



# Tabba Tabba Lithium Mine

## Air Quality Impact Assessment

### Wildcat Resources Limited

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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 Wildcat Resources Limited (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

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## 1.0 Introduction

SLR Consulting Australia Pty Ltd (SLR) was engaged by Wildcat Resources Limited (WRL) (the Proponent) to conduct an Air Quality Impact Assessment (AQIA) report for the proposed Tabba Tabba Lithium Mine, located approximately 50 km southeast of Port Hedland in the Pilbara region of Western Australia.

The assessment has been conducted in accordance with, and compared against, appropriate sections of the following guidance documents:

- National Environment Protection (Ambient Air Quality) Measure, NEPM, 1998 (Updated 2021)
- Environmental Factor Guideline: Air Quality, WA Environmental Protection Authority, 2016
- (Draft) Guideline: Air emissions, Department of Water Environmental Regulation, 2019

### 1.1 Overview of the Project

The Project consists of four mining leases M45/354, M45/375, M45/376 and M45/377 covering the primary mining and operational areas and general-purpose leases acquired for non-mining site activities. The lithium mineral resource is currently estimated 74 Mt contained in spodumene dominant lithium hosting ore and provides an expected mine life of 17 years with mining activities occurring 24-hours per day, 7 days per week.

Infrastructure and mining areas associated with the Project consist of the following:

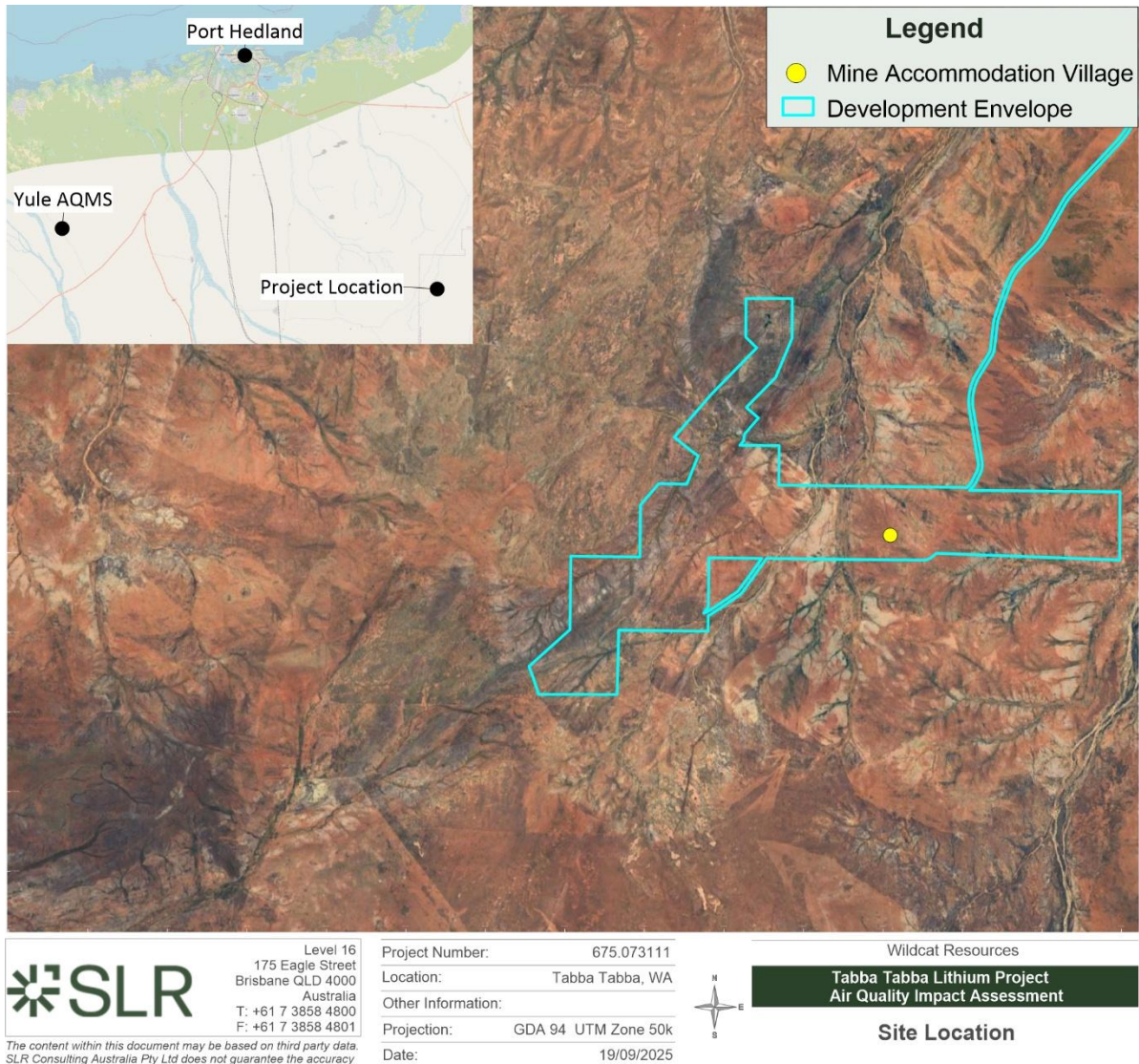
- Two open pit mining areas
- Three waste rock landforms (WRL)
- Two underground mining areas
- Underground mining infrastructure including:
  - Ventilation
  - Cemented rockfill plant
- Run of Mine (ROM) pad
- Processing plant
- Tailings storage facility (dry tailings)
- Mine services area including:
  - Workshops
  - Administrative buildings
  - Vehicle wash facility
  - Stores area
  - Tyre bay
  - Fuel, oil and refueling facilities
  - Water storage dam
- Bore fields



- Mine accommodation village (workers camp)
- 30 MW power plant comprised of:
  - Thirteen mtu 20V4000 gas generators (2.5 MW each)
  - LNG storage (540 tonnes capacity)
- Solar farm

The location of the site and its surrounding areas are presented in **Figure 1**.

**Figure 1 Site Location**



## 2.0 Potential Sources of Emissions to Air

### 2.1 Gas Fired Power Plant

Air emissions include emissions of products of gas combustion associated with the proposed power plant. Pollutants emitted from the combustion of gas include:

- Oxides of nitrogen (NO<sub>x</sub>): NO<sub>x</sub> is a mixture of gases that are composed of nitrogen and oxygen. The most toxicologically significant compound is nitrogen dioxide (NO<sub>2</sub>). Other gases belonging to this group are nitric oxide (NO), nitrous oxide (N<sub>2</sub>O) and nitrogen pentoxide (N<sub>2</sub>O<sub>5</sub>). The majority of NO<sub>x</sub> (90 to 95%(v/v)) generated by the combustion of fossil fuels is in the form of NO, with NO<sub>2</sub> contributing the remaining 5 to 10%(v/v) along with traces of N<sub>2</sub>O. However, NO has the potential to convert to NO<sub>2</sub> as the plume travels downwind.
- Carbon monoxide (CO): CO forms due to incomplete combustion of carbon in fuels (e.g. petrol, wood, coal, natural gas). Given the low CO emission rate expected from the power plant operation and considering the low background CO concentration level, potential for any exceedances of relevant CO guideline can be considered minimal and therefore has not been investigated further in this assessment.
- Sulfur dioxide (SO<sub>2</sub>): Emissions of SO<sub>2</sub> from fossil fuel combustion are directly proportional to the sulfur content of the fuel. As the sulfur content of natural gas is very low, emissions of SO<sub>2</sub> from the proposed power plant will be negligible and have not been considered further in this assessment.
- Particulate matter: Small quantities of particulate matter are formed during fossil fuel combustion, predominantly in the fine particulate size range, from carry-over of non-combustible trace constituents in the fuel and lubricating oil and as products of incomplete combustion.
- Volatile Organic Compounds (VOCs): VOCs is a collective term used to describe organic carbon-based compounds with the ability to enter the atmosphere as a vapour. The environmental, human-health and amenity (i.e. odour) impacts of ambient concentrations of VOCs depend on the composition of released volatile gases, hence there are no ambient air quality criteria for "Total VOCs", only for selected key individual VOC constituents. There is potential for releasing hydrocarbons and volatile organic compounds (VOCs) associated operation of the gas fired generator. Given the scale of the project and considering the remote location, potential hydrocarbon and VOCs emissions to be released from the power plant can be considered minimal. Given this, potential air quality impacts associated with release of hydrocarbons and VOCs can be considered to be minimal and therefore further investigation of these pollutants was unwarranted.

### 2.2 Mining Operations

The main potential emissions to air associated with the mining operations are fugitive emissions of particulate matter, which will be generated as a result of:

- Drilling and blasting
- Material extraction
- Vehicle movements on unsealed roads
- Dumping and stockpiling of materials at waste rock landforms, ROM stockpiles and TSF.



- Storage and handling activities at ROM stockpiles
- Processing of ore including crushing and milling
- Wind erosion from the stockpiles.

From a health and nuisance impact perspective, particles are classified primarily by size, such as TSP (total suspended particulates), PM<sub>10</sub> (particulate matter with an aerodynamic diameter up to 10 microns (µm)) and PM<sub>2.5</sub> (particulate matter with an aerodynamic diameter up to 2.5 µm).

Emissions of TSP have the potential to result in nuisance impacts due to increased rates of dust deposition in the surrounding area.

Human health effects of dust tend to be associated with particles with an aerodynamic diameter of 10 µm or less ( $\leq$  PM<sub>10</sub>). These smaller particles tend to remain suspended in the air for longer periods and can penetrate into the lungs. The PM<sub>10-2.5</sub> fraction (coarse fraction) is termed “thoracic particles”. These particles are inhaled into the upper part of the airways and lungs. PM<sub>2.5</sub> particles are fine particles that are inhaled more deeply and lodge in the gas exchange region (alveolar region) of the human lung and are termed “respirable dust”.

Other air pollutants associated with the mining activities include products of fuel combustion from the on-site diesel powered vehicles and mobile/fixed equipment, the most significant of these being:

- oxides of nitrogen (NO<sub>x</sub>)
- sulphur oxides (SO<sub>x</sub>)
- carbon monoxide (CO)
- volatile organic compounds (VOCs).

As these emissions are predominantly emitted from mobile sources and will be emitted over a large area (as opposed to a single point source emission), any significant increase of these pollutants at surrounding receptors compared to background concentrations is considered unlikely. They have therefore not been investigated further in this assessment.



## 3.0 Regulatory Framework

### 3.1 National Environment Protection (Ambient Air) Measure

The National Environment Protection Council (NEPC) defines national ambient air quality standards and goals in consultation, and with agreement from all Australian state and territory governments. These were first published in 1998 in the *National Environment Protection (Ambient Air Quality) Measure* (NEPM AAQ). The most recent update to the NEPM AAQ was published in 2021 (NEPC 2021).

It is noted that the NEPM AAQ standards apply at performance monitoring locations. Performance monitoring stations are to be located so that they provide a representative measure of the air quality likely to be experienced by the general population in the region or sub-region. The NEPM AAQ standards are therefore not intended for use in assessing air quality impacts from individual sources, specific industries or roadside locations. Nonetheless, many State regulatory agencies have adopted them as air quality impact assessment criteria for use in AQIAs.

The current NEPM standards for the pollutants of interest in this study are presented in **Table 1**. As shown in the table, the objectives for PM<sub>2.5</sub> have reduced from 2025 to provide a framework for continuous improvement and inform future updates of the NEPM AAQ.

**Table 1 Ambient Air Quality NEPM Standards and Goals**

Indicator	Current Standard	Goal from 2025	Averaging Period	Unit
Carbon monoxide (CO)	9	-	8 hour	ppm
Nitrogen dioxide (NO <sub>2</sub> )	0.08	-	1 hour	ppm
	0.015	-	1 year	ppm
Sulfur dioxide (SO <sub>2</sub> )	0.075	-	1 hour	ppm
	0.02	-	24 hours	ppm
Particles as PM <sub>10</sub>	50	-	24 hours	(µg/m <sup>3</sup> at 0°C)
	25	-	1 year	(µg/m <sup>3</sup> at 0°C)
Particles as PM <sub>2.5</sub>	25	20	24 hours	(µg/m <sup>3</sup> at 0°C)
	8	7	1 year	(µg/m <sup>3</sup> at 0°C)



### 3.2 Environmental Protection Authority – Western Australia

The Western Australian Environmental Protection Authority (EPA WA) uses environmental principles, factors and associated objectives as the basis for assessing whether a proposal’s impact on the environment is acceptable.

The Statement of Environmental Principles, Factors, Objectives and aims of EIA (EPA WA 2023) defines the environmental principles, factors and objectives that underpin the environmental impact assessment (EIA) process.

Supporting the Statement of Environmental Principles, Factors and Objectives is a series of guidelines developed to communicate how each environmental factor is considered by the EPA in the EIA process. The EPA’s objective for air quality is:

- ‘To maintain air quality and minimise emissions so that environmental values are protected’ (EPA WA 2020).

Further direction from the Department of Water and Environmental Regulation (DWER) is provided by the draft document “Draft Guideline: Air emissions” (DWER 2019).

The draft guideline provides Ambient Air Quality Guideline Values (AGVs) based on approved health guidelines of Western Australia’s Department of Health (DoH) and the New South Wales Environmental Protection Authority publication, Approved methods for the modelling and assessment of air pollutants in New South Wales (NSW EPA 2016).

The AGVs are categorised for three assessment approaches as summarised in **Table 2**.

Relevant ambient air quality criteria are reproduced from these guideline documents in **Table 3**.

**Table 2 Summary AGVs Pollutant Categories**

Pollutant categories	Category description	Assessment approach
Criteria pollutants	These are the most widespread pollutants in urban areas that are used as general indicators of air quality.	AGVs are to be met at all existing and future offsite sensitive receptors in the modelling domain.
Principal toxic substances	Hazardous air pollutants that are carcinogenic, mutagenic, teratogenic, highly toxic or highly persistent in the environment.	AGVs generally should be met at, or everywhere within the modelling domain (excluding industry premises).
Individual toxic substances	Other toxic pollutants that threaten the beneficial uses of the air environment.	AGVs generally should be met at, or everywhere within the modelling domain (excluding industry premises).



