HORSLEY DRIVE BUSINESS HUB - STAGE 2

Air Quality Assessment

Prepared for:

Charter Hall
Level 20, No.1 Martin Place
Sydney NSW 2000

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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 Charter Hall (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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DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
610.30454-R01-v1.0	20 August 2021	Varun Marwaha	Kirsten Lawrence	Varun Marwaha

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1 Introduction

SLR Consulting Australia Pty Ltd (SLR) has been commissioned by Charter Hall on behalf of Bieson Pty Ltd (the Applicant) to prepare this air quality assessment in support of a State Significant Development (SSD) application (SSD 17161650) in relation to the approved Concept Masterplan known as SSD 7664 and subsequent modifications. SSD 7664 was approved for development on 9 November 2017 and allows for the:

- Establishment of up to 88,700 m^2 of Gross Floor Area for general industrial, light industrial, warehouse and distribution and ancillary office land uses; and
- Conceptual development levels, footprints, building envelopes and car parking rates for Lots 1-3, road layout and site access and landscape designs.

This SSD application is the next phase of the development of the Horsley Drive Business Hub (the Business Hub) – Stage 2 and proposes to seek consent for the construction and operation of two warehouses at the northern end of the Business Hub (the Site).

The Secretary's Environmental Assessment Requirements (SEARs) for SSD 17161650 were issued by the Department of Planning, Industry and Environment (DPIE) in April 2021. The conditions relevant to air quality impacts addressed in this report are shown in **Table 1**.

Table 1 Air Quality Related SEARs for SSD 17161650

SSD 17161650	Response
an assessment of the potential air quality, dust and odour impacts of the development in accordance with relevant Environment Protection Authority guidelines and details of dust control during site preparation and civil works.	**Section 5.2** **Section 5.1**

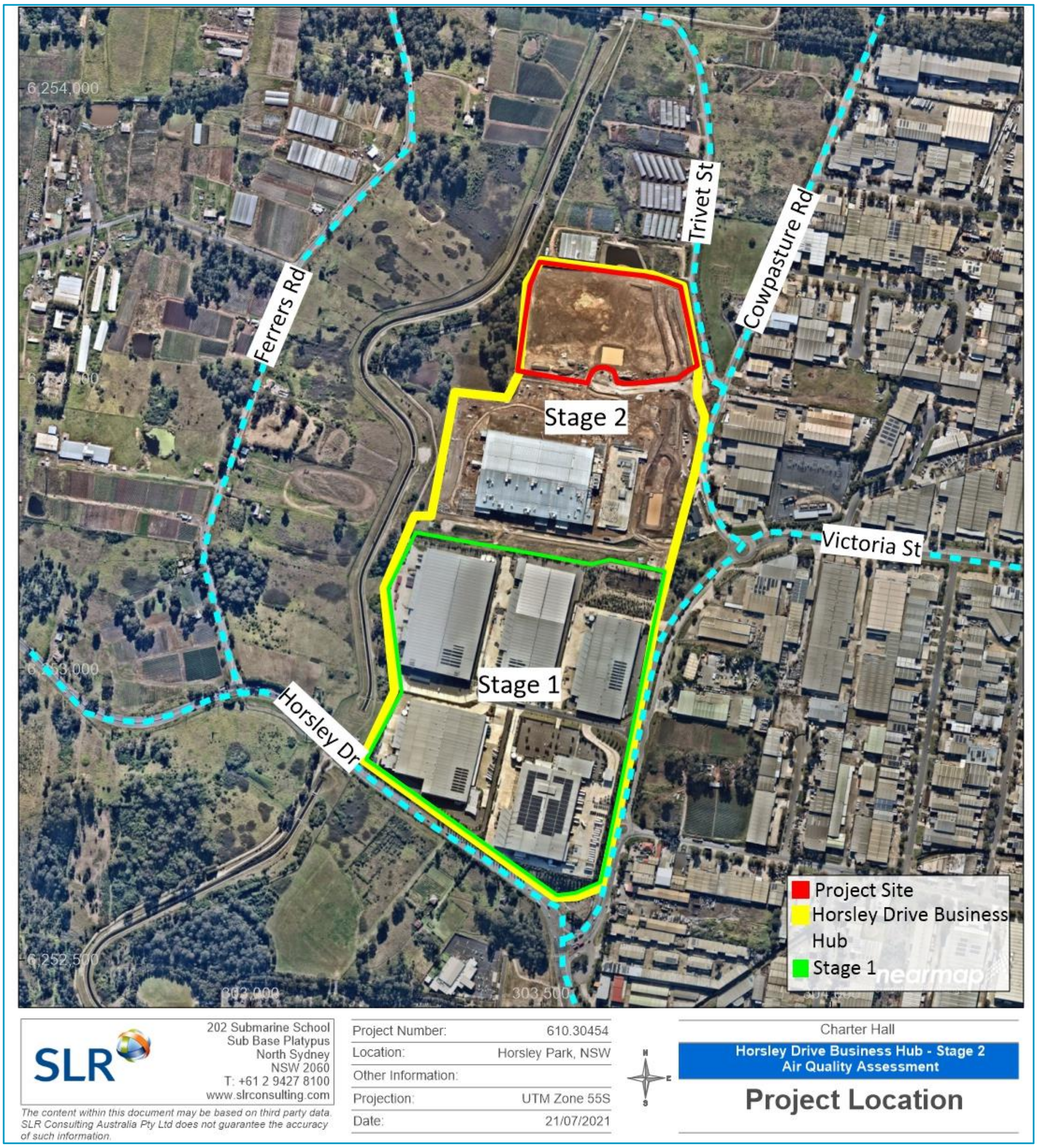
The aim of this AQIA is to assess the risks associated with the potential air emissions due to the construction and operation of two warehouses.

2 Project Overview

2.1 Site Location

The Site is located within the Business Hub – Stage 2 which is located within Western Sydney Parklands (WSP). The Business Hub covers approximately 16.5 hectares (ha) of land and is located on the corner of Cowpasture Road and Trivet Street, Wetherill Park, within the Fairfield LGA. The Site is located on proposed Lots 2 and 3 of the Business Hub. The location of the Site within the Business Hub is shown in **Figure 1**.

