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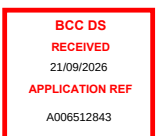
Planning Initiatives

11 Interchange PI Rochedale Qld

Air Quality Assessment

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19 September 2026



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Executive Summary

Vipac Engineers & Scientists Ltd (Vipac) was commissioned by Planning Initiatives, on behalf of Woolworths Group Ltd (Applicant) to conduct an air quality impact assessment of the back-up diesel generator proposed for the Woolworths Customer Fulfillment Centre (CFC) at 11 Interchange PI, Rochedale, Qld.

The site has been subject to Preliminary Approvals (A002432201 approved in 2012 and A003909232 approved in 2015) which override the provisions of the City Plan 2014. These Preliminary Approvals allow for development of the site in accordance with the Light Industry Zone and General Industry Zone under City Plan 2000.

The proposed generator constitutes a new land use for High Impact Industry (Fuel Burning) and therefore represents development as Material Change of Use. The type of approval being sought from the Council is a Development Permit for:

- Material Change of Use for High Impact Industry (Fuel Burning)

This report presents a quantitative air quality impact assessment for the proposed back-up diesel generator, prepared in with respect to the relevant provisions as set out in the Preliminary Approval and contained within the Brisbane City Plan 2000 & 2014 as well as the State Development Assessment Provisions.

The air quality impact assessment has been carried out in accordance with the BCC Air quality planning scheme policy as follows:

- An emissions inventory of the primary air pollutants generated by the back-up generator was derived from pollutant emissions limits set for Tier 2 compliant diesel engines and prepared for a maximum continuous 24/7 operating scenario.
- Emissions data was used as input for air dispersion modelling. The modelling techniques were based on a combination of The Air Pollution Model (TAPM) prognostic meteorological model (developed by CSIRO), CALMET and the CALPUFF dispersion model in accordance with the Air quality planning scheme policy.
- Pollutant concentration predictions at receptors including adopted background concentrations have been undertaken to evaluate impacts for the pollutants of concern.
- Assessment of the predicted concentrations at sensitive receptors against the relevant Air quality objectives of the BCC Air Quality Planning Scheme and Industry Code.

As shown in Table ES-1, despite the conservatism of the modelling, the predicted concentrations of all of the modelled pollutants are below the relevant assessment criteria at all modelled receptors for each applicable averaging period, both in isolation and inclusive of background concentrations.

Based on the dispersion modelling outcomes, it is therefore demonstrated that air quality impacts at surrounding sensitive and general land uses are within acceptable limits and that the requirements of Performance Outcome PO1 of the Industry Code are expected to be achieved.

Table ES-1: Model Predictions at the Worst-Affected Receptor

Pollutant	Averaging Period	DGLC ¹ (µg/m ³)	Goals for all areas ² (µg/m ³)	Criteria ³ (µg/m ³)	Maximum Prediction at the Worst-Affected Receptor (µg/m ³)		Compliant
					In isolation	Cumulative	
PM2.5	24 hour	25	25	25	4.5	11.8	✓
	Annual	n/a	n/a	8	0.3	5.9	✓
PM10	24 hour	50	150	50	4.5	27.7	✓
	Annual	n/a	n/a	25	0.3	16.8	✓
CO	8 hour	4,375	10,000	11,000	147.6	547.6	✓
NO ₂	1 hour	225	328	250	110.7 (158.0) ⁴	155.7 (203.0) ⁴	✓
	Annual	n/a	n/a	62	9.8	28.2	✓
SO ₂	1 hour	598	598	570	0.32	33.4	✓
	24 hour	n/a	n/a	230	0.05	6.3	✓
	Annual	n/a	n/a	57	0.004	3.1	✓

1. Air Quality Planning Scheme Policy (AQSP) 2000 Design ground level concentrations for sensitive land uses
2. AQSP 2000 Goals for all areas
3. AQSP 2014 Criteria
4. Maximum predictions for comparison with AQSP 2000 DGLC and goals.

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1 Introduction

Vipac Engineers & Scientists Ltd (Vipac) was commissioned by Planning Initiatives, on behalf of Woolworths Group Ltd (Applicant) to conduct an air quality impact assessment of the back-up diesel generator proposed for the Woolworths Customer Fulfillment Centre (CFC) at 11 Interchange PI, Rochedale, Qld.

The site has been subject to Preliminary Approvals (A002432201 approved in 2012 and A003909232 approved in 2015) which override the provisions of the City Plan 2014. These Preliminary Approvals allow for development of the site in accordance with the Light Industry Zone and General Industry Zone under City Plan 2000.

The proposed generator constitutes a new land use for High Impact Industry (Fuel Burning) and therefore represents development as Material Change of Use. The type of approval being sought from the Council is a Development Permit for:

- Material Change of Use for High Impact Industry (Fuel Burning)

This report presents a quantitative air quality impact assessment for the proposed back-up diesel generator, prepared in with respect to the relevant provisions as set out in the Preliminary Approval and contained within the Brisbane City Plan 2000 & 2014 as well as the State Development Assessment Provisions. Predicted impacts have been assessed against the relevant requirements of PO1 of the Industry Code, where applicable, through comparison with the relevant air quality assessment criteria.

2 Project Location and Surrounding Area

The air quality assessment has been prepared on behalf of the Applicant in support of a development application on land at 11 Interchange Place, Rochedale described as Lot 1 on SP288046. The site is a significant land parcel located adjacent to a major intersection within a major logistical industrial area at Rochedale and has a total site area of 85,680m². The site is part of the Rochedale Motorway Estate and is currently occupied by the Woolworths Customer Fulfillment Centre (CFC) which is the major distribution centre for Woolworths home delivery services and Direct to Boot facilities in Southeast Queensland.

Figure 2-1 shows the approximate location of the generator and the closest identified receptors, shown in yellow. Table 2-1 provides the receptor Universal Transverse Mercator (UTM) coordinates and classification which align with the Air Quality Planning Scheme Policy 2000 (AQPSP 2000) definition as either sensitive (e.g. residences) or 'general' (or all) areas. Further discussion is provided in section 4.2.

Table 2-1: Air Sensitive and General Receptors

Receptor ID	UTM (km)		Receptor classification
	East	South	
SR1	511.918	6952.979	Sensitive
SR2	511.907	6952.904	Sensitive
SR3	511.897	6952.846	General
SR4	511.888	6952.791	Sensitive
SR5	511.877	6952.733	Sensitive
SR6	511.868	6952.682	Sensitive
SR7	511.953	6952.834	Sensitive
SR8	511.939	6953.07	General
SR9	511.969	6953.154	Sensitive
SR10	511.862	6953.19	Sensitive
SR11	511.752	6953.213	Sensitive



Figure 2-1: Proposed Location and Closest Receptors

3 Proposed Operations

The proposed development involves the establishment of a single diesel fuelled 1.25MW Jubilee JEG1250BS generator to provide a backup source of power to the CFC facility on the site. The backup generator will ensure guaranteed power supply to the site in the event of a power outage to ensure supply for groceries can be relied upon. It is anticipated that the proposed generator will be in use only intermittently with use estimated on average to be about 15 hours per annum. However, the actual usage will be subject to the frequency of events and their duration which may differ based upon the number and duration of unpredictable events including severe weather (storms, heatwaves).

The proposed site layout including the back-up diesel generator is shown in Figure 3-1. Further schematic drawings relevant for the air quality assessment are provided in Appendix A.



- Particulate matter as PM10 (i.e. particles with an aerodynamic diameter less than 10µm);
- Particulate matter as PM2.5 (i.e. particles with an aerodynamic diameter less than 2.5µm);
- Carbon monoxide;
- Nitrogen dioxide; and
- Sulphur dioxide.

- a) provides information the Council may request for a development application;
- b) provides guidance or advice about satisfying an assessment criteria which identifies this planning scheme policy as providing that guidance or advice;
- c) states a standard for the assessment criteria.

4.1.1 Industry Code

The Industry Code guides the assessment of industrial developments to ensure they are appropriately located, designed, and operated to mitigate impacts on the environment and nearby sensitive uses. It seeks to ensure that industrial activities:

- Achieve satisfactory environmental performance.
- Minimise the release of pollutants and protect public health and safety.
- Are compatible with nearby sensitive uses (e.g., residential areas).
- Allow buildings near sensitive areas to accommodate industrial operations without unacceptable impacts on amenity.
- Consider social and environmental needs of workers and visitors, including safety and service provision.

Table 9.3.12.3.A of the code provides the acceptable and performance outcomes for developments. Schedule 1.1.3 Industry threshold of the BCC *Planning Scheme* defines a "Food, beverages or pet food processing, smoking, drying, curing, milling, bottling or canning works, if producing 200 tonnes or more per annum" as a high impact industry.

The relevant performance and acceptable outcomes relevant to the proposed development are shown in Table 4-1.

Table 4-1: Criteria for assessable development

PO1 Development: 1. avoids or minimises air emissions; 2. complies with the following criteria in a sensitive zone, and at a sensitive use in a rural zone: 1. air quality (planning) criteria in Table 9.3.12.3.B; 2. the odour criteria in Table 9.3.12.3.C; 3. the health risk assessment criteria in Table 9.3.12.3.D. Note—An air quality impact report prepared in accordance with the Air quality planning scheme policy can assist in demonstrating achievement of this performance outcome.	AO1.7 Development for a high impact industry where not a concrete batching plant, does not involve an activity which generates air emissions from the site.
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4.1.2 Air Quality Planning Scheme Policy

The Air quality planning scheme policy provides information required for a development application, guidance and advice for satisfying assessment benchmarks and standards for:

1. the preparation of an air quality impact report;
2. the air quality, odour and health risk assessment methodologies to be used to assess the potential air quality impacts of development;
3. the achievement of air quality (planning) criteria, odour criteria and health risk assessment criteria.

In particular, the policy includes guidance and advice for the preparation of air quality impact reports for the assessment of emissions from industrial sources which are relevant and adopted for this assessment.

The policy also specifies a requirement for a screening health risk assessment if the development involves emission to the air of selected pollutants. A full health risk assessment is required where a screening health risk assessment shows that:

- (a) any of the pollutants exceed the ambient air quality (planning) criteria in the referring code, inclusive of background concentration; or
- (b) any of the pollutants exceed 80% of the air quality (planning) criteria in the referring code without background concentration; or
- (c) any pollutant exceeds the short-term or long-term screening concentration in ambient air in Table 5 of the Policy at a sensitive use or sensitive zone.

The Brisbane City Council (BCC) City Plan 2014 defines ambient air quality design ground level criteria for all areas. As shown in Table 4-4,

The air quality criteria for the pollutants of concern as identified in the Air quality planning scheme policy and Industry Code are outlined in Table 4-2.

Table 4-2: Ambient Air Quality Objectives [BCC, 2014]

Pollutant	Averaging Time	Health Outcome Protected	Criteria Including Background ($\mu\text{g}/\text{m}^3$)
PM _{2.5}	24 hour	Health and wellbeing	25
	Annual	Health and wellbeing	8
PM ₁₀	24 hour	Health and wellbeing	50
	Annual	Health and wellbeing	25
NO ₂	1 hour ¹	Health and wellbeing	250
	Annual	Health and wellbeing	62
CO	8 hour	Health and wellbeing	11,000
SO ₂	1 hour	Health and wellbeing	570
	24 hour	Health and wellbeing	230
	Annual	Health and wellbeing	57

1. As a 99.9th percentile

4.2 Brisbane City Council (BCC) City Plan 2000

The superseded BCC City Plan 2000 and its Air quality planning scheme policy (AQSP 2000) provide a framework to determine air pollution impacts and guides applicants on matters they need to address to ensure their proposal complies with the Industrial Amenity and Performance Code. The AQSP 2000 explains the general approach to assessing air quality impacts and contains a three phased process for applicants to follow for evaluating and managing impacts from air emissions. Phase 3 of the policy outlines steps required to determine if the proposal requires detailed evaluation including, for example local and regional modelling. Section 6 identifies the rate of emissions to air of key industrial pollutants at which the different levels of modelling are indicated (Table 4-3).

Table 4-3: Emission based assessment thresholds for modelling [AQSP 2000]

Pollutant	Local Level Modelling (g/s)	Regional Level Modelling (g/s)
PM ₁₀	0.016	2.5
NO _x	0.03	5.0
CO	0.03	n/a
SO ₂	0.016	n/a

Table 3 of the AQSP 2000 (reproduced as Table 4-4) includes ambient air quality goals and design ground level concentrations for sensitive receiving environments and goals for all areas or 'general' land uses.

Table 4-4: Ambient Air Quality Objectives [AQSP 2000]

Pollutant	Averaging Time	Goals for all areas	Design ground level concentration for sensitive receiving environment
PM _{2.5}	24 hour	n/a	25 $\mu\text{g}/\text{m}^3$
PM ₁₀	24 hour	150 $\mu\text{g}/\text{m}^3$	50 $\mu\text{g}/\text{m}^3$
NO ₂	1 hour	0.16 ppm	0.11 ppm
CO	8 hour	8 ppm	3.5 ppm
SO ₂	1 hour	0.2 ppm	0.2 ppm

4.3 Adopted Air Quality Criteria

The air quality criteria for the assessment are adopted from both AQSP 2000 and Brisbane City Council (BCC) City Plan 2014 as outlined in Table 4-5.

