MOMENTUM M7 DEVELOPMENT

Air Quality Impact Assessment

Prepared for:

Gazcorp Pty Ltd
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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 Gazcorp Pty Ltd (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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APPENDICES

Appendix A Construction Risk Assessment Methodology

1 Introduction

SLR Consulting Australia Pty Ltd (SLR) has been commissioned by Gazcorp Pty Ltd (Gazcorp) to prepare an Air Quality Impact Assessment (AQIA) for construction works to be undertaken as part of the Stage 1 development of a business hub to be located within the Western Sydney Employment Area (WSEA) at 813-913 Wallgrove Road, Horsley Park (the Development Site).

The aim of this AQIA is to assess the risks associated with the potential air emissions associated with the proposed construction works, which include the following activities:

- Clearing of vegetation and bulk earthworks;
- Construction of internal estate roads, water, sewer, telecommunications and gas infrastructure;
- Construction of stormwater management devices;
- Installation of estate landscaping;
- Construction of a 45,225 square metre (m^2) warehouse and distributing building (including 3,006 m^2 of office space) on Lot 10; and
- Intersection works with Wallgrove Road at the proposed southern link intersection.

It is highlighted that the Stage 1 development works described above have been approved pursuant to SSD-5248, however are currently subject of a Modification Application. The Modification Application includes a revised estate layout and earthworks across the entire site as part of Stage 1. This AQIA assesses the potential air emissions associated with the Stage 1 development as it is proposed to be modified under the Modification Application (i.e. earthworks and civil infrastructure works across the entire site).

Details regarding the type and scale of operations within the warehousing facilities are not available at the time of preparing this AQIA, hence impacts on neighbouring receptors from ongoing operational-phase activities from warehouse buildings are not assessed in this AQIA.

2 Project Setting

2.1 Overview

The proposed development is located at 813-913 Wallgrove Road, Horsley Park, which is approximately 33 kilometres (km) west-northwest from the Sydney CBD and covers an area of approximately 52.2 hectares (ha). The local setting of the Development Site is shown in **Figure 1**. The indicative layout of the Development Site is shown in **Figure 2**.

Figure 3 shows the approved and proposed extend of earthworks included in the Stage 1 development. The approved Stage 1 development works included the construction of warehouse building No. 10 and earthworks to facilitate the warehouse and associated lead in infrastructure. In total the approved Stage 1 earthworks related to approximately 40% of the total earthworks across the site (approximately 21 hectares). Gazcorp are currently seeking to modify the approved development through a revised concept layout of buildings across the estate, and the delivery of earthworks and civil infrastructure works for the entire site as part of Stage 1. This AQIA assesses the Stage 1 earthworks as they are proposed to be modified (i.e. earthworks across the entire site).

