RAPT CONSULTING

Air Assessment – 27 Steam Street Maitland, NSW

Prepared for

Brown Commercial Building

April 2025

Relationships Attention Professional Trust

Document Details

Air Assessment 27 Steam Street Maitland, NSW

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1. Introduction

Background

RAPT Consulting has been engaged to undertake a qualitative screening level air assessment for Brown Commercial Building to inform a Development Application (DA) for a proposed childcare centre at 27 Steam Street Maitland, NSW.

The site and surrounding area is shown in Figure 1-1.

Figure 1-1 Site and Surrounding Area

The site plan is shown in Figure 1-2.

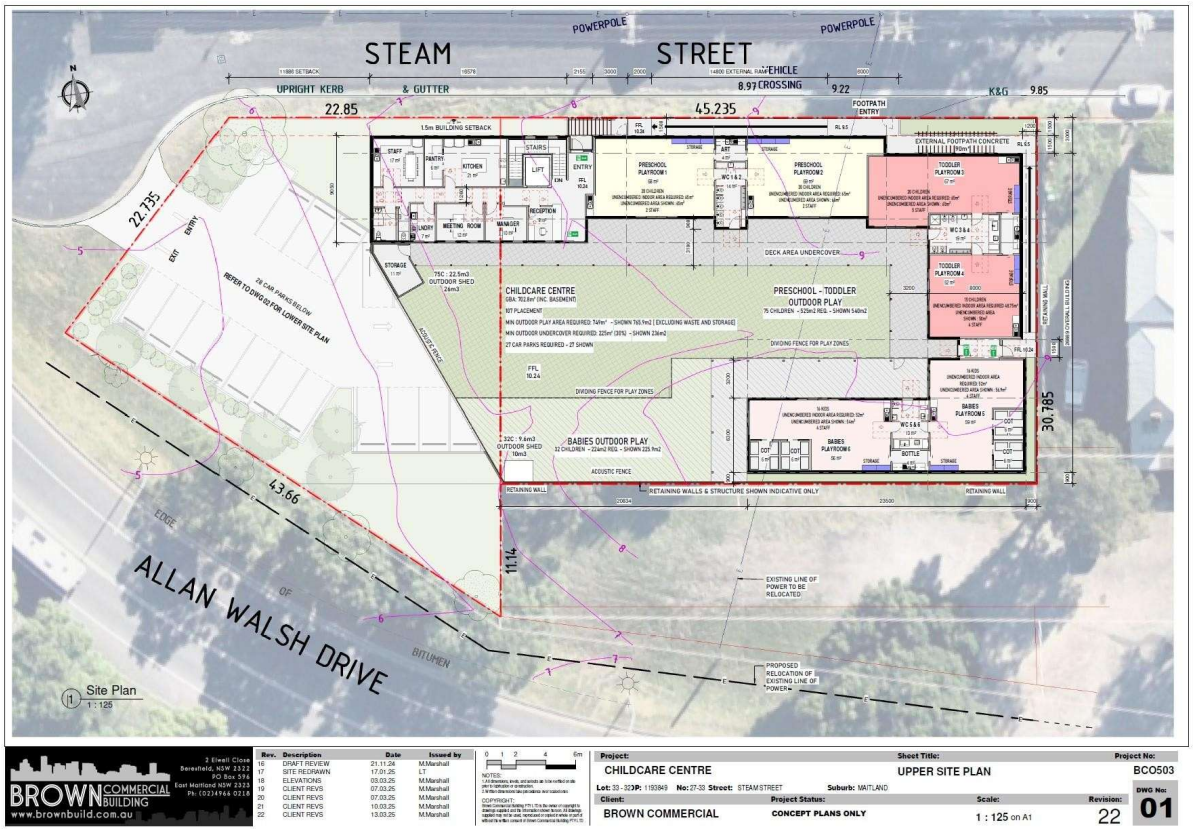


Figure 1-2 Site Plan (Source: Brown Commercial Building)

1.1 Limitations

The purpose of this report is to provide an independent air assessment for the proposal.

It is not the intention of the assessment to cover every element of the ambient environment, but rather to conduct the assessment with consideration to the prescribed work scope.

The findings of the air assessment represent the findings apparent at the date and time of the assessment undertaken. It is the nature of environmental assessments that all variations in environmental conditions cannot be assessed and all uncertainty concerning the conditions of the ambient environment cannot be eliminated. Professional judgement must be exercised in the investigation and interpretation of observations.