Table 4-5: Adopted Ambient Air Quality Criteria⁴

Pollutant	Averaging Time	Goals for all areas ¹	Design ground level concentration for sensitive receiving environment ¹	Criteria Including Background ²
PM _{2.5}	24 hour	n/a	25 $\mu\text{g}/\text{m}^3$	25 $\mu\text{g}/\text{m}^3$
	Annual	n/a	n/a	8 $\mu\text{g}/\text{m}^3$

PM10	24 hour	150 µg/m ³	50 µg/m ³	50 µg/m ³
	Annual	n/a	n/a	25 µg/m ³
NO ₂	1 hour	328 µg/m ³	225 µg/m ³	250 µg/m ³
	Annual	n/a	n/a	62 µg/m ³
CO	8 hour	10,000 µg/m ³	4,375 µg/m ³	11,000 µg/m ³
SO ₂	1 hour	598 µg/m ³	598 µg/m ³	570 µg/m ³
	24 hour	n/a	n/a	230 µg/m ³
	Annual	n/a	n/a	57 µg/m ³

1. AQPSP 2000
2. AQPSP 2014
3. As a 99.9th percentile
4. Gas concentrations at STP conditions (0°C, 1 Atmos)

5 Existing Environment

5.1 Dispersion Meteorology

5.1.1 Regional Meteorology

Data recorded by the nearest Bureau of Meteorology (BoM) long term weather station at Archerfield Airport (Site number: 040211), located approximately 11km west of the source, was reviewed to describe the meteorological and climatic influences in the region. Long term weather data obtained from the BOM weather station at Archerfield Airport is presented in Table 5-1.

The mean temperature range is between 7.8°C and 30.5°C with the coldest month being July and the hottest, January. The rainfall in the region is variable, with most rainfall in the warmer months. On average, most of the annual rainfall is received between December and March. Rainfall is lowest between July and September. The mean annual rainfall is approximately 1061.8 mm.

The long-term wind roses recorded daily at the Archerfield Airport station at 9am and 3pm are provided in Figure 5-1. Winds are shown to be primarily from the west, south and southwest at 9am and from the east and northeast at 3pm. Stronger winds (>40km/hr or >11.1m/s) occur infrequently mostly from the west at 3pm.

Table 5-1: Mean Long-term Weather Data for Archerfield Airport

Month	Mean Temperature		Rainfall (mm)	9 am Conditions			3 pm Conditions		
	Max (°C)	Min (°C)		Temp (°C)	RH (%)	Wind Speed (km/h)	Temp (°C)	Mean RH (%)	Wind Speed (km/h)
Jan	30.5	20.4	135.1	25.8	66	11.8	28.8	55	21.0
Feb	30.0	20.2	156.3	25.1	70	11.1	28.2	58	19.3
Mar	28.9	18.6	133.8	23.7	70	11.0	27.1	56	19.0
Apr	26.7	15.3	77.2	20.9	71	10.5	25.0	54	16.9
May	24.0	11.9	73.2	17.4	74	9.9	22.8	53	14.1
Jun	21.5	9.3	63.6	14.4	74	10.4	20.5	51	14.2
Jul	21.4	7.8	47.2	13.3	71	10.2	20.2	45	15.2
Aug	22.9	8.2	35.6	15.0	67	10.6	21.4	43	18.0
Sep	25.4	11.3	35.0	18.8	62	10.7	23.6	45	21.4
Oct	27.2	14.5	78.9	21.8	60	11.4	25.1	50	22.3
Nov	28.6	17.3	99.9	23.7	61	12.1	26.4	53	22.3
Dec	29.7	19.2	125.6	25.1	64	11.6	27.8	54	22.0
Annual	26.4	14.5	1061.8	20.4	67	10.9	24.7	51	18.8

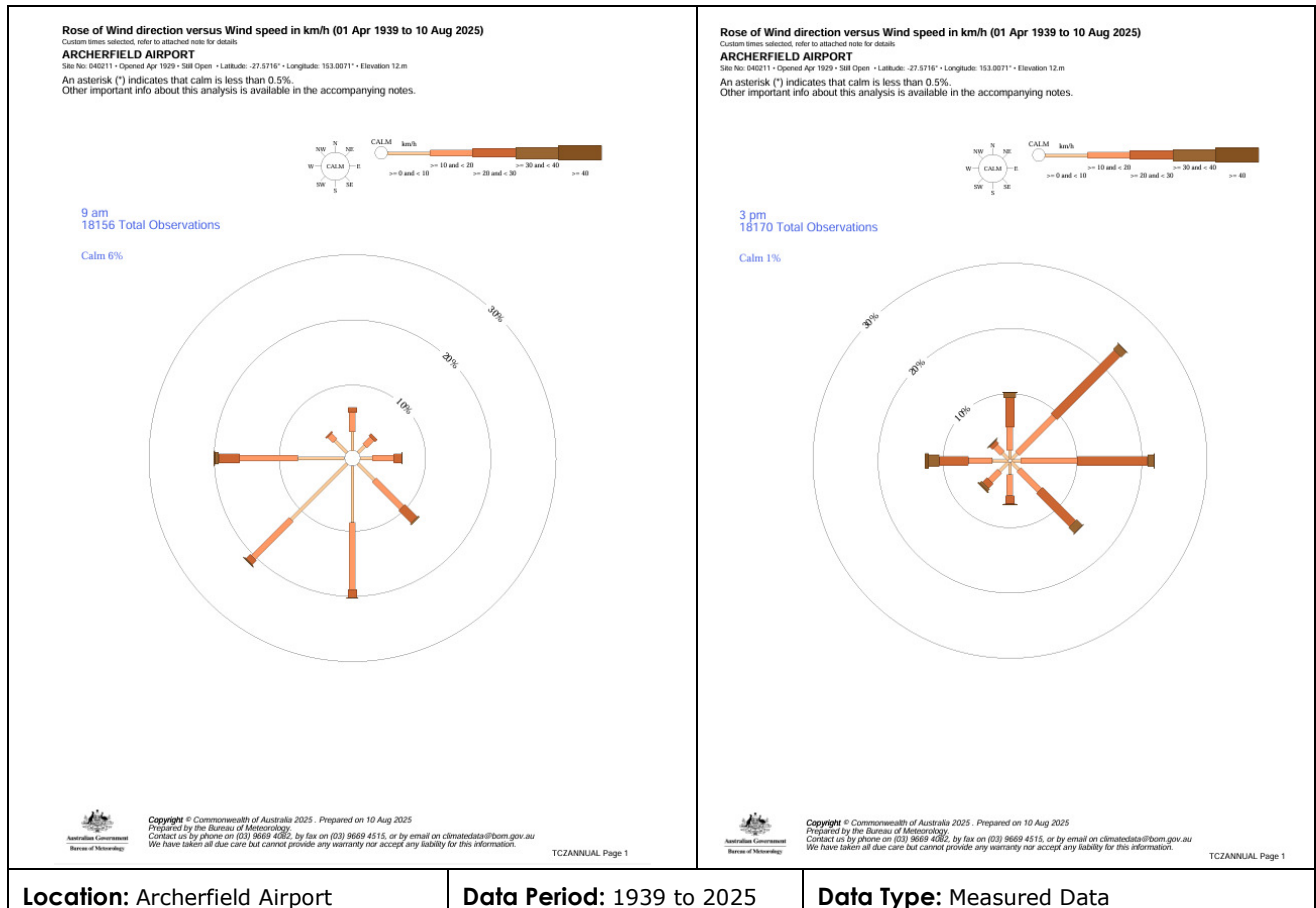


Figure 5-1: Long Term Wind Rose for Archerfield Airport (1939 to 2025)

5.2 Selection of Representative Year for Meteorological Modelling

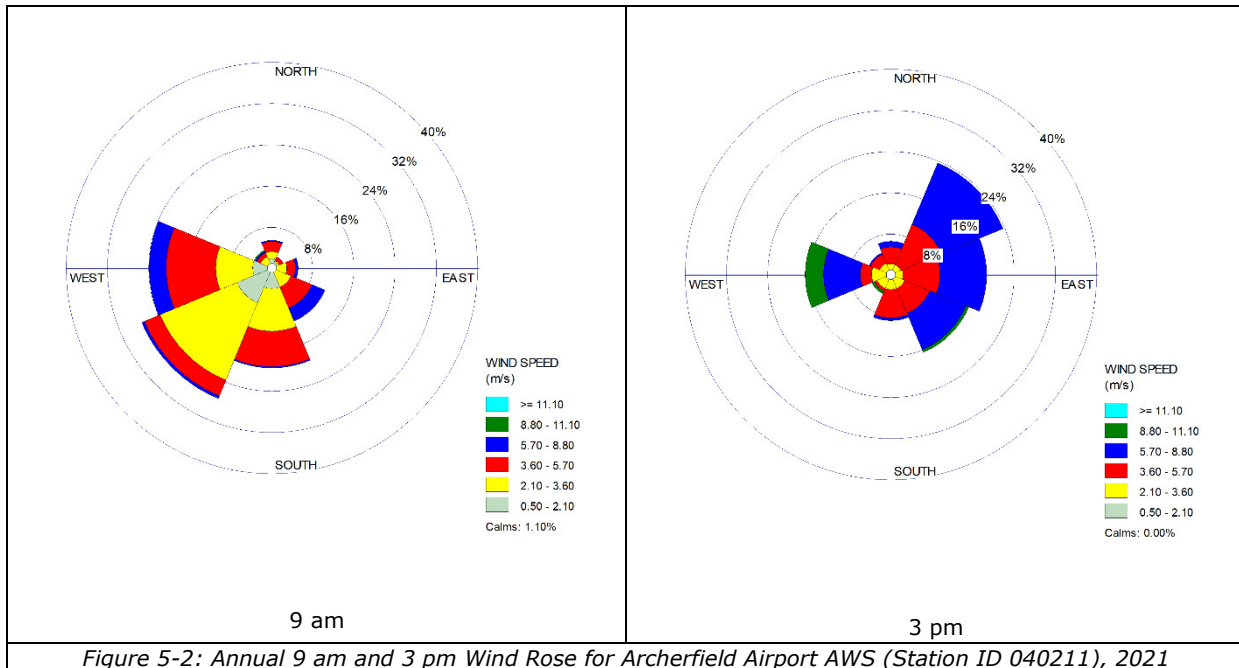
A review of five years of meteorological data (2020–2024) from the closest open long-term BoM station, located at Archerfield Airport (Site number: 040211), approximately 11 km west of the proposed site, was undertaken to determine the most representative meteorological year for use in the dispersion model.

The following parameters were considered in the determination:

- Frequency and distribution of the predominant wind directions;
- Wind speed; and
- Temperature.

The review identified that the 2021 calendar year was the most representative meteorological year for the study, exhibiting wind speed and directional frequencies most closely matching the five-year average. Further details, including a year-by-year comparison of key parameters, are provided in Appendix B.

Figure 5-2 presents the annual, 9 am and 3 pm wind roses for the 2021 calendar year at Archerfield Airport AWS. These figures are provided to support the assessment of representativeness against the long-term wind roses discussed in Section 5.1.1.



5.2.1 Local Meteorology

A three-dimensional meteorological field was required for the air dispersion modelling that includes a wind field generator accounting for slope flows, terrain effects and terrain blocking effects. The Air Pollution Model, or TAPM, is a three-dimensional meteorological and air pollution model developed by the CSIRO Division of Atmospheric Research and can be used as a precursor to CALMET which produces fields of wind components, air temperature, relative humidity, mixing height and other micro-meteorological variables for each hour of the modelling period. The TAPM-CALMET derived dataset for 12 continuous months of hourly data from the year 2021 and approximately centred at the proposed site has been used to provide further information on the local meteorological influences.

5.2.1.1 Wind Speed and Direction

Figure 5-3 presents the annual and seasonal wind roses from the TAPM-CALMET derived dataset for the year 2021 at the site location. Wind roses from 9am and 3pm for the derived dataset are also provided in Figure 5-3 for comparison with the long term recorded data from the Archerfield Airport BoM Weather Station.

Key features of the winds are:

- Annual wind directions are variable, with winds more frequent from the south to south east and from the west and north east.
- Annual average wind speed of 3.2m/s.
- Calm winds (<0.5m/s) represent 2.7% of the winds for the year.
- The strongest winds (>5.7m/s) occur from the west, occurring over winter and spring.
- Lighter winds (<5.7 m/s) primarily from the south occur in autumn and summer.
- The 9am and 3pm wind roses for the TAPM-CALMET derived dataset are generally consistent with the long-term measured data from the Archerfield Airport BoM Weather Station presented in section 5.1.1. Winds are shown to be primarily from the southwest at 9am and are variable at 3pm, with winds more commonly occurring from the west, north east and east.