Figure 1 Satellite Image of the Development Site

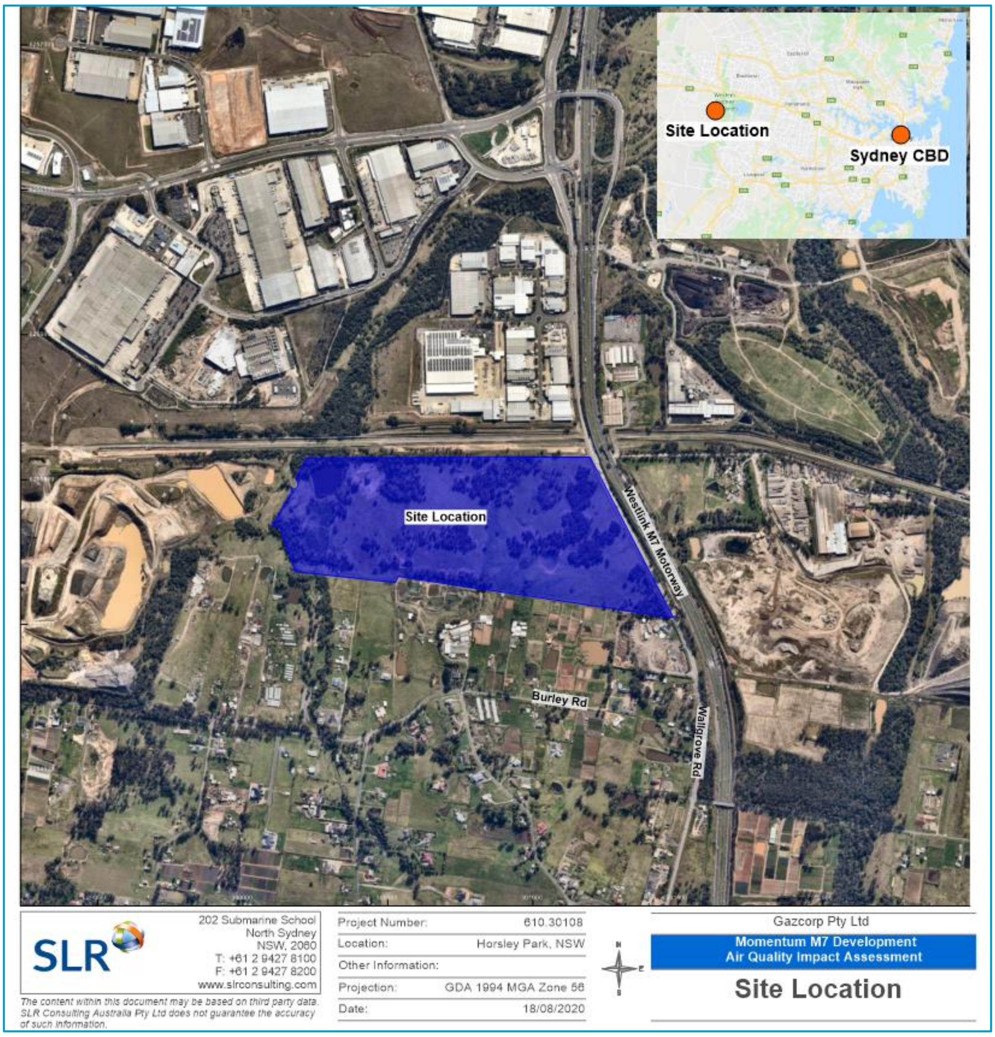
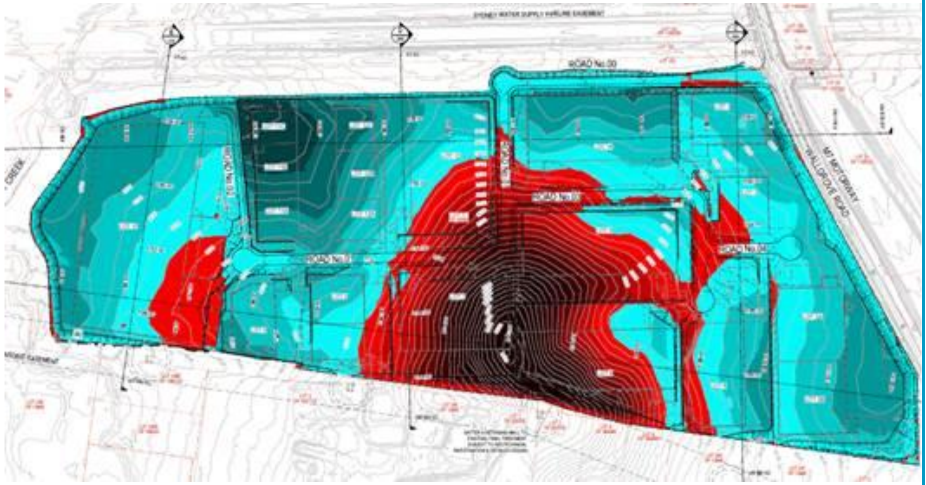


Figure 2 Indicative Site Layout of the Development Site

Figure 3 Approved and Proposed Stage 1 Earthworks extent

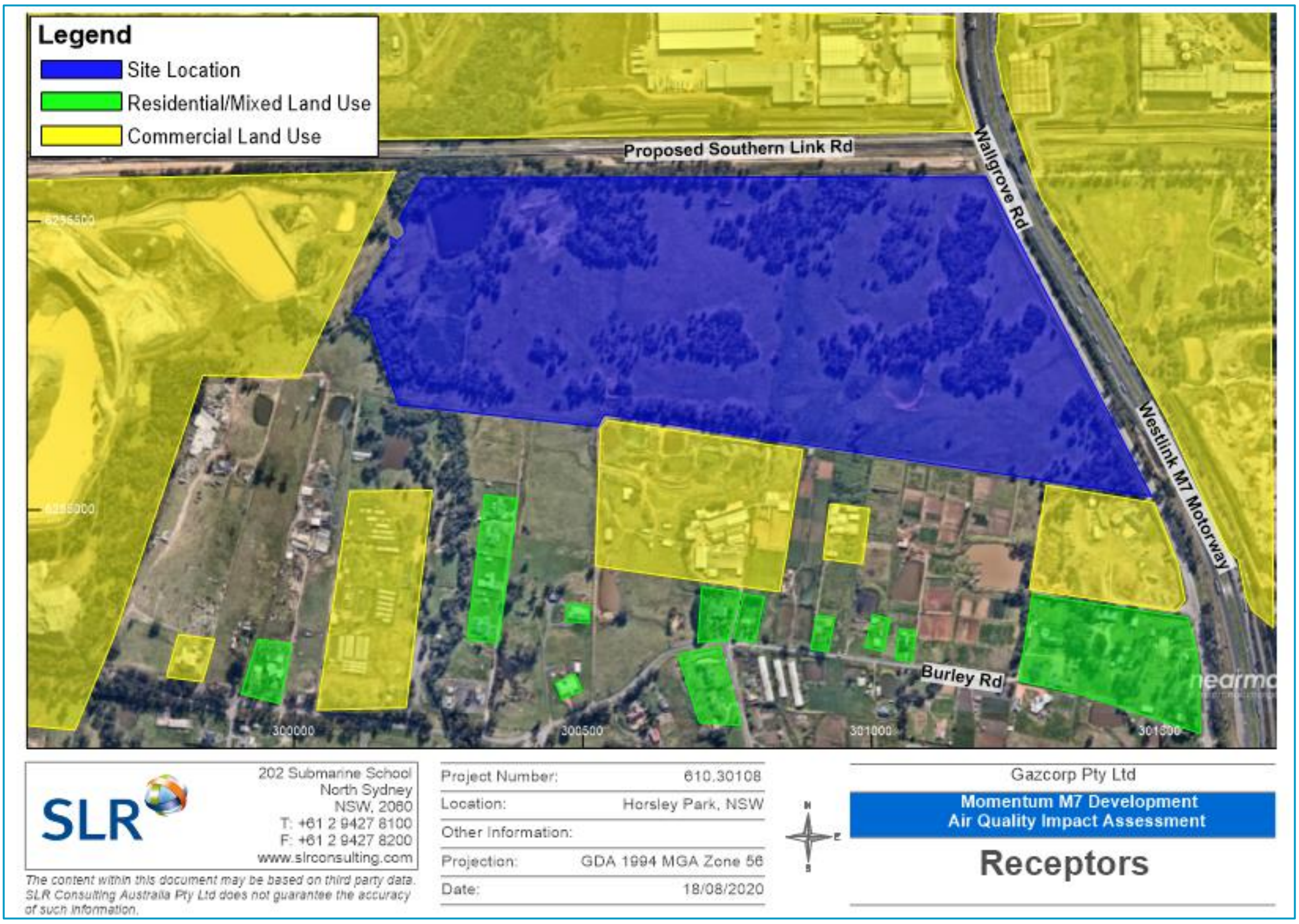
<u>Approved</u> Stage 1 Earthworks	<u>Proposed</u> Stage 1 Earthworks
	

