Appendix H

Air and Odour Impact Assessment

AIR QUALITY AND GREENHOUSE GAS ASSESSMENT
WESTON ALUMINIUM
ADDITIONAL WASTE STREAMS

Weston Aluminium Pty Ltd

20 December 2022

Job Number 21111353

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Air Quality and Greenhouse Gas Assessment Weston Aluminium Additional Waste Streams

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TABLE OF CONTENTS

LIST OF APPENDICES

LIST OF TABLES

1 INTRODUCTION

Todoroski Air Sciences has prepared this report for Weston Aluminium (hereafter referred to as the Proponent). It presents an assessment of the potential air quality impacts and greenhouse gas emissions associated with the proposed additional waste stream processing operations at the Weston Aluminium plant in Kurri Kurri, New South Wales (NSW) (hereafter referred to as the Project).

This air quality and greenhouse gas assessment has been prepared in general accordance with the New South Wales (NSW) Environment Protection Authority (EPA) document *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (**NSW EPA, 2022**).

To assess the potential air quality impacts associated with the Project, this report comprises:

- A background to the Project and description of the proposed site and operations;
- A review of the existing meteorological and air quality environment surrounding the site;
- A description of the dispersion modelling approach and emission estimation used to assess potential air quality impacts;
- Presentation of the predicted results and discussion of the potential air quality impacts and associated mitigation and management measures; and,
- An assessment of the potential greenhouse gas emissions.

2 PROJECT BACKGROUND

2.1 Project setting

The Project site is located at 129 Mitchell Avenue, Kurri Kurri, in the Lower Hunter Valley approximately 31 kilometres (km) northwest of Newcastle and 12km northeast of Cessnock (see **Figure 2-1**). The local land use surrounding the Project is characterised as industrial and bushland with the nearest residential areas located approximately 700 metres (m) to the south.

Figure 2-1 presents the location of the Project and surrounding assessment locations assessed in this report.

Figure 2-2 presents a pseudo three-dimensional visualisation of the topography in the general vicinity of the Project. The Project site can be characterised as relatively flat with undulating hills surrounding the area.

Figure 2-1: Project location

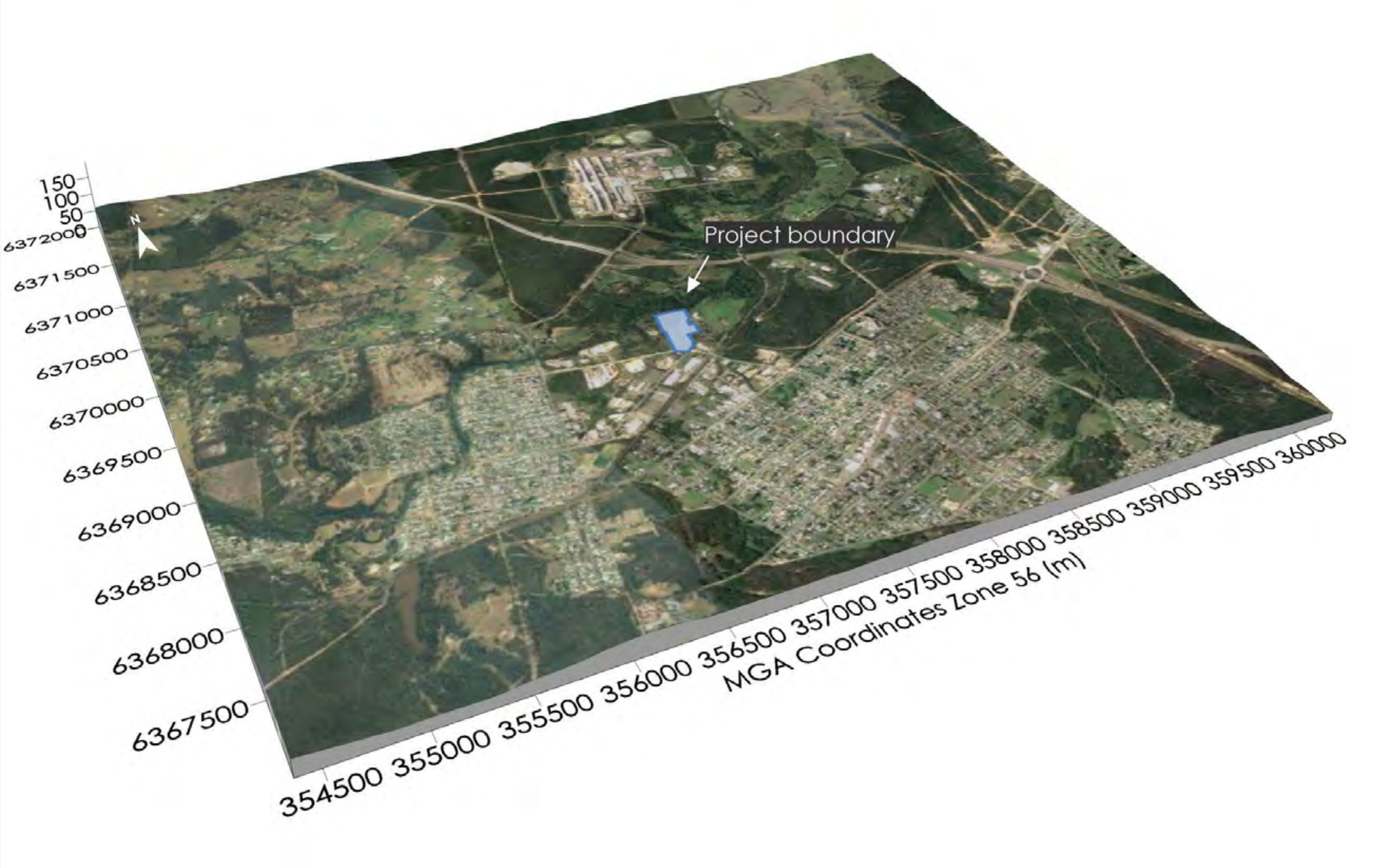

Figure 2-2: Representative view of topography surrounding the Project location

2.2 Project description

2.2.1 Existing operations

Weston Aluminium operates a multi-disciplinary resource recovery and waste management facility in Kurri Kurri NSW. The plant is licenced to process up to 35,000 tonnes per annum (tpa) of scrap metal, accept, store and process up to a combined 40,000tpa of a range of wastes (aluminium dross, spent potlining residues, pharmaceutical wastes and illicit drug wastes) for processing in conventional rotary furnace operations, plus an additional 8,000tpa of medical (clinical, cytotoxic, anatomical, pathogenic, pharmaceutical) and other wastes (solvents and paint, pitch sludge residues, quarantine, oily rags and security document wastes) which may be treated in the thermal processing facility, resulting in a total 48,000tpa of hazardous and non-hazardous waste processed.

2.2.2 Proposed operations

The Project seeks to expand its existing services at the site to receive and store various aqueous and solvent-based liquid wastes, various solid and sludge-based wastes, and other wastes currently approved for thermal treatment at the site, as well as retrofit construction amendments to the existing Aldex building infrastructure. The Project proposes to receive, store, consolidate and process up to 8,750tpa of various wastes within the Aldex Building, however this will be within the existing approved total waste volumes, and thus there will be no increase in the approved waste tonnages for the facility (i.e., 48,000tpa).

To facilitate the storage and treatment of the waste streams, the Project is seeking to repurpose and retrofit the existing Aldex building located within the eastern section of the facility, to receive various waste streams to undergo consolidation and/or limited physio-chemical treatment.

All waste will be delivered to the site via road registered trucks, where it will be unloaded and stored under cover at the designated waste drop off zones and loading bay areas located at the Aldex building. There will be no freestanding or exposed waste stockpiles or waste stores. The Aldex building will be subject to an Emissions Control Unit (ECU), which will provide suitable negative pressure in the building to prevent fugitive emissions. The air will be cleaned by the ECU filtration process.

The materials received will be stored within the Aldex building and will first be consolidated both manually and/or using mechanical aids such as pumps and automated de-packaging technologies including shredders. The waste will then undergo physio-chemical treatments which will involve chemical immobilisation and/or solidification, and chemical neutralisation.

The chemical immobilisation and/or solidification treatment may be used in combination or separately in the treatment process. The waste material is mixed with chemical reagents and/or other suitable solidification mixtures which transforms the waste into a stabilised form suitable for landfill disposal. Wastes would be mixed using either an excavator or front-end loader or using an approved high shear mixing device.

The chemical neutralisation involves treating the waste material to produce an inert solid or liquid by-product, which would either be disposed to trade waste (liquids), transferred off site for disposal (solids), or treated onsite by chemical immobilisation and/or solidification before landfill disposal. A filtration system will be used for the recovered products.

The Project proposes to operate 24 hours a day, 7 days per week.

An indicative site layout is shown in **Figure 2-3**.

Figure 2-3: Indicative site layout

3 STUDY REQUIREMENTS

The purpose of this report is to provide an assessment of the likely effects on air quality which may arise from the Project. The assessment presented in this report addresses planning and regulatory agency requirements, as set out below.

3.1 Secretary's Environmental Assessment Requirements

In preparing this Air Quality and Greenhouse Gas Impact Assessment, the Secretary's Environmental Assessment Requirements (SEARs) issued for the Project in October 2021 have been addressed and the key matters raised for consideration in the Air Quality and Greenhouse Gas Impact Assessment are outlined in **Table 3-1** along with a reference to where the requirements are addressed in the report.

Table 3-1: Secretary's Environmental Assessment Requirements (SEAR Number SSD-24668706)

Aspect	Requirement	Section
Air Quality and Odour	A quantitative assessment of the potential air quality, dust and odour impacts of the development (construction and operation) on surrounding landowners, businesses and sensitive receptors, in accordance with relevant Environment Protection Authority guidelines, including: - the quantities and physio-chemical parameters of materials to be used transported, produced or stored. - an outline of procedures for handling, transport, production and storage - the management of solid, liquid and gaseous waste streams with potential to generate emissions to air. - details of buildings and air handling systems and strong justification for any material handling, processing or stockpiling external to buildings - details of proposed mitigation, management and monitoring measures.	2.2, 6.3, 8, 9.5
Greenhouse Gas Emissions and Energy Efficiency	Including an assessment of the energy use of the proposal and all reasonable and feasible measures that would be implemented on site to minimise the proposal's greenhouse gas emissions (reflecting the Government's goal of net zero emissions by 2050).	9

4 AIR QUALITY CRITERIA

Air quality criteria are benchmarks set to protect the general health and amenity of the community in relation to air quality.

Table 3-1 summarises the air quality goals that are relevant to this study as outlined in the NSW EPA document *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (**NSW EPA, 2022**).