Figure 1 Location of the Horsley Drive Business Hub

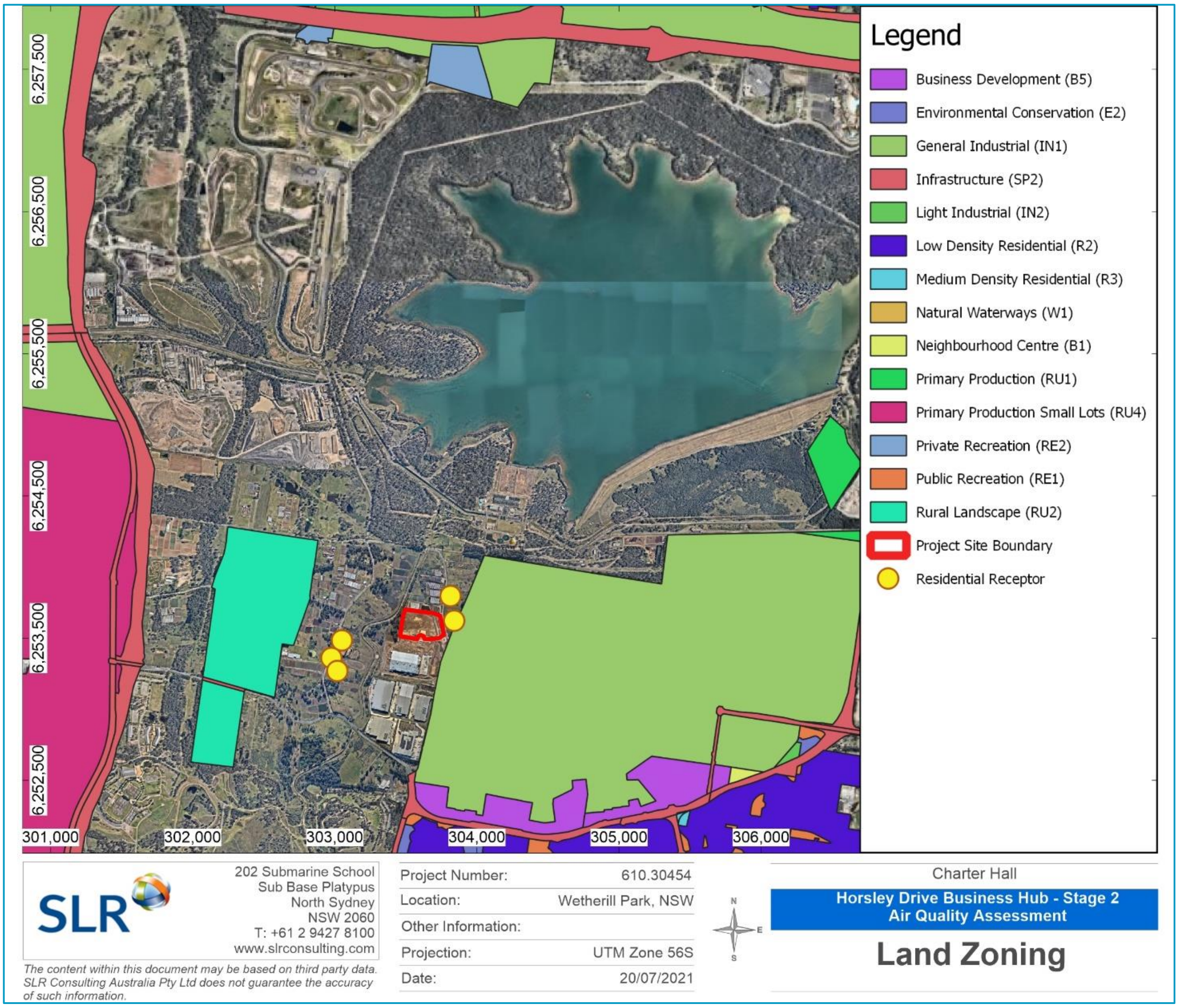


2.2 Neighbouring Land Use

The Site is currently subject to the land use and development control provisions of the State Environmental Planning Policy (Western Sydney Parklands) 2009 (WSP SEPP). The area surrounding the Site includes land subject to the WSP SEPP to the northwest and south, and land zoned General Industrial (IN1) to the east.

To the north and west of the Site are predominately agricultural uses, with some scattered residential receptors. To the east of the Site is the Wetherill Park industrial precinct, which contains over 570 ha of a variety of light industrial, warehouse and storage uses. To the south of the Site is a recently constructed warehouse (Warehouse 1) also located within the Business Hub Stage 2 (see **Figure 1**). **Figure 2** illustrates the surrounding land zoning as specified in the *Fairfield Local Environmental Plan* 2013.

Figure 2 Land Zoning of Surrounding Land



2.3 Residential Receptors

The nearest residential receptors are located approximately 60 m to the east and 130 m to the northeast of the Site boundary. The location of the nearest sensitive receptors is illustrated in **Figure 3**. It is noted a nuisance dust related complaint was received from the nearest residential receptor during the bulk earthworks of Stage 2. This complaint was resolved by covering the exposed surfaces with pavement. No further complaint has been received since the completion of Stage 2 bulk earthworks.

Figure 3 Location of Nearest Residential Receptors

2.4 Concept Masterplan

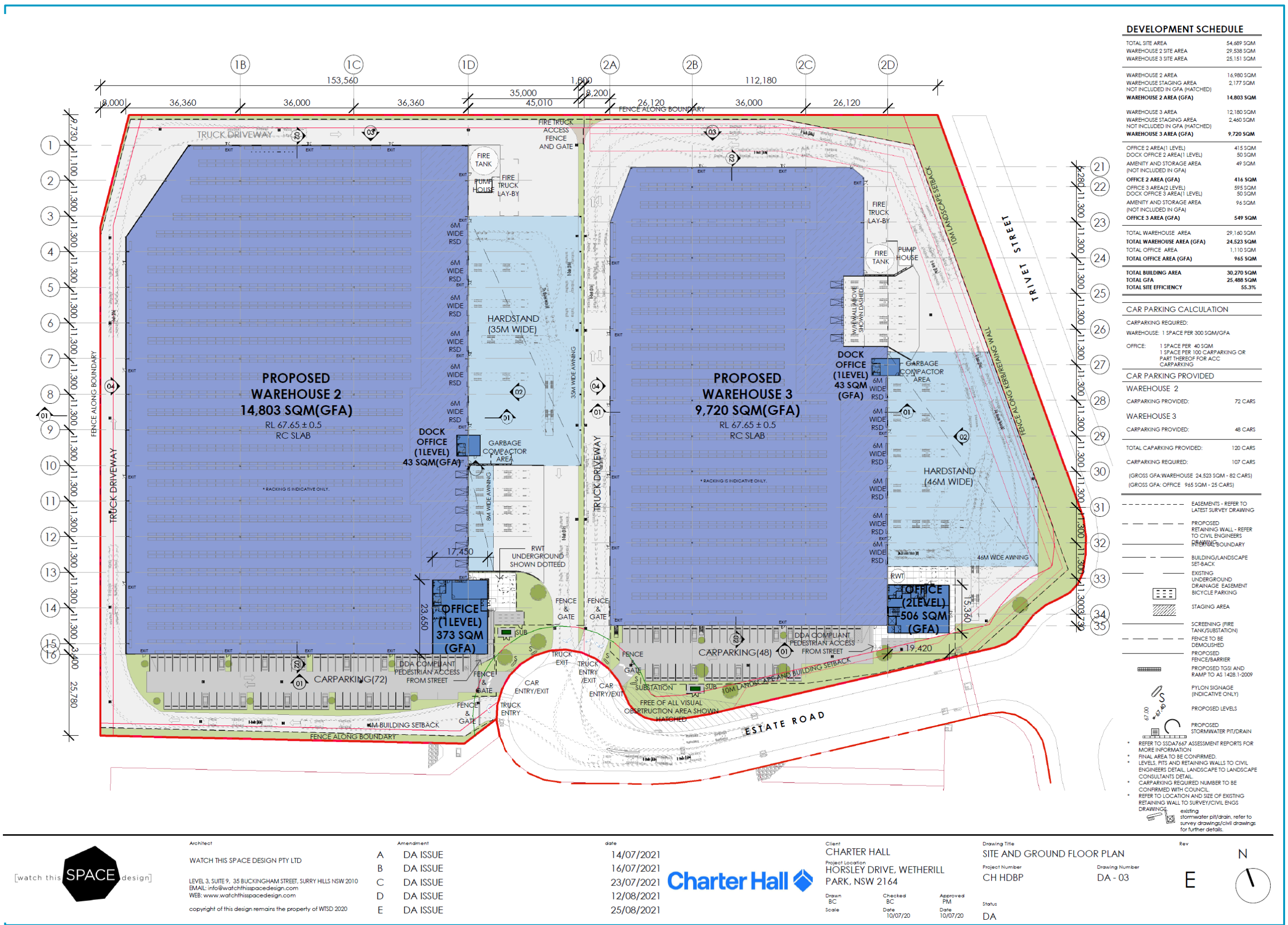
The concept masterplan for this development application consists of the following:

- Two light industrial warehouse buildings with ancillary office spaces and utilities buildings:
  - The western building accommodating a warehouse of approximately 14,803 m^2 GFA (Warehouse 2) and a single storey ancillary office building of 416 m^2; and
  - The eastern building accommodating a warehouse of approximately 9,720 m^2 GFA (Warehouse 3) and a two storey ancillary office building of approximately 549 m^2.
- Car parking spaces;
- Hardstand vehicle parking, loading and manoeuvring areas;

- Landscaping.