2.2 Neighbouring Receptors

As shown in **Figure 4**, a number of residential and commercial properties have been identified in the area surrounding the Development Site using aerial imagery. All neighbouring residential receptors are located to the south of the Development Site along Burley Road and Flavex Lane, with the nearest residence located approximately 140 meters (m) from the southern boundary of the Development Site. The nearest commercial receptors are located approximately 30 m to the south and 120 m to the north of the Development Site boundary. The adjacent areas to the east and west of the Development Site have also been identified as commercial land, although amenities (such as office buildings or workshops) where individuals are likely to experience air quality impacts due to construction activities at the development site, are located approximately 300 m to the northeast and more than 350 m from the eastern and western boundaries of the Development Site.

The impact of air emissions on nearby receivers is dependent on the prevailing meteorological conditions (primarily wind speed and direction), but also the distance from the source to the receiver, and any mitigation between the source and receiver. Such mitigation might be in the form of barriers or vegetation that may act as a physical obstacle or result in changes to airflow, which may help in reducing air quality impacts.

Figure 4 Location of Neighbouring Receptors



2.3 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 Stage 1 construction activities at the Development Site. The following construction activities are expected to occur on site during these works:

- Clearing of vegetation and bulk earthworks;
- Construction of internal estate roads, water, sewer, telecommunications and gas infrastructure ;
- Construction of stormwater management devices;
- Installation of estate landscaping;
- Construction a 45,225 m^2 warehouse and distributing building (including 3,006 m^2 of office space) on Lot 10; and
- Intersection works with Wallgrove Road at the proposed southern link intersection.

This AQIA considers potential air quality impacts associated with the proposed clearing of vegetation, earthworks, construction of stormwater management systems and landscaping works over the entire subdivision of 16 lots contained within the Development Site, encompassing approximately 52.2 ha of land.

The Stage 1 construction works are anticipated to take between eight and nine months. The proposed working hours for the construction period are 7:00am to 6:00pm, Monday to Friday, between 8:00am to 1:00pm on Saturdays, and no work to be conducted on Sundays or public holidays. It is understood that intersection works at the proposed Southern Link Road and Wallgrove Road will be completed in conjunction with the earthworks and construction activities at the Development Site. Thus, impacts from the intersection construction works have been included in the assessment of the overall construction works at the Development Site.

The potential for dust to be emitted during the construction phase 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; 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**.

3 Legislation, Regulation and Guidance

3.1 Pollutants of Concern

The key air pollutants of concern include particulate matter of varying size fractions from construction activities described in **Section 2.3.** The following section outlines the potential health and amenity issues associated with these pollutants.

3.1.1 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.

3.2 Air Quality Criteria

3.2.1 Particulate Matter

State air quality guidelines specified by the NSW Environmental Protection Agency (EPA) for the pollutants identified in **Section3.1** 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.

The impact assessment criteria listed in the Approved Methods for particulate matter and nuisance dust are shown in **Table 1**.