In conducting this assessment and preparing the report, current guidelines for air were referred to. This work has been conducted in good faith with RAPT Consulting's understanding of the client's brief and the generally accepted consulting practice.

No other warranty, expressed or implied, is made as to the information and professional advice included in this report. It is not intended for other parties or other uses.

2. Air Assessment Criteria

2.1 Air Quality Criteria

Table 2-1 summarises the NSW EPA's environmental impact assessment criteria for the pollutants included in this assessment.

Table 2-1 NSW EPA Air Quality Criteria (EPA 2022)

Pollutant	Averaging Period	Criteria
Particulate Matter (PM_{10})	Maximum 24-hour average	50 ug/m3
	Annual Average	25 ug/m3
Particulate Matter ($PM_{2.5}$)	Maximum 24-hour	25 ug/m3
	Annual Average	8 ug/m3
Carbon Monoxide (CO)	Maximum 1-hour average	30 mg/m3
	Maximum 8-hour average	10 mg/m3
Sulphur Dioxide (SO_2)	Maximum 1-hour average	215 ug/m3
	Maximum 24-hour average	57 ug/m3
Nitrogen Dioxide (NO_2)	Maximum 1-hour average	164 ug/m3
	Annual Average	31 ug/m3
Ozone	Maximum 8-hour average	139 ug/m3

2.2 Potential Environmental and Health Issues

Particulate Matter (PM10 and PM2.5)

The relationship between particle mass (as PM10 and PM2.5) and health outcomes such as decreased lung function, increased respiratory symptoms, increased chronic obstructive pulmonary disease, increased cardiovascular and cardiopulmonary disease, and increased mortality is well established. However, health effects are difficult to quantify given the wide range of metrics associated with particulate matter. Particles can span 4 orders of magnitude in size between 1 nm to 10s of mm. Particles can be present in vast numbers; surface areas; be different shapes (such as spherical, angular); be wholly liquid based or feature some crystalline elements; and span a wide range of chemical complexity, according to source regions and transport.

Amenity impacts from dust are usually associated with coarse particles and particles larger than PM10. The impact of dust from a nearby industry on local amenity depends on the distance from the site and climatic conditions such as wind speed and direction. Concern about amenity from dust often relate to “visibility” of dust plumes and dust sources. Visible dust is usually due to short-term episodes of high emissions or dry and windy atmospheric conditions.

Particulate matter also can cause significant environmental problems including reduced visibility and the pollution of air and water. This pollution can result in the acidification of nearby water bodies; changes in nutrient concentrations in coastal waters and large river basins; the depletion of nutrients in soil and can affect the diversity of ecosystems.

Particle pollution can also cause aesthetic damage, staining and damaging stone and other building materials, spoiling property and other belongings.

Dust can become airborne during construction, demolition or when soil and building materials such as aggregates are exposed or left uncovered. Wind then picks up dust particles and carries it off-site. Depending on the size these dust particles can be transported over great distances.

Carbon Monoxide

Carbon monoxide can enter the body by inhalation and be rapidly absorbed by the bloodstream from the lungs. Typical levels in urban and rural settings are unlikely to cause adverse effects, however exposure to extremely high levels of CO can have many adverse consequences including death. Environmental Impacts through atmospheric chemical reactions, can affect the amount of other greenhouse gases, which are linked to climate change.

Sulphur Dioxide

SO2 is a common pollutant to which we are exposed at very low levels regularly by breathing air in cities and some industrial environments. When exposed to elevated levels health effects can include headache, general discomfort and anxiety. Sulphur dioxide in the atmosphere is absorbed by soils and plants. It is also captured within and below clouds and in certain circumstances may raise the acidity of rain.

Nitrogen Dioxide

People living in areas of high motor vehicle usage may be exposed to higher levels of nitrogen oxides. Acute exposure to low levels of NO2 can irritate eyes, nose, throat and lungs, possibly leading to coughing, shortness of breath, tiredness and nausea. Excessive levels can increase the acidity of rain and consequently lower the pH of surface and ground waters and soil.

