ISPT Pty Ltd

Air Quality Impact Assessment of Proposed Backup Generators

Warehouse 6, Elevation at Greystanes
Clunies Ross Street, Greystanes, NSW

17 August 2022
63526 /147,040 (Revision 0)
JBS&G

Table of Contents

Tables

Figures

Appendices

Executive Summary

JBS&G Australia Pty Ltd (JBS&G) was engaged by ISPT Pty Ltd (ISPT, the client) care of Aliro Management Pty Ltd (Aliro) to undertake an Air Quality Impact Assessment (AQIA) for the proposed future use of two backup generators in Warehouse 6 at the proposed 'Elevation at Greystanes' redevelopment, located at Clunies Ross Street in Greystanes New South Wales.

While the development proposal for Warehouse 6 does not include the installation of generators, the AQIA was requested by the Department of Planning, Infrastructure & Environment (DPIE) to assess potential air quality impacts to receptors that may occur in the event of power outages that require use of generators. DPIE is the consent authority for 'Elevation at Greystanes'.

The scope of this assessment has been to limited to potential air emissions generated in the event that generators required for use at Warehouse 6. The assessment has been undertaken by characterising a worst case scenario of emissions. Gaussian dispersion modelling with worse case meteorological data has been used assessed to NSW EPA endorsed air quality criteria.

Based on the findings of this assessment and subject to Limitations in **Section 8,** predicted maximum estimated air emissions from use of the generators (operated for 24 hours a day over a 12 month period) are below each of the applicable criteria value. Chemical and particulate emissions to air from operation of generators at the site will not result in unacceptable air quality impacts to human health in the surrounding area to the site.

For a number of reasons discussed in the report, the assessment has not specifically assessed air quality impacts to the workers and visitors at the Elevation at Greystanes Precinct. Potential impacts to these receptors (if present) would be managed with the occupational health and safety provisions of the operation of the site.

Notwithstanding this conclusion it is recommended that this AQIA be reviewed, and revised if required, should the specification of the units used at the site differ significantly from that assessed. Furthermore any unit used on the site should be tested and maintained as per the suppliers requirements, and any relevant legislative obligations for maintenance of backup generators. This is likely to require as a minimum:

- A weekly check of the area surrounding the generator to ensure it is clean and no parts of either generators are obstructed;
- A once monthly startup to confirm the generator is operating correctly and/or after either generator has been run for 25 consecutive days;
- A monthly visual inspection of wire connections and clamps to ensure all fittings remain intact;
- A monthly visual inspection of piping to ensure no leaks are occurring or any damage is evident;
- A monthly check of oil and coolant levels; and
- A monthly check of available diesel levels.

1. Introduction and Background

1.1 Introduction

JBS&G Australia Pty Ltd (JBS&G) was engaged by ISPT Pty Ltd (ISPT, the client) care of Aliro Management Pty Ltd (Aliro) to undertake an Air Quality Impact Assessment (AQIA) for Warehoue 6 at the proposed 'Elevation at Greystanes' development, located at Clunies Ross Street in Greystanes New South Wales. The proposed 'Elevation at Greystanes' development site occupies an area of approximately 20.2 hectares (ha) and will be developed into a warehouse logistic estate.

The extent of the site for this AQIA is however restricted to the area of Warehouse 6 only, which is located at the southern end of Lot 107 in Deposited Plan 1028208. The location of the site within the proposed 'Elevation at Greystanes' development extent is shown on **Figure 1**. The AQIA was requested by the Department of Planning, Infrastructure & Environment (DPIE) which is the consent authority for Elevation at Greystanes, as part of the following conditions to assess the proposed development of Warehouse 6:

'*Provide details of proposed mitigation, management and monitoring measures to maintain air quality – e.g. backup generator operation and testing (worst case scenario).'*

JBS&G has been advised by Aliro that unlike other warehouses proposed for 'Elevation at Greystanes' the proposed development plan for Warehouse 6 does not include the permanent installation of generators. JBS&G has been advised that should generators be required at Warehouse 6 in the event of electricity grid outages, then mobile generators would be brought onto the site for temporary operation only. As such this AQIA is required to assess the potential impacts to receptors in proximity of the site in the event that mobile generators are used on the proposed warehouse should temporary power outages occur.

1.2 Purpose and Scope of AQIA

The purpose of this AQIA, as required by the DPI&E request, is to present a screening assessment of the potential impacts to air from Warehouse 6 in the event that generators are brought onto site as a temporary backup source of power. As agreed with Aliro the source data used in this AQIA has been based on the specifications provided for the generators anticipated to be installed in other areas of the Elevation at Greystanes complex, and has considered readily available published literature on the potential emissions from diesel generators.

Given that Warehouse 6 will be supplied with electricity from the local grid, the generators are being considered for backup electricity generation only in the event the grid supply is interrupted. The approach presented in this AQIA is considered to be an appropriate screen for this low risk source. There is no intention for the generators to be installed permanently or run continuously – and they will be operated for short duration periods only. Notwithstanding the screening approach provides characterisation of the likely worst case air quality impacts.

2. Site and Existing Environment

2.1 Site Identification

The location of the proposed 'Elevation at Greystanes' development is approximately 25 kilometres (km) west of the Sydney central business district (CBD), within the local government area of Cumberland Council. The location has historically been used for agricultural/pastoral purposes (owned by dairy farmers) and small-scale quarrying (blue metal) prior to regional quarrying activities which saw the stockpiling of quarried materials on site, and associated masonry manufacturing. Following cessation of large-scale quarrying activities, the northern portion has until recently been utilised for masonry/manufacturing activities only (Austral Masonry) with the southern portion utilised for commercial (Boral Concrete and Brick Head Offices) and Council depot/stockpiling yard land uses.

The location of the site as part of the Elevation at Greystanes is shown in **Figure 1**. The current and proposed site layout is shown in **Figure 2**. Site details are summarised in **Table 2.1** and discussed in detail in the following section.

Table 2.1: Summary of Site Details

Site Legal Identifier **(as shown on Figure 2)**	Southern end of Lot 107 in DP 1028208
Site Address	44 Clunies Ross Street, Pemulwuy, NSW, 2145
Site Area	Approximately 10,000m^2 (proposed warehouse footprint)
Approximate Relative Level (RL) m Australian Height Datum (AHD)	84.5 m AHD – post construction of Warehouse 6
Local Government Authority	Cumberland City Council
Site Geographic Coordinates (MGA 56)	Refer to Figure 2
Current Zoning	Zone IN1 General Industrial
Current Land Uses	Agricultural Purposes (owned by dairy farmers) and subject to Minor Quarrying Activities
Proposed Land Uses	Commercial/Industrial

2.2 Current Site Condition

The site to have been subject to recent demolition and cut/fill activities to accommodate the proposed redevelopment. As shown on **Figure 2** the site is wholly unsealed and currently occupied by material stockpiles and used for vehicle parking. However as recently as two years ago the site was occupied by large warehouses and associated works/storage areas with nearby riparian zones, housing a recycling water treatment wetland.

2.3 Surrounding Land Uses

The current land use of adjacent properties or properties across adjacent roads are summarised following.

- North – The site is bound to the north by an area of construction works, understood to be part of the larger Elevation at Greystanes development including a vacant vegetated parcel of land which is dissected by Girraween Creek;
- South – The site is bound to the south by commercial/industrial allotments that are not part of the larger Elevation at Greystanes development;
- East –The site is bound by an area of vacant vegetated land which includes an unsealed dirt road that appears to extend from the Clunies Ross Street cul-de-sac). An area of smaller property lots, presumably residential property lots, is present approximately 200m to the east; and
- West – The site is bound to the west by commercial/industrial allotments that are not part of the larger Elevation at Greystanes development.

The closest environmental receptor is Girraween Creek located approximately 400 m north of the site to the south of The Great Western Highway. A dam is present to the north western site extent.

2.4 Topography

The area of the site sits at a level of 85 m AHD at the eastern end dropping to 76 m AHD the western site boundary. As noted in **Section 2.2**, the site, as part of the larger Elevation at Greystanes area appears to have been subject to cut and fill activities as to accommodate the current built forms resulting in a tiered landscape.

2.5 Meteorology

A review of average climatic data for the nearest Bureau of Meteorology monitoring location (Prospect Reservoir AMO) indicates the site is located within the following meteorological setting:

- Average minimum temperatures vary from 6.1 ^{o}C in July to 17.8 ^{o}C in February;
- Average maximum temperatures vary from 16.9 ^{o}C in July to 28.6 ^{o}C in January;
- Average annual rainfall of approximately 873.7 mm with rainfall greater than 1 mm occurring on an average of 83.9 days per year;
- Monthly rainfall varies from 46.5 mm in September to 98.8 mm in February.

Wind roses for the historical monitoring record at the Prospect Reservoir AMO are presented on **Figure 3** and indicate that on an annual basis, the prevalent wind direction across the area is from the south west which accounts for approximately 20% of all observations. Observations of wind conditions originating from both the west and south-west accounts for approximately 30% of all combined morning and afternoon observations.

2.6 Proposed Site Redevelopment

Review of architectural plans (**Appendix A**) indicates that the majority of the site is to be developed into a large warehouse building (**Figure 2**) constructed with a floor level of 84.5m above Australia Height Datum (m AHD). ISPT have advised that the roof height of the new warehouse building is 13.7m above ground level.

The plans for Warehouse 6 assume the facility will wholly operate on the local electricity grid, and as such no contingency has been included in the design for the housing of generators. Information provided by ISPT to JBS&G has however indicated that generators proposed for other areas of the Elevation at Greystanes redevelopment are likely to be Kohler brand generators. Typically for these other areas of Elevation at Greystanes, two generators have been recommended for warehouses on the order of 18,000m^2 in area, placed at ground level and each fitted with a exhaust valve. Technical specifications as available for the Kohler machines likely to be used in other areas of Elevation at Greystanes (**Appendix B**) indicate the machines have a proprietary system that minimises exhaust emissions and allows for the generators to be operated safely in a standard commercial workspace.

.

3. Description of Air Emission Sources

Noting the particular focus of this assessment, i.e. to determine the magnitude of air emissions that may be caused if backup generators are in temporary use at Warehouse 6, the following sections present a review of information available relating to the generators, the potential for the generation of air impacts and the likely magnitude of those impacts.

Detailed assessment of the nature and location of emissions likely to result from intermittent use of the backup generators on the site are then discussed in **Section 4**.

3.1 Background to the Electricity Generators

The *National Pollution Inventory Measure National Environment Protection (National Pollutant Inventory) Measure 1998* was adopted by the Australian Government with the intention of maintaining and improving ambient air quality, among other goals. The National Pollutant Inventory (NPI) includes measures for estimating the emissions from 94 industries. The process of electricity generation via chemical and mechanical actions and potential for emissions, are described in '*Emission Estimation Techniques Manual for Fossil Fuel Electric Power Generation Version 3.0*' National Pollutant Inventory, dated January 2012 (NPI 2012).

Internal combustion engines convert the chemical energy stored within fossil fuels to electricity, by using either petrol, diesel, natural gas, distillate, or liquified petroleum gas, coupled to electricity generators. Engines are commonly used to provide electricity in remote sites and stand-by (emergency) facilities.

Emissions to air resulting from internal combustion engines include particulates, carbon dioxide (CO_2), water vapour, carbon monoxide (CO), oxides of nitrogen (NOx), hydrocarbons, and minor emissions of metals and metal compounds. Bulk organic liquid storage may also be a source of emissions for the largest installations.

3.2 Emissions from Generators/Engines

NPI (2012) provides emission rates for the quantities of particulate matter less than microns (PM_{10}), carbon monoxide and oxides of nitrogen as summarised in **Table 3.1**. These factors are reported to have been based on the emission factors as derived from the '*Compilation of Air Emission Factors, AP-42, Fifth Edition, Volume 1: Stationary Point and Area Sources*' (Reference: USEPA 1995[1]), for the version that was current in 2011. The emission factors presented in NPI (2012) are based on the rate of fuel consumption by the generator, and NPI (2012) states that the preference for application of these emission factors is to use facility-specific information (e.g. monitoring data) for the final emissions estimate.

Review of Chapter 3.4 of the current version of USEPA (1995[2]) available online indicates that most of the pollutants from internal combustion engines are emitted through the exhaust. The primary pollutants from internal combustion engines are reported to be oxides of nitrogen (NOx), hydrocarbons and other organic compounds, carbon monoxide (CO), and particulates, which include both visible (smoke) and nonvisible emissions. Nitrogen oxide formation is directly related to high pressures and temperatures during the combustion process and to the nitrogen content, if any, of the fuel. Similarly sulfur oxide emissions were reported to be a function of only the sulfur content in the fuel rather than any combustion variables. The other pollutants i.e. the hydrocarbons, CO and particulates were considered to be primarily the result of incomplete combustion, which are discharged into the atmosphere when some of the fuel remains unburned

[1] USEPA, *Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources,* January 1995

[2] now issued as USEPA, *Compilation of Air Pollutant Emission Factors AP-42, Fifth Edition, Volume 1: Stationary Point and Area Sources,* http://www.epa.gov/ttnchie1/ap42.html, 1998a

or is only partially burned during the combustion process. The emission rates for these pollutants are provided in AP-42 as a function of the fuel used by the combustion system, and also separately as a function of the energy output by the system. Both rates are also included in **Table 3.1.**

Table 3.1 Summary of Emission Rates from Stationary Combustion Systems

Pollutant	NPI (2012) Controlled Conditions [A]	AP-42 Controlled Conditions [B]	
	Emission Rate (kg/kL Fuel Used)	**Emission Rate (pounds/MMBtu)**	**Emission Rate (pounds/horsepower-hour)**
Carbon monoxide	5.6×10^{-2}	0.85	5.5×10^{-3}
Oxides of Nitrogen[B]	1.5×10^{1}	3.2	0.024
PM_{10} [C]	0.2	0.1	0.0007
Sulfur dioxide[D]	1.7×10^{1}	1.01	8.08×10^{-3}
Total VOCs[E]	0.7×10^{-3}	0.09	7.05×10^{-4}

Notes:
A = Using Distillate Fuels (as extracted from Table 15 NPI 2012)
B = For large Stationary Diesel Systems, all values converted to kg/kL from pounds/MMBtu and kg/KVA from pounds/horsepower-hour)
C= Emission factors for trace and their compounds from natural gas combustion sourced from Reference: USEPA 1998a section 1.4 Natural Gas Combustion (steam cycle)
D = All sulfur in fuel assumed to be converted to SO2. S = percent sulfur in fuel. Example, if sulfur content is 2.5%, then S= 2.5. If S is not available use defaults (equations are more accurate)
E = Total VOCs emissions are assumed to equal the sum of organic emissions.