Table 4-1: Air quality impact assessment criteria adopted for the Project

Pollutant	Averaging period	Concentration (µg/m³)	Assessment location
Total Suspended Particulate matter (TSP)	Annual	90	Receptor
Particulate matter ≤10µm (PM_{10})	Annual	25	Receptor
	24-hour	50	Receptor
Particulate matter ≤2.5µm (PM_{25})	Annual	8	Receptor
	24-hour	25	Receptor
Sulfur dioxide (SO_2)	24-hour	57	Receptor
	1-hour	286	Receptor
Nitrogen dioxide (NO_2)	Annual	31	Receptor
	1-hour	164	Receptor
Carbon monoxide (CO)	8-hour	10,000	Receptor
	1-hour	30,000	Receptor
Hydrogen fluoride (HF)	24-hour	1.5	Receptor
	7-day	0.8	Receptor
	30-day	0.4	Receptor
	90-day	0.25	Receptor
Lead (Pb)	Annual	0.5	Receptor
Sulfuric acid (H_2SO_4)	1-hour	0.018	Boundary
Hydrogen Chloride (HCl)	1-hour	0.14	Boundary
Ammonia (NH_3)	1-hour	330	Boundary
Antimony (Sb)	1-hour	9	Boundary
Arsenic (As)	1-hour	0.09	Boundary
Barium (Ba)	1-hour	9	Boundary
Beryllium (Be)	1-hour	0.004	Boundary
Boron (B) *	1-hour	50	Boundary
Cadmium (Cd)	1-hour	0.018	Boundary
Chromium (Cr) (VI compounds)	1-hour	0.09	Boundary
Chlorine (Cl)	1-hour	50	Boundary
Cobalt (Co) *	1-hour	0.2	Boundary
Copper (Cu)	1-hour	18	Boundary
Manganese (Mn)	1-hour	18	Boundary
Nickel (Ni)	1-hour	0.18	Boundary
Mercury (Hg)	1-hour	1.8	Boundary
Selenium (Se) *	1-hour	2	Boundary
Thallium (Tl) *	1-hour	1	Boundary
Tin (Sn) *	1-hour	1	Boundary
Vanadium (V) *	1-hour	2	Boundary
Dioxin and Furans	1-hour	2×10^{-6}	Boundary
Cyanide (CN)	1-hour	90	Boundary
PAHs (as benzo[a]pyrene)	1-hour	0.4	Boundary

Pollutant	Averaging period	Concentration (µg/m³)	Assessment location
TVOCs (as benzene)	1-hour	29	Boundary
Zinc (Zn)	1-hour	90	Boundary

Source: **NSW EPA, 2022**

* TCEQ (2016)

5 EXISTING ENVIRONMENT

This section describes the existing environment including the climate and ambient air quality in the area surrounding the Project.

5.1 Local climatic conditions

Long-term climatic data from the Bureau of Meteorology (BoM) weather station at Cessnock Airport Automatic Weather Station (AWS) (Site No. 061260) were used to characterise the local climate in the proximity of the Project. The Cessnock Airport AWS is located approximately 13km west-northwest of the Project.

Table 5-1 and **Figure 5-1** present a summary of data from the Cessnock Airport weather station collected over a 13 to 31-year period for the various meteorological parameters.

The data indicate that January is the hottest month with a mean maximum temperature of 30.4 degrees Celsius (°C) and July as the coldest month with a mean minimum temperature of 4.1°C.

Rainfall peaks during the warmer months and declines during cooler months. The data indicate that February is the wettest month with an average rainfall of 101.6 millimetres (mm) over 8.2 days and July is the driest month with an average rainfall of 28.8mm over 4.1 days. Average annual rainfall for the station is 738.4 mm occurring over an average of 74.6 days.

Humidity levels exhibit variability and seasonal flux across the year. Mean 9am humidity levels range from 60 per cent (%) in October to 80% in March and June. Mean 3pm humidity levels range from 42% in August and September to 55% in June.

Wind speeds during the warmer months tend to have a slightly greater spread between the 9am and 3pm conditions compared to the colder months. Mean 9am wind speeds range from 8.7 kilometres per hour (km/h) in March to 14.0km/h in September. Mean 3pm wind speeds range from 14.2km/h in May to 19.1km/h in September.

Table 5-1: Monthly climate statistics summary – Cessnock Airport AWS

Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann.
Temperature													
Mean max. temp. (°C)	30.4	29.2	27.2	24.3	20.8	17.9	17.6	19.5	22.7	25.4	27.0	29.1	24.3
Mean min. temp. (°C)	17.1	16.9	14.9	10.7	7.5	5.8	4.1	4.5	7.1	9.9	13.1	15.2	10.6
Rainfall													
Rainfall (mm)	75.5	101.6	88.5	54.1	38.3	56.5	28.8	34.0	43.0	54.6	76.6	80.0	738.4
No. of rain days (≥1mm)	6.5	8.2	8.1	5.7	5.2	5.8	4.1	4.4	5.5	6.5	7.2	7.4	74.6
9am conditions													
Mean temp. (°C)	23.2	22.2	20.2	17.8	14.1	11.0	10.1	12.2	16.2	19.1	20.2	22.2	17.4
Mean R.H. (%)	68.0	76.0	80.0	76.0	79.0	80.0	76.0	69.0	63.0	60.0	65.0	65.0	71.0
Mean W.S. (km/h)	11.5	10.2	8.7	10.1	10.4	11.5	11.5	13.0	14.0	13.7	12.7	11.8	11.6
3pm conditions													
Mean temp. (°C)	28.7	27.3	25.7	23.0	19.6	16.8	16.4	18.6	21.2	23.4	25.0	27.3	22.8
Mean R.H. (%)	46.0	53.0	53.0	52.0	54.0	55.0	49.0	42.0	42.0	44.0	47.0	46.0	49.0
Mean W.S. (km/h)	18.5	17.3	15.7	14.6	14.2	15.1	15.3	17.3	19.1	18.7	18.6	18.3	16.9

Source: **Bureau of Meteorology, 2022**

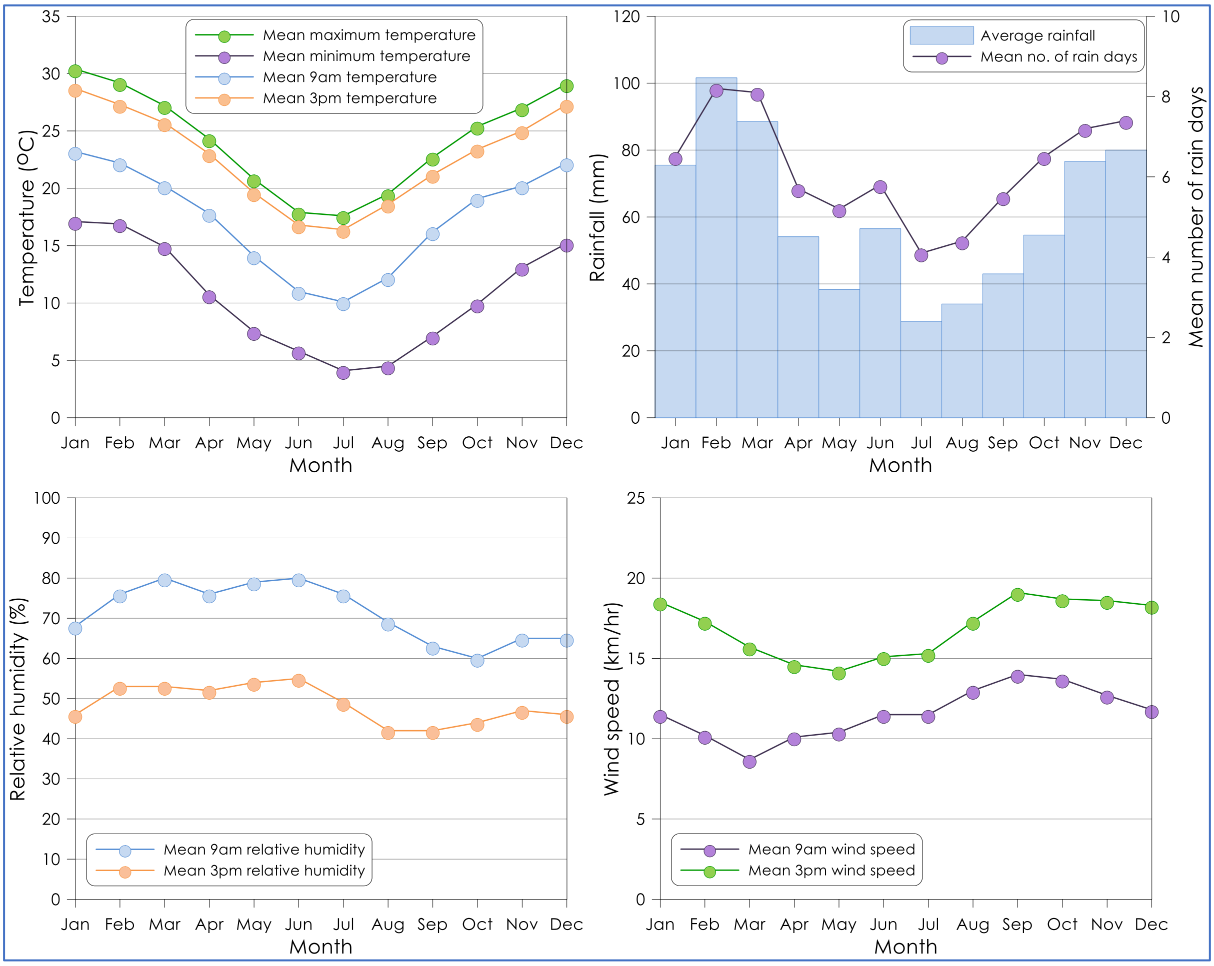

Figure 5-1: Monthly climate statistics summary – Cessnock Airport AWS

5.2 Local meteorological conditions

The Cessnock Airport AWS has been used to represent local meteorological conditions that would be experienced at the Project site. Annual and seasonal windroses prepared from data collected from the 2020 calendar year are presented in **Figure 5-2**.

The 2020 calendar year was selected as the meteorological year for the dispersion modelling based on analysis of long-term data trends in meteorological data recorded for the area as outlined in **Appendix A**.

Analysis of the windroses shows that the wind directions are generally evenly distributed on an annual basis with winds greatest from the northwest and north-northwest. During summer, winds from the south to east-southeast are most frequent. Autumn windrose shows a similar distribution pattern as the annual windrose with winds greatest from the north-northwest. During winter, winds from the northwest and north-northwest are most frequent. During spring, winds are predominately from the north-northwest, southwest and south-southwest.

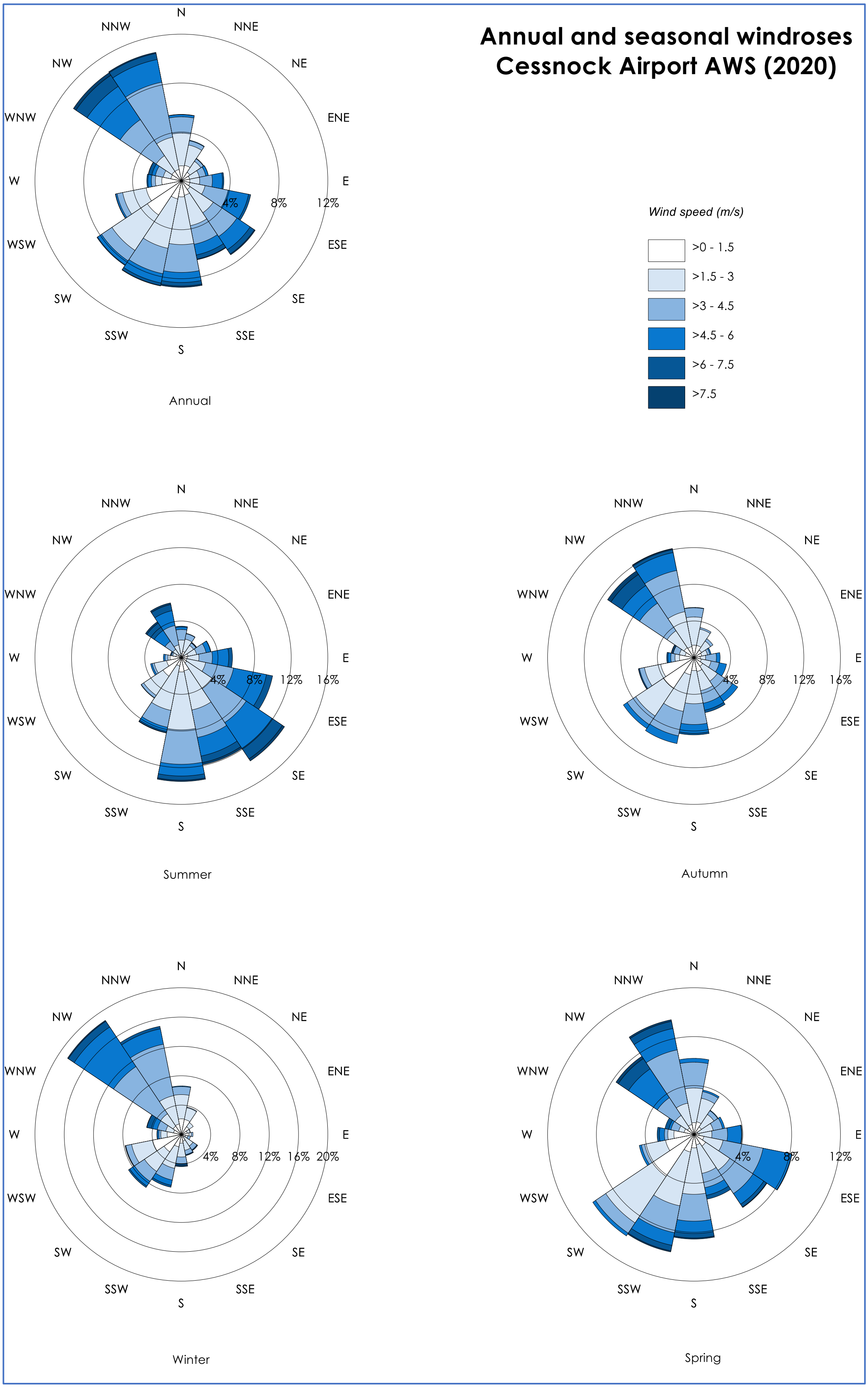

Figure 5-2: Annual and seasonal windroses for Cessnock Airport AWS (2020)

5.3 Local air quality

The main sources of air pollutants in the area surrounding the Project include emissions from other industries within the local industrial area, local anthropogenic activities (such as motor vehicle exhaust and domestic wood heaters) and commercial activities.

