HORSLEY LOGISTICS PARK

Lot 201 - Warehouse 1
Air Quality Impact Assessment

Prepared for:

Jalco Group Pty Ltd
c\- ESR
Level 29
20 Bond Street
Sydney NSW 2000

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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 Jalco Group Pty Ltd (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.

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
610.19360-R04-v3.0	25 February 2022	D Dsouza	F Rahaman, A Naghizadeh	A Naghizadeh
610.19360-R04-v2.0	02 November 2021	D Dsouza	F Rahaman, A Naghizadeh	A Naghizadeh

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1 Introduction

ESR has commissioned SLR Consulting Australia Pty Ltd (SLR) on behalf of Jalco Group (Jalco) to prepare an Air Quality Impact Assessment (AQIA) report for the proposed operation at Warehouse 1 of Lot 201 located at 327-355 Burley Road, Horsley Park (The Project). The proposed operation includes manufacturing and packaging of liquid household cleaning and laundry products as well as storage and distribution of raw material and finished goods.

This AQIA has been prepared in accordance with the NSW EPA document 'Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales' (NSW EPA, 2017), hereafter referred to as 'The Approved Methods'. The assessment methodology includes the modelling of local meteorology and the dispersion of potential emissions from the proposed operations to predict potential air quality impacts on surrounding environment. The sections of this report where the requirements of the Approved Methods are met are as follows:

- Description of the Project including layout of site clearly showing unit operations, all emission sources clearly identified, plant boundary, sensitive receptor locations and local topographic features (Section 2 and Section 4).
- Establishment of air quality assessment criteria for the proposed operation. (Section 3.2).
- A detailed discussion of the methodology used to calculate the expected pollutant emission rates for each source, including detailed calculations (Section 5 and Appendix A).
- A description of the techniques used to prepare the meteorological data into a format for use in the dispersion modelling (Sections 6.4).
- A detailed discussion of the prevailing dispersion meteorology at the Site. The report should typically include wind rose diagrams, an analysis of wind speed, wind direction, stability class, ambient temperature and mixing height; and joint frequency distributions of wind speed and wind direction as a function of stability class (Sections 6.5).
- A detailed discussion of the methodology used to calculate the background concentrations for each pollutant including tables summarising the ambient monitoring data (Section 4.4).
- A detailed discussion of air quality impacts for all relevant pollutants, based on predicted ground-level concentrations at all sensitive receptors, including risk isopleths (contours) and tables summarising the predicted concentrations of all relevant pollutants at sensitive receptors (Section 7).

SLR issued an AQIA report (610.19360-R04-v2.0) for the Project, on 2 November 2021. The submissions submitted during the SSDA exhibition stage included a number of matters in relation to air quality impacts that require further clarification. This revised AQIA incorporates responses to the submissions.

Table 1 presents a detailed list of submissions relating to air quality impacts from the Project together with responses and reference to sections within this report where these matters have been addressed.

Table 1 EPA Response to Submissions

Ref	Comment	SLR Response
Department of Planning, Industry and Environment (DPIE) - Industrial Assessments		
1.10	The Air Quality Impact Assessment was based on a production of 4,000 tonnes per year and a total of 30 heavy vehicle movements per day. This contradicts the Traffic Assessment and EIS. Please clarify and have the report updated if required.	See Section 2.2
1.11	The EIS states that the odour emission monitoring of the Smithfield site was utilised to create the model in the Air Quality Impact Assessment as it has a comparable production capacity of 4,000 tonnes per year. Should the Applicant be seeking a throughput in excess of 4,000 tonnes (sic) per year, the Air Quality Impact Assessment must be updated to assess the resultant impacts of the increased throughput.	See Section 5.1
Western Sydney Airport		
4.2	Section 6.1.6. of the EIS identifies a range of potential emissions from the proposed development. WSA requires further information on the nature of these emissions, including whether the emissions are vertical in nature, the height of ventilation equipment and what the metres per second velocity of such emissions would be. This information is required to assess if there is any potential impact to the protected airspace of Western Sydney International (Nancy-Bird Walton) Airport. The Airports (Protection of Airspace) Regulations 1996 and National Airports Safeguarding Framework Guideline F: Managing the Risk of Intrusions into the Protected Airspace of Airports provide further details in relation to plume rise and protected airspace.	See Section 5.2 and Table 6

Ref	Comment	SLR Response
Fairfield City Council		
7.1	The following additional information needs to be submitted for consideration: - Knowing that the proposal seeks to produce 180,000,000 litres of soap and detergent products per year, the consultant is required to elaborate and provide further justification as to why the volatile organic compound (VOC) as an air pollutant has not considered further in the assessment, considering the volume of chemicals stored (sic) and products manufactured on site. - The consultant stated in Section 2.3.2.1 "It is noted that handling of chemicals will be conducted under a Fume Hood and all extracted air will be treated before being released to the atmosphere. Given above, the Project is unlikely to cause any significant release of VOCs that may elevate the existing VOCs level (sic) in the surrounding area." No information has been provided on the type of air and odour pollution treatment/control equipment to be used/installed at the proposed site and whether this has capacity to deal with the volumes generated. - The consultant shall discuss and provide details on all types of air and odour pollution treatment/ control equipment to be installed at the site and shall demonstrate how effective the air and odour pollution treatment/ control equipment are in treating air and odour pollution to ensure that the proposal complies with the required air and odour Ground Level Concentrations. - The consultant shall confirm the type of receptors (residential, school, childcare, businesses, etc) indicated in Table 3 Details of identified receivers. - The consultant shall demonstrate that an air and odour impact assessment has been undertaken on future neighbouring tenants/occupants of the warehouses located at Horsley Logistic Park as they have not been identified as receptors. A quantitative assessment of the air quality and odour impacts of the development (construction and operation) on surrounding landowners, businesses and sensitive receptors, in accordance with the relevant Environment Protection Authority guidelines.	See Section 2.3.2.2 and Appendix E See Section 9.1 See Section 9.1 See Section 4.1 and Table 4 See Section 7
Environmental Protection Authority		

Ref	Comment	SLR Response
5.2	The EPA has reviewed the EIS and Air Quality Impact Assessment. The EPA's review of the Air Quality Impact Assessment has identified a number of issues that will need to be addressed including: - Further information regarding the proposed air quality controls including the wet scrubber, wastewater treatment plant, and negative pressure. - Consideration of the worst case emission scenario - Analysis of the building's wake (sic) effects and impact on dispersion - Stack (sic) design to include possibility for emissions testing - Further consideration of mitigation measures Further details are provided in Attachment B Comments on Air Quality Impact Assessment	See Section 9.1 See Section 6.3 See Section 6.2 See Section 9.1 See Section 9.3

2 Overview of Proposed Activities

2.1 Proposal Site Location

The Project is to be located at 8 Johnston Crescent, Horsley Park and is comprised of Warehouse 1 at Lot 201 (the Site). The site is located approximately 36 kilometres (km) west of the Sydney CBD. Location and boundary of the Site are illustrated in Figure 1.

Figure 1 Project Location

2.2 Description of Proposed Activities

The Project is proposed to operate on a 24/7 basis with a proposed maximum annual average product throughput of 208,100 tonnes per annum (tpa) and 57 heavy vehicle and 317 light vehicle movements per day over 3 shifts . The key activities at the Site includes:

- Delivery of raw materials ;
- Storage of raw materials;
- Manufacturing of liquid products;
- Storage of finished products; and
- Transport of finished products offsite via trucks.

As shown in Figure 2, the proposed facility will include a Liquid Packaging Area (LPA), Warehouse Area and Bottle Storage Area. Each of these areas will be separated internally to minimise any air exchange between the different zones.

The LPA will operate under negative pressure and will comprise of automated packing operations with one High Speed Fill Line (HSFL), six Low Speed Fill Lines (LSFLs) and one Bleach Fill Line (BFL). The HSFL will be linked to an air extraction and scrubber system to treat exhaust air prior to being released via a stack. Similarly, air from the LSFLs and BFL will also pass through separate extraction and scrubber systems prior to being released via a stack.

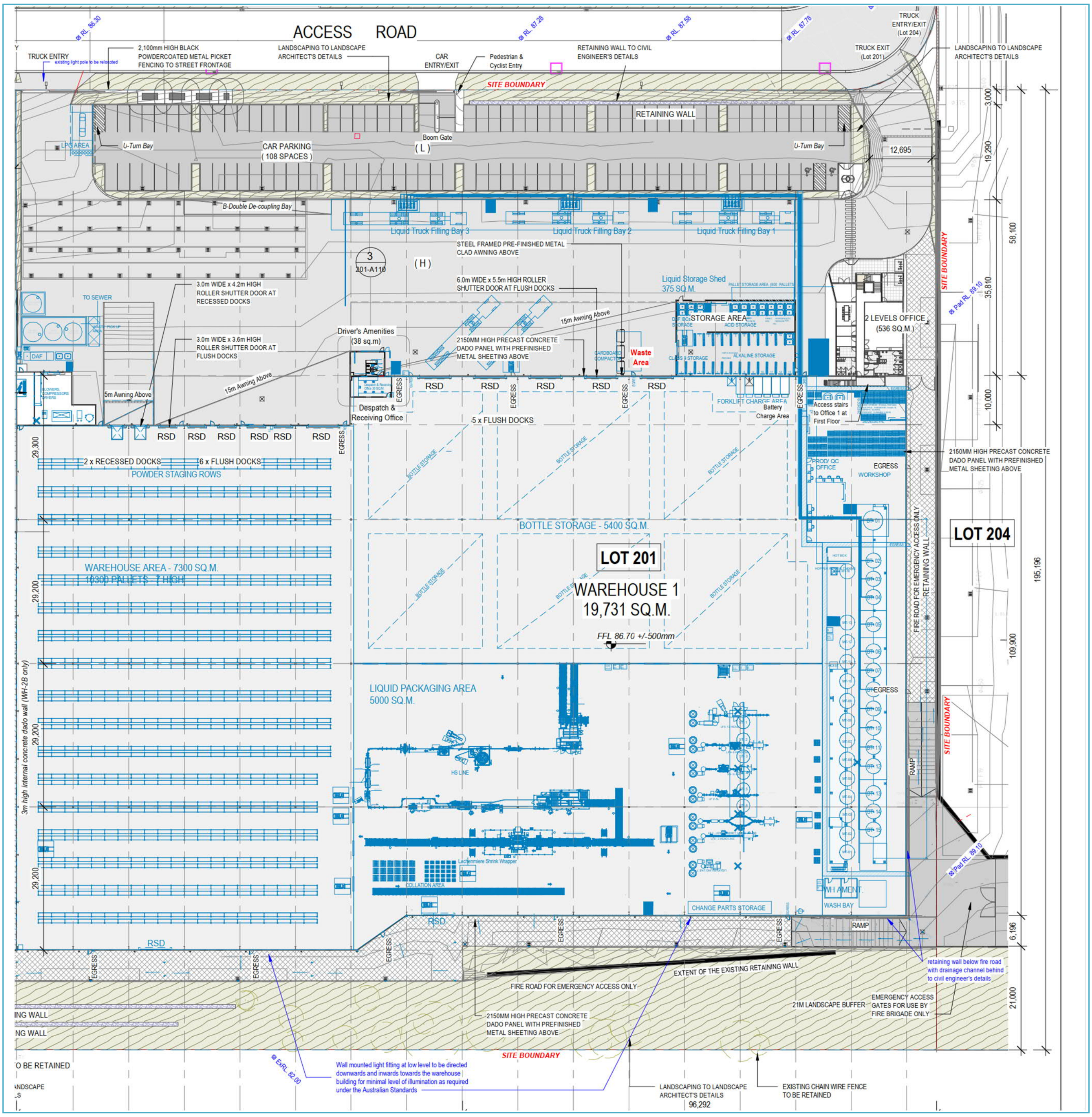
Blending tanks are to be located along the eastern boundary of the Site. Any air from blending activities will be treated using a scrubber system prior to being released via stack.

Wastewater generated during operations will be stored and treated onsite using a series of storage and balance tanks along with a Dissolved Air Flotation (DAF) unit. These operations will be located in the northwest corner of the Site.

Additionally, the warehousing area will be used for delivery and storage of packaged raw materials while the bottle storage area will be used for delivery and storage of empty bottles. These areas will be accessed externally via roller shutter doors (RSDs).

Provisions for a laboratory have also been made for testing of products and raw materials.

Figure 2 Site Layout



2.3 Identified Emission Sources and Pollutants of Concern

Based on the description of activities provided in Section 2.2, the following air emissions sources and pollutants have been identified –

2.3.1 Products of Combustion from Onsite Vehicle Operations

Transport of raw materials/products to and from the Site, trucks idling at the loading docks during loading/unloading activities and staff commuting to and from the Site will give rise to products of fossil fuel combustion including nitrogen oxides (NOx), sulphur dioxide (SO_2), carbon monoxide (CO) and Volatile Organic Compounds (VOCs). However, these emissions will be managed by logistics planning to minimise idling times, and installing signage to turn off engines while loading/unloading etc. Given this and considering the potential emissions associated with surrounding road networks, potential incremental impacts for emissions associated with fossil fuel combustion can be considered to be minimal and therefore have not been considered any further in this assessment.

2.3.2 VOCs and Odours from Manufacturing and Storage of Raw-Material/Finished Products

Based on the Project description provided to SLR, the key air emissions associated with the manufacturing operations are presented in the following sections.

2.3.2.1 VOCs

VOCs are likely to be generated from use of chemical as well as onsite vehicle movements/idling. Impacts from VOCs emissions associated with onsite vehicle movements/idling have been outlined in Section 2.3.1.

Jalco provided Material Safety Data Sheets (MSDS) for all chemicals proposed to be handled at the Site. SLR performed a review of these MSDS' to identify material which contain toxic or odorous organic compounds (as defined by Section 7.2.1 and Section 7.4.1 of the Approved Methods). This was done through a global CAS Registry Number search.

The material identified containing toxic or odorous VOCs and constituting chemicals are presented in Table 2 along with the anticipated usage rate at the Site. Based on this information it is noted that the quantity of these VOCs to be used during proposed operations are considered to be negligible. A full list of all chemicals reviewed are provided in Appendix E.

Additionally, the handling of chemicals in Table 2 would be restricted to the Site laboratory under a Fume Hood. While detailed design of the proposed fume hoods is not yet available, it is understood that the fume hoods will be equipped with appropriate VOC control systems (such as with an activated carbon adsorption system) to ensure the exhaust gas stream is treated prior to release to atmosphere.

Table 2 Anticipated VOC consumption

Chemical Name	VOCs Identified	VOC Content by Weight (%)	Chemical Usage
Dichloromethane	Dichloromethane	100	~2.5 litres/month
Rowe Scientific Dichloromethane	Dichloromethane	>99	~2.5 litres/month

Given above, the Project is unlikely to cause any significant release of odorous and toxic VOC (as defined by the Approved Methods) and as such VOC emissions have not been considered further in this study.

2.3.2.2 Odours

The key odour emission sources associated with the proposed manufacturing operations are identified as follows –

- Scrubber stack sources:
  - One scrubber stack discharge for blending process;
  - One scrubber stack discharge for HSFL operation;
  - One scrubber stack discharge for LSFL operation; and
  - One scrubber stack discharge for BFL operation;
- Odours associated with wastewater storage tank (WWST), balance tank and DAF unit; and
- Fugitive odours associated with spillage during storage and manufacturing via
  - Five vertical vents from LPA; and
  - Leaks from RSD.

3 Regulatory Framework

3.1 Relevant Legislation, Policy and Guidance

The following Air Quality Policy and Guidance documents have been referenced within this assessment and have been used to identify the relevant air quality criteria (see Section 3.2).

3.1.1 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 Site:

- Section 124 and 125 of the POEO Act states that any plant located at a premise (e.g. the incinerator) should be maintained in an efficient condition and operated in a proper and efficient manner to reduce the potential for air pollution.
- Section 126 of the POEO Act requires that materials are managed in a proper and efficient manner to prevent air pollution (e.g. odour).
- 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.

3.1.2 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') (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 2010 for assessment of impacts of air pollutants. The relevant odour criteria set out in the Approved Methods have been reproduced and discussed in Section 3.2.

The EPA's Assessment and Management of Odour from Stationary Sources in NSW (Technical Framework and Technical Notes) publications provide a policy framework for assessing and managing activities that emit odour and offer guidance on dealing with odour issues. These documents are required to be referenced when assessing any odour issue in NSW.

3.2 Relevant Odour Criteria

The equation used by the NSW EPA to determine the appropriate impact assessment criteria for complex mixtures of odorous air pollutants, as specified in the document 'Technical framework: assessment and management of odour from stationary sources in NSW' (hereafter the Odour Framework [DEC 2006a]), is expressed as follows:

$$\text{Impact assessment criterion (ou)} = (\log_{10}(\text{population})-4.5)/-0.6$$

A summary of the impact assessment criteria given for various population densities, as drawn from the Odour Framework, is given in Table 3. Based on a conservative approach, a criterion of 2 ou has been selected for this study.

Table 3 NSW EPA Impact Assessment Criteria for Complex Mixtures of Odorous Air Pollutants

Population of Affected Community	Impact Assessment Criteria for Complex Mixtures of Odours (ou) (nose-response-time average, 99th percentile)
Urban area (≥ 2000)	2.0
~300	3.0
~125	4.0
~30	5.0
~10	6.0
Single residence (≤ 2)	7.0

Source: DEC 2006

3.2.1 Peak to Mean Ratios

It is a common practice to use dispersion models to determine compliance with odour goals. This introduces a complication because dispersion models are typically restricted by the meteorological data inputs to predicting concentrations over an averaging period of 1-hour or greater. The human nose, however, can respond to odours over periods of the order of one second. During longer periods, odour levels can fluctuate significantly above and below the mean depending on the nature of the source.

To determine the ratio between the 1-second peak concentrations and longer period average concentrations (referred to as the peak to mean ratio) that might be predicted by a dispersion model, the EPA commissioned a study by Katestone Scientific Pty Ltd [(Katestone Scientific, 1998), (Katestone Scientific, 1995)]. This study recommended peak to mean ratios for a range of circumstances. The findings of these studies have been adopted in the Approved Methods and Technical Framework.

For area sources, the peak to mean ratio is dependent on atmospheric stability and the distance from the source. Given the separation distance and topographical features between the odour sources at the Site and the nearest sensitive receptors, a Peak-to-Mean Ratio (P/M60) of 2.5 for stability classes A, B, C and D and 2.3 for stability classes E and F applies. A P/M60 ration of 2.3 has also been applied to all wake-affected point sources and volume sources.

The estimated odour emission rates used in the modelling study have accounted for the above peak to mean ratio to enable direct comparison of the results against the goals shown in Section 3.2, which are based on nose-response time.

4 Existing Environment

4.1 Sensitive Receptors

Sensitive receptors are locations where the general population can be adversely impacted by exposure to pollution from the atmospheric emissions. The Approved Methods defines 'sensitive receptors' as 'a location where people are likely to work or reside'. These locations include hospitals, schools, day care facilities and residential housing.

