EMERGENCY GENERATOR AIR QUALITY IMPACT SCREENING ASSESSMENT

Proposed Data Centre
1 Sirius Road
Lane Cove West NSW 2066

Prepared for:

A W Edwards Pty Limited
Level 1, 131 Sailors Bay Road
NORTHBRIDGE NSW 2063

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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 A W Edwards Pty Limited (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
630.12671.00400-R01-v5.0	13 March 2020	Jason Shepherd	Ali Naghizadeh / Judith Cox	Jason Shepherd
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1 Introduction

SLR Consulting Australia Pty Ltd (SLR Consulting) has been engaged by Greenbox Architecture to assess the potential impacts of the operation of emergency generators servicing the proposed Air Trunk Data Centre, at 1 Sirius Road, Lane Cove West, New South Wales (NSW) 2066 (the Project).

This Air Quality Impact Screening Assessment (AQISA) forms part of the supporting documentation for the Development Application (DA) for the Proposal.

2 Project Overview

The Development is located at 1 Sirius Road, Lane Cove West, NSW 2066 and comprises the property title Lot 1 on DP 1151370 (the site). The site (**Figure 2**) is within the local government area of Lane Cove Council (Council). The Development Site is zoned IN2 Light Industry in the Lane Cove Local Environment Plan 2009, as are the Lots surrounding the site (**Figure 3**).

2.1 Standby Generators

The Project includes uninterruptible power supplies (UPS) with battery back-up for power conditioning and short-term interruptions, however, standby generators are required to ensure ongoing operation if the mains grid electricity supply is interrupted for more than a few minutes. The function of the standby generators is to provide power when there is an unexpected interruption of mains grid electricity.

In general, power interruptions last anything from a few seconds to a few hours and therefore even when required the generators would only operate for a short time. It is anticipated that the generators would only be required for a few hours per month, potentially concentrated around the summer months, when high power demands (air conditioning) can lead to power shedding.

The Project is anticipated to incorporate 116 standby generators. The generators are to be located along the east, west and north walls of the building, on five levels. The design drawings that present the distinct locations of the standby generators are provided in **Appendix A**.

Table 1 provides the proposed testing regime for which this AQISA is based.

Table 1 Proposed Generator Testing Regime

Parameter	Value
Run time per test	20 minutes
No of generators per test	2 (non-concurrent)
Run time per day	40 minutes
Testing schedule	Monday to Friday (daylight hours), 52 weeks per year
Total testing time	174 hour/year

This AQISA assumes that each generator would be tested for a period of 20 minutes, with generators not tested within the same hour.

2.2 Power Supply and Outage

The Project power supply is fed directly from the Ausgrid Lane Cove switchyard at 132kV. The Lane Cove 132kV switchyard has 4 bus section with 6 x 132kV feeders suppling power to the bus sections that feed the site. It would require a major failure of the 132kV Electrical transmission infrastructure to create a long-term generator event. In the event of a line failure in the switchyard, the generators would run for a 10-minute programmed sequence.

Recent average down time of Low Voltage supply in Lane Cove currently sits a 117 minutes so the maximum operating time of our Generators (fed by High Voltage) will unlikely surpass this time limit at any one emergency event.

Reliability of electricity distribution networks is measured by the system average interruption duration index (SAIDI) and the system average interruption frequency index (SAIFI). With regard to SAIDI, the Australian Energy Regulator (AER) has found that a typical customer experiences around 200 minutes of outages per year – including planned and unplanned outages (**Figure 1**) (Energy Networks Australia, 2020). For NSW the average is generally less than this, with a maximum of less than 500 minutes (less than 9 hours) in 2014-15.

