AUSTRAK COLD STORAGE

Air Quality Impact Assessment

Prepared for:

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Level 25, 35 Collins Street
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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 Austrak Management & Consulting 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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DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
610.30007-R01-v1.1	6 November 2020	Danroy Dsouza/Varun Marwaha	Kirsten Lawrence	Varun Marwaha
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1 Introduction

SLR Consulting Australia Pty Ltd (SLR) has been commissioned by Beca Pty Ltd (Beca) on behalf of Austrak Management and Consulting Pty Ltd (Austrak) to prepare an Air Quality Impact Assessment (AQIA) report for the proposed construction and operation of a large scale cold storage facility (the Project) to be located at 1 Magnum Place , Minto (the Development Site), within the Campbelltown Local Government Area (LGA).

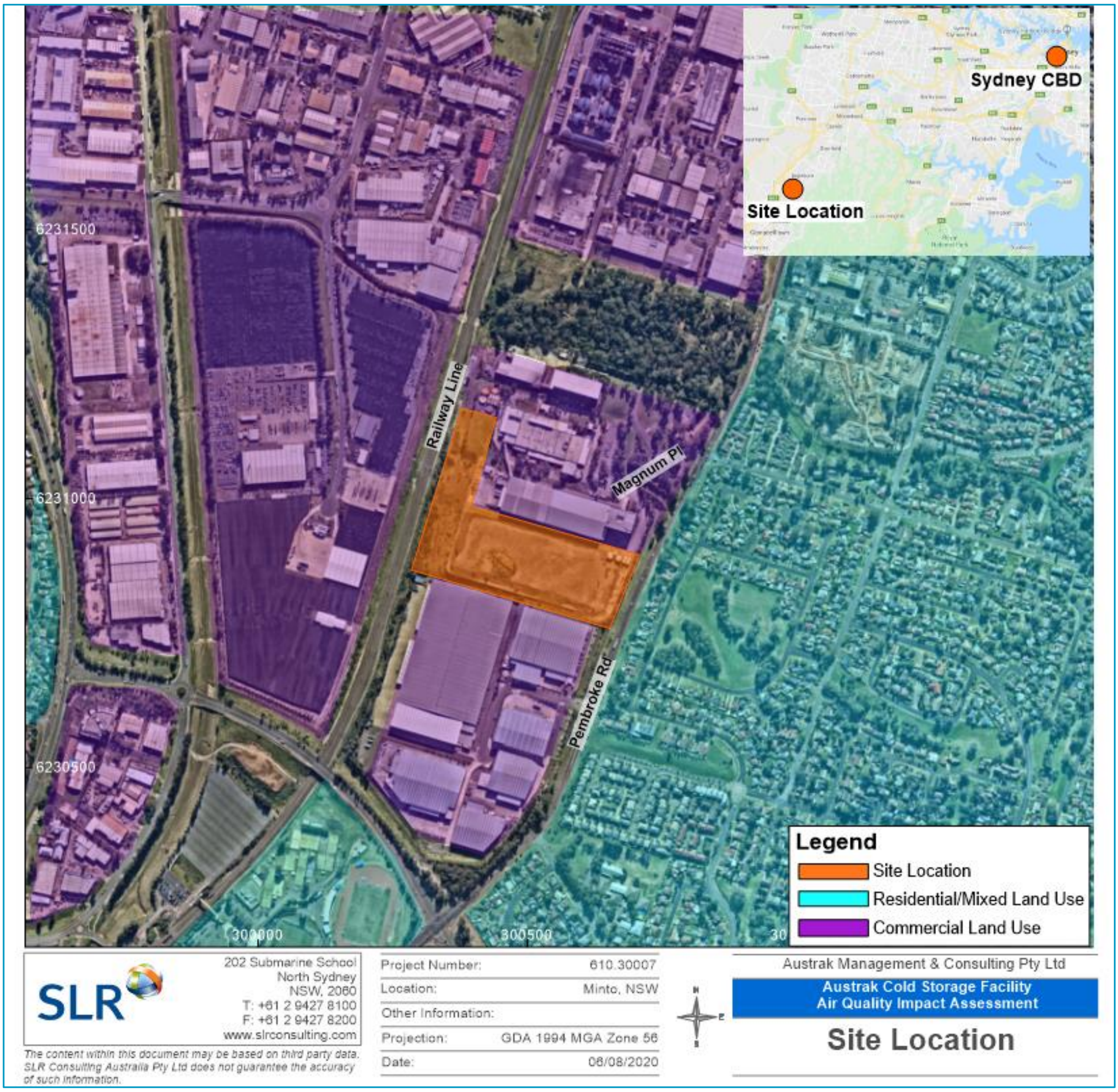
Construction and operations at the Development Site have been declared a State Significant Development and the NSW Department of Planning and Environment (DPIE) has requested an AQIA to be prepared for the Project. Austrak owns and operates an existing warehouse adjacent to the Development Site. Air quality impacts from this existing facility are not included as part of the scope of this report.

The aim of this AQIA is to assess the risks associated with the potential air quality impacts during construction and operation of the Project.

2 Project Overview

The Development Site is located at 1 Magnum Place, Minto within the Campbelltown LGA and is approximately 40 (kilometres) km southwest of Sydney CBD. The location of the Development Site in relation to the surrounding industrial and residential land uses is shown in **Figure 1**.