Table 1 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 2017a

3.3 State Environmental Planning Policy (Western Sydney Employment Area) 2009

The aim of the State Environmental Planning Policy (SEPP) is to protect and enhance the land to which this Policy applies (the *Western Sydney Employment Area*) for employment purposes. Specifically, the particular aims of this Policy are as follows:

a. *to promote economic development and the creation of employment in the Western Sydney Employment Area by providing for development including major warehousing, distribution, freight transport, industrial, high technology and research facilities,*

b. *to provide for the co-ordinated planning and development of land in the Western Sydney Employment Area,*

c. *to rezone land for employment or environmental conservation purposes,*

d. *to improve certainty and regulatory efficiency by providing a consistent planning regime for future development and infrastructure provision in the Western Sydney Employment Area,*

e. *to ensure that development occurs in a logical, environmentally sensitive and cost-effective manner and only after a development control plan (including specific development controls) has been prepared for the land concerned,*

f. *to conserve and rehabilitate areas that have a high biodiversity or heritage or cultural value, in particular areas of remnant vegetation.*

Clause 33H - Earthworks

The objectives of this clause are as follows:

- *to ensure that earthworks for which development consent is required will not have a detrimental impact on environmental functions and processes, neighbouring uses, cultural or heritage items or features of the surrounding land,*
- *to allow earthworks of a minor nature without separate development consent.*

The Development Site is located within the WSEA and therefore the aims of the WSEA SEPP (including Clause 33H) apply to this site. There are no air quality specific development standards or provisions identified in the WSEA SEPP, however the broader environmental protection context defined in (e) above is considered relevant to this AQIA.

3.4 Local Government Air Quality Toolkit

The NSW EPA has developed the Local Government Air Quality Toolkit (EPA 2018), in response to requests from local Council officers for information and guidance on the common air quality issues they manage. Guidance is available under Part 3 of the Local Government Air Quality Toolkit for construction sites. These documents list the common sources of emissions and mitigation and management measures to control airborne dust levels from construction sites and have been consulted in the development of this AQIA.

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 recording wind speed and wind direction data is the Horsley Park Automatic Weather Station (AWS), located approximately 5.5 km east of the Development Site (Station ID 67119). For the purpose of this assessment, it is assumed that the wind conditions recorded by the Horsley Park AWS are representative of the wind conditions experienced at the Development 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 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 'Beaufort Wind Scale' (consistent with terminology used by the BoM) presented in **Table 2** was used to describe the wind speeds experienced at the Development Site.

Table 2 Beaufort Wind Scale

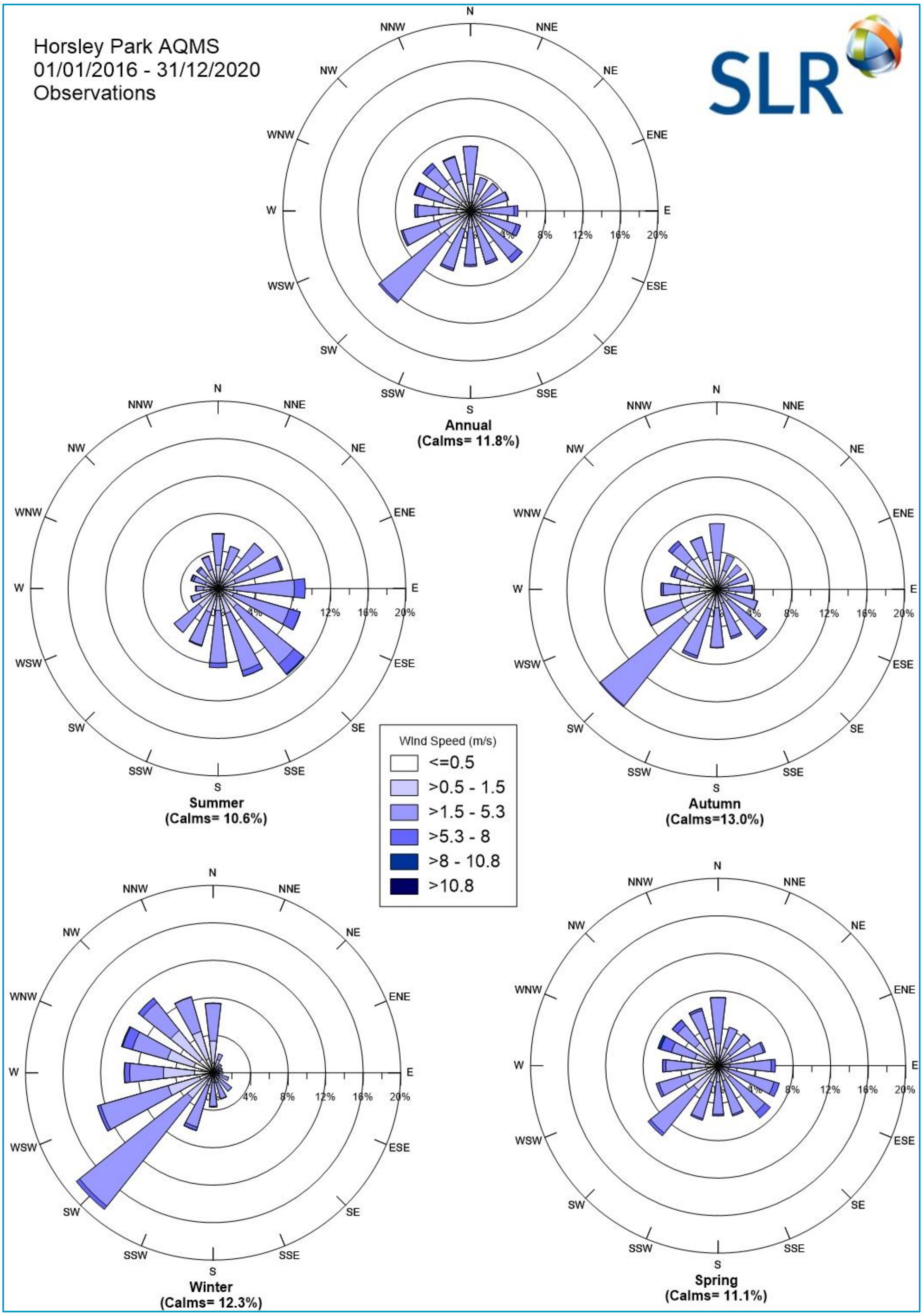
Beaufort Scale #	Description	m/s	Description on Land
0	Calm	0-0.5	Smoke rises vertically
1	Light air	0.5-1.5	Smoke drift indicates wind direction
2-3	Light/gentle breeze	1.5-5.3	Wind felt on face, leaves rustle, light flags extended, ordinary vanes moved by wind
4	Moderate winds	5.3-8.0	Raises dust and 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 (**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.

