
- The likelihood of concurrent dust generating activity on nearby sites;
- Any pre-existing screening between the source and the receptors;
- Any conclusions drawn from analysing local meteorological data which accurately represent the area and if relevant, the season during which the works will take place;
- Any conclusions drawn from local topography;
- The duration of the potential impact (as a receptor may be willing to accept elevated dust levels for a known short duration, or may become more sensitive or less sensitive (acclimatised) over time for long-term impacts); and
- any known specific receptor sensitivities which go beyond the classifications given in the IAQM document.

The IAQM guidance for assessing the sensitivity of an area to dust soiling is shown in Table A-2. The sensitivity of the area should be derived for each of activity relevant to the project (i.e. construction and earthworks).

Table B-2 IAQM Guidance for Categorising the Sensitivity of an Area to Dust Soiling Effects

Receptor sensitivity	Number of receptors	Distance from the source (m)			
		<20	<50	<100	<350
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

Note: Estimate the total number of receptors within the stated distance. Only the *highest level* of area sensitivity from the table needs to be considered. For example, if there are 7 high sensitivity receptors < 20m of the source and 95 high sensitivity receptors between 20 and 50 m, then the total of number of receptors < 50 m is 102. The sensitivity of the area in this case would be high.

A modified version of the IAQM guidance for assessing the *sensitivity of an area* to health impacts is shown in **Table A-3**. For high sensitivity receptors, the IAQM methods takes the existing background concentrations of PM_{10} (as an annual average) experienced in the area of interest into account and is based on the air quality objectives for PM_{10} in the UK. As these objectives differ from the ambient air quality criteria adopted for use in this assessment (i.e. an annual average of 25 µg/m^3 for PM_{10}) the IAQM method has been modified slightly.

- This approach is consistent with the IAQM guidance, which notes that in using the tables to define the *sensitivity of an area*, professional judgement may be used to determine alternative sensitivity categories, taking into account the following factors:
- any history of dust generating activities in the area;
- the likelihood of concurrent dust generating activity on nearby sites;
- any pre-existing screening between the source and the receptors;
- any conclusions drawn from analysing local meteorological data which accurately represent the area, and if relevant the season during which the works will take place;
- any conclusions drawn from local topography;
- duration of the potential impact; and
- any known specific receptor sensitivities which go beyond the classifications given in this document.

Table B-3 IAQM Guidance for Categorising the Sensitivity of an Area to Dust Health Effects

Receptor sensitivity	Annual mean PM_{10} conc.	Number of receptors [a,b]	Distance from the source (m)				
			<20	<50	<100	<200	<350
High	>25 µg/m^3	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low

Receptor sensitivity	Annual mean PM_{10} conc.	Number of receptors [a,b]	Distance from the source (m)				
			<20	<50	<100	<200	<350
	21-25 µg/m^3	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	17-21 µg/m^3	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<17 µg/m^3	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	>25 µg/m^3	>10	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	21-25 µg/m^3	>10	Medium	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	17-21 µg/m^3	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	<17 µg/m^3	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

Notes: (a) Estimate the total within the stated distance (e.g. the total within 350 m and not the number between 200 and 350 m); noting that only the highest level of area sensitivity from the table needs to be considered.
(b) In the case of high sensitivity receptors with high occupancy (such as schools or hospitals) approximate the number of people likely to be present. In the case of residential dwellings, just include the number of properties.

B.4 Step 2c – Risk Assessment

The dust emission magnitude from Step 2a and the receptor sensitivity from Step 2b are then used in the matrices shown in **Table A-4** (demolition), **Table A-5** (earthworks and construction) and **Table A-6** (track-out) to determine the risk category with no mitigation applied.

Table B-4 Risk Category from Demolition Activities

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 B-5 Risk Category from Earthworks and Construction Activities

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 B-6 Risk Category from Track-out Activities

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

B.5 Step 3 - Site-Specific Mitigation

Once the risk categories are determined for each of the relevant activities, site-specific management measures can be identified based on whether the Project Site is a low, medium or high risk site.

B.6 Step 4 – Residual Impacts

Following Step 3, the residual impact is then determined after management measures have been considered.

Appendix C Genergal Air Quality Mitigation Measures for Construction Sites

Augusta Street Warehouse and Distribution Centre

Air Quality Impact Assessment

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The dust IAQM lists a total of 51 mitigation measures for sites ranging from low risk to high risk. **Table C-1** lists the relevant general mitigation measures designated as *highly recommended* (H) or *desirable* (D) by the dust IAQM method for a development shown to have a low risk of adverse impacts. Not all these measures would be practical or relevant to the Project therefore a detailed review of the recommendations should be performed, and the most appropriate measures be adopted as part of the Construction Environmental Management Plan (CEMP).