Figure 1 Satellite Image of the Development Site



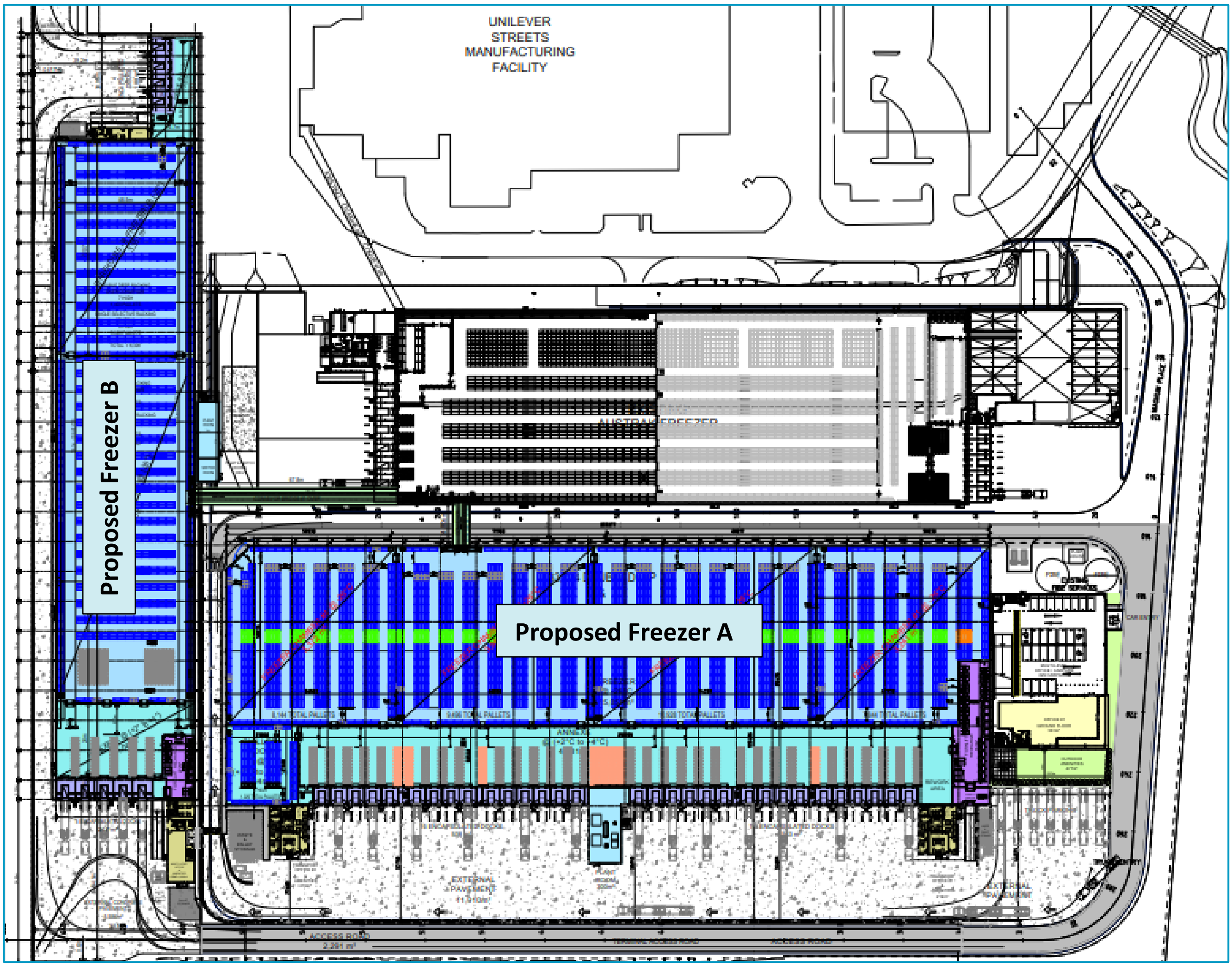
The Development Site is bounded by commercial land use areas to the north and south, with the nearest buildings approximately 20 meters (m) away. The adjacent area to the west of the Development Site has also been identified as commercial land, although amenities (such as office buildings or warehouses) where individuals are likely to experience air quality impacts from the Development Site, are located approximately 170 m and 240 m from the western boundary of the Development Site. The nearest residential sensitive receptors are located approximately 50 m to the east of the Development Site Boundary along Pembroke Road.

The Development Site is proposed to consist of the following facilities:

- Freezer A – Total building area is approximately 22,000 m^2. This includes a freezing facility, loading docks, chiller room, annex, plant rooms, office and a car park building.
- Freezer B – Total building area is approximately 12,000 m^2. This also includes a freezing facility, loading docks, annex, plant rooms, office and a car park.

The indicative layout of the Development Site is shown in **Figure 2**.

Figure 2 Indicative Site Layout of the Proposed Development



Source: Austrack Drawing number: 18-102-00-001, Rev. T, 18 September 2018.

2.1 Construction Activities

It is estimated that the new freezer facilities would take approximately 21 months to construct and then a further 3 months for the installation and commissioning of the equipment. The proposed working hours for the construction period are understood to be 6:00am to 8:00pm, Monday to Saturday.

During the construction phase, the Development Site is expected to be accessed via Magnum Place. The construction activities include staged construction of the proposed freezing facilities, multilevel carparks, office buildings, loading docks and associated supportive/facilitating works, including internal road works and landscaping. There will be minor earthworks (including footings and slab excavation) to take place on the upper level, and full earthworks and footings required for the lower level. As there are no existing structures on the site, no demolition activities will be required prior to construction.

2.2 Proposed Operational Activities

The Development Site is proposed to be utilised as a commercial freezing and storage facility and will operate on a 24/7 basis. Frozen food articles will be delivered via refrigerated trucks for storage and handling. From here, the delivered goods will be transferred on pallets using forklifts into the freezing facilities where they will be kept frozen, packaged and stored on pallets. Both freezing facilities are proposed to have four levels of storage. Freezer A is expected to have a total freezer and chiller racking storage of approximately 37,500 standard pallets, while Freezer B is expected to have storage room for approximately 15,500 standard pallets.

Ammonia refrigeration units are proposed to be used to be employed for freezing operations. The ammonia based refrigeration units work by circulating ammonia around the system to remove heat from an area, and then dissipate it in another area. Ammonia is very efficient at this process because of its low boiling point (-33°C).

The proposed operations will also involve outdoor storage of non-putrescible waste (cardboard, paper etc) and pallets, as well as outdoor truck parking, four storey carparks for staff and visitors, and office buildings with four levels for each freezer facility.

3 Potential Air Pollutant Sources and Types

3.1 Potential Sources of Air Quality Emissions During Construction

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 soils, fill and other dust-generating 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 6**.

3.2 Potential Sources of Emissions During Operations

Potential sources of air emissions associated with the Project operations have been identified as follows:

- Refrigerant leaks and spills could lead to fugitive emissions of ammonia from the standard ammonia refrigeration units.

- Fugitive air emissions, including odours, may occur in the event of spillage of food articles as a result of pallet/packaging breakage etc. In the event of a spillage, the spilt materials will be cleaned up immediately. Spill kits will be readily accessible to all employees at all times. This is in line with the proposed best management practices and consistent with industry standards. As all of the food products handled will be frozen, and all areas within the warehouses will be low temperatures (freezing temperatures), any food spillages are unlikely to cause nuisance odours, and therefore have not been considered any further in this assessment.
- Transport of raw materials/products to and from the site, trucks idling at the loading docks during loading/unloading activities, and staff commuting to and from the site will give rise to products of combustion. These emissions will be managed by logistics planning to minimise idling times, and installing signage to instruct drivers to turn off engines while loading/unloading etc. Compared to the existing emissions from road traffic on Pembroke Road, these emissions will be minimal and have therefore not been considered any further in this assessment.
- It is understood that the proposal does not include any emergency power supply onsite. Hence, no emissions pertaining to backup power generation have been considered in this assessment.

