Ferndell Street, South Granville Childcare Centre

Air Quality Assessment

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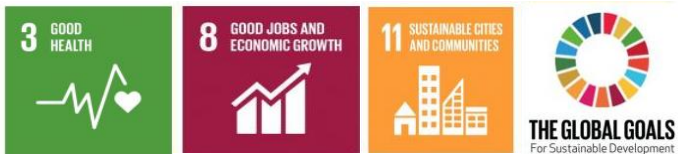

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Acronyms and Abbreviations

Name	Description
Council	Cumberland City Council
DPIE	Department of Planning, Industry and Environment
EPA	(NSW) Environment Protection Authority
NO_2	Nitrogen dioxide
PM	(airborne) particulate matter
PM_{10}	airborne particulate matter with an aerodynamic diameter of less than 10 µm
$PM_{2.5}$	airborne particulate matter with an aerodynamic diameter of less than 2.5 µm
Zephyr	Zephyr Environmental Pty Ltd

EXECUTIVE SUMMARY

Zephyr completed a qualitative assessment of the air quality relevant to a childcare centre as part of the proposed developed at 46-52 Ferndell Street, South Granville. This assessment considered the location of the childcare centre in relation to Ferndell Street, the nearby industries during a site visit, and the potential emissions associated with the nearby industries.

The study determined that the existing background air quality is consistent with the expected particulate matter and NO_X concentrations in Sydney. A review of the industries allowed in the area, and the information from the site visit leads concludes that there are no industries that could not be effectively managed through good engineering practice, to ensure emission and ambient air quality standards are met.

It is also believed the existing setback distance of the childcare centre from Ferndell Street is sufficient to avoid impacts from vehicle emissions, given the relatively low volume of traffic on Ferndell Street. The following design considerations are suggested to help minimise the air quality impacts for the proposed childcare centre:

- Fresh air intakes servicing the building air conditioning systems should be located away from the adjacent road, car parking on the premises, heavy vehicle idling areas, and as practicable. One suggestion may be in the centre of the roof.
- Allowance within the ventilation ductwork for HEPA filtration to remove fine particulate matter prior to circulation through indoor areas.

1 INTRODUCTION

Ferndell Street Pty is seeking to develop a site located at 46-52 Ferndell Street, South Granville. The proposal states the site development will include a warehouse complex comprising of 96 units, as well as a 121-place centre-based childcare facility. The proposal is currently under assessment by the Cumberland City Council ('Council') and was referred to the Sydney Central City Planning Panel in February 2024.

The childcare component listed in the proposal is located on general industrial land (E4 Zoning), which includes manufacturing and warehousing. The Council has raised concerns about the proximity of the proposed childcare centre to nearby industrial sites, as well as Ferndell Street, which may have adverse air quality impacts on the centre and its users.

Zephyr Environmental (Zephyr) has been commissioned to investigate the proposal and provide advice in line with the air quality objectives in the NSW Department of Planning, Industry and Environment's Child Care Planning Guideline (DPIE, 2021), reproduced below:

Objective: To ensure air quality is acceptable where child care facilities are proposed close to external sources of air pollution such as major roads and industrial development.

C26 *Locate child care facilities on sites which avoid or minimise the potential impact of external sources of air pollution such as major roads and industrial development.*

C27 *A suitably qualified air quality professional should prepare an air quality assessment report to demonstrate that proposed child care facilities close to major roads or industrial developments can meet air quality standards in accordance with relevant legislation and guidelines. The air quality assessment report should evaluate design considerations to minimise air pollution such as:*

- *creating an appropriate separation distance between the facility and the pollution source. The location of play areas, sleeping areas and outdoor areas should be as far as practicable from the major source of air pollution*
- *using landscaping to act as a filter for air pollution generated by traffic and industry. Landscaping has the added benefit of improving aesthetics and minimising visual intrusion from an adjacent roadway*
- *incorporating ventilation design into the design of the facility.*

2 Project area

The proposed childcare centre would be located in Sydney's western suburb of South Granville, in the local government area of Cumberland City Council. Figure 1 shows the suburb of South Granville and the surrounding areas.

