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Dexus Property Group Pty Ltd

Air Quality Impact Assessment for a Proposed Warehouse Development

311 South Street,
Marsden Park, NSW
2765

MARCH 2022

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Air Quality Impact Assessment for a Proposed Warehouse Development
311 South Street, Marsden Park, NSW 2765

Dexus Property Group Pty Ltd

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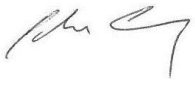
Prepared by:	John Conway	31 March 2022	
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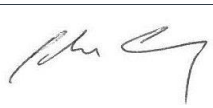
Approved by:	John Conway	31 March 2022	

WSP acknowledges that every project we work on takes place on First Peoples lands.
We recognise Aboriginal and Torres Strait Islander Peoples as the first scientists and engineers and pay our respects to Elders past and present.

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Abbreviations

AAQMS	Ambient Air Quality Monitoring Station
ACM	Asbestos containing material
AHD	Australian Height Datum
Air NEPM	National Environment Protection (Ambient Air Quality) Measure
AWS	Automatic Weather Station
AQIA	Air Quality Impact Assessment
AQMP	Air Quality Management Plan
BoM	Bureau of Meteorology
BCC	Blacktown City Council
BTEX	Benzene, toluene, ethylbenzene, and xylenes
CO	Carbon monoxide
CO_2	Carbon dioxide
DPIE	Department of Planning, Industry and Environment
DS	Dust soiling
EIS	Environmental Impact Statement
EPA	Environment Protection Authority
EPL	Environment Protection Licence
EP&A Act	Environmental Planning and Assessment Act
GFA	Gross floor area
HDV	Heavy duty vehicle
HEMV	Heavy earth moving vehicle
HH	Human health
IAC	Impact Assessment Criteria
IAQM	Institute of Air Quality Management
LFG	Landfill gas
LGA	Local Government Area
LNG	Liquid natural gas
LOR	Limit of reporting
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure

NO	Nitrogen monoxide
NO_2	Nitrogen dioxide
NO_x	Oxides of nitrogen
NSW	New South Wales
O_3	Ozone
PAHs	Polycyclic Aromatic Hydrocarbons
POEO Act	Protection of the Environment Operations Act
PM	Particulate Matters
$PM_{2.5}$	Particles with an aerodynamic of 2.5 micrometres or less
PM_{10}	Particles with an aerodynamic of 10 micrometres or less
SEARs	Secretary's Environmental Assessment Requirements
SO_2	Sulphur dioxide
SSDA	State Significant Development Application
SSI	State Significant Infrastructure
SVOCs	Semi-volatile organic compounds
TPH	Total petroleum hydrocarbons
TRH	Total recoverable hydrocarbons
TSP	Total suspended particulates
VOCs	Volatile organic compounds
WSP	WSP Australia Pty Limited
Units	
ºC	Degree Celsius
g/m^2/month	Grams per metre squared per month
ha	Hectare
MW	Megawatt
Kg	kilogram
km	kilometre
km/h	kilometre per hour
m	Metre
mm	Millimetres
ppm	Parts per million
%	Per cent

t	tonnes
µg/m^3	Microgram per cubic meter
v/v	Volume per volume

Executive summary

Dexus Property Group Pty Ltd (Dexus) is proposing to construct of a warehouse development located at 311 South Street (Project site), Marsden Park, New South Wales (NSW) [the Project]. This qualitative Air Quality Impact Assessment was prepared as part of the Environmental Impact Statement (EIS) for the Project in support of a State Significant Development Application (SSDA).

The project site at 311 South Street is located on the southern side of South Street in the suburb of Marsden Park within the Marsden Park Industrial Precinct in the Blacktown City Council (BCC) local government area (LGA).

The existing environment was characterised in respect of existing land uses, topography the nearest sensitive receptors, local meteorology, and air quality.

The Project is located with the existing Marsden Park Industrial Precinct. To the north lies residential areas (estate and single storey dwellings). To the west there's a small housing estate beyond which lies bushland. The Project site adjoins an operational landfill (Blackstone Waste Services) to the south-east and an Ikea distribution centre directly south. Directly west, the land is currently vacant.

The existing local air quality was characterised for the area in the vicinity of the Project site. The National Pollutant Inventory (NPI) provides information in each local government (LGA) on the type and magnitude of pollutants for industrial premises that exceed specific thresholds. For the 2019/2020 reporting period, 22 facilities emitting 32 substances were reported to the NPI in the BCC LGA.

The nearest industrial facility to the Project site that reports to the NPI is the Grange Avenue Power Station (EDL LFG (NSW) Pty Ltd) located approximately 880 m to north-east. It is a 2-megawatt (MW) landfill gas co-generation power station and reports a range of pollutants to the NPI on an annual basis. Emissions from the power plant have the potential to impact on the Project site. However, reported emissions to the NPI are relatively low and winds from the north-east are uncommon and therefore its contribution to the local airshed is likely to be low. Vehicular traffic emissions on the local road network are a major source of local air emissions.

The nearest industrial facility to the Project site is the currently operational landfill (Blackstone Waste Services) directly adjacent to the south-east. It is an EPA licensed facility that accepts building waste (no putrescible waste accepted). It does not report emissions to the NPI. Dust from on-site operations is expected to be the main air emission with the potential to impact on the Project site, in particular during southerly winds. Landfill gas migration (LFG) also has the potential to impact the Project site.

The nearest Environment Protection Authority (EPA) managed ambient air quality monitoring stations (AAQMS) to the Project site is located at the St Mary's (Mamre Road) AAQMS approximately 10.8 kilometres (km) to the north-west of the Project. Ambient air monitoring data collected at the St Mary's AAQMS for the past five years (2016 to 2020 inclusive) were analysed and are presented in this report as broadly representative of the air quality at the Project site. The results indicate that the annual average PM_{10} concentrations were compliant with the relevant *National Environment Protection (Ambient Air Quality) Measure 2016* (Air NEPM) standard, while there were multiple exceedances of the 24-hour average PM_{10} Air NEPM standard for all years, except for 2017 with a maximum of 26 daily exceedances in 2019 due primarily to bushfire smoke. Except of 2017, there were no exceedances of the annual Air NEPM standard for all years analysed. There were multiple exceedances of the 24-hour Air NEPM standard for all years, with a maximum of 21 daily exceedances in 2019 due to bushfire smoke. Aside from the Air NEPM exceedances, the air quality at St Mary's AAQMS is broadly representative of that likely to be experienced at the Project site.

Meteorological data collected at the St Mary's EPA AAQMS for the years 2016 to 2020 were analysed to evaluate the local wind speed and wind direction. The data indicates predominantly south-westerly and southerly winds with an annual average wind speed of 1.3 m/s and calm conditions (wind speeds of less than 0.5 m/s) of 26.7% over the five years.

Sensitive receptors in the vicinity of the Project were identified including residences (housing estates and single storey dwellings). Several residential receptors are situated on South Road adjacent to the construction haulage routes.

The main types of emissions likely to be generated during construction include dust, odour and combustion emissions from the following sources:

- site establishment and demolition work (dust)
- excavations and earthworks (dust)
- construction of buildings (dust)
- vehicle movements on paved and unpaved roads/routes (dust)
- wind erosion from exposed areas and stockpiles in the construction compound (dust)
- combustion of fuel associated with on-site plant, equipment, vehicles, and diesel generators (combustion emissions)
- unexpected, contaminated material are found and during asphalt laying (odour)

A risk-based approach based on the UK Institute of Air Quality Management (IAQM) document *Guidance on the assessment of dust from demolition and construction* (IAQM 2014) was used to assess the risk of potential dust impacts on the nearest sensitive receptors during construction. The outcomes of the risk assessment indicated that without mitigation the risk of potential dust impacts from demolition, earthworks, construction activities and track out were negligible to low. With the implementation of the management measures detailed in section 5, there would not be unacceptable air quality impacts from the Project.

Gaseous emissions generated from vehicles and plant and machinery would be minimised during construction with mitigation measures in place and would not be of significance.

In the event that contaminated material is encountered on-site, odour impacts are likely to be contained within the site. The unexpected finds protocol would be implemented immediately to determine the type, extent, and management of contamination. During asphalt laying odour emissions would occur. However, these would be confined local to the source, be intermittent and of short duration.