Based on the above, the main potential air emissions expected during the operations at the Development Site are the leakage of ammonia emissions from the refrigeration units.

4 Regulatory Requirements

4.1 Relevant Legislation, Policy and Guidance

The following air quality policy and guidance documents have been referenced within this assessment and have been used to identify the relevant air quality criteria (see **Section 4.2**).

4.1.1 Protection of the Environment Operations Act 1997 & Amendment Act 2011

The Protection of the Environment Operations (POEO) Act 1997 and Amendment Act 2011 are a key piece of environment protection legislation administered by the NSW Environment Protection Authority (EPA) which enables the Government to establish instruments for setting environmental standards, goals, protocols and guidelines.

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

- Section 117 of the POEO Act states that the wilful or negligent release of ozone depleting substances such as chlorofluorocarbons (CFCs) to the atmosphere carries the highest of all penalties under NSW environmental law.
- Section 124 and 125 of the POEO Act state that any plant located at a premise should be maintained in an efficient condition and operated in a proper and efficient manner to reduce the potential for air pollution.
- Section 126 of the POEO Act requires that materials are managed in a proper and efficient manner to prevent air pollution.
- Section 128 of the POEO Act states:
  - The occupier of a premises must not carry on any activity or operate any plant in or on the premises in such a manner to cause or permit the emission at any point specified in or determined in accordance with the regulation of air impurities in excess of [the standard of concentration and/or the rate] prescribed by the regulations in respect of any such activity or any such plant.
  - Where neither such a standard nor rate has been so prescribed, the occupier of any premises must carry on activity, or operate any plant, in or on the premises by such practicable means as may be necessary to prevent or minimise air pollution.
- Section 129 of the POEO Act states that odours generated by operational activities should not be detectable beyond the site boundary.
- Section 133 of the POEO Act states that the EPA may prohibit the burning of fires in the open or burning of waste in an incinerator. These activities are illegal in most local Council areas.

Changes under the POEO Amendment Act 2011 include that the owner of a premises, the employer or any person carrying on the activity which causes a pollution incident is to *immediately* notify the relevant authorities when material harm to the environment is caused or threatened.

4.1.2 Protection of the Environment Operations (Clean Air) Regulation 2010

The POEO (Clean Air) Regulation 2010 (the Regulation) is the core regulatory instrument for air quality issues in NSW. In relation to industry, the Regulation:

- sets maximum limits on emissions from activities and plant for a number of substances.
- deals with the transport and storage of volatile organic liquids.
- restricts the use of high sulphur liquid fuel.
- imposes operational requirements for certain afterburners, flares, vapour recovery units and other treatment plant.

Part 5 (Division 3) of the Regulation deals with the emissions of air impurities from activities and plant, and sets maximum limits on emissions for a number of substances (including solid particles and visible smoke). The standards of concentrations prescribed by Part 5, Division 3 do not apply to or in relation to any plant during start-up and shutdown periods, however are still subject to requirements of Section 128 (2) of the POEO Act in relation to the prevention and minimisation of air pollution.

The Regulation notes that the EPA may grant an exemption in relation to smoke emitted in the course of activities such as research to improve safety in relation to the flammability of materials and smoke reduction or testing undertaken to certify that manufactured or imported products comply with Australian Standards, International Standards or meet any legislative requirements place on them.

Part 6 of the Regulation outlines the control of VOCs and the requirement for any fuel burning equipment or industrial plant to be fitted with control equipment. Exemptions exist where approved by the EPA.

4.1.3 Building Code of Australia and Australian Standards

The Building Code of Australia (BCA) is produced and maintained by the Australian Building Codes Board (ABCB) on behalf of the Australian Government with the aim of achieving nationally consistent, minimum necessary standards of relevant health and safety, amenity and sustainability objectives efficiently. The BCA contains mandatory technical provisions for the design and construction of BCA class buildings. Volume 1, Section F4 and J5.5 of the BCA (2011) specifically addresses amenity and energy efficiency in relation to building ventilation and exhaust systems.

Australian Standard (AS) 1668.2-2002 "*The use of ventilation and air conditioning in building, Part 2: Ventilation design for indoor air contaminant control*" sets design requirements for mechanical ventilation systems. Mechanical ventilation is required in enclosures where specific health and ventilation amenity requirements cannot be met by natural means.

Section 5 of the AS states the following:

- 5.2.2 Exhaust locations: As far as practicable, exhaust-air intakes used for general exhaust-air collection shall be located on the opposite sides of the enclosure from the sources of make-up air, to ensure that the effluents are effectively removed from all parts of the enclosure.
- 5.3.2.1 General requirements: The effluent shall be collected as it is being produced, as close as practicable to the source of generation.
- 5.10.1 Air discharges: Where discharges are deemed to be objectionable (i.e. nuisance related), discharges shall:

- Be emitted vertically with discharge velocities not less than 5 m/s.
- Be situated at least 3 m above the roof at point of discharge.
- Treated to reduce the concentration of contaminants where required.
- Be emitted to the outside at velocities and in a direction that will ensure, to the extent practicable, a danger to health or a nuisance will not occur.
- Be situated a minimum separation distance of 6 m (where the airflow rate is ≥ 1,000 L/s) from any outdoor) air intake opening, natural ventilation device or opening, and boundary to an adjacent allotment, except that where the dimensions of the allotment make this impossible, then the greatest possible distance shall apply.

4.2 Relevant Air Quality Criteria

Ambient air quality criteria relevant to the key pollutants associated with the Project (as identified in **Section 3**) are discussed in the following sections.

The Approved Methods lists the statutory methods that are to be used to model and assess emissions of air pollutants from stationary sources in NSW. The criteria specified in the Approved Methods are the defining ambient air quality criteria for NSW and are considered to be appropriate for this Project.

4.2.1 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 term “particulate matter” refers to a category of airborne particles, typically less than 30 microns (µm) in diameter and ranging down to 0.1 µm and is termed total suspended particulate (TSP).

Emissions of particulate matter less than 10 µm and 2.5 µm in diameter (referred to as PM_{10} and $PM_{2.5}$ respectively) are considered important pollutants due to their ability to penetrate into the respiratory system Particulate emissions from the combustion of natural gas are predominantly in the $PM_{2.5}$ size fraction. In the case of the $PM_{2.5}$ category, recent health research has shown that this penetration can occur deep into the lungs. Potential adverse health impacts associated with exposure to $PM_{2.5}$ include increased mortality from cardiovascular and respiratory diseases, chronic obstructive pulmonary disease and heart disease, and reduced lung capacity in asthmatic children.