Figure 1 AER Unplanned SAIDI by State

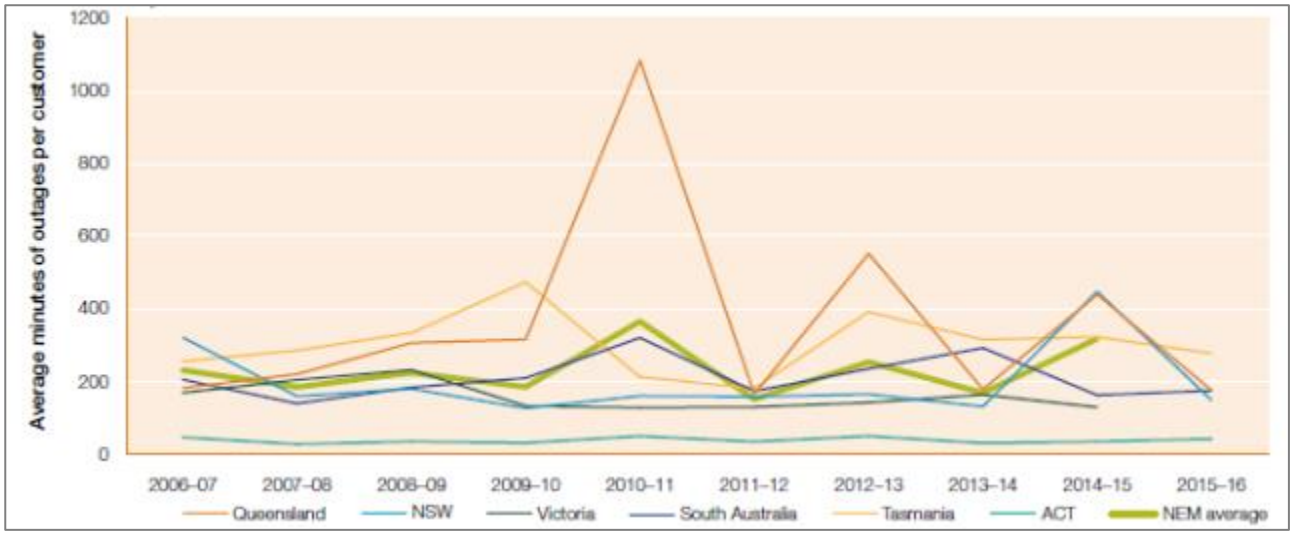


Figure 2 Location of Proposed Development

Source: Google Map Accessed 17/12/2018

Figure 3 Land Zoning Map

Lane Cove Local Environmental Plan 2009

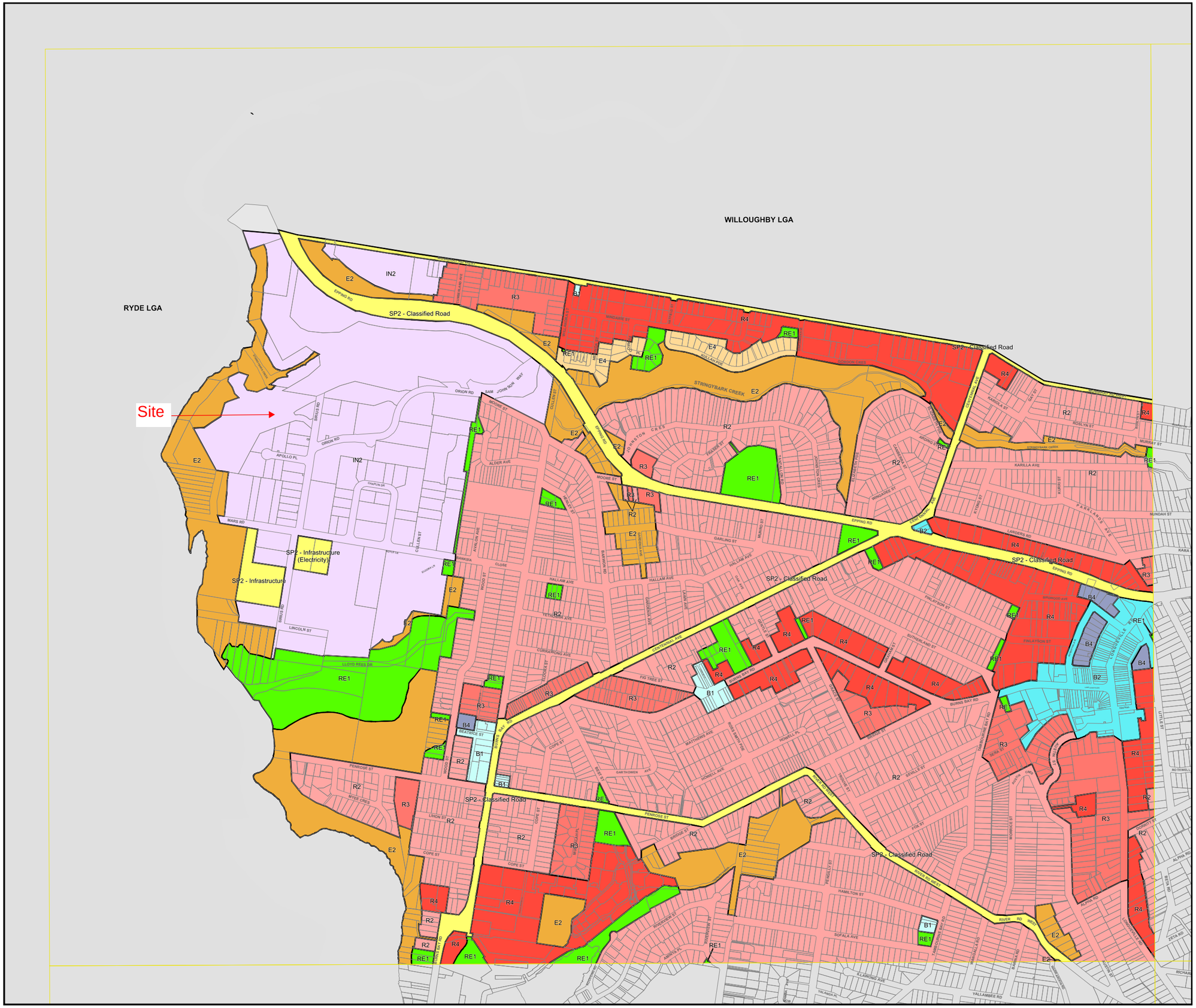
Land Zoning Map - Sheet LZN_001

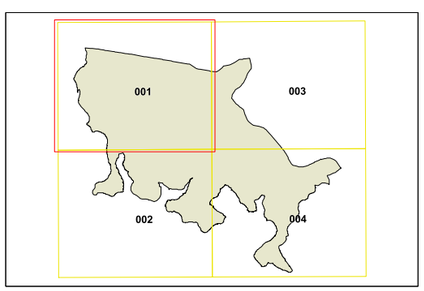
Zone

- B1 Neighbourhood Centre
- B2 Local Centre
- B3 Commercial Core
- B4 Mixed Use
- E2 Environmental Conservation
- E4 Environmental Living
- IN2 Light Industrial
- IN4 Working Waterfront
- R2 Low Density Residential
- R3 Medium Density Residential
- R4 High Density Residential
- RE1 Public Recreation
- SP2 Infrastructure
- UL Unzoned Land

Cadastre

Cadastre 22/12/99 © Land & Property Information (LPI)
Addendum 22/10/15 © Lane Cove Council





N

0 200 400 Metres

Scale: 1:10,000 @ A3

Projection: GDA 1994
MGA Zone 56

Map identification number:
4700_COM_LZN_001_010_20151022

3 Pollutants of Concern

3.1 Products of Combustion from Generators

The proposed backup generators will be Cummins QSK95-G4 3-megawatt (MW) diesel fired generators. Air pollutants associated with the combustion of diesel include oxides of nitrogen (NO_X), carbon monoxide (CO), particulate with an aerodynamic diameter of less than 10 and 2.5 micron (PM_{10} and $PM_{2.5}$), sulfur dioxide (SO_2) and volatile organic compounds (VOC).

The particulate emissions associated with fuel combustion are primarily in the $PM_{2.5}$ range, which has a more stringent air quality criteria than PM_{10} and therefore only $PM_{2.5}$ will be considered in this AQISA.

As outlined in **Section 4.1**, the NSW POEO (Clean Air) Regulation 2010 (NSW Parliament, 2010) exempts emergency standby plant (comprising a stationary reciprocating internal combustion engine for generating electricity) from the air impurities standard for NO_X specified in Schedule 4 in relation to that plant if the plant is used for a total of not more than 200 hours per year (see **Table 3**).

4 Legislative Context and Assessment Criteria

4.1 Protection of the Environment Operations (POEO) Act 1997 & Amendment Act 2011

The *POEO Act* (and *Amendment Act 2011*) is a key piece of environment protection legislation administered by the NSW Department of Planning, Industry and Environment's Environment, Energy and Science (EES) group 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 Site:

- Section 124 and 125 of the *POEO Act* states 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 128 of the *POEO Act* states:

  1. The occupier of a premises must not carry out 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.
  2. 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.

- Schedule 1, Part 1 of the POEO Act defines those activities that are considered to be a scheduled activity for which a licence is required for the premises at which it is carried out. Clause 17 applies to electricity generation by internal combustion engine in a metropolitan area with the capacity to generate more than 30 megawatts (MW) of power and burn more than 3 megajoules (MJ) of fuel per second. The clause does not apply to the generation of electricity by means of electricity plant that is emergency stand-by plant operating for less than 200 hours per year.

Note that the Project's standby generators are envisaged to operate for 174 hours per year during testing (**Section 2.1**) and less than 9 hours per year for emergency power operation (**Section 2.2**) and therefore clause 17 does not apply to the Project.

4.1.1 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; and
- imposes operational requirements for certain afterburners, flares, vapour recovery units and other treatment plant.

Part 5 of the POEO (Clean Air) Regulation 2010 (the Regulation) also deals with 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) as noted below in **Table 2** and **Table 3**. The standards of concentrations prescribed by Part 5, Division 3 do not apply to plant during startup and shutdown periods, however such emissions are still subject to the requirements of Section 128 (2) of the POEO Act in relation to the prevention and minimisation of air pollution.

Table 2 Schedule 6 Standards of Concentration for (Group C[1]) Non-Scheduled Premises

Air Impurity	Activity	Concentration [2]
Particles	Any activity/ plant	100 mg/m^3
Smoke	Solid fuel is burnt	Ringlemann 1 or 20% opacity
	Liquid fuel is burnt	Ringlemann 1 or 20% opacity

Note 1 Group C: Activity granted DA consent and commenced to operate after 1 September 2005.

Note 2 Reference conditions are: Dry, 273 K, 101.3 kPa for any activity.

Table 3 Schedule 4 Standards of Concentration for (Group 6[1]) Scheduled Premises

Air Impurity	Activity [2]	Concentration [3]
Solid Particles	Any activity/ plant	50 mg/m^3
NO_2 or NO or both, as NO_2 equivalent	Any turbine operating on gas, being a turbine used in connection with an electricity generating system with a capacity of less than 10 MW	70 mg/m^3
	Any turbine operating on gas, being a turbine used in connection with an electricity generating system with a capacity of 10 MW or greater but less than 30 MW	70 mg/m^3

	Stationary reciprocating internal combustion engines	450 mg/m^3
VOCs as n-propane	Any activity or plant involving combustion (except as listed below)	40 mg/m^3 VOCs or 125 mg/m^3 CO
	Any stationary reciprocating internal combustion engine using a gaseous fuel	40 mg/m^3 VOCs or 125 mg/m^3 CO
	Any stationary reciprocating internal combustion engine using a liquid fuel	1140 mg/m^3 VOCs or 5880 mg/m^3 CO
Smoke	An activity or plant in connection with which liquid or gaseous fuel is burnt	Ringlemann 1 or 20% opacity

Note 1 Group 6: Activity granted DA consent and commenced to operate after 1 September 2005.

Note 2 only concentration standards relevant to the operations at the Project Site have been listed.