A preliminary site investigation conducted by WSP (Environmental Due Diligence Assessment, 311 South St, Marsden Park, NSW 2765, 2021 [WSP 2021]) for a range of contaminants including asbestos containing material (ACM), volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs), heavy metals and landfill gases.

The investigation noted the presence of ACM in the on-site buildings to be demolished and, in surficial and subsurface soil. Soil sampling was undertaken for the presence of asbestos including two cement sheet samples. One solid sample was confirmed to contain asbestos and one cement sheet sample reporting ACM content. This indicated the variable yet confirmed presence of ACM at the Project site. To ensure on-site and off-site impacts are minimised, all ACM would be removed off-site by certified and experienced asbestos personnel. Daily environmental and occupational monitoring would be undertaken for the duration of demolition and earthworks to make sure recorded levels are below the relevant standards.

Soils samples recorded very low levels of contamination (VOCs, SVOCs and heavy metals), at concentrations that wouldn't be expected to present an impact to future commercial/industrial use. Soil samples were also screened for VOCs across the Project site using a photoionization detector (PID) were recorded at background levels of 2ppm. As such, potential impacts from contaminated soil are not expected to be of significance.

All landfill gas concentrations (methane, hydrogen sulphide, oxygen, carbon monoxide [CO], and carbon dioxide [CO_2]) recorded in the subsurface monitoring wells using an infrared gas analyser were below adopted screening levels except for CO_2 concentrations. Along the southern boundary of the Project site, CO_2 concentrations were recorded higher than 5 per cent volume by volume (%v/v). Surface monitoring of methane using a portable natural gas leak analyser with laser spectroscopy recorded a maximum concentration of 2.9 parts per million (ppm) below the adopted threshold of 500 ppm.

A preliminary landfill gas risk assessment was undertaken for the Project site and indicated a potentially very low risk of landfill gas migration for most of the site shifting to a low risk limited to the Project site's southern boundary. Conservatively, a low risk of landfill gas migration was applied to the whole site. Further investigations are required to confirm the risk of landfill gas migration and the measures required, if any, for its control.

During operation of the Project site, the main emissions are likely to be from vehicular traffic and gas fired boilers. Air emissions are expected to be low with potential impacts minimal.

1 Introduction

1.1 Project overview

WSP Australia Pty Ltd (WSP) was engaged by Archile Projects, on behalf of Dexus Property Group Pty Ltd (Dexus) to prepare an air quality impact assessment (AQIA) report for the construction of a warehouse development located at 311 South Street, Marsden Park, New South Wales (NSW) 2765 [the Project].

This air quality technical report was prepared as part of the Environmental Impact Statement (EIS) for the Project in support of a State Significant Development Application (SSDA).

1.2 Project description

A Concept Master Plan (Master Plan) was prepared for 311 South Street comprising of two warehouses and centre buildings, internal road network layout, building locations, gross floor area (GFA), car parking, hardstand areas, concept landscaping, building heights, setbacks, built form parameters and two on-site bioretention basins (the Project site).

The Concept Master Plan includes:

- principal site access and key estate road alignment
- core development controls and
- staged delivery of the estate aligned with infrastructure and service delivery.

Development and operation of the Master Plan includes:

- bulk and detailed earthworks including cut and fill, export of excess material off site, dam dewatering and construction of benched pads with associated retaining walls
- construction of internal public estate roads and temporary road access to South Street
- stormwater and drainage work including stormwater detention and bio-retention system
- landscaping of bio-retention basin and street verges
- provision of site servicing infrastructure to allow the operation of the industrial unit for warehouse and distribution uses
- provision for a portion of the north-south Collector Road off South Street
- construction and use of two warehouses and distribution centres with a GFA of 15,590 m^2 and 25,150m^2 and associated office spaces with a GFA of 390m^2 and 1,710m^2, for Warehouse 1 and 2 respectively.
- construction of associated carparking and heavy vehicle hardstand areas, vehicle crossings/driveways, soft and hard landscaping, perimeter security fencing
- estate signage and tenant building signage.

Figure 1-1 shows the proposed site plan for the Project.

Figure 1-1 Proposed site plan

1.3 Project location

The Project site at 311 South Street is located within the Marsden Park Industrial Precinct in the Blacktown City Council (BCC) local government area (LGA) on a 10.25-hectare (ha) parcel of land. The site is situated on the southern side of South Street in the suburb of Marsden Park. The site is 1.3 kilometres (km) west of Richmond Road and approximately 39 km north-west of Sydney Central Business District (CBD)

The location of the Project site is shown in Figure 1-2.

Figure 1-2 Location of Project site

1.4 Purpose of this technical report

The objective of this technical report is to identify and qualitatively assess the potential air quality impacts associated with the construction and operation of the Project and to recommend management and mitigation where appropriate.

1.4.1 Secretary's Environmental Assessment Requirements

The NSW Department of Planning, Industry and Environment (DPIE) has provided the SEARs for the EIS. The requirements specific to air quality are outlined as follows:

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

This technical report addresses the SEARs requirements for air quality.

1.5 Scope of work

To fulfil the requirements of the Project objective in relation to air quality, the following scope of works was undertaken:

- summarise the legislation and guidelines relevant to air quality
- characterise the receiving environment (air quality, meteorology (prevailing wind speed and wind direction), topography, sensitive receptors) in the vicinity of the Project using publicly available information.
- identify and analyse key emission generating activities during construction and operation
- develop a risk-based assessment approach to assessing risk of air quality impacts from emission generating activities
- assign risk ratings for each identified activity prior to the implementation of mitigation measures.
- consider the potential risk that adjacent industries may pose to the Project site
- propose mitigation and management measures to minimise potential risks.
- assess residual risks of air quality impacts post-mitigation.
- prepare a qualitative air quality impact assessment report for an EIS in support of a SSDA for the Project.

Given the small-scale construction works and the expected very low emissions likely to be generated during the operation phase, a risk-based qualitative assessment was considered appropriate to evaluate the potential risk of adverse air quality impacts for the Project.

1.6 Pollutants of interest

The construction of the Project would generate dust from activities including demolition works, earth moving, construction and the movement of vehicles and plant and machinery on-site. The combustion of engine fuel from vehicle movement and the operation of on-site plant and machinery has the potential to generate gaseous air pollutants.

At the time of writing this technical paper, detailed information regarding the operation of the Project and the type and nature of the occupants at 311 South Street is not available. However, it is known that the activities would comprise of warehousing, a distribution centre and light industries. While the nature of the light industries is unknown, the main type of air emissions from the warehouses and distribution centre are likely to be traffic related (vehicles emissions) and heating (e.g., emissions gas fired boilers).

Overall, the following air pollutant emissions were identified:

- total suspended particulates (TSP)

- deposited dust
- particulate matter with an equivalent aerodynamic diameter less than 10 micrometres (PM_{10})
- particulate matter with an equivalent aerodynamic diameter less than 2.5 micrometres ($PM_{2.5}$)
- oxides of nitrogen (NO_x, primarily comprising of nitrogen monoxide [NO] and nitrogen dioxide [NO_2])
- carbon monoxide (CO)
- sulphur dioxide (SO_2)
- volatile organic compounds (VOCs) (e.g., benzene, toluene, ethylbenzene, and xylene isomers (BTEX)
- semi-volatile organic compounds (SVOCs) (e.g., polycyclic aromatic hydrocarbons (PAHs) as benzo(a)pyrene equivalents)
- odour
- asbestos containing material (ACM)
- landfill gases (LFG)

This AQIA has focussed primarily on particulate matter (dust) during construction works using a risk-based assessment approach given that dust has the greatest potential to impact on the receiving environment.

Legislative requirements for key pollutants relevant to the Project are discussed in section 2.

2 Legislative context

2.1 Commonwealth

2.1.1 National Environment Protection Council 1994

The National Environment Protection Council (NEPC) was established under the *National Environment Protection Council Act 1994* (NEPC Act). The primary functions of the NEPC are to:

- to prepare National Environment Protection Measures (NEPMs)
- to assess and report on the implementation and effectiveness of the NEPMs in each State and Territory.

NEPMS are a special set of national objectives designed to assist in protecting or managing aspects of the environment e.g., air quality.

The NEPM relevant to air quality for this Project is the:

- National Environment Protection (Ambient Air Quality) Measure 2021 (Air NEPM).