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 2017

4.2.2 Ammonia

Exposure to typical environmental concentrations of ammonia will not affect humans. Ammonia has been used for a long time in human and veterinary medicine and in smelling salts.

Exposure to high levels of ammonia can cause irritation and serious burns on the skin, and in the mouth, throat (laryngitis), lungs (pulmonary oedema) and eyes (conjunctivitis). Exposure at very high levels of ammonia can lead to death. Swallowing concentrated solutions of ammonia can cause burns in the mouth, throat and stomach. Splashing ammonia into the eyes can cause burns and blindness. Individuals that may be more sensitive to ammonia are those with reduced liver function, corneal disease, glaucoma or respiratory diseases (e.g. asthmatics).

In the environment, the fate of ammonia is widely documented. Ammonia is rapidly taken up by plants, bacteria and animals. It is recycled naturally, and nature has many ways of incorporating and transforming ammonia. It does not bioaccumulate in the food chain, but is a nutrient for plants and bacteria (NPI 2020).

The Approved Methods lists the criteria for individual toxic air pollutants including ammonia. The relevant criterion for ammonia is shown in **Table 2**.

Table 2 NSW EPA Criteria for Ammonia (Individual Toxic Air Pollutant)

Pollutant	Reason for Classification	Averaging Period	Design Criteria (mg/m^3)	Design Criteria (ppm)
Ammonia	Toxicity	1-hour	0.33	0.46

Source: The Approved Methods (EPA 2017)

For a Level 2 impact assessment such as this AQIA, the Approved Methods prescribe that the assessment criteria for individual toxic air pollutants must be applied as follows:

a. At and beyond the boundary of the facility;

b. The incremental impact (predicted impacts due to the pollutant source alone) for each pollutant must be reported in concentration units consistent with the criteria (mg/m^3 or ppm), for an averaging period of 1-hour and as the 99.9th percentile of dispersion model predictions.

4.3 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.

5 Existing Environment

5.1 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) affects the degree of mechanical turbulence, which also influences the rate of dispersion of air pollutants.

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 Campbelltown (AWS), located approximately 6.5 km southwest of the Development Site and the Holsworthy AWS located approximately 7 km to the southeast of the Development Site. Considering the proximity and relatively flat terrain between Development Site and Campbelltown AWS, it may be assumed that the wind conditions recorded at Campbelltown AWS are a reasonable representation of the wind conditions experienced at the Development Site.

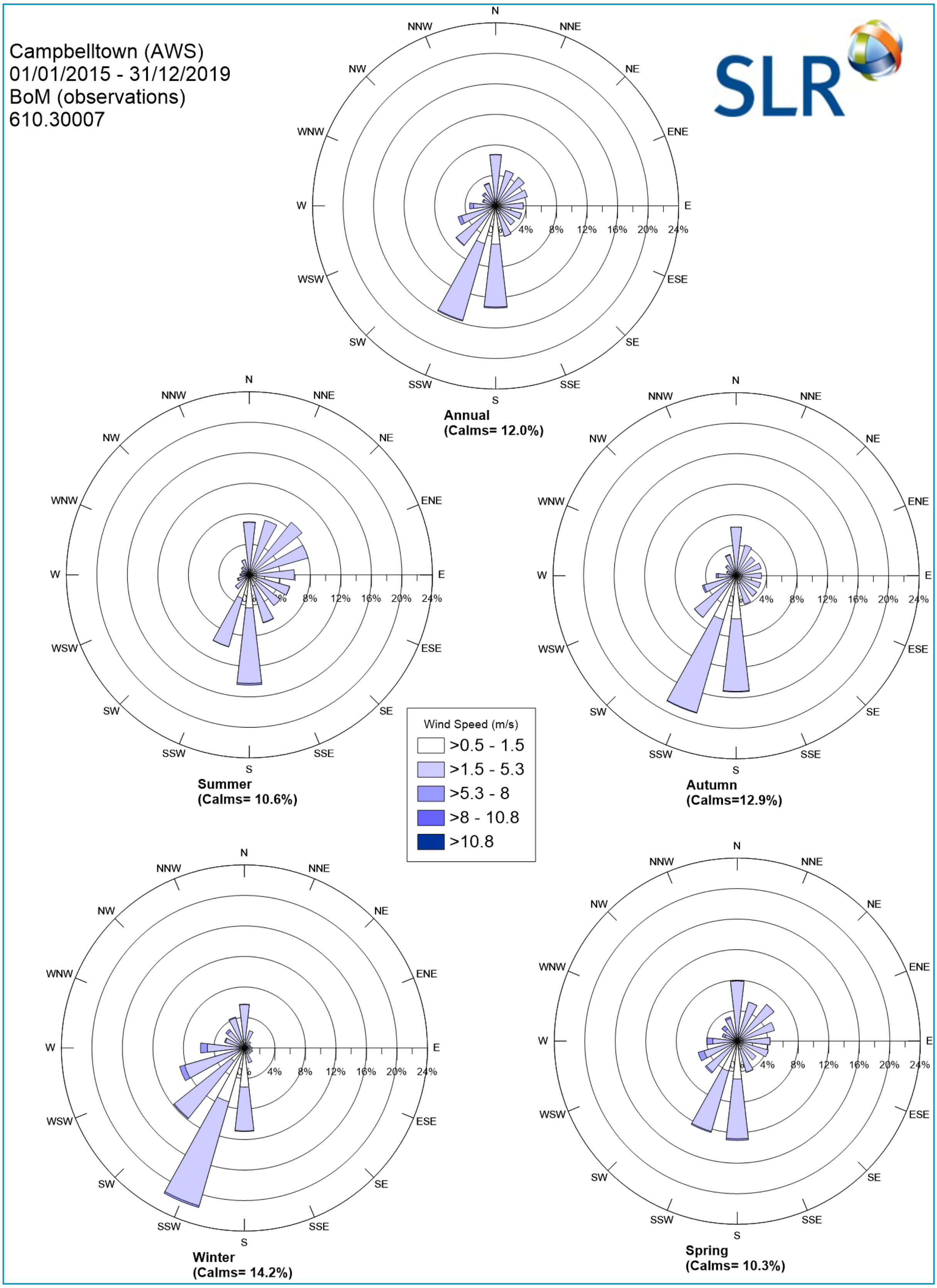
Annual and seasonal wind roses for the years 2015 to 2019 compiled from data recorded by the Campbelltown AWS are presented in **Figure 3**. The wind roses show the frequency of occurrence of winds by direction and strength. The bars correspond to the 16 compass points (degrees from north). The bar at 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) was used to describe the wind speeds experienced at the Development site, outlined in **Table 3**.