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



4.2 Background Air Quality

Air quality monitoring is performed by the NSW Office of Environment and Heritage (OEH) at a number of monitoring stations across NSW. The closest such station with data for the last five years is the Prospect Air Quality Monitoring Station (AQMS), which is located approximately 6.5 km to the northeast of the Development Site. Considering the relatively flat terrain between the Development Site and Prospect AQMS, as well as similar land use surrounding both locations, it is assumed that the air quality monitoring data recorded at the AQMS is a reasonable representation of the air quality experienced at the Development Site. Hence, air quality monitoring data recorded at the Prospect AQMS are presented below.

The following relevant air pollutants are monitored at this station:

- Fine particles as PM_{10}; and
- Fine particles as $PM_{2.5}$.

Air quality monitoring data recorded by the Prospect AQMS were obtained for the calendar years 2016 - 2020 and are summarised in **Table 3** and are shown in **Figure 6** and **Figure 7**.

Table 3 Summary of Prospect AQMS Data (2016 - 2020)

Pollutant	PM_{10} (µg/m³)		$PM_{2.5}$ (µg/m³)	
Averaging Period	**24-hour***	**Annual**	**24-hour***	**Annual**
2016	110.1	18.9	84.9	8.7
2017	61.1	18.9	30.1	7.7
2018	113.3	21.9	47.5	8.5
2019	182.8	26.0	134.1	11.9
2020	245.8	20.2	70.8	8.6
Criterion	**50**	**25**	**25**	**8**

*Figures in brackets denote number of exceedances of the respective 24-hour criteria.

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.

Figure 6 24-hour PM_{10} Concentrations Recorded by Prospect AQMS (2016-2020)