Ozone

Ground level ozone is the main component of smog and is the product of the interaction between sunlight and emissions from sources such as motor vehicles and industry. Ground level ozone is more readily formed during the summer months and reaches its highest concentrations in the afternoon or early evening. Potential health effects from exposure to ozone include irritation and inflammation of eyes, nose, throat and lower airways: coughing, sore and scratchy throat or uncomfortable feeling in chest.

3. Existing Environment

3.1 Meteorology

The ambient air environment surrounding the project site is complex and influenced by a variety of traffic and commercial uses. Meteorology in the area is influenced by several factors such as terrain and land use. Wind speed and direction are largely affected by topography at the local scale, while factors such as synoptic scale winds affect wind speed and direction on the larger scale. Wind speed and direction are important variables in assessing potential air quality impacts, as they determine the direction and distance air pollutants travel.

The closest long-term meteorological data particularly for wind roses for the surrounding area is available from the Bureau of Meteorology (BoM) operated Automatic Weather Station (AWS) at Maitland Site No. 061388.

Windrose plots showing the distribution of wind speed and direction at the Maitland BoM AWS are shown in Figures 3-1 through 3-2. As can be seen from the wind roses, windspeeds and directions fluctuate however generally have a westerly, south and north westerly pattern in the AM and easterly and south / south-easterly winds tend to prevail in the PM.

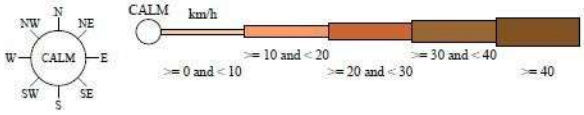
Rose of Wind direction versus Wind speed in km/h (17 Jun 1997 to 09 Feb 2016)

Custom times selected, refer to attached note for details

MAITLAND VISITORS CENTRE

Site No: 061388 • Opened Jun 1997 • Closed Jul 2016 • Latitude: -32.7422° • Longitude: 151.5668° • Elevation 5m

An asterisk (*) indicates that calm is less than 0.5%.
Other important info about this analysis is available in the accompanying notes.



9 am
6613 Total Observations

Calm 27%

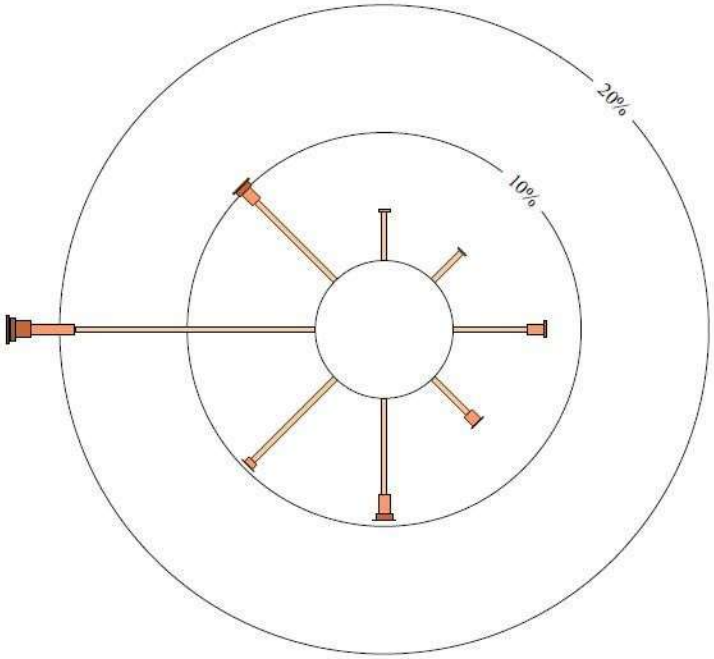


Figure 3-1 Maitland 9:00am Annual Windrose

Rose of Wind direction versus Wind speed in km/h (17 Jun 1997 to 09 Feb 2016)

Custom times selected, refer to attached note for details

MAITLAND VISITORS CENTRE

Site No: 061388 • Opened Jun 1997 • Closed Jul 2016 • Latitude: -32.7422° • Longitude: 151.5668° • Elevation 5m

An asterisk (*) indicates that calm is less than 0.5%.
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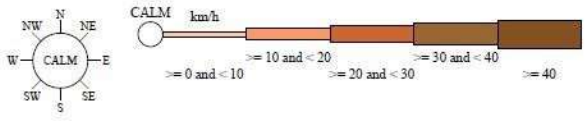