Available data from the nearest air quality monitors operated by the NSW Department of Planning and Environment (DPE) were used to quantify the existing background level for PM_{10}, $PM_{2.5}$, SO_2 and NO_2 pollutants at the Project site. These monitors are located at Beresfield (approximately 17.4km east of the Project), and Wallsend (approximately 20.7km southeast of the Project).

5.3.1 PM_{10} monitoring

A summary of the available PM_{10} monitoring data from 2017 to 2021 from the NSW DPE monitoring stations is presented in **Table 5-2**. Recorded 24-hour average PM_{10} concentrations are presented in **Figure 5-3**. A seasonal trend can be seen in the PM_{10} monitoring data at all monitoring stations with elevated levels occurring in the warmer months.

A review of **Table 5-2** indicates that the annual average PM_{10} concentrations recorded at Beresfield was above the criterion of 25µg/m^3 in 2019. No annual exceedances were recorded at the Wallsend site.

The maximum 24-hour average PM_{10} concentrations were found to exceed the relevant criterion of 50µg/m^3 at both stations during 2018, 2019 and 2020.

Anomalously high PM_{10} concentrations recorded at each monitor in November 2018 are attributed to regional dust storm events (**NSW DPIE 2020a**). The high PM_{10} concentrations recorded in December 2019 and January 2020 are attributed to wildfires and the drought period (**NSW DPIE 2019 & NSW DPIE 2020b**).

Table 5-2: Summary of PM_{10} levels from monitoring stations (µg/m^3)

Year	Annual average		Criterion
	Beresfield	Wallsend	
2017	19.6	17.4	**25**
2018	21.6	19.4	**25**
2019	**25.9**	22.8	**25**
2020	18.5	17.7	**25**
2021	15.9	14.7	**25**
Year	**Maximum 24-hour average**		**Criterion**
2017	49.4	47.9	**50**
2018	**149.1**	**136.5**	**50**
2019	**136.7**	**127.9**	**50**
2020	**77.7**	**77.9**	**50**
2021	36.3	33	**50**

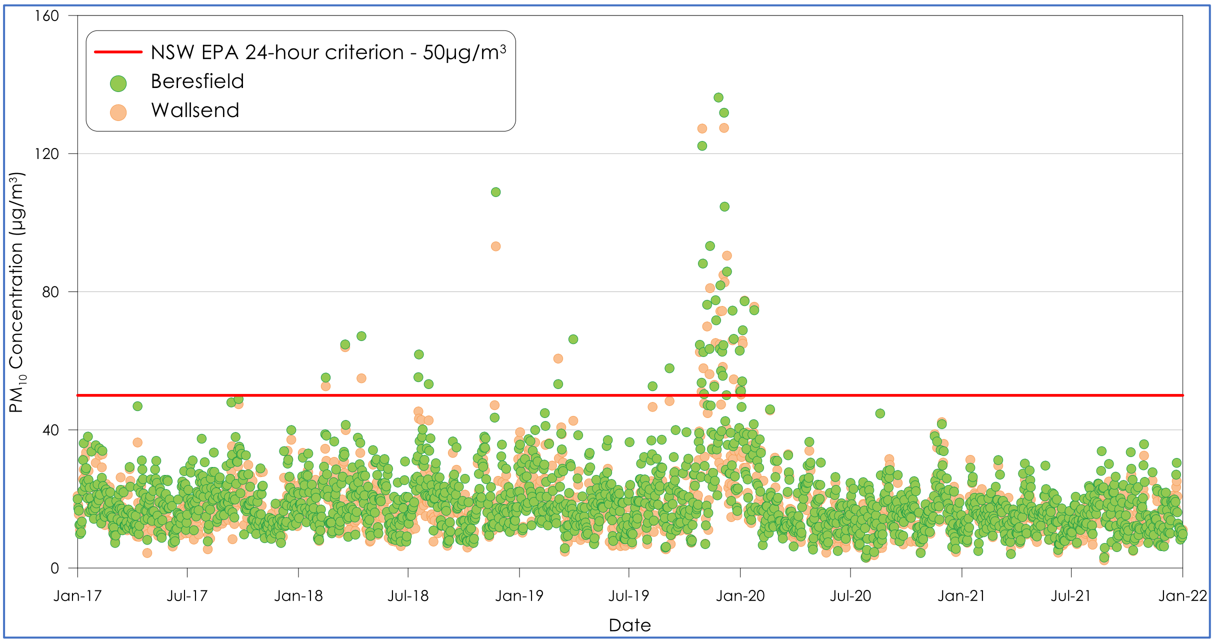

Figure 5-3: 24-hour average PM_{10} concentrations

5.3.2 $PM_{2.5}$ monitoring

A summary of the available $PM_{2.5}$ monitoring data for the 2017 to 2021 for the NSW DPE monitoring stations is presented in **Table 5-3**. Recorded 24-hour average $PM_{2.5}$ concentrations are presented in **Figure 5-4**.

Table 5-3 indicates that the annual average $PM_{2.5}$ concentrations for the Beresfield monitoring station was above the relevant criterion of 8µg/m³ in 2018 and 2019, and the Wallsend monitor was above the criterion in 2019.

The maximum 24-hour concentrations were above the criterion of 25µg/m³ at both monitors during 2019 and 2020. Similar to the PM_{10} monitoring data, the mass bushfires affecting NSW in 2019 and 2020 are seen in the $PM_{2.5}$ monitoring data.

Table 5-3: Summary of $PM_{2.5}$ levels from monitoring stations (µg/m³)

Year	Annual average		Criterion
	Beresfield	Wallsend	
2017	7.6	7.3	**25**
2018	**8.7**	7.5	**25**
2019	**12.1**	**10.4**	**25**
2020	7.7	7.3	**25**
2021	5.9	6.1	**25**
Year	**Maximum 24-hour average**		**Criterion**
2017	18.7	20.4	**50**
2018	24.9	20.2	**50**
2019	**100.5**	**108.3**	**50**
2020	**49.7**	**56.8**	**50**
2021	18.9	21.4	**50**

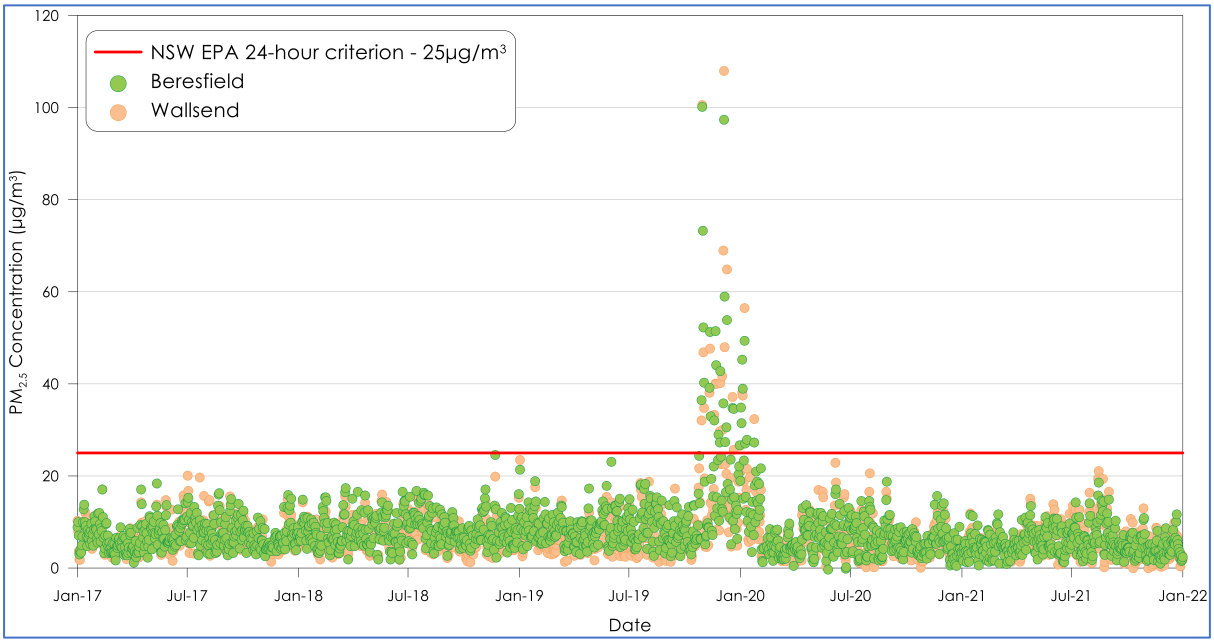

Figure 5-4: 24-hour average $PM_{2.5}$ concentrations

5.3.3 NO_2 monitoring

Figure 5-5 presents the daily maximum 1-hour average NO_2 monitoring data from the nearest NSW DPE monitoring sites. The data show that the levels were well below the relevant criterion of 164µg/m³. A seasonal trend can been seen in the data with higher concentrations in the cooler months.

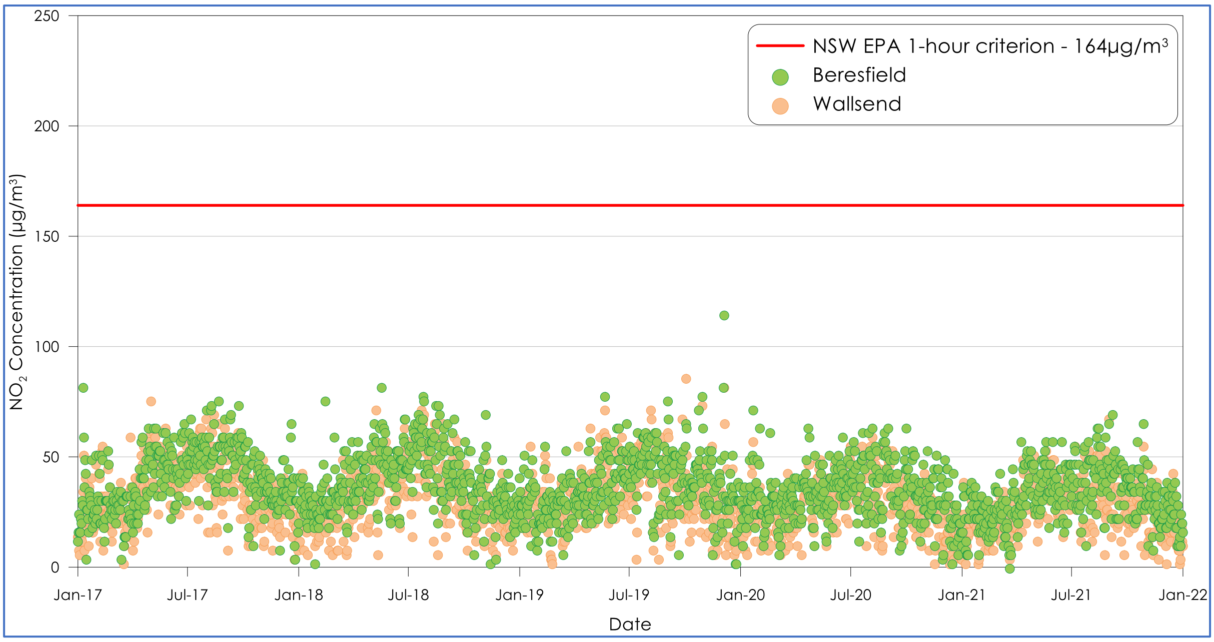

Figure 5-5: Daily maximum 1-hour average NO_2 concentrations

5.3.4 SO_2 monitoring

Figure 5-6 presents the daily maximum 1-hour average SO_2 monitoring data from the nearest NSW DPE monitoring sites. The data show that the levels were well below the 1-hour average SO_2 criteria of 286µg/m^3.