Table C -1 Site-Specific Management Measures Recommended by the IAQM

	Activity	Highly recommended or Desirable
1	Display the head or regional office contact information.	H
2	Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk and should include as a minimum the highly recommended measures in this document. The desirable measures should be included as appropriate for the site.	H
Site Management		
3	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.	H
4	Make the complaints log available to the local authority when asked.	H
5	Record any exceptional incidents that cause dust and/or air emissions, either on- or off-site, and the action taken to resolve the situation in the logbook.	H
Monitoring		
6	Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100 m of site boundary, with cleaning to be provided if necessary.	D
7	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.	H
8	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.	H
Preparing and Maintaining the Site		
9	Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.	H
10	Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.	H
11	Fully enclose site or specific operations where there is a high potential for dust production and the site is actives for an extensive period	D
12	Avoid site runoff of water or mud.	H
13	Keep site fencing, barriers and scaffolding clean using wet methods.	D

	Activity	Highly recommended or Desirable
14	Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.	D
15	Cover, seed, or fence stockpiles to prevent wind whipping.	D
Operating Vehicle/Machinery and Sustainable Travel		
16	Ensure all vehicles switch off engines when stationary - no idling vehicles.	H
17	Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.	H
18	Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on un-surfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).	D
Operations		
19	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.	H
20	Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.	H
21	Use enclosed chutes and conveyors and covered skips.	H
22	Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.	H
23	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.	D
Waste Management		
24	Avoid bonfires and burning of waste materials.	H

Appendix D Operational Phase Risk Assessment Methodology

Augusta Street Warehouse and Distribution Centre

Air Quality Impact Assessment

The Trustee for Huntingwood Property Trust

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Nature of Impact

Predicted impacts may be described in terms of the overall effect upon the environment:

Beneficial: the predicted impact will cause a beneficial effect on the receiving environment.

Neutral: the predicted impact will cause neither a beneficial nor adverse effect.

Adverse: the predicted impact will cause an adverse effect on the receiving environment.

Receptor Sensitivity

Sensitivity may vary with the anticipated impact or effect. A receptor may be determined to have varying sensitivity to different environmental changes, for example, a high sensitivity to changes in air quality, but low sensitivity to noise impacts. Sensitivity may also be derived from statutory designation which is designed to protect the receptor from such impacts.

Sensitivity terminology may vary depending upon the environmental effect, but generally this may be described in accordance with the following broad categories - Very high, High, Medium and Low.

Table D-1 outlines the methodology used in this study to define the sensitivity of receptors to air quality impacts.

Table D-1 Methodology for Assessing Sensitivity of a Receptor

Sensitivity	Criteria
Very High	Receptors of very high sensitivity to air pollution (e.g. dust or odour) such as: hospitals and clinics, and retirement homes.
High	Receptors of high sensitivity to air pollution, such as: schools, residential areas, food retailers, glasshouses and nurseries.
Medium	Receptors of medium sensitivity to air pollution, such as: farms / horticultural land, offices/recreational areas, painting and furnishing, hi-tech industries and food processing, and outdoor storage (ie new cars).
Low	All other air quality sensitive receptors not identified above, such as light and heavy industry.

Magnitude

Magnitude describes the anticipated scale of the anticipated environmental change in terms of how that impact may cause a change to baseline conditions (refer to **Table C-2**). Magnitude may be described quantitatively or qualitatively. Where an impact is defined by qualitative assessment, suitable justification is provided in the text.

Table D-2 Magnitude of Impacts

Magnitude	Description
Substantial	Impact is predicted to cause significant consequences on the receiving environment (may be adverse or beneficial)
Moderate	Impact is predicted to possibly cause statutory objectives/standards to be exceeded (may be adverse)
Slight	Predicted impact may be tolerated.
Negligible	Impact is predicted to cause no significant consequences.

Significance

The risk-based matrix provided in **Table C-3** illustrates how the definition of the sensitivity and magnitude interact to produce impact significance.

Table D-3 Impact Significance Matrix

Sensitivity \ Magnitude		[Defined by Table B2 (IAQM 2014)]			
		Substantial Magnitude	**Moderate Magnitude**	**Slight Magnitude**	**Negligible Magnitude**
[Defined by TableB1 (IAQM 2014)]	Very High Sensitivity	Major Significance	Major/ Intermediate Significance	Intermediate Significance	Neutral Significance
	High Sensitivity	Major/ Intermediate Significance	Intermediate Significance	Intermediate/Minor Significance	Neutral Significance
	Medium Sensitivity	Intermediate Significance	Intermediate/Minor Significance	Minor Significance	Neutral Significance
	Low Sensitivity	Intermediate/Minor Significance	Minor Significance	Minor/Neutral Significance	Neutral Significance

Appendix E TRAQ Assessment

Augusta Street Warehouse and Distribution Centre

Air Quality Impact Assessment

The Trustee for Huntingwood Property Trust

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8 September 2023

E.1 Pollutants Assessed

TRAQ provides predictions of CO, NO_2 and PM_{10} concentrations at various distances from the road kerb. It does not provide predictions of the other traffic-related pollutants identified in **Section 2.3**, namely $PM_{2.5}$, SO_2 and VOCs. Given the low level of SO_2 emissions from vehicles and the low ambient concentrations recorded in the region (see **Section 4.5**), it is reasonable to assume that SO_2 emissions from road traffic are unlikely to result in any exceedances of the relevant criteria at locations beyond the road kerb. SLR's experience in modelling VOC emissions from roads has also shown that kerbside concentration of VOCs are typically well below the relevant air quality guidelines.