2.1.1.1 NATIONAL ENVIRONMENT PROTECTION (AIR QUALITY) MEASURE 2021

Key pollutants commonly found in ambient air are nationally regulated under the Air NEPM.

The Air NEPM outlines standards and goals for key pollutants that are required to be achieved nationwide, with due regard to population exposure. The national environment protection standards of this measure are presented in Table 2.1.

Commonwealth, State and Territory Environment Ministers have flagged an objective to move to a $PM_{2.5}$ standard of 20µg/m^3 (1-day average) and 7µg/m^3 (1-year average) by 2025 as prescribed in the Air NEPM 2016 amendment.

These standards are not relevant to air emissions from individual sources, specific industries, or roadside locations. Air NEPM standards are intended to be applied at performance monitoring locations that represent air quality for a region or sub-region of 25,000 people or more. These performance monitoring stations are operated by the relevant environmental regulatory authority in each State and Territory.

Table 2.1 Air NEPM standards and goals

Pollutant	Averaging period	Air Quality standard[1, 2]	Maximum allowable exceedances[4]
PM_{10}	1 day	50µg/m^3	None
	1 year	25µg/m^3	None
$PM_{2.5}$	1 day	25µg/m^3	None
		20µg/m^3 (2025)	
	1 year	8µg/m^3	None
		7µg/m^3 (2025)	

(1) Defined as a standard that consists of quantifiable characteristics of the environment against which environmental quality can be assessed

(2) µg/m^3 – unit of measurement for particulate matter expressed as micrograms per cubic metre.

2.2 NSW legislation and policy

2.2.1 Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (EP&A Act) and Environmental Planning and Assessment Regulation 2000 (EP&A Regulation) establish a framework for the assessment and approval of developments in NSW. They also provide for the making of environmental planning instruments, including state environmental planning policies (SEPPs) and local environmental plans (LEPs), which determine the permissibility and approval pathway for development proposals and form a part of the environmental assessment process. In accordance with the provisions of the EP&A Act, the Project is a State Significant Infrastructure.

Under section 5.14 of the EP&A Act, the approval of the Minister for Planning and Public Spaces is required for State significant infrastructure, and an EIS has been prepared under Division 5.2 of the EP&A Act.

2.2.2 Protection of the Environment Operations Act

The *Protection of the Environment Operations Act 1997* (POEO Act) provides the legislative framework for the protection and enhancement of air quality in NSW. Its primary objectives are to reduce risks to harmless levels through pollution prevention, cleaner production, application of waste management hierarchy, continual environmental improvement and environmental monitoring.

2.2.3 Approved Methods for the Modelling and Assessment of Air Quality in NSW

Pursuant to the POEO Act, the Approved Methods for Modelling and Assessment of Air Quality in NSW 2016 (Approved Methods) prescribes the statutory methods for modelling and assessing air emission sources in NSW.

The Approved Methods lists impact assessment criteria (IAC) for a range of pollutants against which emissions from an activity is to be assessed. The IAC for the principal pollutants expected to be emitted during operation is presented in Table 2.2

Table 2.2 NSW impact assessment criteria

Pollutant	Averaging period	Air quality standard
PM_{10}	24 hours	50µg/m^3
	Annual	25µg/m^3
$PM_{2.5}$	24 hours	25µg/m^3
	Annual	8µg/m^3
TSP	Annual	90µg/m^3
Dust deposition	Annual	2 g/m^2/month (increase) 4 g/m^2/month (cumulative)

3 Existing environment

3.1 Topography and land use

The Project is located toward the northern end of the Sydney Business Park, an existing commercial/industrial precinct. Adjacent land uses include:

- North: South Street and vacant land beyond with some commercial/residential properties in north-east
- East: Vacant land
- South: Blackstone Waste Services - Waste disposal/landfill facility
- West: Ikea distribution centre and some residential dwellings

The Project site is undulating with an elevation ranging from 42 metres (m) to 46 m Australian Height Datum (AHD) sloping down from the south-east to the north-west. The surrounding topography is also undulating ranging from 35 m to 60 m.

3.2 Sensitive receptors

The Approved Methods (NSW EPA 2016) describes a sensitive receptor as:

'*A location where people are likely to work or reside; this may include a dwelling, school, hospital, office or public recreational area. An air quality impact assessment should also consider the location of any known or likely future sensitive receptor*'.

Table 3.1 presents the nearest sensitive receptors to the Project boundary.

Table 3.1 Sensitive receptors nearest to the Project

Receptor ID	Address	Receptor type	Distance to Project (m)	Direction from Project site boundary
1	9 Glengarrie Road	Residence	85	North-west
2	45 Glengarrie Road	Residence	315	North-west
3	Dortmund Crescent	Housing estate	240	West
4	Robin Street	Ingenia Lifestyle Stony Creek Retirement village	775	South
5	308 South Street	Residence	20	North
6	284 South Street	Residence	430	North-east

Figure 3-1 Location of the nearest sensitive receptors to the Project site

3.3 Local meteorology

The wind direction and wind speed during construction and operational activities can influence the extent and magnitude of air quality impacts. Adverse impacts can occur in in any direction from a site. They are, however, more likely to occur downwind of the prevailing wind direction and in proximity to the Project site.

The closest monitoring station to the Project site is located at St Mary's approximately 10.8 km to the Project site. The ambient air quality monitoring station (AAQMS) is operated and managed by the Environment Protection Authority (EPA) and monitoring for the following parameters:

- PM_{10} and $PM_{2.5}$
- NO_x and ozone (O_3)
- Wind speed, wind direction and temperature

The St Mary's AAQMS is located on Mamre Road at an elevation of 29 m AHD and commenced operation in 1992. It is a performance monitoring station and reports for NEPM compliance. Meteorological and ambient air quality data was reviewed and analysed for 2016 to 2020.

Wind speed and direction collected at the St Mary's AAQMS were analysed for the years 2016 to 2020. Figure 3-2 presents the annual and seasonal wind roses for the St Mary's AAQMS illustrating the frequency of strength and direction of winds.

The wind roses indicate the typical wind fields at St Mary's AAQMS are:

- predominantly from the south-west and south during summer followed by north-westerlies and south-easterlies with an average wind speed of 1.5 m/s and calm (wind speeds of less than 0.5 m/s) conditions of 31.8%
- most frequently from the south-west and south followed by north-westerlies during autumn with an average wind speed of 1.1 m/s and calm conditions of 17.1%
- most frequently from the south-west and south followed by north-westerlies during winter with an average wind speed of 1.1 m/s and calm conditions of 33.6%
- predominantly from the south-west and south during spring followed by north-westerlies with an average wind speed of 1.4 m/s and calm conditions of 24%
- most frequently from the south-west and south followed by north-westerlies with an average wind speed of 1.3 m/s and calm conditions of 26.7% over the five years from 2016 to 2020.

In summary, the St Mary's AAQMS experiences on average light winds and high calm conditions across all seasons. Similar meteorological conditions are likely to be experienced at the Project site with local variances. Sensitive receptors located downwind of the prevailing wind directions i.e. (south-west and south) may potentially be most affected from air emissions during construction works.