The proposed development would operate 24 hours per day.

Figure 4 Draft Concept Masterplan of the Horsley Drive Business Hub – Stage 2



2.5 Identification of Potential Air Emission Sources and Types

As outlined in **Section 1**, the scope of this AQIA covers potential air quality impacts on surrounding receptors due to the proposed construction and operation of two warehouses. The earthworks associated with Stage 2 of the Business Hub have already been approved under SSD 7664 and are not included in the scope of this assessment. The potential sources of air emissions during the construction and operation phases are identified below.

2.5.1 Construction

The following construction works are expected to occur on site:

- Construction and fit out of two warehouse and distribution buildings (approximately 30,000 m^2 in total) on Lots 2 and 3; and

- Construction and fit out of two ancillary office buildings (approximately 1,000 m^2 in total);
- Boundary stormwater management, fencing and landscaping and signage.

The main air quality issues associated with construction works relate to emissions of fugitive dust from unpaved surfaces. 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. The proposed activities that are most likely to lead to short-term emissions of dust (given that no major earthworks are part of this application), are identified as:

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

Potential air quality impacts associated with fugitive dust emissions from the construction phase of the project have been addressed in **Section 5.1**.

2.5.2 Operation

During the operational phase, the main source of air emissions would be emissions of products of fuel combustion and particulate matter (associated with brake and tyre wear as well as re-entrainment of road dust) associated with the trucks and other vehicles entering and leaving Warehouse 2 and 3, or idling at the site during loading/unloading operations. At the time of writing this report, information on the site specific operations (eg, vehicle numbers and types) is not available. Therefore, a general risk assessment associated with warehousing operations is presented in **Section 5.2**.

3 Legislation, Regulation and Guidance

3.1 Pollutants of Concern

As identified in **Section 2.5**, the key air pollutants of interest are considered to be:

- Particulate matter of varying size fractions from building construction and fit out activities (including nuisance dust);
- Products of fuel combustion (including particulates) from vehicle movements and operational activities of Warehouses 2 and 3; and
- Fugitive nuisance dust from operational activities of Warehouses 2 and 3.

The following sections outline the potential health and amenity issues associated with the above pollutants of concern, while **Section 3.2** 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 termed total suspended particulate (TSP). Particulate matter with an aerodynamic diameter of 10 microns or less is 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 (VOC) 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.

3.2 Air Quality Criteria

State air quality guidelines specified by the NSW Environmental Protection Agency (EPA) for the pollutants identified in **Section 2.5** are published in the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (EPA 2017) [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.

A summary of the relevant impact assessment criteria for products of combustion and particulate matter (including nuisance dust) is provided in **Table 2** and **Table 3** respectively.

Table 2 NSW EPA Impact Assessment Criteria for Combustion Gases

Pollutant	Averaging Period	Assessment Criteria	
CO	15 minutes	87 ppm	100 mg/m^3
	1 hour	25 ppm	30 mg/m^3
	8 hours	9 ppm	10 mg/m^3
NO_2	1 hour	12 pphm	246 µg/m^3
	Annual	3 pphm	62 µg/m^3
SO_2	10 minutes	25 pphm	712 µg/m^3
	1 hour	20 pphm	570 µg/m^3
	24 hours	8 pphm	228 µg/m^3
	Annual	2 pphm	60 µg/m^3

Source: EPA 2017

Table 3 NSW EPA Impact Assessment Criteria for Particulate Matter and Nuisance Dust

Pollutant	Averaging Period	Assessment Criteria ($\mu g/m^3$)
Total suspended particulate (TSP)	Annual	90
Particulate matter (PM_{10})	24-hours	50
	Annual	25
Particulate matter ($PM_{2.5}$)	24-hours	25
	Annual	8
Pollutant	**Averaging Period**	**Assessment Criteria (g/m^2/month)**
Deposited dust[1]	Annual	2 (maximum increase in deposited dust level) 4 (maximum total deposited dust level)

Source: EPA 2017

3.3 State Environmental Planning Policy (Western Sydney Parklands) 2009

The aim of this Policy is to put in place planning controls that will enable the Western Sydney Parklands Trust to develop the Western Parklands into a multi-use urban parkland for the region of western Sydney by:

a. allowing for a diverse range of recreational, entertainment and tourist facilities in the Western Parklands,

b. allowing for a range of commercial, retail, infrastructure and other uses consistent with the Metropolitan Strategy, which will deliver beneficial social and economic outcomes to western Sydney,

c. continuing to allow for and facilitate the location of government infrastructure and service facilities in the Western Parklands,

d. protecting and enhancing the natural systems of the Western Parklands, including flora and fauna species and communities and riparian corridors,

e. protecting and enhancing the cultural and historical heritage of the Western Parklands, and

f. maintaining the rural character of parts of the Western Parklands by allowing sustainable extensive agriculture, horticulture, forestry and the like,

g. facilitating public access to, and use and enjoyment of, the Western Parklands, and

h. facilitating use of the Western Parklands to meet a range of community needs and interests, including those that promote health and well-being in the community,

i. encouraging the use of the Western Parklands for education and research purposes, including accommodation and other facilities to support those purposes,

j. allowing for interim uses on private land in the Western Parklands if such uses do not adversely affect the establishment of the Western Parklands or the ability of the Trust to carry out its functions as set out in **section 12 of the Western Sydney Parklands Act 2006**, and

k. ensuring that development of the Western Parklands is undertaken in an ecologically sustainable way.

Section 12 (Matters to be considered by the consent authority) of the WSP SEPP further stipulates the following relevant matters to be considered by the consent authority in determining a development application:

> *"j. the impact on surrounding residential amenity"*

The Site is located within the WSP and therefore the aims of the WSP SEPP apply to the Site. There are no air quality specific development standards or provisions identified in the WSP SEPP, however the broader environmental protection context defined in Section 12 (j) above is considered relevant to this air quality assessment.

4 Existing Environment

4.1 Local Wind 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 is the Horsley Park Automatic Weather Station (AWS), which is located approximately 2.5 km southwest of the Site. Considering the proximity, it may be assumed that the wind conditions recorded at the Horsley Park AWS are a reasonable representation of the wind conditions experienced at the Site.

Annual wind roses for the years 2016 to 2020 along with seasonal wind roses compiled from data recorded by the AWS at Horsley Park are presented in **Figure 5**.

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 <u>blowing from</u> 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 following description of wind speeds recorded at Horsley Park AWS references the Beaufort Wind Scale, as outlined in **Table 4**. Use of the Beaufort Wind Scale is consistent with terminology used by the BoM.