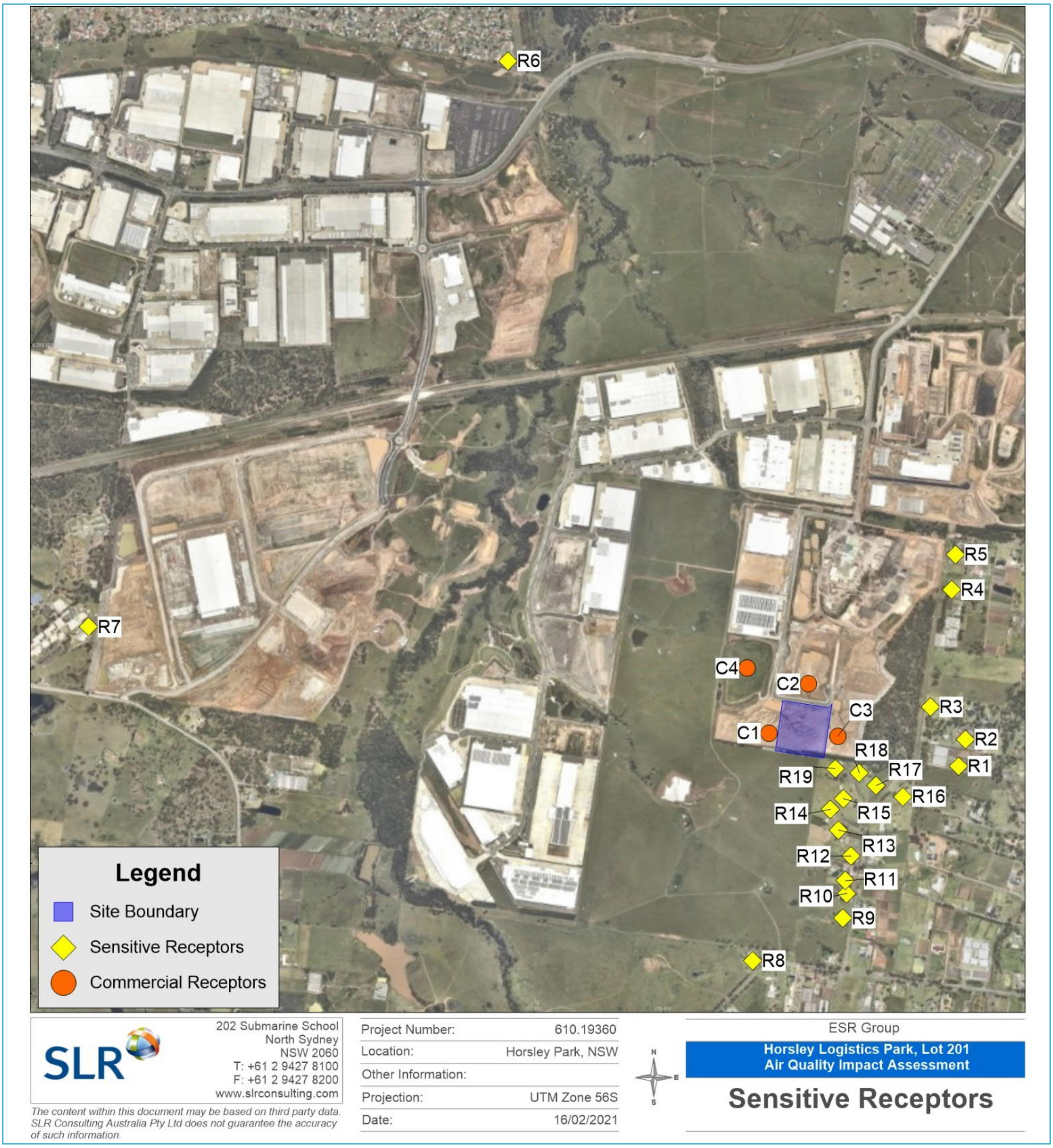
The Site is located in a semi-rural environment surrounded by low density residential areas and industrial areas. A list of existing and proposed sensitive receptors identified in the vicinity of the Site are presented in Table 4, along with the respective distances of each of these receptor points to the nearest Site boundary and receptor type (eg residence, industrial, etc.). Figure 3 illustrates the location of these surrounding receptors relative to the Project location.

It is noted that the Site and neighbouring area are located within the 20 and 25 Australian Noise Exposure Concept Contour as per the State Environmental Planning Policy, Western Sydney Aerotropolis (NSW, 2020) which requires that no further sensitive development (including residences) can be located within this area.

Table 4 Details of Identified Receptors

ID	Location (m, UTM)		Receptor Type	Distance from Nearest Site boundary (m)
	Easting	Northing		
R1	299,140	6,253,875	Residential	534
R2	299,165	6,253,979	Residential	543
R3	299,031	6,254,104	Residential	409
R4	299,113	6,254,556	Residential	708
R5	299,126	6,254,692	Residential	820
R6	297,400	6,256,597	Residential	2,744
R7	295,781	6,254,413	Residential	2,690
R8	298,345	6,253,126	Residential	835
R9	298,692	6,253,289	Residential	652
R10	298,708	6,253,385	Residential	560
R11	298,703	6,253,434	Residential	511
R12	298,725	6,253,528	Residential	425
R13	298,675	6,253,628	Residential	315
R14	298,645	6,253,708	Residential	231
R15	298,694	6,253,749	Residential	205
R16	298,924	6,253,757	Residential	363
R17	298,820	6,253,800	Residential	252
R18	298,756	6,253,848	Residential	172
R19	298,663	6,253,865	Residential	89
C1	298,408	6,254,003	Commercial	30
C2	298,560	6,254,193	Commercial	80
C3	298,673	6,253,991	Commercial	40
C4	298,324	6254,253	Commercial	190

Figure 3 Locations of Receptors

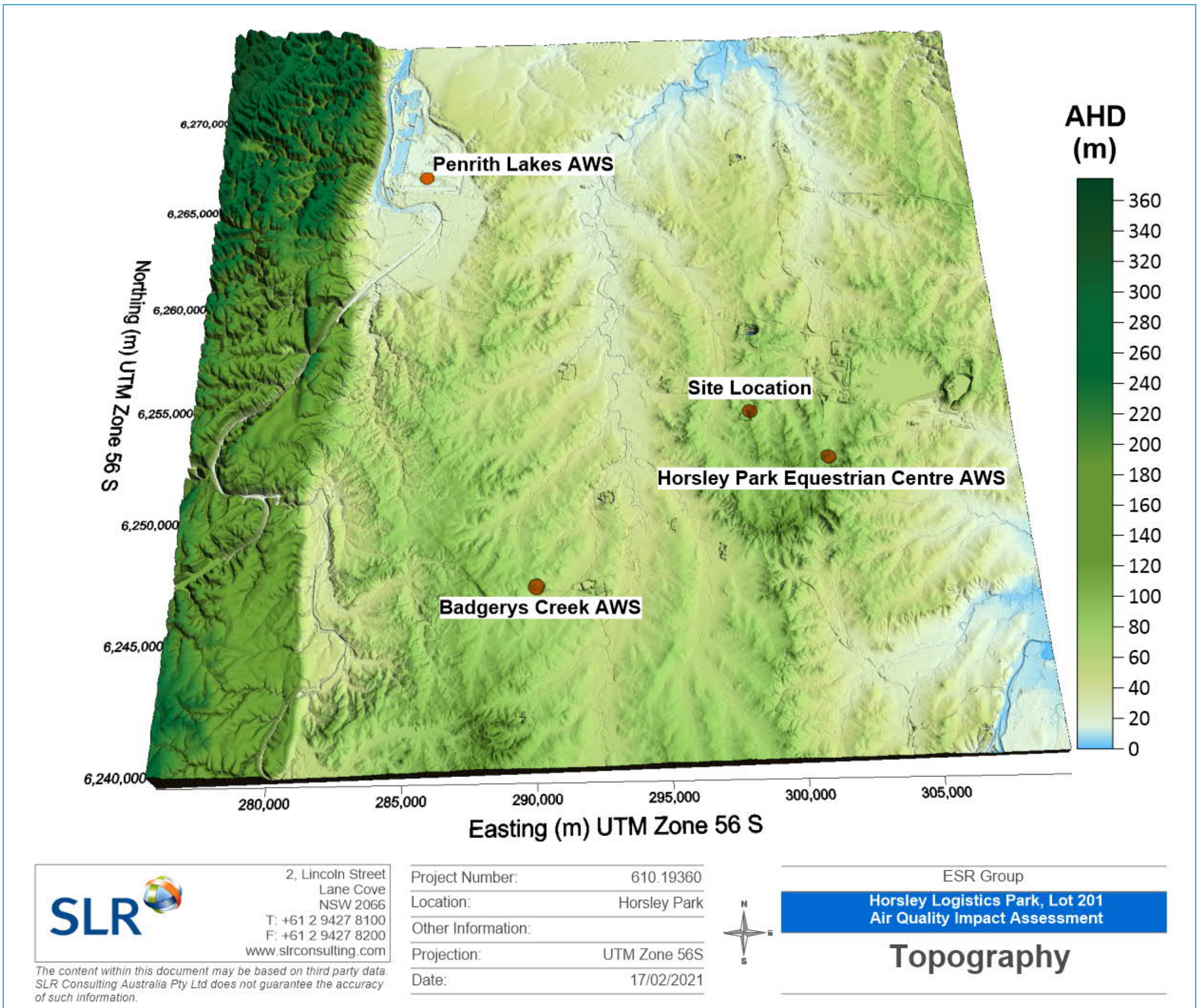


4.2 Surrounding Topography

Topography is important in air quality studies as local atmospheric dispersion can be influenced by night-time katabatic (downhill) drainage flows from elevated terrain or channelling effects in valleys or gullies around the quarry.

A three-dimensional representation of the area is shown in Figure 4. The topography of the local area ranges from approximately 0 m to 360 m Australian Height Datum (AHD). The Site is located on slightly elevated terrain, with potential for light air drainage flows from higher to lower elevations, under calm conditions.

Figure 4 Local Topography Surrounding the quarry



Note: Vertical exaggeration applied

4.3 Climate and Meteorology

The nearest meteorological monitoring station to the Site operated by the Bureau of Meteorology (BoM) is the Horsley Park Equestrian Centre automatic weather station (AWS), located approximately 4 km to the southeast. This station (Station ID 067119) was commissioned in 1997 and has long term (1997-2020) meteorological data for the following parameters:

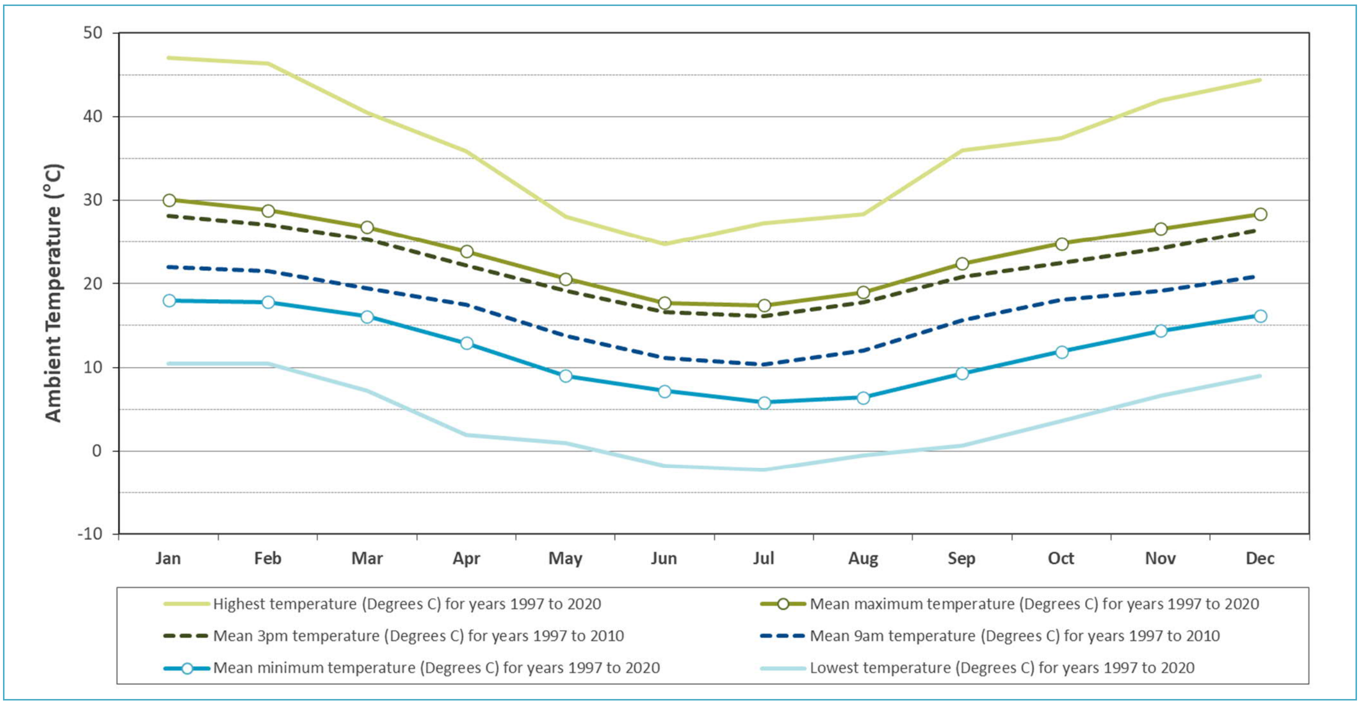
- Temperature (°C)
- Rainfall (mm)
- Solar radiation (MJ/m2)
- Relative humidity (%)
- Wind speed (m/s) and wind direction (degrees).

A review of the long-term data collected is provided in the following sections.

4.3.1 Temperature

Long-term temperature statistics are summarised in Figure 5. Mean maximum temperatures range from 17.4°C in winter to 30.1°C in summer, while mean minimum temperatures range from 5.8°C in winter to 18°C in summer. Maximum temperatures above 45°C and minimum temperatures less than 0°C have been recorded.

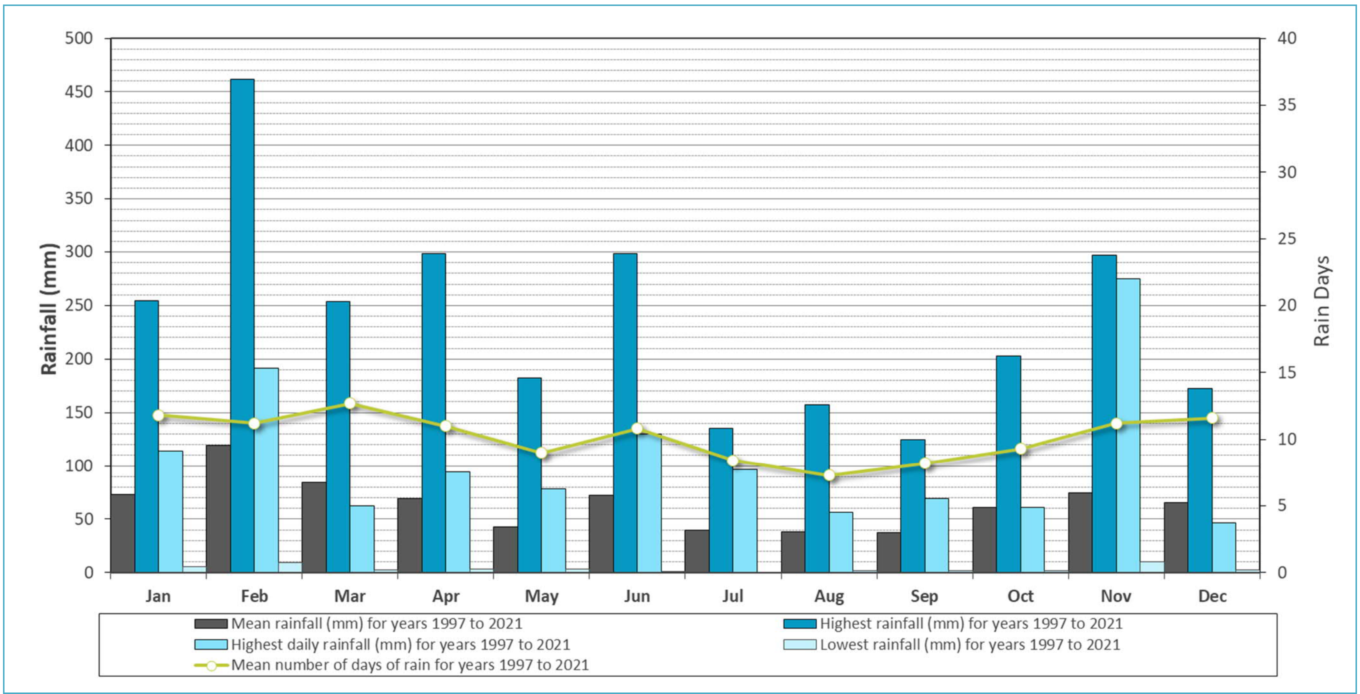
Figure 5 Long Term Temperature Data – Horsley Park Equestrian Centre AWS



4.3.2 Rainfall

Long-term rainfall statistics reported for Horsley Park Equestrian Centre AWS are summarised in Figure 6. Rainfall is relatively high in summer, reducing over autumn into winter, with the lowest average of 37.1 mm recorded during September. The minimum number of rain days recorded by the AWS was approximately seven days for the month of August. Peak rainfall events occur during summer, with the highest rainfall in February. The highest monthly rainfall recorded over the time period examined was 461.8 mm recorded in February 2020.

Figure 6 Long Term Rainfall Data - Horsley Park Equestrian Centre AWS



4.3.3 Wind Speed and Direction

Long term wind data (9 am and 3 pm) reported for Horsley Park Equestrian Centre AWS are presented as wind roses in Figure 7. The wind roses show that winds from the southwest are predominant in the morning while winds from the southeast are predominant during the afternoon.

4.3.4 Solar Radiation

As would be expected, the mean daily solar exposure levels (see Figure 8) are highest in summer (peaking at 22.7 MJ/m^2 in December) and lower in winter (dropping to 8.7 MJ/m^2 in June).

4.3.5 Relative Humidity

Long-term humidity statistics (9 am and 3 pm monthly averages) are summarised in Figure 9. Morning humidity levels range from an average of around 61% in early winter to around 81% in early autumn. Afternoon humidity levels are lower, at around 55% in winter and 42% in spring.