3.3 Proposed Site Generators

As noted in **Section 2.6** assuming the backup generators brought to Warehouse 6 are similar to those planned for use on other areas the Elevation at Greystanes redevelopment, then these are likely to be 2 x 1500 kVA systems. Product specifications for these units (**Appendix B**) report the following:

- Both units have a total height of 2.25m (or 2.8m if used within the supplier provided soundproofing structure);
- The power output of the units operating in a standby capacity is 1513 kvA;
- The exhaust outlet is reported to be 100mm in diameter, exhaust temperature is reported to be 550°C with an exit velocity in the range of 4197 to 4622 L/s;
- Both machines have a power factor of 0.8;
- Both machines are provided with a warranty for a standard two-year period or 1000-hours when operated in a standby, not continuous, capacity. This is consistent with running each unit for 24 hours a day for a total of 41 days over a two year period; and
- Maintenance checks are likely to be required after every 25 hours of operational time as a minimum.

4. Identification of Near-Field Receptors

The range of potential receptors to the emissions from the generators have been set as eleven points located near the site. Details for each receptor point is summarised in **Table 4.1**. The location of the receptors are shown on **Figure 4**.

Table 4.1: Summary of Possible Receptors

Receptor ID	Distance from source (approx.)	Comments	Easting	Northing
1	10m west	Commercial/industrial properties adjacent to the proposed footprint of warehouse 6	307845	6257420
2	60m south	Commercial/industrial properties adjacent to the proposed footprint of warehouse 6	308130	6257430
3	100m east	Open space land eastern side of the dirt trail south of Clunies Ross Street (worst case exposures for residences further east)	308207	6257153
4	100m east	Open space land eastern side of the dirt trail south of Clunies Ross Street (worst case exposures for residences further east)	308199	6257112
5	200m north-east	Residential properties eastern side of Clunies Ross Street	308164	6256873
6	100m north-east	Commercial/industrial properties adjacent to the proposed footprint of warehouse 6	308137	6256780

The majority of receptor locations in **Table 4.1** relate to commercial workforces, however it is considered that the most sensitive receptors to emissions from the site are the users of residential and open space land represented by receptor points 4 and 5 in **Table 4.1**. As such the AQIA has considered emissions that may occur at a distance of 100 m from the site, which is consistent with the closest sensitive receptors. The values determined for a distance of 100 m will be consistent with the levels experienced by the receptors on nearby commercial premises. It is also noted the receptors on commercial sites are not considered as sensitive to potential air emissions, if any, for the following reasons:

- The majority of these workers undertake duties within close buildings with ventilation systems that will not be affected by outdoor air quality, if detrimental; and
- Insufficient information is available on the location and performance of these ventilation systems to estimate whether impacts from the generators will reach indoor workers.

5. Assessment Criteria

Air quality criteria are provided and endorsed by the NSW EPA and are provided in NSW EPA (2016) ‘Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in NSW’. This document specifies a range of impact assessment criteria for toxic and malodorous air pollutants. The impact assessment criteria for the pollutants associated with the proposed generator use (**Section 3.2**) are summarised in **Tables 5.1 and 5.2**.

Table 5.1: Ground Level Concentration Criteria for Substances of Interest at the Site (1hr and 8hr Averaging Period)

Constitutents	1 hr averaging time Ground Concentration		8hr averaging time Ground Concentration	
	Design Level (µg/m³)	Design Level (ppm)	Design Level (µg/m³)	Design Level (ppm)
Nitrogen dioxide	246	12	-	-
Sulfur dioxide	570	20	-	-
Carbon monoxide	30,000	25	10,000	9
PM10	-	-	-	-
Benzene	29	0.009	-	-

Table 5.2: Ground Level Concentration Criteria for Substances of Interest at the Site (24hr and Annual Averaging Period)

Constitutents	24hr averaging time Ground Concentration		Annual average Ground Concentration	
	Design Level (µg/m³)	Design Level (ppm)	Design Level (µg/m³)	Design Level (ppm)
Nitrogen dioxide	-	-	63	3
Sulfur dioxide	228	8	60	2
Carbon monoxide	-	-	-	-
PM10	50	-	25	-
Benzene	-	-	-	-

The air quality impact assessment comprises comparison of the above ground concentration levels to the worst case levels determined for receptor location summarised in **Table 4.1**.

6. Methods for Air Quality Impact Assessment

ISPT has requested that JBS&G undertake an AQA for the site to address the information request made by DPI&E as listed in **Section 1.1**. As the warehouse has not yet been constructed the AQIA reported in the following sections has therefore been based on technical specifications available for the generators likely to be brought to site for backup power generation and published air emission factors for typical generator / large internal combustion engine operation. The assessment has used methods compatible with relevant regulatory guidance, and also by adopting software as currently endorsed by the NSW EPA and similar Australian regulators in other jurisdictions.

In order to address the requested work brief, and based on the presence of sensitive residential receptors at locations 4 and 5 in **Table 4.1**, JBS&G undertook dispersion modelling using the AERMOD dispersion program to estimate the concentrations of each assessed pollutant in air at a distance of 100 m from the proposed generator location in Warehouse 6. Use of AERMOD was considered appropriate for the purposes of the screening level assessment noting that AERMOD is nominated by the Environment Protection Authority of Victoria (VIC EPA) the approved regulatory air model for impact assessments in Victoria. In VIC EPA (2013[3]) it is stated that approval from VIC EPA is required if a model other than AERMOD is to be used.

In completing the AERMOD dispersion modelling a number of conservative assumptions were made to simulate conditions at the site during generator operation. These are listed below.

6.1 Sources of Air Emissions

Noting that there are no definite plans for use of generators at the site, no permanent housing has been included for generators in the final warehouse design plan. However it is reasonable to assume the generators brought onto Warehouse 6 would be comparable those permanently installed for backup power generation in other areas of Elevation at Greystanes. It is also reasonable to assume these generators would be placed outside the Warehouse 6 building near the external plant room as shown on **Figure 2**. To replicate this configuration the modelling has assumed that both generators will essentially act as one emission source in the event that they are turned on. Noting that the orientation and final venting point on each generator is likely to be decided at the time of operation, this is considered an acceptable approach for these point sources in such close proximity of each other.

As per the agreed scope, the assessment was limited to potential emissions occurring from the generators, and does not include any other air emissions that may occur from the warehouse operation. In the absence of the generators being present in their final form on site. JBS&G has addressed the requirements for an AQIA provided by DPI&E (see **Section 1.1**) through dispersion modelling of the following scenario:

- Operation of a generator (as one point source) continuously for 12 months (i.e. the full duration of the meteorological data as discussed in **Section 6.3**) with an assumption of continuous worse case meteorological conditions.

Based on the available warehouse design plans (**Appendix A**) the characteristics of generator emissions used in the dispersion modelling are shown in **Table 6.1.** The likely position of the generator exhaust point has been estimated from Nearmap images of the site.

---

[3] VIC EPA '*Guidance Note on the Use of the Regulatory Air Pollution Model AERMOD in Victoria*' October 2013 (VIC EPA 2013a), http://www.epa.vic.gov.au/~/media/Publications/1551.pdf

Table 6.1 Source Characteristics

Point Source Parameters	Generators Exhaust Point
Easting	307958
Northing	6256551
Ground Level (m AHD)	57.7
Stack Release Height (m AHD)[1]	60.5
Source Type	Point
Machine Type	Kohler B1500 and Kohler KM220
Stack Internal Diameter (m)	0.1
Stack Temperature (continuous in °C)	550
Stack Flow Rate (L/min)	4612
Orientation of Stack Release Point	Vertical (assumed)

Notes:

1. Assumes generator exhaust will be vented from a point placed on the top of the suppliers soundproofing chamber described in **Section 3.3.**

6.2 Terrain Data

It was assumed that the site and surrounding area was essentially flat consistent with the development plans provided for the site (**Appendix A**). The dispersion model has been run under the 'flat' terrain option, omitting the need for site specific terrain data, and consistent with VIC EPA (2013a) recommendations.

Modelling was undertaken across a 1 km extent grid area, centred around the generators' at the northern end of Warehouse 6, with 50 m increments within the extent of the grid.

6.3 Meteorological Data

Modelling has been undertaken using a generic file of worst case meteorological data as suppled with the AERMOD program. The generic worst case file provides 12 months of hourly meteorological data setting wind conditions in one dominant direction and includes a range of meteorological conditions that present a worse case scenario for the potential dispersion / mitigation of air emissions.

Use of the worst case meteorological file is likely to grossly over estimate potential impacts at the all receptors assessed. The preparation and analysis of the meteorological data has been undertaken in accordance with the requirements of NSW EPA (2016), in addition to specific guidance provided in VIC EPA (2013b[4]);

Noting that this is a screening level assessment and maximum potential levels only have been considered, the use of worst case meteorological file is considered appropriate, however the reliability of the results and estimates should be considered in respect of potential limitations associated with this approach. The modelled results will substantially overestimate potential impacts that would be estimated using site specific meteorological data. However where an acceptable result is obtained under such overly conservative modelling and assessment assumptions – there can be a high degree of confidence that the potential air emissions from the generators will not pose a potential air quality risk in the future.

[4] VIC EPA '*Construction of input meteorological data files for EPA Victoria's regulatory air pollution model (AERMOD)*' October 2013 (VIC EPA 2013b), http://www.epa.vic.gov.au/~/media/Publications/1550.pdf

6.4 Receptors Points Under Assessment

As per **Section 4** the range of potential receptors to the emissions from the generators has been streamlined to the most sensitive receptor only for the purposes of this screening AQIA. The most sensitive receptor point is considered to be potential residents located 100 m from the location of the generators (receptor points 4 and 5 on **Figure 4**). Emissions predicted at this location will be sufficiently conservative to characterise the impact of air emissions, if any, at the remaining receptor points located at greater distance from the source.

7. Results of Air Quality Modelling

7.1 Modelled Scenarios

Based on the information available and the range of averaging times /criteria applicable to the pollutants potentially emitted by the generators a number of were modelled for the site, which are summarised in **Table 7.1.**

Table 7.1: Summary of Dispersion Modelling Simulations Completed

Scenario	Objective	Height of Exhaust	Pollutant	Averaging Time
1. Likely Normal Use of Backup Generators	To determine conservative worst case GLCs to be experienced in the surrounding areas due to operation of the generators for one month continuously. Month of operation set to 1st month of meteorological data file.	2.8 m above ground level	NO_2	1hr, annual
			SO_2	1 hr 24 hr and annual
			PM_{10}	24 hr and annual
			CO	1 hr and 8 hr
			VOCs[1]	1hr

Notes:

1. Total VOC results assessed against criteria for benzene.

Table 6.1 summarised the key details relevant to the point at which generator emissions are vented on the site. **Table 7.2** summarises the emission rates and other input parameters used for the generator point source for the modelled scenario. While Aliro has advised that generators will only be used in the event that the electricity supply from the grid is temporarily unavailable or suspended, the model has conservatively assumed the generators are constantly run i.e. emitting odours, for 24 hours a day, 12 months a year. This is considered to be a highly conservative assumption given that the maximum allowable operation under the product warranty is no more than 20 day per year.

The hourly emission rate adopted was based on the available literature value for combustion engines as summarised in **Section 3.2**. Of the emission rates presented in **Table 3.1**, the values obtained from AP-42 in the units of emissions per unit of engine output were adopted over the NPI (2012) rates, which were based on emissions per unit of fuel used. This was considered appropriate given insufficient data is available to predict the frequency and duration of backup generator use at Warehouse 6 (if at all), however it is reasonable to assume that when running the backup generators will be operated at full power. The emission rates presented in **Table 3.1** were converted to the metric units of g/s based on the generator power supply of 1513 kilo-volt amps (kVa) as nominated in the technical specifications (**Appendix B**).

In the absence of being able to measure actual emissions from the generators at the site these emission rates are considered to be overly conservative given that the suspension of power from the electricity grid in Sydney for a whole year is highly unlikely.

Table 7.1 Model Input - Generator Emission Details

Parameter	Source
Easting	307958
Northing	6256551
Ground Level (m AHD)	57.7
Stack Release Height (m AHD)	60.5
Source Type	Point
Assumed Exhaust Internal Diameter (m)	0.1
Exhaust Cross-Sectional Area (m^2)	7.86 x 10^{-3}
Exhaust Flow Rate (m3/min)[1]	4.197
Exhaust Exit velocity (m/s)	9
Stack Emissions Temperature (continuous in °C) [1]	550
Pollutant Emission rate (g/s) – NO2	2.65[2]
Pollutant Emission rate (g/s) – SO2	1.65[2]
Pollutant Emission rate (g/s) – PM10	0.143[2]
Pollutant Emission rate (g/s) – CO	1.12[2]
Pollutant Emission rate (g/s) – total VOC	0.144[2]
Emission release direction	horizontal
Proximity of release point to nearest building	Not considered in the screening level assessment

Note: 1. Based on Kohler technical specifications (**Appendix B**)
2. Emission rate based on uncontrolled emission rate (in Lbs/hp-Hr) reported in **Table 3.1** converted to g/s by adopting the conversion rates based on 1 kilowatt equal to 1.341 units of horsepower-hour, and a power factor of 0.8 for each generator of 1513 kVA as per Kohler technical specifications (**Appendix B**).

7.2 Results of Air Quality Modelling

Modelling results for each of the pollutants of interest are summarised in **Table 7.2**. AERMOD modelling input files have provided as **Appendix C**.