**Table 3 Ambient air quality guideline values (Guideline: Air emissions)**

Substance	Averaging Period	Maximum (ambient) concentration		
		ppm	µg/m <sup>3</sup> at 0 °C	µg/m <sup>3</sup> at 25 °C
Carbon monoxide (CO)	1 hour	25	-	30,000
	8 hours	9	-	10,000
Nitrogen dioxide (NO <sub>2</sub> )	1 hour	0.12	246	226
	Annual	0.03	62	56
Sulfur dioxide (SO <sub>2</sub> )	1 hour	0.2	570	524
	24 hours	0.08	228	210
	Annual	0.02	60	52
Particles (PM <sub>10</sub> )	24 hours	-	50	46
	Annual	-	25	23
Particles (PM <sub>2.5</sub> )	24 hours	-	25	23
	Annual	-	8	7
Particles (total suspended – TSP)	24 hours	-	90	82

### 3.3 Guideline: Dust Emissions (Draft), 2021

A draft of the *Guideline: Dust Emissions* was released for public consultation by DWER in July 2021, with comments closing on 5 November 2021. The objective of the *Guideline: Dust Emissions* is to ensure that adequate information is provided to DWER for assessing applications with fugitive dust emissions. It applies to all applications for a works approval or licence under Part V Division 3 of the EP Act with an identified dust emission component. This document only covers the assessment of fugitive dust (dust which could not reasonably pass through a stack, chimney, vent, or other functionally equivalent opening), with guidance on point source emissions of dust noted as being provided in *Draft Guideline: Air emissions* (refer to **Section 3.2**).

Section 7.2 of the *Guideline: Dust Emissions* lists the health-based air quality criteria to be used for the assessment of fugitive dust impacts. The criteria for PM<sub>10</sub> and PM<sub>2.5</sub> are the same as those listed in **Table 3** (measured at 0°C). Section 7.3 of the *Guideline: Dust Emissions* provides additional guidelines for dust deposition rates for the protection of amenity values of:

- 4 g/m<sup>2</sup>/30 days (maximum)
- 2 g/m<sup>2</sup>/30 days (above background)

In relation to the dust deposition criteria, the *Guideline: Dust Emissions* notes:

- This guideline value may or may not result in amenity impacts, depending on the nature and location of the sensitive receptors; for example, rural versus urban and industrial versus residential.
- The guideline value normally applies to insoluble matter.
- The department expects estimates of background dust levels will be provided to compare with any deposited dust guideline value.



### 3.4 Adopted Air Quality Criteria

For the purpose of this assessment the criteria for identified pollutants of interest have been adopted from guideline values provided in the DWER draft guideline's and are summarised in **Table 4**.

**Table 4 Adopted Air Quality Criteria**

Substance	Averaging Period	Maximum Concentration Standard	
		Criteria	Unit
Carbon monoxide (CO)	1 hour <sup>a</sup>	30,000	µg/m <sup>3</sup> at 0°C
	8 hours <sup>a</sup>	11,000	µg/m <sup>3</sup> at 0°C
Nitrogen dioxide (NO <sub>2</sub> )	1 hour	246	µg/m <sup>3</sup> at 0°C
	Annual	62	µg/m <sup>3</sup> at 0°C
Sulfur dioxide (SO <sub>2</sub> )	1 hour	570	µg/m <sup>3</sup> at 0°C
	24 hours	228	µg/m <sup>3</sup> at 0°C
	Annual	60	µg/m <sup>3</sup> at 0°C
Particles (PM <sub>10</sub> )	24 hours	50	µg/m <sup>3</sup> at 0°C
	Annual	25	µg/m <sup>3</sup> at 0°C
Particles (PM <sub>2.5</sub> )	24 hours	25	µg/m <sup>3</sup> at 0°C
	Annual	8	µg/m <sup>3</sup> at 0°C
Particles (total suspended – TSP)	24 hours	90	µg/m <sup>3</sup> at 0°C
Dust deposition rate	30 days	2 (above background)	g/m <sup>2</sup> /30 days
		4 (maximum)	g/m <sup>2</sup> /30 days

a) Converted to 0°C standard conditions from 25°C criteria and rounded to 2 significant figures.



## 4.0 Existing Environment

### 4.1 Sensitive Receptors

The EPA provide examples of sensitive land use in the document “Guidance Statement No.3 Separation Distances Between Industrial and Sensitive Land Uses” (EPAWA 2005). Land uses considered to be potentially sensitive to emissions from industry and infrastructure include:

- Residential developments
- Hospitals, nursing homes
- Hotels, motels, hostels, caravan parks
- Schools, child care facilities
- Shopping centres, playgrounds, and some public buildings

They note that “some commercial, institutional and industrial land uses which require high levels of amenity or are sensitive to particular emissions may also be considered “sensitive land uses””. Examples of types of land uses include:

- Retail outlets
- Offices
- Training centres
- Some types of storage and manufacturing facilities.

SLR conducted a desktop review of aerial imagery within 6 km of the Development Envelope, and did not identify any sensitive receptors. Although a mine accommodation village is proposed within the Development Envelope, it will house mine workers only in a temporary, occupational capacity as part of the project, therefore their exposure is considered occupational rather than public. Given this, mine accommodation village has not been considered as a sensitive receptor for this assessment.