3 pm
6428 Total Observations

Calm 12%

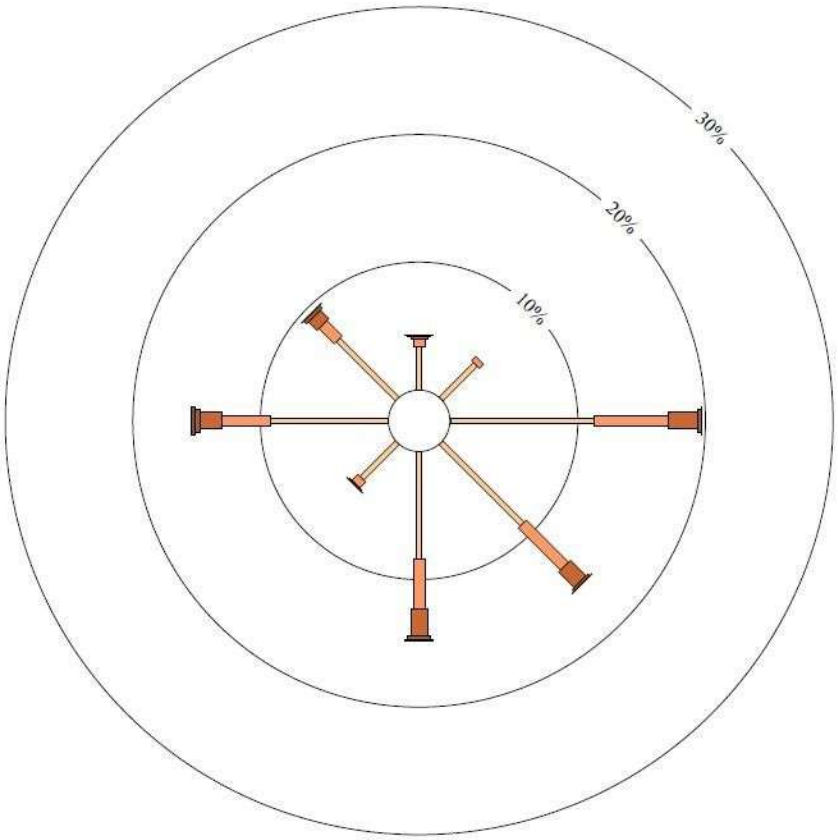

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Figure 3-2 Maitland 3pm Annual Windrose

3.2 Existing Air Quality

The Department of Planning Industry and Environment (DPIE) maintains an air quality monitoring network across NSW. Air quality data from 2020 through 2024 has been sourced from their Singleton and Beresfield station and annual exceedance in air quality objectives are provided in Figure 3-3 and Figure 3-4.