Table 7.2 Maximum Predicted Ground Level Concentrations (GLCs) in µg/m³ at Receptor Point 3

Parameter	Averaging Time	Guideline Concentration (ug/m^3)	Predicted GLC (ug/m^3)	
			Unadjusted Model Results	Adjustment for Wind Direction [2]
Predicted NO_2	1 hour	**246**	**598.2**	179.5
	Annual	**63**	28.2	8.5
Predicted SO_2	1 hour	**570**	395	118.5
	24 hour	**228**	89.1	26.7
	Annual	**60**	17.5	5.25
Predicted PM_{10}	24 hour	**50**	7.7	2.31
	Annual	**25**	1.52	0.5
Predicted CO	1 hour	**30,000**	252.8	75.8
	8 hour	**10,000**	90.8	27.2
Predicted Total VOCs	1 hour	**29**[1]	**34.1**	10.2

Notes:

1. Assessment criteria for benzene only. Comparison assumes 100% of the predicted Total VOC GLC occurs as benzene.
2. A correction factor of 30% has been applied to the unadjusted predicted GLCs to account for actual frequency of wind conditions originating from the west or south-west direction. .

7.3 Comparison to Guideline Criteria

The unadjusted results presented in **Table 7.2** are the 100th percentile (or maximum) results consistent with the requirements of NSW EPA (2016), and the majority of results are less than the adopted criteria. However the maximum predicted results for NO_2 (1 hour averaging time) and Total VOCs (assessed against benzene only criterion) are slightly higher than the adopted criteria, i.e. less than a factor of 2.

In viewing these minor exceedances it should also be noted that the 100th percentile values reported have incorporated substantial levels of conservativism such as use of the generators for 24 hours a day/365 days a year, use of a worst case meteorological file etc. Noting that in reality the observed weather conditions at the nearest weather monitoring station (i.e. Prospect Reservoir, **Section 2.5**) vary substantially from the meteorological file characterisation of winds continuously being directed at the nearest receptor, a correction factor has been applied to the unadjusted model results presented in **Table 7.2** to account for no more than 30% of wind conditions in proximity of the site likely to be directed in a single direction.

The corrected results presented in **Table 7.2** are considered to more closely represent the maximum pollutant GLCs likely to be experienced at the closest receptors to the generators even if the generators are operated for 24 hours a day over a 12 month period.

Review of the adjusted results in **Table 7.2** indicates that the maximum estimated air emissions from use of the generators (operated for 24 hours a day over a 12 month period) are at least half the applicable criteria value.

As such it is considered that the dispersion modelling results for chemical and dust emissions to air from the operation of generators at the site from time to time will not result in unacceptable air emissions and/or potentially unacceptable impacts to human health in the surrounding area.

Notwithstanding this conclusion it is recommended that this AQIA be reviewed, and revised if required, should the need arise to permanently install generators at the site including a review of the specification of the units anticipated for use. Furthermore when any generators are brought onto the site for use as a temporary backup power supply, the units should be maintained as per the suppliers requirements, and any relevant legislative obligations for maintenance of backup generators. This is likely to require as a minimum:

- A weekly check of the area surrounding the generator to ensure it is clean and no parts of either generators are obstructed;
- A once monthly startup to confirm the generator is operating correctly and/or after either generator has been run for 25 consecutive days;
- A monthly visual inspection of wire connections and clamps to ensure all fittings remain intact;
- A monthly visual inspection of piping to ensure no leaks are occurring or any damage is evident;
- A monthly check of oil and coolant levels; and
- A monthly check of available diesel levels.

8. Conclusions and Recommendations

JBS&G Australia Pty Ltd (JBS&G) was engaged by ISPT Pty Ltd (ISPT, the client) care of Aliro Management Pty Ltd (Aliro) to undertake an Air Quality Impact Assessment (AQIA) for the use of two backup generators in Warehouse 6 at the proposed 'Elevation at Greystanes' development, located at Clunies Ross Street in Greystanes New South Wales.

While the development proposal for Warehouse 6 does not include the installation of generators, the AQIA was requested by the DPIE to assess potential air quality impacts to receptors that may occur in the event of power outages that require use of generators.

The scope of this assessment has been to limited to potential air emissions generated by the proposed generators to be installed at Warehouse 6. The assessment has been undertaken by characterising a worst case scenario of emissions. Gaussian dispersion modelling with worse case meteorological data has been used assessed to NSW EPA endorsed air quality criteria.

Based on the findings of this assessment and subject to Limitations in **Section 8,** predicted maximum estimated air emissions from use of the generators (operated for 24 hours a day over a 12 month period) are below each of the applicable criteria value. Chemical and particulate emissions to air from operation of two generators at the site will not result in unacceptable air quality impacts to human health in the surrounding area to the site.

For a number of reasons discussed in the report, the assessment has not specifically assessed air quality impacts to the workers and visitors at the Elevation at Greystanes Precinct. Potential impacts to these receptors (if present) would be managed with the occupational health and safety provisions of the operation of the site.

Notwithstanding this conclusion it is recommended that this AQIA be reviewed, and revised if required, should the need arise to permanently install generators at the site including a review of the specification of the units anticipated for use. Furthermore when any generators are brought onto the site for use as a temporary backup power supply, the units should be maintained as per the suppliers requirements, and any relevant legislative obligations for maintenance of backup generators. This is likely to require as a minimum:

- A weekly check of the area surrounding the generator to ensure it is clean and no parts of either generators are obstructed;
- A once monthly startup test to confirm the generator is operating correctly and/or after either generator has been run for 25 consecutive days;
- A monthly visual inspection of wire connections and clamps to ensure all fittings remain intact;
- A monthly visual inspection of piping to ensure no leaks are occurring or any damage is evident;
- A monthly check of oil and coolant levels; and
- A monthly check of available diesel levels.

9. Limitations

This report has been prepared for use by the client who has commissioned the works in accordance with the project brief only, and has been based in part on information obtained from the client and other parties.

The advice herein relates only to this project and all results conclusions and recommendations made should be reviewed by a competent person with experience in environmental investigations, before being used for any other purpose.

JBS&G accepts no liability for use or interpretation by any person or body other than the client who commissioned the works. This report should not be reproduced without prior approval by the client, or amended in any way without prior approval by JBS&G, and should not be relied upon by other parties, who should make their own enquires.

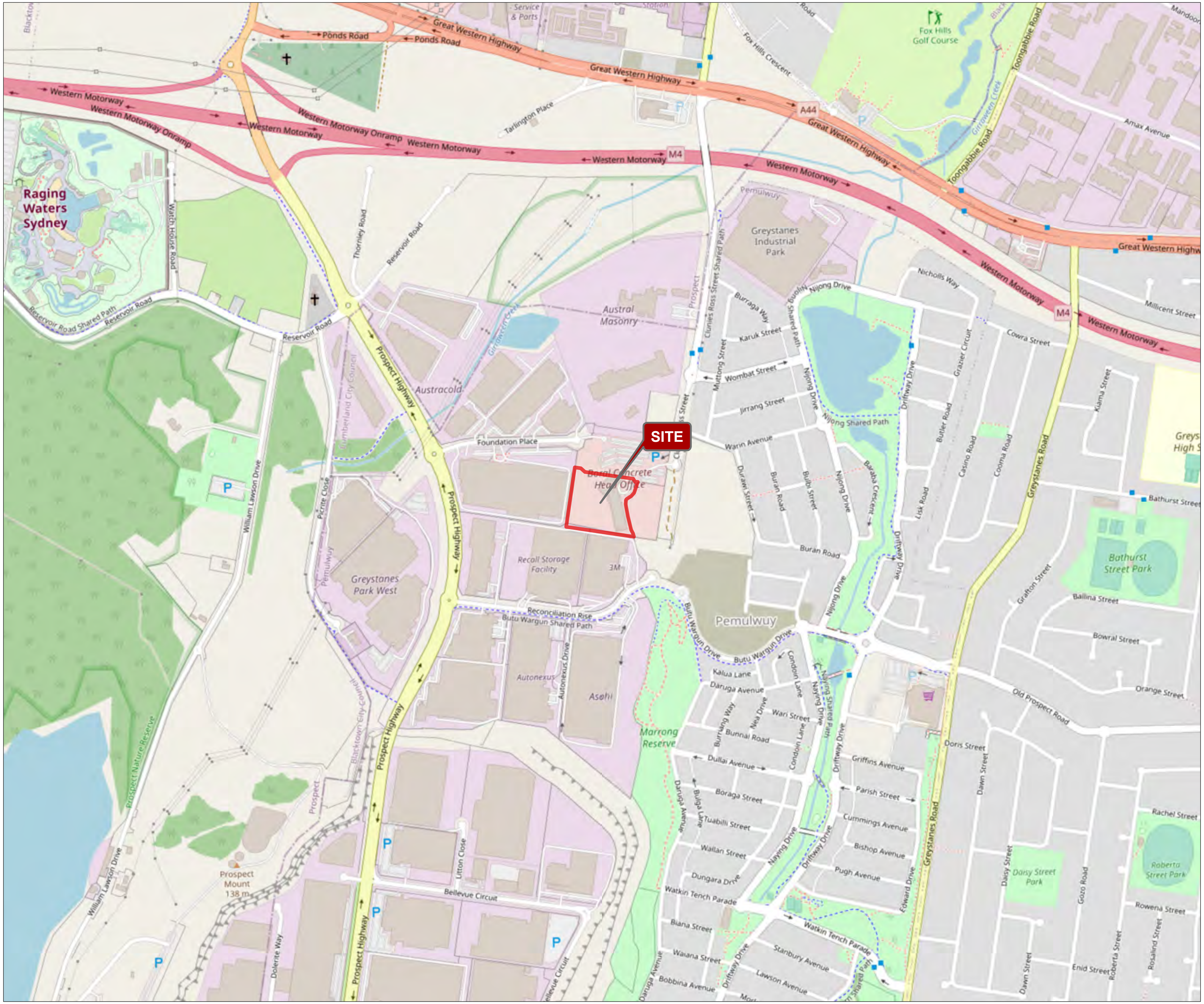
Sampling and chemical analysis of environmental media is based on appropriate guidance documents made and approved by the relevant regulatory authorities. Conclusions arising from the review and assessment of environmental data are based on the sampling and analysis considered appropriate based on the regulatory requirements.

Chemical analytes are based on the information detailed in the site history. Further chemicals or categories of chemicals may exist at the site, which were not identified in the site history and which may not be expected at the site.

Changes to the subsurface conditions may occur subsequent to the investigations described herein, through natural processes or through the intentional or accidental addition of contaminants. The conclusions and recommendations reached in this report are based on the information obtained at the time of the investigations.

This report does not provide a complete assessment of the environmental status of the site, and it is limited to the scope defined herein. Should information become available regarding conditions at the site including previously unknown sources of contamination, JBS&G reserves the right to review the report in the context of the additional information.

Figures



Legend

Approximate Site Boundary

JBS&G

Job No: 63526

Client: Aliro

Version: R02 Rev 0 | Date 10/08/2022

Drawn By: AB | Checked By: SD

Scale 1:12,500

0 110 220

metres

Coord. Sys. GDA 1994 MGA Zone 56

44 Clunies Ross Street
Prospect, NSW

SITE LOCATION

FIGURE 1

File Name: N:\Projects\Aliro\63526 Pemulwuy Warehouse 1 Air Quality Assessment\GIS\02_MapProjects\63526_Pemulwuy_R02_Rev0.aprx
Reference: © OpenStreetMap (and) contributors, CC-BY-SA

Legend
Approximate Site Boundary
Cadastre (DFSI, 2021)

JBS&G

Job No: 63526	
Client: Aliro	
Version: R02 Rev 0	Date 10/08/2022
Drawn By: AB	Checked By: SD
Scale 1:1,750	

0 10 20
metres

Coord. Sys. GDA 1994 MGA Zone 56

44 Clunies Ross Street
Prospect, NSW

SITE LOCATION

FIGURE 2

File Name: N:\Projects\Aliro\63526 Pemulwuy Warehouse 1 Air Quality Assessment\GIS\02_MapProjects\63526_Pemulwuy_R02_Rev0.aprx
Reference: Nearmap - www.nearmap.com (Capture Date: 19/05/2022)

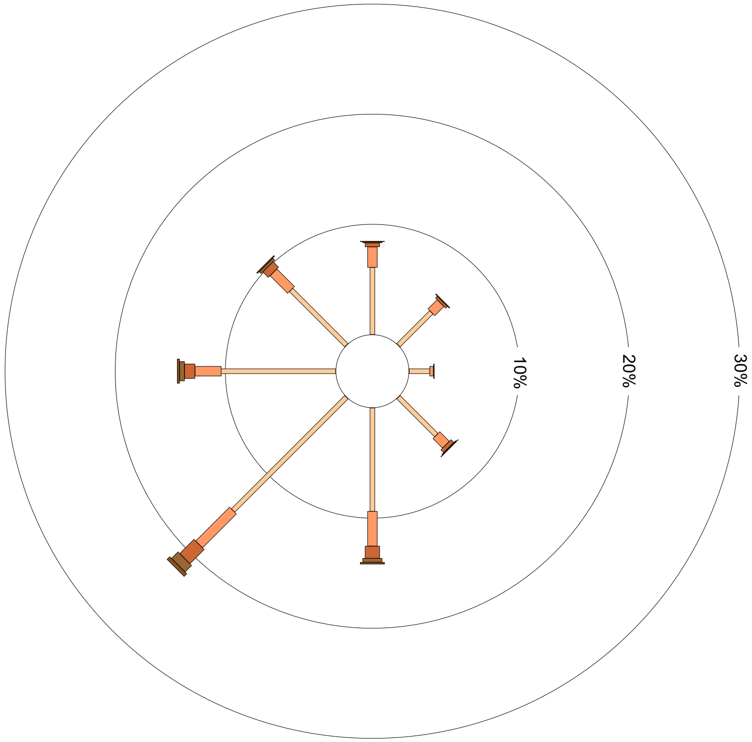
Rose of Wind direction versus Wind speed in km/h (01 Jan 1965 to 27 May 2018)