Zephyr conducted a site visit on Thursday 25 April 2024. The South Granville suburb has a mixture of residential areas (low to high density), industrial zones, and some public recreational areas, as shown in Figure 1. During the site visit the different types of existing industries in the vicinity of the proposed childcare centre were reviewed. The following industries and activities were noted to be present in the General Industry locations identified in Figure 1:

- Petrol stations
- Bus depot
- Vehicle mechanics and repair shops
- Recreational areas and centres (National Badminton Centre, gyms, and indoor and outdoor sporting facilities)
- Warehouses and storage facilities (including cold storage facilities), as well as shipment companies
- Heavy equipment and construction equipment suppliers
- Consulting, conveyancing, and engineering services
- Manufacturing of food, medicinal, foam, and metal products
- Laboratory testing
- Design showrooms and wholesalers
- Other light industries and technology companies.

The proposed development site is located on Ferndell Street (highlighted in Figure 1), which is the main road in the industrial zone (E4) of the suburb. The childcare centre will be situated at the front of the development on Ferndell Street with a setback distance of over 10 m, as shown in Figure 2. The proposed childcare centre would be over 500 m away from the trainline south of 46 Ferndell Street.

The majority of these activities identified during the site visit to South Granville do not present a risk to air quality at the proposed childcare centre as they are not considered to generate hazardous air pollutants. However, there are some that may be considered sources of air pollution such as the manufacturing sites (particulate matter and metals), vehicle mechanic and repairs shops (odour), and the bus depot (oxides of nitrogen). These are discussed, in relation to air quality criteria, in the following section.

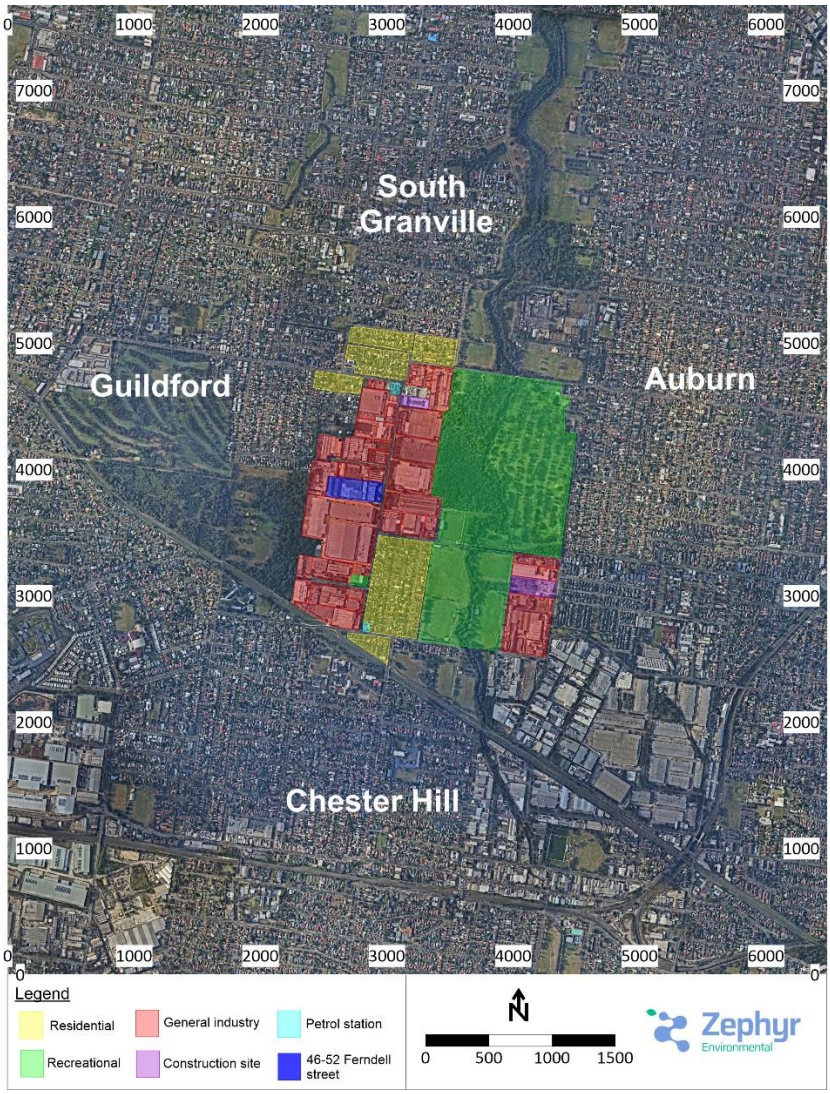

Figure 1: Proposed development site location relative to South Granville and surrounding suburbs