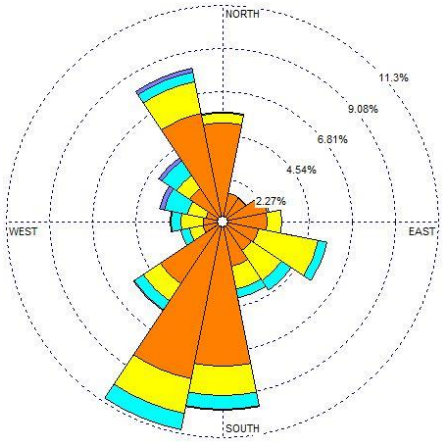
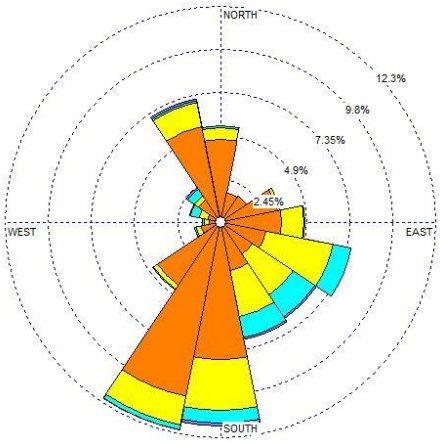
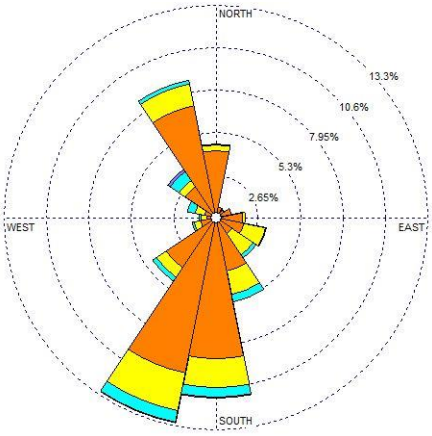
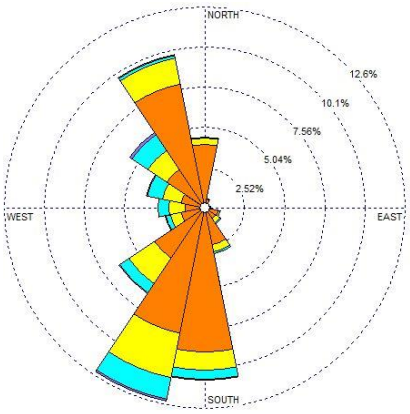
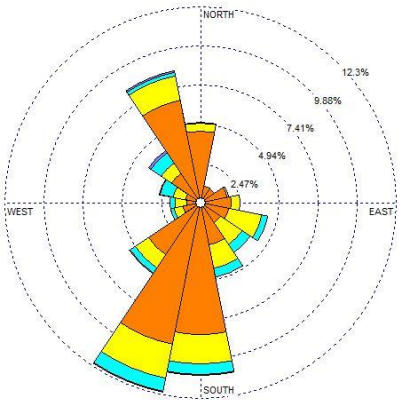
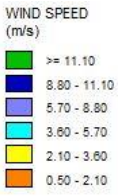
Spring	Summer
	
Autumn	**Winter**
	
Annual	
	

Figure 3-2 Annual and seasonal wind roses at St Mary's AAQMS (2016 to 2020)

3.4 Local ambient air quality

3.4.1 Existing air emission sources

The main industrial and non-industrial air emission sources contributing to the local airshed include:

- traffic using the local road network including South Street and Richmond Road
- railways
- domestic solid and liquid fuel burning
- residential activities e.g., lawn mowers and barbecues
- industrial and food manufacturing
- landfill operations
- waste treatment and wastewater treatment plants
- recreational boating
- paved/unpaved roads
- windblown dust
- backyard incinerators.

These sources give rise to emissions of pollutants relevant to the Project including:

- PM_{10} and $PM_{2.5}$
- NO_x (NO and NO_2)
- CO
- SO_2
- VOCs
- SVOCs
- Odour

The National Pollutant Inventory (NPI) is a national database that provides information about emissions in Australia. It is an on-line database that provides public information of emission estimates for 93 substances together with the source and location of these emissions. The sources include industrial and non-industrial (i.e., diffuse) sources such as motor vehicle exhaust emissions, wood heaters, lawn mowers and barbecues.

3.4.1.1 National Pollutant Inventory

A review of the NPI database for the 2019/2020 reporting year was undertaken to identify and quantify industrial and diffuse sources in the Blacktown City Council (BCC) LGA in which the Project is located. 22 facilities in the BCC LGA report 32 substances to the NPI for the 2019/2020 reporting year.

Industrial facilities

The types of industrial facilities in BCC LGA reporting to the NPI includes:

- food and beverage manufacturing
- electricity generation (from landfill gas)

- petroleum wholesaling
- asphalt production
- concrete manufacturing
- printing facilities
- metal coating and finishing (including an incinerator)
- paint and coatings manufacturing
- iron and steel casting
- wastewater treatment plants
- waste treatment facility
- metal container manufacturing.

The nearest industrial facility that reports to the NPI is the Grange Avenue Power Station (EDL LFG (NSW) Pty Ltd) and is located approximately 880 m to the north-east. It is a 2-megawatt (MW) landfill gas co-generation power station and reports a range of pollutants to the NPI on an annual basis. These include PM_{10}, $PM_{2.5}$, NO_x, SO_2, CO, heavy metals, VOCs, PAHs, and furans/dioxins. Emissions from the power plant have the potential to impact on the Project site, however, reported emissions to the NPI are relatively low and winds from the north-east are uncommon. Consequently, impacts from the power station are likely to low.

Table 3.2 presents industrial and diffuse emissions for key pollutants relevant to the Project.

Table 3.2 NPI reported air emissions for the Blacktown City Council LGA for 2019/2020

Pollutant	**Emissions to air (kg)**		
	Industrial	**Vehicular traffic[2]**	**Total (all sources)[3]**
PM_{10}	56,087	170,254	655,315
$PM_{2.5}$	10,377	NA	15,876
NO_x	159,400	4,264,522	4,829,579
CO	785,930	30,400,000	36,700,000
SO_2	40,157	89,441	159,572
Total VOCs	0	3,527,873	8,188,643
PAHs	0	12,128	24,748

(1) NA: Data not available

(2) Reported motor vehicle emissions for 1999

(3) All other emission sources listed in section 3.4.1.

The reported PM_{10} emissions are dominated by solid fuel burning while $PM_{2.5}$ emissions are largely from industrial sources, although vehicular emissions are not reported. NO_x and CO emissions are predominantly from vehicular traffic emissions.

3.4.1.2 Non NPI industrial facilities

The nearest industrial facility to the Project site is the currently operational landfill (Blackstone Waste Services) directly to the south-east. It is an EPA licensed facility that accepts building waste (no putrescible waste accepted) and does not report emissions to the NPI. Dust from on-site operations is expected to be the main type of air emission with the

potential to impact on the Project site. Landfill (LFG) gas migration also has the potential to impact the Project site from landfilling activities.

A preliminary landfill gas assessment was undertaken to provide an indication of gross migration associated with landfill gases derived from the adjacent landfill facility. The outcomes of the preliminary assessment recommended a low-risk rating be given to the entire site given carbon dioxide (CO_2) concentrations along the southern boundary were recorded higher than 5%v/v.

3.4.2 Background air quality

PM_{10} and $PM_{2.5}$ data collected at the St Mary's AAQMS for the years 2016 to 2020 is summarised as follows:

- there were no exceedances of the annual average PM_{10} Air NEPM standard for all years analysed
- except for 2019, there were no exceedances of the annual average $PM_{2.5}$ Air NEPM standard for all years analysed
- except for 2017, there were multiple exceedances of the 24-hour average PM_{10} Air NEPM standard for all years, with a maximum of 26 daily exceedances in 2019 due to bushfire smoke
- there were multiple exceedances of the 24-hour average $PM_{2.5}$ Air NEPM standard for all years analysed with a maximum of 21 daily exceedances in 2019 due to bushfire smoke.

Given the nearby location of the St Mary's AAQMS, the air quality at the Project site is expected to be of similar magnitude. Aside from the Air NEPM exceedances, the air quality at St Mary's AAQMS is broadly representative of that likely to be experienced at the Project site.

Table 3.3 Ambient air quality data at St Mary's AAQMS (2016 to 2020)

Year	Annual average (µg/m^3)		Maximum 24-hour average (µg/m^3)		
	PM_{10}	**$PM_{2.5}$**	**PM_{10}**	**$PM_{2.5}$**	**Number and date of maximum exceedances**
2016	16.1	7.9[1]	**100.2**	**93.2[1]**	PM_{10}: 2 (maximum occurred on 8 May) $PM_{2.5}$: 7 (maximum occurred on 8 May)
2017	16.2	7.0	49.8	**38.2**	PM_{10}: 0 $PM_{2.5}$: 2 (maximum occurred on 15 August)
2018	19.4	7.9	**80.5**	**49.8**	PM_{10}: 2 (maximum occurred on 22 November) $PM_{2.5}$: 3 (maximum occurred on 28 May)
2019	24.7	**9.8**	**159.8**	**88.3**	PM_{10}: 26 (maximum on 10 December) $PM_{2.5}$: 21 (maximum on 9 December)
2020	18.9	7.6	**260.3**	**82.5**	PM_{10}: 11 (maximum on 24 January) $PM_{2.5}$: 9 (maximum on 5 January)
Air NEPM standard	***25***	***8***	***50***	***25***	

(1) $PM_{2.5}$ monitoring commenced on 15 March 2016

4 Impact assessment

4.1 Construction impacts

4.1.1 Construction overview

The Project would commence construction in Quarter 2 of 2022 until Quarter 2 of 2023, approximately 15 months duration. Construction activities would be undertaken from 7am to 6pm, Monday to Friday and 6am to 12pm on Saturday.