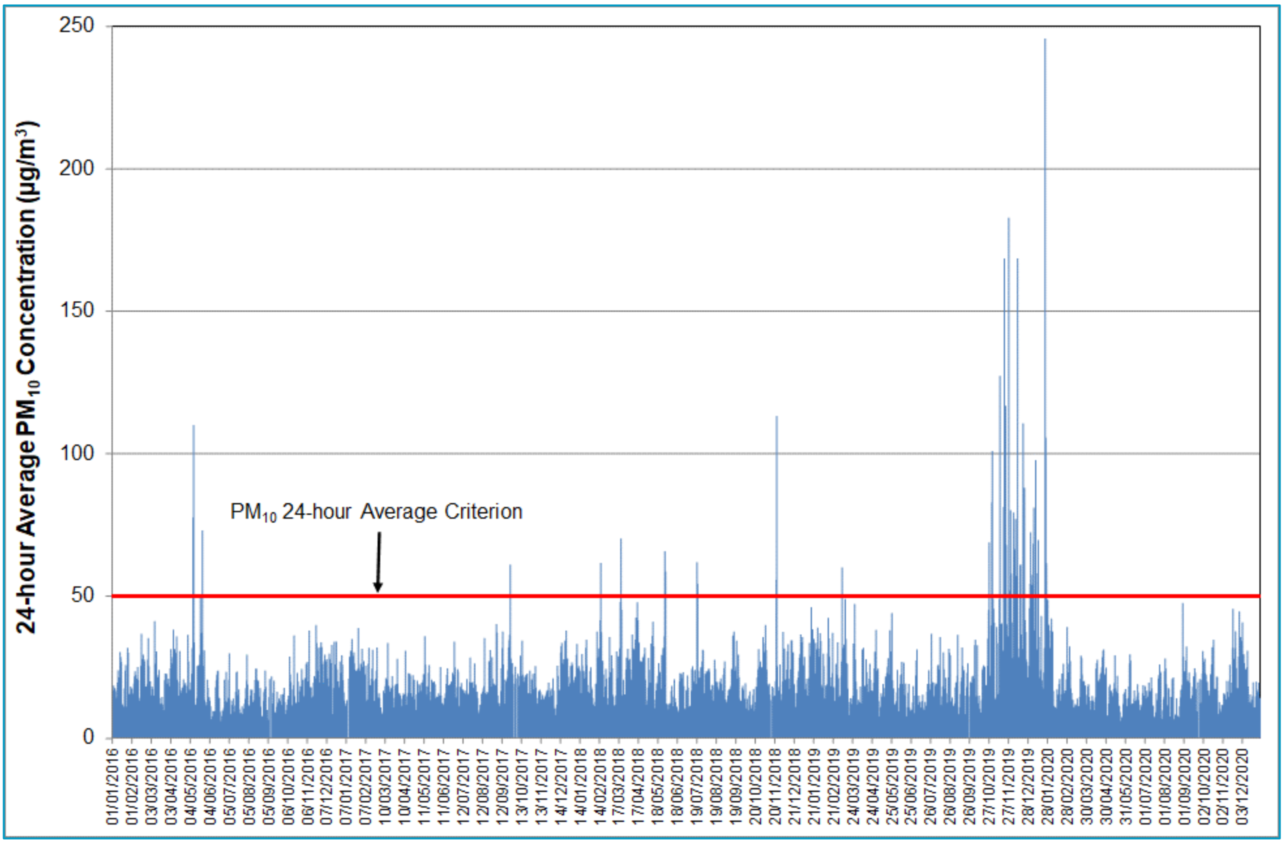
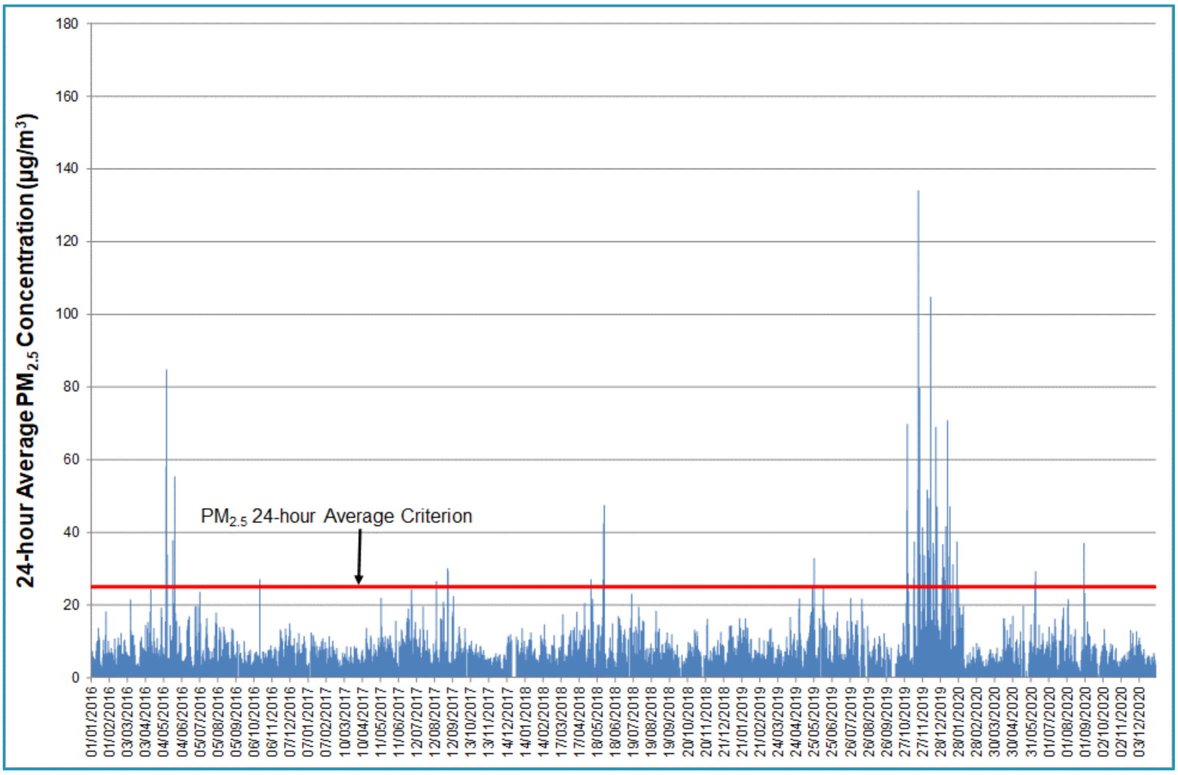


Figure 7 24-hour $PM_{2.5}$ Concentrations Recorded by Prospect AQMS (2016-2020)



5 Assessment of Dust Emissions During Construction

5.1 Construction Dust Risk Assessment Methodology

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.