Table 4 Beaufort Wind Scale

Beaufort Scale #	Description	Wind Speed (m/s)	Description on Land
0	Calm	0-0.5	Smoke rises vertically
1	Light air	0.5-1.5	Smoke drift indicates wind direction
2-3	Light/gentle breeze	1.5-5.3	Wind felt on face, leaves rustle, light flags extended, ordinary vanes moved by wind
4	Moderate winds	5.3-8.0	Raises dust and loose paper, small branches are moved
5	Fresh winds	8.0-10.8	Small trees in leaf begin to sway, crested wavelets form on inland waters
6	Strong winds	>10.8	Large branches in motion, whistling heard in telephone wires; umbrellas used with difficulty

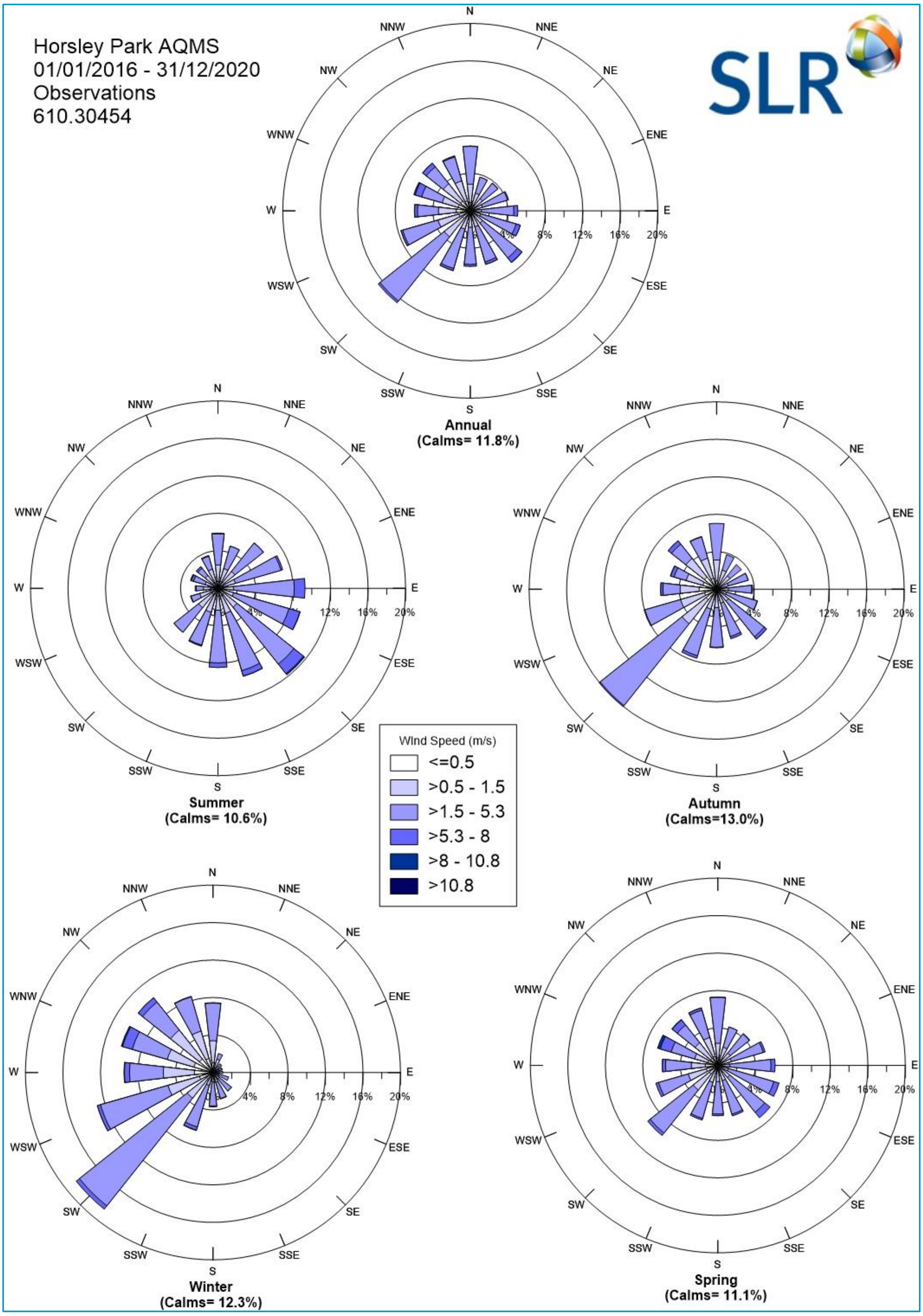
Source: http://www.bom.gov.au/lam/glossary/beaufort.shtml

The annual wind rose in **Figure 5** 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 recorded approximately 12% of the time throughout the five year period reviewed. The average seasonal wind roses for the years 2016-2020 indicate that:

- In summer, wind speeds ranged from calm to fresh winds (between 0.5 m/s and 9.8 m/s). The majority of winds originated from eastern and south eastern quadrants, with very few winds from westerly directions. Calm wind conditions were recorded approximately 11% of the time during summer.
- In autumn, wind speeds ranged from calm to fresh winds (between 0.5 m/s and 9.1 m/s). The majority of winds originated from the southwest quadrant, with very few winds from the northeast. Calm wind conditions were observed to occur approximately 13% of the time during autumn.
- In winter, wind speeds ranged from calm to fresh winds (between 0.5 m/s and 10.1 m/s). The majority of winds originated from southwest quadrant, with very few winds from the east. Calm wind conditions were observed to occur approximately 12% of the time during winter.
- In spring, wind speeds ranged from calm to fresh winds (between 0.5 m/s and 9.9 m/s). The frequencies of winds were generally even from all directions. Calm wind conditions were observed to occur approximately 11% of the time during spring.

As identified in **Section 2.3**, the closest existing sensitive receptors are located east and northeast of the Site boundary. Winds from between the west and southwest directions, which would blow air emissions from the Site towards the nearest existing residences, occur approximately 27% of the time in a year.

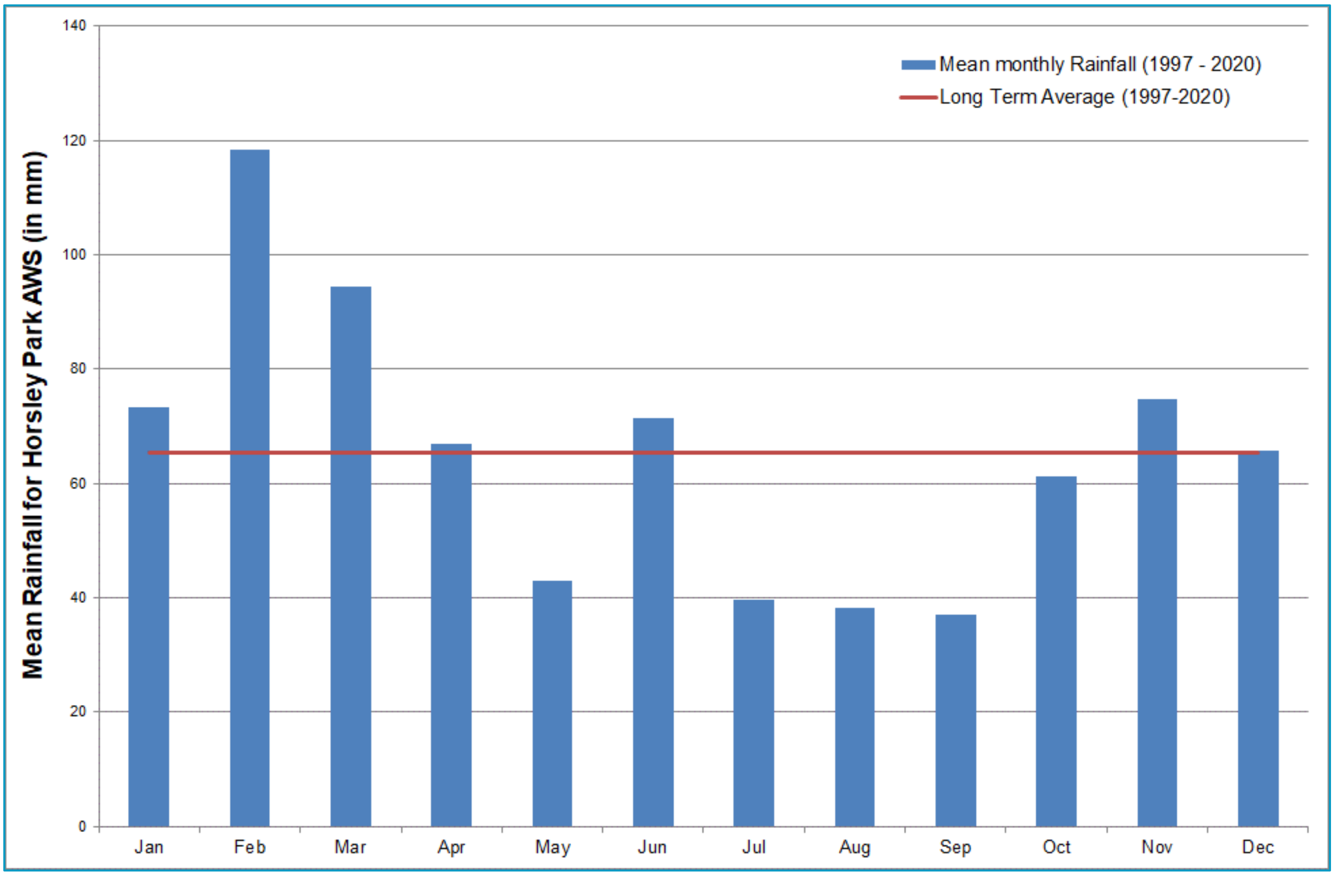
Figure 5 Annual Wind Roses for Horsley Park AWS (2016 to 2020)