Custom times selected, refer to attached note for details

PROSPECT RESERVOIR

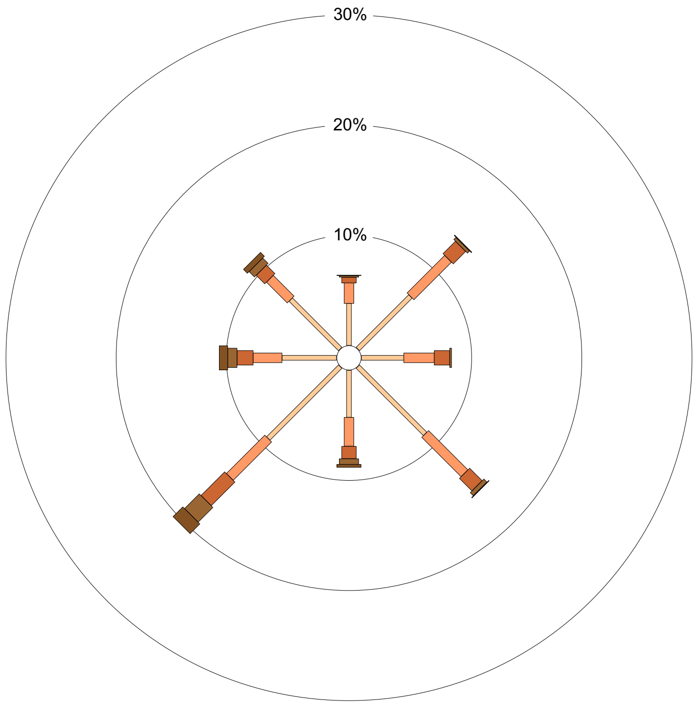
Site No: 067019 • Opened Jan 1887 • Still Open • Latitude: -33.8193° • Longitude: 150.9127° • Elevation 61m

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



9 am
19100 Total Observations

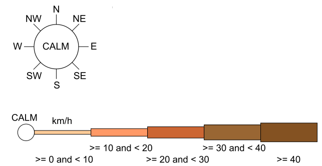
Calm 17%



3 pm
11187 Total Observations

Calm 6%

Legend



JBS&G

Job No: 63526	
Client: Aliro	
Version: R02 Rev 0	Date 10/08/2022
Drawn By: AB	Checked By: SD
Scale 1:12,500	

0 110 220
metres

Coord. Sys. GDA 1994 MGA Zone 56

44 Clunies Ross Street
Prospect, NSW

WIND ROSES
PROSPECT RESERVOIR
BOM WEATHER STATION

FIGURE 3

Legend

Approximate Site Boundary

Receptor Points

Off-Site Receptor

On-Site Receptor

JBS&G

Job No: 63526

Client: Aliro

Version: R02 Rev 0	Date 11/08/2022
Drawn By: AB	Checked By: SD

Scale 1:3,750

0 30 60

metres

Coord. Sys. GDA 1994 MGA Zone 56

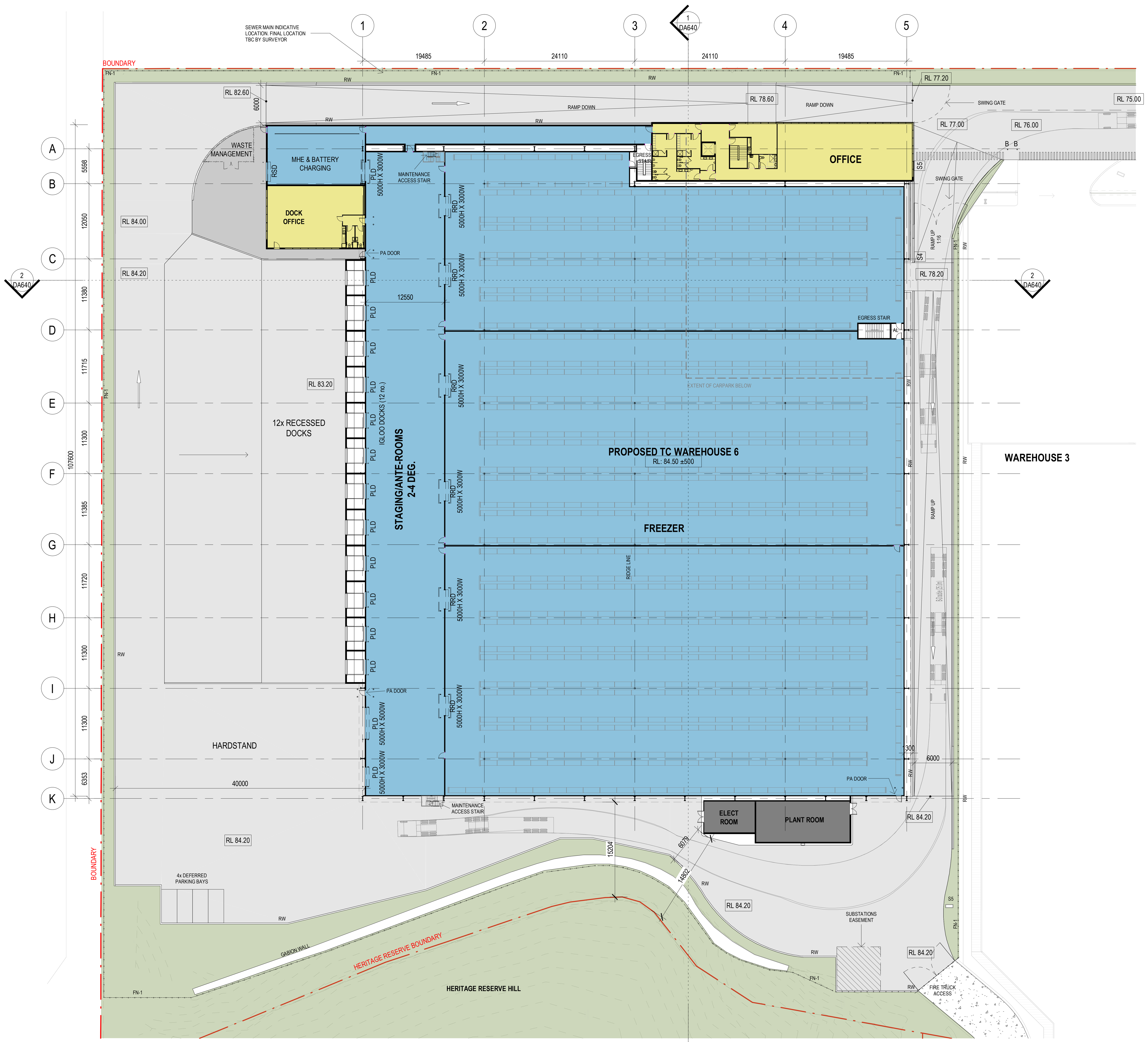
44 Clunies Ross Street
Prospect, NSW

SITE AND
POTENTIAL SENSITIVE RECEPTORS
FOR EMISSIONS TO AIR

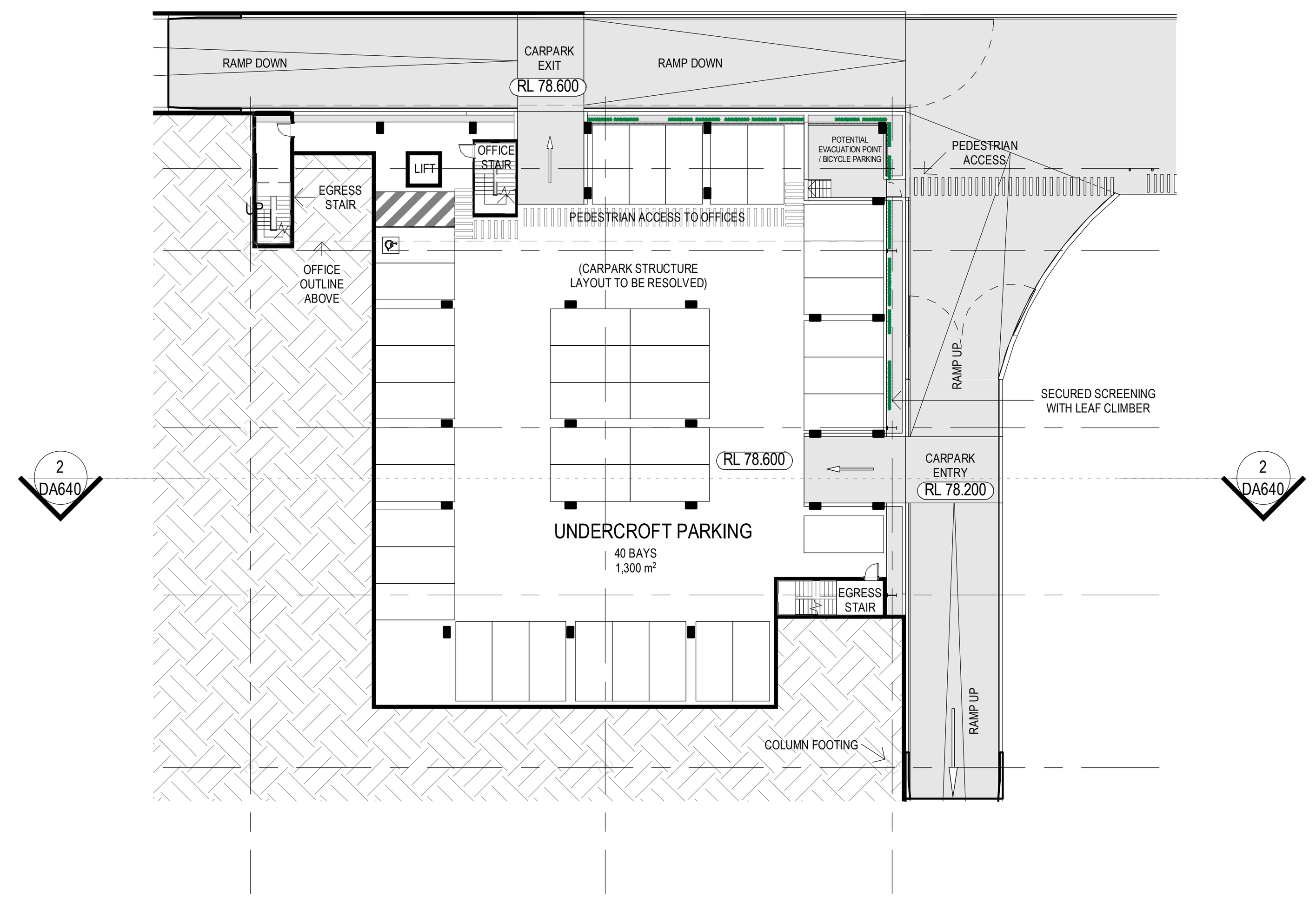
FIGURE 4

File Name: N:\Projects\Aliro\63526 Pemulwuy Warehouse 1 Air Quality Assessment\GIS\02_MapProjects\63526_Pemulwuy_R02_Rev0.aprx
Reference: www.nearmap.com (Capture Date: 19/05/2022)

Appendix A: Site Development Plans



GROUND FLOOR
SCALE: 1 : 400



UNDERCROFT PARKING
SCALE: 1 : 400

NOTES

ALL NEW CROSSOVERS IN ACCORDANCE WITH LOCAL COUNCIL REQUIREMENTS

ALL PARKING SPACES IN ACCORDANCE WITH AUSTRALIAN STANDARDS

ALL DISABLED PARKING SPACES IN ACCORDANCE WITH AUSTRALIAN STANDARD AS2890
(5.4m x 2.4m)

SITE STORMWATER DRAINAGE IN ACCORDANCE WITH LOCAL AUTHORITY & COUNCIL REQUIREMENTS

ALL RELATIVE LEVELS ARE SHOWN TO A.H.D.
(Australian Height Datum)

LEGEND

- INDICATES EXTENT OF HARDSTAND AND HEAVY DUTY DRIVEWAY/RAMP
- AREA OF GRASS / LANDSCAPING, REFER TO LANDSCAPE ARCHITECTS DRAWINGS FOR LANDSCAPE LAYOUT AND DETAIL
- INDICATES EXTENT OF WAREHOUSE
- INDICATES EXTENT OF OFFICES
- CRUSHED ROCK TO FIRE TRUCK ACCESS TRACK
- PROPOSED BOUNDARY
- RW — RETAINING WALL
- FENCE LINE

DEVELOPMENT ANALYSIS

BUILDING	GFA
FREEZER	7,305 m²
2-4 DEG ZONE	1,435 m²
DOCK OFFICE	155 m²
MAIN OFFICE	360 m²
MHE	145 m²
TOTAL BUILDING GFA AREA	9,400 m²

BUILDING	GLA
FREEZER	7,340 m²
2-4 DEG ZONE	1,310 m²
DOCK OFFICE	160 m²
MAIN OFFICE	385 m²
EGRESS & ANCILLARY	425 m²
MHE	155 m²
IGLOO DOCKS	220 m²
TOTAL BUILDING GLA AREA	9,995 m²

EXTERNAL AREAS (APPROX)	
HARDSTAND (INCL. RAMPS)	7,675 m²

PARKING	
UNDERCROFT PARKING	40
GROUNDFLOOR	4
TOTAL BAYS NUMBER	44

NO:	DATE:	REVISION:	BY:	CHK:
D	04.06.2020	SSDA APPROVED BY SBA ARCHITECTS		
E	20.07.2022	FOR SSDA MOD LODGEMENT	AS	JF
F	21.07.2022	FOR SSDA MOD LODGEMENT	AS	JF
G	25.07.2022	FOR SSDA MOD LODGEMENT	AS	JF

All areas indicated are indicative for design and planning purposes only and should not be used for any contractual reasons without verification by a licensed surveyor or further design development being completed.