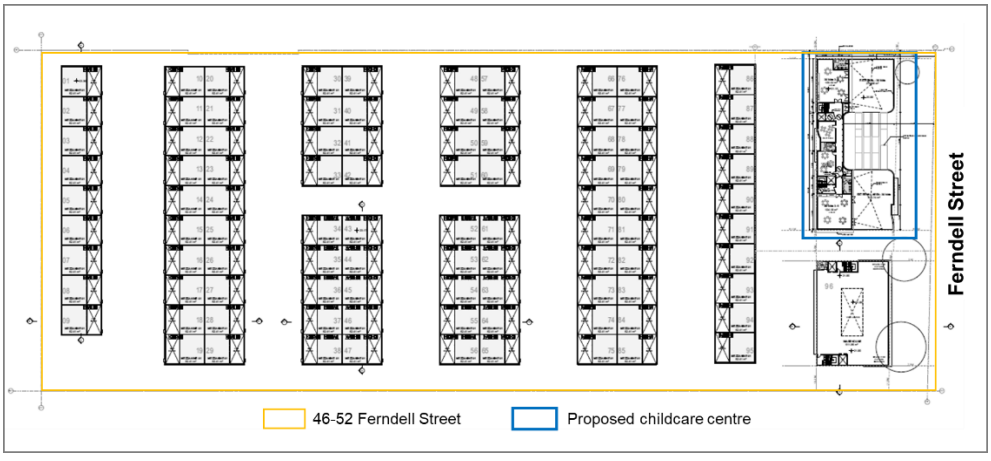

Figure 2: Proposed childcare centre relative to Ferndell Street

3 Air quality assessment criteria

Any approved development within the general industrial area (E4) of South Granville would need to comply with the NSW EPA's ambient air quality and odour assessment criteria. The *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (Approved Methods) specifies these criteria relevant for assessing impacts from air pollution (EPA, 2022).

The main air pollutants relevant to industries in the South Granville area would be odour and particulate matter (PM_{10} and $PM_{2.5}$, particles with aerodynamic diameters less than 10 µm and 2.5 µm, respectively). These are discussed in the following sections with specific reference to their criteria. Nitrogen oxides are also considered below due to the proximity of the proposed development to Ferndell Street.

3.1 Particulate matter

The impact assessment criteria for PM_{10} and $PM_{2.5}$ are health-based and are based on the concentrations of the particulate matter, see Table 1. The values are consistent with the 2021 revised National Environmental Protection (Ambient Air Quality) Measure (Ambient AIR-NEPM, 2021).

Table 1: NSW EPA impact assessment criteria for PM_{10} and $PM_{2.5}$.

Pollutant	Averaging period	Criterion
PM_{10}	Annual	25 µg/m^3
	24-hour	50 µg/m^3
$PM_{2.5}$	Annual	8 µg/m^3
	24-hour	25 µg/m^3

It should be noted that from 2025 the maximum average concentration goals for $PM_{2.5}$ concentrations are 20 µg m^{-3} annually and 7 µg m^{-3} over 24-hours (Ambient AIR-NEPM, 2021).

Airborne PM also has the potential to cause nuisance dust effects when it deposits on surfaces. Larger particles do not tend to remain suspended in the atmosphere for long periods of time and will fall out relatively close to the source. Dust fallout can soil materials and generally degrade the aesthetic environment, and is therefore assessed for nuisance or amenity impacts. Table 2 shows the maximum acceptable increase in deposited dust levels over the existing dust levels and the maximum total deposited dust level. These criteria for deposited dust levels are set to protect against nuisance impacts (EPA, 2022).

Table 2: NSW EPA impact assessment criteria for deposited dust

Pollutant	Averaging period	Maximum increase (due to the project)	Maximum total level (cumulative)
Deposited dust (insoluble solids)	Annual	2 g/m^2/month	4 g/m^2/month

3.2 Odour

The EPA has developed odour goals and the way in which they should be applied with dispersion models to assess the likelihood of nuisance impact arising from the emission of odour.

There are two factors that need to be considered. Firstly, what is the level of exposure to an odour that would be considered acceptable by the community. That is, what are the appropriate goals or criteria that define acceptable levels within the community. Secondly, how can we use dispersion modelling to determine whether an odour emission meets these goals.

The term *level of exposure* has been used to reflect the fact that odour impacts are determined by several factors the most important of which are the so-called FIDOL factors:

- the Frequency of the exposure
- the Intensity of the odour
- the Duration of the odour episodes
- the Offensiveness of the odour
- the Location of the source.