Indicative construction scheduling and methodology for the Project is presented in Table 4.1 and would be further refined as clarity around the construction staging is further developed.

Table 4.1 Construction scheduling

Construction stages	Construction period	Type of work	Activity details
Stage 1	June – September 2022	Site establishment/enabling works	— General earthworks for site levelling — Demolition works — Transport of site sheds/works areas — Establishment of loading areas/waste areas/storage areas — Erection of temporary fencing — Service connections
Stage 2	August 2022 – May 2023	Construction of buildings	— Transport of building materials for warehouse construction — Detailed excavation including footings and concrete pours — Structural steel erection — Concrete slab forming and pouring — Warehouse wall installation — Warehouse roof construction — Inground and above ground services provision
Stage 3	May – August 2023	Building envelope works	— Building finishes — Connection of all services — Warehouse/office fit outs
Stage 4	May – August 2023	External works	— Provision of car parking areas including concrete pours of hardstand areas — Landscaping — Permanent site fencing installation

The following equipment would be used during construction works:

- excavators
- mobile cranes
- concrete truck and pump
- small and medium rigid trucks
- delivery trucks
- spoil trucks
- water cart
- diesel generator.

Construction vehicle access would initially be via South Street until such time as construction of the eastern collector road provides alternative vehicle access during construction and ultimately for the Project site.

The Project would involve an average of 5 service vehicle movements per day in each direction. During periods of excavation works and concrete pours, daily heavy vehicle movements are expected to be in the order of 30 movements per workday. At peak construction activity at the Project site, the number of staff is estimated to be 60 construction works. Assuming a conservative estimate of 1 vehicle per worker, staff travel to the site would be 60 vehicle movements in the morning and 60 vehicle movement leaving the site in the afternoon period.

This technical report primarily focusses on the potential impact of dust emissions. Impacts from combustion emissions and odour are discussed qualitatively.

4.1.2 Dust impacts

Dust (or particulate matter) impacts depend on the quantity and drift potential of the particles in the atmosphere. Larger particles (the larger particle fractions of TSP) settle out closer to the source due to their larger mass. The deposition of the particles can cause nuisance and aesthetic impacts on the receiving environment. Finer particles (PM_{10} and $PM_{2.5}$) remain entrained longer and therefore dispersed at greater distances from the source. The fine nature of these particles also has the potential for human health impacts if not adequately controlled.

The quantity of dust emitted from construction operations is related to the area of land being worked, and the level of construction activity (nature, magnitude, and duration).

The wind direction, wind speed and rainfall when construction activities are taking place, would also influence the likelihood of dust impacts. Adverse impacts can occur in any direction from a site. They are, however, more likely to occur downwind of the prevailing wind direction and/or close to the site. Local conditions including topography and natural barriers (e.g., woodland) can affect airborne concentrations due to impaction. Furthermore, existing background concentrations can be used to determine whether ambient air quality standards are likely to be exceeded as a result of construction activities.

4.1.2.1 Assessment methodology

Dust emissions associated with the construction of the Project were assessed in accordance with the *Guidance on the assessment of dust from demolition and construction* published by the Institute of Air Quality Management (IAQM) in 2014 (hereafter referred to as the IAQM guidance). The IAQM guidance provides a risk-based approach with the aim to identify risks and to recommend appropriate mitigation measures to minimise these risks.

The IAQM guidance considers the risk of dust emissions from a construction site causing amenity and health impacts is related to:

- the activities being undertaken (earthmoving, number of vehicles and plant)
- the duration of these activities

- the size of the site
- the meteorological conditions (wind speed, direction and rainfall)
- the proximity of receptors to the activities
- the adequacy of the mitigation measures applied to reduce or eliminate dust
- the sensitivity of the receptors to dust.

The IAQM guidance for assessing risk involves the following steps:

- conduct a risk-based assessment in accordance with the IAQM guidance for potential dust impact associated with the Project construction:
  - Step 1: screen the need for a more detailed assessment. The IAQM guidance document recommends that a risk assessment is undertaken where sensitive receptors are located within 350 m of the Project site boundary or 50 m of the route (s) used by construction vehicles on public roads up to 500 m from the site entrance(s). For construction works screened out for a detailed risk assessment (in Step 1), the IAQM guidance indicates it can be concluded that the level of risk is 'negligible' and any effects would not be of significance.
  - Step 2: assess the risk of dust impacts. This is done separately for each type activity including demolition, earthworks, general construction and track out[1] by heavy vehicles (i.e., haulage activities).
    - Step 2A: determine the potential dust emission magnitude (large, medium, or small) of the works depending on the type of activity. For demolition, the dust magnitude is classified as large, medium, or small depending on the total building volume demolished, type of construction material e.g., concrete, metal, on-site crushing and screening, and height of demolition activities above ground level. For earthworks, the total site area, soil type are the main determining factors. For general constructions works, the total building volume, on-site concrete batching and sandblasting/blasting determine the dust emission magnitude. For track out, the number of heavy vehicle outward movements in any given day, type of surface material and the unpaved road length are key determinants.
    - Step 2B: determine the sensitivity (high, medium, or low) of the area to dust soiling and human health (Table 4.2 and Table 4.3). Several factors are considered including the number of receptors and their proximity to the works, specific receptor sensitivities, existing background concentrations and site-specific factors that may reduce impacts (e.g., trees that may reduce wind-blown dust).
    - Step 2C: define the risk of dust impacts on dust soiling and human health (Table 4.4 to Table 4.6) by combining the dust emission magnitudes (large, medium, or small) for demolition, earthworks, general construction and track out (Step 2A) with the sensitivity of the area (high, medium, or low) (Step 2B).
  - Step 3: determine the site-specific mitigation
  - Step 4: examine the residual effects and determine whether these are significant.

Table 4.2 Sensitivity of the area to dust soiling

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

[1] Track out is dirt, mud or other materials tracked onto a paved public roadway by a vehicle leaving a construction site

RECEPTOR SENSITIVITY	NUMBER OF RECEPTORS	DISTANCE FROM THE SOURCE (m)			
		<20	<50	<100	<350
Low	<1	Low	Low	Low	Low

Table 4.3 Sensitivity of the area to human health impacts

RECEPTOR SENSITIVITY	ANNUAL MEAN PM_{10} CONCENTRATION[1]	NUMBER OF RECEPTORS	DISTANCE FROM THE SOURCE (m)				
			<20	<50	<100	<200	<350
High	>25µg/m^3	>100	High	High	High	Medium	Low
		10–100	High	High	Medium	Low	Low
		1–10	High	Medium	Low	Low	Low
	<25µg/m^3	>100	High	Medium	Low	Low	Low
		10–100	High	Medium	Low	Low	Low
		1–10	Medium	Low	Low	Low	Low
Medium	>25µg/m^3	>10	High	Medium	Low	Low	Low
		1–10	Medium	Low	Low	Low	Low
Low	<25µg/m^3	≥1	Low	Low	Low	Low	Low

(1) The annual mean PM_{10} concentration ranges were adjusted to reflect the annual mean Air NEPM standard of 25µg/m^3

Table 4.4 Risk of dust impacts for demolition

SENSITIVITY OF AREA	DUST EMISSION MAGNITUDE		
	Large	Medium	Small
High	High	Medium	Medium
Medium	High	Medium	Low
Low	Medium	Low	Negligible

Table 4.5 Risk of dust impacts for earthworks and construction

SENSITIVITY OF AREA	DUST EMISSION MAGNITUDE		
	Large	Medium	Small
High	High risk	Medium risk	Low risk
Medium	Medium risk	Medium risk	Low risk
Low	Low risk	Low risk	Negligible

Table 4.6 Risk of dust impact from track out from trucks

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

4.1.2.2 Risk assessment

Step 1 – Screen the need for a detailed assessment

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

- 350 m of the boundary of the site
- 50 m of the routes used by construction vehicles on the public highway up to 500 m from the site entrance points.