Watson Young Architects P/L Melbourne | Perth | Sydney 03 9516 8555 ACN: 111398700
8 Grattan Street Prahran VIC 3181 info@watsonyoung.com.au watsonyoung.com.au

PROJECT:
GREYSTANES INDUSTRIAL PARK - WH 6
CLUNIES ROSS STREET, GREYSTANES NSW

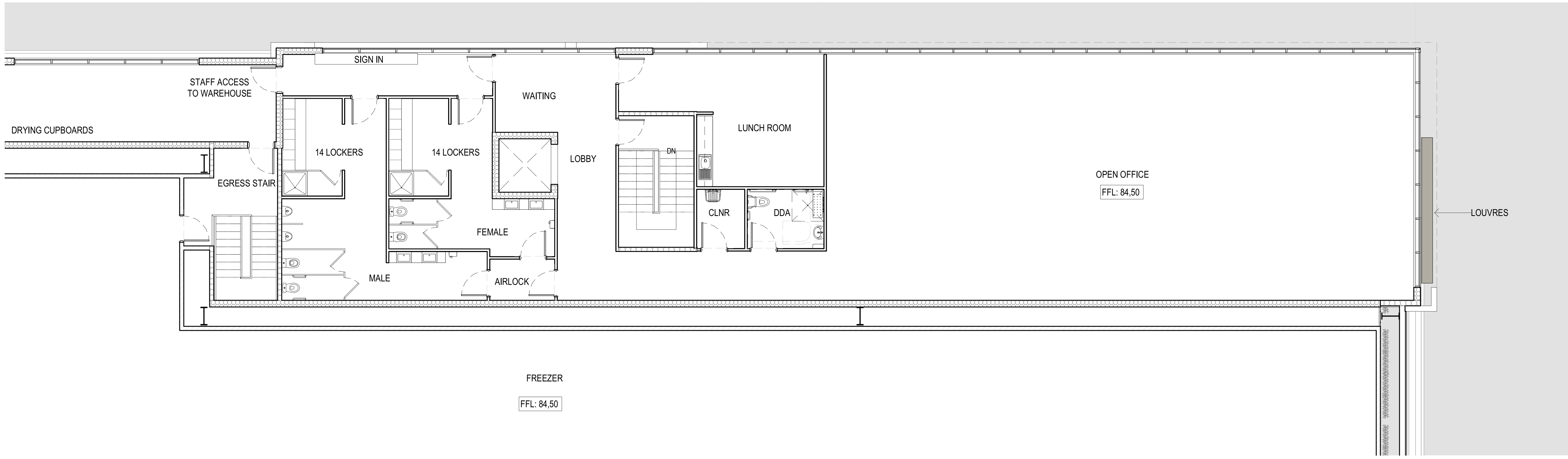
TITLE:
WAREHOUSE FLOORPLAN

CLIENT:
Aliro
ISPT SUPER PROPERTY

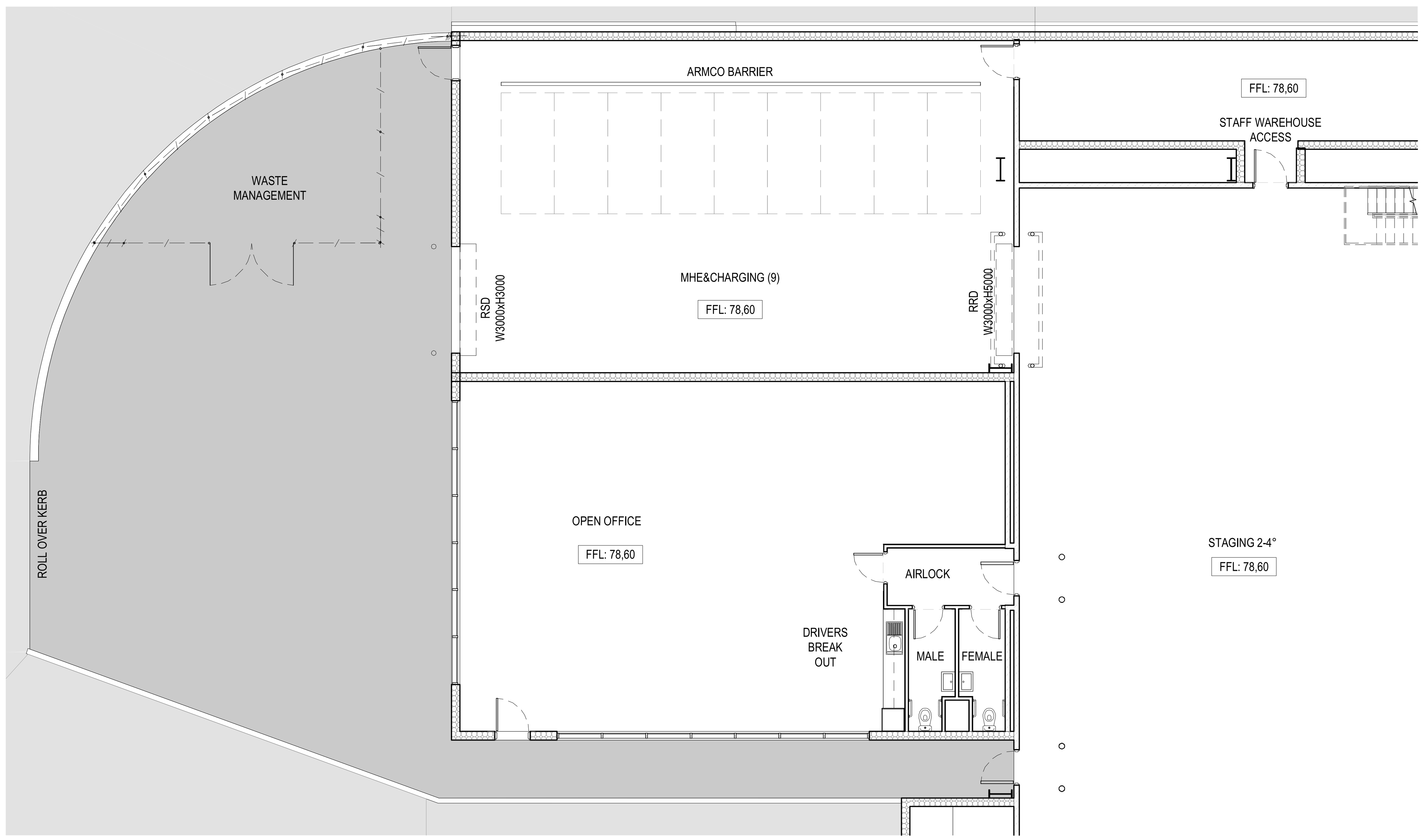
DATE: MARCH, 2022
DRAWN BY: AS
SCALE: As indicated @A1
SCALE:

JOB NO: 22028
DRAWING NO: DA610
REVISION: G

watson young



100_MAIN OFFICE
SCALE: 1 : 100



100_DOCK OFFICE FLOORPLAN
SCALE: 1 : 100

NO:	DATE:	REVISION:	BY:	CHK:
C	04.06.2020	SSDA APPROVED BY SBA ARCHITECTS		
D	20.07.2022	FOR SSDA MOD LODGEMENT	AS	JF

All areas indicated are indicative for design and planning purposes only and should not be used for any contractual reasons without verification by a licensed surveyor or further design development being completed.

Watson Young Architects P/L Melbourne | Perth | Sydney 03 9516 8555 ACN: 111398700
8 Grattan Street Prahran VIC 3181 info@watsonyoung.com.au watsonyoung.com.au

PROJECT:
GREYSTANES INDUSTRIAL PARK - WH 6
CLUNIES ROSS STREET, GREYSTANES
NSW

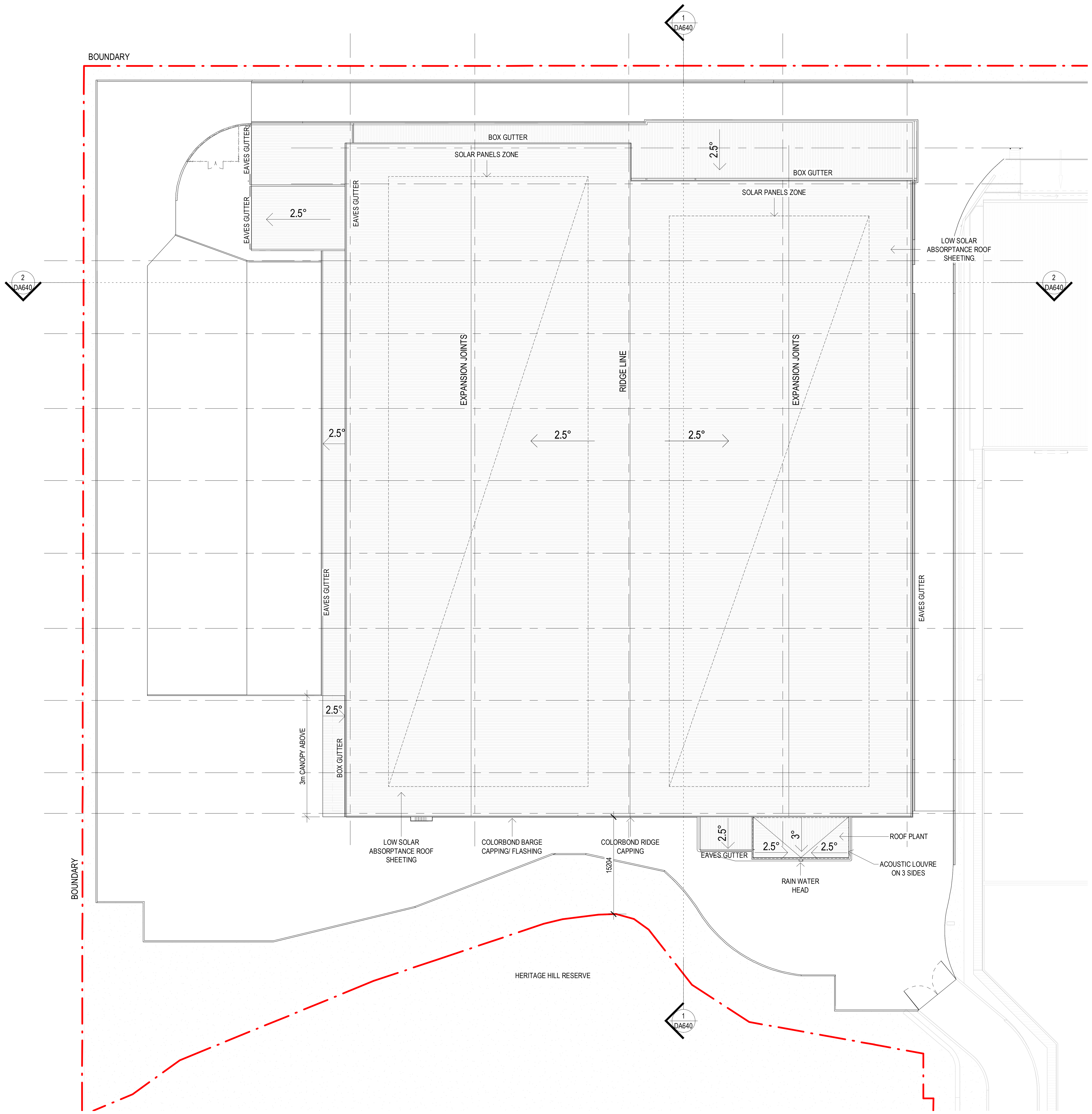
TITLE:
MAIN OFFICE AND DOCK
OFFICE FLOORPLANS

CLIENT:
Aliro
ISPT SUPER PROPERTY

DATE: MARCH, 2022
DRAWN BY: AS
SCALE: 1 : 100@A1
SCALE:

JOB NO: 22028
DRAWING NO: DA611
REVISION: D

watson young



400_ROOF PLAN
SCALE: 1 : 400

NO:	DATE:	REVISION:	BY:	CHK:
D	04.06.2020	SSDA APPROVED BY SBA ARCHITECTS		
E	20.07.2022	FOR SSDA MOD LODGEMENT	AS	JF
F	21.07.2022	FOR SSDA MOD LODGEMENT	AS	JF

All areas indicated are indicative for design and planning purposes only and should not be used for any contractual reasons without verification by a licensed surveyor or further design development being completed.

Watson Young Architects P/L Melbourne | Perth | Sydney 03 9516 8555 ACN: 111398700
8 Grattan Street Prahran VIC 3181 info@watsonyoung.com.au watsonyoung.com.au

PROJECT:
GREYSTANES INDUSTRIAL PARK - WH 6
CLUNIES ROSS STREET, GREYSTANES
NSW

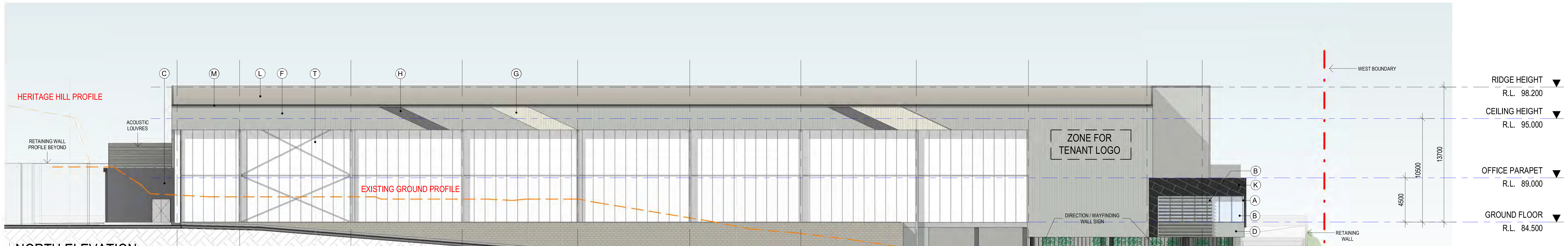
TITLE:
ROOF PLAN

CLIENT:
Aliro
ISPT SUPER PROPERTY

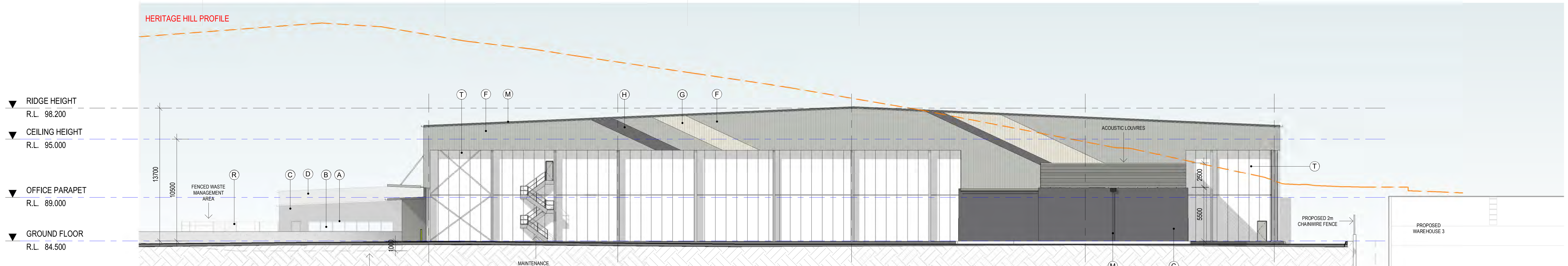
DATE: MARCH, 2022
DRAWN BY: AS
SCALE: 1 : 400 @A1
SCALE:

JOB NO: 22028
DRAWING NO: DA620
REVISION: F

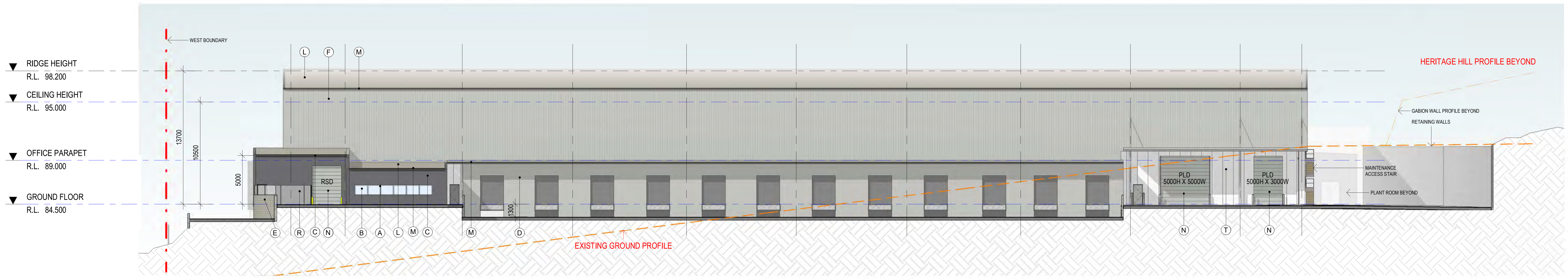
watson young



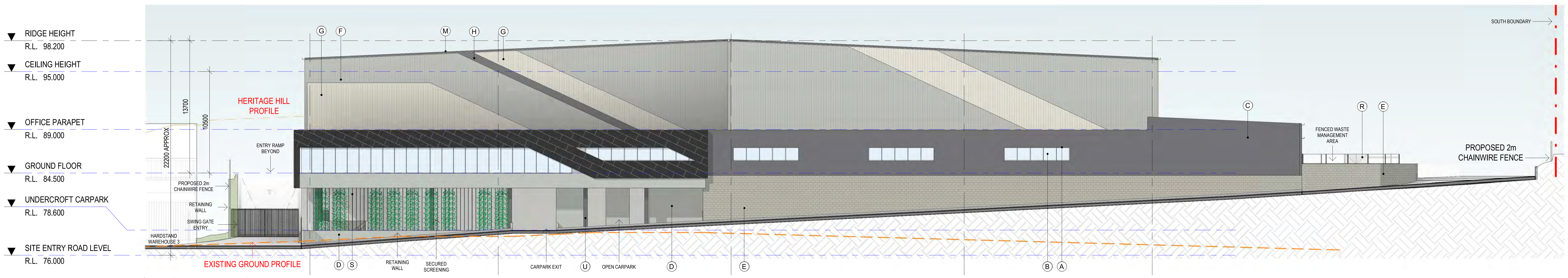
NORTH ELEVATION
SCALE: 1 : 250



EAST ELEVATION
SCALE: 1 : 250



SOUTH ELEVATION
SCALE: 1 : 250



WEST ELEVATION
SCALE: 1 : 250

EXTERNAL FINISHES

A	ALUMINIUM WINDOW FRAME	DARK GREY POWDERCOAT FRAME
B	WINDOW GLAZING	LOW REFLECTIVITY GLAZING
C	PRECAST CONCRETE PANEL, TEXTURE PAINT	COLORBOND BASALT
D	PRECAST CONCRETE PANEL, TEXTURE PAINT	COLORBOND SHALE GREY
E	CONCRETE BLOCK	
F	COLORBOND WALL CLADDING	COLORBOND SHALE GREY
G	COLORBOND WALL CLADDING	COLORBOND SURFMIST
H	COLORBOND WALL CLADDING	COLORBOND BASALT
J	COLORBOND WALL CLADDING	COLORBOND NIGHT SKY
K	ALUMINIUM CLADDING	MONUMENT
L	ROOF CLADDING	COLORBOND DUNE OR SIMILAR
M	GUTTERS, FLASHINGS, DOWN PIPES	COLORBOND BASALT
N	ROLLER SHUTTER DOOR, PANEL LIFT DOOR	COLORBOND SHALE GREY
P	ALUMINIUM LOUVRES	DUNE
R	SCREEN FENCE	CHAINWIRE FENCE
S	SECURE SCREENING	BLACK
T	PREFINISHED INSULATED PANEL	OFF WHITE
U	COLUMNS	COLORBOND BASALT OR SIMILAR

NO:	DATE:	REVISION:	BY:	CHK:
D	04.06.2020	SSDA APPROVED BY SBA ARCHITECTS		
E	20.07.2022	FOR SSDA MOD LODGEMENT	AS	JF
F	21.07.2022	FOR SSDA MOD LODGEMENT	AS	JF

All areas indicated are indicative for design and planning purposes only and should not be used for any contractual reasons without verification by a licensed surveyor or further design development being completed.

Watson Young Architects P/L Melbourne | Perth | Sydney 03 9516 8555 ACN: 111398700
8 Grattan Street Prahran VIC 3181 info@watsonyoung.com.au watsonyoung.com.au

PROJECT:
GREYSTANES INDUSTRIAL PARK - WH 6
CLUNIES ROSS STREET, GREYSTANES
NSW

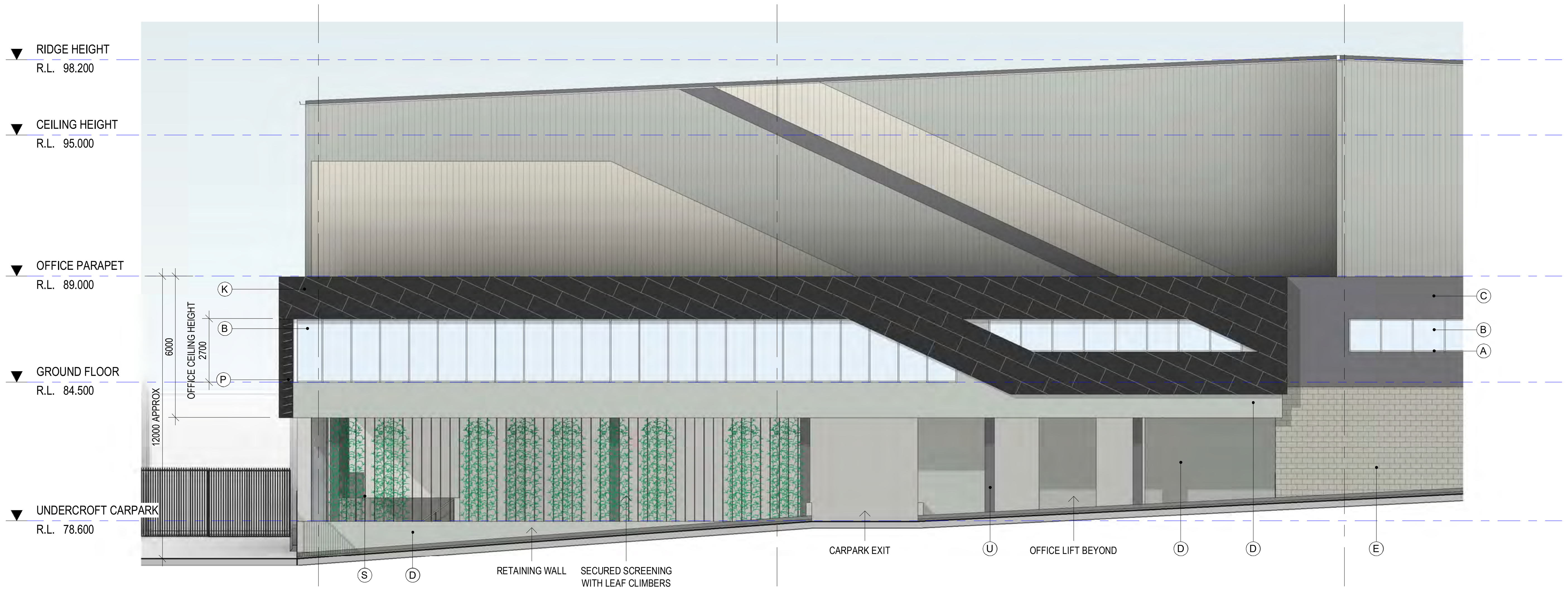
TITLE:
WAREHOUSE ELEVATIONS

CLIENT:
Aliro
ISPT SUPER PROPERTY

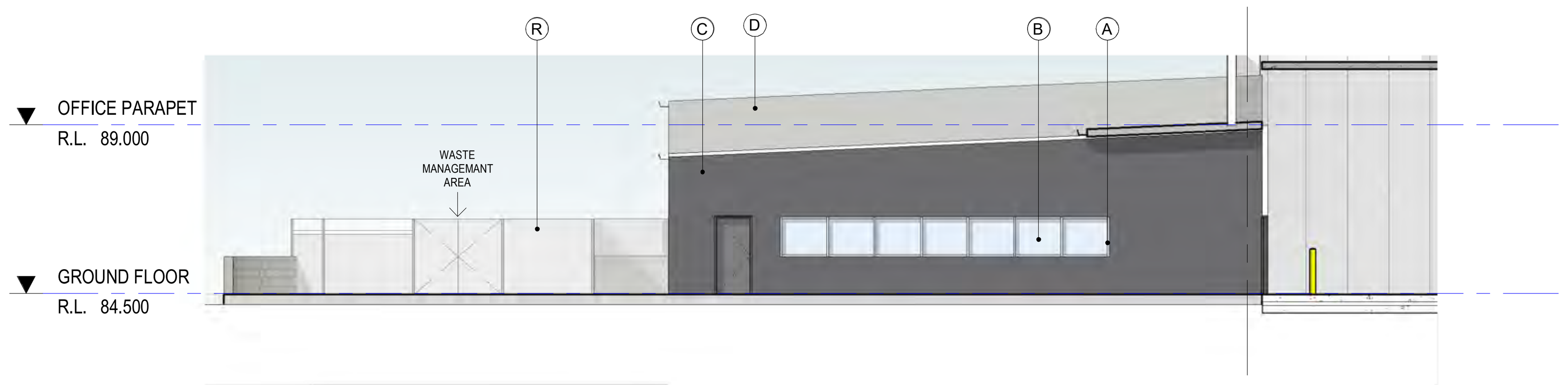
DATE: MARCH, 2022
DRAWN BY: AS
SCALE: 1:250@A1
SCALE:

JOB NO: 22028
DRAWING NO: DA630
REVISION: F

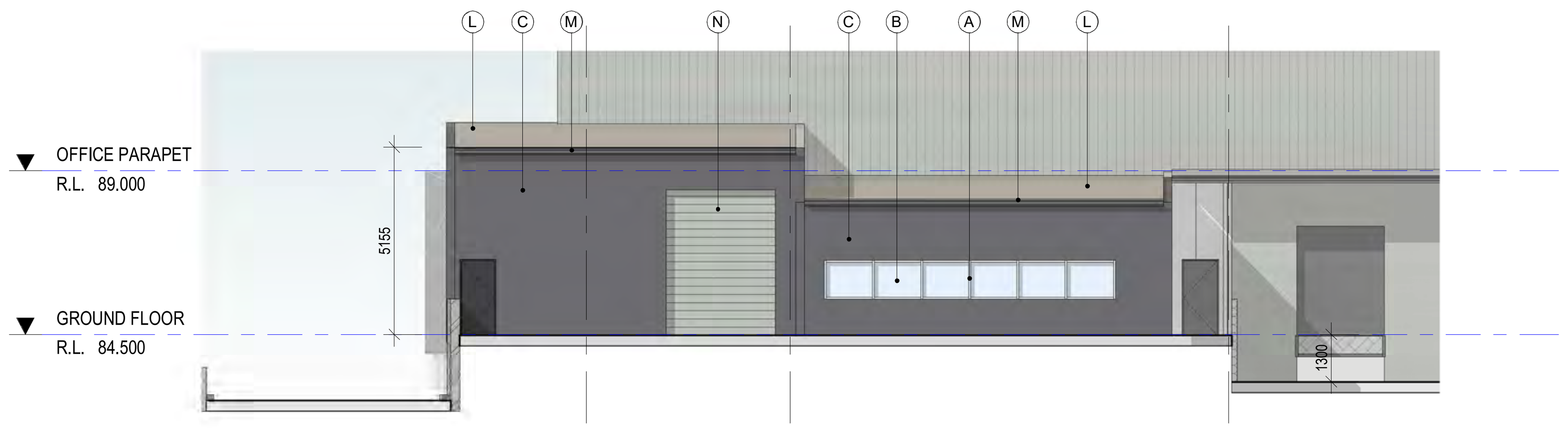
watson young



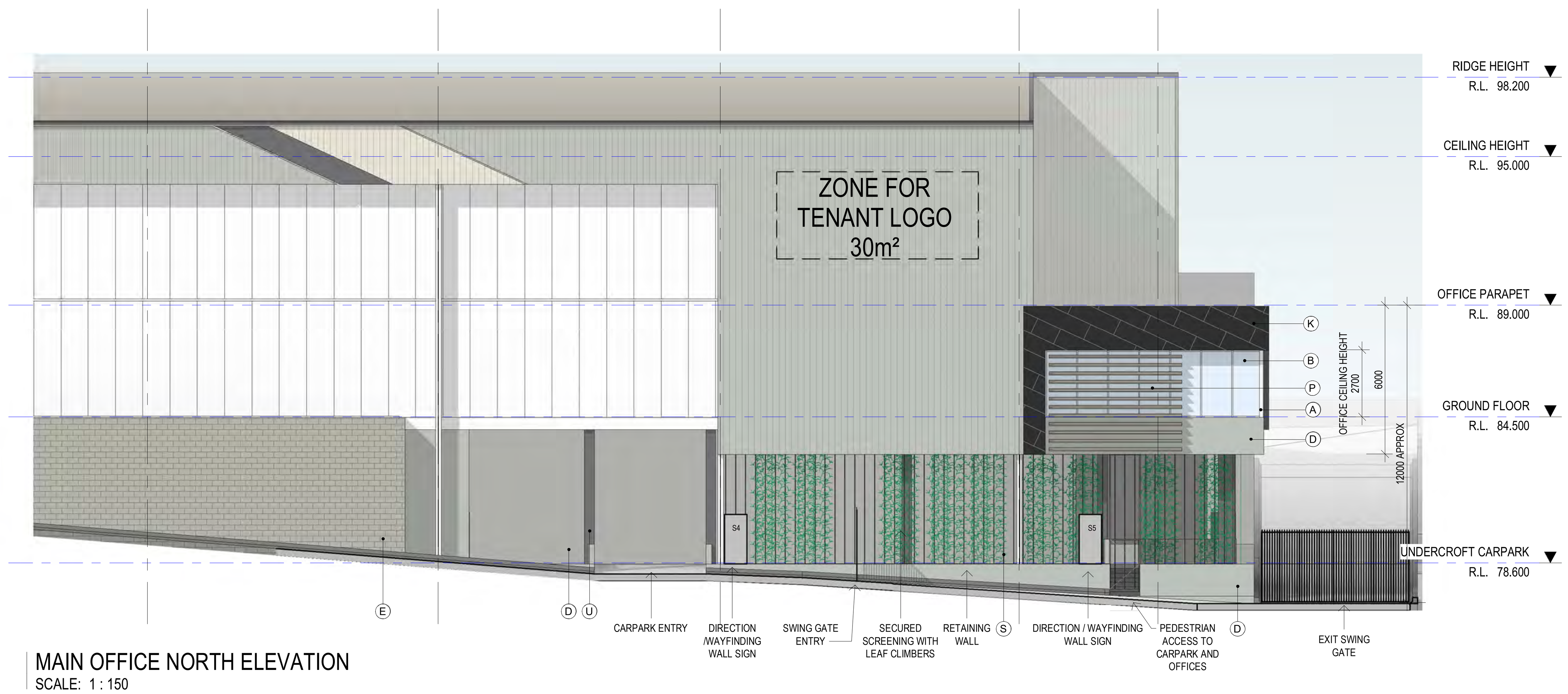
MAIN OFFICE WEST ELEVATION
SCALE: 1 : 150