Note 3 Reference conditions are: Dry, 273 K, 101.3 kPa for any activity.

Clause 57A of the Regulation exempts emergency standby plant (comprising a stationary reciprocating internal combustion engine) for generating electricity from the air impurities standard for NO_2 and NO specified in Schedule 4 (see **Table 3**) relevant to that plant if the plant is used for a total of not more than 200 hours per year.

As noted in **Section 4.1.1**, the Project's standby generators are envisaged to operate for less than 200 hours per year and therefore exempt from Schedule 4 Standards of Concentrations.

4.1.2 NSW Environment Protection Authority Air Quality Policy and Guidance

The EPA is the NSW regulatory authority responsible for air quality regulation and associated activities.

NSW Environment Protection Authority document *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (hereafter 'the Approved Methods') (NSW EPA, 2017), lists the statutory methods for modelling and assessing air pollutants from stationary sources and specifies criteria which reflect the environmental outcomes adopted by the EPA. The Approved Methods are referred to in the POEO (Clean Air) Regulation 2002 for assessment of impacts of air pollutants. The air quality criteria set out in the Approved Methods have been reproduced and discussed in **Section 4.2** .

4.2 Relevant Air Quality Criteria

Ambient air quality criteria for the pollutants identified in **Section 3.1** are prescribed by the Approved Methods.

Section 7.1 of the Approved Methods clearly outlines the impact assessment criteria for each of the above pollutants. The criteria specified in the Approved Methods are the defining ambient air quality criteria for NSW and are considered to be appropriate for the setting. Those relevant to the identified emission sources at the Project are discussed below.

4.2.1 CO

CO is an odourless, colourless gas formed from the incomplete burning of fuels in motor vehicles. CO bonds to the haemoglobin in the blood and reduces the oxygen carrying capacity of red blood cells, thus decreasing the oxygen supply to the tissues and organs, in particular the heart and the brain.

CO in urban areas results almost entirely from vehicle emissions and its spatial distribution follows that of traffic flow. The highest concentrations are found at the kerbside, with concentrations decreasing rapidly with increasing distance from the road.

The impact assessment criteria specified within the Approved Methods for CO are provided in **Table 4**.

Table 4 Impact Assessment Criteria for Carbon Monoxide (CO)

Averaging Period	Criterion
15-min	87 ppm (100 mg/m^3)
1-hour	25 ppm (30 mg/m^3)
8-hour	9 ppm (10 mg/m^3)

Note: ppm = parts per million

4.2.2 NO_X and NO_2

NO_X is a general term used to describe any mixture of nitrogen oxides formed during combustion. In atmospheric chemistry NO_X generally refers to the total concentration of nitric oxide (NO) and nitrogen dioxide (NO_2).

NO is a colourless and odourless gas that does not significantly affect human health. However, in the presence of oxygen, NO can be oxidised to form NO_2 which can have significant health effects including damage to the respiratory tract and increased susceptibility to respiratory infections and asthma. Long term exposure to NO_2 can lead to lung disease.

NO will be converted to NO_2 in the atmosphere after leaving a car exhaust. The impact assessment criteria specified within the Approved Methods for NO_2 are provided in **Table 5**.

Table 5 Impact Assessment Criteria for Nitrogen Dioxide (NO_2)

Averaging Period	Criterion
1-hour	12 pphm (246 µg/m^3)
Annual	3 pphm (62 µg/m^3)

Note: pphm = parts per hundred million

4.2.3 $PM_{2.5}$

$PM_{2.5}$ is considered important pollutants due to their ability to penetrate into the respiratory system. 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 specified within the Approved Methods for suspended particulate matter are provided in **Table 6**.

Table 6 Impact Assessment Criteria for $PM_{2.5}$

Averaging Period	Criterion
24-hour	25 µg/m^3
Annual	8 µg/m^3

4.2.4 SO_2

SO_2 is a colourless, pungent gas with an irritating smell. When present in sufficiently high concentrations, exposure to SO_2 can lead to impacts on the upper airways in humans (i.e. the nose and throat irritation). SO_2 can also mix with water vapour to form sulphuric acid (acid rain) which can damage vegetation, soil quality and corrode materials.

Main sources of SO_2 in the air are industries that process materials containing sulphur (e.g. wood pulping, paper manufacturing, metal refining and smelting, textile bleaching, wineries etc.). SO_2 is also present in motor vehicle emissions, however since Australian fuels are relatively low in sulphur, high ambient concentrations are not common.

The impact assessment criteria specified within the Approved Methods for SO_2 are provided in **Table 7**.

Table 7 Impact Assessment Criteria for Sulphur Dioxide (SO_2)

Averaging Period	Criterion
10-min	25 pphm (712 µg/m^3)
1-hour	20 pphm (570 µg/m^3)
24-hour	8 pphm (228 µg/m^3)
Annual	2 pphm (60 µg/m^3)

Note: pphm = parts per hundred million

4.2.5 Volatile Organic Compounds

VOCs are organic compounds (i.e. contain carbon) that have high vapour pressure at normal room-temperature conditions. Their high vapour pressure leads to evaporation from liquid or solid form and emission release to the atmosphere.

VOCs are emitted by a variety of sources, including motor vehicles, chemical plants, automobile repair services, painting/printing industries, and rubber/plastics industries. VOCs that are often typical of these sources include benzene, toluene, ethylbenzene and xylenes (BTEX). Biogenic (natural) sources of VOC emissions are also significant (eg vegetation).

Impacts due to emissions of VOCs can be health or nuisance (odour) related. Benzene is a known carcinogen and a key VOC linked with the combustion of motor vehicle fuels. The impact assessment criteria specified within the Approved Methods for BTEX compounds are provided in **Table 8**.

Table 8 Impact Assessment Criteria for VOCs

Pollutant	Averaging Period	Criterion*
Benzene	1-hour	0.029 mg/m^3
Cyclohexane	1-hour	19 mg/m^3
Ethylbenzene	1-hour	8.0 mg/m^3
Toluene	1-hour	0.36 mg/m^3
Xylenes	1-hour	0.19 mg/m^3

* Gas volumes are expressed at 25°C and at an absolute pressure of 1 atmosphere (101.325 kPa)

4.2.6 Assessment Criteria

CO, VOC, SO_2 and particulate emissions will be minor relative to their respective ambient air quality criteria, compared to NO_X emissions, therefore provided that no significant impacts are anticipated as a result of NO_X (as NO_2), it can be concluded that there would be no adverse air quality impacts associated with emissions of CO, VOC, SO_2 or particulate.

In addition, given the intermittent and short-term operation of the generators, for the purposes of the AQISA, pollutant criteria with an averaging period of more than one hour are not considered relevant and are therefore not included in the AQISA. The resulting criterion adopted for the AQISA is provided in **Table 9**.

Table 9 AQISA Criteria

Pollutant	Averaging Period	Criterion
NO_2	1-hour	246 µg/m^3

5 Existing Environment

5.1 Local Setting

The Project is located on the western edge of a small industrial park. Lane Cover River and surrounding bushland borders the Project to the north and west. Residential areas are to the approximately 600 m to the west and 400 m to the north.

5.2 Sensitive Receptors

In general, sensitive receptors include houses, schools, kindergartens, recreation areas and sporting ovals. Sensitive receptors relevant to the Project are a number of nearby residences.

The nearest existing sensitive receptors to the Project are residences, the nearest of which is approximately 400 m to the north.

5.3 Topography

The topography immediately surrounding the Project is generally undulating, rising approximately 30 m to the east and south over a distance of 500 m. To the north and west the land slopes downwards approximately 10 m over 200 m to Lane Cover River.

5.4 Meteorology

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.