Table 3 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

Figure 3 Campbelltown AWS Annual and Seasonal Wind Roses (2015-2019)



The annual wind rose for the period 2015 to 2019 (**Figure 3**) indicates that predominant wind directions in the area are consistently from the south and south-southwest directions, with a very low frequency of winds from the northeast quadrant. The annual frequency of calm wind conditions was recorded to be 12% for the period 2015 and 2019.

Winds from the southwest to northwest, which would blow air emissions from the Development Site towards the nearest residential receptors, occur approximately 15% of the time. Winds that would blow emissions toward the commercial receptors located to the north, south and west of the Development Site blow approximately 47%, 19% and 14% of the time, respectively.

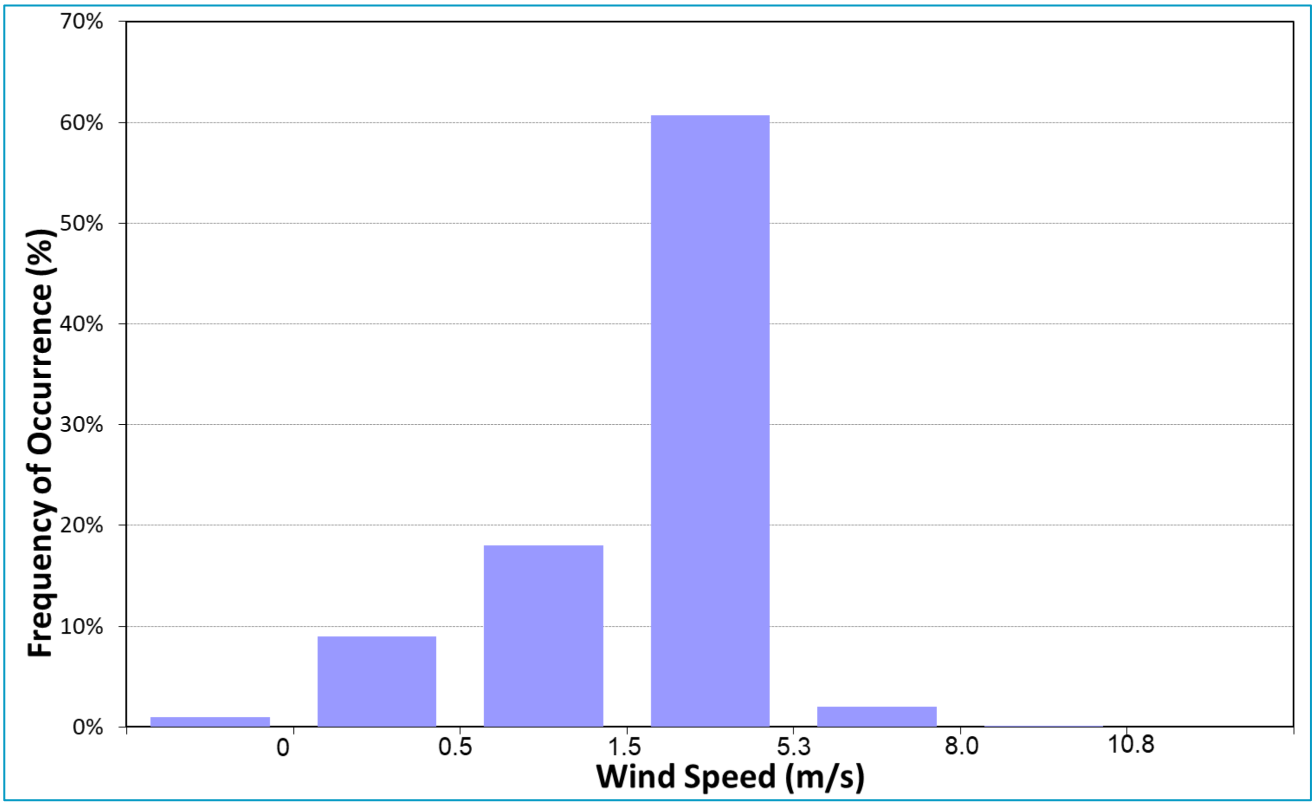
The seasonal wind roses for the years 2015 to 2019 (**Figure 3**) indicate that:

- In summer, the majority of winds ranged from 1.5 m/s to 5.3 m/s and blew from the south and south-southwest directions, with lower frequency of winds from the northeastern and southeastern quadrants. A very low frequency of winds blew from the northwestrn quadrant. Calm wind conditions were observed to occur less than 11% of the time during summer.
- In autumn, the majority of winds blew from the south-southwest and south directions and were mainly comprised of wind speeds ranging from 1.5 m/s to 5.3 m/s, with a very low frequency of winds blowing from the northeastern, southeastern and northwestern quadrants. Calm wind conditions were observed to occur approximately 13% of the time during autumn.
- In winter, mainly light wind speeds (1.5 m/s to 5.3 m/s) blew from the south-southwest direction with a lower frequency of winds from the south, southwest and west-southwest directions. Calm wind conditions were observed to occur approximately 14% of the time during winter.
- In spring, the majority of winds blew from the south and south-southwest directions, with a lower frequency of winds from the north. Wind speeds predominantly ranged from 1.5 m/s to 5.3 m/s. A very low frequency of winds were observed to be blowing from the southeast and northwest quadrants. Calm wind conditions were observed to occur approximately 10% of the time during spring.

Overall, the seasonal wind roses indicate that winds that would blow emissions from the Development Site towards the neighbouring sensitive receptors are more likely to occur during the winter, autumn and spring months and are less likely during the summer months.

The wind speed frequency chart for the period 2015-2019 is shown in **Figure 4**. Wind erosion of dust from exposed surfaces (ie, during the construction phase of the Project) is usually initiated when wind speeds exceed the threshold friction velocity for a given surface or material, however a general rule of thumb is that wind erosion can be expected to occur above 5 m/s (USEPA 2006). The frequency of wind speeds exceeding 5 m/s for the period 2015 to 2019, as recorded by the Campbelltown AWS, was relatively low at approximately 3%.

Figure 4 Wind Speed Frequency Chart for Campbelltown AWS – 2015-2019



5.2 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 Campbelltown West Air Quality Monitoring Station (AQMS), located approximately 4.8 km to the southwest of the Development Site. The following air pollutants are monitored at this station:

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

Air quality monitoring data recorded by the Campbelltown West AQMS were obtained for the calendar years 2015 - 2019 and are summarised in **Table 4**.