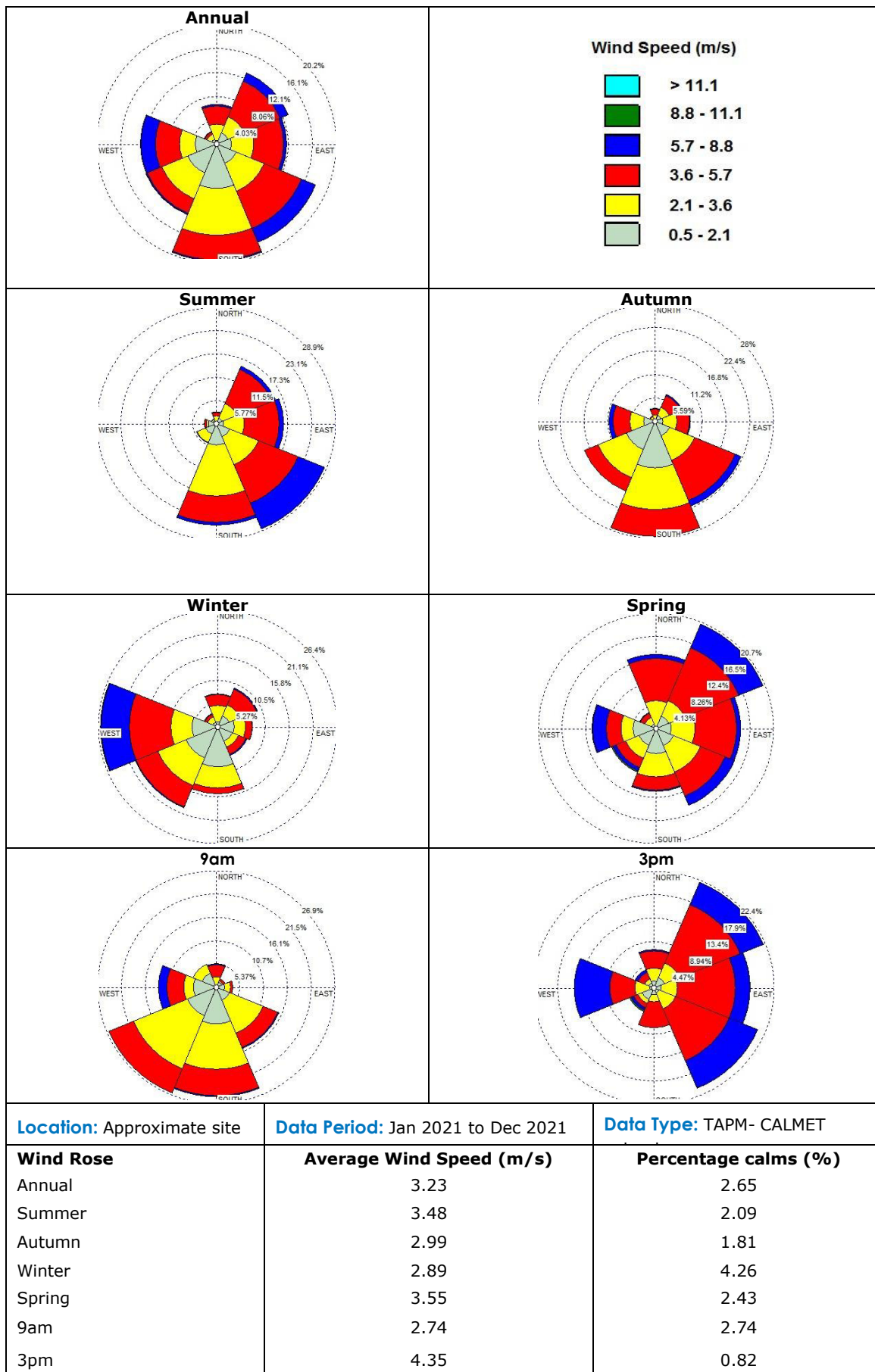


Figure 5-3: Wind Roses for the TAPM-CALMET Derived Dataset at the Project site, 2021

5.2.1.2 Atmospheric Stability

The Pasquill-Gifford stability classification scheme denotes stability classes from A to F. Class A is described as highly unstable and occurs in association with strong surface heating and light winds, leading to intense convective turbulence and much enhanced plume dilution. At the other extreme, class F denotes very stable conditions associated with strong temperature inversions and light winds, which commonly occur under clear skies at night and in the early morning. Intermediate stability classes grade from moderately unstable (B), through neutral (D) to slightly stable (E). Whilst classes A and F are strongly associated with clear skies, class D is linked to windy and/or cloudy weather, and short periods around sunset and sunrise when surface heating or cooling is small. Figure 5-4 shows the stability class percentages from the TAPM-CALMET derived meteorological data for the project site.

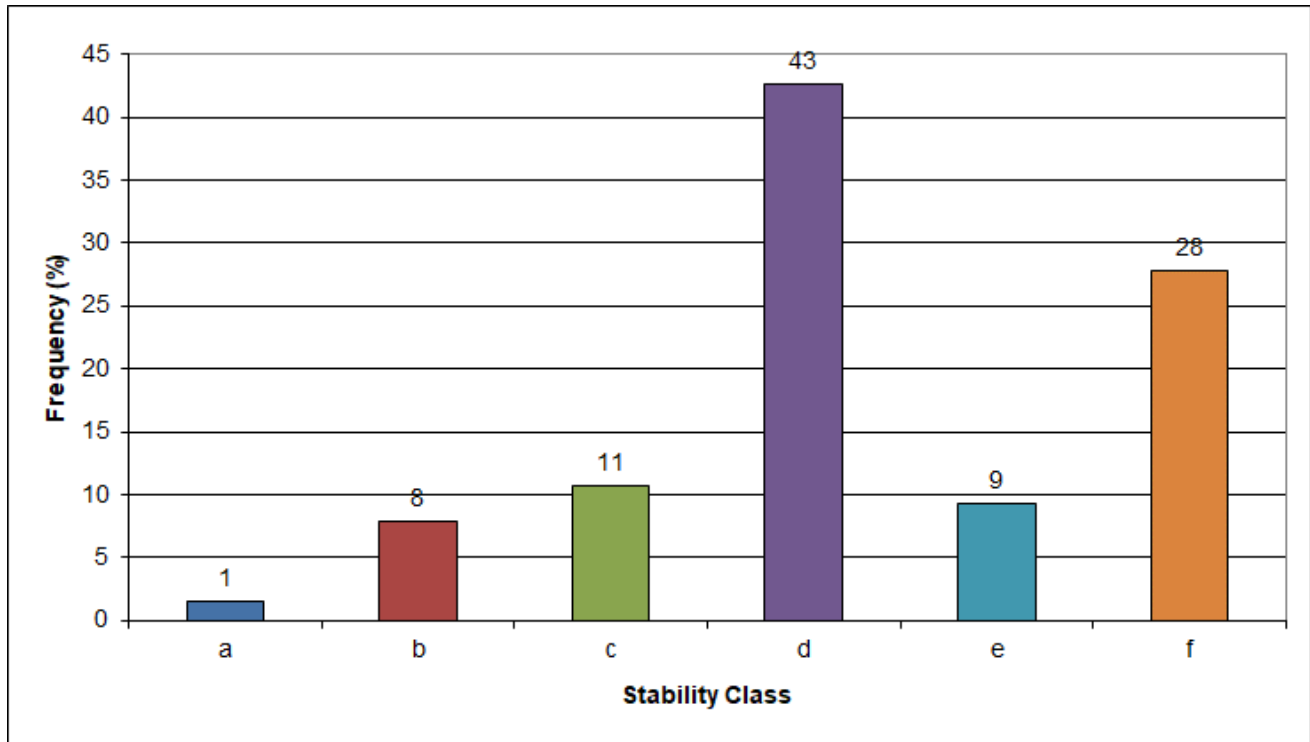


Figure 5-4: Stability Class Percentages for the TAPM-CALMET Derived Data, 2021

5.2.1.3 Mixing Height

Mixing height is defined as the height of the layer adjacent to the ground over which an emitted or entrained inert non-buoyant tracer will be mixed (by turbulence) within a time scale of about one hour or less. Diurnal variations in mixing depths are illustrated in Figure 5-5. As would be expected, an increase in the mixing depth during the morning is apparent, arising due to the onset of vertical mixing following sunrise. Maximum mixing heights occur in the mid to late afternoon, due to the dissipation of ground-based temperature inversions and the growth of the convective mixing layer.

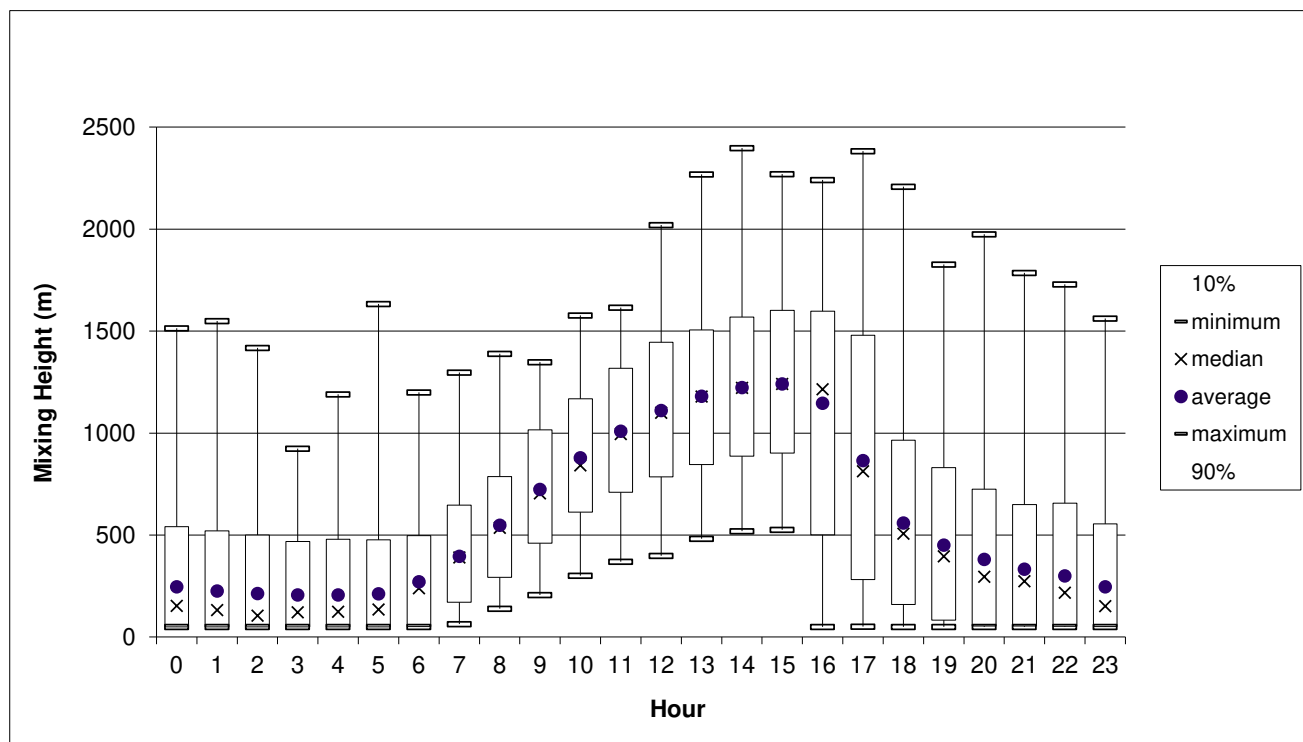


Figure 5-5: Mixing Height of the TAPM-CALMET Derived Data, 2021

5.3 Existing Air Quality

To determine the total effect of emissions within the local area, background concentrations of pollutants should be considered. Ambient monitoring data has been obtained from the Department of Environment, Tourism, Science, Innovation (DETSI) website, raw measured data and annual reports. As specified in the Air quality planning scheme policy, background concentrations of the pollutants of concern have been determined for the most recent five years 2021 to 2025, where data is available.

Background pollutant concentrations were derived from the reported data for the Rocklea, Woolloongabba and Springwood Air Quality Monitoring Stations in the annual Queensland Air Monitoring National Environment Protection (Ambient Air Quality) Measure (AAQ NEPM) reports.

The adopted background data were derived in accordance with the guidance provided in the *Air Quality Planning Scheme Policy*. The adopted background concentrations are shown in Table 5-2 including the source monitoring station and data period.

Table 5-2: Adopted Background Concentrations

Pollutant	Data Source	Period	Highest Annual Average	Max 24 Hour 75 th % ¹	Max 1 Hour 75 th %
			µg/m ³		
PM2.5	Springwood AQMS	2021 - 2025	5.6 ²	7.3	n/a
PM10	Springwood AQMS	2021 - 2025	16.5	23.2	n/a
NO ₂	Springwood AQMS	2021 - 2025	18.4	n/a	45.0
CO	Woolloongabba AQMS	2021 - 2025	n/a	400 ³	n/a
SO ₂	Rocklea AQMS	2021 - 2025	3.1	6.2	33.1

1 75th percentiles conservatively adopted in the absence of reported 70th percentiles.

2 Average of 2021 to 2025 data, as per AQPSP 2014.

3 8-hour average data

6 Assessment Methodology

6.1 Overview

The impact assessment has been carried out as follows:

- An emissions inventory of the primary air pollutants generated by the back-up generator was derived from pollutant emissions limits set for Tier 2 compliant diesel engines and prepared for a maximum continuous 24/7 operating scenario.
- Emissions data was used as input for air dispersion modelling. The modelling techniques were based on a combination of The Air Pollution Model (TAPM) prognostic meteorological model (developed by CSIRO), CALMET and the CALPUFF dispersion model in accordance with the Air quality planning scheme policy.
- Pollutant concentration predictions at receptors including adopted background concentrations have been undertaken to evaluate impacts for the pollutants of concern.
- Assessment of the predicted concentrations at sensitive receptors against the relevant Air quality objectives of the BCC Air Quality Planning Scheme and Industry Code (outlined in Section 4.2).

6.2 Emissions Inventory

Vipac has adopted physical stack data for the modelling assessment from manufacturer specification data for a JEG with a power rating of 1.25MW at 80% load as provided in Appendix D. Emission rates for PM₁₀, PM_{2.5}, CO and NO_x are derived from pollutant emission limits set for Tier 2 diesel engines (*Table 6-1*) and SO₂ emissions based on the 10ppm maximum limit sulphur content of diesel in Australia. Whilst it is acknowledged that Australia does not have the Tier system regulations for non-road diesel engines, the JEG1250BS is built to conform to the Tier 2 standard¹. The manufacturer specification data are provided in Appendix D.