In determining the offensiveness of an odour it needs to be recognised that for most odours the context in which an odour is perceived is also relevant. Some odours, for example the smell of sewage, hydrogen sulfide, butyric acid, landfill gas etc., are likely to be judged offensive regardless of the context in which they occur. Other odours such as the smell of fuel may be acceptable at a petrol station, but not in a house.

In summary, whether or not an individual considers an odour to be a nuisance will depend on the FIDOL factors outlined above and although it is possible to derive formulae for assessing odour annoyance in a community, the response of any individual to an odour is still unpredictable. Odour goals need to take account of these factors.

The EPA Approved Methods include ground-level concentration criteria for complex mixtures of odorous air pollutants. They have been refined by the EPA to take account of population density in the area. Table 3 lists the odour thresholds, to be exceeded not more than 1% of the time, for different population densities.

Table 3: Performance criteria for the assessment of odour

Population of affected community	Odour performance criteria (nose response odour units at the 99th percentile)
Single rural residence (≤ ~2)	7
~10	6
~ 30	5
~ 125	4
~ 500	3
Urban (~ 2000) and/or schools and hospitals	2

The difference between odour goals is based on considerations of risk of odour impact and not differences in odour acceptability between urban and rural areas. For a given odour level there will be a wide range of responses in the population exposed to the odour. In a densely populated area there will therefore be a greater risk that some individuals within the community will find the odour unacceptable than in a sparsely populated area. An important point to note is that the odour assessment criteria are not intended to achieve 'no odour'. They are concerned with controlling odours to ensure offensive odour impacts will be effectively managed.

A criterion of 2 odour units (99th percentile) would apply to the populated areas surrounding the South Granville industrial area.

3.3 Nitrogen oxides

The impact assessment criterion for nitrogen dioxide (NO_2) is presented in Table 4. The values are consistent with the 2021 revised National Environmental Protection (Ambient Air Quality) Measure (Ambient AIR-NEPM, 2021).

Table 4: NSW EPA impact assessment criteria for NO_2.

Pollutant	Averaging period	Criterion
NO_2	1-hour	8 pphm / 164 µg/m^3
	Annual	1.5 pphm / 31 µg/m^3

4 LOCAL METEOROLOGY

The closest Bureau of Meteorology (BoM) Automatic Weather Station (AWS) is located at Bankstown (approximately 6 km from the proposed site).

The annual wind patterns for the last five years (2019 to 2023) at Bankstown are shown in Figure 3. The analysis shows that the wind speed and direction are reasonably consistent from year to year. There is a high percentage of calm conditions in the area, with around between 15% to 20% of the annual winds below 0.5 m/s. The average annual wind speed at Bankstown is around 3 m/s.

The average seasonal wind roses are shown in Figure 4. The analysis indicates that the opposite wind direction patterns occur in summer and winter; with wind from the west, southwest and northwest occurring predominantly in winter, and wind from the east, southeast, and northeast being more prevalent in summer.