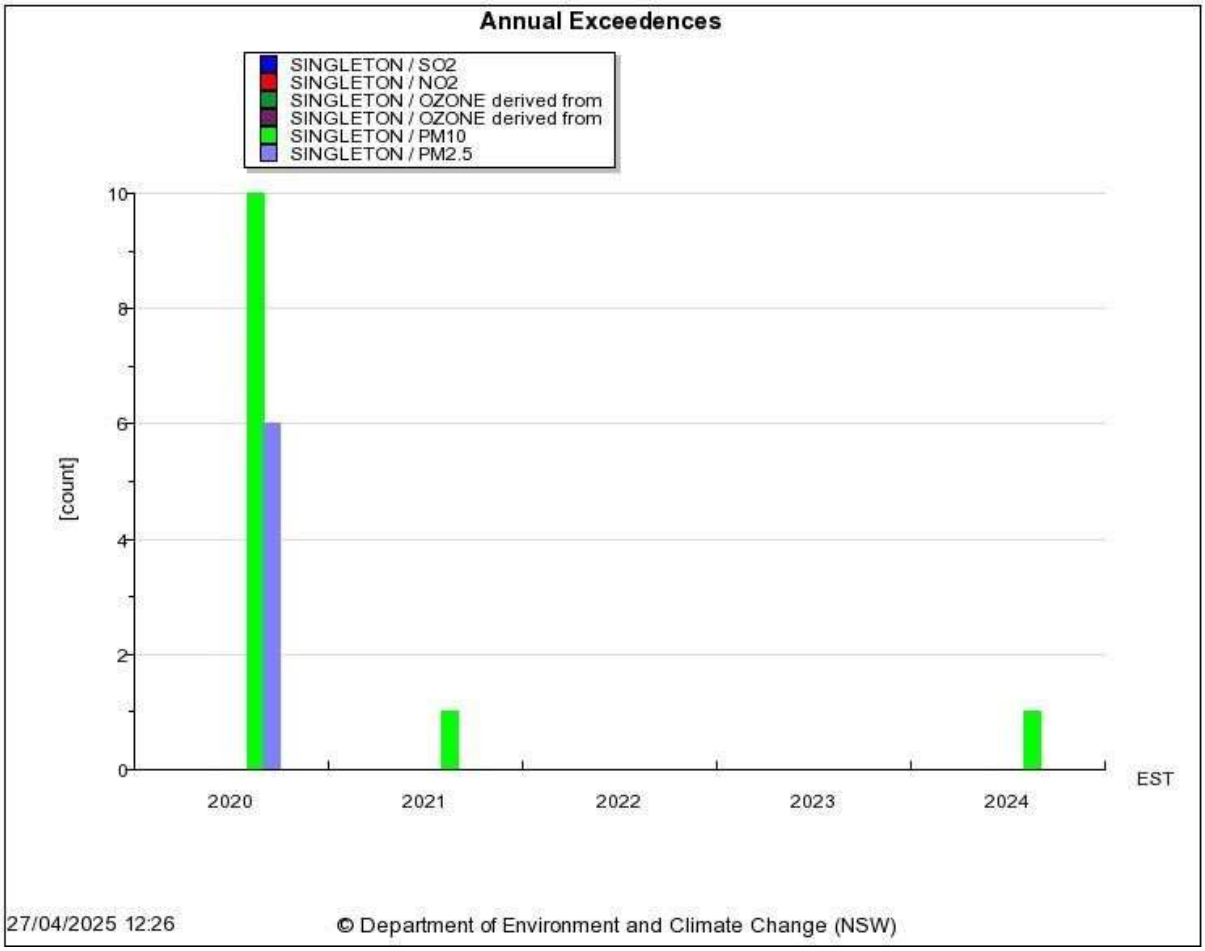

Figure 3-3 Singleton Annual Exceedances

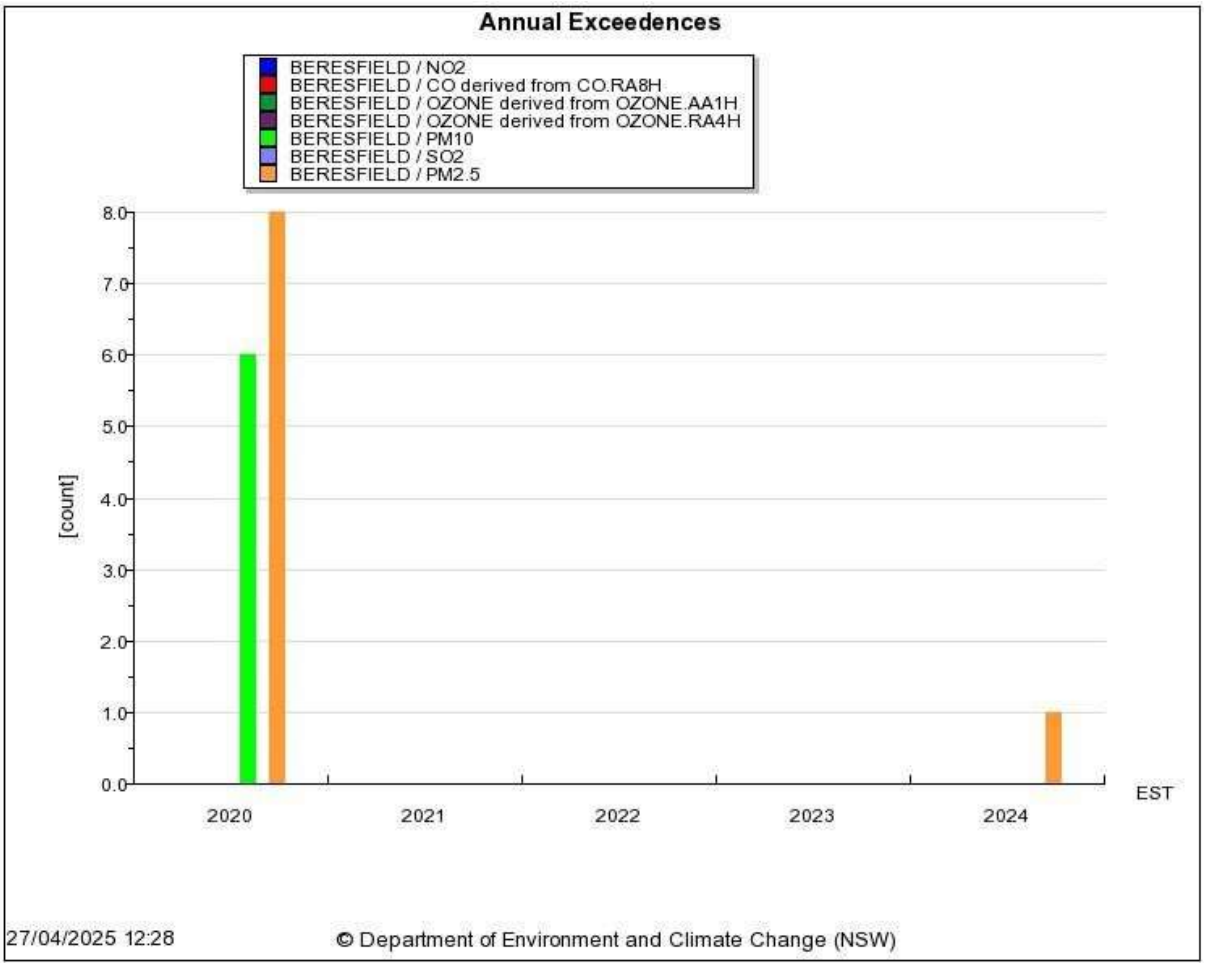

Figure 3-4 Beresfield Annual Exceedances

At the beginning of 2020, there were extensive bush fires throughout Australia particularly in NSW which can be attributed to the limited annual 2020 exceedances of PM10 and PM 2.5 at both the Singleton and Beresfield locations. All other criteria were complied with at both locations with the exception of one PM10 exceedance in 2021 and 2024 at Singleton and one PM2.5 exceedance in 2024 at Beresfield.

4. Assessment of Potential Impacts

Vehicle or rail exhaust emissions can have a significant influence on local air quality in urban and suburban areas. Localised effects can be caused as a direct result of the compounds emitted from vehicle exhausts. Secondary pollutants (eg ozone and photochemical smog) caused by a chemical reaction of the emitted pollutants can also occur where weather conditions are conducive and are of significance in terms of impacts over a wider regional area.

Motor vehicles emit a variety of air pollutants that are known to be associated with adverse health impacts. Common air pollutants emitted by motor vehicles include fine particles, nitrogen oxides, volatile organic compounds such as benzene, toluene, ethylbenzene and xylene (BTEX).

The site is situated in a largely residential with some commercial operators.

Maitland rail station lies approximately 80 metres to the south of the southern portion of the proposed playground.

The Department of Planning Guideline “Development near Rail Corridors and Busy Roads – Interim Guideline” (Guideline) Section 4 of the guideline provides guidance regarding air quality near busy roads.

Figure 4.4 from the guide pertaining to percentages of pollutant concentrations relative to kerbside concentration is reproduced as Figure 4-1.