Figure 7 Wind Roses – Horsley Park Equestrian Centre

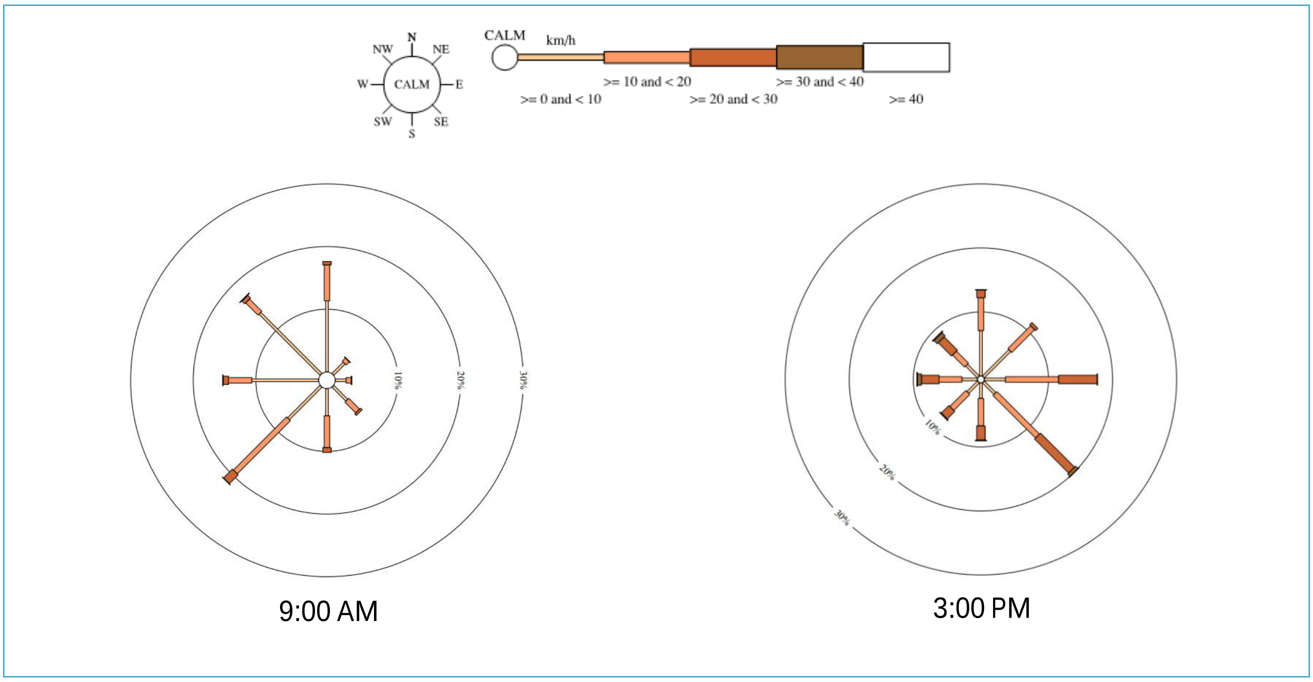


Figure 8 Solar Radiation Data – Horsley Park Equestrian Centre

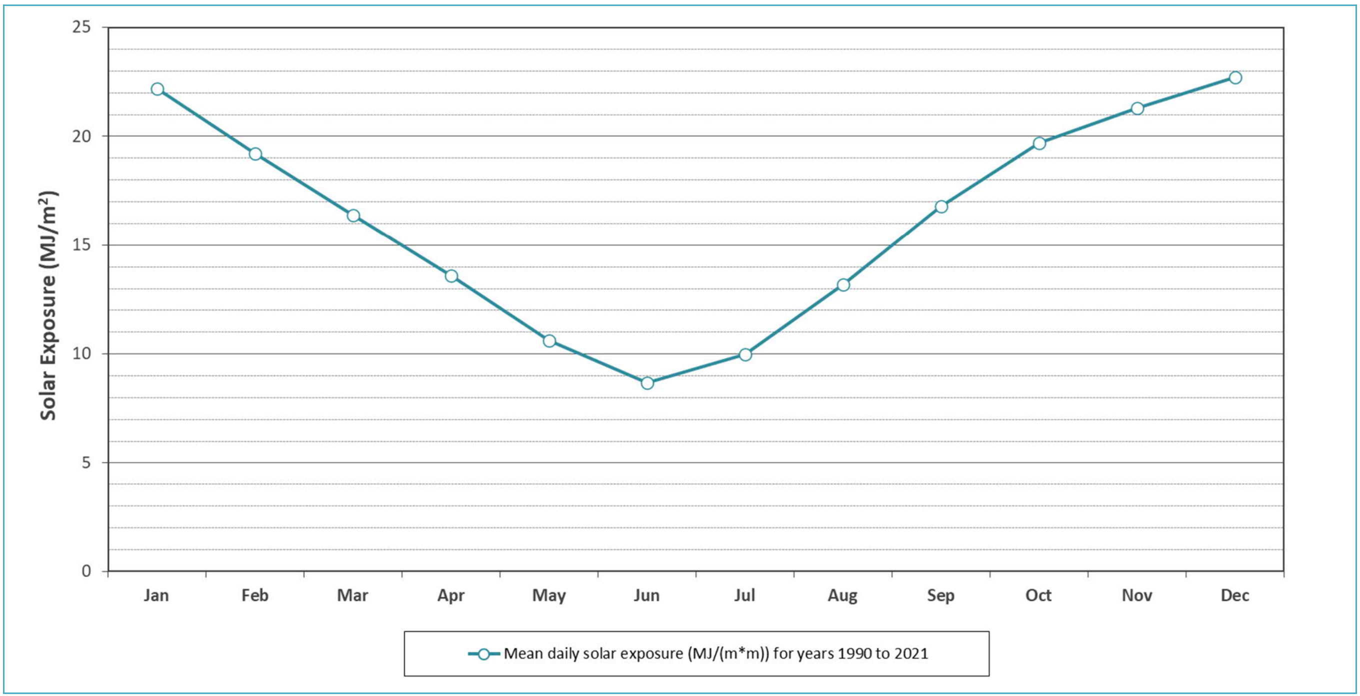
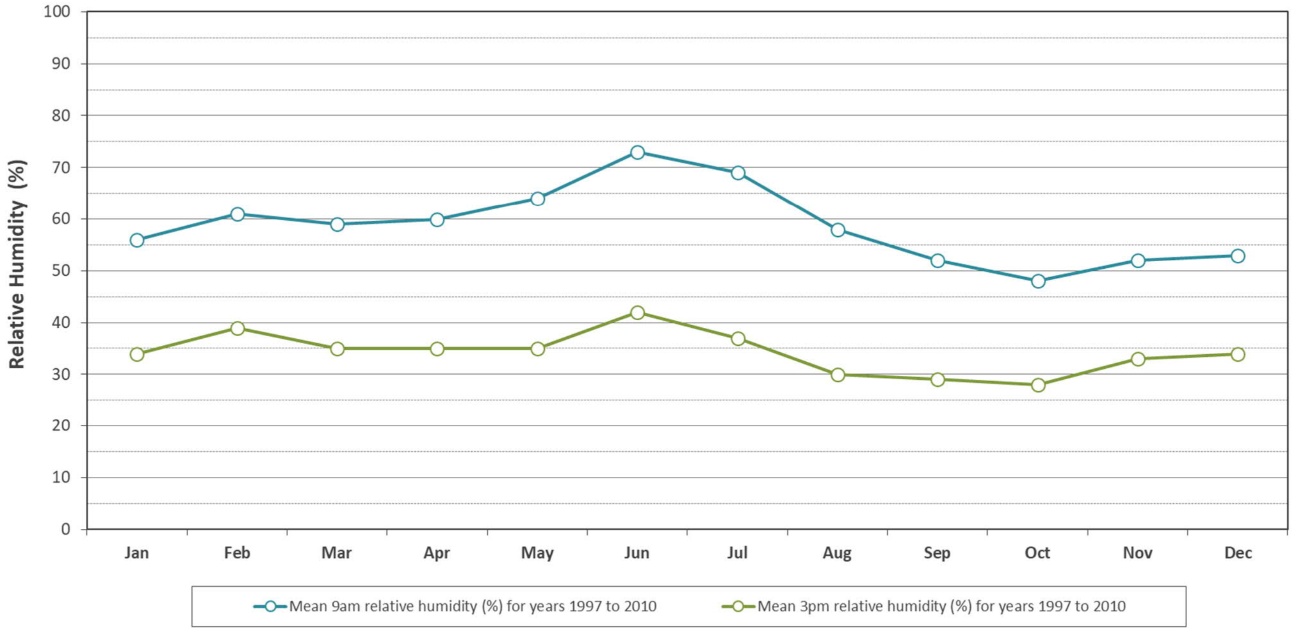


Figure 9 Humidity Data - Horsley Park Equestrian Centre



4.4 Existing Odour Environment

For the purposes of assessing potential cumulative off-site odour levels, the odour sources in local area (within 2 km radius of the Site) have been identified using publicly available information from Environment Protection Licences (EPLs) and the National Pollutant Inventory (NPI) database.

EPLs are issued under the Protection of the Environment Operations Act 1997 (POEO Act) and regulated by the NSW EPA. EPLs stipulate emission limits to water, land and/or air and provide operational protocols to ensure emissions/operations comply with relevant standards. General requirements of EPLs relating to air quality include:

- Plant and equipment are to be maintained and operated in a proper and efficient manner.
- Emissions of dust and odour are to be minimised/prevented from the premises.

The NPI database provides details on industrial emissions of over 4,000 facilities across Australia. The requirement to return emissions estimates to the NPI is determined by the activities/processes being undertaken at the facility, and also whether those processes exceed process-specific thresholds in terms of activity rates (i.e. throughput and/or consumption).

A search of the NSW EPA public register and NPI database for operations within a 2 km radius of the Site identified the following odour sources –

- PGH Bricks and Pavers Horsley Park, approximately 1.4 km north; and
- George Borg Piggery Horsley Park, approximately 1.8 km northeast;

Both these operations are unlikely to emit odours that would have similar characteristics of that to be emitted from the proposed operations.

Given above, background odour levels at the site and surrounding areas are considered to be negligible for this study.

5 Estimation of Air Emissions

5.1 Emission Estimation Methodology

SLR conducted odour emission monitoring at Jalco's existing Smithfield operations at 277-303 Woodpark Rd, Smithfield. These operations include powder and liquid detergent manufacturing and warehousing facility and have an average throughput of 66,000 tpa. Based on the following considerations, measured odour emission rates from this facility have been deemed to be a conservative representation of the proposed operations –

- At the time of sampling the production facility was operating at a peak hourly throughput of 17 tonnes per hours (tph). These emission rates were then scaled up to represent a peak hourly throughput of 270 tph at the Site based on the following considerations –
  - Samples collected from Line 3 LSFL at the Smithfield facility operated at a maximum capacity of 10 bottles/min. These emissions and flowrates were scaled up to represent the HSFL with a maximum capacity of 100 bottles/min.
  - Emission and flow rates from samples collected from Line 3 LSFL at the Smithfield facility were adopted for six proposed LSFL.
  - Bleach line operations are anticipated to have the same throughput as that sampled at the Smithfield site. Hence, measured emissions and flow rates have been adopted for the Site.
- A number of samples were collected inside the Smithfield facility near roof vents and roller shutter doors. The odour concentrations for these samples ranged between 54 ou and 220 ou. Considering the Smithfield facility manufactures both liquid and powder products, and given some of the samples were collected in close proximity to the powder manufacturing area which SLR staff found to be particularly odorous, samples with the highest concentrations were deemed to be unrepresentative of the Project fugitive emissions and as such an odour concentration of 59 ou was used as this represented odour concentrations sampled at the liquid product manufacturing facility. It is further noted that the use of this odour concentration is likely to lead to overestimation of fugitive emissions at the Site as samples collected at the Smithfield site are impacted by spillages due to manual dosing of blending tanks, fugitive emissions from unsealed tanks and residual emissions from uncontrolled filling lines, all of which contribute to the fugitive odour samples collected from the Smithfield plant. As the proposed operations will employ advanced technologies and will be predominantly automated (no manual dosing and sealed tanks), the potential for leaks and spills is greatly reduced. Hence, overall fugitive emissions from the Site are anticipated to be much lower than the Smithfield plant and fugitive odour emission samples collected at Smithfield are considered to be a conservative representation of proposed operations;
- At the time of the site visit conducted by SLR staff, powder product manufacturing and packaging areas were observed to be significantly odorous than the liquid product manufacturing and packaging areas; and
- Odour emissions sampled to represent the proposed liquid manufacturing operations were collected primarily from liquid manufacturing and packaging areas of the Smithfield plant;

A detailed emission test report including sampling methodology and monitoring results are provided in Appendix A.

Based on the review of results from the emission testing program, conservative odour concentrations and odour emission rates (OER) have been estimated for each of the identified potential sources . The estimated odour concentrations and OER are presented in Table 5.

Table 5 Measured and Estimated Odour Emission Parameters

	Measured at Smithfield Facility		Estimated at Proposed Facility		
Odour Emission Source	Odour Concentration (ou)	Flow Rate (m^3/s)	Odour Concentration (ou)	Flow Rate (m^3/s)	OER (ou.m3/s)
Scrubber Stacks					
Scrubber Stack (HSFL)	-	-	38[a]	2.6[b]	98
Scrubber Stack (LSFL)	200	0.3	38[a]	1.5[c]	59
Scrubber Stack (BFL)	83	0.5	83	0.5	37
Scrubber Stack (Blending tanks)	180	0.2	180	0.8[d]	145
Wastewater Treatment Facility (WWTF)					
WWST	25,000	0.01	25,000	0.01	250
Balance Tank	-	-	25,000	0.01	250[e]
DAF Unit	-	-	25,000	0.01	250[e]
Fugitive Emissions					
Vertical vents	59[f]-220	23.3[g]	59 [f]	5.0 [h]	1,239[i]
RSD	54-120	-	-	-	138[j]

a-Samples collected at Smithfield facilities Line 3 (Appendix A, Table 5) were scaled using an estimated odour removal efficiency (5.2) based on samples collected at inlet and outlet of the blending tank's scrubber

b-Since no HSFL exists at Smithfield operations, flow rate was scaled using Line 3 operating capacity of 10 bottles/min vs proposed HSFL operating capacity of 100 bottle/min

c-Measured flow rate scaled to represent 6 proposed operational LSFL

d-Measured flow rate for 3 blending tanks scaled to represent proposed number of tanks, i.e. 10

e-Conservatively assumed to be same as WWST

f- Several samples were collected inside the Smithfield facility near roof vents and RSD. The odour concentrations for these samples ranged between 54 ou and 220 ou. Considering the sample location and other factors, a concentration of 59 ou is deemed to be a conservative odour concentration of the proposed emissions from the Project. It is noted that by using a conservative velocity of 2 m/s (instead of actual proposed velocity of 8.5 m/s) and keeping odour emission rate (1,239 ou.m^3/s) constant the effective odour concertation is 211 ou.

g-Estimated based on current ventilation rate of 1 air exchange per hour at Smithfield facility

h-Provided in fan design criterion (Appendix C)

i- OER represents odour emission from 5 vertical vent. 90% of the total fugitives, estimated to be 1,377 ou.m^3/s based on 1 air exchange per hour

j- 10% of total fugitives are assumed to be released via RSD

5.2 Estimated Emissions

Estimated odour emission rates (OER) and other relevant parameters used in the air dispersion modelling are presented in Table 6. It is noted that emission rates presented in Table 6 were scaled using Peak to Mean Ratios presented in Section 3.2.1 prior to modelling.

It is noted that all point sources were modelled using hourly varying temperatures to represent ambient conditions.

Table 6 Estimated Odour Emission Rates

Odour Emission Source	Source type	Height Above Ground (m)	Diameter (m)	Exit Velocity (m/s)	Area (m^2)	Temperature	OER ($ou.m^3/s$)[1]
Scrubber Stacks							
Scrubber Stack (HSFL)	Point	16	0.5	13.0[a]	-	Ambient	98
Scrubber Stack (LSFL)	Point	16	0.375	13.9[a]	-	Ambient	59
Scrubber Stack (BFL)	Point	16	0.375	4.1	-	Ambient	37
Scrubber Stack (Blending tanks)	Point	16	0.375	7.3	-	Ambient	145
WWTF							
WWST	Area	2	-	-	16.6	-	15.04 ($ou.m^3/m^2/s$)
Balance Tank	Area	2	-	-	15	-	15.04 ($ou.m^3/m^2/s$)
DAF Unit	Area	1	-	-	12	-	15.04 ($ou.m^3/m^2/s$)
Fugitive Emissions							
Vertical vents (5)	Point	15.7	0.86[b]	2[c]	-	Ambient	248
RSDs (4)	Volume	0	-	-	-	-	34

1-Excludes peak to mean ratio

a-Estimated based on an operational capacity of 100 bottle/min for the HSFL and 10 bottles/min for LSFL

b-Diameter based on effective area for a square vent.

c-Actual operational velocity is likely to be approximately 8.5m/s. However, a conservative velocity of 2 m/s was modelled to present worst case impacts

6 Atmospheric Dispersion Modelling Methodology

6.1 Model Selection

Emissions from the proposed operations have been modelled using a combination of the TAPM, CALMET and CALPUFF models. CALPUFF is a transport and dispersion model that ejects "puffs" of material emitted from modelled sources, simulating dispersion and transformation processes along the way. In doing so it typically uses the fields generated by a meteorological pre-processor CALMET, discussed further below. Temporal and spatial variations in the meteorological fields selected are explicitly incorporated in the resulting distribution of puffs throughout a simulation period. The primary output files from CALPUFF contain either hourly concentration or hourly deposition fluxes evaluated at selected receptor locations. The CALPOST post-processor is then used to process these files, producing tabulations that summarise results of the simulation for user-selected averaging periods. It is noted that building wake affect were also included in the model.

6.2 Building Wake Effects

Building Wake Effects were incorporated into the CALPUFF model using the Building Profile Input Program (BPIP) and simulated using the PRIME methodology. The location and dimensions of the proposed Jalco warehouse and existing buildings were included in the model based on a screening criterion of buildings within a distance of 5L (where L is the lesser of the height or width of the building) from each release point for buildings with a height greater than 0.4 times the stack height

6.3 Worst Case Modelling Scenario

The following factors were considered while modelling to ensure the scenario represented worst case impacts–

- All sources were located at the closest feasible locations to nearby receptors
- Emission rates used for the assessment were based on sampled collected from the existing Jalco facility at Smithfield facility where:
    - Dosing of blending tanks is performed manually leading to spillages and fugitive emissions. The operations at the Site are proposed to be predominantly automated (no manual dosing of products) which would significantly reduce the potential for spillages.
    - Blending tanks are not sealed, leading to fugitive emissions. The blending tanks at the proposed facility are fully sealed with no potential for fugitive emissions.
    - With the exception of the bleach line, odorous air from filling lines are not extracted and treated. All filling lines at the Site are proposed to be equipped with air extraction and odour control systems.
    - Powder products, which are deemed to have a relatively high contribution to the site's fugitive odour emissions are also produced. Production of powder products is not proposed at the Site.
    - The odour control systems used (wet scrubbers) are old technology scrubbers, and not likely to control odours as effectively as modern scrubbers currently being considered for the Project.
- Therefore, overall fugitive emissions from the Site are anticipated to be much lower than even the lowest emission rates collected at the Smithfield facility and the emission rates presented in Table 6 are considered to be a conservative representation of proposed operations;

- The estimated emission rates for the WWTP have been calculated using peak flow rates measured at the Smithfield facility when the storage tanks were being filled. This leads to an overestimation of the odour emission rates from these sources as filling of the balance and storage tanks only occurs intermittently and hourly average air flow rates from the storage tanks are likely significantly lower than the peak flows measured over a 5 minute periods. SLR understands that wastewater is directed to the WWTP once every three hours (after completion of a batch) and is typically completed over a 10-30 minute timeframe.
- A highly conservative exit velocity of 2 m/s was modelled for the vent stacks as opposed to actual operational velocity of 8.5 m/s however, the estimated odour emission rates were left unchanged (Table 5). Since all other meteorological parameters that may impact the dilution rate are constant, the lower velocity will lead to less effective dispersion of the plume and higher impacts at the receptor.
- All emission rates were calculated assuming a peak hourly throughput of 270 tph which translates to an annual throughput of approximately 2,365,200 tpa. However, the maximum anticipated annual throughput at this site is 208,000 tpa. This is only assumed such that the peak emissions from the Project under varying meteorological conditions can be conservatively assessed. SLR understands that the facility would be typically not be operating at peak throughput during the night (when dispersion of pollutants is typically least effective) and as such, the 99th percentile concentrations presented in this report are considered to be conservative.

6.4 Meteorological Modelling

6.4.1 Selection of Representative Year for Meteorological Modelling

In order to determine a representative meteorological year, five years of meteorological data (2016-2020) from the nearest BoM station (Horsley Park Equestrian Centre AWS, Station ID 67119) located approximately 4 km southeast of Site location were reviewed and analysed. Specifically, the following parameters were analysed:

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

Based on this analysis, 2019 calendar year was selected as a representative year for this study.

6.4.2 TAPM

The TAPM prognostic model, developed by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) was used to generate the upper air data required for CALMET modelling.

TAPM predicts wind speed and direction, temperature, pressure, water vapour, cloud, rain water and turbulence. The program allows the user to generate synthetic observations by referencing databases (covering terrain, vegetation and soil type, sea surface temperature and synoptic scale meteorological analyses) which are subsequently used in the model input to generate one full year of hourly meteorological observations at user-defined levels within the atmosphere.