Table 4 Summary of Campbelltown West AQMS Data (2015 - 2019)

Pollutant	PM_{10} (µg/m³)		$PM_{2.5}$ (µg/m³)	
Averaging Period	**24-hour#**	**Annual**	**24-hour#**	**Annual**
2015	69.7 (1)	15.6	15.7*	7.9*
2016	50.1 (1)	16.1	35.8 (3)	7.9
2017	53.1 (1)	15.7	25.0	7.4
2018	72.3 (3)	17.9	45.4 (2)	8.4
2019	132.0 (25)	22.3	106.0 (27)	11.8
Criterion	**50**	**25**	**25**	**8**

#numbers in brackets represent number of exceedances of relevant criteria

*Based on data since 17 September 2015

Exceedances of the 24-hour average PM_{10} criterion were recorded by the Campbelltown West AQMS during all five years, while exceedances of the 24-hour average $PM_{2.5}$ criterion were recorded during 2016, 2018 and 2019. A review of the exceedances recorded during 2015 (OEH 2017), 2016 (OEH 2018), 2017 (OEH 2019a), 2018 (OEH 2020) and 2019 indicates that they were associated with natural events such as bushfires or dust storms, or hazard reduction burns.

No exceedances of the annual average PM_{10} criterion were recorded by the Campbelltown West AQMS over the five year period reviewed, however exceedances of the annual average $PM_{2.5}$ criterion were recorded for the years 2018 and 2019.

Based on their review of ambient monitoring data from their 43 station air quality monitoring network, NSW EPA (in their publication *NSW* Annual Air Quality Statement 2019 [OEH 2020]), concluded that the air quality index was in the 'very good', 'good' or 'fair' category for at least 79%-86% of the time in the Sydney region. Widespread smoke and dust storms significantly affected air quality levels throughout NSW, particularly during the bushfire emergency period from late October 2019. Sydney air quality was also affected by smoke from hazard reduction burns during the cooler months.

However, even though the air quality is generally good in Sydney, there is potential for fugitive dust emissions from the proposed construction activities to elevate local ambient particulate concentrations and contribute to exceedances of the 24-hour average criteria.

No other significant sources of ammonia have been identified in the area, hence the potential for cumulative impacts with any releases of ammonia from the Development Site is negligible.

Figure 5 24-hour PM_{10} Concentrations Recorded by Campbelltown West AQMS (2015-2019)

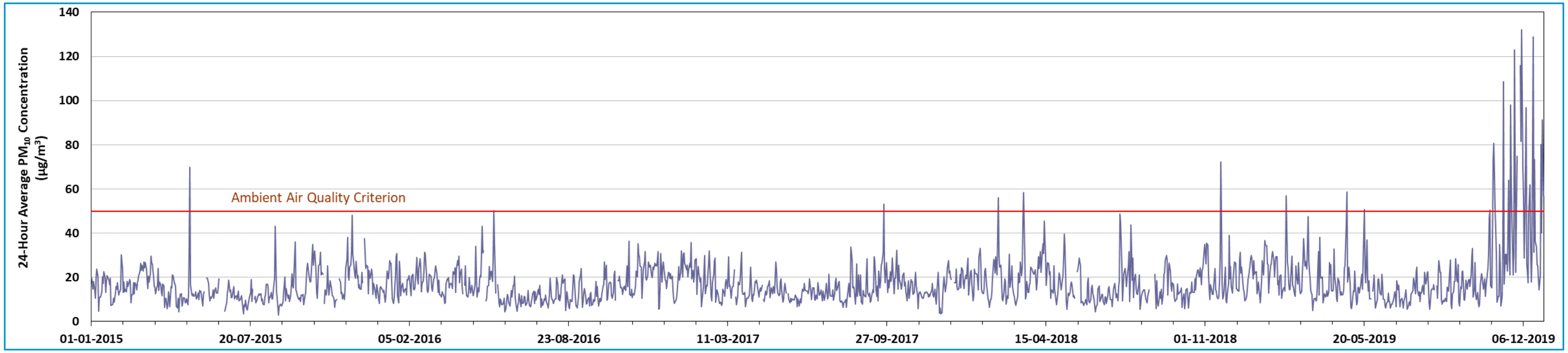
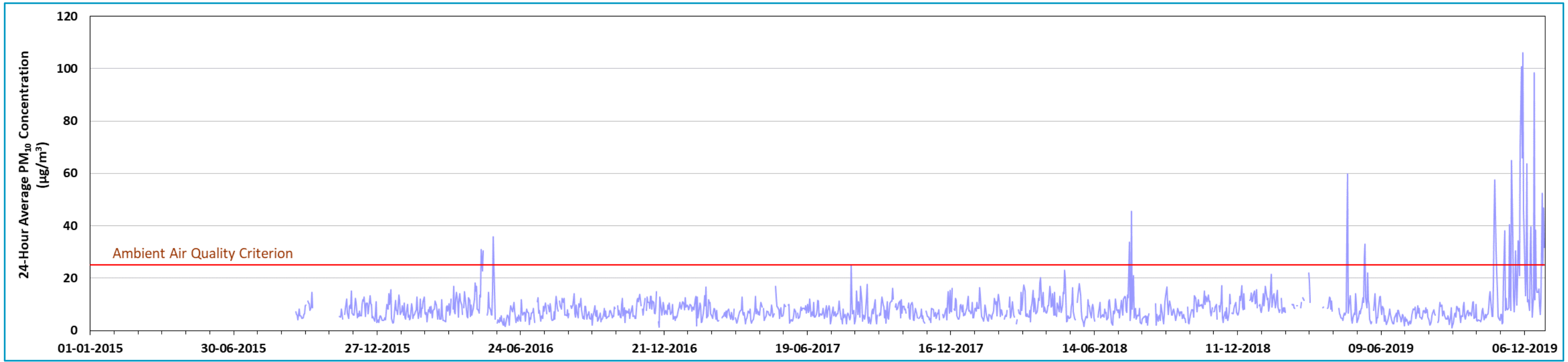


Figure 6 24-hour $PM_{2.5}$ Concentrations Recorded by Campbelltown West AQMS (2015-2019)



6 Assessment of Dust Emissions During Construction

6.1 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.

6.2 Construction Phase Dust Risk Assessment

6.2.1 Step 1 – Screening Based on Separation Distance

As noted in **Section 2**, the nearest residential receptors are located approximately 50 m from the Development Site, while the nearest commercial receptors are located approximately 20 m from the Development Site.

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

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

As a 'human receptors' are located approximately 20 m to 50 m of the boundary of the site, and approximately 50 m of the site entrance, further assessment is required.