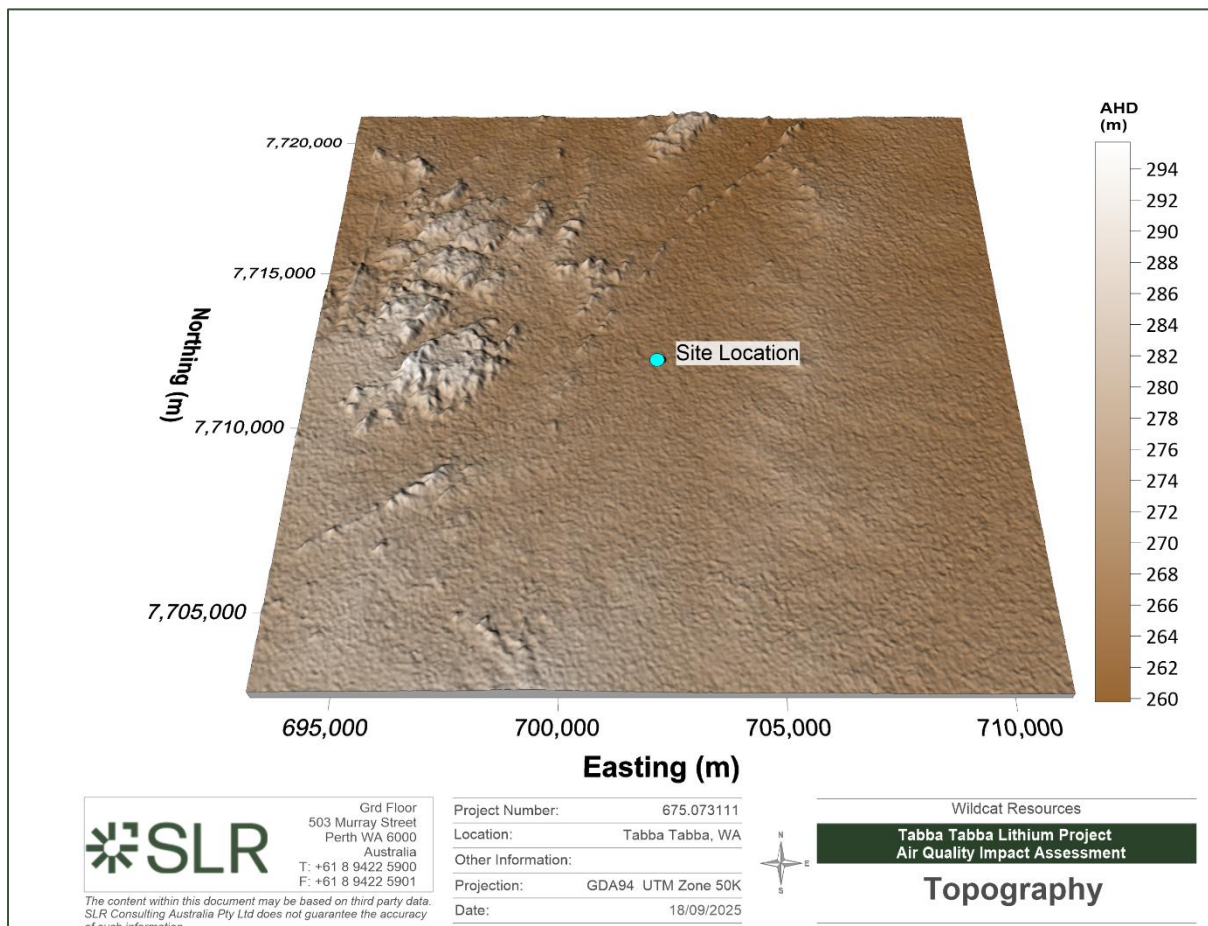


## 4.2 Topography

The topographical data was sourced from the United States Geological Service’s Shuttle Radar Topography Mission database that has recorded topography across Australia with a 1 arc second (~30 m) spacing.

The elevation of the surrounding area varies from 70 m to up to 175 m above sea level, with the Project site located in an area with an elevation of 100 m. Elevated terrain is present to the west of the Project site, while no significant topographical features are observed in other surrounding directions.

**Figure 2 Topographic Map of the Region Surrounding the Project Site**



### 4.3 Climate and Meteorology

The nearest inland meteorological monitoring station to the Project site operated by the Bureau of Meteorology (BoM) with long term climate statistics is the Port Hedland Airport automatic weather station (AWS), located approximately 45 km to the northwest (Station ID4032). This station was commissioned in 1942 and has long-term meteorological data for the following parameters:

- Temperature (°C)
- Rainfall (mm)
- Solar radiation (MJ/m<sup>2</sup>)
- Relative humidity (%)
- Wind speed (m/s) and wind direction (degrees).

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

#### 4.4 Temperature

Long-term temperature statistics are summarised in **Figure 3**. Mean maximum temperatures range from 27.4°C in winter to 36.8°C in summer, while mean minimum temperatures range from 12.5°C in winter to 25.7°C in summer. Maximum temperatures of 48°C and minimum temperatures of 3°C have been recorded.

#### 4.5 Rainfall

Long-term rainfall statistics are summarised in **Figure 4**. Rainfall is relatively low throughout the year with the highest monthly average rainfalls occurring in between January and March. Average rainfalls are low for the rest of the year with the lowest average rainfall occurring between July and November, with the lowest average rainfall of 0.9 mm recorded during October. Peak rainfall events often occur between December and April, with the highest rainfall occurring in January. These high rainfall events are often associated the influence of tropical cyclones. The highest monthly rainfall recorded over the time period examined was 453.5 mm recorded in January 1967.

#### 4.6 Wind Speed and Direction

Long term wind data (9 am and 3 pm) are presented as wind roses in **Figure 5**. The wind roses show that winds from the eastern quadrant are predominant in the morning. Winds from the northern quadrant are predominant in the afternoon. The nearest Bureau of Meteorology (BoM) Automatic Weather Station (AWS) located at Port Hedland, approximately 45 km from the Project site. Wind patterns at the Project site may differ from those at Port Hedland.

#### 4.7 Solar Radiation

As would be expected, the mean daily solar exposure levels (see **Figure 6**) are highest in summer (peaking at 28.5 MJ/m<sup>2</sup> in November) and lower in winter (dropping to 15.6 MJ/m<sup>2</sup> in June).

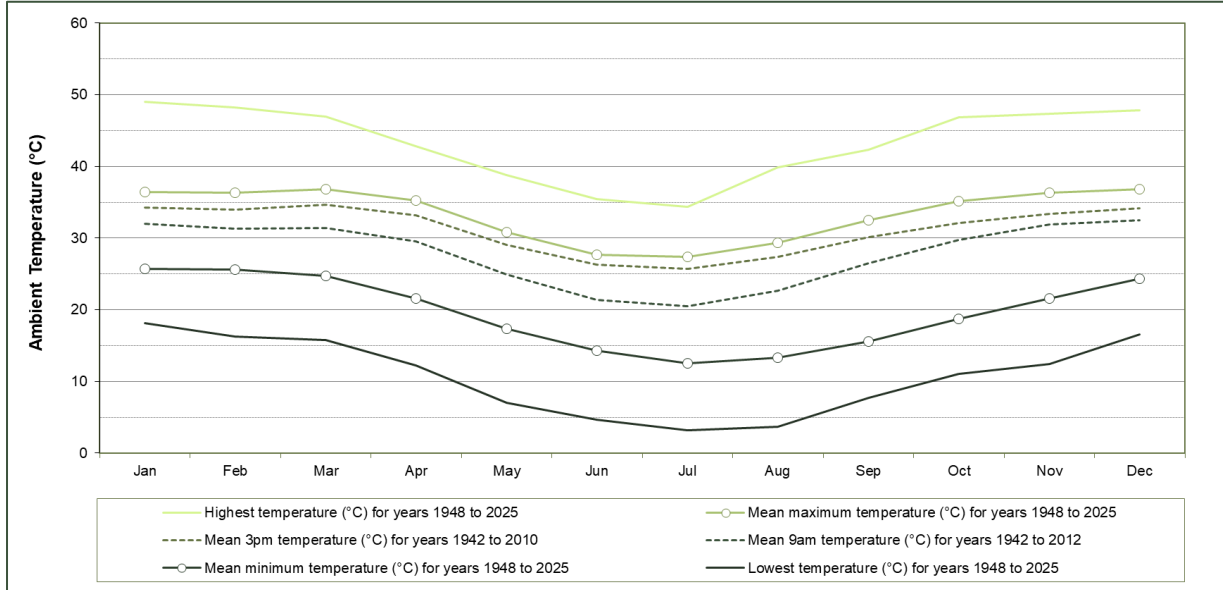
#### 4.8 Relative Humidity

Long-term humidity statistics (9 am and 3 pm monthly averages) are summarised in **Figure 7**. Morning humidity levels range from an average of around 60% in February