Rainfall

Dry periods (no rainfall) have the greatest potential for fugitive dust emissions during construction. The long term monthly rainfall averages recorded at Horsley Park AWS rain gauge are shown in **Figure 6**. It is noted that generally rainfall is relatively low in mid-winter to mid spring periods. This rainfall pattern suggests that dust emissions from the construction activities at the Site have the greatest potential to impact on receptors during late autumn to early spring.

Figure 6 Long Term Mean Monthly Rainfall for Horsley Park AWS – 1995 to 2020



4.2 Background Air Quality

Air quality monitoring is performed by the NSW DPIE at a number of monitoring stations across NSW. The closest such station is the Prospect air quality monitoring station (AQMS), approximately 5.5 km to the northeast of the Site. The Prospect AQMS was commissioned in 2007 and is located in William Lawson Park, Myrtle Street, Prospect. It is situated in a residential area and is at an elevation of 66 m. The Prospect AQMS monitors the concentration levels of following air pollutants:

- Carbon monoxide (CO)
- Oxides of nitrogen (NO, NO_2 and NO_X);
- Fine particles ($PM_{2.5}$ and PM_{10}); and
- Sulfur dioxide (SO_2).

A summary of the monitored pollutant concentrations for the last five years (2016-2020) is presented in **Table 5** and the data are presented graphically in **Figure 8** to **Figure 11**.

Table 5 Summary of Air Quality Monitoring Data at Prospect AQMS (2016 – 2020)

Year	CO	NO_2		PM_{10}		$PM_{2.5}$		SO_2	
	Rolling 8-hour	Maximum 1-hour	Annual	Maximum 24-hour	Annual	Maximum 24-hour	Annual	Maximum 1-hour	Annual
	mg/m^3	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$
2016	1.9	108.7	18.9	110.1	18.9	84.9	8.7	60.1	1.7
2017	1.4	123.0	18.9	61.1	18.9	30.1	7.7	65.8	1.9
2018	1.4	104.6	16.2	113.3	21.9	47.5	8.5	71.5	1.8
2019	3.5	100.5	16.7	182.8	26.0	134.1	11.9	60.1	2.0
2020	2.3	88.2	14.2	245.8	20.2	70.8	8.6	51.5	1.4
Criterion	**10**	**246**	**62**	**50**	**25**	**25**	**8**	**570**	**60**

Figure 7 Measured Rolling 8-Hour Average CO Concentrations at Prospect AQMS (2016 – 2020)

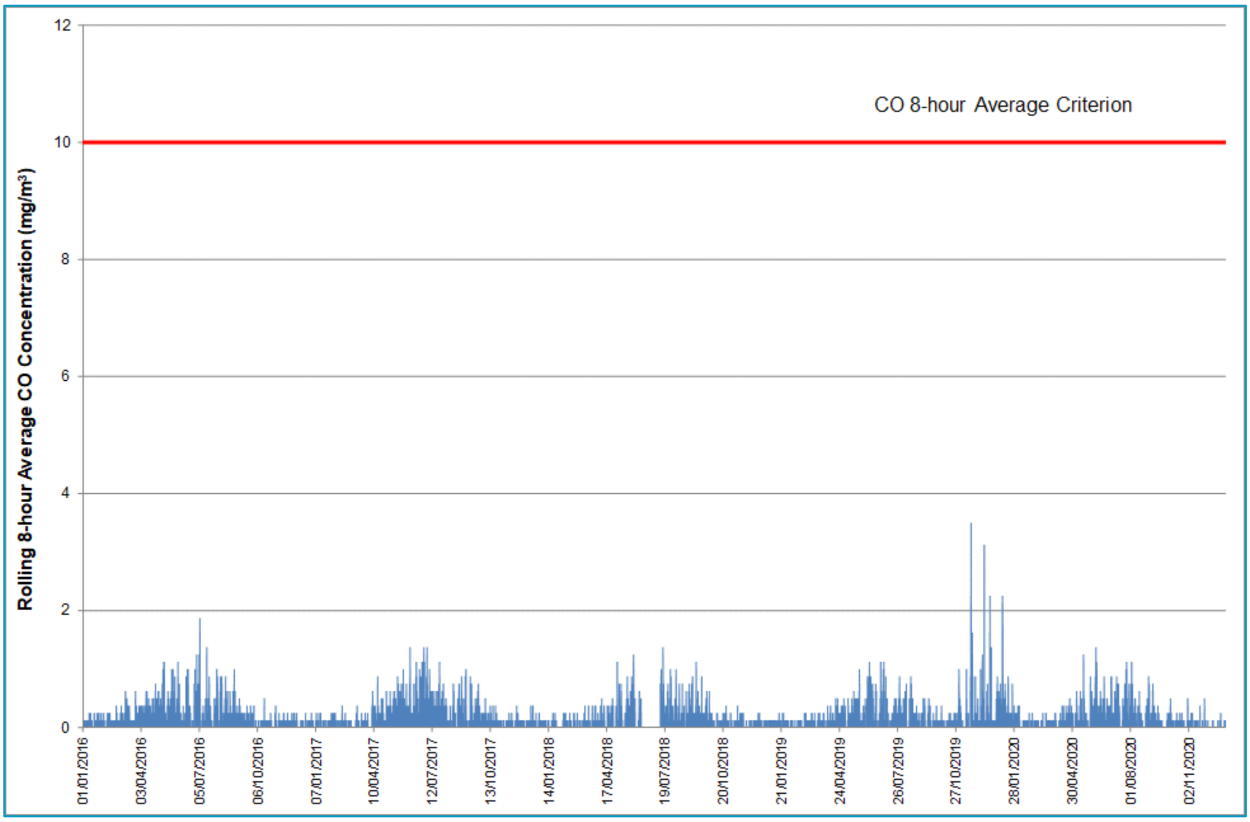


Figure 8 Measured Maximum 1-Hour Average NO_2 Concentrations at Prospect AQMS (2016 – 2020)