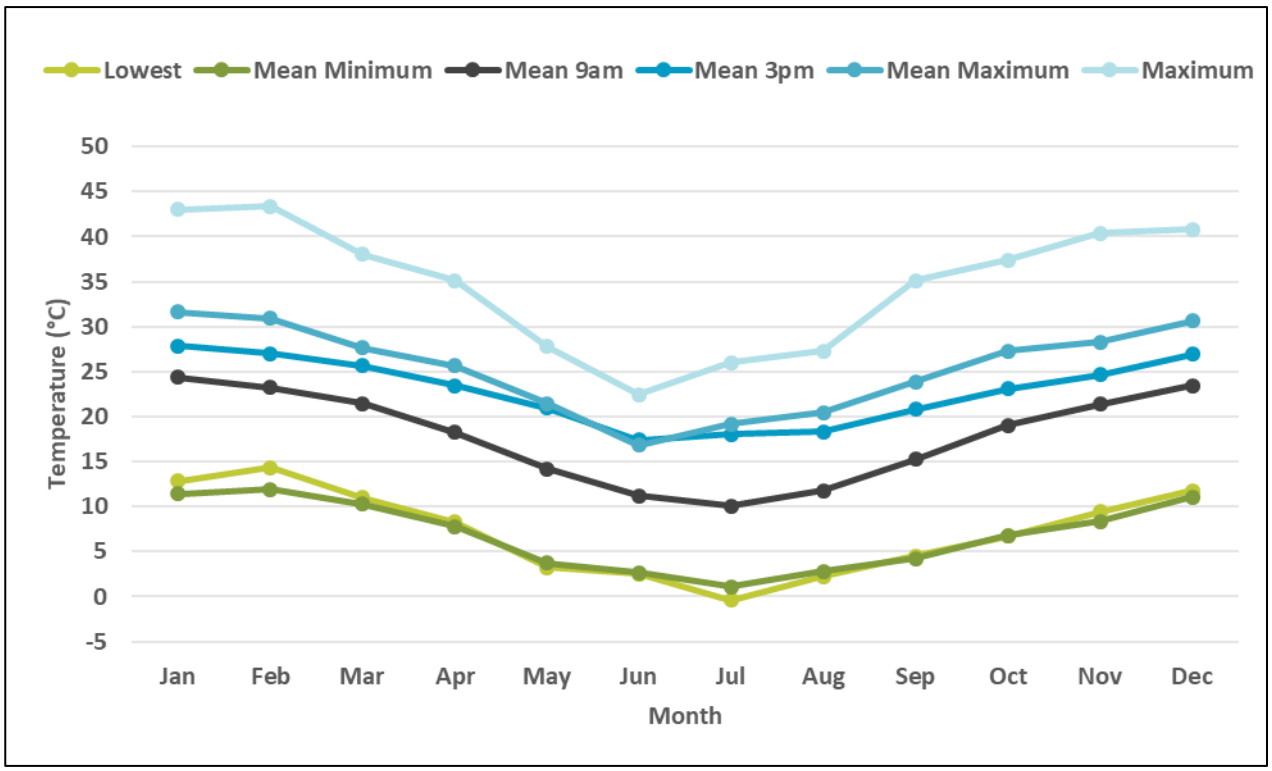
The Bureau of Meteorology (BoM) maintains and publishes data from weather stations across Australia. The nearest available automatic weather station (AWS) collecting data suitable for use in a quantitative air dispersion modelling study operated by the BoM is located at Sydney Olympic Park, approximately 7.5 km southwest of the site.

Given the proximity to the site, it is likely that weather at Sydney Olympic Park AWS would be similar to that experienced at on site. A review of the available data collected by this station between 2015 and 2019 is provided in the following sections.

5.4.1 Temperature

Temperature statistics for Sydney Olympic Park AWS between 2015 and 2019 are summarised in **Figure 4**. Mean maximum temperatures range from 16.8°C in winter to 31.6°C in summer, while mean minimum temperatures range from 1.1°C in winter to 11.9°C in summer. Longer periods of higher temperatures can dry out soil, resulting in both higher background dust levels and on-site dust emissions.

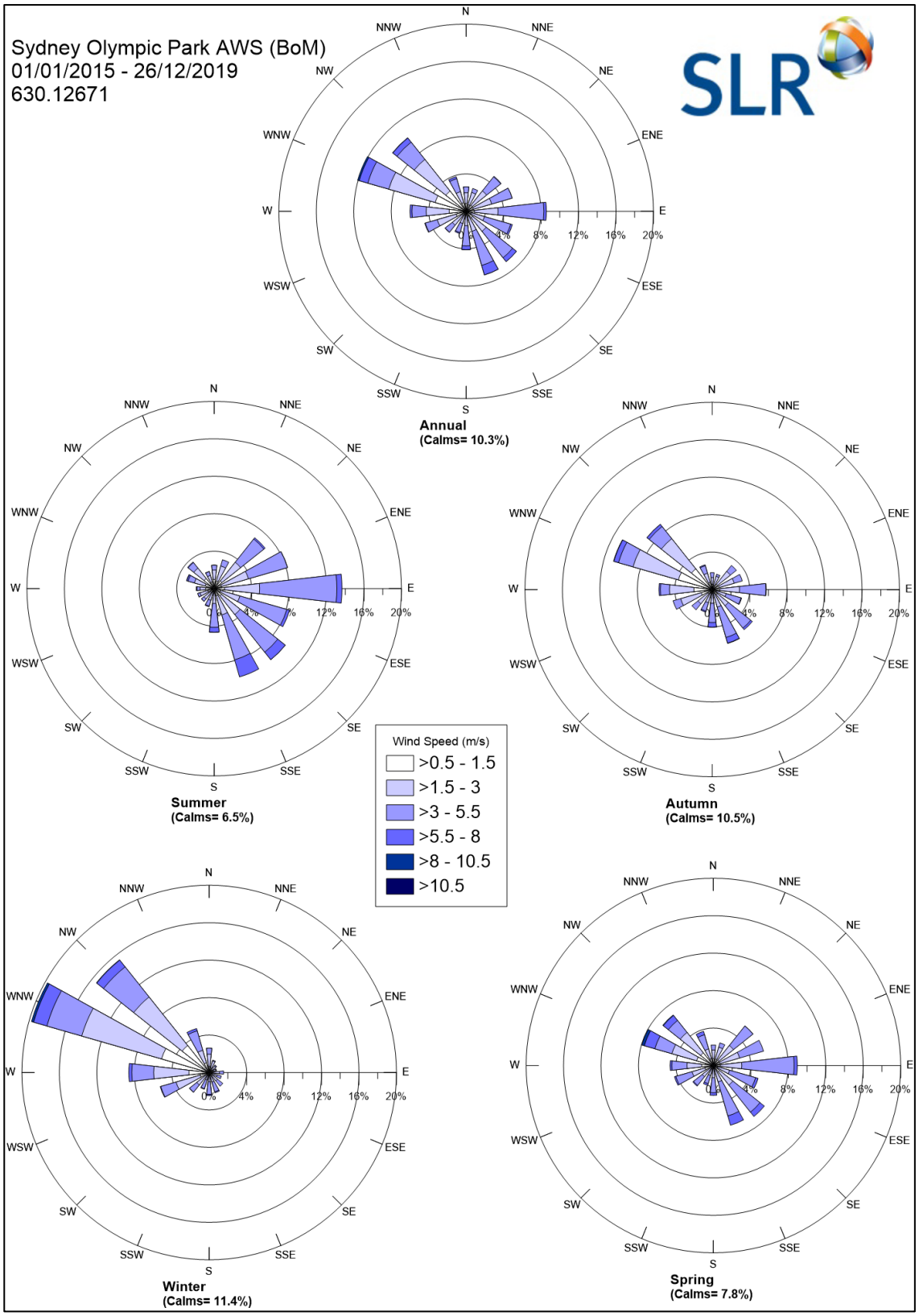
Figure 4 Temperature Trends for Sydney Olympic Park AWS (2015 – 2019)



5.4.2 Wind

Annual and seasonal wind roses for Sydney Olympic Park AWS for the years 2015 to 2019 are presented in **Figure 5**. The wind roses show that on an annual basis, winds from the west-northwest, northwest and east are predominant, with lower frequency of winds observed to be blowing from the northern and southern directions. Calm conditions (wind speed less than 0.5 m/s) occur for approximately 10.3% of the time between 2015 to 2019. In Summer winds from the eastern directions are predominant while in autumn and winter winds from the west-northwest and northwest are predominant. During spring, winds are very similar to the annual distribution.