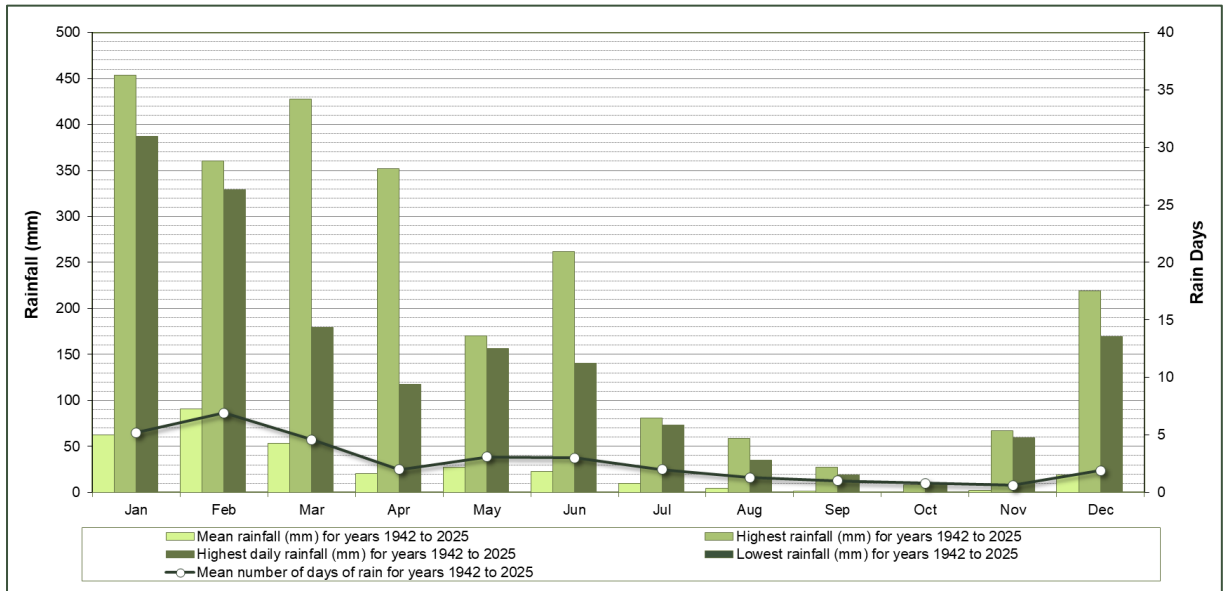


dropping to around 32% in September. Afternoon humidity levels are lower, at around 53% in February, dropping to a low of 31% in September.

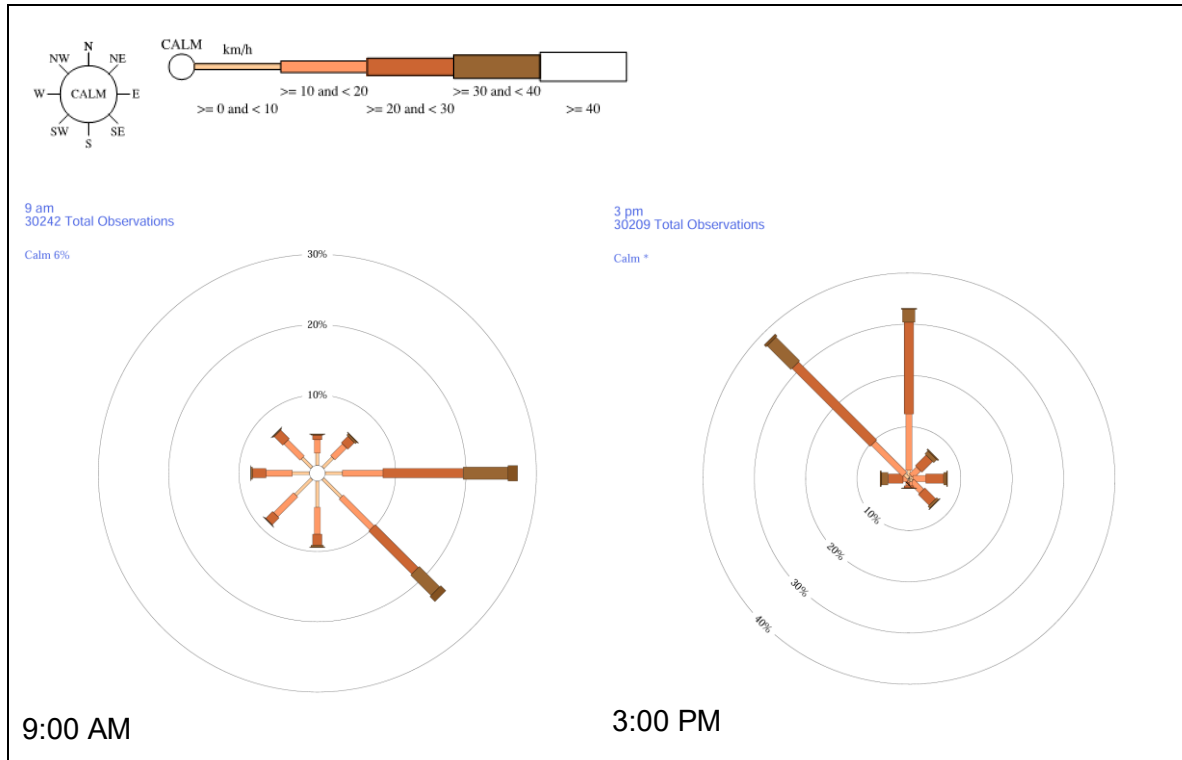
**Figure 3 Long Term Temperature Data – Port Hedland Airport**



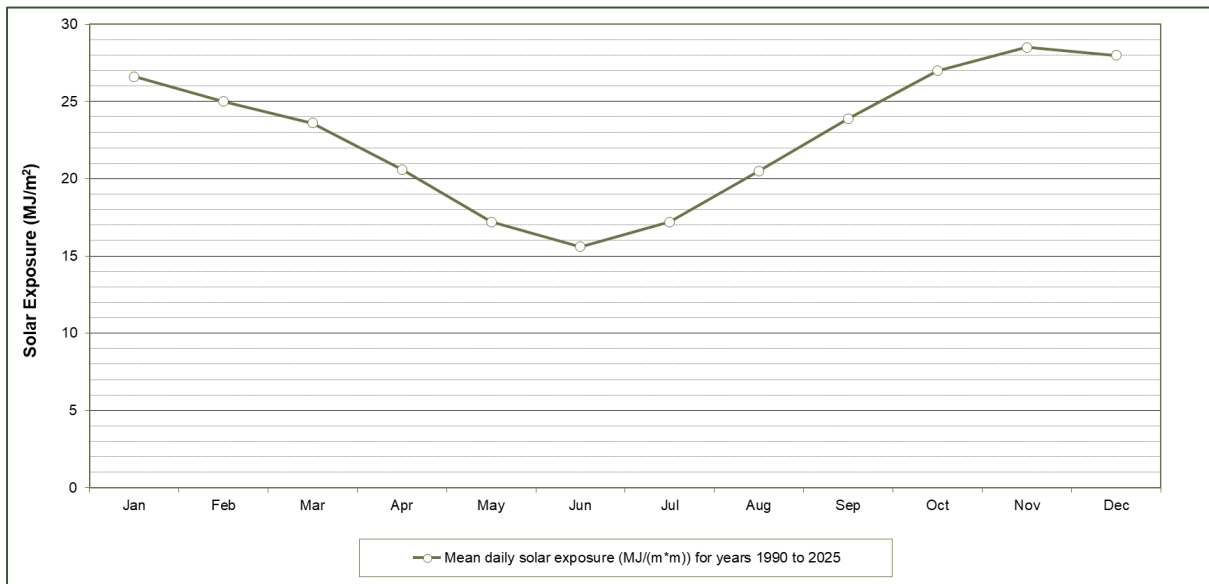
**Figure 4 Long Term Rainfall Data – Port Hedland Airport**