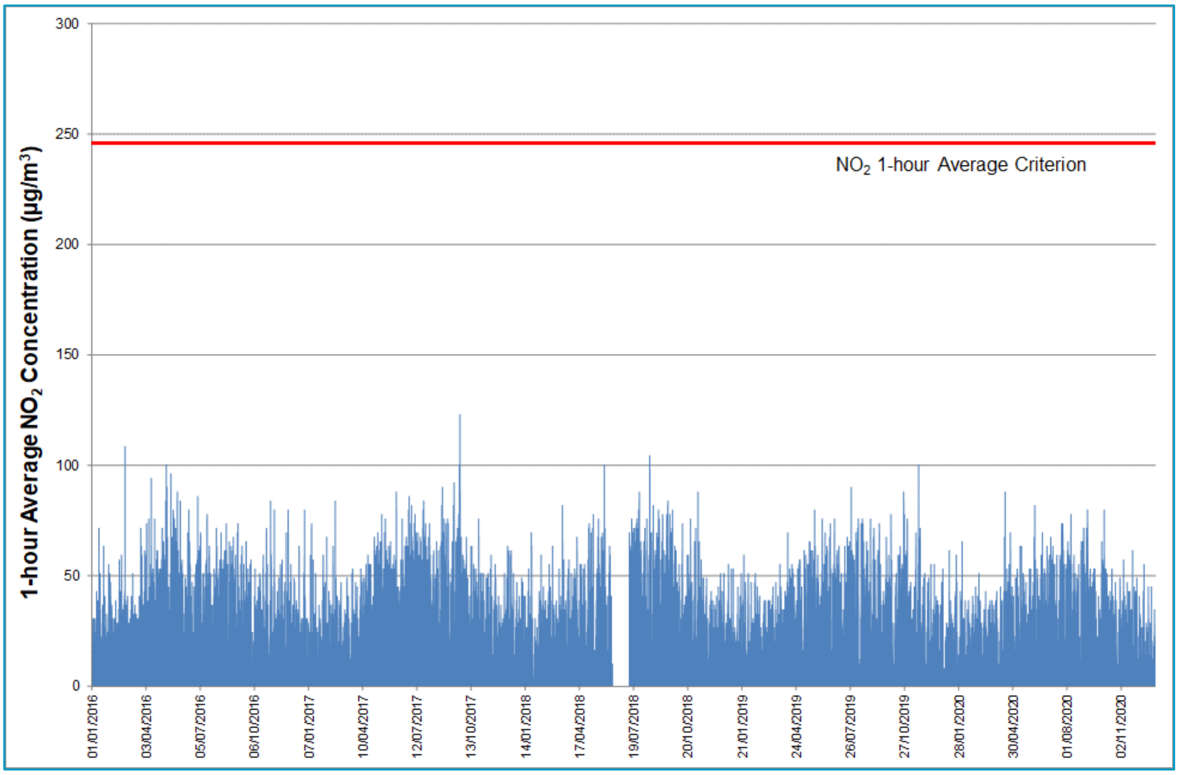


Figure 9 Measured 24-Hour Average PM_{10} Concentrations at Prospect AQMS (2016 – 2020)

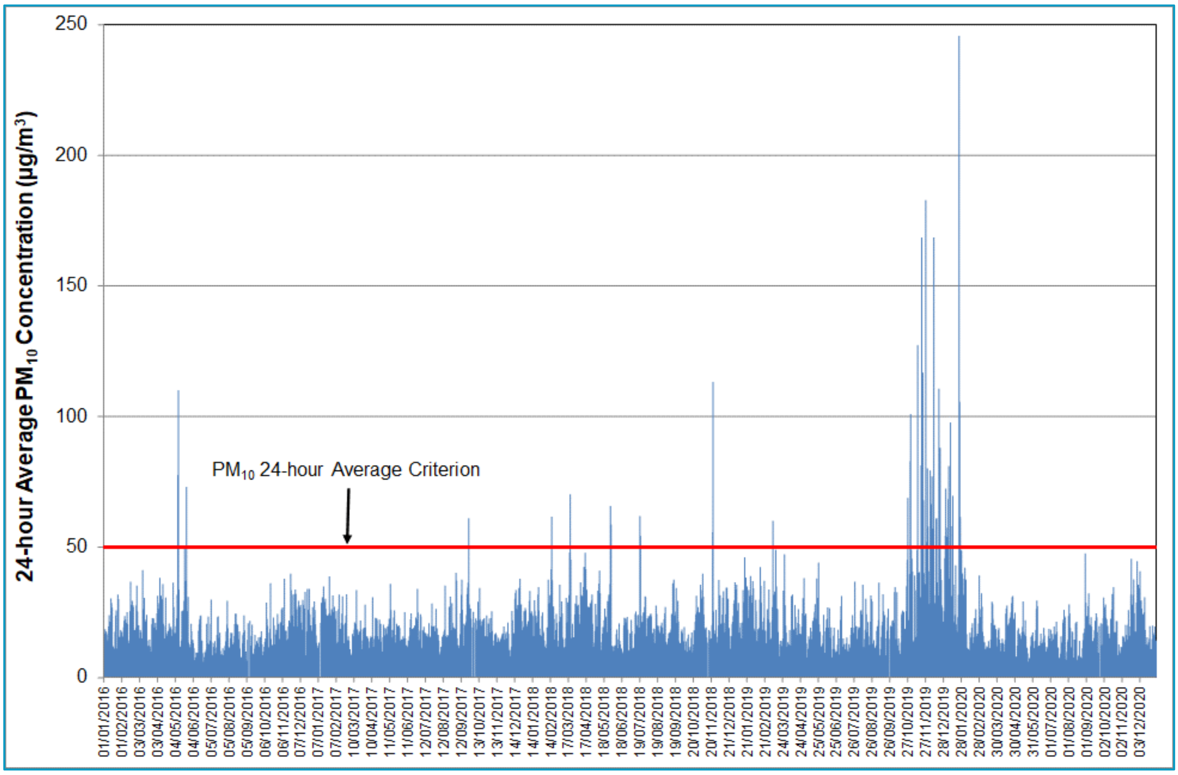


Figure 10 Measured 24-Hour Average $PM_{2.5}$ Concentrations at Prospect AQMS (2016 – 2020)