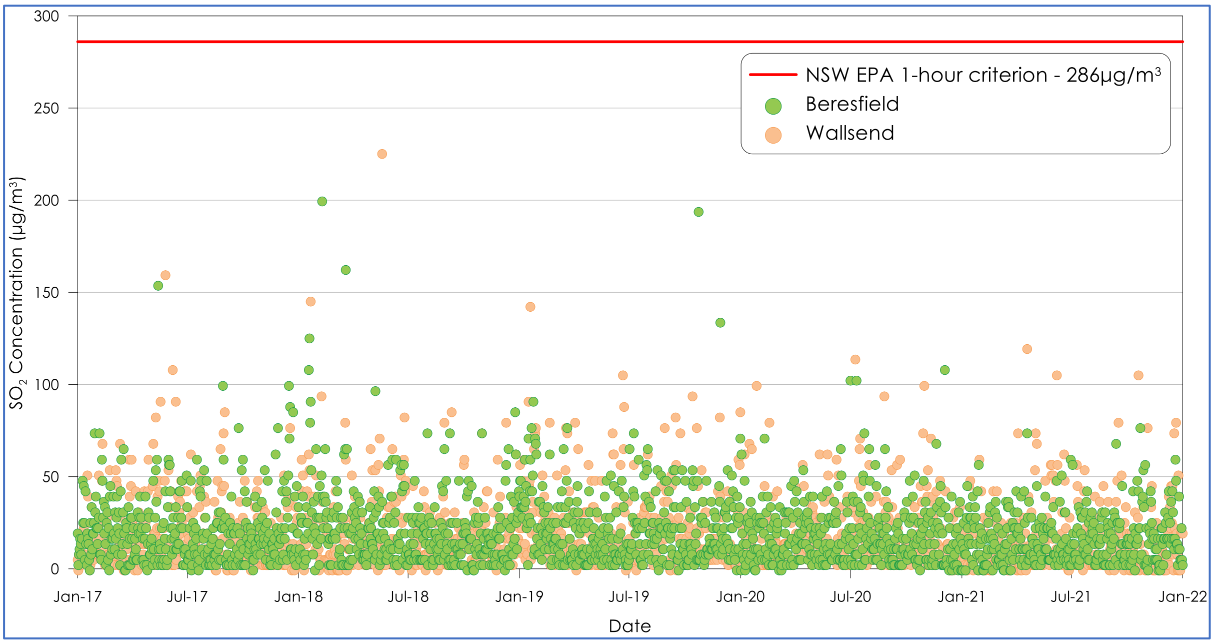

Figure 5-6: Daily maximum 1-hour average SO_2 concentrations

5.3.5 CO monitoring

Background levels of CO are not recorded at the Beresfield monitoring station, therefore measurements from the nearest station that records CO levels have been sourced from Newcastle.

Figure 5-7 presents the available daily maximum rolling 8-hour average CO monitoring data from the Newcastle monitor. The monitoring data recorded are well below the relevant criterion of 10,000µg/m^3.

A seasonal trend can be seen in the CO monitoring data with elevated levels occurring in the cooler months compared to the warmer months. This seasonal trend is likely to be due to combustion sources such as residential wood heater emissions in the wintertime. The 2019/2020 bushfires can be seen affecting the monitoring data.

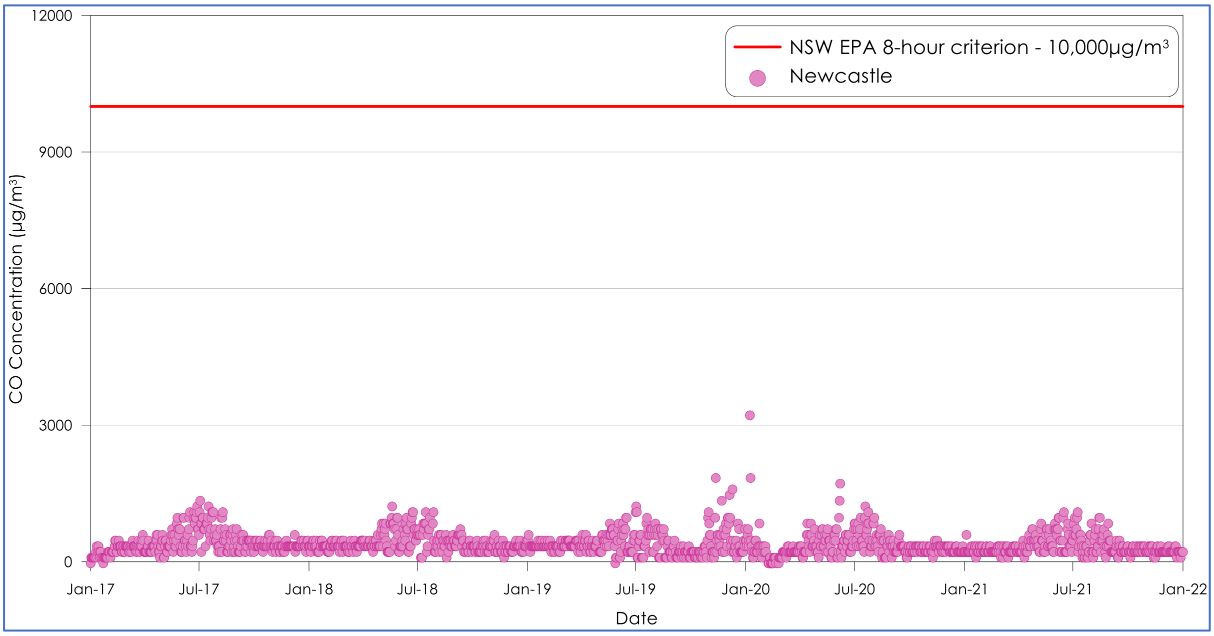

Figure 5-7: Rolling 8-hour average CO concentrations

5.3.6 Summary of background pollutant concentrations

Table 5-4 presents a summary of the background pollutant concentrations applied in this assessment. The measured annual average pollutant concentrations from the closest DPE monitor located at Beresfield for the modelled year of 2020 were used for the annual average background levels in the assessment.

It is noted that the maximum measured 24-hour average $PM_{2.5}$ and PM_{10} levels exceeded the relevant criterion during 2020 (refer to **Figure 5-3** and **Figure 5-4**) and as such applying these values to the assessment for background would show an exceedance. For the purposes of this assessment, we have applied the maximum measured 24-hour average $PM_{2.5}$ and PM_{10} levels below the relevant criterion as representative of background levels.

In the absence of available data, estimates of the annual average background TSP concentrations can be determined from a relationship between PM_{10} and TSP concentrations and the measured PM_{10} levels. This relationship assumes that an annual average PM_{10} concentration of 25µg/m^3 corresponds to a TSP concentration of 90µg/m^3 based on the NSW EPA air quality impact criteria. Applying this relationship with the measured annual average PM_{10} concentration of 18.5µg/m^3 indicates an approximate annual average TSP concentration of 66.6µg/m^3.

Background measurements of CO is not recorded at the Beresfield monitoring station and the nearest station that records CO is located in Newcastle. The maximum measured 8-hour average CO level during 2020 at the Newcastle monitor has been applied for this assessment.

Table 5-4: Background pollutant concentrations

Pollutant	Background level	Units
Annual average TSP	66.6	µg/m^3
24-hour average PM_{10}	47.1	µg/m^3
Annual average PM_{10}	18.5	µg/m^3

Pollutant	Background level	Units
24-hour average $PM_{2.5}$	23.7	µg/m^3
Annual average $PM_{2.5}$	7.7	µg/m^3
Annual average deposited dust	3.0	g/m^2/month
Annual average NO_2	14.4	µg/m^3
Maximum 1-hour average NO_2	71.8	µg/m^3
Maximum 1-hour average SO_2	108.7	µg/m^3
Maximum 24-hour average SO_2	22.9	µg/m^3
Maximum 1-hour average CO	4,000	µg/m^3
Maximum 8-hour average CO	3,250	µg/m^3

6 DISPERSION MODELLING APPROACH

6.1 Introduction

The following sections are included to provide the reader with an understanding of the model and the modelling approach applied for the assessment.

An air dispersion model is a complex simulation of how the prevailing weather conditions affect the way air pollutants travel and disperse in the atmosphere away from the Project. Such models are used to predict the potential air quality impacts of the Project on the surrounding environment.

For this assessment, the CALPUFF modelling suite is applied to dispersion modelling. The model was setup in accordance with the NSW EPA documents *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (**NSW EPA, 2022**) and *Generic Guidance and Optimum Model Settings for the CALPUFF Modeling System for Inclusion into the 'Approved Methods for the Modeling and Assessments of Air Pollutants in NSW, Australia'* (**TRC Environmental Corporation**, **2011**).

6.2 Modelling methodology

6.2.1 Meteorological modelling

The meteorological modelling methodology applied a 'hybrid' approach which includes a combination of prognostic model data from The Air Pollution Model (TAPM) with surface observations in the CALMET model.

The centre of analysis for TAPM was 32deg48min south and 151deg28min east. The simulation involved an outer grid of 30km, with three nested grids of 10km, 3km and 1km with 35 vertical grid levels.

The 2020 calendar year was selected as the period for modelling the Project. This period was selected based on a review of the long-term meteorological and ambient air quality conditions representative of the prevailing conditions as outlined in **Appendix A**. Accordingly, the available meteorological data for January 2020 to December 2020 from the BoM Cessnock Airport AWS monitoring site were included in the simulation.

The outputs of the CALMET modelling are evaluated using visual analysis of the wind fields and extracted data.

Figure 6-1 presents a visualisation of the wind field generated by CALMET for a single hour of the modelling period. The wind fields are seen to follow the terrain well and indicate the simulation produces realistic fine scale flow fields (such as terrain forced flows) in surrounding areas.