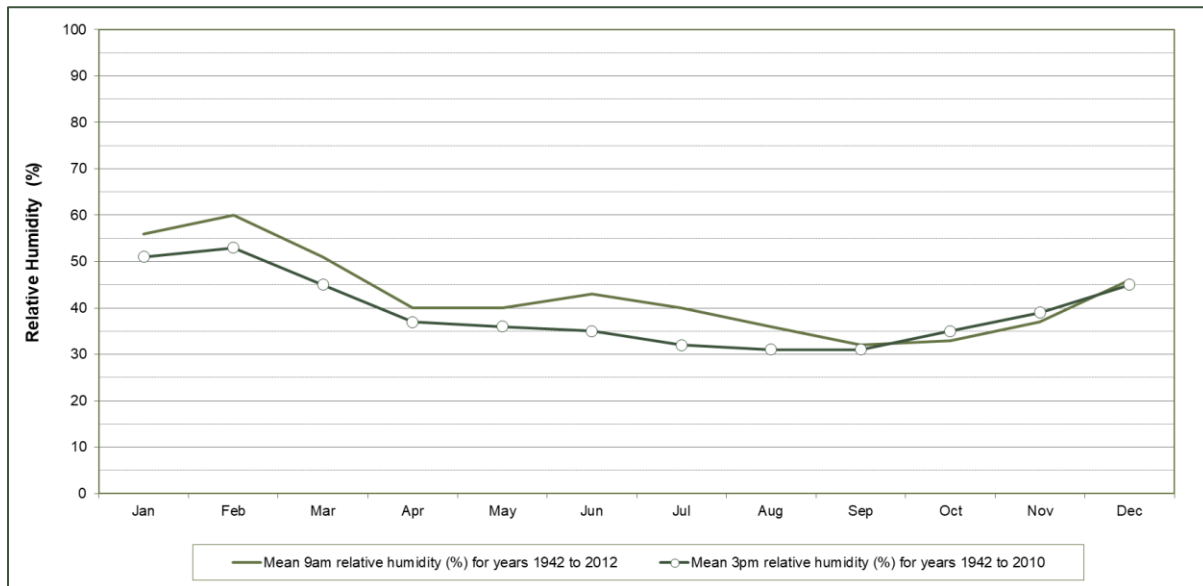
**Figure 5 Wind Roses – Port Hedland Airport**



**Figure 6 Solar Radiation Data – Port Hedland Airport**



**Figure 7 Humidity Data – Port Hedland Airport**



## 4.9 Existing Air Environment

Ambient air quality criteria relate to the total cumulative pollutant concentration that the population may be exposed to. Air dispersion modelling assessments therefore require the background air quality to be characterised, so that background concentrations of each pollutant of interest can be added to the model predicted incremental impacts to provide an assessment of potential cumulative impacts. In addition, background ozone levels (not being assessed) are used as inputs for NO to NO<sub>2</sub> conversion calculations further discussed in **Section 7.4**.

DWER operate a network of sixteen ambient air quality monitoring stations (AQMSs) across the state as part of their NEPM monitoring network. In addition, DWER provides oversight to the Port Hedland Industries Council funded monitoring network consisting of nine AQMSs providing coverage of industrial, community and background locations for Port Hedland.

As the DWER AQMS network is focussed on major population centres, there are no such monitoring stations located in the vicinity of the Project site. Instead, background air quality data is estimated using validated data from Yule River AQMS.

The Yule River AQMS is a rural background monitoring location part of the Port Hedland monitoring network and is located approximately 40km southwest from Port Hedland industrial zone and approximately 70 km west of the Project site.

Background air quality levels for this assessment estimated from validated data obtained from Yule River AQMS and are presented in **Table 5**.



**Table 5 Background Concentrations Used in this Assessment**

Pollutant	Averaging Period	Adopted Background Concentration	Basis
PM <sub>2.5</sub>	24-hours	6.6 µg/m <sup>3</sup>	75 <sup>th</sup> percentile for 24-hour average PM <sub>2.5</sub> concentrations for Yule River AQMS 2024 year
	Annual	4.9 µg/m <sup>3</sup>	Annual average for Yule River AQMS 2023 year
PM <sub>10</sub>	24-hours	25.5 µg/m <sup>3</sup>	75 <sup>th</sup> percentile for 24-hour average PM <sub>10</sub> concentrations for Yule River AQMS 2024 year
	Annual	22.8 µg/m <sup>3</sup>	Annual average for Yule River AQMS 2024 year
TSP	24-hours	63.8 µg/m <sup>3</sup>	Scaled from the assumed background annual average PM <sub>10</sub> concentration using a PM <sub>10</sub> /TSP ratio of 0.40 based on data collected in the vicinity of coal mines (Richardson 2000) *
Deposited Dust	30-days	2 g/m <sup>2</sup> /month	Conservative estimate in the absence of any local data
NO <sub>2</sub>	1-hour	14.4 µg/m <sup>3</sup>	75 <sup>th</sup> percentile of daily peak one-hour nitrogen dioxide concentrations for Rolling Green AQMS for 2022 year
	Annual	4.1 µg/m <sup>3</sup>	Annual average nitrogen dioxide concentration for Rolling Green AQMS for 2022 year
Ozone	1-hour	120 µg/m <sup>3</sup>	Maximum 1-hr average ozone concentration for Rolling Green AQMS for 2022 year

\* no publicly available PM<sub>10</sub>/TSP ratio for mineral mines are available in the literature.