As outlined in section 3, whilst the back-up diesel generator is anticipated to operate for less than 100 hours annually, an extremely conservative emissions scenario representative of continuous operation has been modelled.

Table 6-1: Tier 2 Emissions Limits

Rated Power	Emission Rate (g/kW-h)		
	PM	CO	NO _x + NMHC
kW>900	0.2	3.5	6.4 ¹

1. conservatively adopted as PM_{2.5} and PM₁₀ emissions.

2. adopted as 100% NO_x emissions.

6.3 Modelling Inputs

Table 6-2 outlines the input parameters adopted for the modelling. It is noted that the exhaust is discharged via two stacks.

Table 6-2: Modelled Source Emissions Data

UTM Coordinates (km)		Ht (m)	Diam (m) ²	Vel ¹ (m/s)	Flowrate ¹ (m ³ /s)	Temp (K)	Emission Rate (g/s)				
X	Y						PM _{2.5}	PM ₁₀	CO	NO _x	SO ₂ ²
511829	6952838	2.5	0.2	57.8	1.817	823	0.035	0.035	0.61	1.11	0.0004
511829	6952839	2.5	0.2	57.8	1.817	823	0.035	0.035	0.61	1.11	0.0004

1. Operational data at 80% load

2. Based on 10ppm maximum limit sulphur content of diesel in Australia.

Comparison of the emissions data with the emission based assessment thresholds for modelling specified in the AQPS 2000 (*Table 4-3*) indicates that local level modelling is required for the assessment.

¹ Email communication, Jubilee Energy to Client

6.4 Modelling

6.4.1 Overview

The modelling approach discussed in the following sections is based on a combination of The Air Pollution Model (TAPM) prognostic meteorological model (developed by CSIRO), and the CALMET model suite used to generate a three-dimensional meteorological dataset for use in the CALPUFF dispersion model. The approach aligns with the guidelines outlined in the Air quality planning scheme policy and the CALPUFF modelling guidance (NSW OEH, 2011).

6.4.2 TAPM

A 3-dimensional dispersion wind field model, CALPUFF, has been used to simulate the impacts from the Project. CALPUFF is an advanced non-steady-state meteorological and air quality modelling system developed and distributed by Earth Tech, Inc. The model has been approved for use in the 'Guideline on Air Quality Models' (NSW OEH, 2011) as a preferred model for assessing applications involving complex meteorological conditions such as calm conditions.

To generate the broad scale meteorological inputs to run CALPUFF, this study has used the model The Air Pollution Model (TAPM), which is a 3-dimensional prognostic model developed and verified for air pollution studies by the CSIRO.

6.4.3 CALMET

CALMET is an advanced non-steady-state diagnostic three-dimensional meteorological model with micro-meteorological modules for overwater and overland boundary layers. The model is the meteorological pre-processor for the CALPUFF modelling system.

The CALMET simulation was run as No-Obs simulation (NSW OEH, 2011) with the gridded TAPM three-dimensional wind field data from the innermost grid. CALMET then adjusts the prognostic data for the kinematic effects of terrain, slope flows, blocking effects and three-dimensional divergence minimisation.

6.4.4 CALPUFF

CALPUFF is a non-steady-state Lagrangian Gaussian puff model. CALPUFF employs the three-dimensional meteorological fields generated from the CALMET model by simulating the effects of time and space varying meteorological conditions on pollutant transport, transformation and removal.

Emission sources can be characterised as arbitrarily-varying point, area, volume and lines or any combination of those sources within the modelling domain.

The radius of influence of terrain features was set at 5 km while the minimum radius of influence was set as 0.1 km. The terrain data incorporated into the model had a resolution of 1 arc-second (approximately 30 m) in accordance with the *Generic Guidance and Optimum Model Settings for the CALPUFF Modelling System for Inclusion into the 'Approved Methods for the Modelling and Assessments of Air Pollutants in NSW, Australia'* (NSW OEH, 2011).

The TAPM, CALMET and CALPUFF settings adopted for the modelling are summarised in Table 6-3.

Table 6-3: TAPM, CALMET and CALPUFF settings

Model	Parameter	Setting
TAPM (v4.0.5)	Number of grids (spacing)	30km, 10km, 3km, 1km
	Number of grid points	41 x 41 x 25 (vertical)
	Year of analysis	2021
	Centre of analysis	27.568S; 152.9973 E
	Meteorological data assimilation	Archerfield BoM Station
CALMET (v.6.5.0)	Met grid domain	10km x 10km
	Met grid resolution	0.05km
	Met grid south-west corner	509.310km E, 6950.312km S

	3D Windfield	m3D from TAPM (1 km) input as in initial guess in CALMET
CALPUFF (v6.42)	Method used to compute dispersion coefficients	2 - dispersion coefficients using micrometeorological variables
	Building downwash included	Prime method
	Default settings	All other CALPUFF defaults have been used in line with OEH (2011).

6.5 Other Modelling Parameters

6.5.1 Method for Conversion of Oxides of Nitrogen to Nitrogen Dioxide

Oxides of nitrogen (NO_x) emitted from combustion engines are composed primarily of nitric oxide (NO) and nitrogen dioxide (NO₂). Although NO and NO₂ are reported together as NO_x, they have different characteristics, including different formation mechanisms, measurement techniques, and toxicity. Eventually, all NO emitted is oxidized to NO₂ in the atmosphere in the presence of ozone and sunlight. The reaction takes place over several hours and can result in increased ground level NO₂ concentrations further down-plume (far field) and decreased closer to the source (near field).

As outlined in the Air Quality Planning Scheme, the ozone limiting method has been adopted to estimate the limited conversion of NO_x to NO₂ which is dependent on ambient concentrations of NO₂ and Ozone (O₃). The ozone limiting method is used as follows:

- (i) for the predicted ambient concentrations of NO_x at each receptor location, assume that all NO_x is converted to NO₂ (NO_x-pred in equation below);
- (ii) obtain site-representative continuous 1-hour average measurements of NO₂ and O₃ for the same period as the dispersion modelling predictions (NO₂-bkgd and O₃-bkgd in equation below);
- (iii) determine the total ground-level concentration of NO₂ (NO₂-total in equation below) by estimating according to the following equation, for each hour of the modelling results;
- (iv) apply the following equation to estimate the predicted concentration of NO₂ at the sensitive use or sensitive zone -

$$\text{NO}_2\text{-total} = (0.1 * \text{NO}_x\text{-pred}) + \min\{0.9 * \text{NO}_x\text{-pred or } 46/48 \text{ O}_3\text{-bkgd}\} + \text{NO}_2\text{-bkgd}$$

where:

all concentrations are reported in µg/m³;

46/48 represents the molecular weight of NO₂ divided by the molecular weight of O₃.

- (v) determine the frequency with which the 1-hour average air quality (planning) criteria for NO₂ is exceeded at each sensitive use or sensitive zone with and without the development.

7 Assessment of Impacts

This section presents the results of the air quality impact assessment for predicted ground level concentrations of the pollutants of concern for proposed generator operations at the 11 sensitive receptor locations. Contour plots displaying the spatial predictions of pollutant concentrations in the surrounding environment are provided in Appendix C.

7.1 Model Predictions

Table 7-1 to Table 7-3 provides the model predictions of pollutant concentrations for the diesel generator operating in isolation and with background (cumulative) at the 11 receptors and compares them with the adopted project criteria. As shown in Table 7-1 to Table 7-3, despite the conservatism of the modelling approach, the model predictions are below the project criteria for all pollutants at all of the sensitive receptors modelled.

Table 7-1: Model Predictions for CO and NO₂

Receptor	Max 1 Hour NO ₂	In isolation (µg/m ³)			Max 1 Hour NO ₂	Cumulative (µg/m ³)		
		99.9 th % 1 Hour NO ₂	Annual NO ₂	8 Hour CO		99.9 th % 1 Hour NO ₂	Annual NO ₂	8 Hour CO
SR1	140.8	90.8	6.4	64.5	185.8	135.8	24.8	464.5
SR2	97.6	88.4	8.6	72.9	142.6	133.4	27.0	472.9
SR3	157.5	109.2	9.8	80.8	202.5	154.2	28.2	480.8
SR4	158.0	105.4	9.6	147.6	203.0	150.4	28.0	547.6
SR5	112.2	94.8	5.1	56.7	157.2	139.8	23.5	456.7
SR6	110.5	86.6	4.8	47.3	155.5	131.6	23.2	447.3
SR7	152.3	110.7	8.3	81.9	197.3	155.7	26.7	481.9
SR8	139.4	84.0	6.1	49.9	184.4	129.0	24.5	449.9
SR9	114.4	70.3	4.2	38.1	159.4	115.3	22.6	438.1
SR10	96.0	74.4	7.4	57.1	141.0	119.4	25.8	457.1
SR11	73.9	64.6	6.8	33.2	118.9	109.6	25.2	433.2
DGLC ¹	225	225	n/a	4,375	225	225	n/a	4,375
All areas ²	320	320	n/a	10,000	320	320	n/a	10,000
Criteria ³	n/a	250	62	11,000	n/a	250	62	11,000
Adopted Criteria Achieved	✓	✓	✓	✓	✓	✓	✓	✓

1. AQPSP 2000 Design ground level concentrations for sensitive land uses

2. AQPSP 2000 Goals for all areas

3. AQPSP 2014 Criteria

Table 7-2: Model Predictions for SO₂

Receptor	In isolation (µg/m ³)			Cumulative (µg/m ³)		
	1 Hour SO ₂	24 Hour SO ₂	Annual SO ₂	1 Hour SO ₂	24 Hour SO ₂	Annual SO ₂
SR1	0.20	0.02	0.002	33.3	6.2	3.1
SR2	0.14	0.03	0.003	33.2	6.2	3.1
SR3	0.12	0.03	0.004	33.2	6.2	3.1
SR4	0.32	0.05	0.004	33.4	6.3	3.1
SR5	0.13	0.03	0.002	33.2	6.2	3.1
SR6	0.13	0.02	0.002	33.2	6.2	3.1
SR7	0.15	0.04	0.003	33.3	6.2	3.1

Receptor	In isolation ($\mu\text{g}/\text{m}^3$)			Cumulative ($\mu\text{g}/\text{m}^3$)		
	1 Hour SO_2	24 Hour SO_2	Annual SO_2	1 Hour SO_2	24 Hour SO_2	Annual SO_2
SR8	0.26	0.02	0.002	33.4	6.2	3.1
SR9	0.20	0.01	0.002	33.3	6.2	3.1
SR10	0.08	0.02	0.003	33.2	6.2	3.1
SR11	0.13	0.02	0.003	33.2	6.2	3.1
DGLC¹	570	230	57	570	230	57
All areas²	598	n/a	n/a	598	n/a	n/a
Criteria³	598	n/a	n/a	598	n/a	n/a
Adopted Criteria Achieved	✓	✓	✓	✓	✓	✓

1. AQPSP 2000 Design ground level concentrations for sensitive land uses
2. AQPSP 2000 Goals for all areas
3. AQPSP 2014 Criteria

Table 7-3: Model Predictions for PM_{2.5} and PM₁₀

Receptor	In isolation ($\mu\text{g}/\text{m}^3$)				Cumulative ($\mu\text{g}/\text{m}^3$)			
	24 Hour PM _{2.5}	Annual PM _{2.5}	24 Hour PM ₁₀	Annual PM ₁₀	24 Hour PM _{2.5}	Annual PM _{2.5}	24 Hour PM ₁₀	Annual PM ₁₀
SR1	2.0	0.2	2.0	0.2	9.3	5.8	25.2	16.7
SR2	2.6	0.3	2.6	0.3	9.9	5.9	25.8	16.8
SR3	2.9	0.3	2.9	0.3	10.2	5.9	26.1	16.8
SR4	4.5	0.3	4.5	0.3	11.8	5.9	27.7	16.8
SR5	2.3	0.2	2.3	0.2	9.6	5.8	25.5	16.7
SR6	1.9	0.2	1.9	0.2	9.2	5.8	25.1	16.7
SR7	3.2	0.3	3.2	0.3	10.5	5.9	26.4	16.8
SR8	1.6	0.2	1.6	0.2	8.9	5.8	24.8	16.7
SR9	1.1	0.1	1.1	0.1	8.4	5.7	24.3	16.6
SR10	1.6	0.2	1.6	0.2	8.9	5.8	24.8	16.7
SR11	1.3	0.2	1.3	0.2	8.6	5.8	24.5	16.7
DGLC¹	25	8	50	25	25	8	50	25
All areas²	25	n/a	50	n/a	25	n/a	50	n/a
Criteria³	n/a	n/a	150	n/a	n/a	n/a	150	n/a
Adopted Criteria Achieved	✓	✓	✓	✓	✓	✓	✓	✓

1. AQPSP 2000 Design ground level concentrations for sensitive land uses
2. AQPSP 2000 Goals for all areas
3. AQPSP 2014 Criteria

8 Conclusion

An air quality assessment has been carried out for the back-up diesel generator proposed for the Woolworths CFC at 11 Interchange PI, Rochedale, Qld.

As summarised in Table 8-1, the results of the modelling have shown that the predictions comply with the relevant criteria and averaging periods at all receptors modelled.