5.2 Construction Phase Dust Risk Assessment

5.2.1 Step 1 – Screening Based on Separation Distance

As noted in **Section 2.2**, the nearest residential receptors are located approximately 140 m from the southern boundary of the Development Site. The nearest commercial receptors are located approximately 30 m to the south, 100 m to the east and 120 m to the north of the Development Site boundary.

The IAQM screening criteria for further assessment is the presence of a sensitive 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 residential receptors are located approximately 140 m of the boundary of the site, and commercial receptors are located approximately 30 m from the Development Site boundary, further assessment is required.

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

Based on the IAQM definitions presented in **Appendix A**, the dust emission magnitudes for each phase of the construction works have been categorised as presented in **Table 4**. No significant demolition activities are proposed as part of the works, hence the risk of dust impacts from demolition activities have not been assessed.

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 (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. **Relevance to this Project:** *An estimated 52.2 ha (522,000 m^2) site area is expected to undergo bulk earthworks.*
Construction	Medium	**IAQM Definition:** Total building volume 25,000 m^3 to 100,000 m^3, potentially dusty construction material (eg concrete), piling, on site concrete batching. **Relevance to this Project:** *A warehouse and distribution building is proposed to be constructed on Lot 10 covering an area of 45,225 m^2 including 3,006 m^2 of office space.*
Trackout	Large	**IAQM Definition:** 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. **Relevance to this Project:** *It is estimated that approximately 60 heavy vehicles movements per day will occur during the peak construction period.*

5.2.3 Step 2b – Risk Assessment

Receptor Sensitivity

Based on the criteria listed in **Table A1** in **Appendix A**, the sensitivity of the identified residential receptors is concluded to be *high* while the sensitivity of the commercial receptors is concluded to be *medium*, for both dust soiling and health impacts.

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 follows:

- *Low* for residential receptors as the number of residential receptors have been estimated to be within the range of 10-100 with the nearest receptor located approximately 140 m from the Development Site boundary.
- *Medium* for commercial receptors as the number of commercial receptors have been estimated to be within the range of 10-100 with the nearest receptor located approximately 30 m from the Development Site boundary.

Additionally, these categorisations have been made taking into account the 5-year mean background PM_{10} concentration of 20.7 µg/m^3 recorded at Prospect AQMS (see **Section 4.2**).

Risk Assessment

Given the sensitivity of the general area for dust soiling and for health effects is classified as *low* at residential receptors and *medium* at commercial receptors, and the dust emission magnitudes for the various construction phase activities as shown in **Table 4**, the resulting risk of air quality impacts if no controls are implemented is as presented in **Table 5**.

Table 5 Preliminary Risk of Air Quality Impacts from Construction Activities (Uncontrolled)

Type of Receptor	Impact	Sensitivity of Area	Dust Emission Magnitude			Preliminary Risk		
			Earthworks	Construction	Trackout	Earthworks	Construction	Trackout
Residential	Dust Soiling	Low	Large	Medium	Large	Low Risk	Low Risk	Low Risk
	Human Health	Low				Low Risk	Low Risk	Low Risk
Commercial	Dust Soiling	Medium	Large	Medium	Large	Medium Risk	Medium Risk	Medium Risk
	Human Health	Medium				Medium Risk	Medium Risk	Medium Risk

The results indicate that if no dust controls are applied, the risks of adverse dust soiling and human health impacts are as follows:

- *Low risk* at residential receptors during the earthworks, construction and trackout phases.
- *Medium risk* at commercial receptors during the earthworks, construction phase and trackout phase.

5.2.4 Step 3 - Mitigation Measures

As per **Section 5.2.3**, construction works at the Development Site pose a *medium risk* to neighbouring commercial receptors during earthworks and construction phases and *low risk* during trackout phase, while the neighbouring residential receptors are expected to experience a *low risk* of fugitive dust impacts for all phases of construction works. Since the commercial receptors have been concluded to have a higher risk of dust soiling as well as human health impacts, mitigation measures shown in **Table 6** are based on *medium risk*.

Table 6 lists the relevant mitigation measures designated as *highly recommended* (H) or *desirable* (D) by the IAQM methodology for a development shown to have a medium risk of adverse impacts. Not all these measures would be practical or relevant to the proposed Development Site 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). For almost all construction activity, the 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.