DOCK OFFICE EAST ELEVATION
SCALE: 1 : 150



DOCK OFFICE SOUTH ELEVATION
SCALE: 1 : 150



MAIN OFFICE NORTH ELEVATION
SCALE: 1 : 150

EXTERNAL FINISHES

A	ALUMINIUM WINDOW FRAME	DARK GREY POWDERCOAT FRAME
B	WINDOW GLAZING	LOW REFLECTIVITY GLAZING
C	PRECAST CONCRETE PANEL, TEXTURE PAINT	COLORBOND BASALT
D	PRECAST CONCRETE PANEL, TEXTURE PAINT	COLORBOND SHALE GREY
E	CONCRETE BLOCK	
F	COLORBOND WALL CLADDING	COLORBOND SHALE GREY
G	COLORBOND WALL CLADDING	COLORBOND SURFMIST
H	COLORBOND WALL CLADDING	COLORBOND BASALT
J	COLORBOND WALL CLADDING	COLORBOND NIGHT SKY
K	ALUMINIUM CLADDING	MONUMENT
L	ROOF CLADDING	COLORBOND DUNE OR SIMILAR
M	GUTTERS, FLASHINGS, DOWN PIPES	COLORBOND BASALT
N	ROLLER SHUTTER DOOR, PANEL LIFT DOOR	COLORBOND SHALE GREY
P	ALUMINIUM LOUVRES	DUNE
R	SCREEN FENCE	CHAINWIRE FENCE
S	SECURE SCREENING	BLACK
T	PREFINISHED INSULATED PANEL	OFF WHITE
U	COLUMNS	COLORBOND BASALT OR SIMILAR

NO:	DATE:	REVISION:	BY:	CHK:
D	04.06.2020	SSDA APPROVED BY SBA ARCHITECTS		
E	20.07.2022	FOR SSDA MOD LODGEMENT	AS	JF

All areas indicated are indicative for design and planning purposes only and should not be used for any contractual reasons without verification by a licensed surveyor or further design development being completed.

Watson Young Architects P/L Melbourne | Perth | Sydney 03 9516 8555 ACN: 111398700
8 Grattan Street Prahran VIC 3181 info@watsonyoung.com.au watsonyoung.com.au

PROJECT:
GREYSTANES INDUSTRIAL PARK - WH 6
CLUNIES ROSS STREET, GREYSTANES
NSW

TITLE:
OFFICE ELEVATIONS

CLIENT:
Aliro
ISPT SUPER PROPERTY

DATE: MARCH, 2022
DRAWN BY: AS
SCALE: As indicated @A1
SCALE:

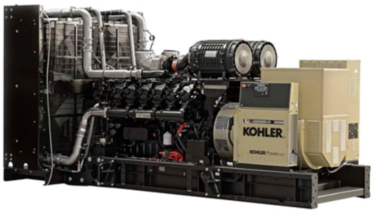
JOB NO: 22028
DRAWING NO: DA632
REVISION: E

watson young

Appendix B: Generator Technical Specifications

KOHLER Industrial Diesel Generator Set – B1500

50 Hz



RATINGS 400 V - 50 Hz		
Standby	kVA	1513
	kWe	1210
Prime	kVA	1375
	kWe	1100

Benefits & features

KOHLER premium quality

- KOHLER provides **one source responsibility** for the generating set and accessories
- The generator set, its components and a wide range of options have been **fully developed, prototype tested, factory built**, and production tested
- The generator sets are designed in accordance to ISO8528
- Approved for use with HVO (Hydrotreated Vegetable Oil) according to EN15940

KOHLER premium performances

Engines

- High reliability enhanced through a simple design for optimal functional performances
- High performances turbochargers providing high engine performances under all loads
- Easy operation and maintenance: accessories requiring daily maintenance are conveniently located on the same side of the engine

Alternator

- Provide industry leading motor starting capability
- Excitation system to permit sustained overcurrent > 300% In, during 10 sec
- Built with a class H insulation and IP23

Cooling

- A compact and complete solution using a mechanical driven fan radiator
- High temperature and altitude product capacity available

Control Panel

- The KOHLER wide controller range provides the reliability and performances you expect from your equipment. You can program, manage and diagnose it easily and in an efficient way

KOHLER worldwide support

- A standard two-year or 1000-hours limited warranty for standby applications.
- A standard one-year or 2500 hours limited warranty for prime power applications.
- A worldwide product support

GENERAL SPECIFICATIONS	
Engine brand	BAUDOUIN
Alternator commercial brand	KOHLER
Voltage (V)	400/230
Standard Control Panel	APM403
Consumption @ 100% load ESP (L/h)	326
Consumption @ 100% load PRP (L/h)	293
Emission level	Fuel consumption optimization
Type of Cooling	Mechanical driven fan
Performance class	G2

GENERATOR SETS RATINGS

				Standby Rating			Prime Rating	
	Voltage	PH	Hz	kWe	kVA	Amps	kWe	kVA
B1500	415/240	3	50	1210	1513	2105	1100	1375
	400/230	3	50	1210	1513	2184	1100	1375
	380/220	3	50	1210	1513	2299	1100	1375

DIMENSIONS COMPACT VERSION	
Length (mm)	4765
Width (mm)	2250
Height (mm)	2465
Tank capacity (L)	500
Dry weight (kg)	9440

DIMENSIONS SOUNDPROOFED VERSION	
Type soundproofing	NOT AVAILABLE
Length (mm)	6060
Width (mm)	2440
Height (mm)	2896
Tank capacity (L)	500
Dry weight (kg)	15230
Acoustic pressure level @1m in dB(A) 50Hz (75% PRP)	93
Acoustic pressure level @7m in dB(A) 50Hz (75% PRP)	84

Reference Conditions: 25°C Air Inlet Temperature, 40°C Fuel Inlet Temperature, 100 kPa Barometric Pressure; 10.7 g/kg of dry air Humidity. Intake Restriction set to maximum allowable limit for clean filter; Exhaust Back pressure set to maximum allowable limit.
Data was taken from a single engine test according to the test methods, fuel specification and reference conditions stated above and is subjected to instrumentation and engine-to-engine variability. Test conducted with alternate test methods, instrumentation, fuel or reference conditions can yield different results. Data and specifications subject to change without notice.

Industrial Diesel Generator Set – B1500
50 Hz

Engine

General	
Engine brand	BAUDOUIN
Engine ref.	12M33G1500_V2_5 *
Air inlet system	Turbo
Fuel	Diesel Fuel/HVO
Emission level	Fuel consumption optimization
Cylinder configuration	V
Number of cylinders	12
Displacement (l)	39,23
Bore (mm) * Stroke (mm)	150 * 185
Compression ratio	15 : 1
Speed 50Hz (RPM)	1500
Maximum stand-by power at rated RPM (kW)	1320
Charge Air coolant	Air/Air
Frequency regulation, steady state (%)	+/- 0.5%
Injection Type	Direct
Governor type	Electronic
Air cleaner type, models	Dry
Fuel system	
Maximum fuel pump flow (l/h)	1070
Fuel Inlet Minimum recommended size (mm)	14
Fuel Outlet Minimum recommended size (mm)	14
Max head on fuel return line (m)	5,90
Maximum allowed inlet fuel temperature (°C)	70

Consumption with cooling system	
Specific consumption @ ESP Max Power (g/kW.h)	210,30
Specific consumption @ PRP Max Power (g/kW.h)	207,80
Specific consumption @ 75% of PRP Power (g/kW.h)	200,10
Specific consumption @ 50% of PRP Power (g/kW.h)	204,70

* Engine reference may be partially modified depending on genset application, options selected by the customer and lead time required.
** Fuel consumption is up to 4% higher when using HVO than Diesel Fuel

Lubrication System		
Oil system capacity including filters (l)	160	
Min. oil pressure (bar)	2	
Max. oil pressure (bar)	7	
Oil sump capacity (l)	155	
Oil consumption 100% ESP 50Hz (l/h)	0,98	
Air Intake system		
Max. intake restriction (mm H2O)	663	
Combustion air flow (l/s)	1650	
Exhaust system		
	PRP	**ESP**
Exhaust gas temperature (°C)	550	550
Exhaust gas flow (L/s)	4197	4617
Max. exhaust back pressure (mm H2O)	765	
Cooling system		
Radiator & Engine capacity (l)	303	
Fan power 50Hz (kW)	55	
Fan air flow w/o restriction (m3/s)	27,50	
Available restriction on air flow (mm H2O)	20	
Type of coolant	Gencool	
Coolant capacity HT, engine only (l)	83	
Max coolant temperature, Shutdown (°C)	103	
Thermostat begin of opening HT (°C)	77	
Thermostat end of opening HT (°C)	87	

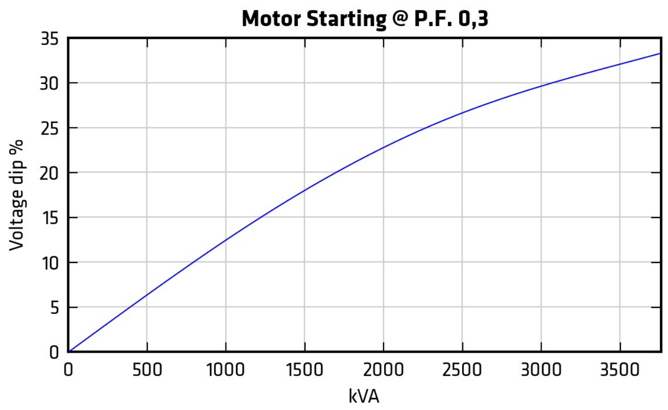
Reference Conditions: 25°C Air Inlet Temperature, 40°C Fuel Inlet Temperature, 100 kPa Barometric Pressure; 10.7 g/kg of dry air Humidity. Intake Restriction set to maximum allowable limit for clean filter; Exhaust Back pressure set to maximum allowable limit.
Data was taken from a single engine test according to the test methods, fuel specification and reference conditions stated above and is subjected to instrumentation and engine-to-engine variability. Test conducted with alternate test methods, instrumentation, fuel or reference conditions can yield different results. Data and specifications subject to change without notice.

KOHLER

Industrial Diesel Generator Set – B1500
50 Hz

Alternator Specifications	
Alternator commercial brand	KOHLER
Kohler Alternator description	KH05520T
Number of pole	4
Number of bearing	Single Bearing
Technology	Brushless
Indication of protection	IP23
Insulation class	H
Number of wires	12
AVR Regulation	Yes
Coupling	Direct
Capacity for maintaining short circuit at 3 In for 10 s	Yes
Application data	
Overspeed (rpm)	2250
Power factor (Cos Phi)	0,80
Voltage regulation at established rating (+/- %)	0,50
Wave form : NEMA=TIF	<40
Wave form : CEI=FHT	<2
Total Harmonic Distortion in no-load DHT (%)	2,6
Total Harmonic Distortion, on linear load DHT (%)	1,7
Recovery time (Delta U = 20% transcient) (ms)	200
Performance datas	
Continuous Nominal Rating 40°C (kVA)	1400
Unbalanced load acceptance ratio (%)	8

Peak motor starting (kVA) based on x% voltage dip power factor at 0.3

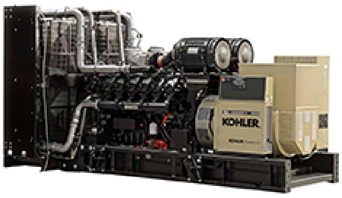


Alternator Standard Features

- All models are brushless, rotating-field alternators
- NEMA MG1, IEEE, and ANSI standards compliance for temperature rise and motor starting
- The AVR voltage regulator provides superior short circuit capability
- Self-ventilated and dip proof construction
- Sustained short-circuit current of up to 300% of the rated current for up to 10 seconds
- Superior voltage waveform

Note: See Alternator Data Sheets for alternator application data and ratings, efficiency curves, voltage dip with motor starting curves, and short circuit decrement curves.