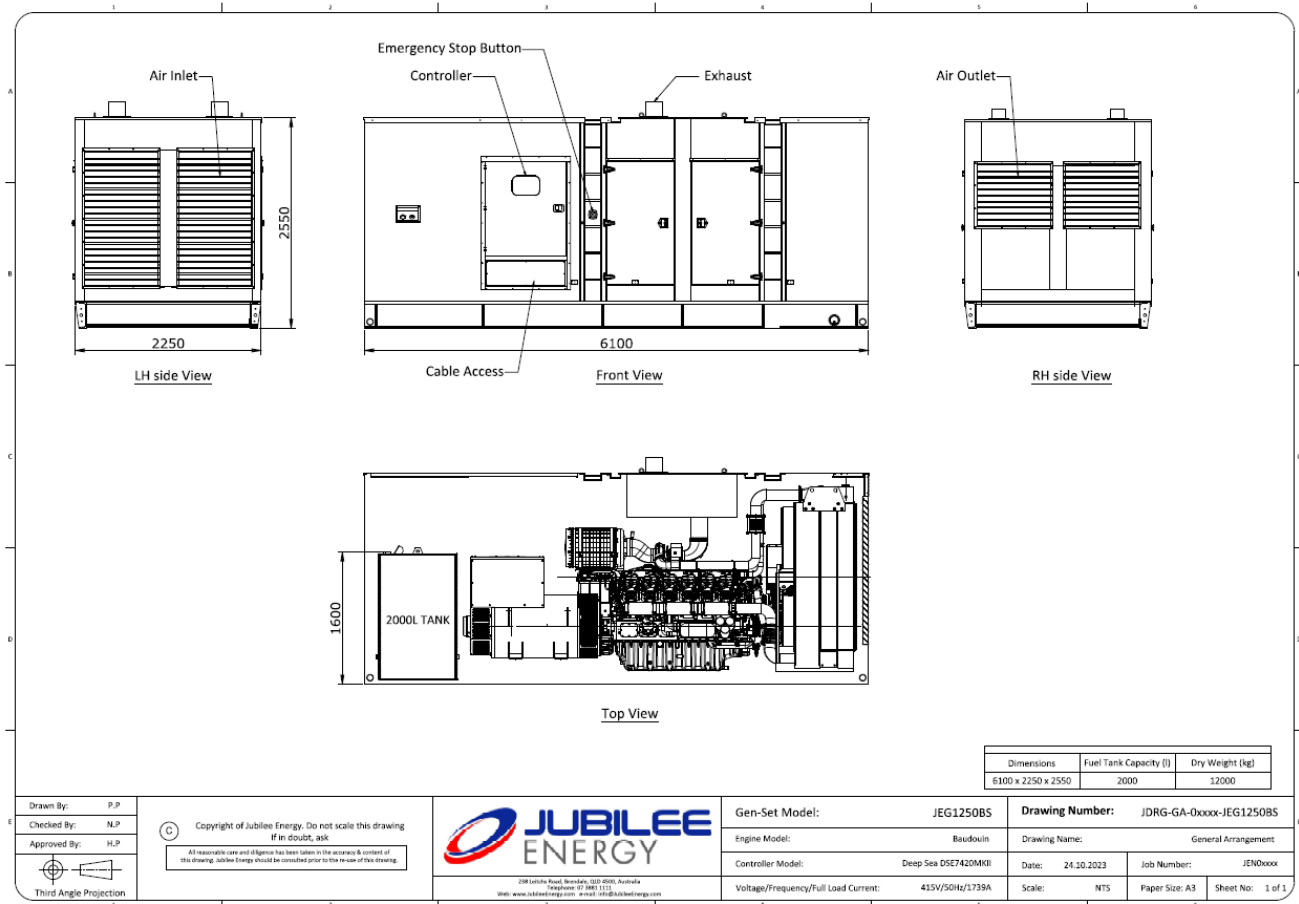
Based on the dispersion modelling outcomes, it is therefore demonstrated that air quality impacts at surrounding sensitive and general land uses are within acceptable limits and that the requirements of Performance Outcome PO1 of the Industry Code are expected to be achieved.

Table 8-1: Model Predictions at the Worst-Affected Receptor

Pollutant	Averaging Period	DGLC ¹ ($\mu\text{g}/\text{m}^3$)	Goals for all areas ² ($\mu\text{g}/\text{m}^3$)	Criteria ³ ($\mu\text{g}/\text{m}^3$)	Maximum Prediction at the Worst-Affected Receptor ($\mu\text{g}/\text{m}^3$)		Compliant
					In isolation	Cumulative	
PM2.5	24 hour	25	25	25	4.5	11.8	✓
	Annual	n/a	n/a	8	0.3	5.9	✓
PM10	24 hour	50	150	50	4.5	27.7	✓
	Annual	n/a	n/a	25	0.3	16.8	✓
CO	8 hour	4,375	10,000	11,000	147.6	547.6	✓
NO ₂	1 hour	225	328	250	110.7 (158.0)	155.7 (203.0)	✓
	Annual	n/a	n/a	62	9.8	28.2	✓
SO ₂	1 hour	598	598	570	0.32	33.4	✓
	24 hour	n/a	n/a	230	0.05	6.3	✓
	Annual	n/a	n/a	57	0.004	3.1	✓

1. AQPSP 2000 Design ground level concentrations for sensitive land uses
2. AQPSP 2000 Goals for all areas
3. AQPSP 2014 Criteria
4. Maximum predictions for comparison with AQPSP 2000 DGLC and goals.

Appendix A General Arrangement



Appendix B Selection of Representative Meteorological Year

Selection of Representative Meteorological Year Meteorological data collected over the period 2020-2024 at Archerfield Airport AWS (Station ID 040211), located approximately 11 km to the west of the proposed site, was analysed to select a single representative year for dispersion modelling.

The analysis compared the annual and monthly data distributions against the 5-year averages for key parameters, including wind rose patterns (direction and speed), average monthly wind speed, and average monthly temperature.

The results showed that data collected during the 2021 calendar year exhibited the closest similarity with the 5-year averages.

Supporting analysis is presented in Figures B-1 to B-3.

Figure B-1 presents the average monthly wind speeds for each year as well as the 5-year monthly average, Figure B-2 presents the average monthly temperature for each year along with the 5-year monthly averages, and Figure B-3 presents the annual wind roses for each year (2020 – 2024) for the Archerfield Airport AWS.

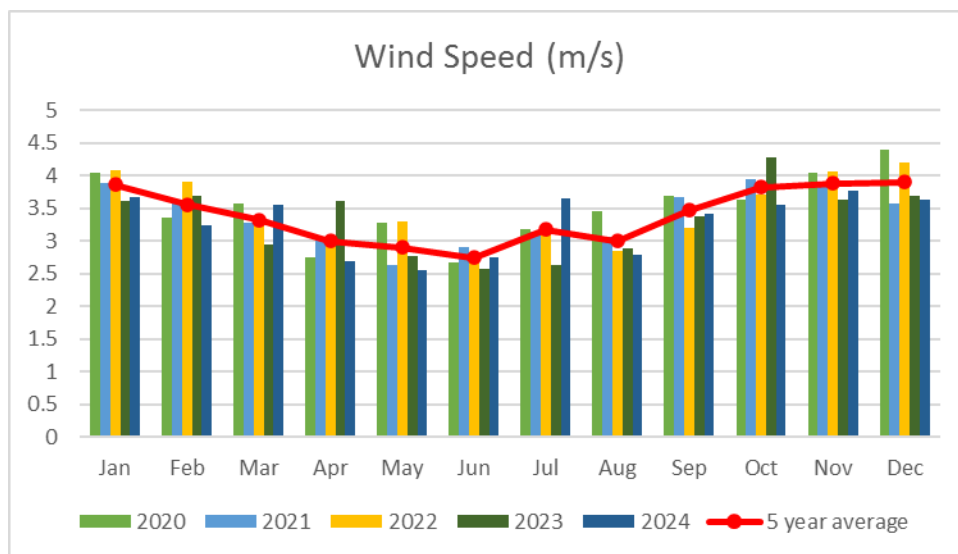


Figure B-1: Monthly Average Wind Speeds at Archerfield Airport AWS, 2020-2024

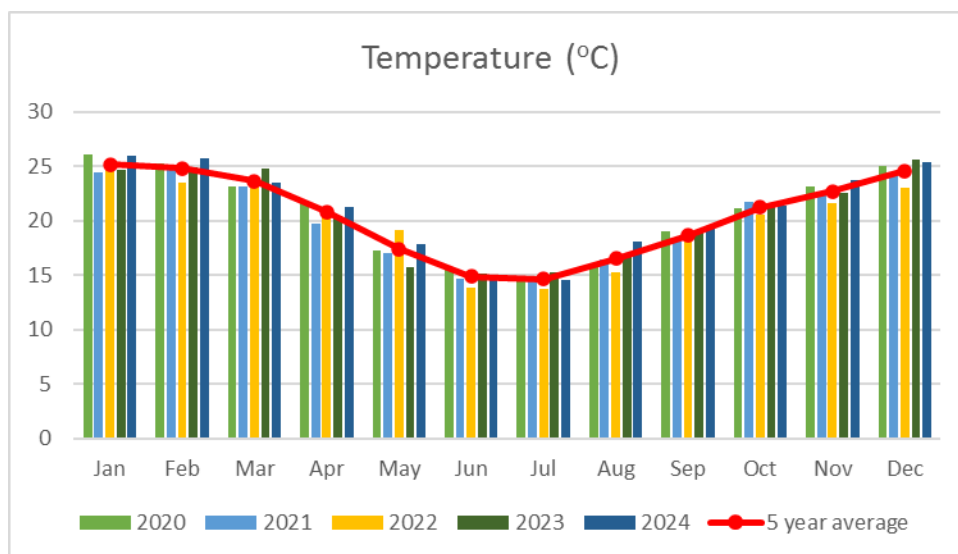
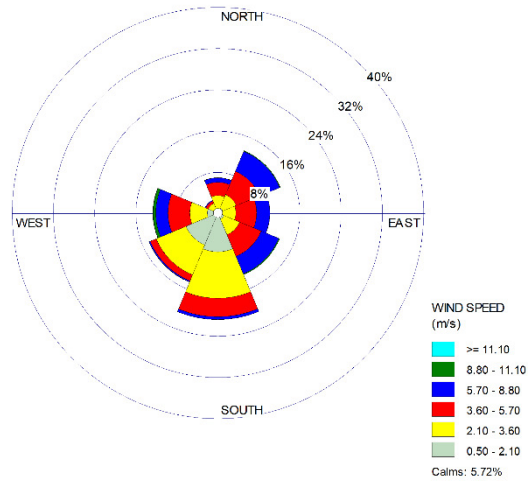
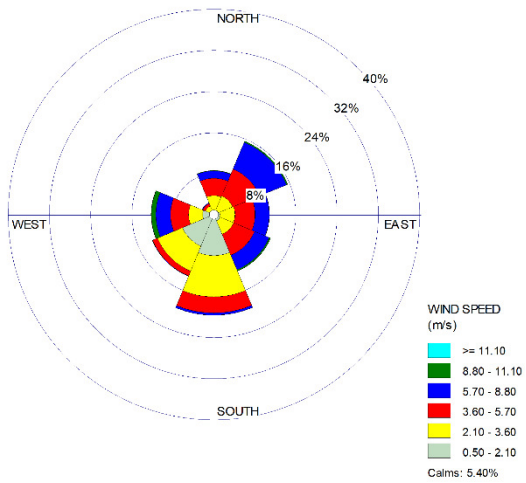


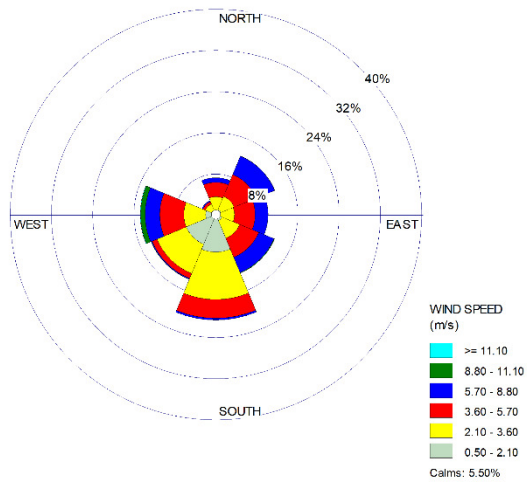
Figure B-2: Monthly Average temperatures at Archerfield Airport AWS, 2020-2024