Additionally, the TAPM model may assimilate actual local wind observations so that they can optionally be included in a model solution. The wind speed and direction observations are used to realign the predicted solution towards the observation values. In this study, data from the BoM's Horsley Park Equestrian Centre AWS, Badgerys Creek AWS and Penrith Lakes AWS has been used to nudge (ie influence) the TAPM predictions. Table 7 details the parameters used in the TAPM meteorological modelling for this assessment.

Table 7 Meteorological Parameters Used for this Study - TAPM

TAPM (v 4.0)	
Number of grids (spacing)	4 (30 km, 10 km, 3 km and 1 km)
Number of grid points	35 x 35 x 35
Year of analysis	2019
Centre of analysis	290,980 m E 6,255,878 m S
Data assimilation	Horsley Park Equestrian Centre AWS, Badgerys Creek AWS and Penrith Lakes AWS

6.4.3 CALMET

In the simplest terms, CALMET is a meteorological model that develops hourly wind and other meteorological fields on a three-dimensional gridded modelling domain that are required as inputs to the CALPUFF dispersion model. Associated two dimensional fields such as mixing height, surface characteristics and dispersion properties are also included in the file produced by CALMET. The interpolated wind field is then modified within the model to account for the influences of topography, sea breeze, as well as differential heating and surface roughness associated with different land uses across the modelling domain. These modifications are applied to the winds at each grid point to develop a final wind field. The final hourly varying wind field thus reflects the influences of local topography and land uses.

CALMET modelling was conducted using the nested CALMET approach, where the final results from a coarse-grid run were used as the initial guess of a fine-grid run. This has the advantage that off-domain terrain features including slope flows and blocking effect can be allowed to take effect and the larger-scale wind flow provides a better start in the fine-grid run.

The outer domain was modelled with a resolution of 250 m. The TAPM-generated three-dimensional meteorological data were used as the 'initial-guess wind' field and local topography and land use information were used to refine the wind field predetermined by the TAPM.

The output from the outer domain CALMET modelling was then used as the 'initial-guess' field for the mid and inner domain CALMET modelling. A horizontal grid spacing of 50 m was used in the inner domain to adequately represent local terrain features and land use. The inner grid resolution was refined to a 50 m resolution to ensure adequate number of cells between source and receptors to enhance the reliability of the model predictions. Use of lower resolution (>100m) would likely to have the source and receptors in the same or neighbouring cells that may cause unrealistic model predictions at the ground and elevated receptors. Fine scale local topography and land use information and predetermined by the coarse CALMET runs.

Table 8 details the parameters used in the meteorological modelling to drive the CALMET model.

Table 8 Meteorological Modelling Parameters – CALMET

Parameter	Outer Domain	Inner Domain
Meteorological grid	12.5 km × 12.5 km	5 km × 5 km
Meteorological grid resolution	250 m	50 m
Initial guess filed	3D output from TAPM model	3D output from mid domain modelling

6.5 Meteorological Data Used In Modelling

To provide a summary of the meteorological conditions predicted at the site using the methodology described in Section 6.4, a single-point, ground-level meteorological dataset was 'extracted' from the 3-dimensional dataset at the Site and is presented in this section.

6.5.1 Wind Speed and Direction

A summary of the annual wind behaviour predicted by CALMET for 2019 is presented as a wind speed distribution plot in Figure 10 and wind roses in Figure 11.

The wind roses show the frequency of occurrence of winds by direction and strength. The bars correspond to the 16 compass points (degrees from north). The direction of the bar shows the direction from which the wind is blowing. The length of the bar represents the frequency of occurrence of winds from that direction, and the widths of the bar sections correspond to wind speed categories, the narrowest representing the lightest winds. Thus, it is possible to visualise how often winds of a certain direction and strength occur over a long period, either for all hours of the day, or for particular periods during the day. There are times when the wind is calm (defined as being from zero to 0.5 metres/second), and the percentage of the time that winds are calm are shown as a note on the wind rose. The 'Beaufort Wind Scale' (consistent with terminology used by the BoM) was used to describe the wind speeds experienced at the Proposal Site, outlined in Table 9.

Table 9 Beaufort Wind Scale

Beaufort Scale #	Description	m/s	Description on land
0	Calm	0-0.5	Smoke rises vertically
1	Light air	0.5-1.5	Smoke drift indicates wind direction
2-3	Light/gentle breeze	1.5-5.3	Wind felt on face, leaves rustle, light flags extended, ordinary vanes moved by wind
4	Moderate winds	5.3-8.0	Raises dust and loose paper, small branches are moved
5	Fresh winds	8.0-10.8	Small trees in leaf begin to sway, crested wavelets form on inland waters
6	Strong winds	>10.8	Large branches in motion, whistling heard in telephone wires; umbrellas used with difficulty

Source: http://www.bom.gov.au/lam/glossary/beaufort.shtml

Figure 11 indicates that winds experienced in the study area are predominantly light (between 1.5 m/s and 5.3 m/s). Calm wind (<0.5 m/s) conditions were predicted to occur approximately 11% of the time throughout the modelling period.

The seasonal wind roses indicate that typically:

- In summer, light winds are predicted to blow predominantly from the eastern quadrant. Very low frequency of winds are predicted to blow from the western directions. Calm winds are predicted to occur approximately 11% of the time during summer.
- In autumn, predominantly light winds are predicted to blow from the southwest and northeast quadrants with minimal winds blowing from the northwest quadrant. Calm winds are predicted to occur approximately 14% of the time during autumn.
- In winter, predominant light to moderate winds from the southwest quadrant are predicted with relatively lower frequency of winds from the other directions. Calm winds are predicted to occur approximately 14% of the time during winter.
- In spring, light winds are predicted to blow from all directions with the exception for northerly and southerly winds. Calm winds are predicted to occur approximately 9% of the time during spring.

Figure 10 Annual Wind Speed Frequencies at the Proposal Site (CALMET Predictions, 2019)

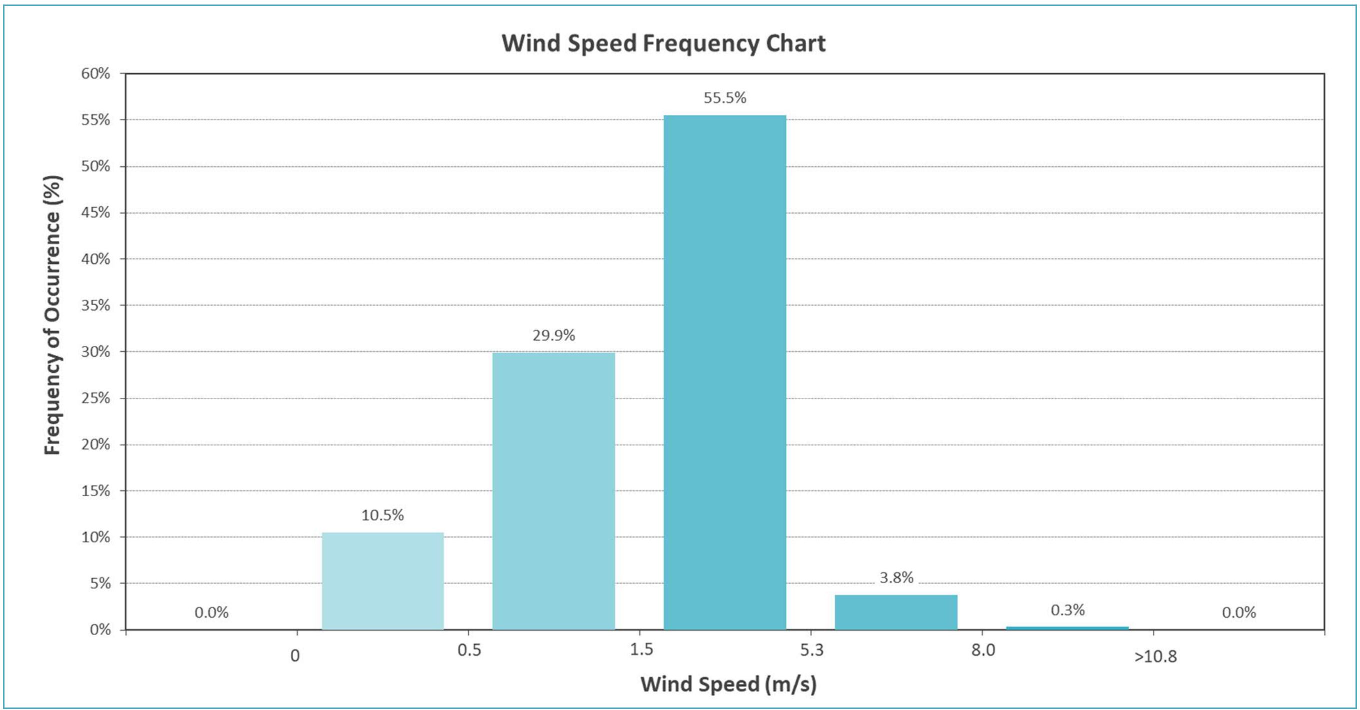
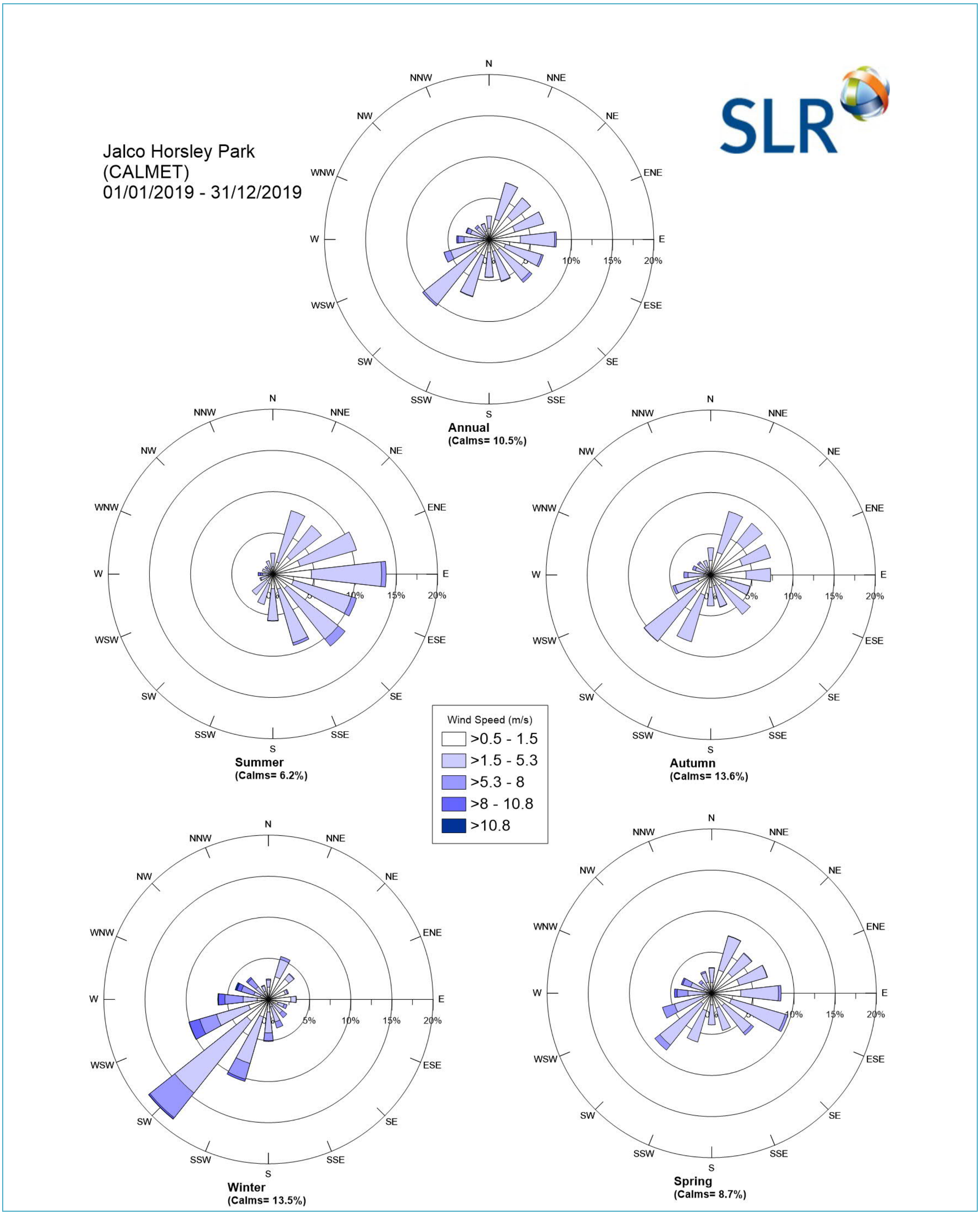


Figure 11 CALMET-Predicted Seasonal Wind Roses for the Proposal Site– 2019



6.5.2 Atmospheric Stability

Atmospheric stability refers to the tendency of the atmosphere to resist or enhance vertical motion. The Pasquill-Gifford-Turner (PGT) assignment scheme identifies six stability classes, A to F, to categorise the degree of atmospheric stability as follows:

- A = Extremely unstable conditions
- B = Moderately unstable conditions
- C = Slightly unstable conditions
- D = Neutral conditions
- E = Slightly stable conditions
- F = Moderately stable conditions

The meteorological conditions defining each PGT stability class are shown in Table 10.

Table 10 Meteorological Conditions Defining PGT Stability Classes

Surface Wind Speed (m/s)	Daytime Insolation			Night-Time Conditions	
	Strong	Moderate	Slight	Thin overcast or > 4/8 low cloud	<= 4/8 cloudiness
< 2	A	A - B	B	E	F
2 - 3	A - B	B	C	E	F
3 - 5	B	B - C	C	D	E
5 - 6	C	C - D	D	D	D
> 6	C	D	D	D	D

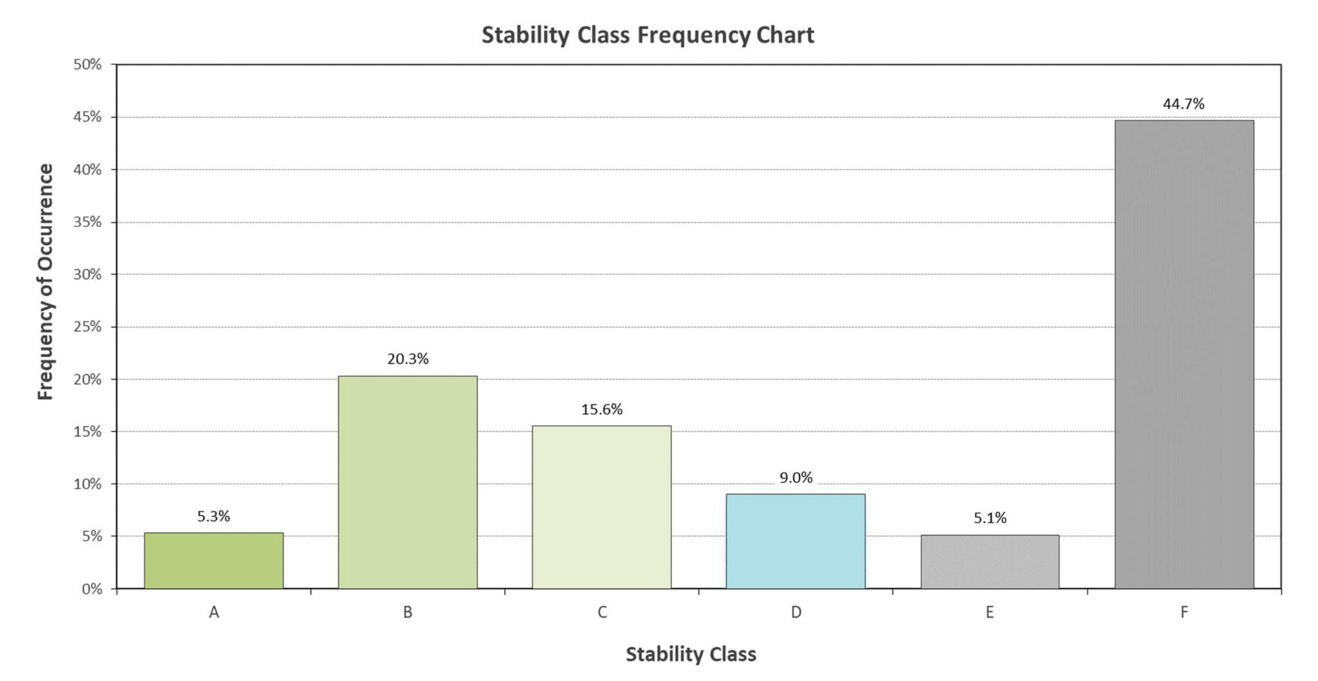
Source: (NOAA, 2018)

Notes:

1. Strong insolation corresponds to sunny midday in midsummer in England; slight insolation to similar conditions in midwinter.
2. Night refers to the period from 1 hour before sunset to 1 hour after sunrise.
3. The neutral category D should also be used, regardless of wind speed, for overcast conditions during day or night and for any sky conditions during the hour preceding or following night as defined above.

The frequency of each stability class predicted by CALMET, extracted at the Site, during the modelling period is presented in Figure 12. The results indicate a high frequency of conditions typical to Stability Class F. Stability Class F is associated with the relatively high frequency of low wind speed conditions at night-time, giving rise to stable atmospheric conditions.

Figure 12 Predicted Stability Class Frequencies at the Proposal Site (CALMET predictions, 2019)

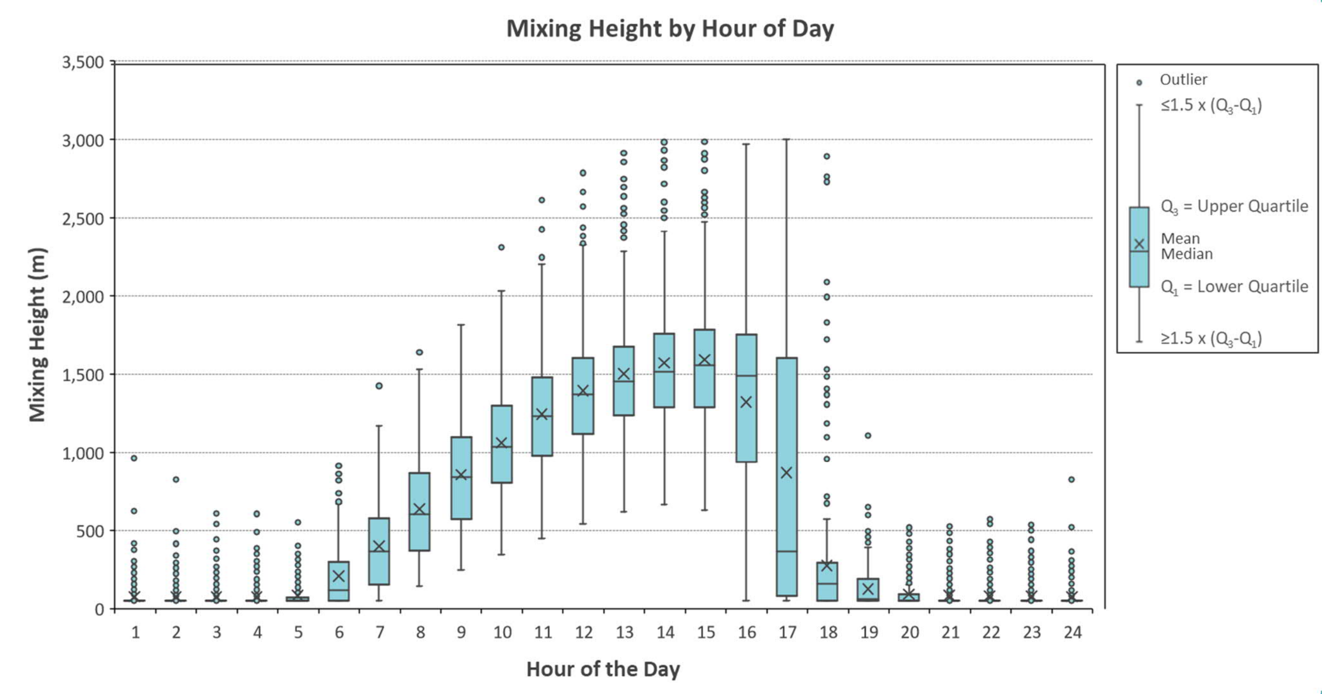


6.5.3 Mixing Heights

Diurnal variations in maximum and average mixing heights predicted by CALMET at the Proposal Site during the 2019 modelling period are illustrated in Figure 13.