Figure 5 Annual and Seasonal Wind Roses for Sydney Olympic Park AWS (2015 – 2019)



5.5 Ambient Air Quality

The NSW Environment, Energy and Science (EES) maintains a network of air quality monitoring stations (AQMS) across NSW. The nearest such station is located at Lindfield, approximately 2.5 km to the north of the Project Site.

The Lindfield AQMS was commissioned in 1994 and is located on Bradfield Rd, Lindfield. It is situated in a residential area and is at an elevation of 64 m. A number of air pollutants and meteorological variables are currently measured by the Lindfield AQMS including NO_X and O_3. Air pollutant data recorded by the Lindfield AQMS were obtained for the calendar years 2015 – 2019 (noting that no data was available from 5 June 2019 onwards). The data are summarised in **Table 10** (red font indicates an exceedance of the relevant criterion), and presented graphically in **Figure 6** and **Figure 7**.

Ambient concentrations of the NO_2 were well below the relevant criteria for all years investigated. The maximum background concentrations of NO_2 (46.2 µg/m^3) was conservatively chosen to represent the background concentration for the compliance assessment.

Ozone (O_3) monitored at Lindfield has been included for determining the predicted NO_2 concentrations from NO_X emissions using the ozone limiting method (OLM) discussed in **Section 7**. Only one exceedances of the Maximum 1-hour O_3 criterion was recorded at the Lindfield AQMS for each of the years 2016 and 2017. The 2018 concentration was used to represent the O_3 background concentration, corresponding to the year chosen for the NO_2 background concentration.

Table 10 Summary of Lindfield AQMS NO_2 and O_3 Data (2015 – 2019)

Pollutant	Lindfield - NO_2	Lindfield – O_3
Averaging Period	Maximum 1-hour	Maximum 1- hour
Units	µg/m^3	µg/m^3
2015	38.3	206
2016	38.4	221 [1]
2017	38.9	227 [2]
2018	46.2	163
2019	35.6	201
Criterion	**246.4**	**214**

Notes:

[1] One exceedance of the 1-hour average O_3 criterion was recorded at Lindfield.

[2] One exceedance of the 1-hour average O_3 criterion was recorded at Lindfield.

Figure 6 Measured 1-Hour Average NO_2 Concentrations at Lindfield AQMS (2015 – 2019)

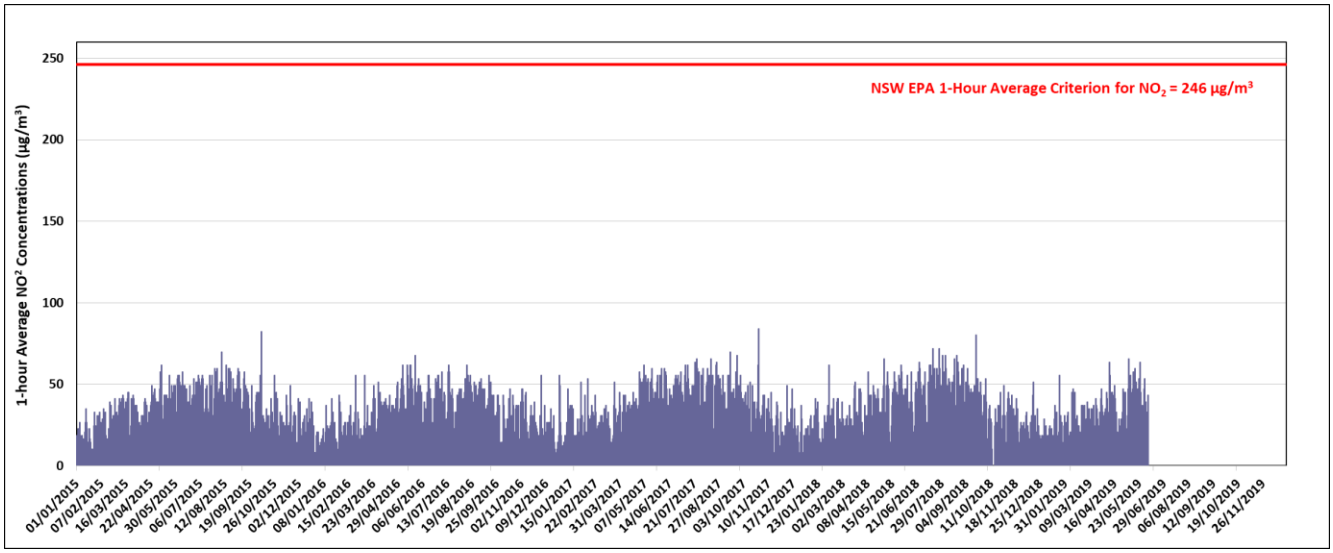
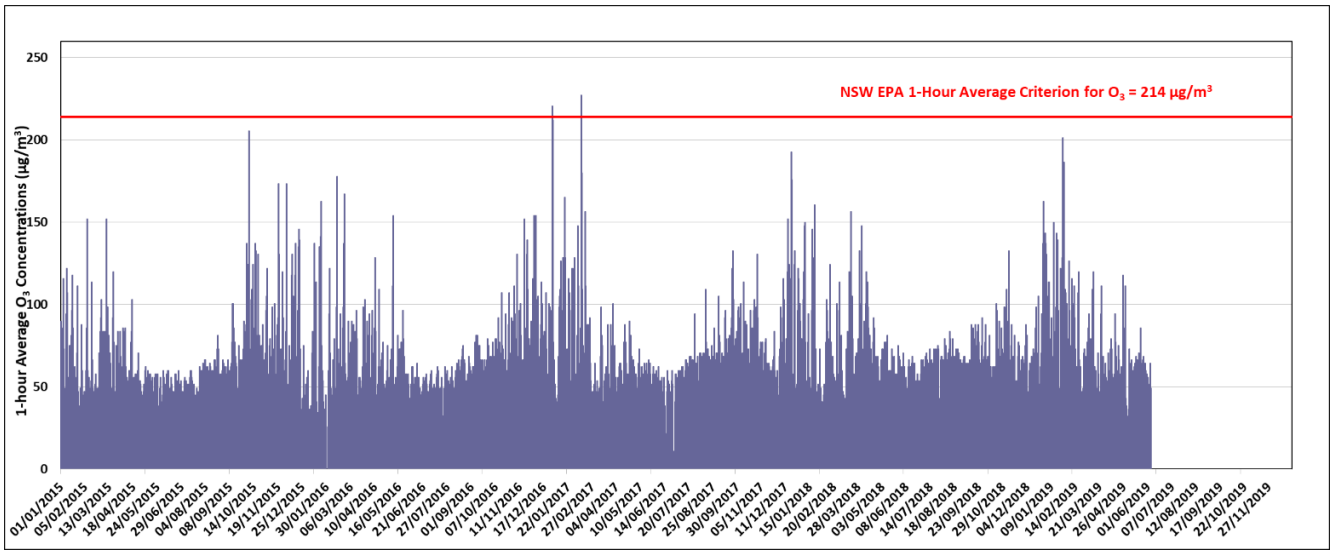


Figure 7 Measured 1-Hour Average O_3 Concentrations at Lindfield AQMS (2015 – 2019)



6 Assessment Methodology

A level 1 screening assessment as defined by the Approved Methods was conducted using the approved dispersion model, AUSPLUME v 6.0.