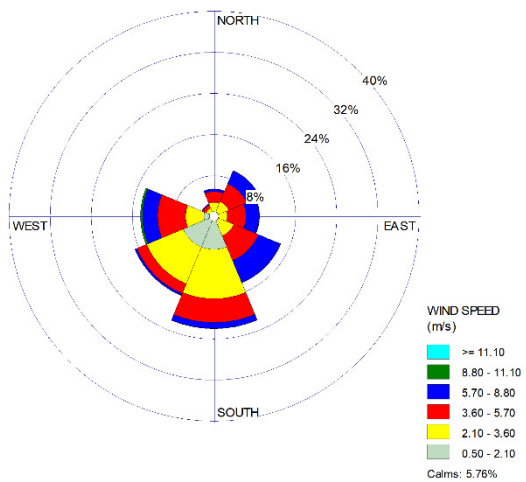
2020 - 2024



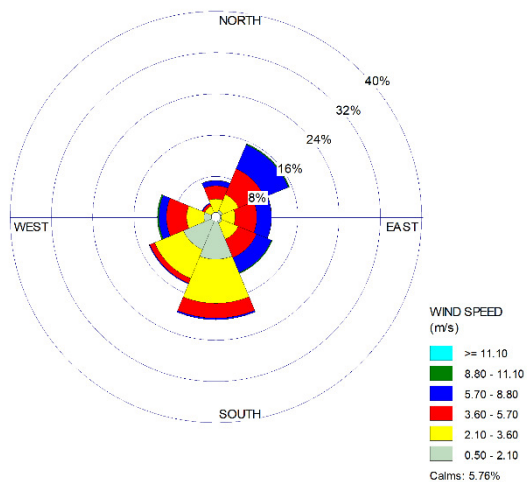
2020



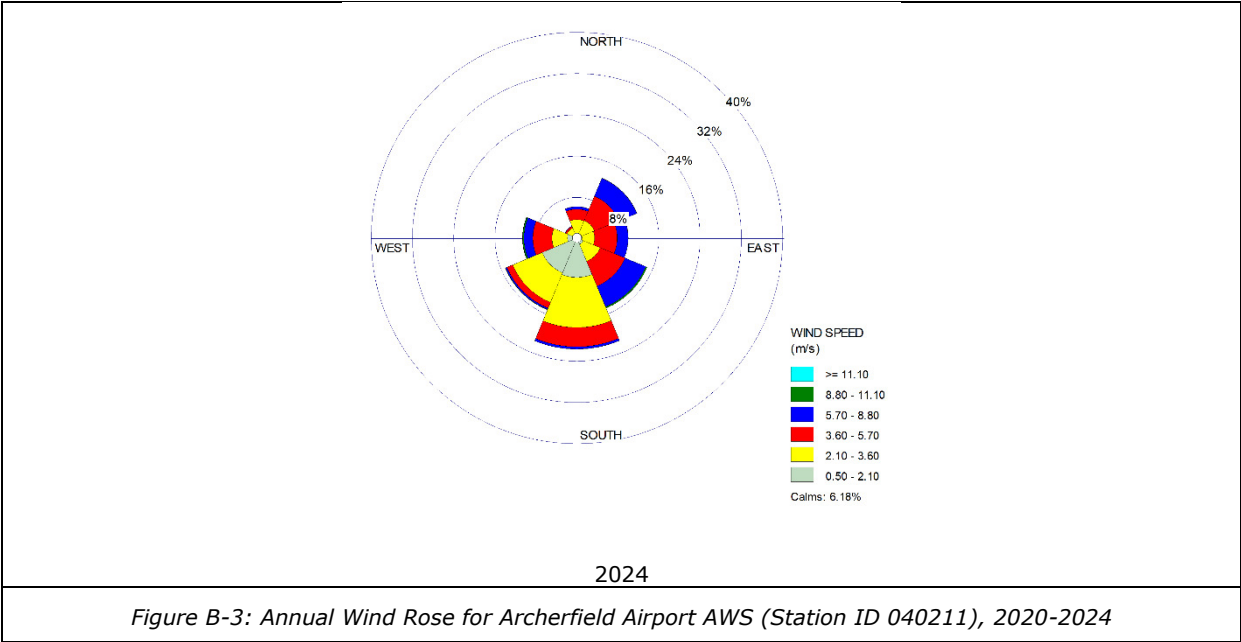
2021



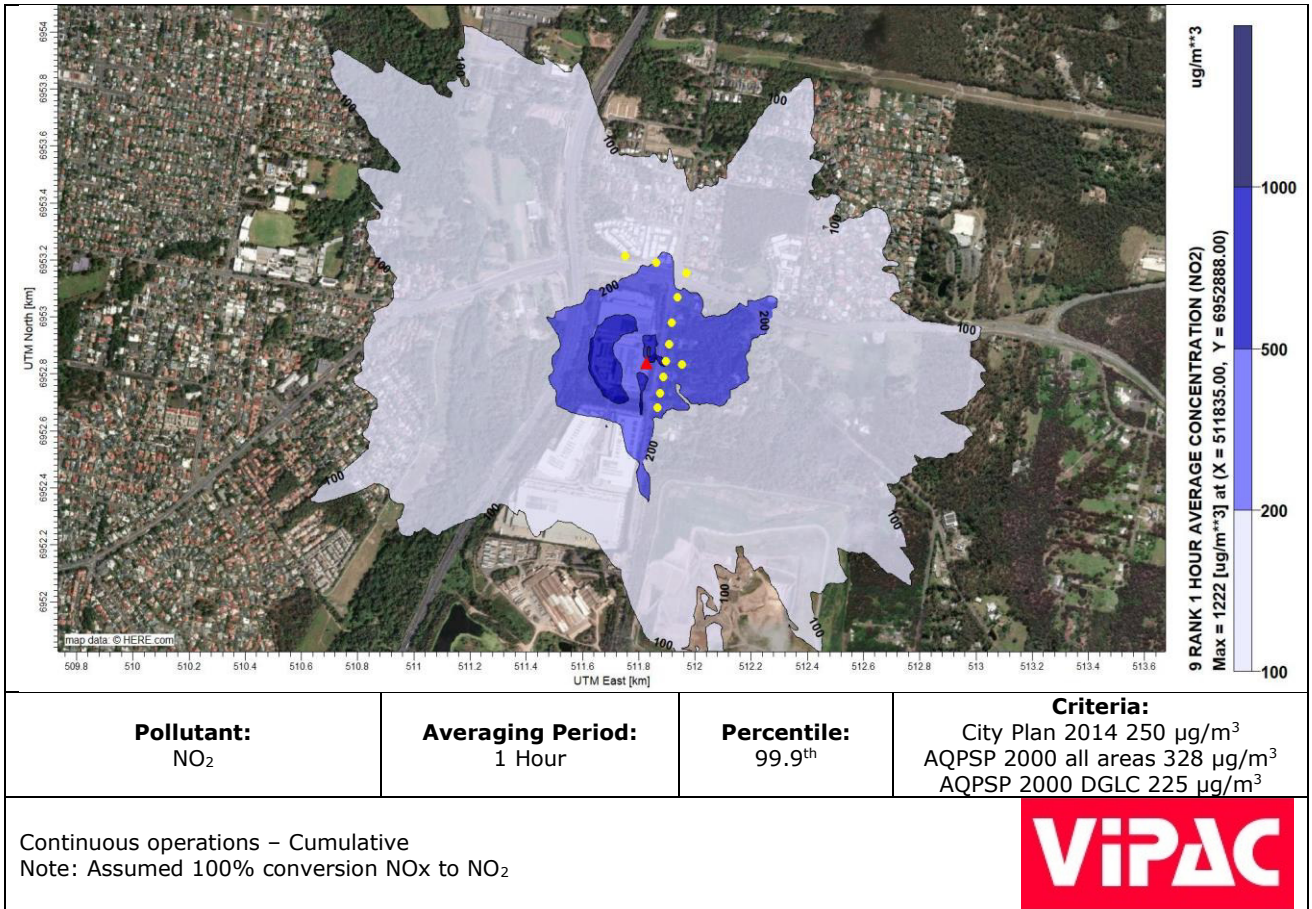
2022

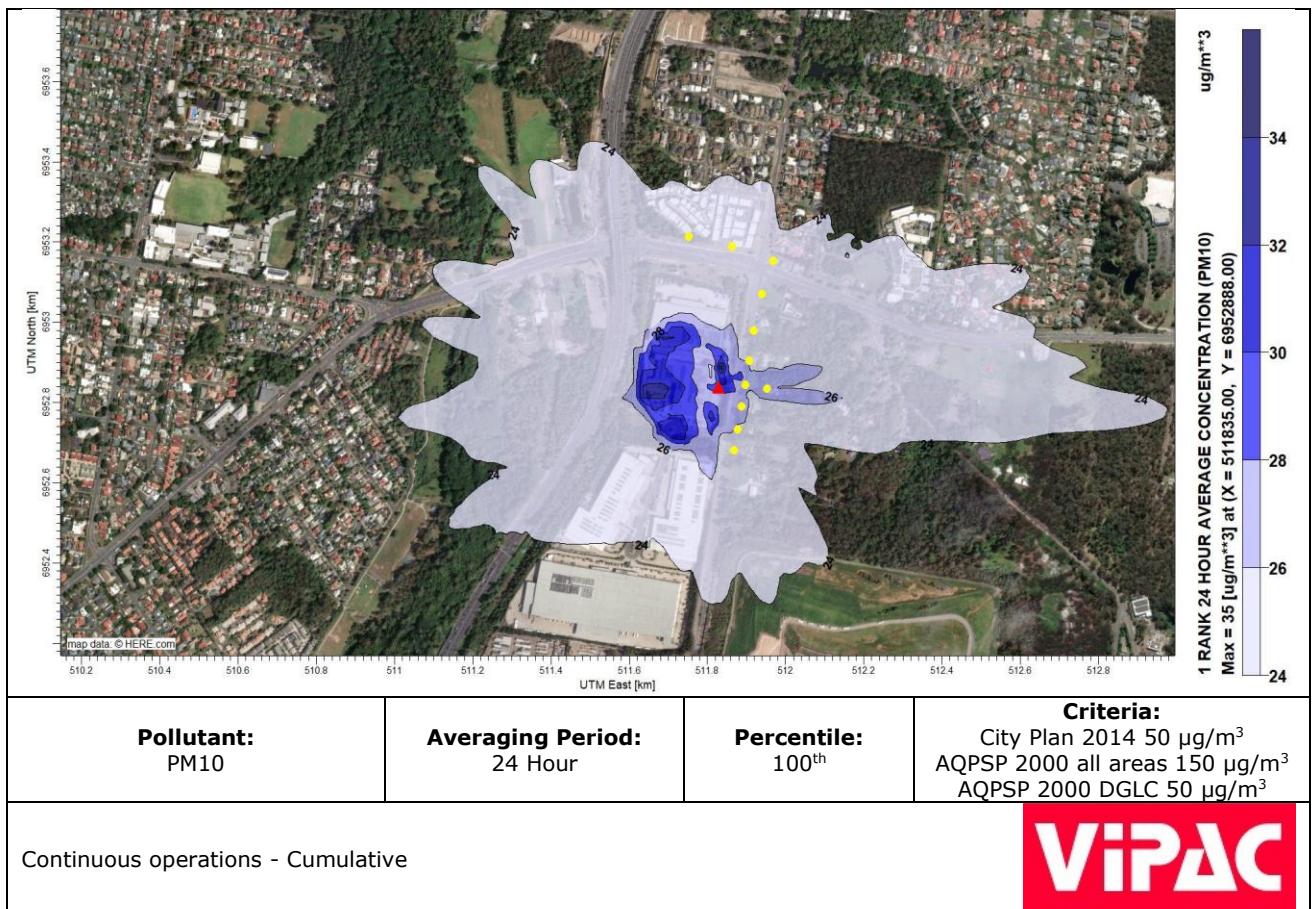
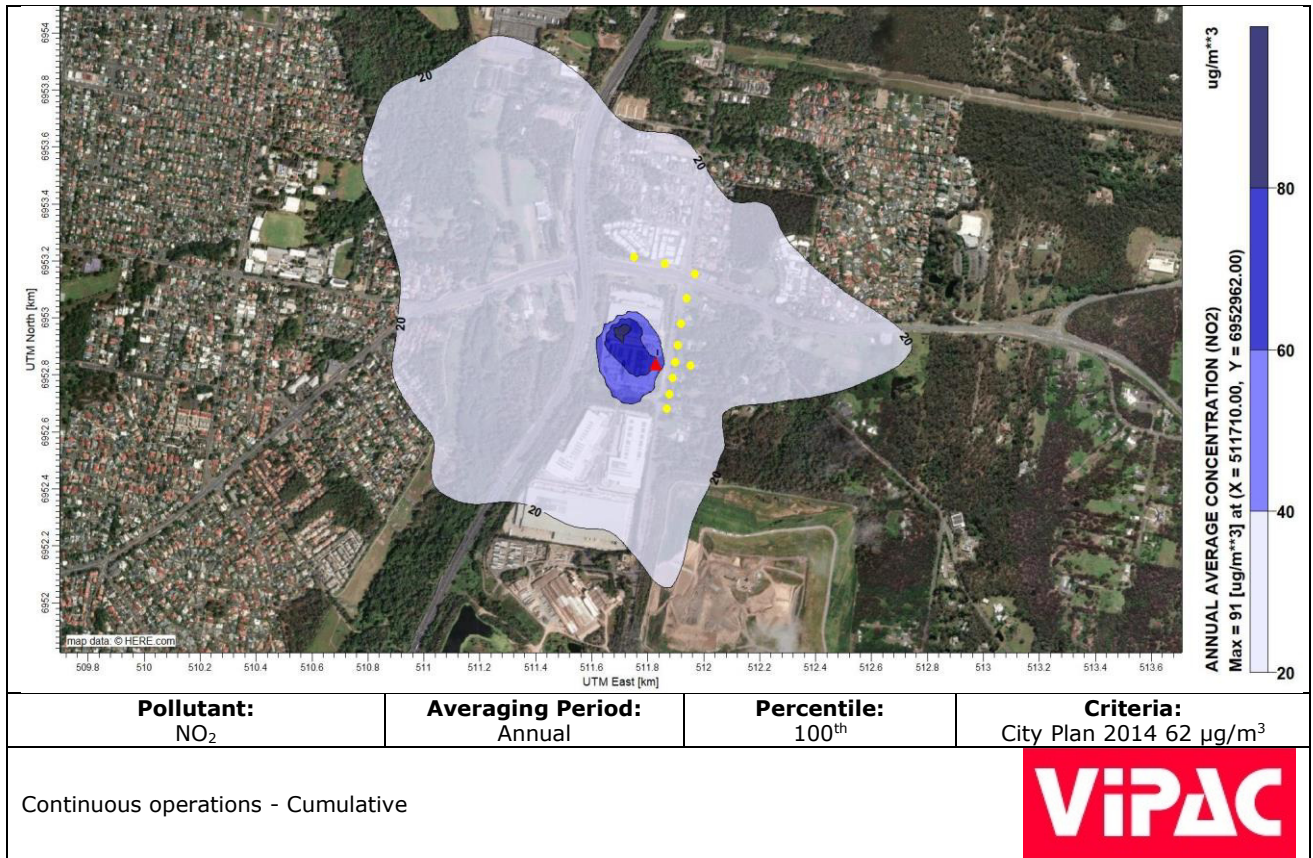