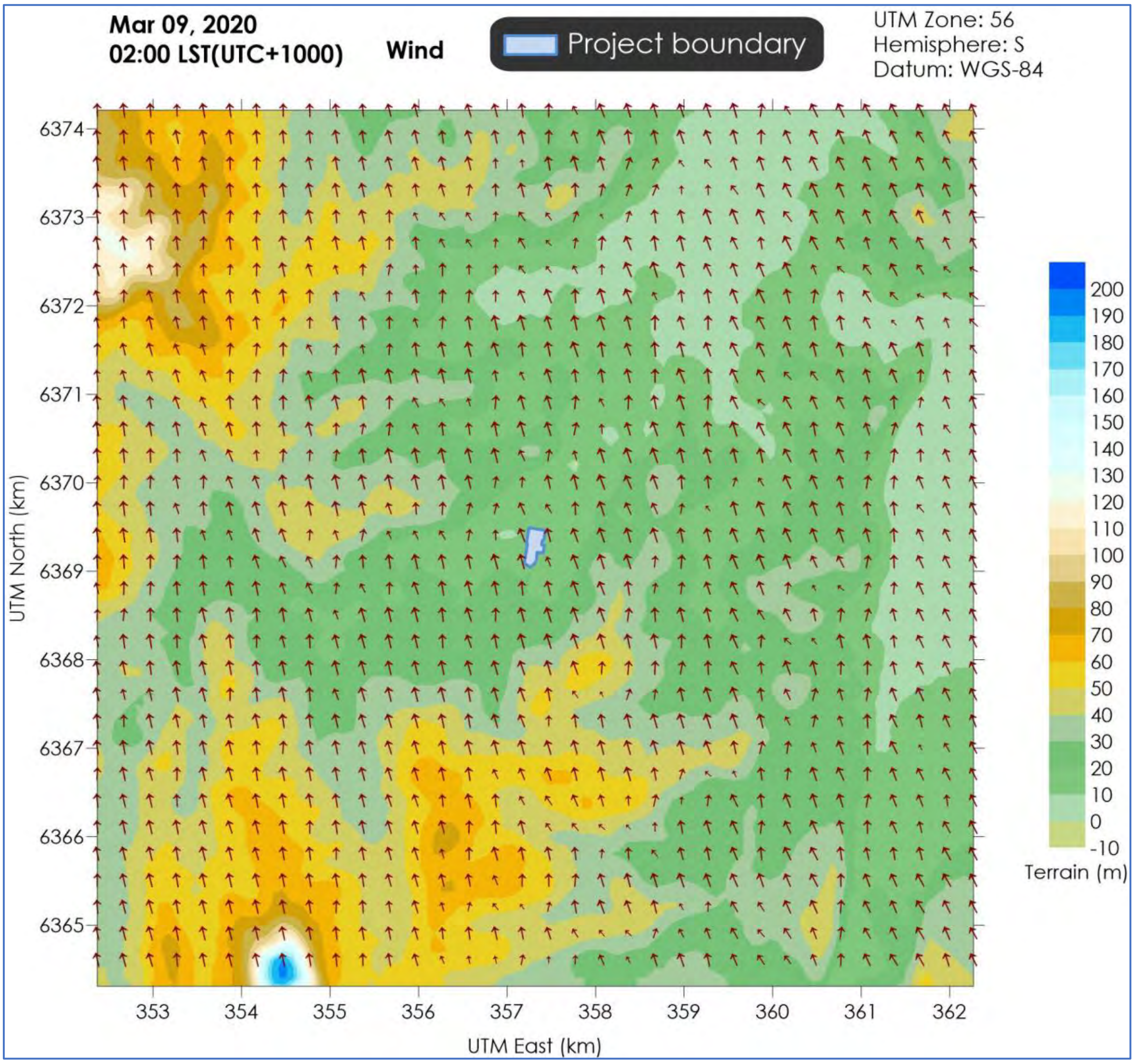

Figure 6-1: Example of the wind field for one of the 8,760 hours of the year that are modelled

CALMET generated meteorological data were extracted from a point within the CALMET domain and are represented in **Figure 6-2** and **Figure 6-3**.

Figure 6-2 presents the annual and seasonal windroses from the CALMET data. The CALMET modelling results reflect the expected wind distribution patterns of the area based on consideration of the measured data and the expected terrain effects on the prevailing winds. **Figure 6-3** includes graphs of the temperature, wind speed, mixing height and stability classification over the modelling period and is consistent with the conditions expected to occur in the area.

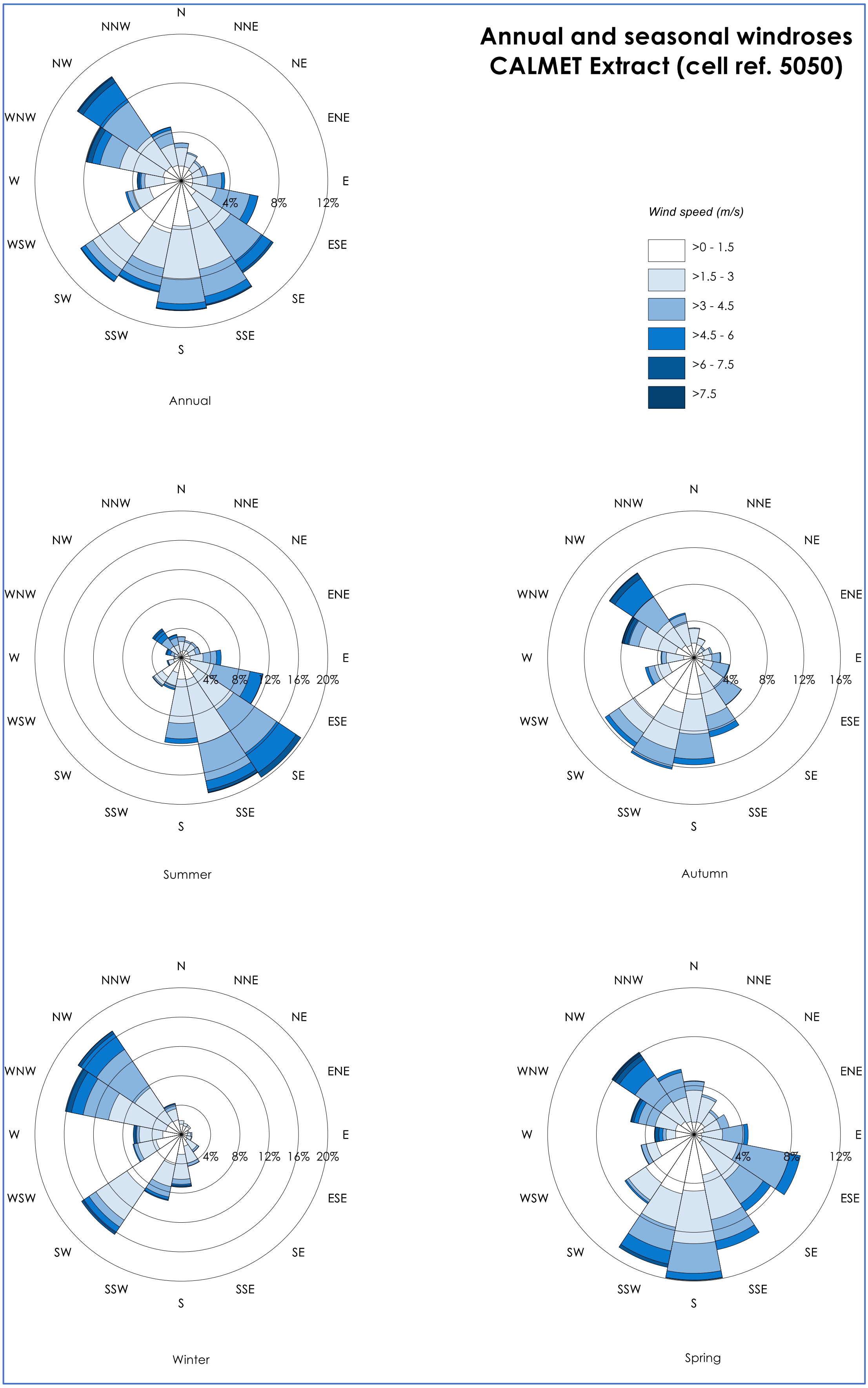

Figure 6-2: Windroses from CALMET extract (cell ref 5050)

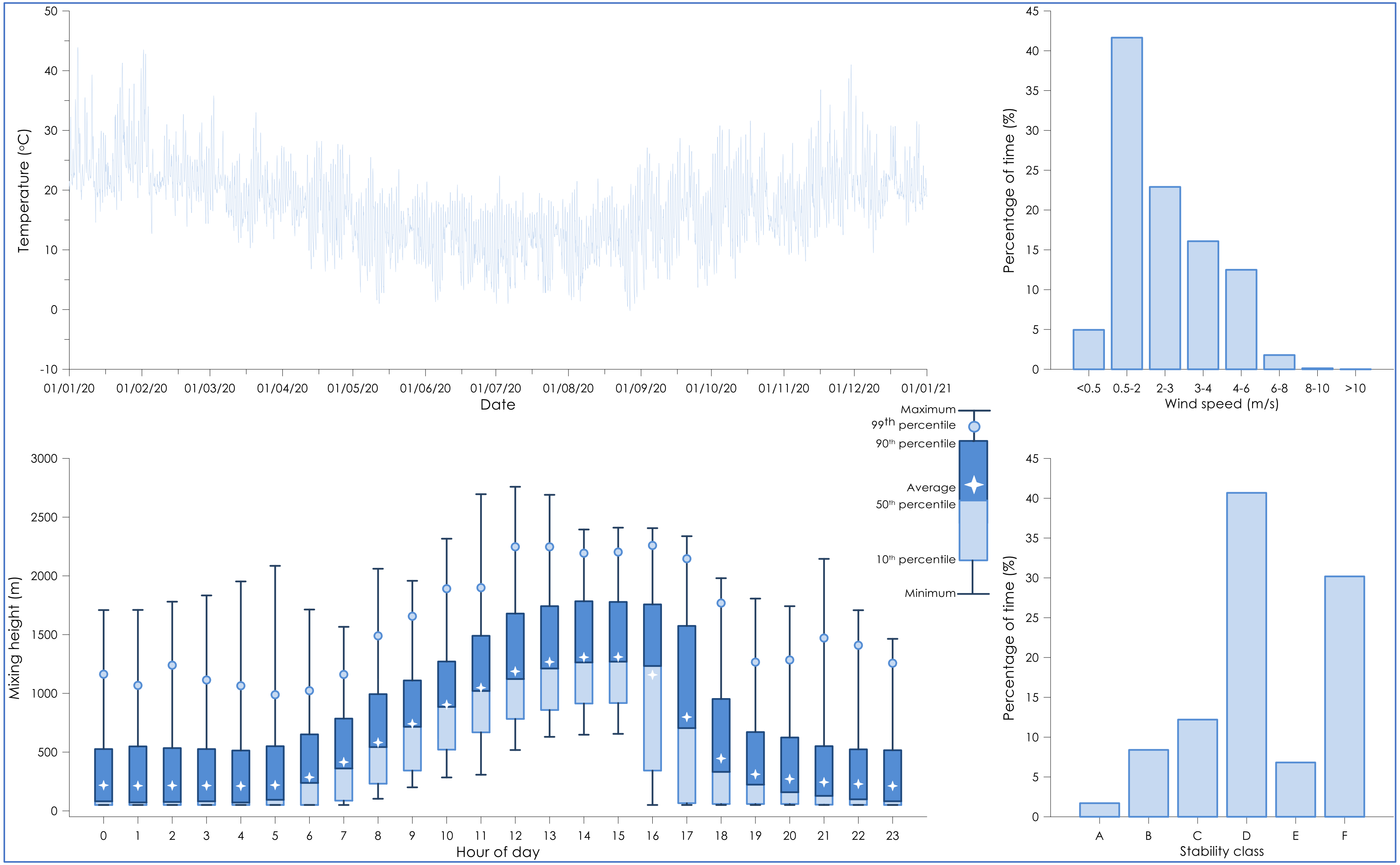

Figure 6-3: Meteorological analysis of CALMET extract (cell ref 5050)

6.3 Dispersion modelling

The CALPUFF dispersion model, in conjunction with a CALMET generated meteorological data file, was applied to provide predictions of the ground level concentrations of potential pollutant concentrations associated with the operation of the Project.

Emissions from the stack exhausts have been modelled as a point source with parameters outlined in the following section.

6.3.1 Construction emissions

The establishment of the Project would involve retrofitting of the associated infrastructure (awning extension to the north and possible minor extension of the south eastern building portion) and installation of new internal equipment. This construction activity has the potential to generate some dust emissions.

Potential construction dust emissions will be primarily generated due to material handling, vehicle movements, windblown dust generated from exposed areas and stockpiles. Exhaust emissions will be from the operation of construction vehicles and plant.