## 5.0 Assessment Methodology

### 5.1 Assessment Scenarios

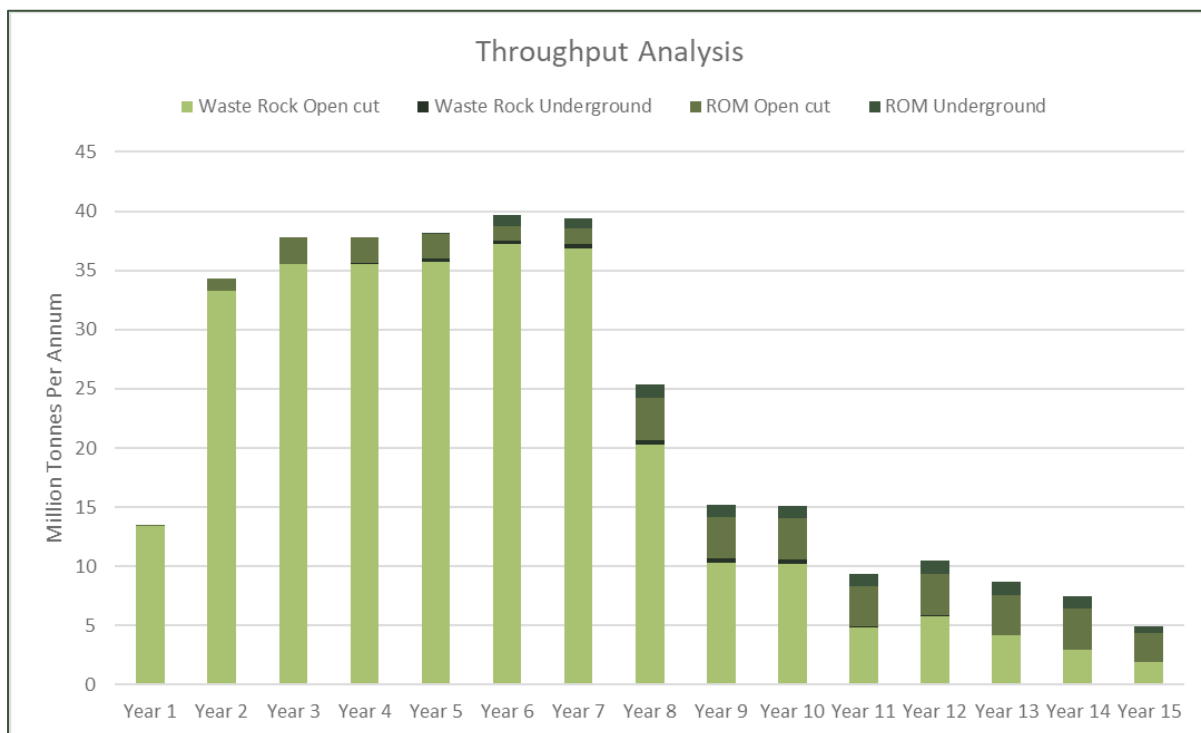
#### 5.1.1 Power Plant Operation

A potential worst case operational scenario representing concurrent operation of all thirteen gas fired generators at 100% continuous load was assessed. A backup diesel generator is also proposed. However, it is expected to operate only during plant startup, shutdown or emergency conditions and therefore concurrent operation with the gas turbines is unlikely. In addition, emissions from the diesel generator would be significantly lower than those associated with normal operation (i.e. all thirteen gas turbine operating at full load). Given this, a detailed assessment of the backup diesel generator was not considered warranted.

#### 5.1.2 Mining Operations

A potential worst case operating scenario representing concurrent operation of opencut and underground mines with potential for highest generation of dust based on analysis of ROM and overburden throughput were established and adopted for this assessment. The schedule of material throughput is provided in **Figure 8**. The basis of the worst case scenarios is presented in **Table 6**.

**Figure 8 Schedule of Material Throughput**



**Table 6 Assessment Scenario for Mining Activities**

Parameter	(Mtpa)	Basis
Waste rock throughput	37	Projected highest annual overburden throughput



Parameter	(Mtpa)	Basis
ROM throughput (Mtpa)	3.6	Projected highest annual ROM throughput

## 6.0 Estimation of Air Emissions

### 6.1 Mining and Processing

Potential air emissions associated with the proposed mining and processing operations, were estimated using activity data representative of the potential worst-case scenario and relevant emission factors sourced from the USEPA's *AP42 Emission Factor Handbook* (US EPA 2006) and updates), Australian Coal Association Research Program (ACARP) emission factors (ACARP 2015) and the *NPI Emission Estimation Technique Manual for Mining* (DSEWPC 2012).

A summary of the activity data used to estimate the potential particulate emissions for each emission source is presented in **Table 7**.

The estimated annual particulate emissions for the proposed operations are presented in **Table 8**, with details of the emission factor calculations and estimated emissions for each activity presented in **Appendix A**.

As shown in **Table 8**, the main source of fugitive dust emissions from the site is estimated to be the wheel-generated emissions associated with the transport of materials within the site.

### 6.2 Power Generation

The stack parameters and emission rates for the power generators for this study were provided by Wildcat and are summarised in **Table 9** and **Table 10**. The locations (UTM coordinates) of each stack were obtained from review of aerial imagery with reference to site plans provided to SLR.



**Table 7 Summary of Activity Data Used in Emission Estimates**

Parameter	Data	Unit
<b>General</b>		
Operating hours	24	hrs/day
<b>Open Cut Mine</b>		
Waste rock throughput	37,200,000	t/annum
ROM throughput	3,600,000	t/annum
Drilling	52,003	holes/annum
Blasting	260	blasts
Average Blast Area	4,500	m <sup>2</sup>
Moisture content - waste rock	2	%
Moisture content - ROM	4	%
Silt content - waste rock	0.4	%
Silt content - ROM	3.5	%
Dozer	17,900	hrs
Haul truck - empty weight	137	t
Haul truck - gross weight	318	t
Hauling distance - pit to WRD	5.5	km
Hauling distance - pit to ROM pad	5.2	km
Grader speed	5	km/hr
Grading	17,100	hrs/annum
Wind erosion - pit	117	ha
Wind erosion - WRD	361	ha
Wind erosion - processing area	76	ha
Wind erosion - TSF	167	ha
<b>Underground Mine</b>		
Waste rock throughput	420,000.00	t/annum
ROM throughput	1,110,000.0	t/annum
Hauling distance - Waste rock	2.8	km
Hauling distance - ROM pad	2.2	km
<b>Processing Area</b>		
Processing Throughput	4,500,000	t/annum
Tailings generated to Dry tailings stockpile	3,850,000	t/annum
Primary crushing	4,500,000	t/annum
Secondary crushing	4,500,000	t/annum
Hauling distance (tailings)	3.2	km



**Table 8 Estimated Annual Fugitive Dust Emission Rates**

Scenario	Annual Emission Rate (kg/annum)		
	TSP	PM <sub>10</sub>	PM <sub>2.5</sub>
Dozer	6,294	583	58
Drilling	30,682	15,955	1,436
Blasting	17,267	8,979	518
Loading waste to truck - open cut	55,056	26,040	3,943
Loading waste to truck - portal	622	294	45
Loading ROM to trucks -open cut	18,000	7,200	720
Loading ROM to trucks -Portal	5,550	2,220	222
Hauling waste on unpaved roads - open cut	2,557,542	622,069	62,207
Hauling waste on unpaved roads -Portal	14,700	3,576	358
Hauling ROM on unpaved roads - Open cut	234,004	56,917	5,692
Hauling ROM on unpaved roads - Portal	69,376	16,874	1,687
Emplacing waste at WRL - open cut	55,056	26,040	3,943
Emplacing waste at WRL- portal	622	294	45
Loading ROM to stockpiles	23,550	9,420	942
Unloading ROM from stockpile	23,550	9,420	942
Primary crushing	11,250	4,500	450
Secondary crushing	33,750	13,500	1,350
Hauling rejects	186,620	47,953	4,795
Grading roads	4,063	1,796	126
Wind erosion - Exposed areas	282,440	141,220	13,218
<b>Total</b>	<b>3,629,994</b>	<b>1,014,848</b>	<b>102,697</b>