Dimensions compact version with baseframe fuel tank



Length (mm) * Width (mm) * Height (mm)	4765 * 2250 * 2465
Dry weight (kg)	9440
Tank capacity (L)	500

Container dimensions ISO20 soundproofed version

Length (mm) * Width (mm) * Height (mm)	6060 * 2440 * 2896
Dry weight (kg)	15230
Tank capacity (L)	500
Acoustic pressure level @1m in dB(A) 50Hz (75% PRP)	93
Sound power level guaranteed (Lwa) 50Hz (75% PRP)	114
Acoustic pressure level @7m in dB(A) 50Hz (75% PRP)	84

* dimensions and weight without options

APM403

BASIC GENERATING SET AND POWER PLANT CONTROL

The APM403 is a versatile control unit which allows operation in manual or automatic mode

- Measurements : voltage and current
- kW/kWh/kVA power meters
- Standard specifications: Voltmeter, Frequency meter.
- Optional : Battery ammeter.
- J1939 CAN ECU engine control
- Alarms and faults: Oil pressure, Coolant temperature, Overspeed, Start-up failure, alternator min/max, Emergency stop button.
- Engine parameters: Fuel level, hour counter, battery voltage.
- Optional (standard at 24V): Oil pressure, water temperature.
- Event log/ Management of the last 300 genset events.
- Mains and genset protection
- Clock management
- USB connections, USB Host and PC,
- Communications : RS485 INTERFACE
- ModBUS protocol /SNMP
- Optional : Ethernet, GPRS, remote control, 3G, 4G,
- Websupervisor, SMS, E-mails

STANDARD DELIVERY

All our gensets are fitted with:

- Industrial water-cooled DIESEL engine
- Electric starter & charge alternator
- Standard air filter
- Electric circuit breaker, adapted to the short-circuit current of the generating set
- Single bearing alternator IP 23 T° rise/ insulation to class H/H
- Welded steel base frame with 85% vibration attenuation mounts
- frame height optimized to allow it to be moved safely by forklift
- enclosure made of new high-quality European steel with enhanced corrosion resistance
- enclosures and base frames tested and analyzed by the French Corrosion Institut
- 100% of tanks tested for permeability
- Personal protection ensured by protective grilles on hot and rotating parts
- Separate 9 dB(A) silencer
- Fuel tank welded inside the genset frame
- Retention bund included for gensets up to 250 kVA ESP
- Charged DC starting battery with electrolyte
- Emergency stop button on the outside
- Flexible fuel lines & lub oil drain cock
- Exhaust outlet with flexible and flanges
- User's manual (1 copy)
- Packing under plastic film
- Delivered with oil and antifreeze liquid

CODES AND STANDARDS

Engine-generators set is designed and manufactured in facilities certified to standards ISO9001:2015 & ISO14001:2015. The generator sets and its components are prototype-tested, factory built and production tested and are in compliance with the relevant standards:

- Machinery Directive 2006/42/EC of May 17th 2006
- EMC Directive2014/30/UE
- Safety objectives set out in the Low Voltage Directive 2014/35/UE
- EN ISO 8528-13, EN 60034-1, EN 61000-6-1, EN 61000-6-2, EN 61000-6-3, EN 55011, EN 1679-1 et EN 60204-1

TERMS OF USE

According to the standard, the nominal power assigned by the genset is given for 25°C Air Intlet Temperature, of a barometric pressure of 100 kPA (100 m A.S.L), and 30% relative humidity. For particular conditions in your installation, refer to the derating table.

WARRANTY INFORMATIONS

Standard Warranty Period:

- for Products in "back-up" service
  - 30 months from the date the Product leaves the plant
  - 24 months from the Product’s commissioning date
  - 1,000 running hours

The warranty expires when one of the above conditions is met.

- for Products in “prime” or "continuous" service (continuous supply of electricity, either in the absence of any normal electricity grid or to complement the grid),
  - 18 months from the date the Product leaves the plant
  - 12 months from the Product’s commissioning date
  - 2,500 running hours

The warranty expires when one of the above conditions is met.

For more details regarding conditions of application and scope of the warranty please refer to our General “terms & conditions of sales”.

Appendix C: Summary of AERMOD Inputs

```
** AERMOD Input Produced by AUSMOD v6.0
** Licensed to SumiD_JBS
** AERMOD Control Pathway
CO STARTING
   TITLEONE WH6 Generator Test Case CO exhaust at 3m high Constant emission
   MODELOPT CONC FLAT NOCHKD
   AVERTIME 1 24 PERIOD
   POLLUTID PM10
   RUNORNOT RUN
   ERRORFIL "PM10 3m High Exhaust Release Constant.err"
CO FINISHED

** AERMOD Source Pathway
SO STARTING
   LOCATION PS01 POINT 307958.000 6256551.000 0.000
   SRCPARAM PS01 0.14300 3.000 823.150 40.000 0.100
   CONCUNIT 1000000 g/s ug/m3
   SRCGROUP GP01 PS01
   SRCGROUP ALL
SO FINISHED

** AERMOD Receptor Pathway
RE STARTING
   GRIDCART RGCART STA
                XYINC 307000.000 50 50.000 6256000.000 50 50.000
   GRIDCART RGCART END
** Discrete receptors
   DISCCART       307838.514 6256570.387
   DISCCART       307980.789 6256413.040
   DISCCART       308100.126 6256466.872
   DISCCART       308129.912 6256665.271
   DISCCART       308179.563 6256864.074
   DISCCART       307848.505 6256823.775
RE FINISHED

** AERMOD Meteorology Pathway
ME STARTING
   SURFFILE "ScreenMet.sfc"
   PROFFILE "ScreenMet.pfl"
   SURFDATA 00011111 2010
   UAIRDATA 00022222 0
   PROFBASE 0 METERS
ME FINISHED

** AERMOD Output Pathway
OU STARTING
   RECTABLE ALLAVE 1ST
   RECTABLE 1 9TH
   RECTABLE 24 1ST
   MAXTABLE ALLAVE 999
```

```
   RANKFILE 1 100 ALL_PERIOD_100T.RNK
   PLOTFILE 24 ALL 1ST ALL_24_1H.PLT
OU FINISHED
```

```
** AERMOD Input Produced by AUSMOD v6.0
** Licensed to SumiD_JBS
** AERMOD Control Pathway
CO STARTING
   TITLEONE WH6 Generator Test Case NO2 exhaust at 3m high Constant emission
   MODELOPT CONC FLAT NOCHKD
   AVERTIME 1 PERIOD
   POLLUTID NO2
   RUNORNOT RUN
   ERRORFIL "NO2 3m High Exhaust Release Constant.err"
CO FINISHED

** AERMOD Source Pathway
SO STARTING
   LOCATION PS01 POINT 307958.000 6256551.000 84.500
   SRCPARAM PS01 2.65000 3.000 823.150 40.000 0.100
   CONCUNIT 1000000 g/s ug/m3
   SRCGROUP GP01 PS01
   SRCGROUP ALL
SO FINISHED

** AERMOD Receptor Pathway
RE STARTING
   GRIDCART RGCART STA
                XYINC 307000.000 50 50.000 6256000.000 50 50.000
   GRIDCART RGCART END
** Discrete receptors
   DISCCART       307838.514 6256570.387
   DISCCART       307980.789 6256413.040
   DISCCART       308100.126 6256466.872
   DISCCART       308129.912 6256665.271
   DISCCART       308179.563 6256864.074
   DISCCART       307848.505 6256823.775
RE FINISHED

** AERMOD Meteorology Pathway
ME STARTING
   SURFFILE "ScreenMet.sfc"
   PROFFILE "ScreenMet.pfl"
   SURFDATA 00011111 2010
   UAIRDATA 00022222 0
   PROFBASE 0 METERS
ME FINISHED

** AERMOD Output Pathway
OU STARTING
   RECTABLE ALLAVE 1ST
   RECTABLE 1 9TH
   MAXTABLE ALLAVE 999
   RANKFILE 1 100 ALL_01_100T.RNK
```

```
   PLOTFILE 01 ALL 9TH ALL_01_9H.PLT
   PLOTFILE 01 ALL 1ST ALL_01_1H.PLT
OU FINISHED
```

```
** AERMOD Input Produced by AUSMOD v6.0
** Licensed to SumiD_JBS
** AERMOD Control Pathway
CO STARTING
   TITLEONE WH6 Generator Test Case PM10 exhaust at 3m high Constant emission
   MODELOPT CONC FLAT NOCHKD
   AVERTIME 1 24 PERIOD
   POLLUTID PM10
   RUNORNOT RUN
   ERRORFIL "PM10 3m High Exhaust Release Constant.err"
CO FINISHED

** AERMOD Source Pathway
SO STARTING
   LOCATION PS01 POINT 307958.000 6256551.000 84.500
   SRCPARAM PS01 0.14300 3.000 823.150 40.000 0.100
   CONCUNIT 1000000 g/s ug/m3
   SRCGROUP GP01 PS01
   SRCGROUP ALL
SO FINISHED

** AERMOD Receptor Pathway
RE STARTING
   GRIDCART RGCART STA
                XYINC 307000.000 50 50.000 6256000.000 50 50.000
   GRIDCART RGCART END
** Discrete receptors
   DISCCART       307838.514 6256570.387
   DISCCART       307980.789 6256413.040
   DISCCART       308100.126 6256466.872
   DISCCART       308129.912 6256665.271
   DISCCART       308179.563 6256864.074
   DISCCART       307848.505 6256823.775
RE FINISHED

** AERMOD Meteorology Pathway
ME STARTING
   SURFFILE "ScreenMet.sfc"
   PROFFILE "ScreenMet.pfl"
   SURFDATA 00011111 2010
   UAIRDATA 00022222 0
   PROFBASE 0 METERS
ME FINISHED

** AERMOD Output Pathway
OU STARTING
   RECTABLE ALLAVE 1ST
   RECTABLE 1 9TH
   RECTABLE 24 1ST
   MAXTABLE ALLAVE 999
```

```
   RANKFILE 1 100 ALL_PERIOD_100T.RNK
   PLOTFILE 24 ALL 1ST ALL_24_1H.PLT
OU FINISHED
```

```
** AERMOD Input Produced by AUSMOD v6.0
** Licensed to SumiD_JBS
** AERMOD Control Pathway
CO STARTING
   TITLEONE WH6 Generator Test Case SO2 exhaust at 3m high Constant emission
   MODELOPT CONC FLAT NOCHKD
   AVERTIME 1 24 PERIOD
   POLLUTID SO2
   RUNORNOT RUN
   ERRORFIL "SO2 3m High Exhaust Release Constant.err"
CO FINISHED

** AERMOD Source Pathway
SO STARTING
   LOCATION PS01 POINT 307958.000 6256551.000 84.500
   SRCPARAM PS01 1.65000 3.000 823.150 40.000 0.100
   CONCUNIT 1000000 g/s ug/m3
   SRCGROUP GP01 PS01
   SRCGROUP ALL
SO FINISHED

** AERMOD Receptor Pathway
RE STARTING
   GRIDCART RGCART STA
                   XYINC 307000.000 50 50.000 6256000.000 50 50.000
   GRIDCART RGCART END
** Discrete receptors
   DISCCART       307838.514 6256570.387
   DISCCART       307980.789 6256413.040
   DISCCART       308100.126 6256466.872
   DISCCART       308129.912 6256665.271
   DISCCART       308179.563 6256864.074
   DISCCART       307848.505 6256823.775
RE FINISHED

** AERMOD Meteorology Pathway
ME STARTING
   SURFFILE "ScreenMet.sfc"
   PROFFILE "ScreenMet.pfl"
   SURFDATA 00011111 2010
   UAIRDATA 00022222 0
   PROFBASE 0 METERS
ME FINISHED

** AERMOD Output Pathway
OU STARTING
   RECTABLE ALLAVE 1ST
   RECTABLE 1 9TH
   RECTABLE 24 1ST
   MAXTABLE ALLAVE 999
```

```
   RANKFILE 1 100 ALL_PERIOD_100T.RNK
   PLOTFILE 01 ALL 9TH ALL_01_9H.PLT
   PLOTFILE 24 ALL 1ST ALL_24_1H.PLT
OU FINISHED
```

```
** AERMOD Input Produced by AUSMOD v6.0
** Licensed to SumiD_JBS
** AERMOD Control Pathway
CO STARTING
   TITLEONE WH6 Generator Test Case VOC exhaust at 3m high Constant emission
   MODELOPT CONC FLAT NOCHKD
   AVERTIME 1
   POLLUTID OTHER
   RUNORNOT RUN
   ERRORFIL "VOC 3m High Exhaust Release Constant.err"
CO FINISHED

** AERMOD Source Pathway
SO STARTING
   LOCATION PS01 POINT 307958.000 6256551.000 84.500
   SRCPARAM PS01 0.14400 3.000 823.150 40.000 0.100
   CONCUNIT 1000000 g/s ug/m3
   SRCGROUP GP01 PS01
   SRCGROUP ALL
SO FINISHED

** AERMOD Receptor Pathway
RE STARTING
   GRIDCART RGCART STA
                XYINC 307000.000 50 50.000 6256000.000 50 50.000
   GRIDCART RGCART END
** Discrete receptors
   DISCCART       307838.514 6256570.387
   DISCCART       307980.789 6256413.040
   DISCCART       308100.126 6256466.872
   DISCCART       308129.912 6256665.271
   DISCCART       308179.563 6256864.074
   DISCCART       307848.505 6256823.775
RE FINISHED

** AERMOD Meteorology Pathway
ME STARTING
   SURFFILE "ScreenMet.sfc"
   PROFFILE "ScreenMet.pfl"
   SURFDATA 00011111 2010
   UAIRDATA 00022222 0
   PROFBASE 0 METERS
ME FINISHED

** AERMOD Output Pathway
OU STARTING
   RECTABLE ALLAVE 1ST
   RECTABLE 1 9TH
   MAXTABLE ALLAVE 999
   RANKFILE 1 100 ALL_01_100T.RNK
```

```
   PLOTFILE 01 ALL 9TH ALL_01_9H.PLT
OU FINISHED
```

Document Distribution

Rev No.	Copies	Recipient	Date:
A	1 x Electronic Copy	Ms. Stephanie Maxwell, Aliro	12/08/2022
0	1 x Electronic Copy	Ms. Stephanie Maxwell, Aliro	17/08/2022

Document Status

Rev No.	Author	Reviewer	Approved for Issue		
		Name	Name	Signature	Date
A	Sumi Dorairaj, CEnvP-SC	Matthew Parkinson, CEnvP-SC	Draft for client comment	-	12/08/2022
0	Sumi Dorairaj, CEnvP-SC	Matthew Parkinson, CEnvP-SC	Draft for client comment	-	17/08/2022

.

www.jbsg.com.au