The potential dust impacts due to these activities are difficult to accurately quantify on any given day due to the short sporadic periods of dust generating activity which may occur over the construction time frame. The sources of dust are temporary in nature and will only occur during the construction period.

The total amount of dust generated from the construction process is unlikely to be significant given the nature of the activities. Additionally, the potential dust emissions generated by the construction activities would typically be less than the emissions potentially produced during the operational stages of the Project. Also, as the activities would occur for a limited period, no significant or prolonged effect at any off-site receptor is predicted to arise.

The Project would implement various dust mitigation and management measures to ensure that emissions are reduced as reasonably possible. A list of the control measures are outlined in **Table 6-1**.

Table 6-1: Summary of potential mitigation measures during construction phase

Activity	Mitigation measure
Communications	Display site contact details for enquiries and complaints-handling. There details are already provided through signage at the premises entry, and on the Company website. The Environment and Sustainability Manager is responsible for site environmental communications and complaints management.
	Display the head or regional office contact information.
Dust management	Develop and implement a Construction Dust Management Plan (DMP) which will include, but are not limited to, measures to prevent dust from affecting the amenity of the surrounding area, all materials to be stored or stockpiles at suitable locations and stockpile size height managed, and regular cleaning of haul roads.
Site Management	Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.
	Make the complaints log available to the local authority when asked.

Activity	Mitigation measure
	Record any exceptional incidents that cause dust and/or air emissions, either on- or off-site, and the action taken to resolve the situation in the log book.
Monitoring	Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, and make the log available to the local authority when asked. Weekly inspection of equipment and recording results.
	Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked
	Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
Site layout	Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.
	Fully enclose specific operations through solid screens, tarps or barriers where there is a high potential for dust production and the site is active for an extensive period.
	Avoid site runoff of water or mud.
	Keep site fencing, barriers and scaffolding clean using wet methods.
	Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on-site. If they are being re-used on-site cover as described below.
	Cover, seed or fence stockpiles to prevent wind whipping.
Operating vehicle/machinery and sustainable travel	Ensure all vehicles switch off engines when stationary - no idling vehicles.
	Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable.
	Impose and signpost a maximum-speed-limit of 25km/h on surfaced and 15km/h on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).
Operations	Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.
	Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
	Use enclosed chutes and conveyors and covered skips.
	Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
	Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.
Waste management	Dispose of waste to an approved waste management facility.

6.3.2 Odour emissions

Odour emissions have the potential to be generated from the processing of waste materials at the Project. Generally, such odours would be present in the form of VOC's emitted from the activity. The VOC emissions from the activities proposed have been conservatively calculated and are low, indicating only a low potential for odorous emissions to be generated. The Aldex building is equipped with an ECU and under negative pressure to prevent the release of fugitive emissions. Thus, any potential emissions generated would also be well dispersed via a stack. This can be seen in the modelling results of total VOC's, which even when assuming all of the emissions are comprised of Benzene, indicate ground level concentrations well below the applicable criteria. Any individual odours emissions that are part of the total VOC would be even lower.

Overall, due to the low potential emission rate and good dispersion, odour emissions have not been considered further in this assessment.

6.3.3 Estimated emissions

The Project operates six stacks which service different parts of the facility, as outlined below:

- Stack 1 – A wet-dry lime scrubber fabric filter baghouse which services the Rotary Furnace and Reverberatory Furnace (on a non-concurrent basis);
- Stack 2 – A cold-air fabric filter which formerly serviced material storage bays (recently deleted, though retained on WA's Environment Protection Licence for possible future construction and operation; hence model inclusion);
- Stack 4 – A cold-air fabric filter which services the Metal Reclaiming Machine, Cooler and Screens;
- Stack 5 – A dry lime and activated carbon scrubber fabric filter which services the Thermal Waste Treatment Plant;
- Stack 6 – Vents clean combustion air emissions from the holding side of the Reverberatory Furnace to the atmosphere; and,
- Stack 7 – A cold air fabric filter baghouse that services the Aldex building.

It is to be noted that the site originally operated seven stacks, however during the fire in 2021, Stack 3 was damaged and will not be replaced. As a result, Stack 3 has been excluded in the modelling.

Exhaust emissions for Stack 4 were recalculated based on the maximum stack concentrations presented in the *Air Quality Impact Assessment Weston Aluminium Modification* (**TAS, 2020**) and the flow parameters presented in **Table 6-2**.

The emissions for Stack 5 have been modelled as per the *Environmental Assessment Modification – Pharmaceutical & Illicit Drug Waste Air Quality Impact Assessment* (**AECOM, 2017**). Emissions for Stack 1, 2, 6, and 7, were modelled based on the maximum stack concentrations as measured at the site from 2016 to 2019 as outlined in Table 5-2 in the *Air Quality Impact Assessment Weston Aluminium Modification* (**TAS, 2021**).

The Project entails processing liquid and solid wastes in the Aldex Building, where emissions generated from the physio-chemical treatments would be ventilated via Stack 7. The treatment processes involve incorporating a reagent (such as cement) in the mixture to either neutralise or immobilise the waste to procure a solid or liquid waste product for disposal. These treatment methods may result in the generation of a small amount of dust inside the building, potentially containing traces of other pollutants.

Emissions generated from the Project have been modelled based on the maximum tonnage of each waste material proposed to be processed at the site relative to the proposed total waste tonnage (that is, 8,750tpa). Whilst some of the proposed inputs are liquid and thus do not generate dust, some dust may be generated from the handling of bulk wastes and through the addition of materials during treatment operations (e.g. cement). As a conservative measure, the calculations for emissions for each pollutant emitted from Stack 7 were based on the assumption that all of the material is a solid (e.g. soil and aggregates) using the material handling emission factor equation sourced from the United States (US) EPA AP42 Emission Factors (**US EPA, 1985 and Updates**); per the following equation:

Equation 1:

$$EF_{TSP} = 0.74 \times 0.0016 \times \left(\frac{U}{2.2}^{1.3} \Big/ \frac{M}{2}^{1.4}\right) kg/tonne$$

where:

EF_{TSP} = Emission factor for TSP;

U = Wind speed (m/s); and,

A = Moisture content (%)

The handling occurs indoors thus the wind speed and moisture content parameters were assigned as 0.6m/s and 2.54%, respectively from Table 89 in the *NSW Coal Mining Benchmarking Study: International Best Practice Measures to Prevent and/or Minimise Emissions of Particulate Matter from Coal Mining* (**Katestone, 2010**). A control efficiency of 85% has been applied for the material handling to reflect that the waste is in liquid form and has a low propensity for dust emission. Also, the waste would be loaded into the mixer at a height of up to 1.5m. These calculated emissions have been added to the existing concentrations for Stack 7.

The stack parameters are summarised in **Table 6-2**.

Table 6-2: Modelled stack parameters

Stack	Parameter							
	Easting (m)	Northing (m)	Stack height (m)	Stack diameter (m)	Temp. (ºC)	Exit velocity (m/sec)	Flow rate (Am3/s)	Flow rate (Nm3/s)
Stack 1(2)	357263	6369323	30	1.5	66.7	18.0	31.8	25.6
Stack 2(2)	357308	6369263	15	1.3	30.9	12.7	16.1	14.5
Stack 4(3)	357313	6369290	15	1.4	36.6	16.9	26.0	22.9
Stack 5 (1)	357348	6369348	30	1.5	150.2	18.8	32.8	21.2
Stack 6(2)	357300	6369324	18	0.6	305.6	15.1	4.0	1.9
Stack 7(2)	357326	6369227	15	1.5	25.5	16.4	29.0	26.5

(1) AECOM (2017), (2) TAS (2021) & (3) TAS (2020)

The modelled emissions rates for each pollutant are based on the historical maximum measured level, as summarised in **Table 6-3**. The maximum emission rates are held constant over the modelling period.

Table 6-3: Measured stack emission rates (g/s)

Pollutant	Stack 1	Stack 2	Stack 4	Stack 5	Stack 6	Stack 7
Total dust	2.81E-01	1.59E-02	8.11E-02	8.40E-03	6.03E-02	1.80E-01
PM_{10}	7.93E-02	1.59E-02	3.10E-02	6.00E-03	3.20E-03	2.12E-02
$PM_{2.5}$	-	-	-	8.00E-04	-	-
CO	6.44E-01	-	-	5.60E-03	5.65E-03	-
SO_2	1.53E-01	-	-	3.33E-02	1.88E-02	1.86E-01
H_2SO_4	4.35E-02	-	-	3.31E-01	6.78E-03	3.71E-02
NOx	2.30E-01	-	-	5.44E-01	1.53E-01	5.30E-02
HCl	4.86E-02	-	-	3.98E-02	-	1.83E-06
HF	2.56E-03	1.45E-03	2.00E-03	3.30E-03	5.65E-04	1.27E-06
TVOCs	7.93E-02	-	-	-	7.91E-03	3.18E-02
Sb	1.80E-05	-	-	1.60E-05	-	4.88E-08
As	1.53E-05	-	-	1.60E-06	-	5.36E-07
Cd	5.24E-04	-	-	2.70E-06	-	4.88E-08
Cl	-	-	-	-	-	2.44E-07
Pb	8.26E-05	-	-	8.20E-06	-	1.22E-06
Hg	3.66E-05	-	-	8.70E-04	-	4.88E-08
B	-	-	-	-	-	4.88E-08
Be	2.17E-06	-	-	6.50E-07	-	4.88E-08
Ba	-	-	-	-	-	4.88E-08
Cr	8.23E-05	-	-	8.60E-06	-	6.10E-07
Co	2.17E-06	-	-	-	-	4.88E-08
Mn	1.21E-04	-	-	1.40E-04	-	-
Ni	4.35E-05	-	-	4.00E-06	-	4.88E-08
NH_3	-	-	-	-	-	1.22E-06
Tl	-	-	-	-	-	4.88E-08
Se	1.24E-05	-	-	-	-	-
Sn	5.70E-05	-	-	-	-	-
V	2.17E-06	-	-	-	-	4.88E-07
Cu	-	-	-	4.60E-05	-	4.88E-07
Dioxins and Furans*	-	-	-	2.10E-10	-	-
PAHs	1.79E-02	-	-	-	3.77E-05	5.35E-04
CN	1.79E-02	-	-	-	-	-
Zn	-	-	-	-	-	4.88E-08

*ng/m^3

The modelled source locations for the Project are shown in **Figure 6-4**. The model includes consideration of potential "building" wake effects on air dispersion that arise due to the effect of winds passing over the buildings at the Project site.