As would be expected, an increase in mixing depth during the morning is apparent, arising due to the onset of vertical mixing following sunrise. Maximum mixing heights occur in the mid to late afternoon, due to the dissipation of ground based temperature inversions and growth of the convective mixing layer.

Figure 13 Predicted Mixing Heights at the Proposal Site(CALMET predictions, 2019)



7 Dispersion Modelling Results

Table 11 presents predicted ground level odour concentrations (99th percentile, nose response averaging period) at the identified sensitive receptor locations. A contour plot presenting the isopleth of predicted odour concentrations across the modelling domain is presented in Figure 14.

It is noted that odour concentrations for commercial receptors have been derived by averaging all odour concentrations predicted within the respective boundaries.

Table 11 Predicted Odour Concentrations at Residential Receptors

Receptor ID	Receptor Type	Predicted Incremental Odour Concentration (99th Percentile Nose Response Average)
R1	Residential	0.1
R2	Residential	0.1
R3	Residential	0.2
R4	Residential	0.2
R5	Residential	0.2
R6	Residential	0.02
R7	Residential	0.02
R8	Residential	0.1
R9	Residential	0.1
R10	Residential	0.2
R11	Residential	0.2
R12	Residential	0.2
R13	Residential	0.3
R14	Residential	0.3
R15	Residential	0.3
R16	Residential	0.2
R17	Residential	0.2
R18	Residential	0.3
R19	Residential	0.6
C1	Commercial	2.8*
C2	Commercial	0.8*
C3	Commercial	0.7*
C4	Commercial	0.9*
Criterion		2.0

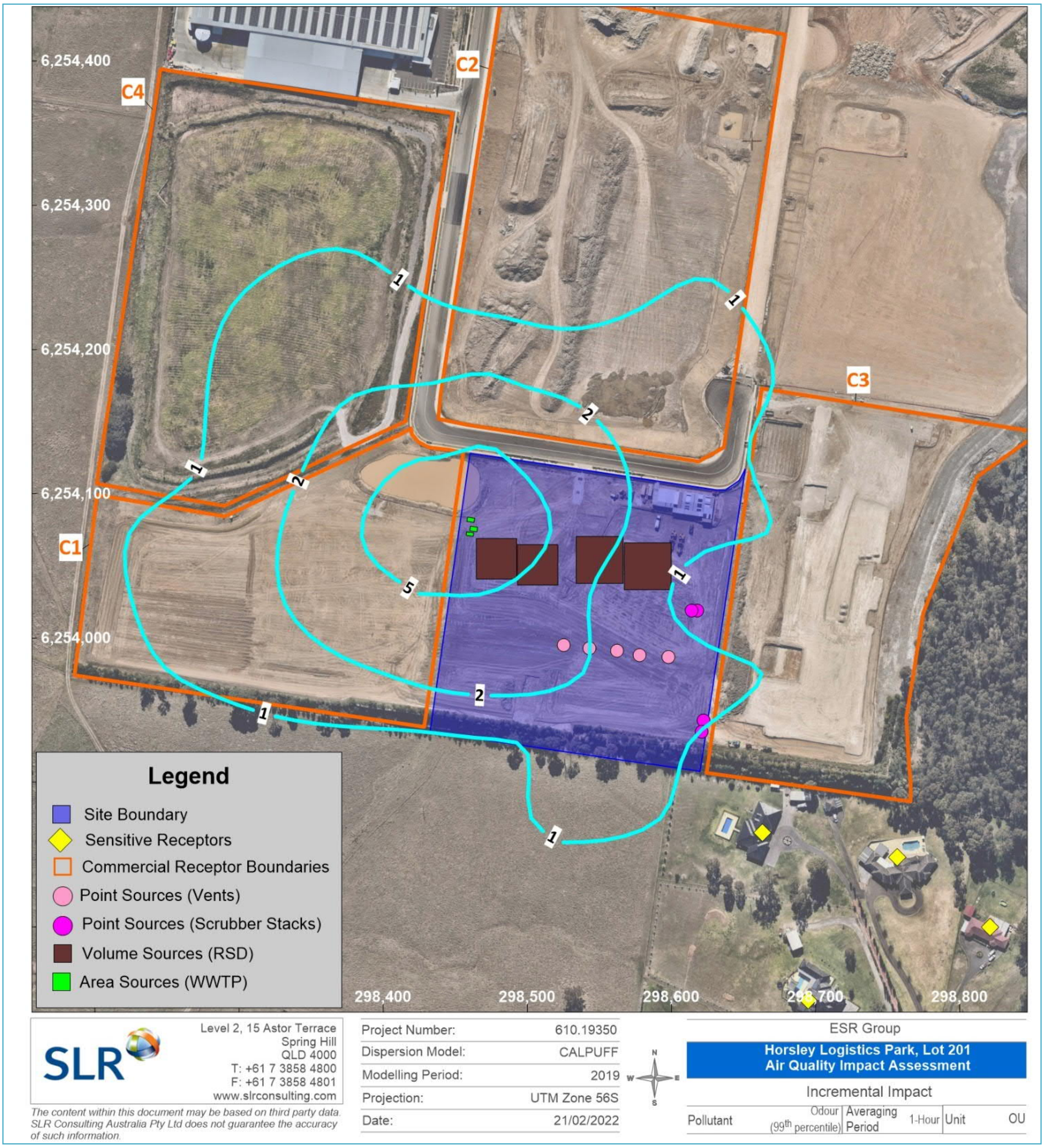
*Results based on average odour concentrations predicted within respective commercial receptor boundaries.

Table 11 shows that the odour concentrations predicted at all surrounding residential receptors are well below the relevant odour criterion of 2 ou with the nearest residential receptor predicted to experience a maximum odour concentration of 0.6 ou (99th percentile, nose response averaging period).

Additionally, Table 11 shows that all commercial receptors are predicted to experience odour concentrations (average across the entire commercial site) below the 2 ou criterion with the exception of receptor C1 which is predicted to experience a marginal exceedance of 2.8 ou (99th percentile, nose response averaging period). It is noted that this slightly elevated average ground level odour concentration is driven by high odour concentrations at the eastern boundary of C1. Predicted odour concentrations within C1 drop significantly within 50 m from the boundary with the average odour concentration at areas located beyond the 50 m distance below the 2 ou criterion. Even though a marginal exceedance is predicated at C1, given the sites industrial land use and unlikelihood of people being present in the highest impacted areas closest to the boundary (SLR understands that this area is proposed to be a carpark), these slightly elevated odour concentrations are not expected to cause any odour nuisance. Further, as outlined in Section 6.3 emissions from the facility, particularly WWTP, which are located in close proximity to the C1 boundary are likely overestimated and actual emissions could potentially be significantly lower.

Based on the results of the modelling, it is concluded that proposed operation is unlikely to cause any significant odour nuisance at surrounding sensitive receptors.

Figure 14 Odour Impacts



8 Changes to the Modelled Design

The air quality impact assessment presented above was completed based on a proposed roof vent design that included no noise mitigation. However, to reduce the potential for any noise related exceedances, the original design was updated after the completion of the air quality modelling to incorporate noise barriers around each roof vent (on all four sides). SLR understands that the proposed noise barriers will extend 1.5 m above the roof level (approximately 0.9 m above the original design stack exhaust) and that the exit diameter will be kept same as the original design. No changes to the flow rate or exit velocity would not be caused by these noise barriers.

Given above, it is expected that the off-site odour impacts associated with the updated design is likely to be less than those presented in this report.

9 Equipment Design and Mitigation Measures

9.1 Equipment Design Considerations

It is noted that the detailed design for odour control equipment including the scrubbers, WWTP and laboratory fume hood have not been carried out at this stage and SLR have made assumptions were appropriate to represent worst case odour impacts anticipated from the Site. A detailed odour audit is proposed to be conducted post commissioning to verify that all odour control equipment will meet the minimum requirement listed below –

- All scrubber systems are to be designed and operated to meet the specifications for minimum release height, diameter, exit velocity and OER presented in Table 6.
- All scrubber stacks are to be designed with appropriate sampling ports in compliance with Australian Standard (AS) 4323.1 – Stationary Source Emissions to allow for emission testing.
- Where practicable, design the scrubber system to be capable of retrofitting additional/improved odour control technologies to further reduce any potential for odour emissions.
- All components of the WWTP are to be designed to meet minimum OER presented in Table 6.
- The laboratory fume hoods are to be designed to incorporate activated carbon filters to ensure any VOC emissions from handling of relevant chemicals (shown in Table 2) will be treated prior to release to atmosphere.
- Ensure the building will be designed to incorporate necessary sealing requirements described in Appendix F.

9.2 Odour Control Options for WWTP

The WWTP was identified to be a relatively large odour source, with a 28% contribution to total odour emissions from the Site. In order to identify the WWTPs contribution to ground level impact, source contribution analysis was performed. Impacts from the WWTP ranged from <0.1 ou to 0.4 ou at the modelled residential receptors. Odours below a concentration of 1 ou are unlikely to be perceptible in an ambient environment. Thus, it is concluded that odour emissions from the WWTP are not likely to lead to nuisance impacts at nearby residential receptors.

It is further noted that emissions from the WWTP are likely significantly overestimated due to use of peak flow rates for the estimation of hourly emissions (refer Section 6.3).

Nevertheless, an odour control strategy has been assessed and presented below to indicate that feasible control options are available in the unlikely event that the operation of the WWTP is found to lead to nuisance impacts at nearby sensitive receptor locations.

The control strategy assessed involved the enclosure of the entire WWTP, extraction of air from the enclosed space and release to atmosphere through a stack. Modelled parameters are presented in Table 12. The modelling methodology, for this odour control scenario was in line with the methodology presented in Section 6.

Table 12 Model Parameters for WWTP with Odour Control

Emission Source	Source type	Height Above Ground (m)	Diameter (m)	Exit Velocity (m/s)	Temperature	OER (ou.m³/s)[1]
WWTP Stack	Point	16[a]	0.3[a]	6.4[b]	Ambient	1,509[c]

a-Assumed similar to scrubber stacks

b-based on an assumed flowrate of 2 m³/s to maintain negative pressure with at least 2 air exchanges per hour to avoid any fugitive emissions.

c-Includes Peak to Mean Ratio of 2.3 for wake affected point source

The modelling found that this odour control strategy could result in an approximately 50%-90% reduction of odour impacts at modelled residential receptors, with the nearest residential receptor experiencing approximately 75% lower odour impacts due to the WWTP.

Given the worst-case operating scenario modelled predicted compliance with the adopted odour impact assessment criteria, at nearby residential receptors and low level of impact at nearby commercial receptors, installation of additional odour control systems at this initial stage is not deemed necessary. However, feasible and retrofittable pollution control devices capable of significantly reducing odour levels from the Project are available and should be installed at a later stage if change in circumstances lead to an increase on odour emission rates compared with what has been assumed by this air quality impact assessment.

9.3 Recommended Mitigation Measures

As discussed in Section 7, the predicted 99th percentile odour concentrations at all nearby residential and commercial receptors are predicted to be well below the adopted odour impact criterion of 2 ou (nose response time) with the exception of low level odour impacts at commercial receptor C1 are anticipated. Therefore, at this initial stage odour management measures that should be considered for the Project include:

- Signage should be displayed to remind drivers to turn off vehicle engines when stationary to minimise exhaust emissions.
- General environmental awareness training should be provided to relevant staff and contractors, including:
  - Potential air quality and odour impacts that may be caused by activity during normal and abnormal circumstances;
  - Prevention of accidental air emissions and actions to be taken when accidental emissions occur;
  - Efficient and appropriate use and maintenance of equipment used at the marina (where relevant to their role); and
  - Procedures for complaint handling.
- All staff and contractors should be instructed to report any undue pollutant release (including odour) and visible emissions from the exhaust vents to the site manager.

- The site should be inspected daily and good housekeeping practices employed (e.g. ensuring the timely clean-up of any spills, identifying and rectifying any leaks that could contribute to fugitive emissions, etc.).

In addition to the above, complaints monitoring could be a very useful tool in assessing whether nuisance is being caused. It is therefore recommended that any complaint should be investigated as soon as possible so that effective appraisal of the complaint can be carried out by subjective assessment. Where odour complaints are verified, engineering, operational or other odour reduction measures may be implemented.

10 Conclusion

SLR was commissioned by ESR to prepare an AQIA in order to assess the air quality impacts associated with the proposed operations at Warehouse 1 of Lot 201 located at 327-355 Burley Road, Horsley Park. The proposed operations will be conducted by Jalco and include manufacturing and packaging of liquid household cleaning and laundry products as well as warehousing operations for relevant raw material and finished goods.

This AQIA has been prepared in accordance with the Approved Method (NSW EPA, 2017). The assessment methodology includes the modelling of local meteorology and the dispersion of potential emissions from the proposed operations to predict the level of impact that may be experienced in the surrounding environment.

The relevant odour emission rates at the Site were estimated using odour samples collected at a similar facility currently operated by Jalco and located at Smithfield. The odour emission rates and other modelling parameter were calculated to represent conservative operational conditions at the Site and were modelled using the CALMET/CALPUFF modelling to predict the potential odour impacts at the surrounding identified sensitive receptor locations.

The dispersion modelling study predicted that the off-site odour impacts (99th percentile, nose response averaging period) would be below the odour criterion of 2 ou at all neighbouring residential and commercial receptors (average across the entire commercial site) with the exception of commercial receptor C1. This receptor is predicted to experience a marginal exceedance of 2.8 ou (99th percentile, nose response averaging period). It is noted that this slightly elevated average ground level odour concentration is driven by high odour concentrations at the eastern boundary of C1. Predicted odour concentrations within C1 drop significantly within 50 m from the boundary with the average odour concentration at areas located beyond the 50 m distance below the 2 ou criterion. Even though a marginal exceedance is predicated at C1, given the sites industrial land use and unlikelihood of people being present in the highest impacted areas closest to the boundary for significant periods of time (SLR understands that this area is proposed to be a carpark), these slightly elevated odour concentrations are not expected to cause any odour nuisance. Further, as outlined in Section 6.3 emissions from the facility, particularly WWTP, which are located in close proximity to the C1 boundary are likely overestimated and actual emissions could potentially be significantly lower.

Other air emissions including product of combustion associated with the proposed operation are likely to be minimal and unlikely to cause any notable increase in existing pollutant levels at surrounding area.

Based on the findings of this assessment, it is concluded that the proposed operation is unlikely to cause any adverse impacts at the surrounding sensitive receptors and would comply with the relevant ambient air quality and odour guidelines.

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APPENDIX A

Odour Test Report

JALCO SMITHFIELD

Odour Emission Monitoring Test Report

Prepared for:

Jalco Group Ptd Ltd
c/- ESR
Level 29, 20 Bond St
Sydney NSW 2000

Signatory

Issue Date: 15 September 2021

Accredited for Compliance with ISO/IEC 17025 - Testing.
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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 Jalco Group Pty Ltd (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.

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
610.19360-TR01R00	24 August 2021	J Shepherd	G Starke	G Starke

CONTENTS

DOCUMENT REFERENCES

TABLES

APPENDICES

1 NOMENCLATURE

o	degrees	l/min	litres per minute
>	greater than	Max	maximum
≥	greater than or equal to	m	metres
<	less than	m/s	metres per second
≤	less than or equal to	m^2	square metres
%	percentage	m^3	cubic metres
#	denotes reporting conditions not specified in EPL and therefore adopted from POEO Schedule 5 Test methods, averaging periods and reference conditions for scheduled premises – Group 5	m^3/s	cubic metres of air per second
§	denotes concentration limit not specified in EPL and therefore adopted from POEO Schedule 4 Standards of concentration for scheduled premises: general activities and plant – Group 5	$\mu g/m^3$	micrograms per cubic metre of air
^	denotes Special Condition in EPL No. 10000 Condition L3.4 - Oxygen correction is not required for Nitrogen Oxides for emission Points 12 and 13	mg/m^3	milligrams per cubic metre of air
AESTD	Australian Eastern Standard Time Daylight Savings	Min	minimum
AEST	Australian Eastern Standard Time	min	minutes
ALS	Australian Laboratory Services	NA	not applicable
AM	ambient method	NATA	National Association of Testing Authorities
Am^3/s	actual cubic metres of air per second	NSW	New South Wales
Avg	average	NM	not measured
AS	Australian Standard	No.	number
AS/NZS	Australian Standards/New Zealand Standards	NO_x	oxides of nitrogen
CO^2	carbon dioxide	OEH	Office of Environment and Heritage
CO	carbon monoxide	OM	other method
CSC	certified span concentration	O_2	oxygen
Conc.	concentration	PM_{10}	particulate matter less than 10 microns
ºC	degrees Celsius	$PM_{2.5}$	particulate matter less than 2.5 microns
D	duct diameter	Ppb	parts per billion
EPA	Environment Protection Agency / Environment Protection Authority	ppm	parts per million
EPL	Environment Protection Licence	POEO	Protection of the Environment and Operations (Clean Air) Regulations 2010
F	fluoride	Qld	Queensland
g/g mole	grams per gram mole	SLR	SLR Consulting Australia Pty Ltd
GC/MS	Gas Chromatography/Mass Spectrometry	SO_2	sulphur dioxide
HCl	hydrogen chloride	SO_3/H_2SO_4	sulphur trioxide / sulphuric acid mist
hr	Hours	TM	Test Method
ID	identification	TSP	total suspended particulate
K	kelvin	UNSW	University of New South Wales
kg/m^3	kilograms per cubic metre	USEPA M	United States Environment Protection Agency Method
kPa	kilopascals	UTM	Universal Transverse Mercator
LOR	limit of reporting		

2 Introduction

SLR Consulting Australia Pty Ltd (SLR Consulting) was commissioned by Jalco to undertake odour emission monitoring at their located at 277-303 Woodpark Rd, Smithfield (the Site).

The objective of the testing was to obtain data to be used as input to the air quality impact assessment for the site.

The following scope of work was performed on 22 June 2021:

- A single odour sample collected from:
  - inlet and outlet of the wet scrubber serving the blending tanks
  - inlet and outlet of the wet scrubber serving the bleach filling line
  - filling Line 3 fan
  - inside and outside of the shed near the roller shutter door air curtain
  - mezzanine floor near the blending tanks
  - wastewater storage tank
  - whirlybird (from between liquid and powder lines) before operations start at 7:00 am
  - whirlybird (from between liquid and powder lines) during operations
- Where appropriate, monitor airflow, temperature and moisture and calculate mass odour emission rates.

This letter report outlines the sampling methodologies, the odour monitoring results, and includes the calculations of odour emission rates for each source, where appropriate.

2.1 Operating Conditions

On the day of testing, the plant operating procedures and production rates were considered normal by Site personnel.

3 Process Emissions Monitoring

3.1 Test Methods and Analysis References

All sampling and monitoring was performed by SLR unless otherwise specified. The following sections outline for each parameter requested to be tested, a brief description of the relevant test method for sampling and analysis and the NATA Accredited Laboratory that completed the analysis.