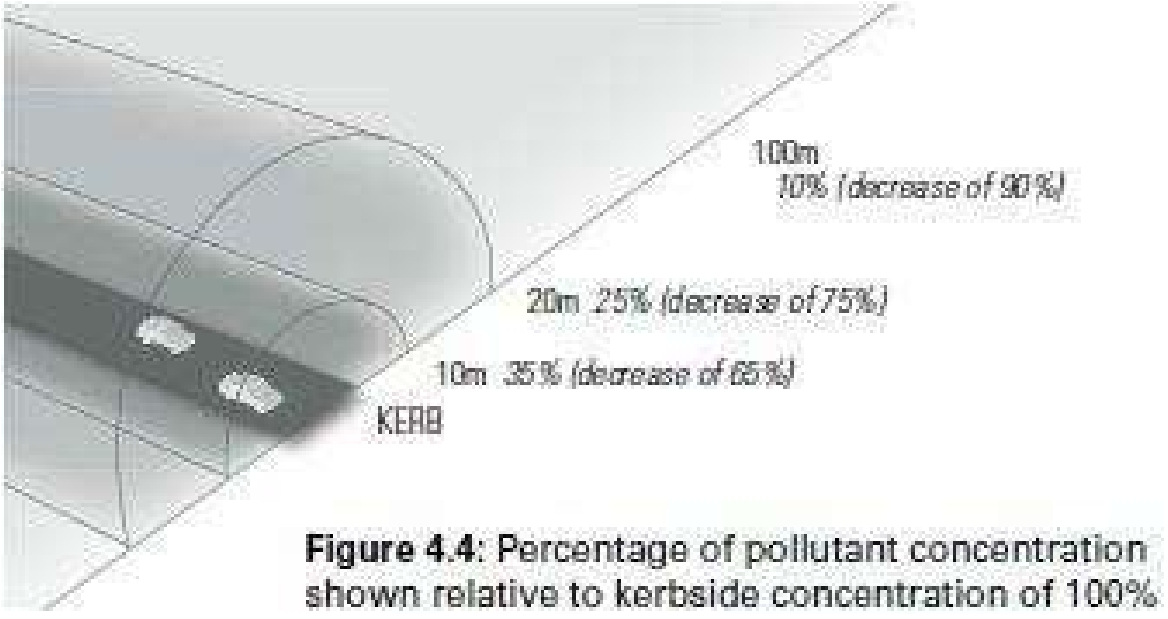

Figure 4-1 Percentage of pollutant concentration shown relative to kerbside concentration of 100%

Therefore, based on Figure 4.4 from the Guide, a decrease of more than 75% pollutants could be expected as the distance from the site is more than 80 metres from Maitland Station. Steam Street and Allan Walsh Drive are local roads and not considered a potentially

significant pollutant source. As distance increases a corresponding decrease of pollutants is expected which would also be the case.

The guide also provides guidance for when air quality should be a design consideration. These considerations include:

- Within 10 metres of a congested collector road (traffic speeds of less than 40 km/hr at peak hour) or a road grade > 4% or heavy vehicle percentage flows > 5%
- Within 20 metres of a freeway or main road (with more than 2500 vehicles per hour, moderate congestions levels of less than 5% idle time and average speeds of greater than 40 km/hr)
- Within 60 metres of an area significantly impacted by existing sources of air pollution (road tunnel portals, major intersection / roundabouts, overpasses or adjacent major industrial sources), or
- As considered necessary by the approval authority based on consideration of site constraints, and associated air quality issues.

With consideration to the proposed childcare centre, none of the abovementioned considerations apply.

Aerial and recent site observations noted there were not 'heavy' industrial activities in the immediate vicinity of the proposal. Rather light industrial activities and / or commercial activities. Additionally, a review of the wind rose data shows prevailing winds will tend to carry these potential sources away from the proposal and would be well dispersed further reducing risk to the site.

Based on the review of existing air quality in the area, the prevailing meteorological conditions for the area and guidance from the Guide, the proposal presents a low risk with consideration to air quality and should be acceptable from an air quality perspective.

Mitigation Measures

While the results of the assessment indicate the site is low risk from an air quality perspective, to minimise and or mitigate potential air pollution issues it is recommended the site consider:

- The use of planted vegetation along the boundaries of the Proposal site where possible is recommended to provide further opportunity to minimise the effect of air pollution
- For all indoor areas, mechanical ventilation should be used. Central HVAC units that serve multiple classrooms are typically more effective than single-room unit systems. In rooms where sufficient mechanical ventilation can be ensured, the building envelope should be sealed to prevent infiltration of external air through cracks around windows, doors, and HVAC ducts. The HVAC system should be operated with appropriate filtration to reduce particulate ingress into the classrooms. The filters should be inspected and replaced regularly according to manufacturer's recommendations.

5. Conclusion

RAPT Consulting has undertaken a qualitative air quality impact assessment to inform a Development Application (DA) for a proposed childcare centre at 27 Steam Street Maitland, NSW.

A review of existing local air quality, meteorological conditions, traffic information and a comparison to current relevant guidelines has been undertaken. Based on the review, the proposal should be acceptable from an air quality perspective. The report concludes that air quality parameters for the general area are satisfactory, as far as can be determined by accessing public information and according to existing limits as published by the Office of Environment and Heritage (OEH) and under the National Environmental Protection Measure.