AUSPLUME is a Gaussian plume model, based on the assumption that cross-sections through elevated plumes from point sources of pollution have a Gaussian (or normal) distribution of concentration. AUSPLUME is also a steady-state model, which assumes the atmosphere is in a state of uniform flow, and wind velocity is a function of height alone and does not vary with direction.

AUSPLUME was configured in accordance with the methodology set out in the Approved Methods, with the exception of terrain effects, which were not included in this screening assessment.

6.1 Environmental Inputs

AUSPLUME requires a range of inputs to describe the Project environment:

- Topographical data
- Meteorological data
- Background pollutant concentrations
- Building downwash (point sources only)
- Receptor locations

The inputs for this screening assessment are summarised in **Table 11**.

Table 11 Air Quality Model Input Data

Item	Source	Description
Topographical data	N/A	The terrain surrounding the site is relatively flat and there are no significant topographical features located between the site and the nearest sensitive receptor. Topographical effects on plume dispersion are therefore expected to be minor and the modelling was performed assuming flat terrain.
Meteorological data	AUSPLUME *METSAMP* worst case screening meteorological data set.	A synthetic dataset containing a full range of worst-case meteorological conditions (wind speed, ambient temperature, mixing height and stability class category) and can be used to provide a conservative estimate of worst case downwind concentrations for averaging periods of 1 hour or less.
Background pollutant concentrations	NSW EES AQMS	Lindfield AQMS NO_2 (1 Jan 2018 – 31 Dec 2018)
Building downwash	The Project structure	Building downwash is a phenomenon caused by structures near to pollutant emission sources influencing atmospheric turbulence. Airflow is rapidly mixed to the ground as frictional forces and pressure gradients cause stagnations and eddies to develop in the wake of buildings downwind of elevated sources. The USEPA Good Engineering Practice (GEP) stack height is the height necessary to ensure that emissions from the stack do not result in excessive concentrations of any air pollutants in the immediate vicinity of the source as a result of nearby structures and is equal to the stack height plus 1.5 times the lesser of the building height or projected building width. A stack is considered to be wake affected when the stack and building are located less than five times the lesser of the building height or project building width apart. AUSPLUME contains the Prime algorithm which was used to predict building downwash effects. Influencing building dimensions were calculated using the USEPA's Building Profile Input Program (BPIP). The generator emissions will be wake affected by the Project structure, increasing downwind concentrations.

Item	Source	Description
Receptor locations	N/A	The METSAMP file is based on a constant wind direction. Receptors locations chosen are therefore located downwind between 400 m (representing the nearest sensitive receptor) and 1000 m, with 100 m resolution.

N/A Not applicable

6.2 Source Characteristics and Emission Rates

For the purposes of modelling for this AQSIA, the NO_X emission rates have calculated from an exhaust emission data sheet provided by the technology provider (**Appendix B)**. Exhaust flow rates and exhaust diameter were provided by the technology provided via email. In the absence of exhaust stack information, it is conservatively assumed that the exhaust is mounted vertically with a release height of 4 m above ground level, representing those generators on Level 1 of the building. With regards to plume dispersion, this represents a worst-case scenario and is therefore considered conservative. Building downwash effects were included.

Table 13 provides the modelled source characteristics and provides the equivalent 1-hour emission rate which accounts for the testing schedule of one generator for 20 minutes per hour. **Figure 8** illustrates the point source, building and receptors.

Table 12 Emission Inventory

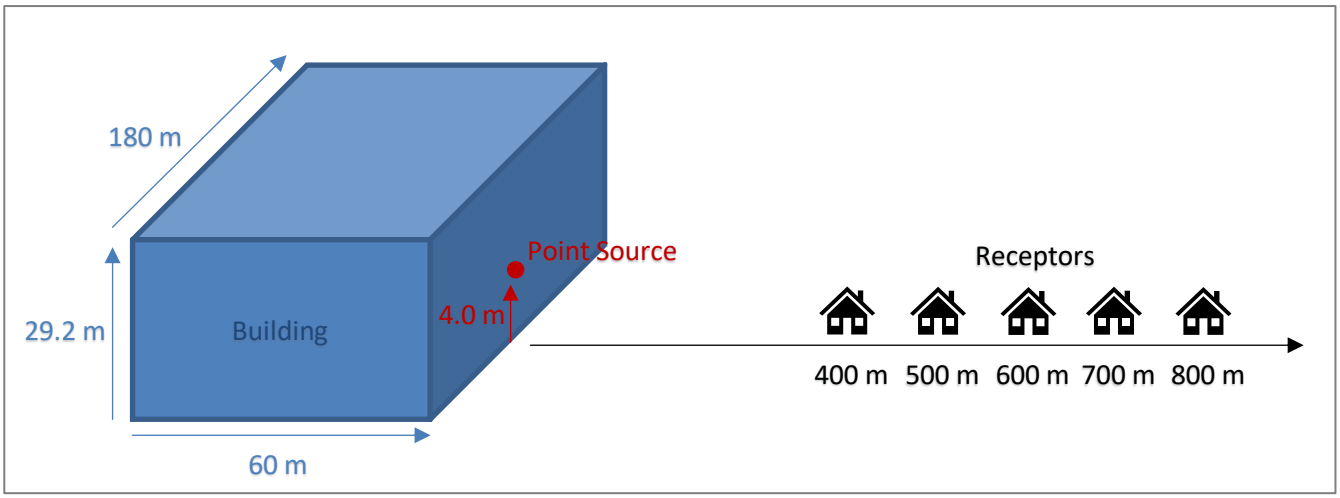
Pollutants	Emission Rate (g/s)		Source / Data Sheet
	Per Generator	One Generator Operating for 20 Minutes Pro Rata to One Hour	
NO_2[1]	7.9	2.6	16V4000G74F Engine Type (n1 Cycle Type)

1 Conservatively assumed to be equal to 100% of NO_X emissions.

Table 13 Source Characteristics

Parameter	Model Run 1
Source type	Point
Model coordinates (m)	0 S, 0 E
Release height (m)	4.0
Temperature (°C)	485
Stack diameter (m)	0.45
Stack cross sectional area (m^2)	0.16
Exhaust flow rate (m^3/s)	5.8
Exit velocity (vertical; m/s)	36.47
Building dimensions (L x W x H) (m)	61 x 90 x 25
Building coordinates (m)	-60 S, 90 E; -60 S, -90 E; 0 S, -90 E; 0 S, 90 E;

Figure 8 AUSPLUME Model Schematic



6.3 Additional Model Parameters and Options

A summary of additional AERMOD modelling options and parameters used for the assessment is provided in **Table 14**.

Table 14 Model Parameters

Parameter	Option
Terrain Effects	N/A
Building wake effects	BPIP Prime
Horizontal dispersion curves	Pasquill-Gifford
Vertical dispersion curves	Pasquill-Gifford
Enhanced plume spreads for buoyancy	Enabled
Adjust Pasquill–Gifford formulae for roughness height	Enabled
Plume rise parameters	AUSPLUME defaults
Wind speed categories	AUSPLUME defaults
Wind profile exponents	Irwin urban

N/A Not applicable

7 Assessment of Impacts

The Approved Methods require that the maximum predicted incremental (Project) GLCs are combined with the maximum background concentration to give the predicted maximum cumulative GLCs. The predicted maximum cumulative NO_2 GLCs at distances representative of the nearest sensitive receptors are discussed below.

NO_2 impacts were determined in accordance with the Approved Methods by using USEPA's OLM which assumes that all O_3 in the in the atmosphere will react with NO in the plume until either all the O_3 or all the NO is used up. This approach assumes that the atmospheric reaction is instant. In reality, the reaction takes place over a number of hours. Impacts at nearby receptors less than 1 km are likely to occur within one hour, so this method can be considered conservative. The predicted NO_2 concentration is given by:

$$[NO_2]_{pred} = (0.1[NO_x]_{pred}) + MIN(0.9[NO_X]_{pred}, (46/48)[O_3]_{bkgd})$$

The predicted maximum cumulative NO_2 GLCs at a distance representative of the nearest sensitive receptor are provided in **Table 15**.