3.1.1 Flow and Temperature Sampling and Analysis

Flow and temperature sampling and analysis was performed in accordance with NSW OEH TM-1 and TM-2 (USEPA M2 Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube)). Where possible, a velocity profile was obtained across the stack utilising an S-Type pitot tube and manometer. Where practicable, each sampling plane complied with AS4323.1-1995 "Stationary source emissions Selection of sampling positions".

Temperatures were measured using a digital thermometer connected to a Type K chromel/alumel thermocouple probe.

3.1.2 Odour Sampling and Analysis

All Odour sampling and analysis was performed in accordance with NSW OEH OM-7 (AS/NZS 4323.3-2001 "Stationary source emissions Part 3: Determination of odour concentration by dynamic olfactometry").

Odorous gas was drawn through a clean Teflon (PTFE) sample probe connected to a single use, odour-free Nalophan sampling bag. The sampling pump was connected to the airtight plastic container to provide a sample gas flow-rate of approximately 2 l/min. After the required volume has been sampled, the pump was stopped and the bag was sealed.

All collected samples were labelled with reference number, location, sampling date and times, kept under dark conditions. Samples were handled in accordance with SLR's QA/QC procedures and delivered to The Odour Unit, NATA accreditation number 14974, for analysis in accordance with AS/NZS 4323.3.

As required by the Australian Standard, all samples were analysed within 30 hours of sampling using dynamic olfactometry. Laboratory certificates of analysis are presented in Appendix B.

3.2 Deviations from Test Methods

There were deviations to the specified test reference methodologies, and these are specified below:

Sample Location – NSW TM-1, AS/NZS 4323.1:

- Blending Tanks Wet Scrubber Inlet - the sample location was deemed non-compliant with AS/NZS 4323.1. The sample plane did not meet the minimum distance required for distance from downstream disturbance and distance from upstream disturbance.
- Blending Tanks Wet Scrubber Outlet - the sample location did not meet ideal sampling plane criteria for both distance from upstream and downstream disturbance requirements.
- Bleach Line Wet Scrubber Inlet - the sample location did not meet ideal sampling plane criteria for distance from downstream disturbance.
- Bleach Line Wet Scrubber Outlet - the sample location did not meet ideal sampling plane criteria for distance from upstream disturbance.
- Whirlybird - the sample location was deemed non-compliant with AS/NZS 4323.1. SLR adopted additional sampling points in accordance with AS/NZS 4323.1 to improve the accuracy of the measurement. However, the location does not meet the minimum criteria set out in AS/NZS 4323.1.

3.3 Reference Conditions

Reference conditions for all reported concentrations and flow rates are at standard temperature and pressure (0°C, 101.3 kPa) and as measured moisture and oxygen concentration.

4 Results

SLR Consulting completed all the sampling as per the relevant standards, methods and analysis of flow and temperature. Results are presented in the following tables.

Table 1 Emissions Monitoring: Blending Tanks Wet Scrubber Inlet

Test Details			
Sample date	22 June 2021		
Conditions	Normal		
Sampling plane description	One 35 mm access port located on bend.		
Sample plane compliance	Not compliant with the dimensional requirements of Australian Standard AS4323.1. When the criteria in Table 1 of AS/NZS 4323.1 cannot be met, a greater number of sampling points shall be used in order to retain as much accuracy as is practicable.		
Additional Notes	None.		
Testing officer(s)	Danny Echeverri and Ali Naghizadeh		
Source Conditions			
Stack dimensions (m)	0.38 m (diameter)		
Av. stack gas temperature (°C)	21		
Barometric pressure (kPa)	103.1		
Duct static pressure (kPa)	0.001		
Average velocity (m/sec)	2.2		
Actual gas flowrate (m^3/min)	14		
Gas flow rate at S.T.P. (Nm^3/min)	13		
Dry gas flow rate (Nm^3/min)	Not assessed		
% H2O v/v	Not assessed		
AS 4323.1 compliance			
Requirements	Criteria	Sampling plane	Compliance
Distance from downstream disturbance	2 D min	0 D (bend)	No
Distance from upstream disturbance	6 D min	0 D (bend)	No
Flow direction at all points	Same direction	Same direction	Yes
Velocity at all points	> 3 m/s	< 3 m/s at all points	No
Cyclonic component	< 15°	< 15°	Yes
Difference between points	< 10% absolute temperature	< 10% absolute temperature	Yes
Difference between mean and points	< 10% absolute temperature	< 10% absolute temperature	Yes
Highest to lowest pitot pressure	< 9 : 1	< 9 : 1	Yes
Highest to lowest gas velocity	< 3 : 1	< 3 : 1	Yes
Gas temperature	> dew point	> dew point	Yes
Overall classification			Non compliant *

* Non-compliant sampling position: If the measurement near a bend is unavoidable, the sampling position shall be greater than one duct diameter upstream of the bend or greater than two duct diameters downstream of the bend.

Table 1 Emissions Monitoring: Blending Tanks Wet Scrubber Inlet continued

Test Results	
Odour	
Run No.	1
SLR Sample ID No.	11245
Sample Period (hrs)	0922 – 0940
Odour Concentration (OU)	940
Mass Odour Emission Rate ($OU.m^3/s$)	210

Table 2 Emissions Monitoring: Blending Tanks Wet Scrubber Outlet

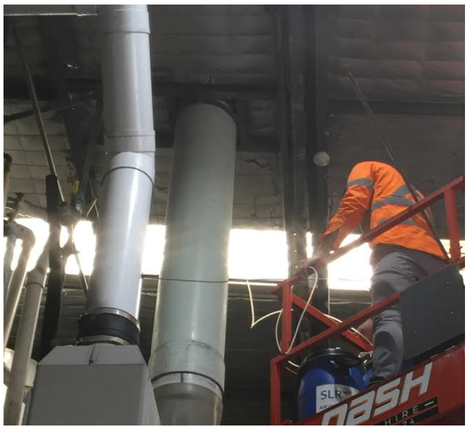
Test Details			
Sample date	22 June 2021		
Conditions	Normal		
Sampling plane description	One 35 mm access port located , 1.1 hydraulic diameters downstream from a bend, and 2.7 hydraulic diameters upstream from the exit.		
Sample plane compliance	Not compliant with the dimensional requirements of Australian Standard AS4323.1. When the criteria in Table 1 of AS/NZS 4323.1 cannot be met, a greater number of sampling points shall be used in order to retain as much accuracy as is practicable.		
Additional Notes	None.		
Testing officer(s)	Danny Echeverri and Ali Naghizadeh		
Source Conditions			
Stack dimensions (m)	0.38 m (diameter)		
Av. stack gas temperature (°C)	20		
Barometric pressure (kPa)	103.3		
Duct static pressure (kPa)	0.001		
Average velocity (m/sec)	2.2		
Actual gas flowrate (m³/min)	15		
Gas flow rate at S.T.P. (Nm³/min)	14		
Dry gas flow rate (Nm³/min)	Not assessed		
% H2O v/v	Not assessed		
AS 4323.1 compliance			
Requirements	Criteria	Sampling plane	Compliance
Distance from downstream disturbance	2 D min	1.1 D (exit)	No
Distance from upstream disturbance	6 D min	2.7 D (inlet)	No
Flow direction at all points	Same direction	Same direction	Yes
Velocity at all points	> 3 m/s	< 3 m/s at all points	No
Cyclonic component	< 15°	< 15°	Yes
Difference between points	< 10% absolute temperature	< 10% absolute temperature	Yes
Difference between mean and points	< 10% absolute temperature	< 10% absolute temperature	Yes
Highest to lowest pitot pressure	< 9 : 1	< 9 : 1	Yes
Highest to lowest gas velocity	< 3 : 1	< 3 : 1	Yes
Gas temperature	> dew point	> dew point	Yes
Overall classification			Non ideal *

* Non ideal sampling position: If the measurement near a bend is unavoidable, the sampling position shall be greater than one duct diameter upstream of the bend or greater than two duct diameters downstream of the bend. When the criteria in Table 1 of AS/NZS 4323.1 cannot be met, a greater number of sampling points shall be used in order to retain as much accuracy as is practicable.

Table 2 Emissions Monitoring: Blending Tanks Wet Scrubber Outlet continued

Test Results	
Odour	
Run No.	1
SLR Sample ID No.	11246
Sample Period (hrs)	0940 – 0949
Odour Concentration (OU)	180
Mass Odour Emission Rate (OU.m^3/s)	42

Table 3 Emissions Monitoring: Bleach Line Wet Scrubber Inlet

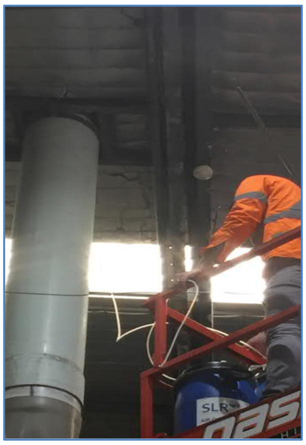
Test Details			
Sample date	22 June 2021		
Conditions	Normal		
Sampling plane description	One 35 mm access port located 1.8 hydraulic diameters downstream from a bend, and 2.9 hydraulic diameters upstream from the exit.		
Sample plane compliance	Not compliant with the dimensional requirements of Australian Standard AS4323.1. When the criteria in Table 1 of AS/NZS 4323.1 cannot be met, a greater number of sampling points shall be used in order to retain as much accuracy as is practicable.		
Additional Notes	None.		
Testing officer(s)	Danny Echeverri and Ali Naghizadeh		
Source Conditions			
Stack dimensions (m)	0.24 m (diameter)		
Av. stack gas temperature (°C)	25		
Barometric pressure (kPa)	103.5		
Duct static pressure (kPa)	0.200		
Average velocity (m/sec)	7.3		
Actual gas flowrate (m³/min)	20		
Gas flow rate at S.T.P. (Nm³/min)	18		
Dry gas flow rate (Nm³/min)	Not assessed		
% H2O v/v	Not assessed		
AS 4323.1 compliance			
Requirements	Criteria	Sampling plane	Compliance
Distance from downstream disturbance	2 D min	1.8 D (exit)	No
Distance from upstream disturbance	6 D min	2.9 D (bend)	No
Flow direction at all points	Same direction	Same direction	Yes
Velocity at all points	> 3 m/s	> 3 m/s at all points	Yes
Cyclonic component	< 15°	< 15°	Yes
Difference between points	< 10% absolute temperature	< 10% absolute temperature	Yes
Difference between mean and points	< 10% absolute temperature	< 10% absolute temperature	Yes
Highest to lowest pitot pressure	< 9 : 1	< 9 : 1	Yes
Highest to lowest gas velocity	< 3 : 1	< 3 : 1	Yes
Gas temperature	> dew point	> dew point	Yes
Overall classification			Non ideal *

* Non ideal sampling position: If the measurement near a bend is unavoidable, the sampling position shall be greater than one duct diameter upstream of the bend or greater than two duct diameters downstream of the bend. When the criteria in Table 1 of AS/NZS 4323.1 cannot be met, a greater number of sampling points shall be used in order to retain as much accuracy as is practicable.

Table 3 Emissions Monitoring: Bleach Line Wet Scrubber Inlet continued

Test Results	
Odour	
Run No.	1
SLR Sample ID No.	11248
Sample Period (hrs)	1100-1115
Odour Concentration (OU)	99
Mass Odour Emission Rate (OU.m^3/s)	30

Table 4 Emissions Monitoring: Bleach Line Wet Scrubber Outlet

Test Details			
Sample date	22 June 2021		
Conditions	Normal		
Sampling plane description	One 35 mm access port located 2.7 hydraulic diameters downstream from a bend, and 4 hydraulic diameters upstream from the exit.		
Sample plane compliance	Not compliant with the dimensional requirements of Australian Standard AS4323.1. When the criteria in Table 1 of AS/NZS 4323.1 cannot be met, a greater number of sampling points shall be used in order to retain as much accuracy as is practicable.		
Additional Notes	None.		
Testing officer(s)	Danny Echeverri and Ali Naghizadeh		
Source Conditions			
Stack dimensions (m)	0.38 m (diameter)		
Av. stack gas temperature (°C)	25		
Barometric pressure (kPa)	103.3		
Duct static pressure (kPa)	0.023		
Average velocity (m/sec)	4.1		
Actual gas flowrate (m^3/min)	27		
Gas flow rate at S.T.P. (Nm^3/min)	25		
Dry gas flow rate (Nm^3/min)	Not assessed		
% H2O v/v	Not assessed		
AS 4323.1 compliance			
Requirements	Criteria	Sampling plane	Compliance
Distance from downstream disturbance	2 D min	2.7 D (exit)	Yes
Distance from upstream disturbance	6 D min	4 D (bend)	No
Flow direction at all points	Same direction	Same direction	Yes
Velocity at all points	> 3 m/s	> 3 m/s at all points	Yes
Cyclonic component	< 15°	< 15°	Yes
Difference between points	< 10% absolute temperature	< 10% absolute temperature	Yes
Difference between mean and points	< 10% absolute temperature	< 10% absolute temperature	Yes
Highest to lowest pitot pressure	< 9 : 1	< 9 : 1	Yes
Highest to lowest gas velocity	< 3 : 1	< 3 : 1	Yes
Gas temperature	> dew point	> dew point	Yes
Overall classification			Non ideal *

* Non ideal sampling position: If the measurement near a bend is unavoidable, the sampling position shall be greater than one duct diameter upstream of the bend or greater than two duct diameters downstream of the bend. When the criteria in Table 1 of AS/NZS 4323.1 cannot be met, a greater number of sampling points shall be used in order to retain as much accuracy as is practicable.

Table 4 Emissions Monitoring: Bleach Line Wet Scrubber Outlet continued

Test Results	
Odour	
Run No.	1
SLR Sample ID No.	11249
Sample Period (hrs)	1115-1139
Odour Concentration (OU)	83
Mass Odour Emission Rate (OU.m³/s)	35

Table 5 Emissions Monitoring: Filling Line 3 Fan

Test Details		
Sample date	22 June 2021	
Conditions	Normal	
Sampling plane description	Face of fan	
Sample plane compliance	NA	
Additional Notes	None.	
Testing officer(s)	Danny Echeverri and Ali Naghizadeh	
Source Conditions		
Opening dimensions (m)	0.15 m (diameter)	
Av. stack gas temperature (°C)	28	
Barometric pressure (kPa)	103.3	
Duct static pressure (kPa)	NA	
Average velocity (m/sec)	16	
Actual gas flowrate (m³/min)	16	
Gas flow rate at S.T.P. (Nm³/min)	14	
Dry gas flow rate (Nm³/min)	Not assessed	
% H2O v/v	Not assessed	
Odour		
Run No.	1	
SLR Sample ID No.	11243	
Sample Period (hrs)	1034-1046	
Odour Concentration (OU)	200	
Mass Odour Emission Rate (OU.m³/s)	50	

Table 6 Emissions Monitoring: Roller Shutter Door Air Curtain - Inside

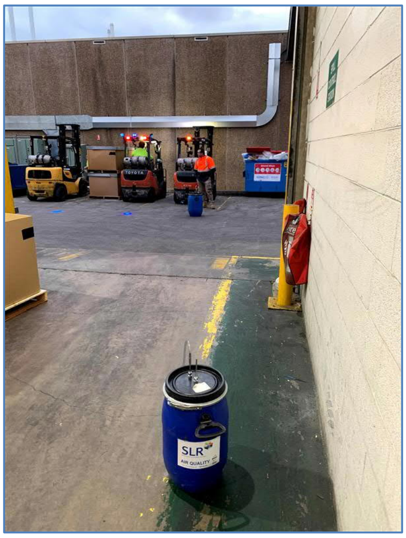
Test Details		
Sample date	22 June 2021	
Conditions	Normal	
Sampling plane description	Inside face of roller shutter door (before air curtain)	
Sample plane compliance	NA	
Additional Notes	None.	
Testing officer(s)	Danny Echeverri and Ali Naghizadeh	
Source Conditions		
Opening dimensions (m)	4.6 m x 4 m	
Av. stack gas temperature (°C)	12	
Barometric pressure (kPa)	103.3	
Duct static pressure (kPa)	NA	
Average velocity (m/sec)	0.40	
Actual gas flowrate (m³/min)	440	
Gas flow rate at S.T.P. (Nm³/min)	430	
Dry gas flow rate (Nm³/min)	Not assessed	
% H2O v/v	Not assessed	
Odour		
Run No.	1	
SLR Sample ID No.	11242	
Sample Period (hrs)	0708-0720	
Odour Concentration (OU)	120	
Mass Odour Emission Rate (OU.m³/s)	870	

Table 7 Emissions Monitoring: Roller Shutter Door Air Curtain - Outside

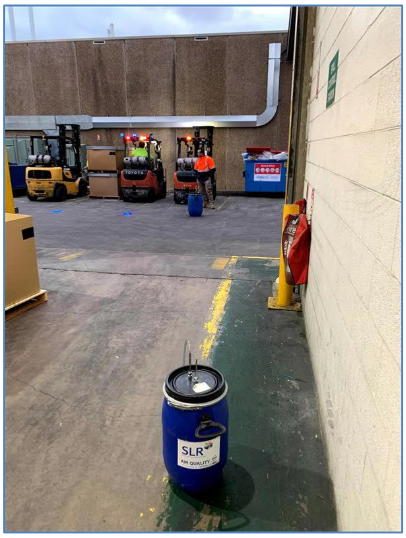
Test Details		
Sample date	22 June 2021	
Conditions	Normal	
Sampling plane description	Outside face of roller shutter door	
Sample plane compliance	NA	
Additional Notes	None.	
Testing officer(s)	Danny Echeverri and Ali Naghizadeh	
Source Conditions		
Opening dimensions (m)	4.6 m x 4 m	
Av. stack gas temperature (°C)	12	
Barometric pressure (kPa)	103.3	
Duct static pressure (kPa)	NA	
Average velocity (m/sec)	0.10	
Actual gas flowrate (m^3/min)	110	
Gas flow rate at S.T.P. (Nm^3/min)	110	
Dry gas flow rate (Nm^3/min)	Not assessed	
% H_2O v/v	Not assessed	
Odour		
Run No.	1	
SLR Sample ID No.	11241	
Sample Period (hrs)	0708-0720	
Odour Concentration (OU)	54	
Mass Odour Emission Rate ($OU.m^3/s$)	99	

Table 8 Ambient Monitoring: Mezzanine Floor near Blending Tanks

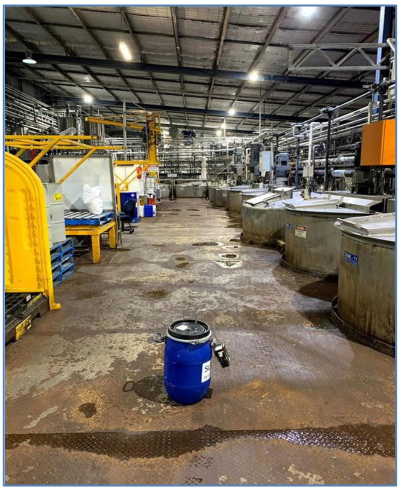
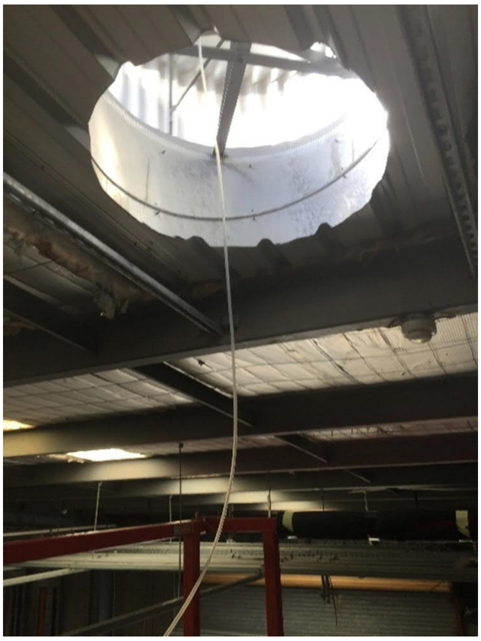
Test Details		
Sample date	22 June 2021	
Conditions	Normal	
Sampling plane description	NA	
Sample plane compliance	NA	
Additional Notes	Ambient monitoring	
Testing officer(s)	Danny Echeverri and Ali Naghizadeh	
Source Conditions		
Opening dimensions (m)	NA	
Av. stack gas temperature (°C)	17	
Barometric pressure (kPa)	103.3	
Duct static pressure (kPa)	NA	
Average velocity (m/sec)	NA	
Actual gas flowrate (m^3/min)	NA	
Gas flow rate at S.T.P. (Nm^3/min)	NA	
Dry gas flow rate (Nm^3/min)	Not assessed	
% H2O v/v	Not assessed	
Odour		
Run No.	1	
SLR Sample ID No.	11239	
Sample Period (hrs)	0524-0533	
Odour Concentration (OU)	59	