Table 6 Site-Specific Management Measures Recommended by the IAQM

	Activity	
1	**Communications**	
1.1	Develop and implement a stakeholder communications plan that includes community engagement before work commences on site	H
1.2	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
1.3	Display the head or regional office contact information.	H
1.4	Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority.	H
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 daily 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
3.4	Agree dust deposition, dust flux, or real-time PM10 continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least three months before work commences on site or, if it a large site, before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction.	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	Fully enclose site or specific operations where there is a high potential for dust production and the site is actives for an extensive period	H
4.4	Avoid site runoff of water or mud	H
4.5	Keep site fencing, barriers and scaffolding clean using wet methods.	H
4.6	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	H
4.7	Cover, seed or fence stockpiles to prevent wind erosion	H
5	**Operating Vehicle/Machinery and Sustainable Travel**	
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

	Activity	
5.4	Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on unsurfaced 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
5.5	Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.	H
5.6	Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing	D
6	Operations	
6.1	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
6.2	Ensure an adequate water supply on the site for effective dust/particulate matter suppression/ mitigation, using non-potable water where possible and appropriate	H
6.3	Use enclosed chutes and conveyors and covered skips	H
6.4	Minimise drop heights from loading shovels and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate	H
6.5	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	H
7	Waste Management	
7.1	Avoid bonfires and burning of waste materials.	H
8	Earthworks	
8.1	Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable	D
8.2	Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable	D
8.3	Only remove the cover in small areas during work and not all at once	D
9	Construction	
9.1	Avoid scabbling (roughening of concrete surfaces) if possible	D
9.2	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	H
9.3	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	D
9.4	For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust	D
10	Trackout	
10.1	Use water-assisted dust sweeper(s) on the access and local roads to remove, as necessary, any material tracked out of the site.	H
10.2	Avoid dry sweeping of large areas.	H
10.3	Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.	H
10.4	Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.	H
10.5	Record all inspections of haul routes and any subsequent action in a site log book.	H
10.6	Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned	H
10.7	Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).	H
10.8	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	H

	Activity	
10.9	Access gates to be located at least 10 m from receptors where possible	H

H = Highly recommended; D = Desirable

5.2.5 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 7**.

Table 7 Residual Risk of Air Quality Impacts from Construction

Type of Receptor	Impact	Sensitivity of Area	Preliminary Risk		
			Earthworks	Construction	Trackout
Residential	Dust Soiling	Low	Negligible Risk	Negligible Risk	Negligible Risk
	Human Health	Low	Negligible Risk	Negligible Risk	Negligible Risk
Commercial	Dust Soiling	Medium	Low Risk	Low Risk	Low Risk
	Human Health	Medium	Low Risk	Low Risk	Low Risk

The mitigated dust soiling and human health impacts are anticipated to be *negligible* at the residential receptor for earthworks, construction and trackout phases of the works. During earthworks, construction and trackout phases impacts are anticipated to be *low risk*.

6 Conclusions

SLR Consulting Australia Pty Ltd (SLR) has been commissioned by Gazcorp Pty Ltd (Gazcorp) to prepare an Air Quality Impact Assessment (AQIA) for construction works to be undertaken as part of the Stage 1 development of a subdivided business hub located within the Western Sydney Employment Area (WSEA) at 813-913 Wallgrove Road, Horsley Park (the Development Site).

The aim of this AQIA is to assess the risks associated with the potential air quality impacts due to the proposed construction works, which will include the following activities:

- Clearing of vegetation and bulk earthworks;
- Construction of internal estate roads, water, sewer, telecommunications and gas infrastructure;
- Construction of stormwater management devices;
- Installation of estate landscaping;
- Construction 45,225 m^2 warehouse and distributing building (including 3,006 m^2 of office space) on Lot 10; and
- Intersection works with Wallgrove Road at the proposed southern link intersection.

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 earthworks, construction and trackout) at neighbouring residential receptors. The residual dust impacts are anticipated to have *low risk* for the earthworks, construction and trackout phases at commercial receptors.

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

7 References

- EPA 2017a, Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales, Environment Protection Authority NSW, January 2017.
- Holman *et al* 2014, *IAQM Guidance on the assessment of dust from demolition and construction,* Institute of Air Quality Management, London. http://www.iaqm.co.uk/text/guidance/construction-dust-2014.pdf.
- EPA 2018, Local Government Air Quality Toolkit, Module 3 – Guidelines for Managing Air Pollution, Part 3 – Guidance Notes for Construction Sites, available online at https://www.epa.nsw.gov.au/your-environment/air/air-nsw-overview/local-government-air-quality-toolkit, accessed on 23 August 2018.
- DPIE 2021, NSW Air Quality Statement 2020, available online at https://www.environment.nsw.gov.au/topics/air/nsw-air-quality-statements/annual-air-quality-statement-2020, accessed 15 February 2021.

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 19.8 $\mu g/m^3$ 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/m³	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	21-25 µg/m³	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	17-21 µg/m³	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<17 µg/m³	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	>25 µg/m³	>10	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	21-25 µg/m³	>10	Medium	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	17-21 µg/m³	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	<17 µg/m³	>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

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