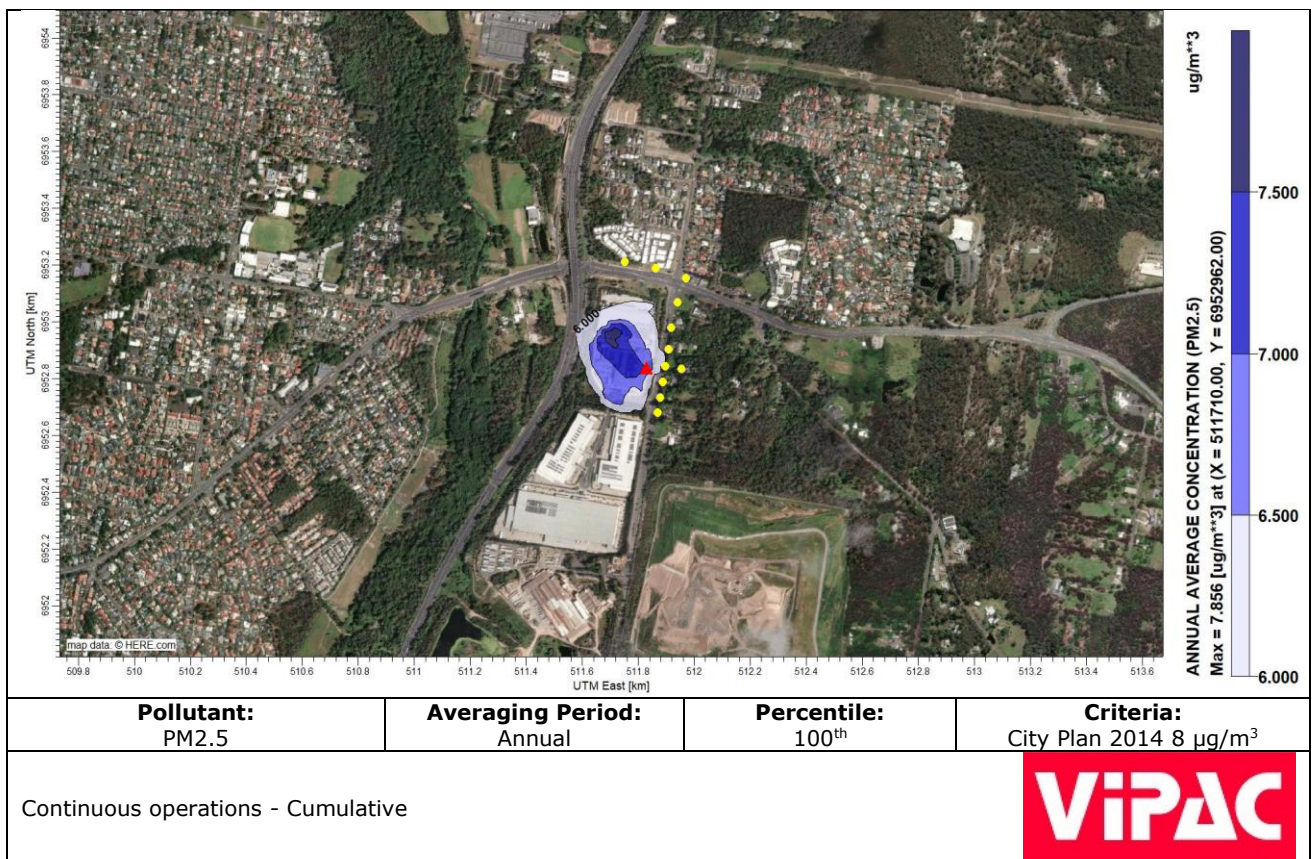
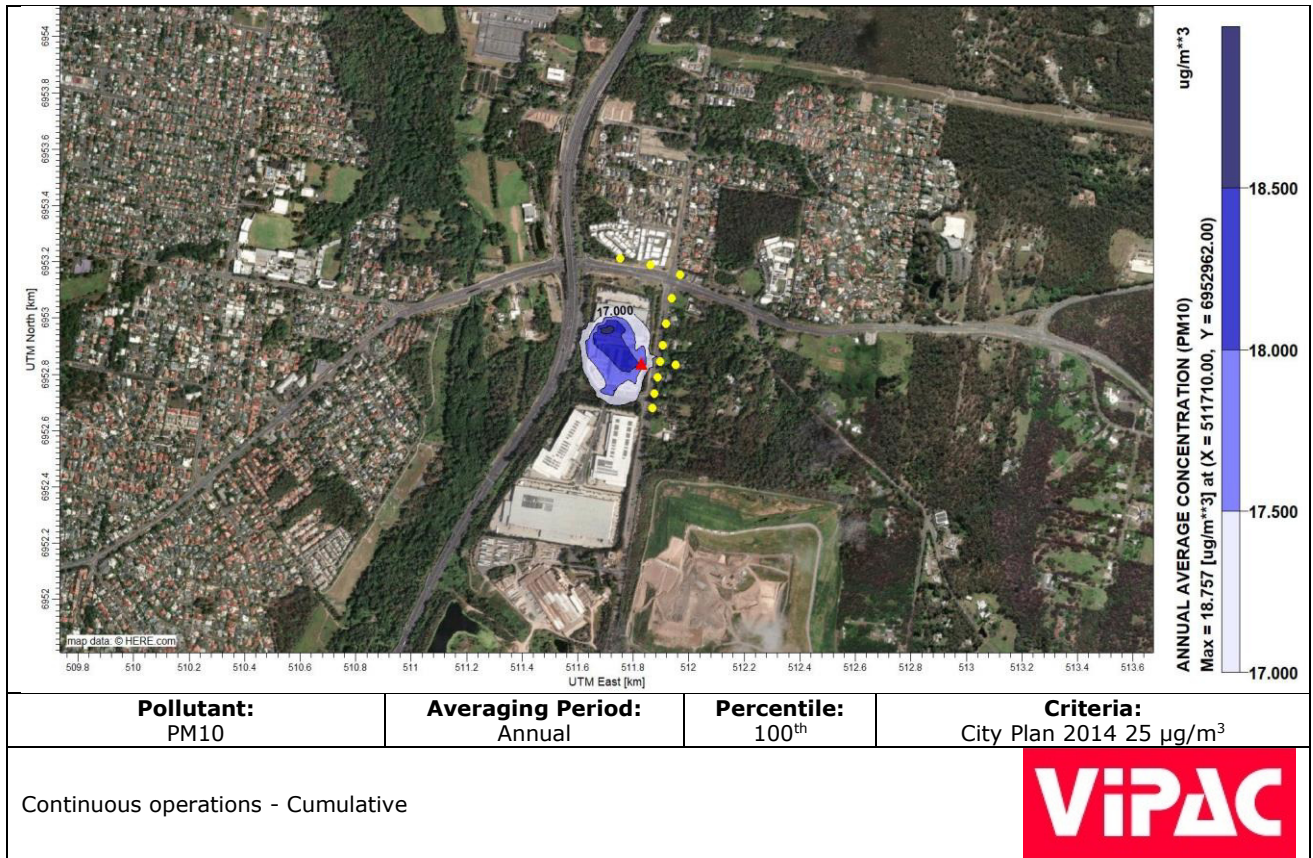
2023