Table 15 Model Run 1: Predicted Maximum 1-hour Average NO_X GLCs at Sensitive Receptors (µg/m^3)

Receptor horizontal distance from source (m)	NO_X Incremental GLC	O3 Background	NO_2 (OLM) Incremental GLC	Background	Cumulative GLC	Criterion	Compliance
400 m	263	163	183	46	229	246	**Yes**
500 m	263		183		229		**Yes**
600 m	257		182		228		**Yes**
700 m	248		181		227		**Yes**
800 m	238		180		226		**Yes**
900 m	212		177		223		**Yes**
1000 m	190		175		221		**Yes**

8 Conclusions

The modelling study has incorporated a number of conservative assumptions and the predicted offsite impacts are anticipated to be over-predictions of potential worst-case impacts. In addition, in accordance with the Approved Methods, the modelling outcomes incorporate the maximum predicted incremental impact and the maximum background concentration to obtain a worst-case cumulative impact.

Nevertheless, the results of the modelling indicate compliance with the assessment criteria.

9 References

Australian Government. (2016, July). National Environment Protection Council Act 1994 (Compilation No. 11). Canberra, ACT.

DEE. (2018). *Australia's HFC Phase-Down Factsheet*. Retrieved from Australian Government Department of Environment and Energy: https://www.environment.gov.au/protection/ozone/publications/hfc-phase-down-factsheet

DEWHA. (2012). *National Pollutant Inventory Emission Estimation Technique Manual for Fuel and Organic Liquid Storage.*

Energy Networks Australia. (2020, March 11). *Behind the news: network reliability*. Retrieved from https://www.energynetworks.com.au/news/energy-insider/behind-the-news-network-reliability/

EPAV. (2013, October). *EPA Publication 1551 Guidance notes for using the regulatory air pollution model AERMOD in Victoria.* Retrieved 04 03, 2017, from Environmental Protection Authority Victoria: http://www.epa.vic.gov.au/~/media/Publications/1551.pdf

NSW EPA. (2017, January). *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales.* New South Wales Environment Protection Authority.

NSW Parliament. (2010). *Protection of the Environment Operations (Clean Air) Regulation 2010.*

APPENDIX A

Building Drawings

SITE AREA: 39,453m²

G.F.A.

LEVEL 1	4,013 m²
LEVEL 2	7,781 m²
LEVEL 3	7,781 m²
LEVEL 4	7,626 m²
LEVEL 5	7,781 m²
TOTAL GFA:	34,983 m²

FSR = GFA / SITE AREA
= 34,983 / 39,453

FSR 0.89

SCHEDULE OF CHANGES

Mark	Description
1	Reduced plant areas internal to Level 1- and 2 additional data halls. Level revised to rl.8.4 (was rl9.9)
2	External plant platforms revised to suit new power solution - including additional levels to West, North, and East. Increased platform areas
3	Layout changes to sub-station
4	Added passenger lift to provide access to all levels
5	Re-arrangement of data hall
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8	Amendments to location ofcar parking spaces - to maintain required spaces
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10	Water storage tanks added to South West car park - 6 tanks and 1 pump room
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Issue	Date	Description
01	12.12.18	ISSUE FOR APPROVAL
02	13.12.18	ISSUE FOR APPROVAL
03	14.12.18	ISSUE FOR SSD SUBMISSION
04	24.06.19	FOR REVIEW
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11	15.01.20	FOR REVIEW
12	17.01.20	FOR REVIEW
13	23.01.20	S4.55 SUBMISSION
14	23.01.20	S4.55 SUBMISSION

Sc. 1:500 0 5 10 15 25m

Project Manager

Services Design

GREENBOX

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LEVEL 25
25 BLIGH STREET
SYDNEY NSW 2000 AUSTRALIA

GREENBOX ARCHITECTURE PTY LTD
ABN: 79 139 779 098

ISO 9001 CERTIFIED QUALITY SYSTEM

Client

Project
ATSYD2
1 SIRIUS ROAD LANE COVE WEST

Drawn By: WG	Scale: 1 : 500 @ A1
Checked By: DW	Approved By: AO
Date: 23.01.20	Job Number: 180095

Project Status

Drawing Title
LEVEL 1 FLOOR PLAN _ RL 8.4

Drawing Number: **ATSYD2_SSD_DRG_ARC_0100**
Issue: 14

RL 8.4

A1
23-Jan-20 8:48:54 AM

SITE AREA: 39,453m²

G.F.A.

LEVEL 1	4,013 m²
LEVEL 2	7,781 m²
LEVEL 3	7,781 m²
LEVEL 4	7,626 m²
LEVEL 5	7,781 m²
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FSR 0.89

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ATSYD2
1 SIRIUS ROAD LANE COVE WEST

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WG	1 : 500 @ A1
Checked By	Approved By
DW	AO
Date	Job Number
23.01.20	180095

Project Status

Drawing Title
LEVEL 2 FLOOR PLAN _ RL14.4

Drawing Number
ATSYD2_SSD_DRG_ARC_0101

Issue
14

RL 14.4

A1

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SITE AREA: 39,453m²

G.F.A.

LEVEL 1	4,013 m²
LEVEL 2	7,781 m²
LEVEL 3	7,781 m²
LEVEL 4	7,626 m²
LEVEL 5	7,781 m²
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FSR 0.89

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1 SIRIUS ROAD LANE COVE WEST

Drawn By: WG	Scale: 1 : 500 @ A1
Checked By: DW	Approved By: AO
Date: 23.01.20	Job Number: 180095

Project Status

Drawing Title
LEVEL 3 FLOOR PLAN _ RL20.2

Drawing Number: **ATSYD2_SSD_DRG_ARC_0102**
Issue: 14

RL 20.2

A1

23-Jan-20 8:49:26 AM

SITE AREA: 39,453m²

G.F.A.

LEVEL 1	4,013 m²
LEVEL 2	7,781 m²
LEVEL 3	7,781 m²
LEVEL 4	7,626 m²
LEVEL 5	7,781 m²
TOTAL GFA:	34,983 m²

FSR = GFA / SITE AREA
= 34,983 / 39,453

FSR 0.89

PARKING SCHEDULE

Type	QUANTITY
6000 x 2750 Mini Bus	1
5400 x 2400 Accessible	2
5400 x 2400 (Class 1&1A)	56
5900 x 2400 (Class 1&1A-Parallel)	2
6200 x 2400 (Class 1&1A-Parallel)	8
TOTAL	69

SCHEDULE OF CHANGES

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14	23.01.20	S4.55 SUBMISSION

Sc. 1:500 0 5 10 15 25m

Project Manager

Services Design

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ABN: 79 139 779 098

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Project
ATSYD2
1 SIRIUS ROAD LANE COVE WEST

Drawn By	Scale
WG	1 : 500 @ A1
Checked By	Approved By
DW	AO
Date	Job Number
23.01.20	180095