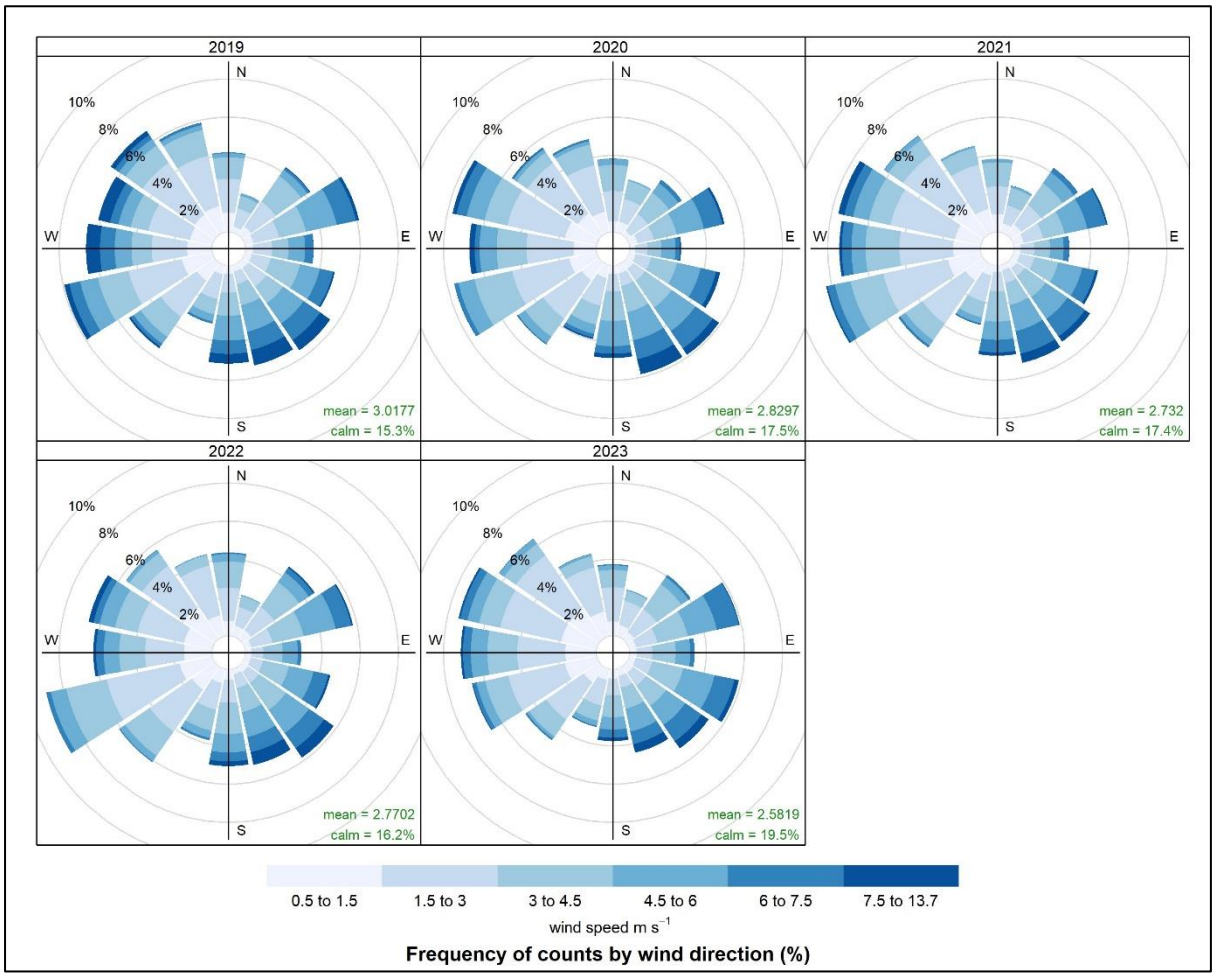

Figure 3: Annual wind roses for 2019 to 2023 at Bankstown.