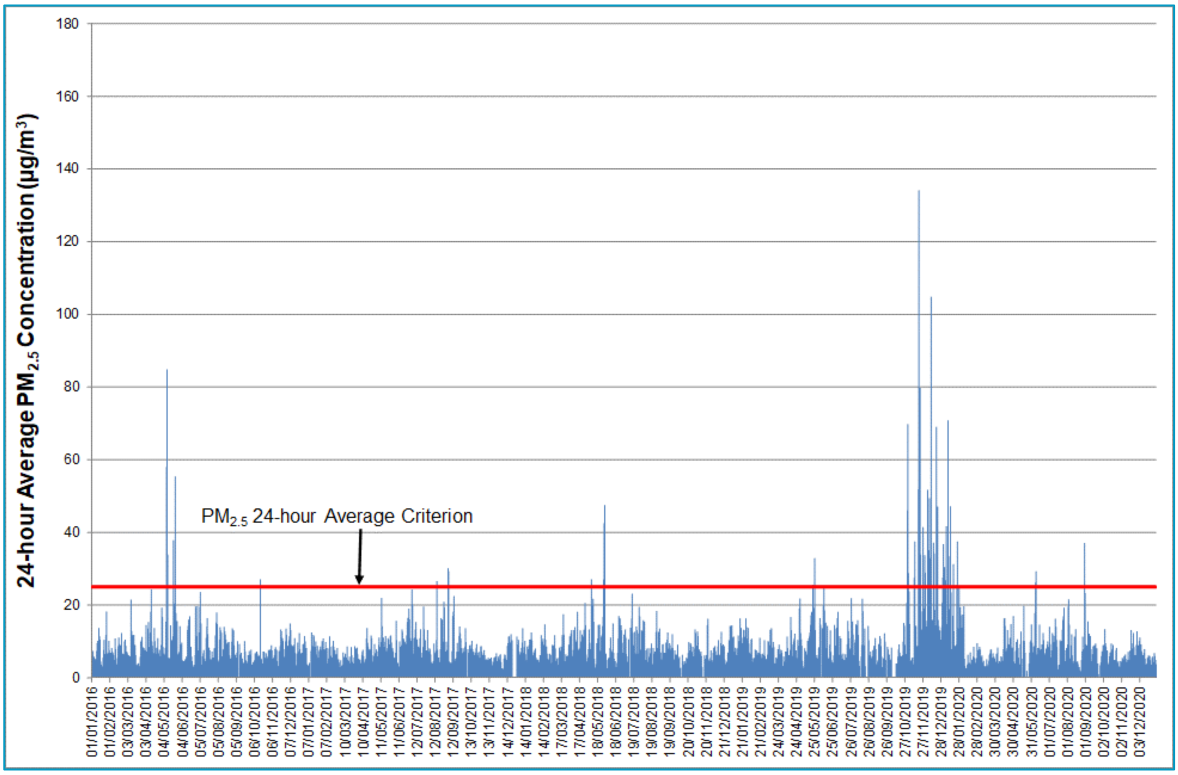
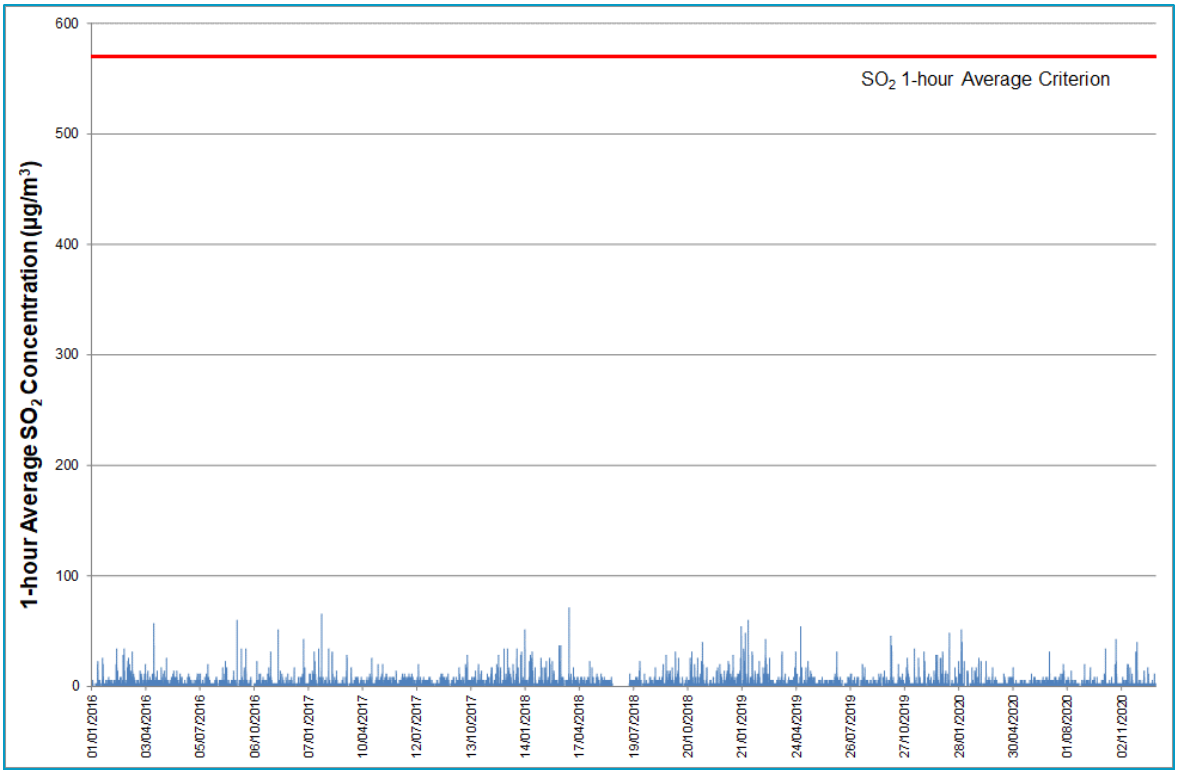


Figure 11 Measured Maximum 1-Hour Average SO_2 Concentrations at Prospect AQMS (2016 – 2020)



The monitoring data for CO, NO_2 and SO_2 indicate that the respective air quality criteria (short term and long term) for these pollutants are easily achieved at the Prospect AQMS.

The monitoring data for fine particles show that exceedances of the relevant short term criteria (24-hour average) were recorded during all five years (2016-2020) for PM_{10} and $PM_{2.5}$.

It has been noted in the latest NSW Annual Air Quality Statement (DPIE 2021) that air quality varied across the NSW depending on regions. Daily average PM_{10} levels exceeded the national standard at one or more metropolitan and regional centres on 24% (87 days) of days in 2020, compared to 48% (175 days) of days in 2019. During 2020, days with extreme air pollution were attributed to the following sources:

- 10 days due to smoke from bushfires (January and February)
- 9 days due to a combination of smoke from bushfires and dust storms (January and February)
- 4 days due to dust storms (January, February and August)
- 1 day due to smoke from hazard reductions burns (September).

Air quality in NSW was greatly affected by the unprecedented extensive bushfires between late 2019 and early 2020. In 2020, the air quality in NSW met national standards between 85% and 99% of the time across regions, an improvement compared to 2019 (60% to 92%).

In summary, even though the air quality is generally good in the Sydney region, there is potential for short term elevations in background particulate concentrations associated with regional events such as bushfires and dust storms etc to elevate local ambient particulate concentrations at the Site. Therefore, care needs to be taken to minimise emissions of dust from the construction works during these periods, to avoid exacerbating these particulate pollution events.

5 Assessment of Air Quality Impacts

As noted in **Section 2.5**, the earthworks associated with Stage 2 of the Business Hub have already been approved under SSD 7664, so the following sections assess the impacts associated with construction and operation of two warehouse buildings only.

5.1 Dust Emissions During Construction

For this assessment, 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], Holman *et al* 2014) has been used to provide a qualitative assessment method (refer to **Appendix A** for full methodology). The IAQM method uses a four-step process for assessing 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.
- **Step 4**: Assess significance of remaining activities after management measures have been considered.

Step 1 – Screening Based on Separation Distance

As noted in **Section 2.3**, the nearest sensitive receptor (residential) is located approximately 60 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 a 'human receptor' is located within 350 m of the boundary of the site, and within 500 m of the site entrance, further assessment is required. For the purpose of this assessment, the number of sensitive receptors is estimated to be between 1 and 10 within 100 m of the Site boundary.

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

Based upon the above assumptions and the IAQM definitions presented in **Appendix A**, the dust emission magnitudes for the construction works and trackout related impacts have been categorised as presented in **Table 6**.

Table 6 Categorisation of Dust Emission Magnitude

Activity	Dust Emission Magnitude	Basis
Construction	Medium	**IAQM Definition:** Total building volume greater than 100,000 m^3, piling, on site concrete batching; sandblasting. **Relevance to this Project:** *Two warehouse buildings are proposed at the Site, with a total building volume estimated to be approximately 245,000 m^3 (total warehouse area of 24,500 m^2 and average height of 10 m).* *While the total volume of the Project is estimated to be >100,000 m^3, the main structure would be constructed using material with relatively low potential for dust release (i.e. precast concrete walls, concrete floor slab, Colourbond roofing, Colourbond foil backed wall cladding). Moreover, no sandblasting is proposed. Therefore, a dust emission magnitude of medium is considered appropriate.*
Trackout	Small	**IAQM Definition:** 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 **Relevance to this Project:** *It is estimated that less than 10 heavy vehicle (on/off site) movements per day will occur during the peak construction period.*

Step 2b – Risk Assessment

Receptor Sensitivity

Based on the criteria listed in **Table A1** in **Appendix A**, the sensitivity of the identified 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.