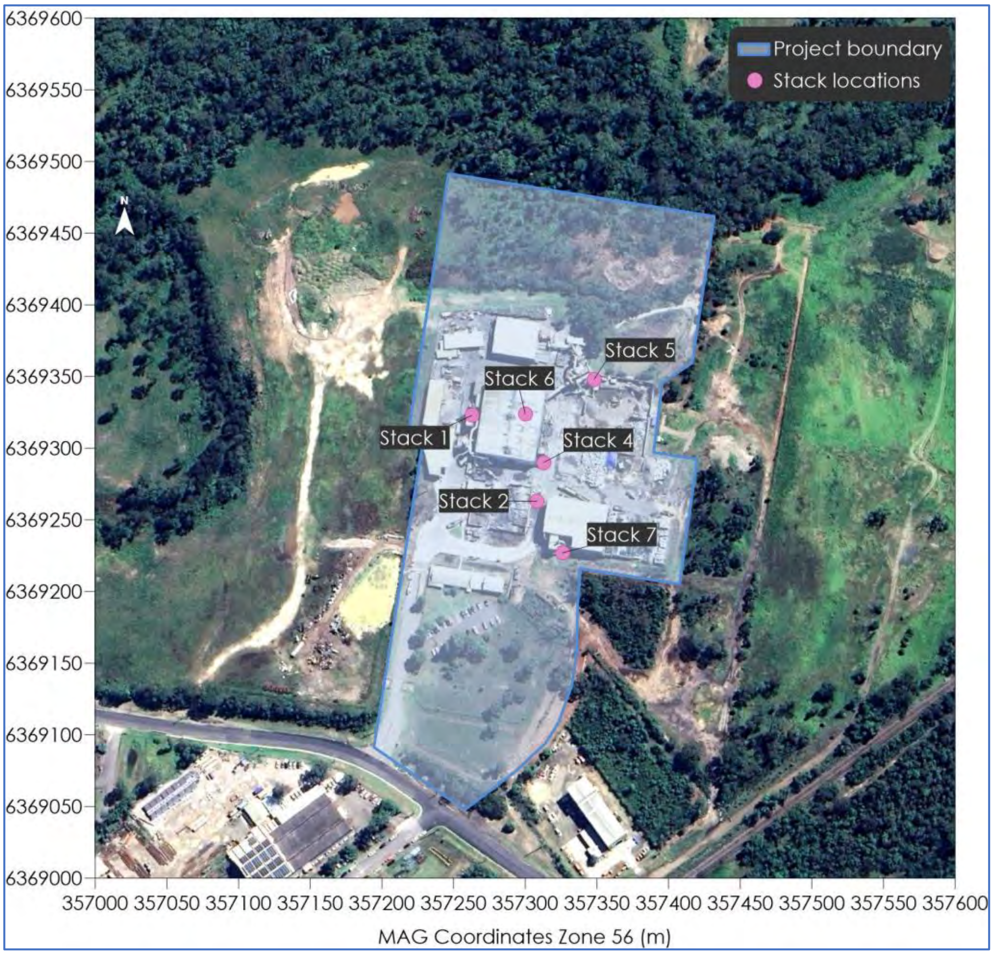

Figure 6-4: Modelled source locations

7 DISPERSION MODELLING RESULTS

This section presents the predicted air quality levels which may arise from air emissions generated by the Project.

The impact assessment criteria apply at the most impacted sensitive receptor or at any location off-site depending on the pollutant assessed.

Table 7-1 presents the predicted maximum impact at the worst affected sensitive receptor due to the existing operations and the proposed Project. The cumulative impact includes the existing operations with the Project and the estimated background levels in **Section 5.3.6**.

The results indicate the maximum contribution from the Project at the sensitive receptor locations would be below the relevant criteria for each of the assessed pollutants.

Table 7-1: Predicted maximum impact at the worst affected sensitive receptor (µg/m³)

Pollutant	Averaging period	Incremental impact due to Project and Existing Operations	Background	Total impact	Criteria
TSP	Annual	1.0	66.6	67.6	**90**
PM_{10}	Annual	0.2	18.5	18.7	**25**
	24-hour	1.5	47.1	48.6	**50**
$PM_{2.5}$	Annual	<0.1	7.7	7.7	**8**
	24-hour	<0.1	23.7	23.7	**25**
SO_2	24-hour	3.9	22.9	26.8	**57**
	1-hour	<0.1	108.7	108.7	**286**
NO_2	Annual	0.9	14.4	15.3	**31**
	1-hour	24.3	71.8	96.1	**164**
CO	8-hour	11.6	3,250	3,262	**10,000**
	1-hour	17.6	4,000	4,018	**30,000**
HF	24-hour	<0.1	-	<0.1	**2.9**
	7-day	<0.1	-	<0.1	**1.7**
	30-day	<0.1	-	<0.1	**0.84**
	90-day	<0.1	-	<0.1	**0.5**
Pb	Annual	<0.1	-	<0.1	**0.5**

Table 7-2 presents the predicted maximum impact at the worst affected off-site location due to the existing operations and the proposed Project.

The results indicate the maximum contribution from the existing and proposed Project at the worst affected off-site location would be below the relevant criteria for each of the assessed pollutants.

Table 7-2: Predicted maximum impact at the worst affected off site location (µg/m³)

Pollutant	Averaging period	Incremental impact due to Project and Existing Operations	Criteria
Sulfuric acid (H_2SO_4)	1-hour	9.0	**18**
Hydrogen Chloride (HCl)	1-hour	1.3	**140**
Ammonia (NH_3)	1-hour	2.69E-04	**330**
Antimony (Sb)	1-hour	5.24E-04	**9**
Arsenic (As)	1-hour	4.79E-04	**0.09**
Barium (Ba)	1-hour	1.08E-05	**9**
Beryllium (Be)	1-hour	6.52E-05	**0.004**

Pollutant	Averaging period	Incremental impact due to Project and Existing Operations	Criteria
Boron (B) *	1-hour	1.08E-05	**50**
Cadmium (Cd)	1-hour	1.39E-02	**0.018**
Chromium (Cr) (VI compounds)	1-hour	2.34E-03	**0.09**
Chlorine (Cl)	1-hour	5.38E-05	**50**
Cobalt (Co) *	1-hour	6.52E-05	**0.2**
Copper (Cu)	1-hour	5.58E-04	**18**
Manganese (Mn)	1-hour	4.30E-03	**18**
Nickel (Ni)	1-hour	1.21E-03	**0.18**
Mercury (Hg)	1-hour	1.06E-03	**1.8**
Selenium (Se) *	1-hour	3.44E-04	**2**
Thallium (Tl) *	1-hour	1.08E-05	**1**
Tin (Sn) *	1-hour	1.58E-03	**1**
Vanadium (V) *	1-hour	1.10E-04	**2**
Dioxin and Furans	1-hour	2.46E-09	**2×10^{-6}**
Cyanide (CN)	1-hour	0.50	**90**
PAHs (as benzo[a]pyrene)	1-hour	0.55	**0.4**
TVOCs (as benzene)	1-hour	7.4	**29**
Zinc (Zn)	1-hour	4.55E-06	**90**

* TCEQ (2016)

Figure 7-1 to **Figure 7-3** present selected key pollution concentration isopleths showing the spatial distribution of the predicted incremental impacts associated with the Project.

Figure 7-1: Predicted maximum 1-hour average VOC concentrations due to the Project (µg/m³)

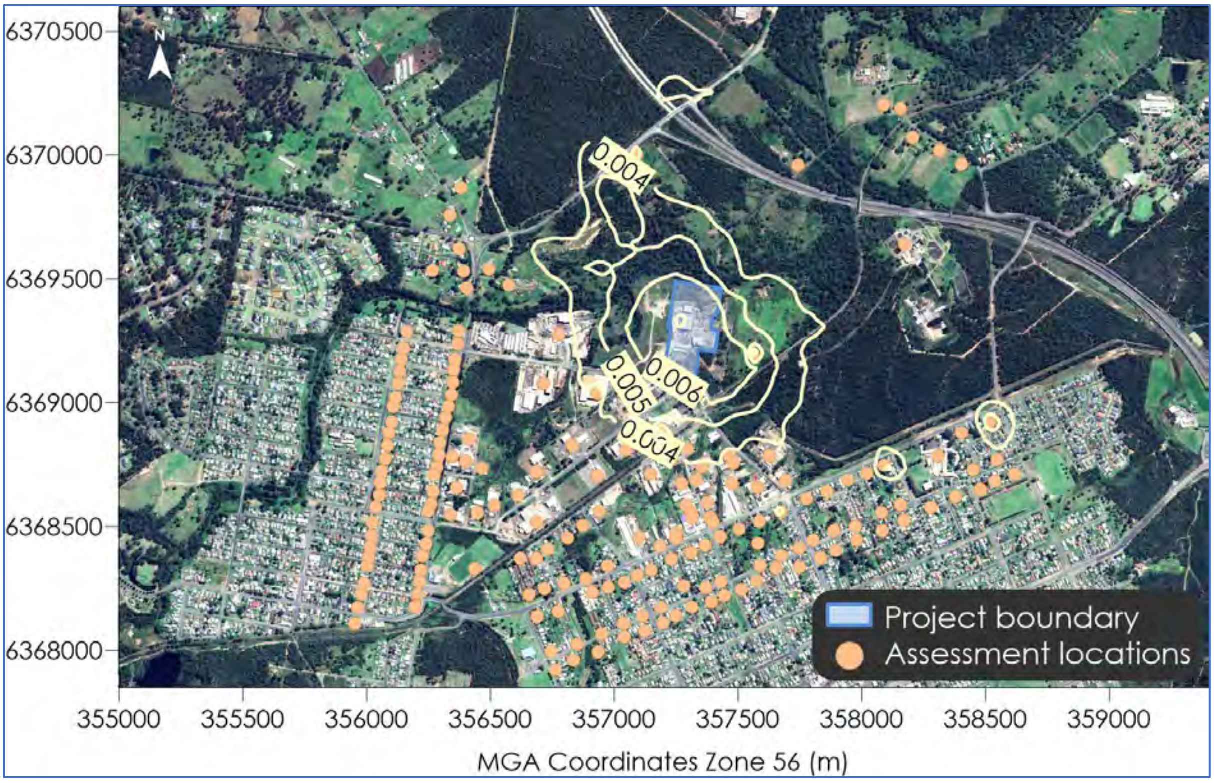

Figure 7-2: Predicted maximum 1-hour average Cd concentrations due to the Project (µg/m³)

Figure 7-3: Predicted maximum 1-hour average H_2SO_4 concentrations due to the Project (µg/m³)

8 MITIGATION AND MANAGEMENT

The proposed operations at the Project have the potential to generate dust and exhaust stack emissions. To ensure that activities associated with the Project have a minimal effect on the surrounding environment and at receptor locations, it is recommended that all reasonable and practicable dust mitigation measures be utilised.

Table 8-1 outlines reasonable and practicable operational dust mitigation measures for the Project.

Table 8-1: Operational dust mitigation measures

Source	Mitigation Measure
General	Activities to be assessed during adverse weather conditions and modified as required (e.g. cease activity where reasonable levels of dust cannot be maintained using the available means).
	Weather forecast to be checked prior to undertaking material handling or processing.
	Engines of on-site vehicles and plant to be switched off when not in use.
	Vehicles and plant are to be fitted with pollution reduction devices where practicable.
	Vehicles are to be maintained and serviced according to manufacturer's specifications.
	Visual monitoring of activities is to be undertaken to identify dust generation.
	Ensure stack exhaust controls are operating as per manufacturers specifications
Exposed areas/stockpiles	The extent of exposed surfaces and stockpiles is to be kept to a minimum.
	Exposed areas and stockpiles are solely contained within the Aldex Building to reduce potential for dust emissions.
Material handling	Reduce drop heights from loading and handling equipment where practical.
Hauling activities	Spills on trafficked areas to be cleaned immediately.
	Driveways and hardstand areas to be swept/cleaned regularly as required.
	Vehicle traffic is to be restricted to designated routes.
	Co-ordinate the delivery schedule to avoid a queue of the incoming or outgoing trucks for extended periods of time.
	Speed limits are to be enforced.
	Vehicle loads are to be covered when travelling off-site.
	Sweeper unit to be regularly deployed to the operational site to sweep/clean internal roads periodically to prevent any tracking of fine debris.

9 GREENHOUSE GAS ASSESSMENT

The National Greenhouse Accounts (NGA) Factors document published by the former Department of the Environment and Energy defines three scopes (Scope 1, 2 and 3) for different emission categories based on whether the emissions generated are from "direct" or "indirect" sources.

Scope 1 emissions encompass the direct sources from the Project defined as:

> "*...from sources within the boundary of an organisation as a result of that organisation's activities*" (**Department of the Environment and Energy, 2021**).

Scope 2 and 3 emissions occur due to the indirect sources from the Project as:

> "*...emissions generated in the wider economy as a consequence of an organisation's activities (particularly from its demand for goods and services), but which are physically produced by the activities of another organisation*" (**Department of the Environment and Energy, 2021**).

For the purpose of this assessment, emissions generated in all three scopes defined above provide a suitable approximation of the total greenhouse gas (GHG) emissions generated from the Project.

Scope 3 emissions can be a significant component of the total emissions inventory; however, these emissions are often not directly controlled by the operation. These emissions are understood to be considered in the Scope 1 emissions from other various organisations related to the Project.