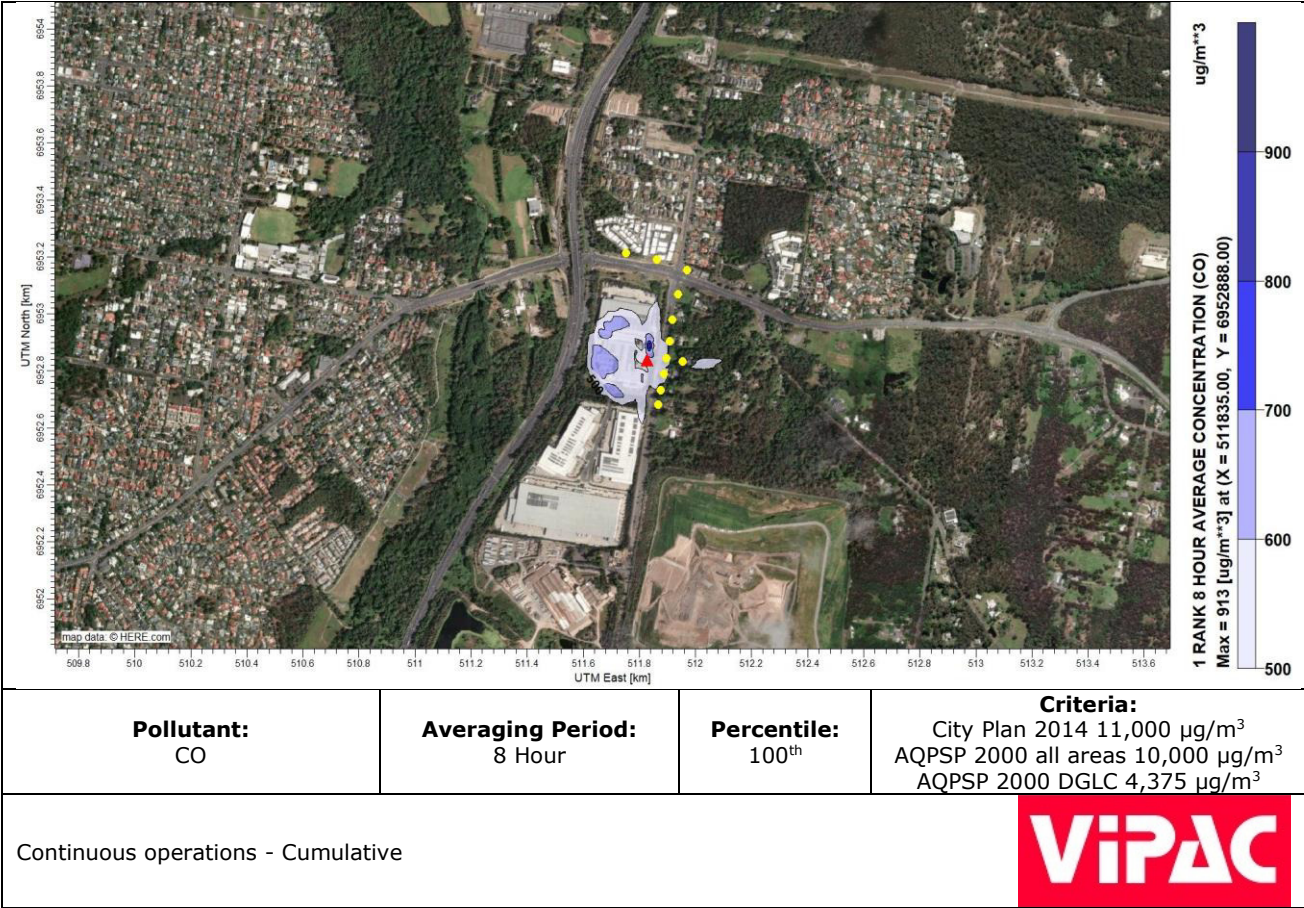


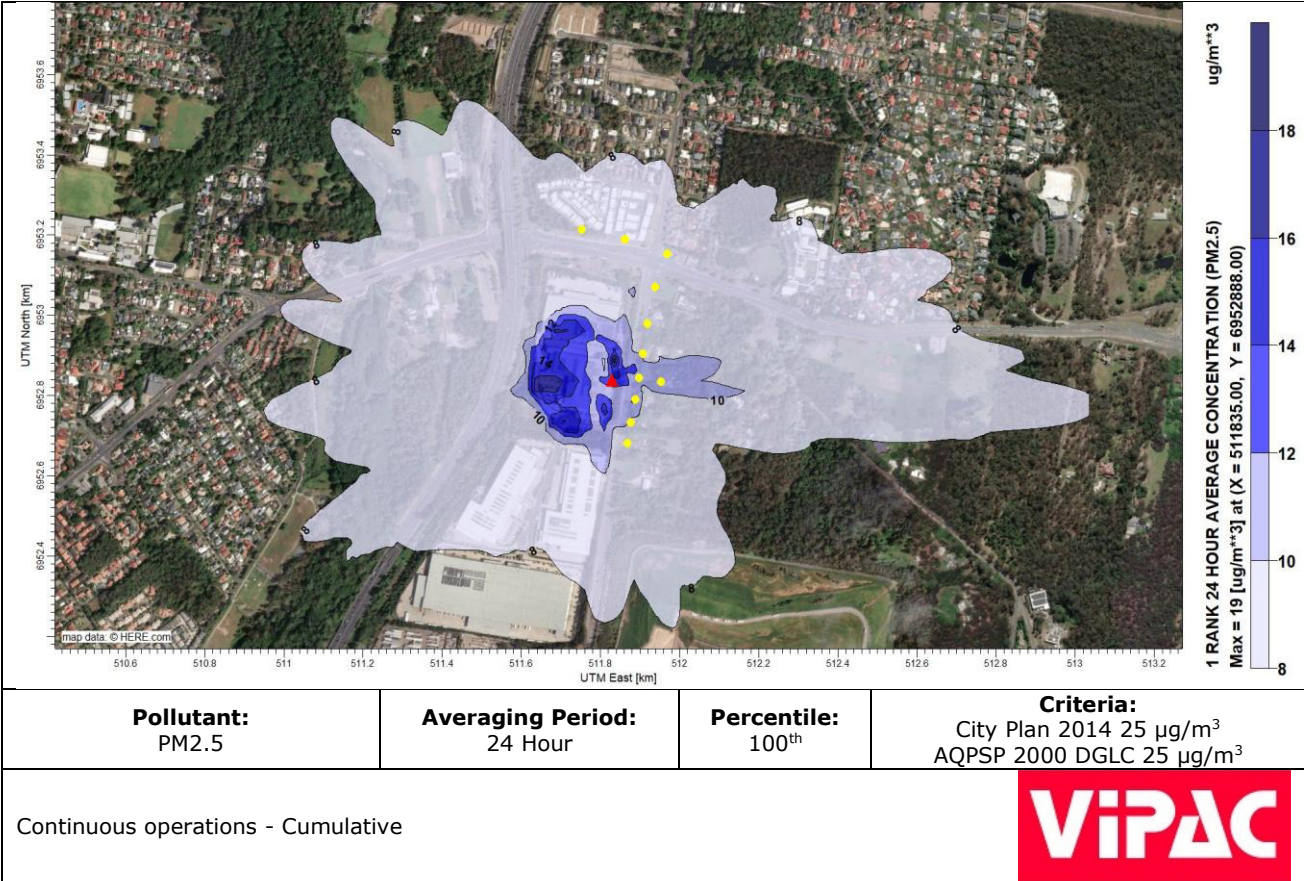
Appendix C Contour Plots

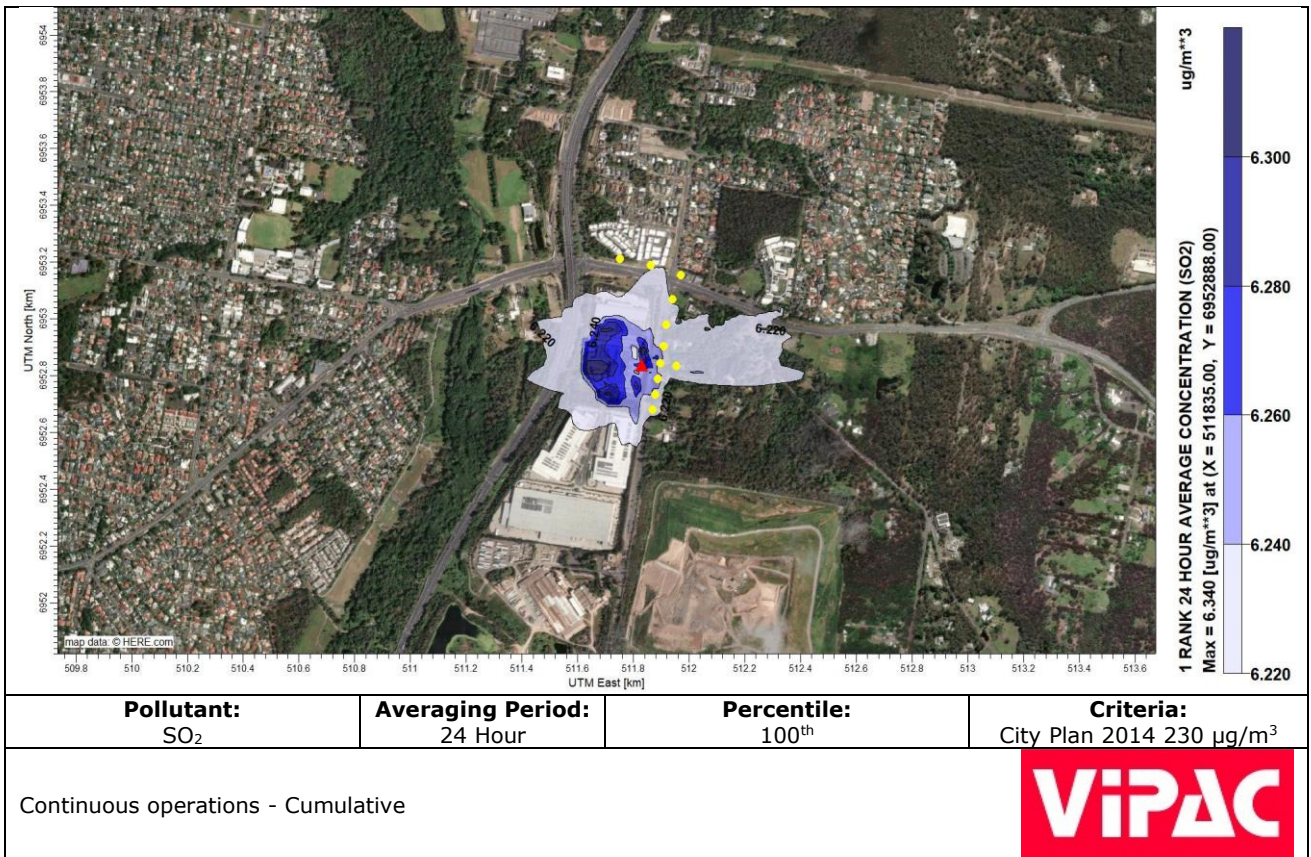
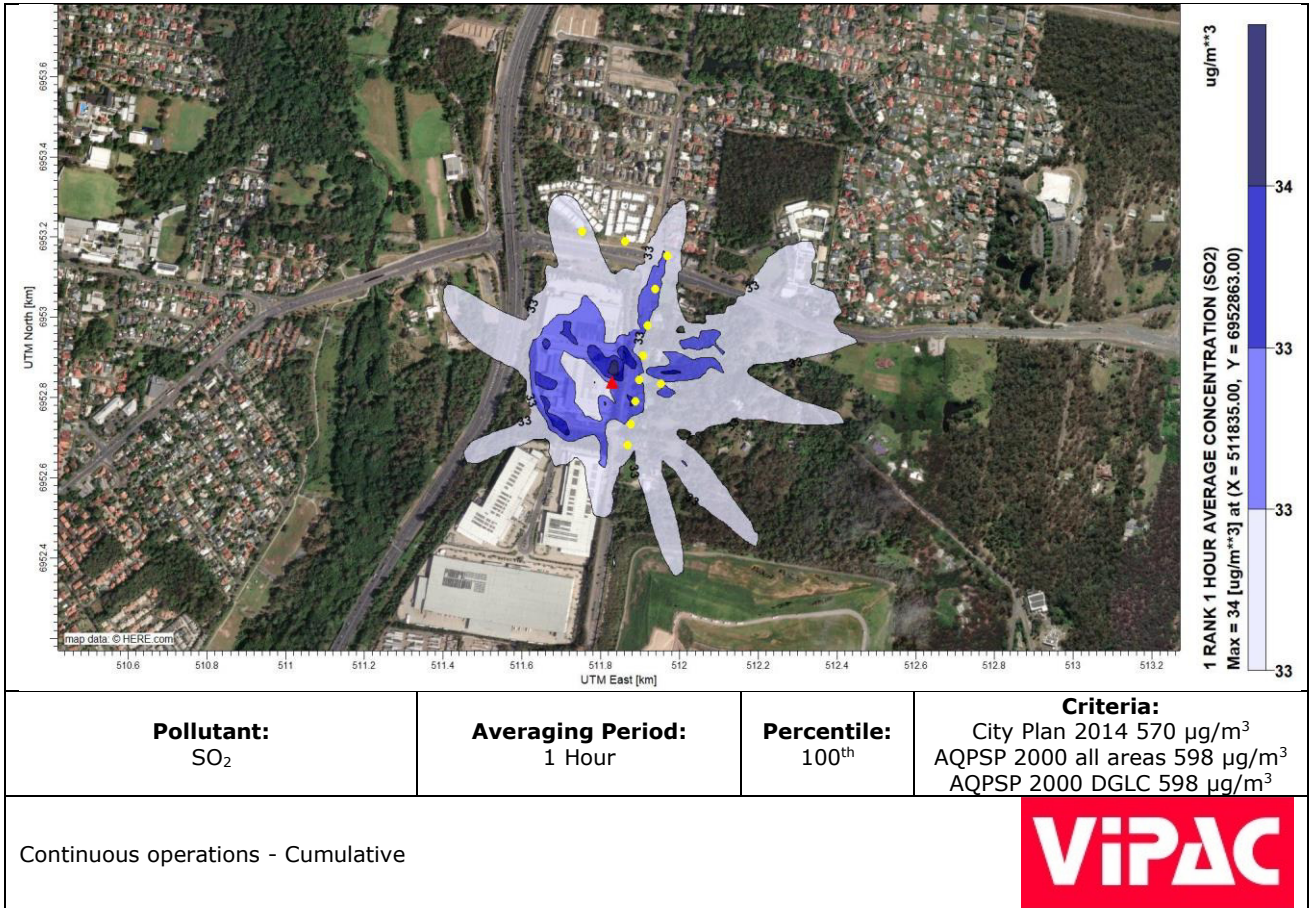












Appendix D Manufacturer Specifications



Woolworths CFC Rochedale Generator

1250 kVA / 1000 kW Prime Rated
BS RANGE



Model: JEG1250BS



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1300 JUB NRG
JubileeEnergy.com



Technical Data

v22.04

Baudouin 12M33G1400/5	Mecc Alte ECO43-2L4A	Phase Three	Type Enclosed	Model Number JEG1250BS
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RATINGS	PRIME POWER (PRP)			STANDBY POWER (ESP)		
Voltage	kVA	kWe	Amps	kVA	kWe	Amps
380/220	1250	1000	1900	1375	1100	2090
400/230	1250	1000	1800	1375	1100	1980
415/240	1250	1000	1737	1375	1100	1911

Power Definition

Prime Power (PRP) is the power continuously available at variable load in lieu of mains power. An overload of 10% is permitted for one hour in every 12 hours of operation.

Standby Power (ESP) is the maximum output available for up to a maximum of 500 hours per year. No overload is permitted.

Standard Conditions: air inlet temperature of 40°C, barometric pressure of 100 kPa (110 m.a.s.l.) relative humidity of 30%.

Note: All ratings data based on operation under ISO 8528-1 and ISO 3046-1. The above ratings may be subject to deration at different ambient temperatures or site altitude conditions.



Scope of Supply

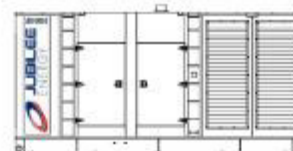
- Water cooled Baudouin diesel engine at 1500rpm
- Single bearing Mecc Alte alternator
- Radiator with coolant expansion bottle
- Fully guarded engine-driven fan
- Bunded baseframe fuel tank
- Heavy duty rubber anti-vibration mounts
- 24V starter batteries, tray and connecting cables
- Battery charger and Battery Isolator switch
- Spin on Oil and Fuel filters and dry type Air filter
- Sump Drain Kit
- Automatic Mains Failure controller with protections
- Main line circuit breaker
- Emergency Stop buttons
- Sound attenuated canopy with centre lift / fork slots
- Industrial silencer with rain flap
- Factory Test Certificate and Pre-delivery service
- Operation Manual

Typical Enclosed Generator Sound Pressure Level in Free Field Conditions

dB(A) @ 1m	82.8	dB(A) @ 7m	73.5
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Dimensions and Weight

Length (L)	6100 mm
Width (W)	2250 mm
Height (H)	2550 mm
Dry Weight	12000 kg



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JEG1250BS

v22.04

ENGINE & COOLING TECHNICAL DATA BAUDOUIN 12M33G1400/5

	DESCRIPTION	VALUE	UNITS
GENERAL	Engine Speed	1500	rpm
	Number of Cylinders	12	Inline
	Aspiration	Turbocharged & Aftercooled	
	Bore / Stroke	150 / 185	mm
	Displacement	39.2	litres
	Governor	Electronic	-
FUEL	Fuel Consumption at 110% Power	243	litres/hr
	Fuel Consumption at 100% Power	217	litres/hr
	Fuel Consumption at 75% Power	160	litres/hr
	Fuel Consumption at 50% Power	108	litres/hr
	Fuel Consumption at 25% Power	59	litres/hr
	Special Fuel Tank Capacity	2000	litres
AIR	Maximum Air Intake Restriction (Clean Filter)	≤30	mBar
	Maximum Air Intake Restriction (Contaminated Filter)	≤65	mBar
	Engine Air Intake Flow @ PRP	77.7	m ³ /min
EXHAUST	Exhaust Gas Flow @ PRP	218	m ³ /min
	Exhaust Gas Temperature	≤550	°C
	Maximum Exhaust Back Pressure	75	mBar
	Recommended Exhaust Pipe Diameter	200	mm
COOLING	Maximum Restriction to Cooling Air Flow	175	Pa
	Maximum Coolant Temperature	103	°C
	Cooling Fan Airflow	1140	m ³ /min
	Coolant Capacity	83	litres
	Thermostat Adjusting Temperature Range	77 - 87	°C
OIL	Total Oil Capacity	160	litres
	Typical Oil Pressure at Rated Speed	4-6.5	Bar
	Maximum Oil Temperature in Oil Pan	105	°C
ELEC	Electrical System Voltage	24	V
	Battery Type	AGM	-
	Starter Power	10	kW

ALTERNATOR TECHNICAL DATA MECC ALTE ECO43-2L4A

	DESCRIPTION	VALUE
GENERAL	Operating Temperature	40 °C
	Coupling	Direct
	Number of Bearings	Single
	Phase / Poles	3 Phase / 4 Pole
	Power Factor	Cos ϕ = 0.8
	Excitation	Self Excited
	Insulation System	Class H
	Protection Grade	IP23
	Voltage Regulation	± 1.0%

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