Given the above, SO_2 and VOC traffic emissions have not been considered further in this assessment. $PM_{2.5}$ emissions, however, have been assessed based on the PM_{10} concentrations given by TRAQ using a conservative $PM_{2.5}/PM_{10}$ ratio estimated from COPERT Australia derived emission factors (see **Section Appendix E**).

E.2 Modelling Assumptions and scenarios

Given the closest road to the surrounding sensitive receptors (i.e., the residences to the north of the Site – refer **Figure E-1**) is the Great Western Highway, traffic numbers along three segments of this road were used to estimate the pollutant concentrations generated by the Project. The three segments are:

- Great Western Highway west of Flushcombe Road (segment 1)
- Great Western Highway east Flushcombe Road and west of Lot 5 entrance (segment 2)
- Great Western Highway east of Lot 5 entrance (segment 3)

The traffic numbers for each segment were estimated from data provided by the client (see **Appendix E**) and are presented in **Table E-1**. Road gradients was calculated based on terrain elevations.

Figure E-1 Closest Residential Receptors to the Kerbside of Great Western Highway

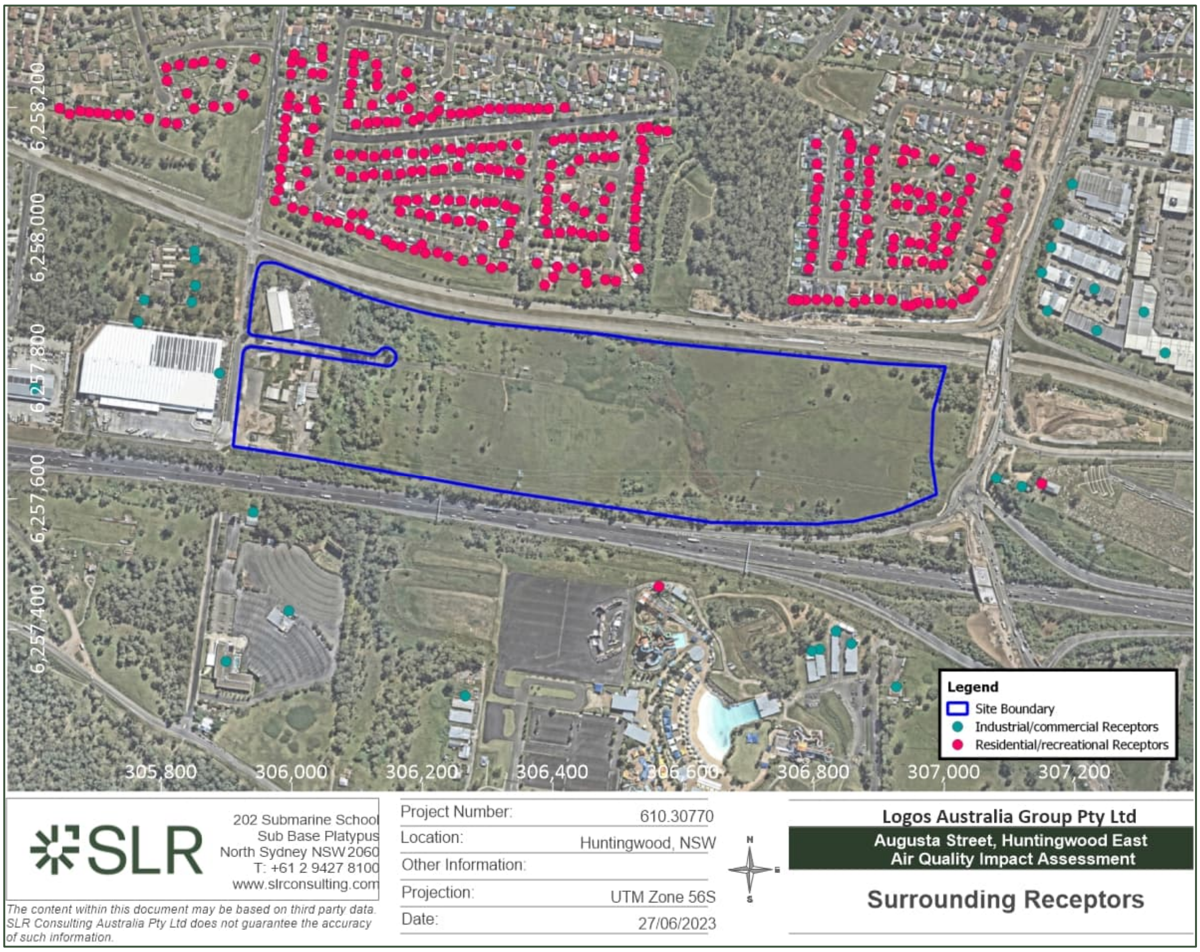


Table E-1 Great Western Highway Hourly Traffic Volumes After the Project

Road Segment	Direction	AM Peak	PM Peak	Road Gradient (%)
GWH west of Flushcombe	EB(a)	**210***	55	-1.6
	WB(b)	**55**	60	1.6
GWH east Flushcombe and west of WH5 entrance	EB	**160**	145	0.6
	WB	**145**	160	-0.6
GWH East of WH5 entrance	EB	60	**235**	0.8
	WB	235	**210**	-0.8

(a) Eastbound
(b) Westbound
*Bold numbers are used for modelling.