Scope 3 emissions also arise from a number of various other sources indirectly associated with the operation of the Project such as emissions generated by employees travelling to and from the site. The relatively minor individual contributions, that are difficult to accurately quantify due to the diversity and nature of the sources, have not been considered further in this assessment.

9.1 Emission sources

The Weston Aluminium site currently reports its greenhouse gas emissions, energy production and energy consumption annually under the *National Greenhouse and Energy Reporting Act 2007* (NGER). Given that the Project does not seek to change the approved waste tonnages for the facility, it is not anticipated that there would be a change to the direct (Scope 1 and Scope 2) GHG emissions generated at the site relative to the existing operations. The Project would see the processed waste material transported offsite to respective landfill destinations and as such would change the Scope 3 emissions for the site.

Scope 1 and 2 GHG emission sources identified for the existing operations as well as the Project are the on-site combustion of diesel fuel, combustion of natural gas and on-site consumption of electricity.

Scope 3 emissions have been identified as resulting from the purchase of diesel, natural gas, electricity for use on-site and the transport of product material.

Estimated quantities of materials that have the potential to emit GHG emissions associated with Scope 1 and 2 emissions for the existing operations and the Project have been summarised in **Table 9-1** below. These estimates are based on a review of the 2020-2021 NPI EERS report for the current activities, and relate to whole-of-site operations (rather than solely Project-related contributions in isolation).

Table 9-1: Summary of annual quantities of materials estimated for the existing operations and Project

Type	Quantity	Units
Diesel	262	kL
Electricity	4,189	MWh
Natural gas	96,373	GJ

Note: kL = kilolitres, MWh = megawatt hour and GJ = gigajoules

The quantity of diesel fuel required to transport the product materials for the existing operations has been estimated based on an average distance to existing customers. To estimate the consumption of diesel fuel required for the Project, the average fuel consumption of 53.1L/100km for articulated trucks is applied (**ABS, 2022**). The distance travelled to transport product for the existing operations has been estimated at 34,197km, as a result the return trip to the site has been included to account for additional emissions resulting in a total combined travelling distance of 68,393km.

The same methodology has been applied to determine the diesel fuel required to transport processed material for the Project to various disposal sites within the area. A travelling distance for the Project has been estimated at 7,397km, resulting in a total combined travelling distance of 14,793km to account for return trips to the site.

Table 9-2 summarises the estimated diesel fuel required.

Table 9-2: Estimated diesel fuel required to transport product

Activity	Estimated travel distance (km)	Amount of material transported (tpa)	Payload (t)	Fuel (kL)
Existing	68,393	39,250	25	36
Project	14,793	8,750	25	8

9.2 Emission factors

To quantify the amount of carbon dioxide equivalent (CO_2-e) material generated from the Project, emission factors obtained from the NGA Factors (**Department of the Environment and Energy, 2021**) are summarised in **Table 9-3**.

Table 9-3: Summary of emission factors

Type	Energy content factor	Emission factor			Units	Scope
		CO_2	CH_4	N_2O		
Diesel	38.6	69.9	0.1	0.2	kg CO_2-e/GJ	1
		3.6	-	-		3
Electricity	-	0.79	-	-	kg CO_2-e/kWh	2
		0.07	-	-		3
Natural gas	0.0393	51.4	0.1	0.03	kg CO_2-e/GJ	1
		13.1	-	-		3

Note: kWh = kilowatt hour, CO_2 = Carbon Dioxide, CH_4 = Methane and N_2O = Nitrous Oxide

9.3 Summary of greenhouse gas emissions

Table 9-4 summarises the estimated annual CO_2-e emissions due to the existing operation and proposed Project.

Table 9-4: Summary of CO_2-e emissions (t CO_2-e)

Type	Scope 1	Scope 2	Scope 3
Diesel	709	-	36
Electricity	-	3,309	293
Natural gas	4,966	-	1,262
Transport of product – Existing	-	-	98
Transport of product – Project	-	-	21
Total	**5,675**	**3,309**	**1,712**

9.4 Contribution of greenhouse gas emissions

Table 9-5 summarises the emissions associated with the Project based on Scopes 1, 2 and 3.

Table 9-5: Summary of CO_2-e emissions per scope for the Project (kt CO_2-e)

Period	Scope 1	Scope 2	Scope 3
Annual	**5,675**	**3,309**	**1,712**

The estimated annual greenhouse emissions for Australia during 2021 was 501.5 million tonnes of carbon dioxide equivalent (Mt CO_2-e) (**Department of the Industry, Science, Energy and Resources, 2022**). In comparison, the estimated annual average greenhouse emission for the Project is 0.009Mt CO_2-e (Scope 1 and 2). Therefore, the annual contribution of greenhouse emissions from the Project in comparison to the Australian greenhouse emissions for the 2019 period is estimated to be approximately 0.002 per cent (%).

At a state level, the estimated greenhouse emissions for NSW in the 2019 period was 136.6Mt CO_2-e (**Department of the Environment and Energy, 2021**). The annual contribution of greenhouse emissions from the Project in comparison to the NSW greenhouse emissions for the 2019 period is estimated to be approximately 0.007%.

9.5 Greenhouse gas management

The Net Zero emissions program in NSW includes various programs to reach 50 percent emissions reduction on 2005 levels by 2030 and achieve net zero emissions by 2050. These emission reduction initiatives under this plan include upgrading the electricity infrastructure to deliver a modern energy system based on renewable energy, invest in innovative technologies for a range of industrial activities, increase uptake in the use of electric vehicles, improve waste and material management facilities to process resources efficiently, and creating a green hydrogen industry to create clean fuels and products.

The Project would utilise various mitigation measures to minimise the overall generation of GHG emissions that would assist NSW in reaching its 2050 targets. Some examples of GHG mitigation and management practices that would be applied during construction and operation of the Project include:

- Investigating ways to reduce energy consumption throughout the life of the Project and reviewing energy efficient alternatives;
- Regular maintenance of equipment and plant;
- Ensure plant and equipment are switched off when not in use;
- Monitoring the consumption of fuel and regularly maintaining diesel powered equipment to ensure operational efficiency;
- Monitoring the total site electricity and gas consumption and investigating avenues to minimise consumption;
- Where possible, consider using consolidated/bulk solvents in downstream operations to offset GHG emissions; and,
- Source consumable materials from environmentally sustainable sources.

10 SUMMARY AND CONCLUSIONS

This report has assessed the potential air quality and greenhouse gas impacts associated with the Project.

Air dispersion modelling was used to predict the potential for off-site pollutant impacts in the surrounding area due to the operation of the Project. The estimated emissions applied in the modelling are likely to be conservative and would overestimate the actual impacts.

It is predicted that all the assessed air pollutants generated by the operation of the Project would comply with the relevant assessment criteria at all the applicable assessment locations and therefore would not lead to any unacceptable level of environmental harm or impact in the surrounding area or at any receptor.

An assessment of the likely greenhouse gas emissions from the Project has been completed. The estimated annual average greenhouse emission is 0.009Mt CO_2-e material (Scope 1 and 2), which is calculated to be approximately 0.002% of the Australian greenhouse emissions and approximately 0.007% of the NSW greenhouse emissions for the 2019 and 2021 period, respectively.

Nevertheless, the site would apply appropriate best practice pollutant management and mitigation measures to ensure it minimises the potential occurrence of excessive air emissions from the site.

Overall, the assessment demonstrates that the Project can operate without causing any significant air quality impact at receptors in the surrounding environment.

11 REFERENCES

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Appendix A

Selection of Meteorological Year

Selection of meteorological year

A statistical analysis of the latest five contiguous years of meteorological data from the nearest BoM weather station with suitable available data, Cessnock Airport weather station, is presented in **Table A-1**.

The standard deviation of the latest five years of meteorological data spanning 2017 to 2021 was analysed against the available measured wind speed, temperature, and relative humidity. The analysis indicates that 2018 dataset is closest to the mean for wind speed and 2020 is closest for temperature and the long-term average for relative humidity. On the basis of a score weighting analysis, 2020 was found to be most representative.

Figure A-1 shows the frequency distributions for wind speed, temperature, and relative humidity for the 2020 year compared with the mean of the 2017 to 2021 data set. The 2020-year data appear to be well aligned with the mean data.

Table A-1: Statistical analysis of meteorological data from Cessnock Airport AWS

Year	Wind speed	Temperature	Relative humidity
2017	0.3	1.1	5.0
2018	0.3	1.0	5.3
2019	0.3	1.3	6.3
2020	0.4	0.6	3.0
2021	0.4	0.7	3.3

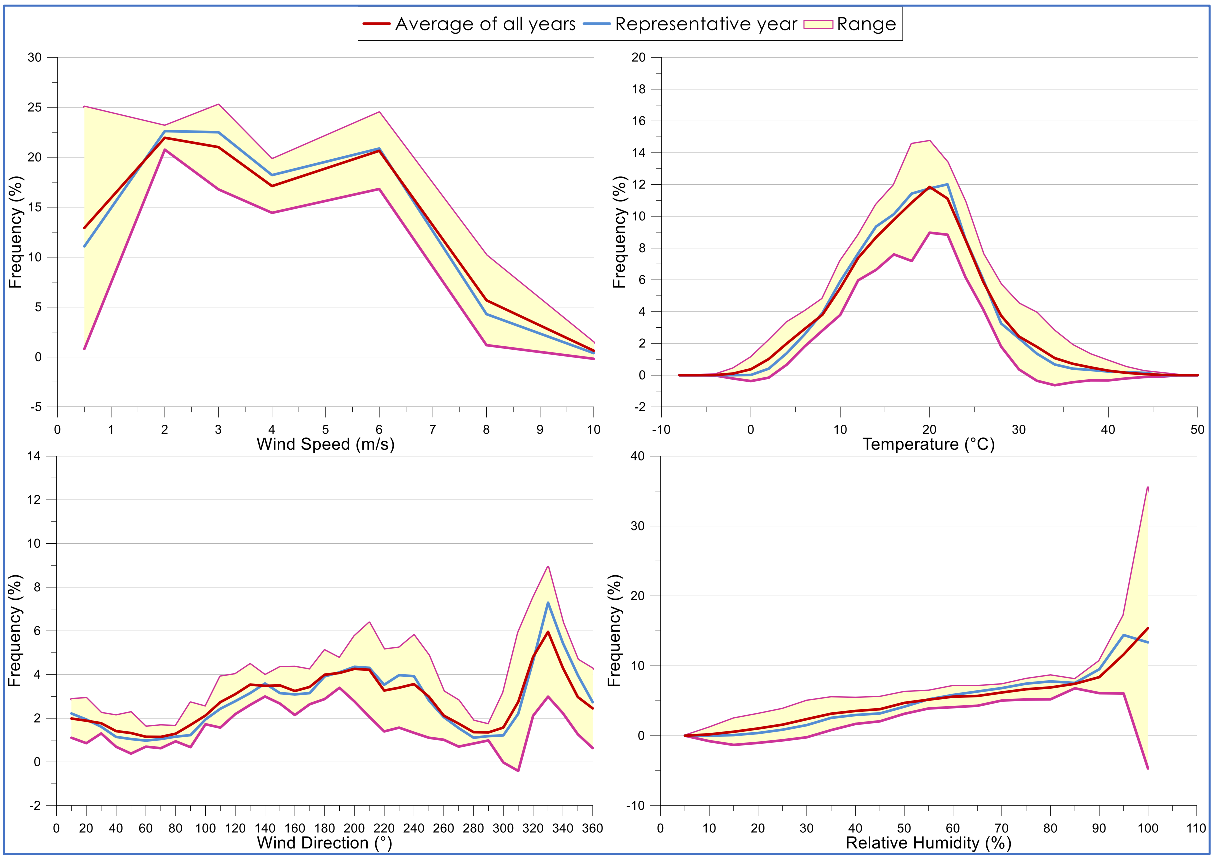

Figure A-1: Frequency distributions for wind speed, wind direction, temperature and relative humidity