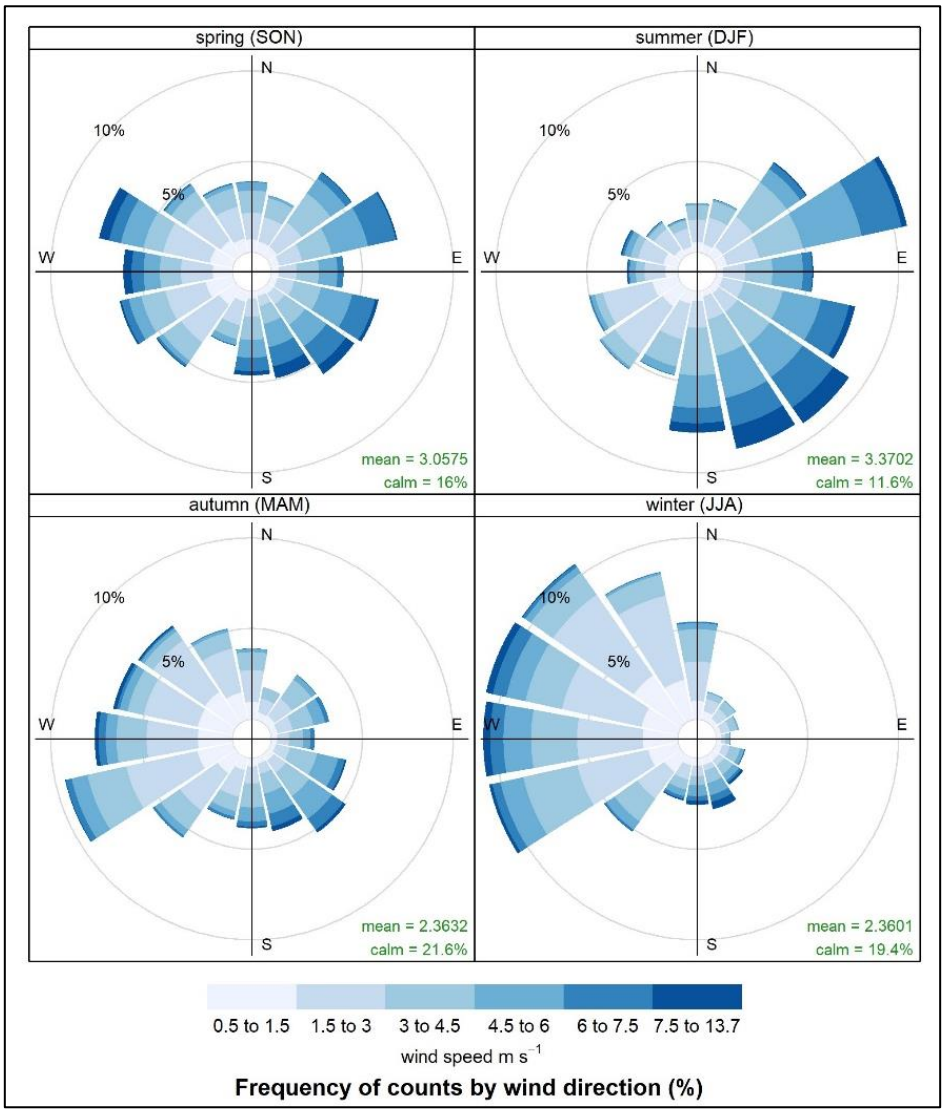

Figure 4: Seasonal wind roses for 2019 to 2023 at Bankstown

5 Baseline air quality

The nearest air quality monitoring stations are located at Lidcombe and Chullora, approximately less than 5 km east and southeast, respectively, from the proposed site.

The annual average concentrations of PM_{10}, $PM_{2.5}$, and NO_2 at Lidcombe and Chullora from 2019 to 2023 are presented in Table 5. The average annual concentrations of particulate matter ($PM_{2.5}$ and PM_{10}) in Chullora and Lidcombe are representative of air quality for Sydney. The analysis also showed the average annual concentrations are less than the NSW EPA Impact Assessment criteria for particulate matter (8 µg/m^3 for $PM_{2.5}$ and 25 µg/m^3 for PM_{10}, respectively). The annual average concentration of NO_2 (1.0 pphm) is equivalent to 18.8 µg/m^3 (at 25°C), well below the NSW EPA Impact Assessment criteria for NO_2.

Table 5: Measured annual average PM_{10}, $PM_{2.5}$, and NO_2 concentrations at Lidcombe and Chullora.

Year	Concentration / ugm^{-3}				Concentration / pphm	
	PM_{10}		$PM_{2.5}$		NO_2	
	Lidcombe	Chullora	Lidcombe	Chullora	Lidcombe	Chullora
2019	-	25	-	12	-	1.1
2020	16	21	7	9	1.0	0.9
2021	16	16	6	7	0.9	0.9
2022	13	14	5	6	1.0	1.0
2023	17	-	7	-	1.1	-
Average	15	19	6	8	1.0	1.0

The 24-hour average concentrations of PM_{10} and $PM_{2.5}$ are presented in Figure 5 and the 1-hour average concentrations of NO_2 (1-hour) are shown in Figure 6. The average values are also compared to their relevant assessment criteria. The data available from Chullora monitoring station indicates the $PM_{2.5}$ concentrations in 2019 and 2020 were impacted by the state-wide extreme drought and intense bushfires across large parts of NSW during this period.