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

Based upon 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 5**. 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 5 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:** *Total area of the Development Site is estimated to be approximately 34,000 m^2.*
Construction	Large	**IAQM Definition:** Total building volume greater than 100,000 m^3, piling, on site concrete batching; sandblasting. **Relevance to this Project:** *A multi-level building is proposed at the Development Site including separate four-level car park, the total building volume is estimated to be greater than 100,000 m^3.*
Trackout	Medium	**IAQM Definition:** 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. **Relevance to this Project:** *It is estimated that between 10 and 50 heavy vehicles movements per day will occur during the peak construction period.*

6.2.3 Step 2b – Risk Assessment

Receptor Sensitivity

Based on the criteria listed in **Table A1** in **Appendix A**, the sensitivity of the identified receptors in this study is concluded to be *high* for the residential receptors and *medium* for the commercial receptors for both dust soiling and health effects, as they include areas where people may be reasonably expected to be present continuously as part of the normal pattern of land use.

Sensitivity of an Area

Based on the classifications shown in **Table A2** and **Table A3** in **Appendix A**, the sensitivity of the area to both dust soiling and health effects may be classified as *medium* for the residential receptors and *low* for commercial receptors. This categorisation has been made taking into account the individual receptor sensitivities derived above, the 5-year mean background PM_{10} concentration of 17.5 µg/m^3 recorded by the Campbelltown West AQMS (see **Section 5.2**) and the existing number of residential receptors (10-100) located within 50 m and existing commercial receptors (10-100) located within 20 m from the Development Site boundary. Note - impacts on commercial receptors approximately 170 m and 240 m to the west of the Development Site have conservatively assumed to be the same as the commercial receptors to the north and south of the Development Site boundary.

Risk Assessment

Given the sensitivity of the general area is classified as *medium* for residential receptors and *low* for commercial receptors for both dust soiling and health effects, and the dust emission magnitudes for the various construction phase activities as shown in **Table 5**, the resulting risk of air quality impacts is as presented in **Table 6**.

Table 6 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	Medium	Large	Large	Medium	Medium Risk	Medium Risk	Low Risk
	Human Health	Medium				Medium Risk	Medium Risk	Low Risk
Commercial	Dust Soiling	Low	Large	Large	Medium	Low Risk	Low Risk	Low Risk
	Human Health	Low				Low Risk	Low Risk	Low Risk

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

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

As per the methodology, the highest risk is category is adopted, and mitigation measures recommended accordingly.

6.2.4 Step 3 - Mitigation Measures

Since the residential receptors have been concluded to have a higher risk of dust soiling as well as human health impacts, the mitigation measures shown in **Table 7** are based on *medium risk*.

Table 7 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 Methods 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 7 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 PM_{10} 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

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

H = Highly recommended; D = Desirable

6.2.5 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 8**.

Table 8 Residual Risk of Air Quality Impacts from Construction

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

The mitigated dust soiling and human health impacts are anticipated to be of *low risk* at the residential receptors for the earthworks and construction phase, with *negligible risk* for trackout. There is also a *negligible risk* of impacts at the commercial receptors for the earthworks, construction activities and trackout.

7 Operational Impacts

7.1 Ammonia Leakage from Refrigeration Units

Under normal operating conditions, the refrigeration units will operate as a closed system, with no releases to atmosphere. However, as discussed in **Section 3**, there is potential for accidental ammonia release from the Development Site due to an emergency event such as a pipeline rupture, over-pressure conditions, seal leaks, equipment corrosion, or hose failures during an ammonia delivery. Such incidents have potential for health impacts for on-site staff, as well as health and odour impacts for the surrounding community, as a result of exposure to ammonia gas. Accidental ammonia releases also have the potential to result in product loss due to ammonia contamination, interruption of refrigeration capacity, product loss due to refrigeration interruption, and potential for equipment and property damage resulting from the incident. Minimising the risk of accidental releases is therefore a critical design element for such systems.

At the time of writing this report, selection and detailed design of the specific ammonia-based refrigeration systems to be used has not been finalised. However, the refrigeration units will be fitted with fail-safe mechanisms in line with current good industry practice, to minimise the risk of accidental ammonia release. An appropriate preventative maintenance program should also be implemented, including periodically testing of all refrigeration-related safety cut-out switches to minimise the likelihood of such incidents. In addition, a site-specific emergency plan should be prepared for the Project based on Australian Standard *AS/NZS 2022 Anhydrous Ammonia – Storage and Handling (2003)*.

7.2 Mitigation Measures

Under normal operating conditions, no significant sources of air emissions have been identified for the Development Site. However, as outlined in **Section 7.1**, there is potential for an accidental release of ammonia from the refrigeration system to occur in the event of equipment failure or damage. These risks are most appropriately managed through the implementation of best practice in the equipment selection, design and installation of the system. An appropriate preventative maintenance program should also be implemented, and a site-specific emergency plan should be prepared.

While no significant air emission sources are identified for normal operating conditions, the POEO Act requires that any plant located at a premise should be maintained and operated in a proper and efficient manner to reduce the potential for air pollution, and that materials, processes and emissions control systems are managed in a proper and efficient manner to prevent air pollution. Recommended mitigation measures to reduce the potential for air quality impacts associated with the Development Site are outlined below.

Staff Awareness and Training

- Management should provide adequate training to staff and contractors on good housekeeping practices and efficient and appropriate use and maintenance of equipment used at the Project site. Staff should also be made aware of procedures relating to waste management and air quality control (including staff responsibilities associated with these procedures).
- Practical and easy-to-read signage should be provided in waste management areas. Signage could also be provided to emphasise useful information relating to air quality control procedures and general housekeeping requirements to act as a daily reminder to staff working at the premises. This includes signage to remind drivers to turn off engines while parked at the site during loading/unloading etc.

Maintenance of Vegetated Buffers

- Vegetated buffers can effectively act to increase mechanical turbulence and improve dispersion of pollutants, as well as acting as a physical barrier to the transport of airborne pollutants.
- Some plants can also be selected provide a natural scent to mask odours.

General

- Compliance with relevant Australian Standards and BCA requirements.
- Use of low-VOC paints and solvents for surface painting of buildings and other activities where feasible and practicable.
- Location of fixed plant (ie generators) as far from sensitive receptors (including ventilation system intakes) as practicable.
- Installation of appropriate mechanical air extraction systems for the facility and use of suitable exhausts/vents/stacks to ensure compliance with POEO Act limits and regulations.
- Fuel/oil/solvent/chemical storage areas appropriately bunded in compliance with BCA requirements and spill kits located proximal to storage areas and high use areas for immediate clean-up of spills and leaks.
- Regular inspection, maintenance and cleaning of equipment, extraction systems, ductwork, exhaust fans etc as required and in accordance with manufacturer's specifications.
- Appropriate operation of all equipment in accordance with manufacturer's specifications.
- Maintain a record of maintenance undertaken, inspection, repair and replacement of parts.
- Organise scheduled inspections and maintenance by appropriately qualified service engineers.
- Implementation of good housekeeping practices and standard operating procedures addressing clean up and appropriate disposal of waste materials.
- Maintenance of a complaints log including all relevant details of the complaint/complainant.
- Preparation of a concise Environmental Management Plan (EMP) outlining operating procedures, internal checking protocols, staff training requirements and awareness of air quality control measures and other environmental initiatives and commitments.