Sensitivity of an Area

Based on the classifications shown in **Table A2** and **Table A3** in **Appendix A**, 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 21.8 µg/m^3 recorded at Prospect AQMS (see **Section 4.2**) and the existing number of sensitive receptors present in the vicinity of the Site (ie 1-10 within 100 m).

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 construction and trackout phases as shown in **Table 6**, the resulting risk of air quality impacts is as presented in **Table 7**.

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 even if no mitigation measures were to be applied to control emissions during the construction phase, and a negligible risk for trackout.

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

Impact	Sensitivity of Area	Dust Emission Magnitude		Preliminary Risk	
		Construction	Trackout	Construction	Trackout
Dust Soiling	Low	Medium	Small	Low Risk	Negligible Risk
Human Health	Low			Low Risk	Negligible Risk

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'.

Table 8 lists the relevant mitigation measures designated as *highly recommended* (H) or *desirable* (D) by the IAQM methodology for a development shown to have a low risk of adverse impacts. These are consistent with those implemented during the construction of Warehouse 1.

Table 8 Site-Specific Management Measures Recommended by the IAQM for Low Risk Sites

	Activity	
1	Communications	
1.1	Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.	H
1.2	Display the head or regional office contact information.	H
1.3	Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions.	D
2	Site Management	
2.1	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
2.2	Make the complaints log available to the local authority when asked.	H
2.3	Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in the log book.	H
3	Monitoring	
3.1	Perform weekly on-site and off-site inspections 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.	D
3.2	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
3.3	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
4	Preparing and Maintaining the Site	
4.1	Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.	H
4.2	Erect solid screens or barriers around dusty activities or the site boundary that is at least as high as any stockpiles on site.	H
4.3	Keep site fencing, barriers and scaffolding clean using wet methods.	D
4.4	Cover, seed or fence stockpiles to prevent wind erosion	D
	Operating Vehicle/Machinery and Sustainable Travel	

	Activity	
5.1	Ensure all on-road vehicles comply with relevant vehicle emission standards, where applicable	H
5.2	Ensure all vehicles switch off engines when stationary - no idling vehicles	H
5.3	Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable	H
6	Operations	
6.1	Ensure an adequate water supply on the site for effective dust/particulate matter suppression/ mitigation, using non-potable water where possible and appropriate	H
6.2	Use enclosed chutes and conveyors and covered skips	H
6.3	Minimise drop heights from loading shovels and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate	H
7	Waste Management	
7.1	Avoid bonfires and burning of waste materials.	H
7.2	Ensure effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.	H
8	Construction	
8.1	Avoid scabbling (roughening of concrete surfaces) if possible	D
8.2	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
9	Trackout	
9.1	Use water-assisted dust sweeper(s) on the access and local roads to remove, as necessary, any material tracked out of the site.	D
9.2	Avoid dry sweeping of large areas.	D
9.3	Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.	D
9.4	Record all inspections of haul routes and any subsequent action in a site log book.	D
9.5	Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).	D

H = Highly recommended; D = Desirable

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 9**.

Table 9 Residual Risk of Air Quality Impacts from Construction

Impact	Sensitivity of Area	Residual Risk	
		Construction	Trackout
Dust Soiling	Low	Negligible Risk	Negligible Risk
Human Health	Low	Negligible Risk	Negligible Risk

The mitigated dust deposition and human health impacts for the construction and trackout phases of the works are anticipated to be *negligible*. This is consistent with the fact that no complaints regarding air quality issues were recorded since the implementation of additional measures during Warehouse 1 construction phase.

5.2 Assessment of Impacts from Warehouse Operations

As discussed in **Section 2.5.2**, air quality issues associated with the proposed warehouse operations predominantly relate to emissions of products of combustion (including particulate matter) and from trucks and other vehicles accessing and idling at the site.

These emissions will be of a similar nature to existing emissions from traffic on Horsley Drive and other local roads connecting the industrial operations in the area. The scale and magnitude of emissions from the Site is anticipated to be significantly lower compared to the estimated annual average daily traffic on Horsley Drive. To assess the risk of air emissions from the Site impacting on surrounding sensitive receptors during the operational phase, the following 'risk based' 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 *neutral* to the environment.

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

  The nearest residential receptors to the Site are located approximately 60 m to the east (see **Section 2.2**). In terms of the methodology in **Appendix B**, the sensitivity of the nearest residential areas to emissions from the Site should be considered *high*.

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

  Based on the relatively small amount of traffic movements expected to occur on site, existing regional background levels of traffic-related pollutants, and the distance between the Site and the nearest residential receptors, the magnitude of the impact of these emissions on ambient pollutant levels at considered to be *negligible*. The guideline, *Development near Rail Corridors and Busy Roads* (DoP 2008) states that at 60 m from the roadside, traffic impacts are approximately 20% (ie 80% decrease) of the kerbside levels.

Given the above considerations, the significance of the potential impact of the Site on the local sensitive receptors is concluded to be ***neutral*** for all receptors (see **Table 10**).

An irregular vegetative buffer exists between the Site and the existing sensitive receptors located to the east and west. It is recommended that this vegetative buffer is retained and expanded, as this will assist in screening the existing residents from any air impacts.

Table 10 Impact Significance

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

6 Conclusions

SLR was commissioned by Charter Hall on behalf of Bieson Pty Ltd (the Applicant) to prepare this air quality assessment in support of a State Significant Development (SSD) application SSD 17161650 to the approved Concept masterplan.

This development application is the next phase of the development of the Horsley Drive Business Hub (the Business Hub) – Stage 2 and proposes to seek consent for the construction and operation of two warehouses (the Site).

The aim of this AQIA is to assess the risks associated with the potential air quality impacts due to the proposed construction and operation of the two warehouses at the Site.

The potential for off-site dust impacts were 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 all construction activities (ie construction and trackout) at neighbouring sensitive receptors.

Based on the anticipated warehousing activities (storage and distribution) at the two warehouses, the potential for offsite air impacts from the operations is concluded to be *neutral*. It is recommended that the existing vegetative buffer along the easter Site boundary be retained and expanded where possible to assist in screening any dust or other air emissions being blown towards the nearest existing residences to the east.

Based on the above, air quality issues are not considered to represent a constraint for the proposed development.

7 References

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APPENDIX A

CONSTRUCTION RISK ASSESSMENT METHODOLOGY

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 site, more than 50 m from the route used by construction vehicles on public roads and more than 500 m from the site entrance. This step is noted as having deliberately been chosen to be conservative, and will require assessments for most projects.

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.

Note: No demolition of existing structures will be performed as part of this Development.

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.

Step 2b – Risk Assessment

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 A1**. It is noted that user expectations of amenity levels (dust soiling) is dependent on existing deposition levels.

Table A1 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 wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land.	The enjoyment of amenity would not reasonably be expected; or Property would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling; or There is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land.
	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 PM10.*	*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 A2**. The sensitivity of the area should be derived for each of activity relevant to the project (ie construction and earthworks).

Table A2 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 A3**. 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 (ie an annual average of 20.0 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 A3 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
	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.

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 A4** (earthworks and construction) and **Table A5** (track-out) to determine the risk category with no mitigation applied.

Table A4 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 A5 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

APPENDIX B

OPERATIONAL PHASE RISK ASSESSMENT METHODOLOGY

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 B1 outlines the methodology used in this study to define the sensitivity of receptors to air quality impacts.

Table B1 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. Magnitude may be described quantitatively or qualitatively. Where an impact is defined by qualitative assessment, suitable justification is provided in the text.

Table B2 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 below illustrates how the definition of the sensitivity and magnitude interact to produce impact significance.

Table B3 Impact Significance Matrix

Magnitude / Sensitivity		[Defined by Table B2]			
		Substantial Magnitude	**Moderate Magnitude**	**Slight Magnitude**	**Negligible Magnitude**
[Defined by TableB1]	**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

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