E.2.1 Dispersion Model Configuration

TRAQ requires a number of inputs to describe the Project environment and emissions to air, including:

- Background pollutant concentrations
- Peak hour traffic volumes and vehicle speeds
- Traffic mix (heavy vehicle percentage)
- Road type, number of lanes and gradient
- Year of assessment (vehicle fleet)
- Location land use
- Season

The sources of the required data and assumptions made for the purpose of this assessment are summarised in **Table E-2**.

Table E-2 TRAQ Input Data

Parameter	Value	Description
Background pollutant concentrations	PM_{10} 24-Hour: 31.6 µg/m^3 PM_{10} Annual: 19.3 µg/m^3 $PM_{2.5}$ 24-Hour: 13.8 µg/m^3 $PM_{2.5}$ Annual: 7.8 µg/m^3 NO_2 1-Hour: 39.0 µg/m^3 NO_2 Annual: 15.9 µg/m^3 CO 1-Hour: 0.3 mg/m^3 CO 8-Hour: 0.3 mg/m^3	The 1-, 8- and 24-hour average values are the 90th percentile background air quality concentrations recorded by the Prospect AQMS as per TRAQ guidance. The values are based on records from 2018-2022 inclusive (refer **Section 4.5)**
Road Grade	As per **Table E-1**	Average gradient estimated from terrain elevations
Peak hour speeds	10 km/hr	TRAQ default for peak periods on commercial arterial and arterial roads

Parameter	Value	Description
Peak hour traffic volumes	**GWH West of Flushcombe** Eastbound: 200 Westbound: 55 **GWH between Flushcombe and WH5** Eastbound: 160 Westbound: 145 **GWH East of WH5** Eastbound: 235 Westbound: 210	Highest projected peak hourly traffic volumes.
Peak hour percentage of daily traffic	10%	TRAQ default
Traffic mix (Percent Heavy Vehicles)	10%	Heavy vehicle ratio provided by the client.
Road type	Commercial Arterial	-
Year of assessment (vehicle fleet)	2026	-
Location land use	Residential	-
Season	Worst-case	TRAQ default worst-case season
Cold start emissions	Included	-

The TRAQ default traffic mix for commercial arterial roads have combined total of 10.8 per cent heavy vehicles. As shown in **Table E-2**, the heavy vehicle proportion assumed in the modelling was assumed to be 10%. To do this, the default traffic mix was adjusted as shown in **Table E-3**. The proportions of individual heavy and light vehicle classes within each group remained the same but the overall split between the two groups was modified to have the relevant values.

Table E-3 Adopted Traffic Mix Used in TRAQ

Vehicle Category		**TRAQ Default Traffic Mix (%)***	**Traffic Mix Used in this Assessment (%)**
CP	Petrol passenger vehicles	72.8	73.5
CD	Diesel passenger vehicles	2.1	2.1
LDCP	Light-duty commercial petrol vehicles less than 3.5 tonnes	10.2	10.3
LDCD	Light-duty commercial diesel vehicles less than 3.5 tonnes	3.5	3.5
MC	Motorcycles	0.6	0.6
Percentage Light Vehicles		***89.2%***	***90.0%***
HDCP	Heavy-duty commercial petrol vehicles greater than 3.5	0.2	0.2

Vehicle Category		TRAQ Default Traffic Mix (%)*	Traffic Mix Used in this Assessment (%)
RT	Rigid trucks, 3.5-25 tonnes, diesel only	6.5	6.0
AT	Articulated trucks greater than 25 tonnes, diesel only	3.6	3.3
BusD	Heavy public transport buses, diesel only	0.5	0.5
Percentage Heavy Vehicles		***10.8%***	***10.0%***

Default TRAQ traffic mix for 'Commercial Arterial' road type

The TRAQ screening tool does not include emission factors for $PM_{2.5}$. For the purposes of this assessment therefore, an estimated $PM_{2.5}/PM_{10}$ ratio was derived from the COPERT Australia emission factor database tool (COPERT). Vehicle speeds of 10 km/hr and 65 km/hr were modelled using COPERT to derive PM_{10} and $PM_{2.5}$ emission factors for the 2021 NSW vehicle fleet. The $PM_{2.5}/PM_{10}$ ratio for each vehicle speed scenario was estimated and a ratio of 85% (calculated based on the lower 10 km/hr vehicle speeds, which was worst-case) was adopted as a conservative measure (accounts for both exhaust and non-exhaust emissions). This ratio was applied to the PM_{10} concentrations predicted by TRAQ to derive estimated $PM_{2.5}$ concentrations. It is noted that the ambient $PM_{2.5}$ and PM_{10} concentration ratio recorded by the Prospect AQMS is approximately 40%.