Table 9 Emissions Monitoring: Wastewater Storage Tank

Test Details		
Sample date	22 June 2021	
Conditions	Normal	
Sampling plane description	Open face of water storage tank hatch	
Sample plane compliance	NA	
Additional Notes	None.	
Testing officer(s)	Danny Echeverri and Ali Naghizadeh	
Source Conditions		
Opening dimensions (m)	0.54 m (diameter)	
Av. stack gas temperature (°C)	13	
Barometric pressure (kPa)	103.3	
Duct static pressure (kPa)	NA	
Average velocity (m/sec)	0.03	
Actual gas flowrate (m^3/min)	0.01	
Gas flow rate at S.T.P. (Nm^3/min)	0.01	
Dry gas flow rate (Nm^3/min)	Not assessed	
% H_2O v/v	Not assessed	
Odour		
Run No.	1	
SLR Sample ID No.	11244	
Sample Period (hrs)	0809-0821	
Odour Concentration (OU)	25,000	
Mass Odour Emission Rate (OU.m^3/s)	170	

Table 10 Emissions Monitoring: Whirlybird Before Operations

Test Details	
Sample date	22 June 2021
Conditions	Normal
Sampling plane description	One 88 cm diameter opening located directly below the whirlybird.
Sample plane compliance	NA
Additional Notes	None.
Testing officer(s)	Danny Echeverri and Ali Naghizadeh

Source Conditions		
Opening dimensions (m)	0.88 m (diameter)	
Av. stack gas temperature (°C)	17	
Barometric pressure (kPa)	103.3	
Duct static pressure (kPa)	NA	
Average velocity (m/sec)	1.4	
Actual gas flowrate (m^3/min)	50	
Gas flow rate at S.T.P. (Nm^3/min)	49	
Dry gas flow rate (Nm^3/min)	Not assessed	
% H_2O v/v	Not assessed	

Odour	
Run No.	1
SLR Sample ID No.	11240
Sample Period (hrs)	0525-0535
Odour Concentration (OU)	110
Mass Odour Emission Rate (OU.m^3/s)	91

Table 11 Emissions Monitoring: Whirlybird During Operations

Test Details		
Sample date	22 June 2021	
Conditions	Normal	
Sampling plane description	One 88 cm diameter opening located directly below the whirlybird.	
Sample plane compliance	NA	
Additional Notes	None.	
Testing officer(s)	Danny Echeverri and Ali Naghizadeh	
Source Conditions		
Opening dimensions (m)	0.88 m (diameter)	
Av. stack gas temperature (°C)	21	
Barometric pressure (kPa)	103.3	
Duct static pressure (kPa)	NA	
Average velocity (m/sec)	1.3	
Actual gas flowrate (m^3/min)	47	
Gas flow rate at S.T.P. (Nm^3/min)	44	
Dry gas flow rate (Nm^3/min)	Not assessed	
% H_2O v/v	Not assessed	
Odour		
Run No.	1	
SLR Sample ID No.	11247	
Sample Period (hrs)	1015-1027	
Odour Concentration (OU)	220	
Mass Odour Emission Rate (OU.m^3/s)	170	

4.1 Results Summary

A summary of the emission test results as required for an air quality impact assessment is presented in Table 12. All volumes and concentrations are reported at standard temperature and pressure (0ºC and 101.3 kPa), and at stack oxygen concentration unless otherwise stated.

Table 12 Summary of Emission Testing Results

Odour	Units	Blending Tanks Wet Scrubber Inlet	Blending Tanks Wet Scrubber Outlet	Bleach Line Wet Scrubber Inlet	Bleach Line Wet Scrubber Outlet	Filling Line 3 Fan	Roller Shutter Door Air Curtain - Inside	Roller Shutter Door Air Curtain - Outside	Mezzanine Floor near Blending Tanks	Wastewater Storage Tank	Whirlybird Before Operations	Whirlybird During Operations
Stack Diameter	m	0.38	0.38	0.24	0.38	0.15	4.6 x 4	4.6 x 4	NA	0.54	0.88	0.88
Average Stack Temperature	ºC	21	20	25	25	28	12	12	17	13	17	21
Average Stack Pressure	kPa	0.001	0.001	0.20	0.023	NA	NA	NA	NA	NA	NA	NA
Average Stack Velocity	m/s	2.2	2.2	7.3	4.1	16	0.40	0.10	NA	0.03	1.4	1.3
Odour Concentration	OU	940	180	99	83	200	120	54	59	25,000	110	220
Mass Odour Emission Rate	ou.m^3/s	210	42	30	35	50	870	99	NA	170	91	170

5 Monitoring Instrument Calibration

Details of the most recent calibration of each instrument used to take the measurements are provided in Table 13.

Table 13 Equipment Calibration Details

Asset Number	Name	Next Calibration / Due Date
2003	Pump	19-05-2022
2453	Thermocouple	12-02-2022
2454	Digitemp	07-06-2022
183541	Drycal	19-02-2022

6 Measurement Uncertainty

The estimated measurement uncertainty associated with the monitoring methods are provided in Table 14.

Table 14 Measurement Uncertainty

Parameter	Associated Test Method	Uncertainty
Velocity	TM-2, AS 4323.1, USEPA M2A, 2C	±5%
Temperature	TM-2, USEPA M2C	$\pm 2^{o}$C
Odour	OM-7, AS4323.3	± 50 - 124% (based upon a single determination)

7 References

AS. (1995). 4323.1:1995 - Stationary Source Emissions - Selection of Sampling Positions.

AS/NZS. (n.d.). 4323.3:2001 - Stationary source emissions Part 3: Determination of odour concentration by dynamic olfactometry.

NSW DEC. (2007). Approved Methods for the Sampling and Analysis of Air Pollutants in NSW.

USEPA. (2017). Method 2 - Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube).

USEPA. (2017a). Method 2C - Determination Of Gas Velocity And Volumetric Flow Rate In Small Stacks Or Ducts (Standard Pitot Tube).

APPENDIX B

Lab Analysis Report

THE ODOUR UNIT PTY LTD

Accreditation Number: 14974

Odour Sample Measurement Results
Panel Roster Number: SYD20210623_064

Sample Location	TOU Sample ID	Sampling Date & Time	Analysis Date & Time	Panel Size	Valid ITEs	Nominal Sample Dilution	Actual Sample Dilution (Adjusted for Temperature)	Dilution Equipment ID	Sample Odour Concentration (as received, in the bag) (ou)	Sample Odour Concentration (Final, allowing for dilution) (ou)
11240: WB1 Run 1	SC21449	22.06.2021 0535 hrs	23.06.2021 1008 hrs	4	8	--	--	--	108	108
11239: Platform Run 1	SC21450	22.06.2021 0533 hrs	23.06.2021 1034 hrs	4	8	--	--	--	59	59
11241: RSD – O Run	SC21451	22.06.2021 0720 hrs	23.06.2021 1057 hrs	4	8	--	--	--	54	54
11242: RSD – I Run 1	SC21452	22.06.2021 0720 hrs	23.06.2021 1119 hrs	4	8	--	--	--	118	118
11244: DAF – 5	SC21453	22.06.2021 0821 hrs	23.06.2021 1153 hrs	4	8	--	--	--	25,300	25,300
11245: BT Scrubber – In	SC21454	22.06.2021 0935 hrs	23.06.2021 1319 hrs	4	8	--	--	--	939	939

Samples Received in Laboratory – From: SLR Consulting   Date: 22.06.2021   Time: 1500 hrs

Note: The following are not covered by the NATA Accreditation issued to The Odour Unit Pty Ltd:

1. The collection of samples by the methods of AS/NZS 4323.4 and the calculation of Specific Odour Emission Rate (**SOER**).
2. Final results that have been modified by the dilution factors where parties other than The Odour Unit Pty Ltd have performed the dilution of samples.

THE ODOUR UNIT

THE ODOUR UNIT PTY LTD

NATA
Accreditation Number: 14974

Odour Sample Measurement Results
Panel Roster Number: SYD20210623_064

Sample Location	TOU Sample ID	Sampling Date & Time	Analysis Date & Time	Panel Size	Valid ITEs	Nominal Sample Dilution	Actual Sample Dilution (Adjusted for Temperature)	Dilution Equipment ID	Sample Odour Concentration (as received, in the bag) (ou)	Sample Odour Concentration (Final, allowing for dilution) (ou)
11246: BT Scrubber – Out Run 1	SC21455	22.06.2021 0935 hrs	23.06.2021 1412 hrs	4	8	--	--	--	181	181
11247: WB – B Run 1	SC21456	22.06.2021 1027 hrs	23.06.2021 1434 hrs	4	8	--	--	--	215	215
11243: Line 3 Run 1	SC21457	22.06.2021 1046 hrs	23.06.2021 1459 hrs	4	8	--	--	--	197	197
11248: BL Scrubber – In Run 1	SC21458	22.06.2021 1142 hrs	23.06.2021 1533 hrs	4	8	--	--	--	99	99
11249: BL Scrubber – Out Run 1	SC21459	22.06.2021 1142 hrs	23.06.2021 1558 hrs	4	8	--	--	--	83	83

Samples Received in Laboratory – From: SLR Consulting Date: 22.06.2021 Time: 1500 hrs

Note: The following are not covered by the NATA Accreditation issued to The Odour Unit Pty Ltd:

1. The collection of samples by the methods of AS/NZS 4323.4 and the calculation of Specific Odour Emission Rate (**SOER**).
2. Final results that have been modified by the dilution factors where parties other than The Odour Unit Pty Ltd have performed the dilution of samples.

THE ODOUR UNIT PTY LTD

Accreditation Number: 14974

Odour Panel Calibration Results

Reference Odorant	Reference Odorant Panel Roster Number	Concentration of Reference gas (ppb)	Panel Target Range for n-butanol (ppb)	Measured Concentration (ou)	Measured Panel Threshold (ppb)	Does this panel calibration measurement comply with AS/NZS 4323.3 (Yes / No)
n-butanol	SYD20210623_064	51,000	$20 \le \chi \le 80$	1,449	35	Yes

Comments

Odour characters (non-NATA accredited) as determined by odour laboratory panel:

SC21449	soapy, detergent
SC21450	soapy, detergent
SC21451	soapy, detergent
SC21452	soapy, detergent
SC21453	soapy, detergent, bleach
SC21454	soapy, detergent
SC21455	soapy, detergent
SC21456	soapy, detergent
SC21457	soapy, detergent
SC21458	soapy, detergent
SC21459	soapy, detergent

Disclaimers

1. Parties, other than The Odour Unit Pty Ltd, responsible for collecting odour samples have advised that they have voluntarily furnished these odour samples, appropriately collected and labelled, to The Odour Unit Pty Ltd for the purpose of odour testing.
2. The collection of odour samples by parties other than The Odour Unit Pty Ltd relinquishes The Odour Unit Pty Ltd from all responsibility for the sample collection and any effects or actions that the results from the test(s) may have.
3. Any comments included in, or attachments to, this Report are not covered by the NATA Accreditation issued to The Odour Unit Pty Ltd.
4. This report shall not be reproduced, except in full, without written approval of The Odour Unit Pty Ltd.

Report Status

Status	Version	Date	Prepared by	Checked by	Change	Reason
Draft	0.1	29.06.2021	A. Schulz	-	-	-
Final	1.0	29.06.2021	A. Schulz	M. Assal	-	-
Revised	1.1	08.07.2021	A. Schulz	-	Sample ID	Incorrect

END OF DOCUMENT

APPENDIX C

Vertical Vent Design

Represented by:
Fantech Pty. Ltd.
A.B.N. 11 005 434 024
63 Vision Street
Dandenong South VIC 3175
Telephone: +61 (03) 9554 7845
Facsimile: +61 (03) 9554 7833
E-mail: info@fantech.com.au

Technical Data - Fan Model RVE0714BP7/29

Location:

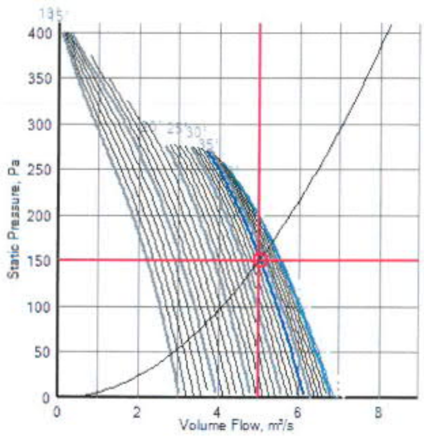
Designation:

Performance - Required

Air Flow :	5.00 m³/s
Static Pressure :	150 Pa
Selection Pressure:	150 Pa
Installation Type:	TYPE -
Air Density:	1.204 kg/m³
- Atmos. Temp:	20 °C
- Altitude:	0 m
- Humidity:	0.0 %

Actual

Air Flow:	5.04 m³/s
Static Pressure:	152 Pa
Total Pressure:	250 Pa

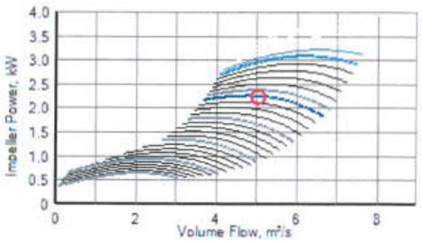


Fan Data

Catalogue Code:	RVE0714BP7/29 (RVE0714BP7B030)		
Description:	Vertical exhaust axial roof unit		
Diameter:	710 mm	Hub:	250 mm
Impeller Type:	Axial	Pitch:	29°
Blade Material:	GRP	Blades:	7
Speed:	1440 r/min @50 Hz	Form:	A
Power, Abs:	2.25 kW	Peak:	2.26 kW
Input Power:	2.57 kW		
Efficiency Total:	55.8%	Static:	34.0%
Fan Weight:	116.9 kg		

Motor Data (at STP)

Motor Type:	Standard	
Electrical Supply:	415V 3ph 50Hz	
Motor Frame:	D100L	
Motor Power:	3.30kW (AOM)	(3.00kW IEC)
FLC/Start:	6.82A (AOM) / 35.96A	(6.20A FL IEC)
Motor Speed:	4 pole	
Motor Efficiency:	87.5%	



Energy Efficiency, NCC/BCA Vol. 1, Table J5.2 compliant

+ 2010 - 2012
+ 2013 - 2016
+ 2015 - 2016 Carpark
+ 2019

Sound Data

Spectrum (Hz):	63	125	250	500	1K	2K	4K	8K	dBW	dB(A) @ 3m
Inlet (dB):	88	84	83	82	80	77	75	66	92	64
Outlet (dB):	89	85	82	82	82	80	78	75	93	66

Sound levels are quoted as in-duct values. dB(A) values are average spherical free-field for comparative use only.

Energy Sustainability Data

Hours Per Day:	10	Annual Electricity Cost ($):	1235.6
DaysPerYear:	300	Annual GH Gas (Tonnes):	11.3
CO2 per kWh (kg):	1.467	Annual Carbon Usage (Tonnes):	3.1
Cost per kWh ($):	0.16		

As part of our continuous improvement processes, Fantech reserves the right to make changes in design or specification to products without notice.

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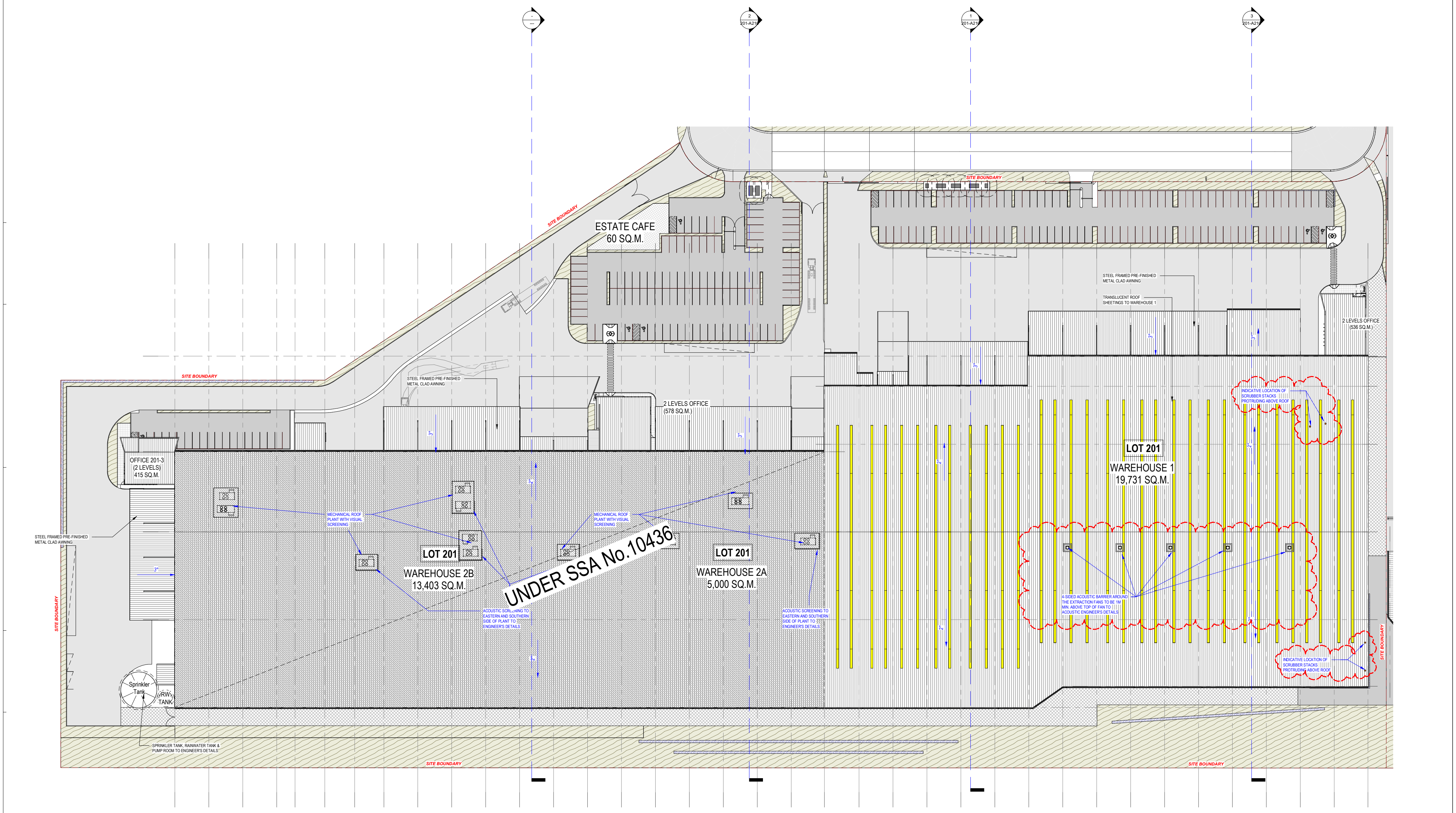
APPENDIX D

Site Plans and Elevations



1 201 Roof plan

201-A200 1 : 500 @B1

DEVELOPMENT APPLICATION

ESR

CUSTOMER

PROJECT MANAGER

PROJECT: ESR HORSLEY LOGISTIC PARK

ADDRESS: 327-335 BURLEY ROAD, HORSLEY PARK NSW

PROJECT NUMBER: 200226

Rev	Description	Date
P1	Lot 201 - Warehouse 2B & 3 consolidated to 2B, Mechanical roof plant and with screening added.	05.08.21
P2	Lot 201 Roof plant platform finalised.	02.09.21
P3	Acoustic screen added to roof plant.	07.10.21
P4	Acoustic fence added to extraction fans. WH 2A & 3 elevations updated.	28.10.21
P5	Stacks above roof added.	01.11.21

General Notes:-
Architectural drawings to be read in conjunction with all other consultants detailed drawings, specifications & reports.
Do not scale this drawing. Verify all dimensions on site.
Refer all discrepancies to HLA before commencing any work.