Project Status

Drawing Title
LEVEL 4 FLOOR PLAN _ RL26.0

Drawing Number: **ATSYD2_SSD_DRG_ARC_0103** Issue: 14

RL 26.0

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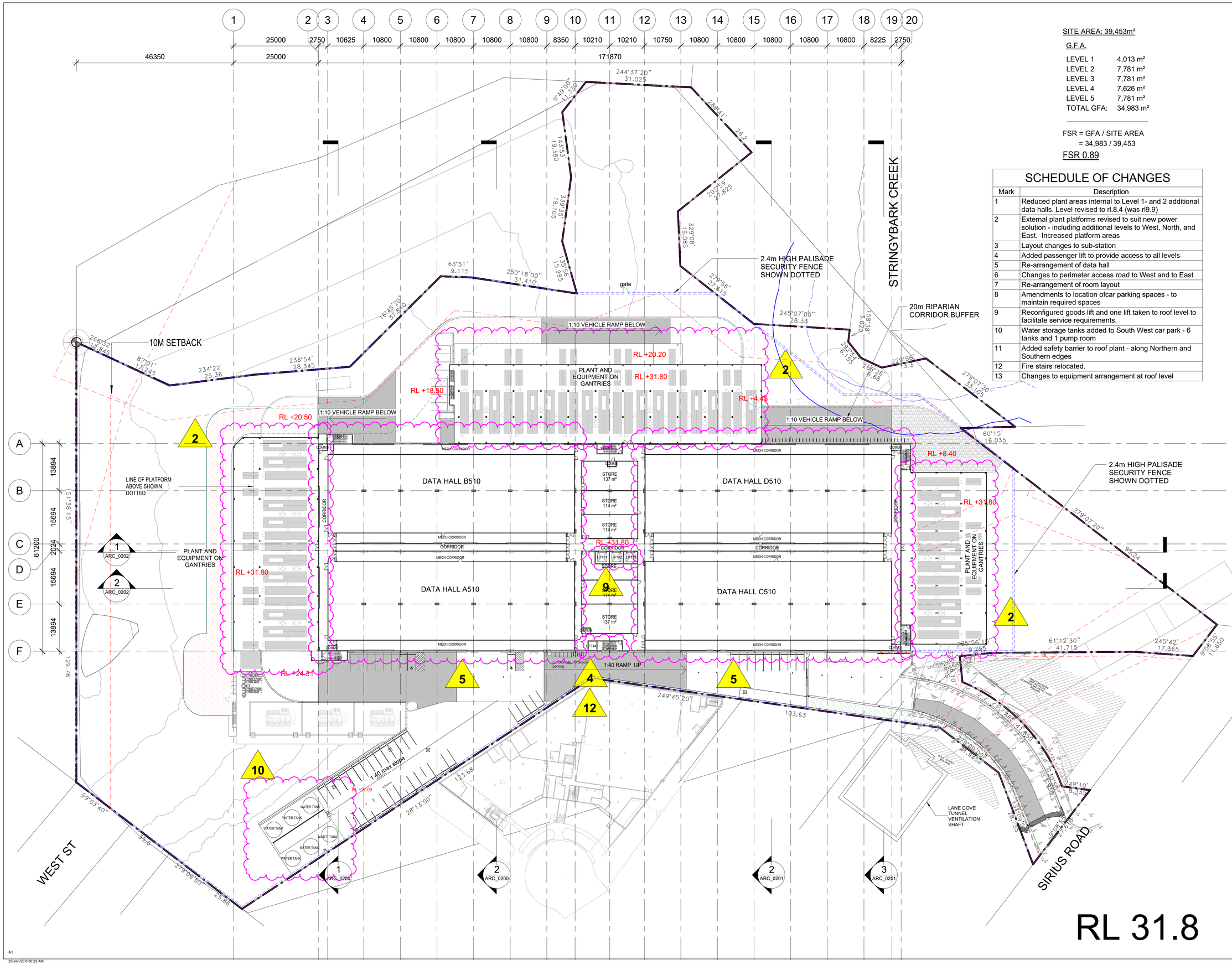

SITE AREA: 39,453m²

G.F.A.

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FSR 0.89

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Sc. 1:500 0 5 10 15 25m

Project Manager

Services Design

GREENBOX
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GREENBOX ARCHITECTURE PTY LTD
ABN: 79 139 779 098
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Client

Project
ATSYD2
1 SIRIUS ROAD LANE COVE WEST

Drawn By	Scale
WG	1 : 500 @ A1
Checked By	Approved By
DW	AO
Date	Job Number
23.01.20	180095

Project Status

Drawing Title
LEVEL 5 FLOOR PLAN_RL31.8

Drawing Number **ATSYD2_SSD_DRG_ARC_0104** Issue **14**

A1
23-Jan-20 8:50:22 AM

APPENDIX B

Generator Specifications

Revision *Change index*					

Motordaten

engine data

	Genset	Marine	O & G	Rail	C & I
Application	x				
Engine model	16V4000G74F				
Application group	3D				
Emission Stage/Optimisation	fuel-optimised				
Test cycle	D2				
fuel sulphur content [ppm]	5				
mg/mN³ values base on residual oxygen value of [%]	measured				

Not to exceed Werte*

*not to exceed values**

Cycle point	[-]	n1	n2	n3	n4	n5	n6	n7	n8
Power (P/PN)	[-]	1,00	0,75	0,50	0,25				
Power	[kW]	1966	1475	983	491				
Speed (n/nN)	[-]	1	1	1	1				
Speed	[rpm]	1500	1500	1500	1500				
Exhaust back pressure	[mbar]	0	0	0	0				
NOx	[g/kWh]	14,5	14,8	12,8	13,4				
	[mg/mN³]	4425	4490	3264	2143				
CO	[g/kWh]	0,7	0,7	0,7	1,8				
	[mg/mN³]	200	162	154	249				
HC	[g/kWh]	0,24	0,29	0,39	0,96				
	[mg/mN³]	70	70	83	133				
O2	[%]	8,8	9,3	10,5	13,4				
Particulate measured	[g/kWh]	-	-	-	-				
	[mg/mN³]	-	-	-	-				

* Calculated values are not proven by tests and therefore the accuracy cannot be guaranteed.

Emissions data measurement procedures are consistent with those described in the applicable rules and standards.

The NOx, CO, HC and PM emission data tabulated here were taken from a single new engine under the test conditions shown above and are valid for the following conditions:

- Ambient air pressure 1 bar
- Air intake temperature approx. 25°C
- Rel. Humidity 30%-60%
- New Engine
- New standard- air filter
- Exhaust gas back pressure according the given value in this EDS
- Fuel according to EN 590 or US EPA 40CFR89
- Coolant and Lubricants according MTU Fuels and Lubricants Specification
- measured after combined exhaust streams.

The nominal emissions data shown is subject to instrumentation, measurement, facility and engine to engine variations. Emissions data is based on single operating points and thus cannot be used to compare to EPA regulations which use values based on a weighted cycle. Emissions data may vary depending on the type of exhaust gas aftertreatment that may be installed on the engine, therefore it is suggested that the engine manufacturer be contacted directly for further information.

Field emission test data are not guaranteed to these levels. Actual field test results may vary due to test site conditions, installation, fuel specification, test procedures, and instrumentation. Over time deterioration may occur which may have an impact on emission levels. Engine operation with excessive air intake or exhaust restriction beyond published maximum limits, or with improper maintenance, may results in elevated emission levels.

MTU Friedrichshafen GmbH has made efforts to ensure that the information in this data sheet is accurate, but reserves the right to amend specifications and information without notice and without obligation or liability. No liability for any errors, facts or opinions is accepted. Customers must satisfy themselves as to the suitability of this product for their application. No responsibility for any loss as a result of any person placing reliance on any material contained in this data sheet will be accepted.

Aenderungsbeschreibung/Description of Revision	Kommt vor/Frequency
Freigabe	

Buchst./Rev. Ltr.	Aenderungs-Nr./Revision Notice No.	Bearbeitungsstatus/Lifecycle
-.1		In Arbeit

MTU Friedrichshafen GmbH

WORD	Datum/ Date	Name
Erstell. Drawn	12.02.2018 09:42:43	link
Bearb. Change	20.04.2018 15:26:46	link
Inhalt Content	19.04.2018	Khakholk
Gepr. Checked	20.04.2018	Kneifel

Motortyp / Engine Type: **16V4000G74F**

Projekt-/Auftrags-Nr. Project/Order No.

Verwendbar f.Typ Applicable to Model

Format/Size: **A3**

Material-Nr./Material No.: **EDS 4000 1220**

Benennung/ Title

EMISSIONSDATENBLATT

EMISSION DATA SHEET

Zeichnungs-Nr./Drawing No.: **ZNG00013242**

Beschreibung/Description

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