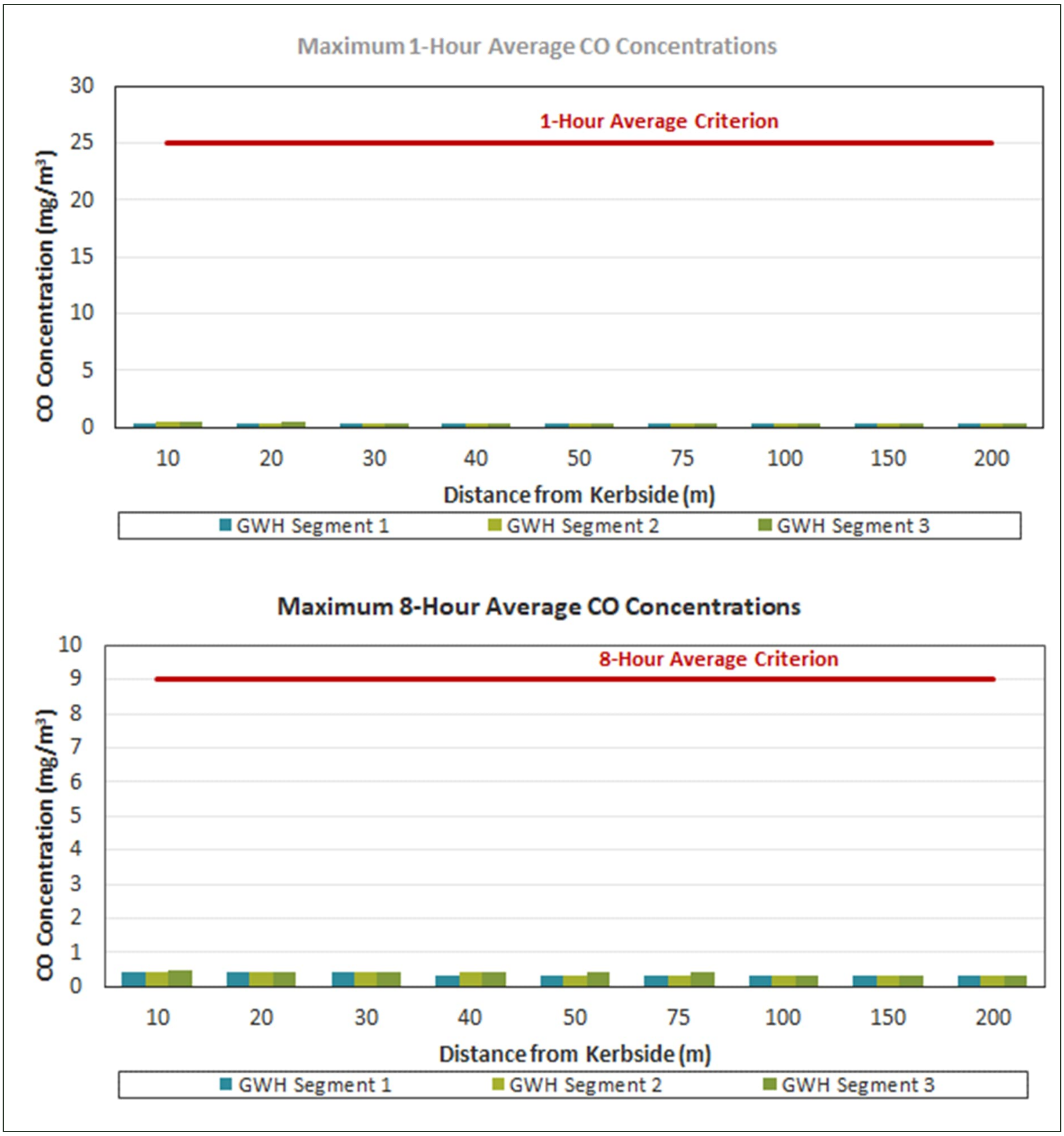
E.3 Modelling Results

The air quality impacts predicted by the screening model TRAQ due to vehicle emissions from different segments of the Great Western Highway, based on the anticipated peak hour traffic volumes and the adopted TRAQ settings (see **Table E-2**, are presented below. As outlined in **Section E.2**, the closest residential receptors will be approximately 50 m, 20m, and 40 m from the kerbside of segments 1, 2, and 3 of the Great Western Highway. As shown in the results plots, pollutant concentrations decrease with increasing distance from the road.

E.3.1 Carbon Monoxide

The CO concentrations predicted by TRAQ at varying distances are shown in **Figure E-2**. These are cumulative concentrations, including the background levels listed in **Table E-2**. As shown by the plots, the predicted concentrations are far below the relevant ambient air quality criteria.