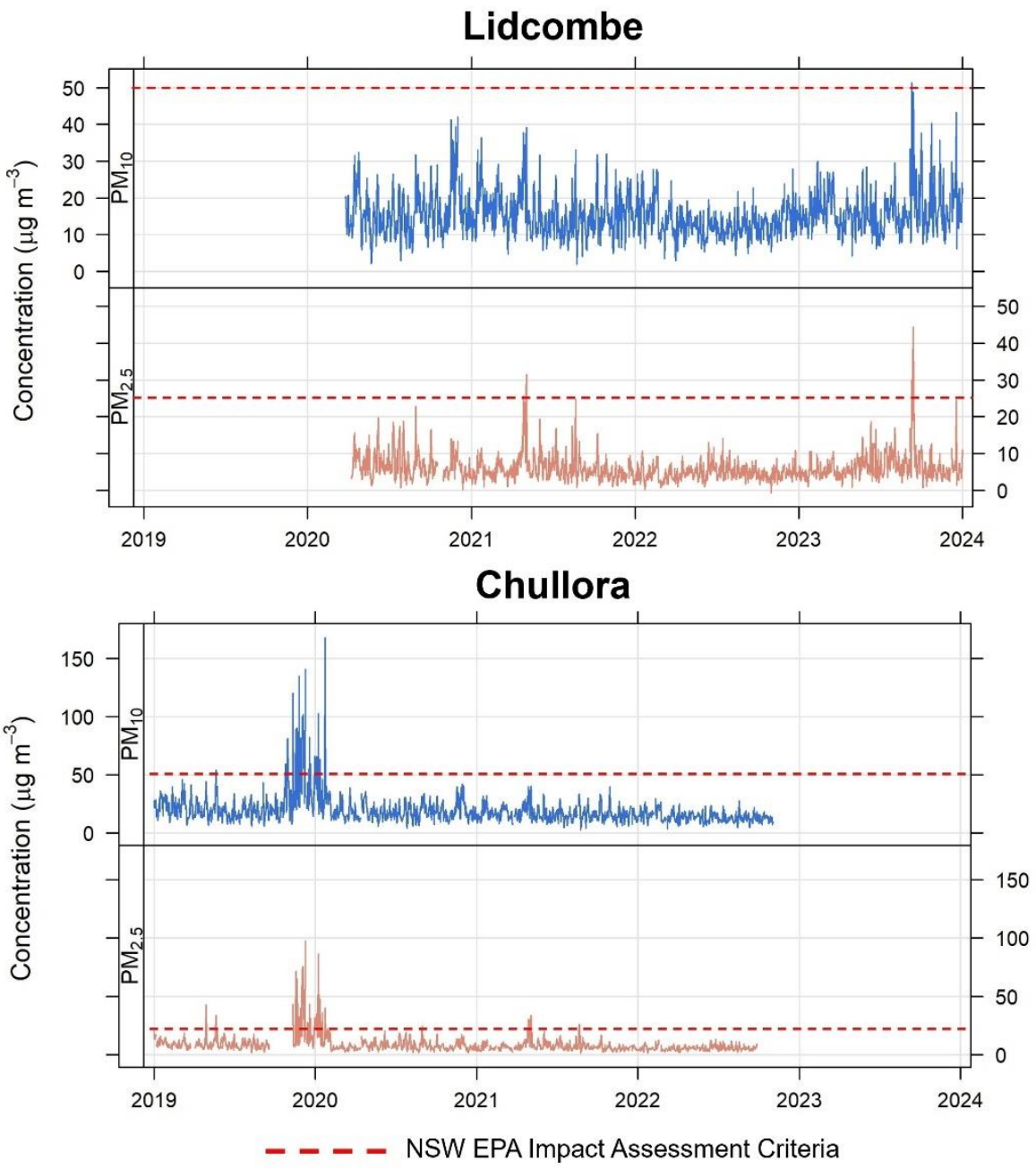

Figure 5: 24-hour $PM_{2.5}$ and PM_{10} concentrations at Chullora and Lidcombe

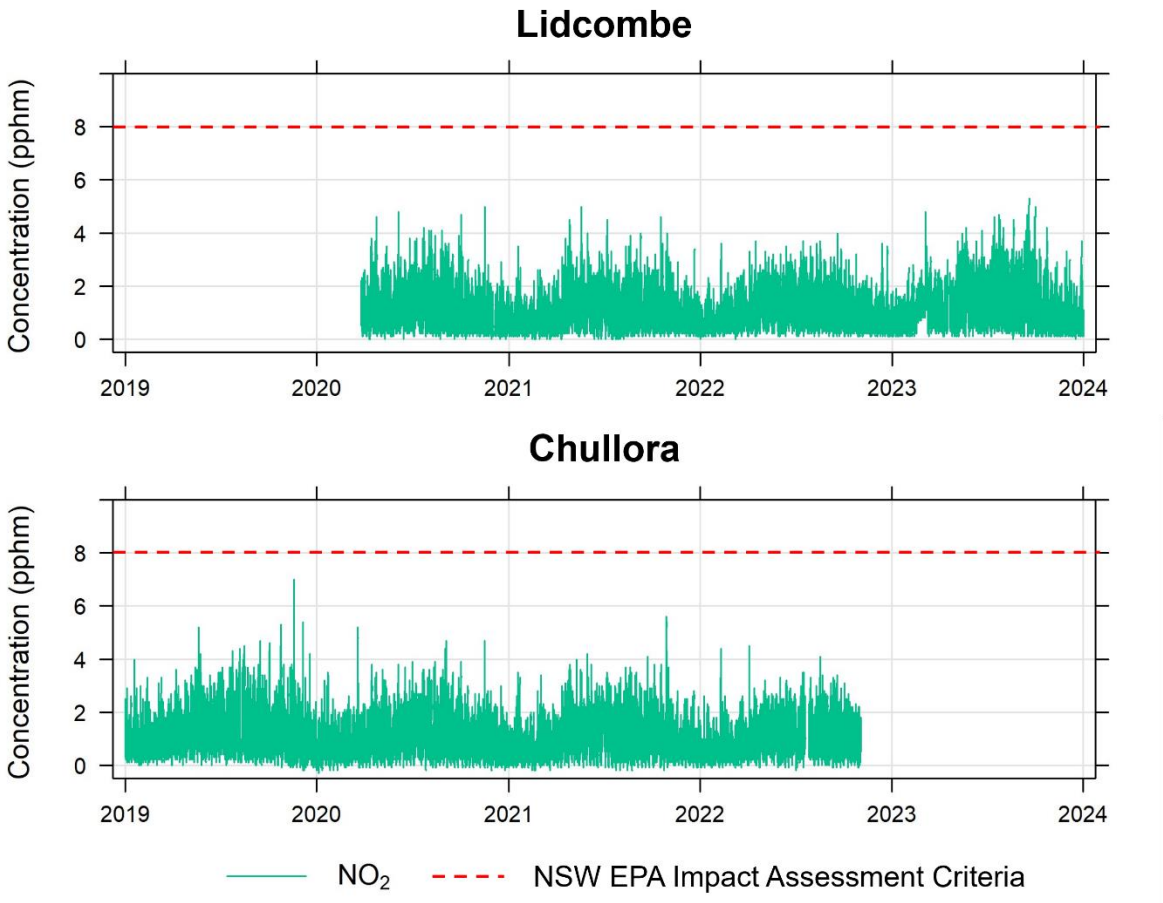

Figure 6: 1-hour average NO_2 concentrations at Chullora and Lidcombe

6 Review of current and future activities

Traffic count data collected in 2009 indicated total daily traffic volumes on Hector Street (160 m South of Boundary Road, Chester Hill) were of the order of 13,000 vehicles per day (TfNSW, 2024). The outdoor play area of the proposed childcare centre will be over 10 m from Ferndell Street, which is likely to be a sufficient set back distance from the vehicle emissions.

The Cumberland City Council Local Environmental Plan (LEP, 2021) lists a number of industries 'permitted with consent' for the Zone E4 General Industrial. This includes centre-based childcare facilities, depots, food and drinks premises, freight transport facilities, goods repair and reuse premises, light industries, and warehouses. The site inspection carried out on 25 April 2024 confirmed these types of premises were present around Ferndell Street.

A review of the industries allowed, and the information from the site visit leads to the conclusion that there are no industries that could not be effectively managed through good engineering practice, to ensure emission and ambient air quality standards are met, both as the facility boundary and at all sensitive receptor locations.

7 Design recommendations

While there is not currently any industrial use that may adversely impact the operation of the childcare centre, there are measures that can be incorporated into the design that may also assist to minimise impacts. These could include the following:

- Fresh air intakes servicing the building air conditioning systems should be located away from the adjacent road, car parking on the premises, heavy vehicle idling areas, and as practicable. One suggestion may be in the centre of the roof.