There are four sensitive receptors within 350 m of the Project site boundary, two to the north-west, one to the west and one to the north. Two of these sensitive receptors (R5 and R6) are within 50m of South Street. This triggers the requirement to conduct a detailed risk assessment.

Step 2A – Determine the potential dust emissions magnitude

The potential dust emission magnitudes for demolition, earthworks, construction and vehicle track out activities were evaluated in this section. Examples provided in the IAQM guidance have been used to classify potential large, medium, or small dust emission magnitude as shown in Table 4.7.

Table 4.7 Example definitions for large, medium, and small dust emission magnitude

ACTIVITIES	LARGE	MEDIUM	SMALL
Demolition	— Total building volume >50,000 cubic metres (m^3) — Potentially dusty construction material e.g., concrete — On-site crushing/screening Height of demolition activities (>20 metres (m) above ground level)	— Total building volume 20,000 – 50,000m^3 — Potentially dusty construction material — Height of demolition activities (10 – 20m above ground level)	— Total building volume <20,000m^3 — Low potential for dust release e.g., metal — Height of demolition activities (<20m above ground level) — Demolition during wetter months
Earthworks	Total site area >10,000 square metres — Potential dusty soil type (e.g., clay) — >10 heavy earth moving vehicles active at any one time — Formation of bunds >8 metres in height — Total material moved >100,000 tonnes (t)	— Total site area 2,500 – 10,000 square metres (m^2) — Moderately dusty soil type (e.g., silt) — 5-10 heavy earth moving vehicles active at any one time — Formation of bunds 4 - 8 metres (m) in height — Total material moved 20,000 t – 100,000 t	— Total site area <2,500m^2 — Soil type with large grain size (e.g., sand) — <5 heavy earth moving vehicles active at any one time — Formation of bunds <4 m in height — Total material moved <20,000 t — Earthworks during wetter months
Construction	— Total building volume >100,000m^3 — On-site concrete batching — Sandblasting	— Total building volume 25,000 – 100,000m^3 — On-site concrete batching — Potentially dusty construction material (e.g., concrete)	— Total building volume <25,000 m^3 — Construction material with low potential for dust release (e.g., metal cladding or timber)
Track out[1]	— >50 heavy duty vehicles (HDV>3.5t) outward movements in any one day — Potential dusty surface material (e.g., high clay content) — Unpaved road length >100 m	— 10-50 HDV (>3.5t) outward movements in any one day — Moderately dusty surface material (e.g., high clay content) — Unpaved road length 50 – 100 m	— <10 HDV (>3.5t) outward movements in any one day — Surface material with low potential for dust release — Unpaved road length <50 m

Demolition

The dust emission magnitude is determined by the following parameters:

— building volume (cubic metres)

— type of construction material being demolished

— operation of a crushing/screening plant

— height (m) of the demolition activity

— timing of duration works.

It is understood existing building and ancillary would be demolished along with concrete building slabs, light duty pavements, bitumen, pumps, concrete walls, guard rails, and crib walls. The Project site would be cleared of all debris prior the commencement of earthworks. The likely volume of material expected to be generated from demolition works is not currently known. However, it is not expected to be greater than 20,000m^3. Table 4.8 presents the dust emission magnitude for demolition works at the Project site.

In addition, the indicative construction scheduling for the Project indicates that demolition works are likely to occur from June to September 2022 during cooler and damper months.

Table 4.8 Dust emission magnitude for demolition works at the Project site

Location	Building structure volume	Construction material	On-site crushing / screening	Height of activities above ground level (m)	Emission magnitude
Project site	<20,000m^3	Concrete	No	<10m	Small

Earthworks

The dust emission magnitude for earthworks is determined by the following parameters:

- site area (m^2)
- soil type
- number of heavy earth moving vehicles (HEMVs)
- material handled (m^3)

Approximately 88,000m^3 of material would be moved during earthworks comprising the following:

- 20,300m^3 of cut material
- 48,500m^3 of imported fill material
- 20,00m^3 of spoil generated (assuming a rate of 2.000m^3/Ha)

Bunds would also be formed around the sedimentation basin located at the western corner of the Project site.

Table 4.9 presents the dust emission magnitude for earthworks at the Project site.

Table 4.9 Dust emission magnitude during earthworks at the Project site

Location	Site area (m^2)	Soil type	Number of HEMVs[1]	Material handled[3]		Emission magnitude
				m^3	TONNES	
Project site	102,455	Silty/Clay	5-10	88,800	489,288[2]	Large

(1) HEMVs: Heavy earth moving vehicles

(2) Assuming an earth density of 5,510 kg/m^3

(3) Total volume of excavated, fill and spoil material

Construction

The key factors when determining the potential dust emission magnitude during the construction phase include the building volume, method of construction, construction materials, and duration of build. Table 4.7 provides examples of small, medium, and large dust emission magnitudes.

The volume of buildings to be constructed are:

- 41,100m^3 of warehouse space
- 2,100m^3 of office space

Table 4.10 presents the dust emission magnitude for construction works at the Project site.

Table 4.10 Dust emission magnitude for construction works at the Project site

Location	Building volume (m^3)	Construction material	On-site concrete batching	Blasting	Emission magnitude
Project site	43,200	Concrete/metal cladding	No	No	Medium

Track out

Track out is defined as '*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. This arises when HDVs leave the construction site with dusty materials, which may then spill onto the road, and/or when HDVs transfer dust and dirt onto the road having travelled over muddy ground on site*' (the IAQM Guidance).

HDVs would travel to and from the construction site and onto South Street to access Richmond Road. It is assumed that the length of the unpaved road (on-site) would be between 50m and 100m given the size of the site.

Table 4.11 presents the dust emission magnitude for track out at the Project site.

Table 4.11 Dust emission magnitude for track out at the Project site

Location	Daily HDV outward movements	Surface material	Unpaved road length (m)	Emission magnitude
Project site	10-50	Silty/clay	50-100	Medium

Step 2B – Determine the sensitivity of the area

The sensitivity of the surrounding land uses takes account of several factors. These are:

- the specific sensitivities of receptors
- the number of receptors and their proximity to the site
- local background PM_{10} concentrations
- site-specific factors that may reduce the risk of wind-blown dust (e.g., trees).

The majority of the nearest sensitive receptors to the Project site are residential in nature with one retirement village. Residential receptors are considered to be *high* sensitivity receptors to dust soiling and health effects.

The annual average PM_{10} concentration collected at the St Mary's EPA AAQMS was below the Air NEPM standard of 25 µg/m^3 for all the five years analysed (2016 to 2020).

The matrices for determining the sensitivity of the surrounding area to dust soiling and human health effects are presented in Table 4.2and Table 4.3.

Table 4.12 presents a summary of the sensitivity of the receiving environment to dust soiling and human health effects.

Table 4.12 Summary of sensitivity to the surrounding area

Location	Demolition		Earthworks		Construction		Trackout	
	DS[1]	HH[2]	DS[1]	HH[2]	DS[1]	HH[2]	DS[1]	HH[2]
Project site	Low	Low	Low	Low	Low	Low	Medium	Medium

(1) DS: Dust soiling

(2) HH: Human health

Step 2C – Define the risk of impact

The dust emission magnitudes for demolition, earthworks, construction and track out were combined with the sensitivity of the area to determine the risk of dust impacts. The matrices providing the thresholds for the risk of dust impacts are presented in Table 4.4, Table 4.5 and Table 4.6.

Based on the dust emission magnitudes for each activity presented in Table 4.7, the sensitivity of the surrounding area and the determining matrices (Table 4.4to Table 4.6), the dust risk for demolition, earthworks, construction and track out activities associated with the Project are given in Table 4.13.

In summary, the Project would present a negligible to low risk of dust soiling or health effects at the nearest sensitive receptors.

Table 4.13 Summary of dust risk

Location	Demolition		Earthworks		Construction		Trackout	
	DS[1]	HH[2]	DS[1]	HH[2]	DS[1]	HH[2]	DS[1]	HH[2]
Project site	Negligible	Negligible	Low	Low	Low	Low	Low	Low

Step 3 – Site Specific mitigation measures

Risks are described in terms of a negligible, low, medium, or high risk. Where there are low, medium, or high risks of an impact occurring, then site-specific mitigation is required based on the risk level. For cases where the risk category is negligible, no mitigation measures beyond those required by legislation is required.