HL Architects Pty Ltd A.C.N. 161 638 320
nominated architect: Kok Hong LAU
(Reg.No. NSW #7559, QLD #5003, TAS #1101)
e admin@hlarchitects.com.au
t 02 9166 9942
m 0424 160 365
w www.hlarchitects.com.au
a Suite 53, 9 George St, North Strathfield NSW 2137

DRAWING TITLE: ROOF PLAN

DRWN: Author
CHK: Checker

DRAWING NUMBER: 200226 - DA - 201-A105
ISSUE: P5

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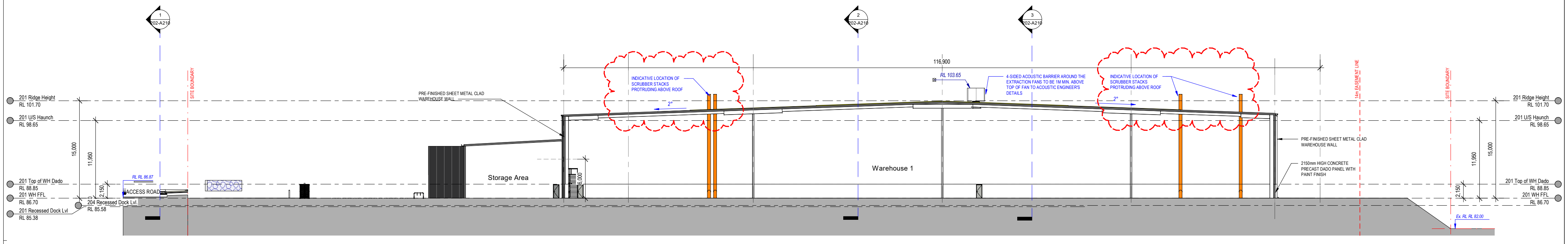
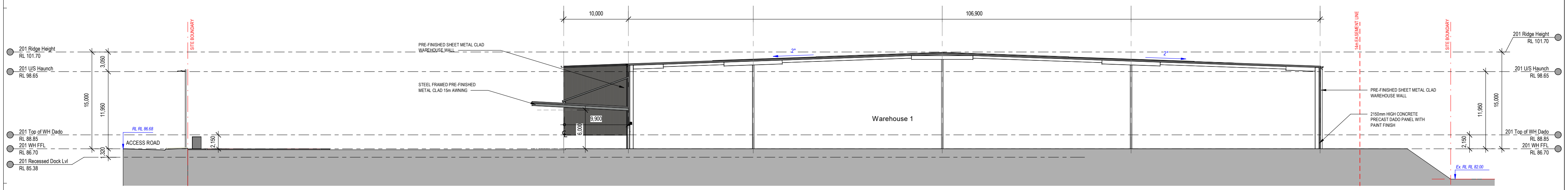


3 Lot 201 Cross Section (WH-1 - Storage Shed)
201-A105 1 : 250 @B1



1 Lot 201 Cross Section (WH-1 Flush Dock)
201-A105 1 : 250 @B1

DEVELOPMENT APPLICATION

ESR

PROJECT: ESR HORSLEY LOGISTIC PARK
ADDRESS: 327-335 BURLEY ROAD, HORSLEY PARK NSW
PROJECT NUMBER: 200226

Rev	Description	Date
P7	Lot 201 - Warehouse 2B & 3 consolidated to 2B, Mechanical roof plant and with screening added.	05.08.21
P8	Lot 201 Roof plant platform finalised.	02.09.21
P9	Warehouse 1 fitout updated.	20.09.21
P10	Acoustic screen added to roof plant.	07.10.21
P11	Acoustic fence added to extraction fans. WH 2A & 3 elevations updated.	28.10.21
P12	Stacks above roof added.	01.11.21

General Notes:-
Architectural drawings to be read in conjunction with all other consultants detailed drawings, specifications & reports.
Do not scale this drawing. Verify all dimensions on site.
Refer all discrepancies to HLA before commencing any work.

HL Architects Pty Ltd A.C.N. 161 638 320
nominated architect: Kok Hong LAU
(Reg.No. NSW #7559, QLD #5003, TAS #1101)
e admin@hlarchitects.com.au
t 02 9166 9942
m 0424 160 365
w www.hlarchitects.com.au
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hla architects

DRAWING TITLE: LOT 201 WAREHOUSE SECTIONS
DRAWN: AB
CHK: HL
DRAWING NUMBER: 200226 - DA - 201-A210
ISSUE: P12

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APPENDIX E

List of MSDS' Reviewed

MSDS name	MSDS name
Fr Lustrous 1034901 (Seven Scent)	Calcium Chloride (Redox)
Acticide Rsc (Thor)	Carezyme Premium 4500l (Novozymes)
Sds Global Fragrance_Apple Splash 10776_Ap17358200	Cbsx Optical Brightener Sds (Redox)
95 Sgf4-Zci 200l Drum 1000l Ibc (Ethanol (Wilmar)	Citric Acid Anhydrous Sds (Redox)
Eucalyptus Compound A209010 (Gr Davis)	Cmc Dt 1000 Finnfix Bda (Sodium Carboxymethyl Cellulose) (Redox)
Eucalyptus Oil Bp7075 (Auschem Pacific)	Dequest 2047g (Edtmpa) (Redox)
Frag Ballerina 77 (Givaudan)	Detercal G Blue (Albright & Wilson)
Cold Active 525 Eo (Givaudan)	Direct Blue 86 (Kayarus Turquoise Blue Gln) (Cathay)
Elegant Silk A Tsg14-07934 Sds (Takasago)	Telon Turquoise M-5g 85% 2013 Sds (Dyechem)
Everlasting Blue 51_Aad0636800 (Givaudan)	Acid Light Yellow 2g (Cathay)
Frag Solar Spark 217 Eo (Givaudan)	Exacol Carmoisine (Cathay)
Tender Touch B Tsg14-07937 Sds (Takasago)	Exacol Chocolate Brown Ht (Cathay)
Gardilene Ssas-Ssasj (Albright & Wilson)	Exacol Tartrazine (Cathay)
Gardiquat 1450 (Albright & Wilson)	Lanaset Violet B (Ascher Colour)
Gardiquat 1450dodigen 1611actici Bac50 (Clariant)	Edta Acid Trilon Bs (Redox)
Lactic Acid Sds (Redox)	Fluorescein Lt (Cathay)
Oxamin Lo-Ammonyx Co (Indorama)	Gardilene Fd Sds 45886 (Albright & Wilson)
Perf Citron (Firmenich)	Gardilene Sq70 (Albright & Wilson)
Perf Citrus Fantasy Cp187459 (Firmenich)	Gardilene Sx40au(Albright & Wilson)
Perf Forever Summer 4905 (Iff)	Gardinol Esb 30 (Albright & Wilson)
Fragrance Green Apple Rf8420 (Givaudan)	Genagen Cab Uqs Dehyton Ke-As (Basf)
Fragrance Indigo Rose 6921	Genagen Cab Uqs (Clariant)
Perf Lavender Fresh Mod Sds (Iff)	Mermaid Grade 6-9 Salt (Cheetham Salt)
Domestos Blue Lb0045h(1021) (Givaudan)	Liq Sod Silicate D.Vitrasol A5 (Pq Australia)
Lemon Soap Fragrance (Iff)	Hi-Foam 750 (Rpl)
Sinbad 88e Vs3 (Givaudan) (2)	Isopropyl Laurate Palmester 1505 (Axieo)
True Lime 185 (Givaudan)	Aximul Dsn18 (Axieo)
Fragrance Velvet 6282 (Givaudan)	Lactic Acid Sds (Redox)
Fragrance Fresh R191951 (Givaudan)	Lamesoft Po 65 (Rspo) (Basf)
Fragrance Mountain Forest (Givaudan)	Liquitint Aquamarine (Rpl)
Polyquart Pro A (Basf)	Liquitint Blue Hp (Rpl)
Peracetic Adic Peraclean 5 (Redox)	Liquitint Bright Yellow (Rpl)
Rhodamine 25% Ww I.M.S. (Cathay)	Liquitint Green Cg (Milliken)
Sodium Hydroxide 46 -50% Sds (Ixom)	Liquitint Pink Al (Milliken & Company)
Sodium Hypochlorite Sds (Ixom)	Liquitint Red St (Milliken)
Sodium Metasilicate 5h20 (Redox)	Dye Liquitint Yellow Lp (Milliken)
Sunqat_Ctn90-Sds (Rpl)	Mannaway 4 0l Sds (Novozyme)
Teric 164 (Indorama Ventures)	Mannaway 4 0l Sds (Novozyme)

MSDS name	MSDS name
Pinechem 560_Au Ghs Sds (Axieo)	Mermaid Table Salt (Free Flowing Agents) (Cheetham Salt)
Fragrance Tiger Lily Petals 13037 (Givaudan)	Nd-Acid Brilliant Blue 150% (Cathay)
Trilon Bx Liquid (Basf)	Palmera A9912 (Lauric Acid 99%) (Axieo)
Yellow Citrus 12789 (Givaudan)	Lemon Splice 600 (Givaudan)
Fragrance Sunglow 481 (Givaudan)	Propylene Glycol Bp-Usp (Avo1p05700) (Imcd) (2)
Fragrance Blue Fresh 151 (Givaudan)	Propylene Glycol Bp-Usp (Avo1p05700) (Ingredients Plus)
Frag Alice Springs 738603 Sds (Symrise)	Rhodamine B540 (Cathay)
Perf Wattle & Orange Flower 5042 (Iff)	Sixin_G-920s-Sds 23-11-16 (Rpl)
Poseidon 17dd (Iff)	Sixin_G-9051-Sds (Rpl)
Thor 57aa (Iff)	Soda Ash Dense (Natrio Pty Ltd)
So Fresh 1636 (Iff)	Soda Ash Dense Sds (Ixom)
Eucalyptus (Symrise)	Soda Ash Dense Sds (Redox)
Cpd Lavender (Iff)	Soda Ash Dense 25kg Wpp Bags (Redox) (2)
Frag Orange Paradise 9463 An04125201 (Givaudan)	Soda Ash Light (Tangshan Sanyou)
Fragrance Fresh Peel 8407(Givaudan)	Soda Ash Light (Redox)
Triclosan (Dksh)	Soda Ash Light Sds (Sanyou)
Lemon Blitz (Iff)	Sodium Benzoate Bp (Emerald Performance Chemicals)
Flower Blue 79 Hypo (Givaudan)	Sodium Bicarbonate Sobica7420 Animal-Ind (Redox)
Perf Honey Blossom & Black Orchid 7335 (Iff)	Sodium Citrate Hydrous (Redox)
Eucafresh 661 (Iff)	Sodium Stearate (Rpl)
Mambo 244175 Be (Firmenich)	Sokalan Cp 5 Granules (Basf)
Bluefusionpowder 187398 F (Firmenich)	Stepanol Dcfas (Ixom)
Citrus Fantasy 147831kb (Firmenich)	Stpp (Redox)
Frag Ceremonia Hl 18 12962 (Henkel)	Stpp T701 25kg Bag -Sotrip0800 (Redox)
Frag Baremeplus Hl 18 12971 (Henkel)	Teric La8n (Indorama Ventures)
Frag Sunny Hl 17-12907 (Henkel)	Teric La8n(Indorama Ventures)
Frag Louisa Hl 17-12909 (Henkel)	Tinopal Cbs X Sds (Basf) (003)
Frag Glamorous Hl 17-12904 (Henkel)	Tinopal Dma-X (Basf)
Frag Frangi Flower Hl 18 12966 (Henkel)	Triethanolamine 99% (Redox)
Flora Bleach Lfa2865 (Ixom)	Trilon B Powder (Basf)
Purple Romance Hl 18-13080 (Henkel)	Urea Prill (Ixom)
Teric 12a4n-Mb (Indorama Ventures)	Vitamin E Acetate (Brenntag)
Garidquat Obau (Albright & Wilson)	Vitrasol N40 (Na-Silic) (Pq Australia)
Bio Spotless 66 Hf (Givaudan)	Peractive Ac White (White Taed) (Zhejiang Jinke)
Thor 57aa Rspo Mb (Iff)	Zeolite (Pq Australia)
Adele 60ba (Rspo)(Mb) (Iff)	Sodium Sulphate Anhydrous (Redox)
Perf Lychee&Lime Blossom 5459(Mb)(Rspo) (Iff)	Liquanase Evity 3.5l (Novozymes)
Perf Frangipani Dreams T15112708 (Takasago)	Boric Acid (Optibor Tg)
Blue Boost Encap-T15045517-S (Takasago)	Intensa Envity 200 T (Novozymes)
Markio Hl 18-12969 (Henkel)	Pelben 35 White N1 (Interchem)

MSDS name	MSDS name
Perfume Oil Prem 18-12963 Be Pure Lfg Hl (Henkel)	Magnesium Sulphate Sds (Redox)
Seascape Mod 4824 (Iff)	Polyquta 550d (Ingredients Plus)
Acticide M20 (Thor)	Lemon Dial 788564 (Symrise)
Perf Black Beauty M2 T15129944 (Takasago)	Xpect 1000 L (Novozymes)
Perf Cold Active 525 F (Givaudan)	Trisodium Phosphate (Tsp) (Redox)
Perf Creamy White Mod 5497 (Iff)	Sunset Yellow C155 1610132 (Range Products)
Perf Fabulous Cov (Symrise)	Dowanol Dpnb (Imcd)
Gardilene Hs73au Pf (Albright & Wilson)	Fragrance Mercury 8366 (Givaudan)
Rebirth Lf (Symrise)	Laneto 50 (Rita)
Perf Ocean Mist (Givaudan)	Nipaguard Dmdmh (Clariant)
Perf Blessing 17 (Givaudan)	Liquitint Patent Blue Blue Mc (Rpl)
Perf Active Fresh 91 (Givaudan)	Glucopure Up Glucotain Plus (Clariant)
Frag Lime Time 0193 (Iff)	Guardmax Dtpmp Na7 (Rpl)
Exodus 275 Dz (Givaudan)	Flosoft Fs 222 (Snf)
Perfume 19-13280 Floral Fever Bloom Tc (Henkel)	Progress Uno 100l (Novozymes)
Parrot 303 (Iff)	Medley Boost 200 T (Novozymes)
Perf 20-13462 Roseclean Couture (Henkel)	Alfresco Nat Be 450 (Iff)
Lavabloom 237761 (Symrise)	Sokalan Pa 30 Cl Granules (Basf)
Frag Ceremonia Plus Hl 20-13481 (Henkel)	Coconut Fatty Acid Palmera B1210 (Albright & Wilson)
Vivaldi Pretec Lfg 17-12637 (Henkel)	Dehyton Pk45 (Mb) (Rspo) (Basf)
Perf Deep Azure T15141281 (Takasago)	Praepagen Tqsv-Ipa Rspo(Clariant)
Perf Blooming Season T15142997 (Takasago)	Gardinol Esb70cp (Albright & Wilson)
Fr Lemon & Spearmint (Sevenscent)	Teric La8n-Mb (Indorama Ventures)
Fr Violet & Wild Blackberry (Sevenscent)	Guardmax Hedp Granule (Rpl)
Blancolia 11383p (Rpl)	Sixin Sx 60t (Rpl)
Mr Lemon (Symrise)	Palmfonate Mes Mb (Rpl)
Coco Milk (Symrise)	Jalcoclean V2 (Novozymes)
Active Citrus (Symrise)	Victoria C9099 (Iff)
Lemony Grass (Symrise)	Intensa Core 200l (Novozymes)
Violet & Lavender (Symrise)	Detersoft White (Alrbight & Wilson)
Sivanase 12 T (Novozymes)	Glucopon 215 Up (Basf)
Amplify 12l (Novozymes)	Xanthan Gum Tnas-Cs (Rpl)
Xpect 1000 T (Novozymes)	Antistatic Pf7 (Imcd)
Carezyme Premium 5000 T (Novozymes)	Sanolin Lave Green G Liq Vp5525 (Clariant)
Sokalan Hp 56 Granula (Basf)	Bitrex (Rpl)
Sokalan Hp 56 Granules Msds	Kayarus Turquoise Blue Gl (Cathay)
Acticide Mbs (Thor)	Sequion Clr (Rpl)
Acusol 445n Polymer Sds (Redox)	Texapon N 25bz (Basf)
Acusol Op305 Opacifier (Redox)	Perf Nd Rose & Rhubarb 11 (Givaudan)
Acusol Op301 (Redox) (3)	Channel 28 6565033-144 (Novozymes)

MSDS name	MSDS name
Aloe Vera Inner Leaf Gel Decolorized 10x (Ingedients Plus)	Lactic Acid 88%(Foodgrade) Class 8-A (Redox)
Aloe Vera Inner Leaf Gel Doeodorised 1x From Concentrate (Ingedients Plus)	Dichloromethane Sds (Honeywell)
Peractive Ac Blue (Blue Taed) (Zhejiang Jinke)	Dichloromethane Sds (Rowe Scientific)
Borax Decahydrate (Redox)	Dichloromethane Sds (Vwr)
Brilliant Blue Fcf Austracert (Cathay)	Sulphuric Acid +51% (Ixom)
Britesil H20 (Interchem)	Blue White Taed Sds (Jinke)
Butyl Glysolv Butyl Icinol (Indorama Ventures)	Butter Natural

APPENDIX F

Negative Pressure Determination

GROSVENOR] **engineering group**
innovative | intelligent | sustainable

Part of Grosvenor Engineering Group: NationWide | KL AIR | Computer Air Services | AIR-RITE

23 February 2022

ESR Australia

Level 29, 20 Bond St,

Sydney NSW 2000

Attention: Mr David Mollerstrom - Project Manager

Dear David,

Re: Jalco – Liquid Storage Area

We wish to advise that the air exchange rate documented on mechanical services drawings is 1.5 air changes per hour and should create a negative pressure with the fans running. The volumetric flowrate to achieve this air change rate is 25,000 l/s that is facilitated by 5 off roof mounted axial fans at 5,000 l/s each. The success in creating this negative pressure is how well the structure is sealed form the wall mounted air openings to the intake of the fans. Each doorway into this area must have seals and where the walls meet the roof sheets must be sealed. If doorways are not maintained closed the pressure difference will equalise and may have leakage. The room volume is large so we expect the pressure difference to be between negative 1 and 3 Pascals.

Please do not hesitate to contact the undersigned on 0411473518 if you have any further queries on the above advice.

Peter Souflias BE(Mechanical) Fellow EA, MAIRAH
Director and National Engineering Manager
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