- Allowance within the ventilation ductwork for HEPA filtration to remove fine particulate matter prior to circulation through indoor areas.

8 Conclusions

Zephyr completed a qualitative assessment of the air quality relevant to a childcare centre as part of the proposed developed at 46-52 Ferndell Street, South Granville. This assessment considered the location of the childcare centre in relation to Ferndell Street, the nearby industries during a site visit, and the potential emissions associated with the nearby industries.

The assessment determined that the existing background air quality is consistent with the expected particulate matter and NO_X concentrations in Sydney. A review of the industries allowed in the area, and the information from the site visit leads concludes that there are no industries that could not be effectively managed through good engineering practice, to ensure emission and ambient air quality standards are met at sensitive receptions, including the proposed childcare centre.

The existing setback distance of the childcare centre from Ferndell Street is sufficient to avoid impacts from vehicle emissions, given the relatively low volume of traffic on Ferndell Street. The following design considerations are suggested to help minimise the air quality impacts for the proposed childcare centre:

- Fresh air intakes servicing the building air conditioning systems should be located away from the adjacent road, car parking on the premises, heavy vehicle idling areas, and as practicable. One suggestion may be in the centre of the roof.
- Allowance within the ventilation ductwork for HEPA filtration to remove fine particulate matter prior to circulation through indoor areas.

9 REFERENCES

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