For general mitigation measures, the highest risk category ('*low*') was applied for the Project. To ensure the dust impacts associated with the Project are minimised, site-specific mitigation measures are presented in Chapter 5.

Step 4 – Determine significance of residual impacts

For all construction activities associated with the Project, the aim is to prevent significant effects on sensitive receptors through effective mitigation.

Based on the proposed construction works and the advice in the IAQM guidance document (IAQM 2014), it is not considered likely that the works would result in unacceptable air quality impacts subject to the implementation of mitigation measures presented in section 5.

4.1.3 Gaseous emissions

Gaseous emissions such as CO, NO_x, SO_2, VOCs and PAHs would be generated from vehicles, mobile plant and machinery and fugitive sources during the construction phase.

4.1.3.1 Vehicles and mobile plant

Diesel fuel combustion from vehicle movements and on-site plant and machinery operation would generate CO, NO_x, SO_2 and low levels of non-combustible hydrocarbons (i.e., VOCs and PAHs). The emission rates and potential impact on surrounding areas would depend on the number and power output of the combustion engines, the quality of fuel used, the condition of the engines and the intensity of use.

During the construction phase, equipment and material would be transported to the Project site. Details of daily heavy vehicle movements are presented in section 4.1.1. The plant and machinery involved in the Project construction includes excavators, crane, dozers, dumper trucks, transport trucks, generators, and air compressors.

Fuel combustion emissions from vehicles and, mobile plant and equipment at the Project site would be intermittent and transient. Given the anticipated duration of works at any given location, the likely numbers of emission sources, and scheduling of activities (i.e., not all machinery would be operating at the same location simultaneously), gaseous

emissions are not anticipated to significantly impact on local air quality. Emissions would be adequately manageable through the implementation of mitigation measures (refer to section 5).

4.1.3.2 Fugitive emissions

Petroleum, diesel, liquefied natural gas (LNG) and mineral oils stored in the storage and laydown areas at the construction compound have the potential to generate fugitive emissions. These hazardous and dangerous goods would be secured in purpose built bunded and secure areas. These emissions are expected to be minor and readily dispersed within the compound. With appropriate handling and storage, air quality impacts from these fugitive sources are considered to be negligible.

4.1.3.3 Odour

Odour emissions have the potential to be generated during excavation works if contaminated materials are found. In the event that contaminated materials are encountered, work in the affected area would cease immediately and the unexpected finds protocol would be implemented. Odour emission would also be generated during asphalt laying and would be detectable close to the sources.

In summary, air quality impacts during construction works have the potential to occur from emissions of particulate matter, products of combustion and odour. However, the impacts are anticipated to be localised, intermittent, and of short duration. In addition, not all the on-site plant and machinery would be operational simultaneously. Management and mitigation measures presented in section 5 would ensure potential impacts on the receiving environment are appropriately managed.

4.1.4 Asbestos containing material

WSP (WSP 2021) conducted an environmental due diligence of the Project site indicating the presence of asbestos containing material within building structures (nominal observations), stored fibro sheeting (potential ACM) and intermittently in surficial material in the vicinity of the northern and central areas of the Project site. The assessment undertaken did not aim to identify all surficial or subsurface ACM and as such there may be a broader distribution observed during development.

Sampling was undertaken in April 2021 for the presence of asbestos including two cement sheet samples. One solid sample was confirmed to contain asbestos and one cement sheet sample reporting ACM content. This indicated the variable yet confirmed presence of ACM at the Project site.

If not appropriately managed, there is the potential for both occupational (on-site workers) and off-site impacts. The implementation of a monitoring program and strict management measures during the demolition and excavation stages of the Project would ensure impacts are minimised.

4.1.5 Soil sampling

32 soil samples were collected across the Project site from 20 test pits and two sediment samples. They were analysed for a range of susbstances including total petroleum hydrocarbons (TPH), total recoverable hydrocarbons (TRH), BTEX, naphthalene, PAHs, metals, phenols, pesticides and herbicides. BTEX, naphthalene, TRH and PAHs concentrations in the soil samples were below the laboratory limit of reporting (LORs). TRH fractions were reported in four soil samples but were all below adopted assessment criteria for the site. Concentrations of zinc in three samples and copper in one sample were reported above the adopted ecological assessment criteria. One concentration of nickel was reported above the criteria for general solid waste.

The WSP (WSP 2021) indicated that '*elevated laboratory results were generally observed to be limited to the shallow soils (mostly shallow fill) and typically included some metals, longer chain petroleum hydrocarbons and nutrients, at concentrations that wouldn't be expected to present an impact to future commercial/industrial use*'.

Surface emissions monitoring was undertaken for VOCs across the Project site. Screening using a photoionisation detector (PID) did not indicate the presence of VOCs, with all readings recorded at background levels of 2 part per million (ppm).

4.1.6 Landfill gases

The Project site directly adjoins the Blackstone Waste Services facility to the south-east. This waste facility holds an Environment Protection Licence (EPL) for waste disposal by application to land, non-thermal treatment of general waste and waste storage of other types of waste. The current EPA EPL for the waste facility suggests that no putrescible waste is currently being accepted at the landfill but still accepts building waste. Building waste is likely to contain wood material, which is considered putrescible due to its organic nature. Following a review of historic information for this landfill site, it has been found that putrescible material has potentially been historically accepted at the landfill facility. Such organic material has the potential to degrade, producing methane and carbon dioxide gases (among other trace gases). Due to the close proximity of the landfill to the Project site, there is the potential for underground hazardous gases and vapours to migrate through the subsurface profile onto the site.

WSP (WSP 2021) undertook a limited surface and subsurface landfill gas monitoring survey at the Project site on 27 and 29 April 2021 to monitor any potential landfill gas which may be migrating through the subsurface on the site. Five soil gas bores were installed as follows:

- three locations on the southern boundary close to the Blackstone Waste Services landfill facility
- one location on the western boundary
- one location in the centre of the Project site

All landfill gas concentrations (methane, hydrogen sulphide, oxygen, carbon monoxide and CO_2) recorded in the subsurface monitoring wells using an infrared gas analyser were below adopted screening levels except for CO_2 concentrations. Along the southern boundary of the Project site, CO_2 concentrations were recorded higher than 5 per cent volume by volume (%v/v).

A preliminary landfill gas risk assessment was undertaken for the Project site and indicated a potentially very low risk of landfill gas migration for most of the site shifting to a low risk limited to the Project site's southern boundary. The WSP report concluded that given the preliminary nature of the assessment, including limited data, consideration should be given to the potential for a low-risk rating to be applied to the entire site. Further investigation is likely to be required to determine the extent of gas migration and confirm the risk classification for the site. The WSP (WSP 2021) report presents mitigation measures for a low-risk site to control landfill gas migration onto the site.

Surface emissions monitoring was also undertaken for methane across the Project site using a portable natural gas leak analyser with laser spectroscopy. All methane concentrations were below the adopted threshold of 500 ppm with a maximum methane concentration of 2.9 ppm recorded.

These preliminary measurements indicated a low risk of landfill gas migration from Blackstone Waste Services landfill to the Project site. Further investigations are required to confirm the risk of landfill gas migration and measures, if any, required for its control.

4.2 Operational impacts

It is understood the type of activities at the Project site would include warehousing, a distribution centre and light industries. The nature of the light industries is not known at present. However, it is not expected these industries would generate significant sources of emissions. The Project site would be operational 24 hours a day 7 days a week.

The main sources of air emissions from the Project are expected to be:

- Cars and light vehicles entering/leaving the site from the new eastern boundary Collector Road

- Heavy duty vehicles accessing the site to the west of warehouse Unit 2E
- gas fired boilers

The Traffic and Parking Assessment Report (Positive Traffic 2021) conducted for the Project indicates that applying the warehouse traffic generation rate for the size of the Project (site area) equates to 216 trip two way in the AM peak. For typical warehouse developments that operate of a shift basis, the afternoon changeover often avoids the afternoon road network peak hour.