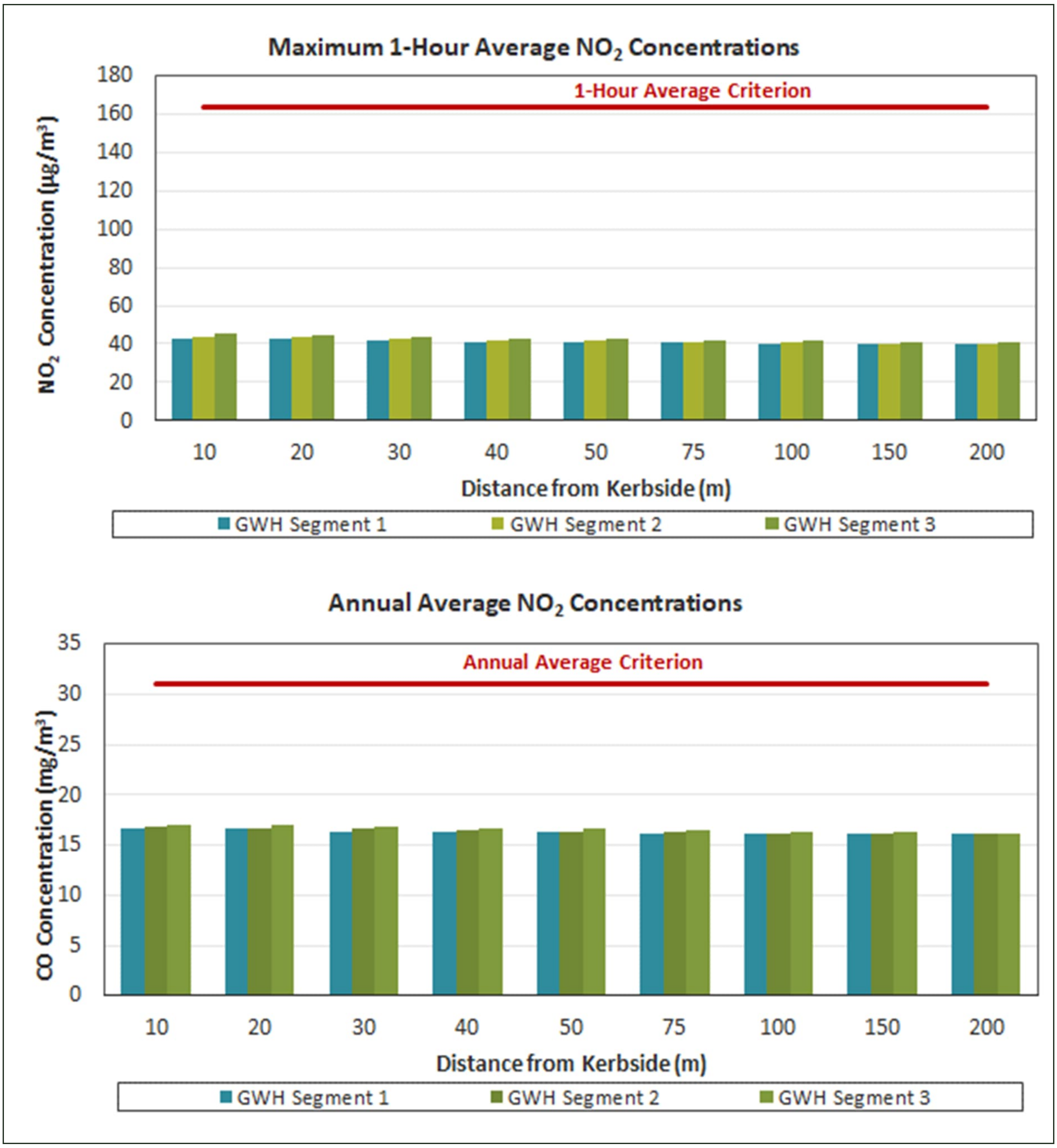
Figure E-2 Maximum Predicted CO Concentrations Versus Distance from Great Western Highway (TRAQ)



E.3.2 Nitrogen Dioxide

The maximum cumulative 1-hour average and annual average NO_2 concentrations predicted by TRAQ at varying distances from the various segments of Great Western Highway are shown in **Figure E-3**. As shown by the plots, the predicted concentrations are well below the current ambient air quality criteria for NO_2.