Complaints Handling

- A complaints handling system should be maintained to track complaints and to effectively manage any requests for information or respond to any public concerns in relation to the proposed development (construction and operational phases).
- All information relating to complaints should be kept in a complaints register. The complaints register should note the following details of a complaint relating to nuisance odour or dust:
  - Date and time that the complaint was made.
  - Name and contact details of the complainant.
  - Location where the nuisance odour/dust was noted.
  - Weather conditions experienced on the day (e.g. temperature, humidity, wind characteristics, clear or rainy).

- The perceived frequency and duration of the conditions giving rise to the complaint.
- The perceived (or assumed) cause of the condition giving rise to the complaint.
- A description of the conditions and the effect upon the complainant.
- Project-related activities undertaken at the time of the complaint.
- Actions taken where site activities are determined to be the cause of the complaint.
- Sign-off by a responsible person.
- Follow-up with the complainant.

- Where a complaint is made, investigation into the source of the complaint should be made and remedial control measures undertaken to reduce emissions to a level that does not cause a continuation of unacceptable nuisance.

8 Conclusions

SLR Consulting Australia Pty Ltd (SLR) has been commissioned by Beca Pty Ltd (Beca) on behalf of Austrak to prepare an Air Quality Impact Assessment (AQIA) report for the proposed construction and operation of a large scale cold storage facility to be located at the Development Site, within the Campbelltown LGA.

The aim of this AQIA is to assess the risks associated with the potential air quality impacts during construction and operation of the Development Site.

During the construction phase, 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 *low* at the nearest residential receptors for the earthworks, construction phase with a *negligible risk* of impacts from trackout. A *negligible risk* of impacts is also anticipated at the commercial receptors from the construction activities and trackout.

During the operational phase, no significant sources of air emissions have been identified for normal operating conditions. However, there is potential for an accidental release of ammonia from the refrigeration system to occur in the event of equipment failure or damage. These risks are most appropriately managed through the implementation of best practice in the equipment selection, design and installation of the system. An appropriate preventative maintenance program should also be implemented, and a site-specific emergency plan should be prepared.

Based on the above, and taking into consideration the recommended mitigation measures outlined in this report, air quality issues are not considered to represent a constraint for the proposed development.

9 References

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APPENDIX A

CONSTRUCTION RISK ASSESSMENT METHODOLOGY

Step 1 – Screening Based on Separation Distance

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

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

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

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

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

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

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

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

- ***Large***: Total building volume greater than 100,000 m^3, piling, on site concrete batching; sandblasting.

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

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

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

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

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

Step 2b – Risk Assessment

Assessment of the Sensitivity of the Area

Step 2b of the assessment process requires the sensitivity of the area to be defined. The sensitivity of the area takes into account:

- The specific sensitivities that identified sensitive receptors have to dust deposition and human health impacts;
- The proximity and number of those receptors;
- In the case of PM_{10}, the local background concentration; and
- Other site-specific factors, such as whether there are natural shelters such as trees to reduce the risk of wind-blown dust.

Individual receptors are classified as having *high*, *medium* or *low* sensitivity to dust deposition and human health impacts (ecological receptors are not addressed using this approach). The IAQM method provides guidance on the sensitivity of different receptor types to dust soiling and health effects as summarised in **Table A1**. It is noted that user expectations of amenity levels (dust soiling) is dependent on existing deposition levels.

Table A1 IAQM Guidance for Categorising Receptor Sensitivity

Value	High Sensitivity Receptor	Medium Sensitivity Receptor	Low Sensitivity Receptor
Dust soiling	Users can reasonably expect a high level of amenity; or The appearance, aesthetics or value of their property would be diminished by soiling, and the people or property would reasonably be expected to be present continuously, or at least regularly for extended periods as part of the normal pattern of use of the land.	Users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home; or The appearance, aesthetics or value of their property could be diminished by soiling; or The people or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land.	The enjoyment of amenity would not reasonably be expected; or Property would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling; or There is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land.
	Examples: Dwellings, museums, medium and long term car parks and car showrooms.	*Examples: Parks and places of work.*	*Examples: Playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short term car parks and roads.*
Health effects	Locations where the public are exposed over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day).	Locations where the people exposed are workers, and exposure is over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day).	Locations where human exposure is transient.
	Examples: Residential properties, hospitals, schools and residential care homes.	*Examples: Office and shop workers, but will generally not include workers occupationally exposed to PM10.*	*Examples: Public footpaths, playing fields, parks and shopping street.*

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

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

- any known specific receptor sensitivities which go beyond the classifications given in the IAQM document.

The IAQM guidance for assessing the sensitivity of an area to dust soiling is shown in **Table A2**. The sensitivity of the area should be derived for each of activity relevant to the project (ie construction and earthworks).

Table A2 IAQM Guidance for Categorising the Sensitivity of an Area to Dust Soiling Effects

Receptor Sensitivity	Number of receptors	Distance from the source (m)			
		<20	<50	<100	<350
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

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

A modified version of the IAQM guidance for assessing the *sensitivity of an area* to health impacts is shown in **Table A3**. For high sensitivity receptors, the IAQM methods takes the existing background concentrations of PM_{10} (as an annual average) experienced in the area of interest into account and is based on the air quality objectives for PM_{10} in the UK. As these objectives differ from the ambient air quality criteria adopted for use in this assessment (ie an annual average of 19.8 µg/m^3 for PM_{10}) the IAQM method has been modified slightly.

This approach is consistent with the IAQM guidance, which notes that in using the tables to define the *sensitivity of an area*, professional judgement may be used to determine alternative sensitivity categories, taking into account the following factors:

- any history of dust generating activities in the area;
- the likelihood of concurrent dust generating activity on nearby sites;
- any pre-existing screening between the source and the receptors;
- any conclusions drawn from analysing local meteorological data which accurately represent the area, and if relevant the season during which the works will take place;
- any conclusions drawn from local topography;
- duration of the potential impact; and
- any known specific receptor sensitivities which go beyond the classifications given in this document.

Table A3 IAQM Guidance for Categorising the Sensitivity of an Area to Dust Health Effects

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