The Positive Traffic report (Positive Traffic 2021) also refers to the Marsden Park Precinct Traffic and Transport Assessment undertaken by AECOM in 2013. This report presents 2036 AM and PM peak hour traffic volume forecasts at the Project site. These are 1375 AM peak and 1097 PM peak respectively and included additional development north of South Street. As such, the contribution of the traffic for the Project is less than 10% of the total traffic at 311 South Street.

The number of potential gas fired boilers at the Project site is not known, possibly one per unit (up to 5). They would be used primarily for heating and release low levels of NO_X and CO.

In summary, air emissions from the Project site during operations would contribute to the local airshed, however based on the type and nature of the likely occupants of the Project site and the relatively low levels of traffic entering/exiting the Project site, the impact of air emissions on the local air environment is likely to be low.

5 Mitigation measures

The main air emissions as discussed in section 4 are dust, combustion emissions and odour for both the construction and operation phases of the Project. Table 5-1 presents proposed mitigation measures to minimise potential air quality impacts during construction and operation.

Table 5-1 Mitigation measures

ITEM	MITIGATION MEASURES
Construction	
General	A construction air quality management plan (AQMP) would be prepared for the Project outlining the type and nature of emission sources, potential impact on nearby sensitive receptors and management measures to minimise and reduce emissions.
Demolition and removal of buildings	Prior to demolition works, all buildings would be assessed for the presence of ACM and removed by certified asbestos personnel. Soft stripping inside buildings to be conducted before demolition. Where possible walls and windows would be retained to provide a screen against dust. Effective water suppression would be used during demolition operations. Where possible hand-held sprays would be used rather than hoses as the water can be directed to the dust source. Hazardous material such as asbestos would be bagged and removed and damped down before demolition.
Dust	Temporary site fencing and gates to be installed around all internal and external construction site areas
	Restrict/cease activities with high dust generating potential during periods of high winds (> 10 m/s).
	Minimise the extent of exposed and stripped surface areas within the Project area.
	Ensure an adequate water supply on the site for effective dust suppression/mitigation, using non-potable water where possible and appropriate. Where required, a mobile water cart would be used to minimise dust on site tracks and exposed areas.
	Keep stockpiles small, bunded, moist or covered to minimise wind erosion. Cover/protect other areas susceptible to significant dust emissions from wind erosion.
	Locate stockpiles as far away from sensitive receptors where practicable.
	Cover or stabilise potentially dust-generating materials during transport to, from and around the construction site.
	Restrict vehicle speeds to 25 km/hr to minimise wheel generated dust on all site tracks.
	Access routes clearly marked out and maintained, with designated parking and turning areas, and surfaced appropriately to minimise wheel-generated dust.

ITEM	MITIGATION MEASURES
	Ensure vehicles remain on designated tracks and adhere to on-site speed limits (25 km/hr). Regular watering on unsealed surfaces and unsealed road, particularly during periods of dry and windy conditions (>10 m/s).
	Cover or stabilise potentially dust-generating materials during transport to, from and around the construction site.
	Limit truck loads to a vertical height no greater than 0.5 m above the side walls of the vehicle.
	Control the speed of dumping from tip trucks.
	Ensure all trucks entering/leaving the site are covered to prevent the escape of materials during transport.
	A rumble grid to be installed at the site entry/exit to prevent track out of mud onto public roads.
Contaminated material	In the event that unexpected finds e.g., organic contaminated material, are encountered on-site, the unexpected finds protocol would be implemented.
Combustion emissions	Regular vehicles and mobile plant and equipment maintenance to ensure efficient operation.
	Engine idling to be minimised when vehicle or mobile plant and equipment are not in use.
	Emissions from HDVs to be regulated in accordance with the requirements prescribed in the National Environment Protection (Diesel Vehicle Emissions) Measure 2001.
	Avoid overloading of vehicles.
	No visible smoke plumes to be generated.
ACM Management	In areas where the preliminary investigation (WSP 2021) indicated the presence of ACM in soil, excavated material would be spread out and sparrow picked to remove visibly bonded asbestos. All monitoring and reporting of ACM, and corrective actions if necessary, would be carried out in accordance with requirements outlined in an Asbestos Removal Control Plan for the site. Spoil would be analysed for asbestos. If present, it would be appropriately managed by certified asbestos personnel.
Landfill gas	Conduct extensive surface and subsurface landfill gas monitoring to investigate the extent, if any, of gas migration and confirm the risk classification for the Project site. Consider gas mitigation controls as listed in the WSP environmental due diligence report (WSP 2021).
Monitoring	Prepare and implement an ambient air monitoring program during construction works that includes, as a minimum, the measurement of dust, ACM and landfill gases.
	Record all dust, odour, and air quality complaints, identify cause(s), take appropriate measures to reduce emissions as soon as is practicable and record the measures taken.
	Carry out regular site inspections to monitor compliance with the AQMP, record inspection results, and make inspection log available to the regulatory authority when requested.

ITEM	MITIGATION MEASURES
Operation	
Dust	Restrict on-site vehicle speeds to minimise wheel generated dust on sealed roads.
	Ensure gas fired boilers are maintained regularly and conform to all regulatory requirements.
	Depending on the type and nature of the activity, all occupants must ensure air emissions are minimised and comply with relevant NSW legislation.

6 Conclusion

Dexus is proposing to construct a warehouse development located at 311 South Street, Marsden Park. This qualitative air quality impact assessment was prepared as part of an EIS for the Project in support of a State Significant Development Application (SSDA).

This technical report qualitatively assessed the potential air quality impacts for the construction and operation of the Project.

The main types of emissions likely to be generated during construction include dust, odour, and combustion emissions from the following sources:

- site establishment and demolition work (dust)
- excavations and earthworks (dust)
- construction of buildings (dust)
- vehicle movements on paved and unpaved roads/routes (dust)
- wind erosion from exposed areas and stockpiles in the construction compound (dust)
- fuel associated with on-site plant, equipment, vehicles, and diesel generators (combustion emissions)
- in the event the unexpected, contaminated material are found and during asphalt laying (odour)

A risk-based approach was used to assessing the risk of potential impacts dust impacts on the nearest sensitive receptors during construction. The outcomes of the risk assessment indicated that without mitigation the risk of potential dust impacts from demolition, earthworks, construction activities and track out were negligible to low. With the implementation of the management measures detailed in section 5, there would not be unacceptable air quality impacts from the Project.

Gaseous emissions generated from vehicles and plant and machinery would be minimised during construction with mitigation measures in place and would not be of significance.

In the event that contaminated material is encountered on-site, odour impacts are likely to be contained within the site. The unexpected finds protocol would also be implemented immediately to determine the type, extent, and management of contamination During asphalt laying odour emissions would occur. However, these would be confined local to the source, be intermittent and of short duration.

A preliminary site investigation conducted by WSP (WSP 2021) indicated the presence of ACM in the buildings to be demolished and, in surficial and subsurface soil. Sampling was undertaken for the presence of asbestos including two cement sheet samples. One solid sample was confirmed to contain asbestos and one cement sheet sample reporting ACM content. This indicated the variable yet confirmed presence of ACM at the Project site.

To ensure on-site and off-site impacts are minimised, all ACM would be removed off-site by certified and experienced asbestos personnel. Daily environmental and occupational monitoring would be undertaken for the duration of demolition and earthworks to make sure recorded levels are below relevant standards.

The preliminary investigation (WSP 2021) indicated very low levels of soil contamination, at concentrations that wouldn't be expected to present an impact to future commercial/industrial use. Subsurface screening for VOCs using a PID were recorded at background levels of 2 ppm. As such, potential impacts from contaminated soil are not expected to be of significance.

Landfill gas monitoring (WSP 2021) was also undertaken across the site. All gas concentrations (methane, hydrogen sulphide, oxygen, CO, and CO_2) recorded in the subsurface monitoring wells were below adopted screening levels except for CO_2 concentrations. Along the southern boundary of the Project site, CO_2 concentrations were recorded higher than 5%v/v. A preliminary landfill gas risk assessment was undertaken for the Project site and indicated a potentially very low

risk of landfill gas migration for most of the site shifting to a low risk limited to the Project site's southern boundary. Conservatively, a low risk of landfill gas migration was applied to the whole site. Further investigations are required to confirm the risk of landfill gas migration and the measures required, if any, for its control.

During operation of the Project site, the main emissions are likely to be from vehicular traffic and gas fired boilers. Air emissions are expected to be low with potential impacts minimal.

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