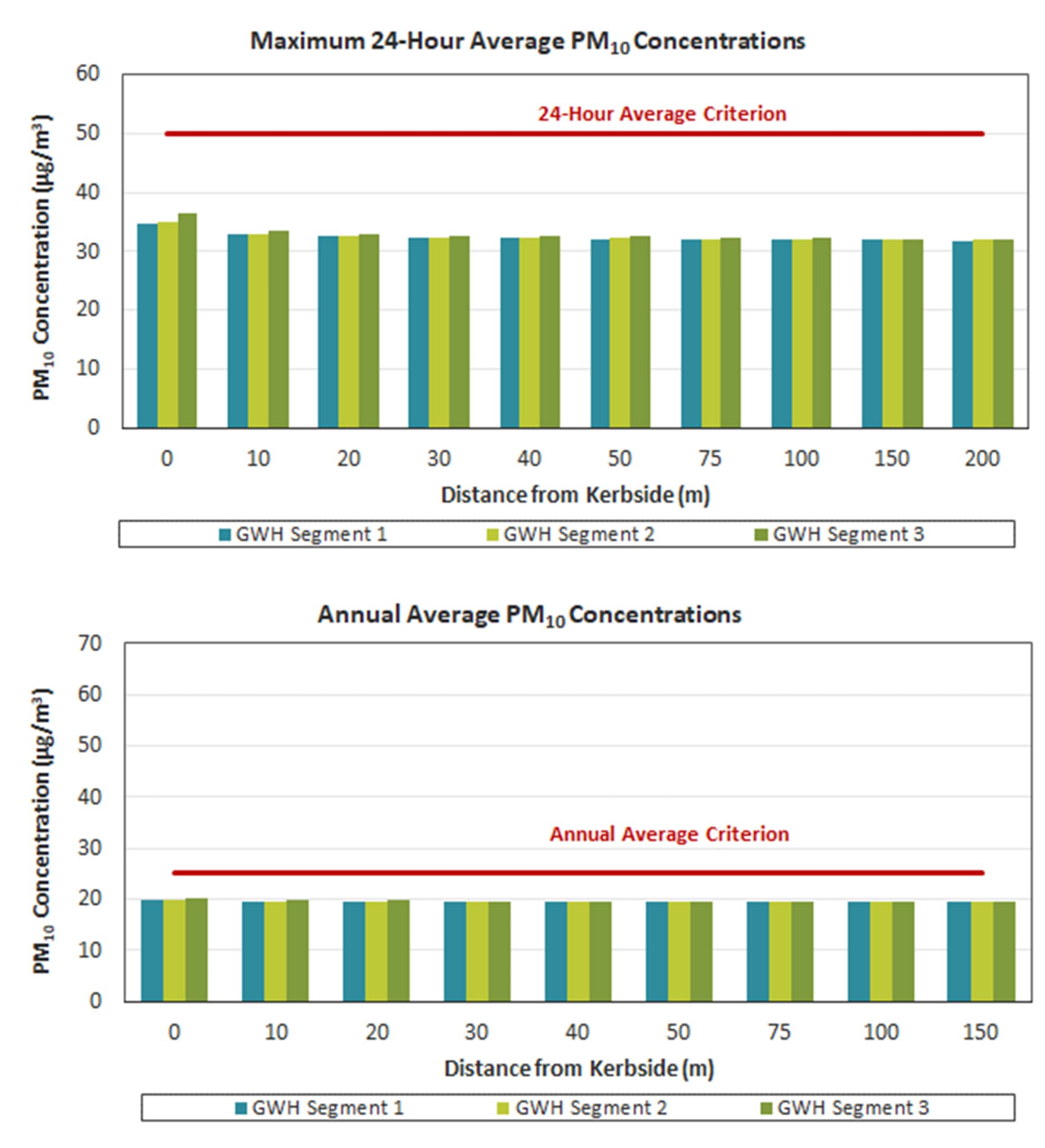
Figure E-3 Maximum Predicted NO_2 Concentrations Versus Distance from Great Western Highway (TRAQ)



E.3.3 PM_{10}

The maximum cumulative 24-hour average and annual average PM_{10} concentrations predicted by TRAQ at varying distances from the various segments of Great Western Highway are shown in **Figure E-4**. As shown by the plots, the predicted concentrations are below both the 24-hour average and annual average criteria at distances all distances from the kerbside.

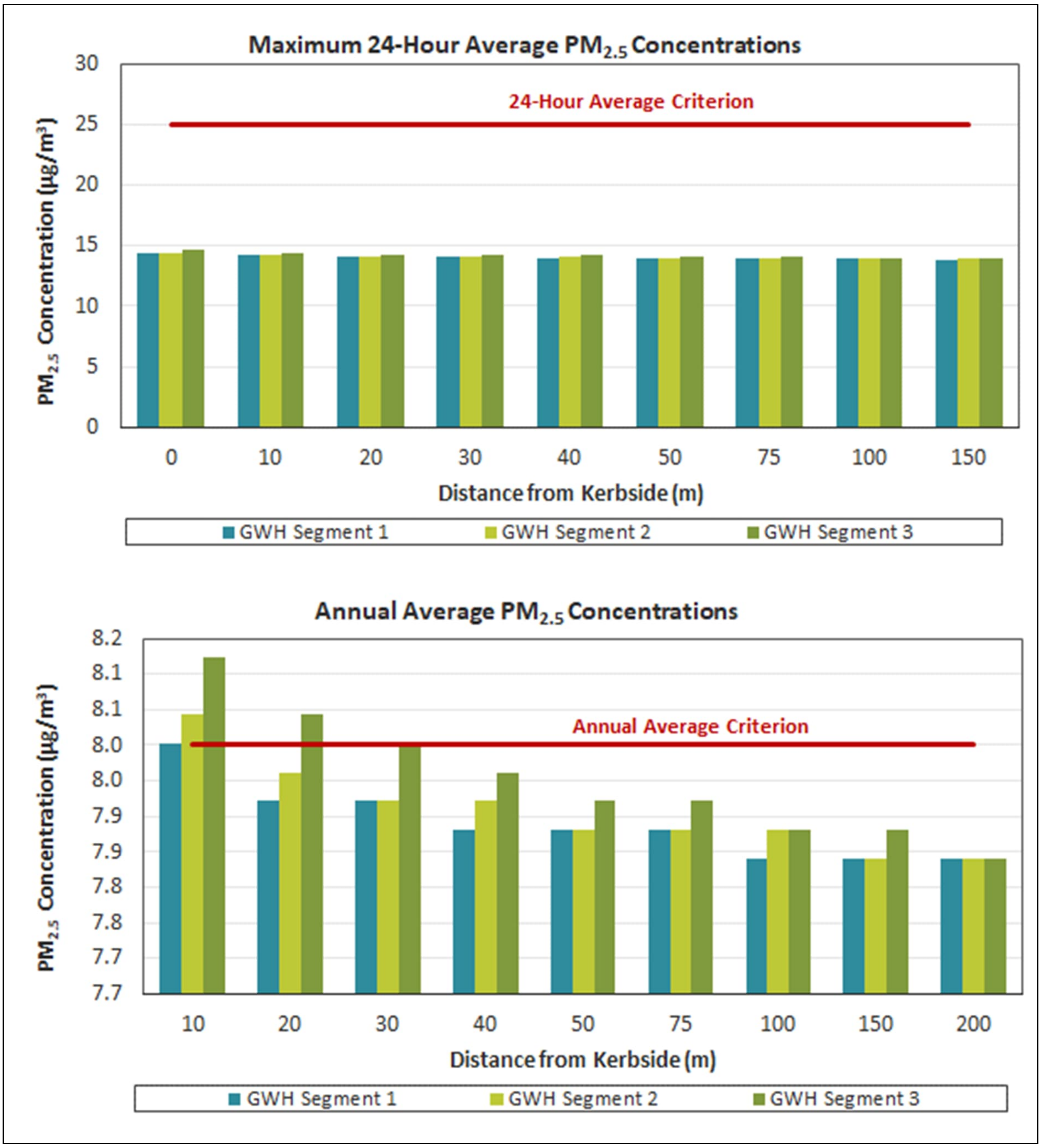
Figure E-4 Maximum Predicted PM_{10} Concentrations Versus Distance (TRAQ)



E.3.4 $PM_{2.5}$

$PM_{2.5}$ concentrations have been estimated from the PM_{10} concentrations given by TRAQ using a $PM_{2.5}/PM_{10}$ ratio of 85% (estimated from COPERT Australia derived emission factors). The maximum cumulative 24-hour average and annual average $PM_{2.5}$ concentrations derived using this approach are shown in **Figure E-5**.

Figure E-5 Estimated $PM_{2.5}$ Maximum Concentrations Versus Distance



As shown by **Figure E-5**, the predicted 24-hour average concentrations are below the current 24-hour average ambient air quality criterion for $PM_{2.5}$ at all distances from the kerbside. However, the annual average $PM_{2.5}$ concentrations are predicted by TRAQ to be above the current annual average guideline at 10 m from the kerbside. This is mainly due to the high background concentration of 7.8 µg/m^3 which is elevated compared to the 8.0 µg/m^3 criteria.

E.4 Summary

The predicted concentrations at 50 m, 20 m, and 40 m from the kerbside of segment 1, segment 2, and segment 3 of the Great Western Highway are summarised in **Table E-4** for all pollutants and averaging periods assessed. As shown in the table and discussed above, all concentrations comply with the relevant criteria at the nearest sensitive receptor locations.

Table E-4 TRAQ Model Results

Pollutant and Averaging Period	Units	Incremental Impact	Background Concentration	Cumulative Impact*	Criteria
50 m from the Kerb – Segment 1					
Maximum 1-hour CO	mg/m^3	0.1	0.3	0.4	**25**
Maximum 8-hour CO	mg/m^3	<0.1	0.3	0.3	**9**
Maximum 1-hour NO_2	$\mu g/m^3$	2.0	39.0	41.0	**164**
Annual NO_2	$\mu g/m^3$	0.4	15.9	16.3	**31**
Maximum 24-hour PM_{10}	$\mu g/m^3$	0.5	31.6	32.1	**50**
Annual PM_{10}	$\mu g/m^3$	0.2	19.3	19.5	**25**
Maximum 24-hour $PM_{2.5}$	$\mu g/m^3$	0.2	13.8	14.0	**25**
Annual $PM_{2.5}$	$\mu g/m^3$	0.1	7.8	7.9	**8**
20 m from the Kerb – Segment 2					
Maximum 1-hour CO	mg/m^3	0.1	0.3	0.4	**25**
Maximum 8-hour CO	mg/m^3	0.1	0.3	0.4	**9**
Maximum 1-hour NO_2	$\mu g/m^3$	4.2	39.0	43.2	**164**
Annual NO_2	$\mu g/m^3$	0.8	15.9	16.7	**31**
Maximum 24-hour PM_{10}	$\mu g/m^3$	1.0	31.6	32.6	**50**
Annual PM_{10}	$\mu g/m^3$	0.4	19.3	19.7	**25**
Maximum 24-hour $PM_{2.5}$	$\mu g/m^3$	0.4	13.8	14.2	**25**
Annual $PM_{2.5}$	$\mu g/m^3$	0.2	7.8	8.0	**8**
40 m from the Kerb – Segment 3					
Maximum 1-hour CO	mg/m^3	0.1	0.3	0.4	**25**
Maximum 8-hour CO	mg/m^3	0.1	0.3	0.4	**9**
Maximum 1-hour NO_2	$\mu g/m^3$	4.0	39.0	43.0	**164**
Annual NO_2	$\mu g/m^3$	0.8	15.9	16.7	**31**
Maximum 24-hour PM_{10}	$\mu g/m^3$	1.0	31.6	32.6	**50**
Annual PM_{10}	$\mu g/m^3$	0.4	19.3	19.7	**25**
Maximum 24-hour $PM_{2.5}$	$\mu g/m^3$	0.4	13.8	14.2	**25**

* Predicted incremental impact plus assumed background concentration.

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