**Table 9 Locations of Power Generators**

Source	Location (UTM Zone 50k)	
	Easting (m)	Northing (m) <sub>s</sub>
Generator 1	700,710	7,709,952
Generator 2	700,724	7,709,952
Generator 3	700,738	7,709,952
Generator 4	700,752	7,709,952
Generator 5	700,766	7,709,952
Generator 6	700,780	7,709,952
Generator 7	700,794	7,709,952
Generator 8	700,808	7,709,952
Generator 9	700,822	7,709,952
Generator 10	700,836	7,709,952
Generator 11	700,850	7,709,952
Generator 12	700,864	7,709,952
Generator 13	700,878	7,709,952

**Table 10 Stack and Emission Data used in the Modelling Study**

Source	Operating Conditions	Stack Height (m)	Stack Diameter (m)	Exit Velocity (m/s)	Exit Temperature (°C)	Modelled Emission Rate (g/s)
						NO <sub>x</sub>
Generator 1-13	100% load	10	0.508	7.1	414	1.4
Conservative estimates of stack parameter and emission rates were established based on data scaled upward from design specifications. These artificially elevated emission rates allow for any unintended variability in operation of the plant						



## 7.0 Dispersion Modelling Methodology

### 7.1 Model Selection

Emissions from the proposed Project have been modelled using the US EPA’s CALPUFF (Version 6.326) modelling system.

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.

### 7.2 Meteorological Modelling Methodology

#### 7.2.1 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 observational data recorded in 2023 at meteorological station located at Port Hedland Airport was used to realign the predicted solution towards the observation values. **Table 11** details the parameters used in the TAPM meteorological modelling for this assessment.

**Table 11 Meteorological Parameters Used for this Study - TAPM**

TAPM (v 4.04)	
Number of grids (spacing)	4 (30 km, 10 km, 3 km, 1 km)
Number of grid points	25 x 25 x 25
Year of analysis	2023
Centre of analysis	700532m E 7713553 m S (UTM 50K)
Data assimilation	Port Hedland Airport



## 7.2.2 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 for a 18 km × 18 km domain with a resolution of 150 m. TAPM-generated three-dimensional meteorological data was used as the initial guess wind field. The local topographical data and land use in the area were then used to refine the initial guess wind field predetermined by the TAPM data. CALMET was run in no observation mode as there were no BoM stations within the modelling domain.

The topographical data was sourced from the United States Geological Service's Shuttle Radar Topography Mission database that has recorded topography across Australia with a 3 arc second (approximately 90 m) spacing. The land use data file was created using the latest publicly available aerial imagery.

## 7.3 Meteorological Data Used in Modelling

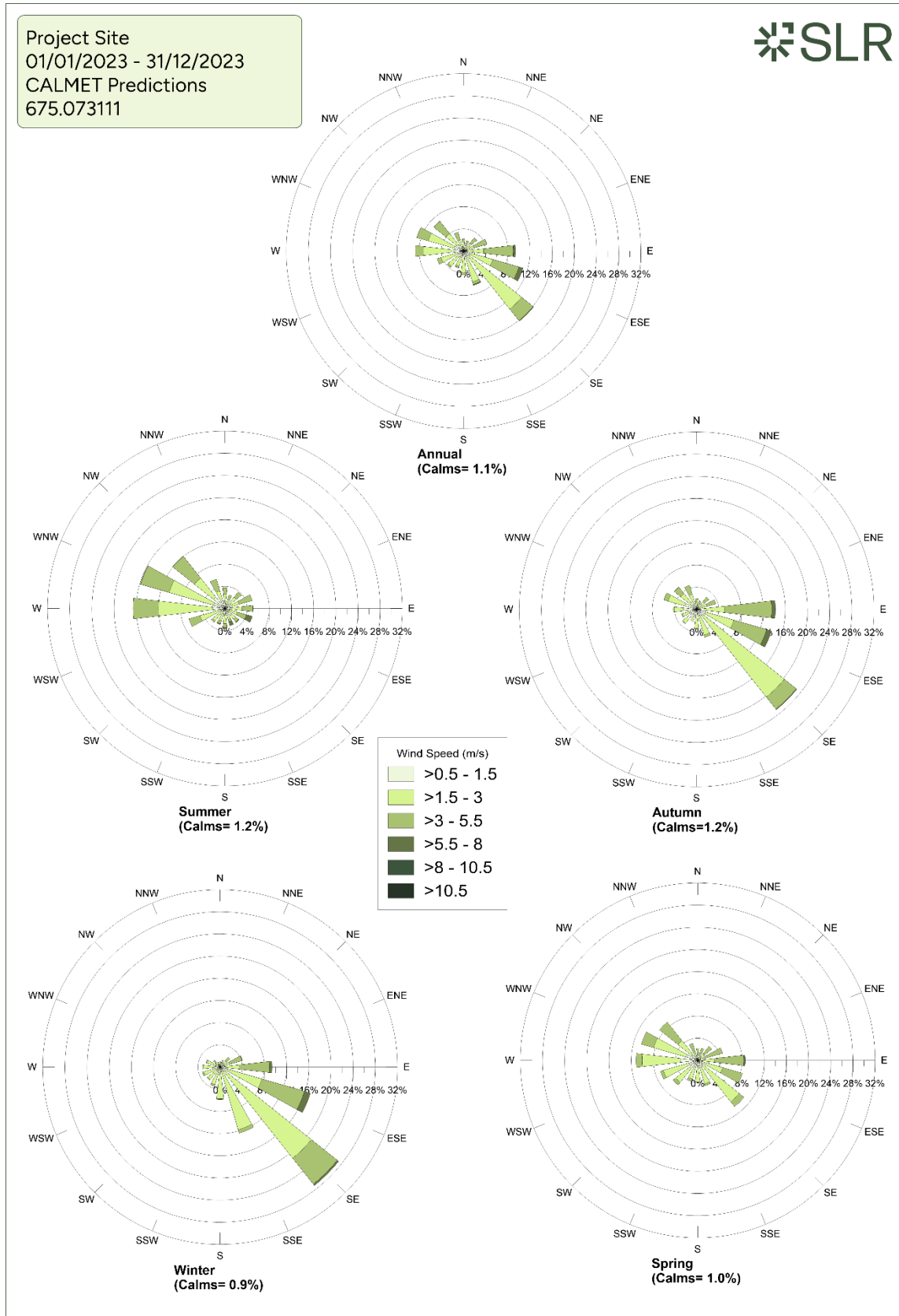
### 7.3.1 Wind Speed and Direction

A summary of the annual wind behaviour predicted by TAPM/CALMET for the Project site for the modelled year (2023) is presented as wind roses in **Figure 9** and as wind speed frequency plot in **Figure 10**. These plots indicate that on an annual basis, the Project site predominantly experiences moderate wind speed conditions (between 3 m/s and 8 m/s), predominantly from the southeast quadrant. Calm wind conditions (wind speeds less than 0.5 m/s) were predicted to occur for about 1.1% of the time throughout the modelling period.

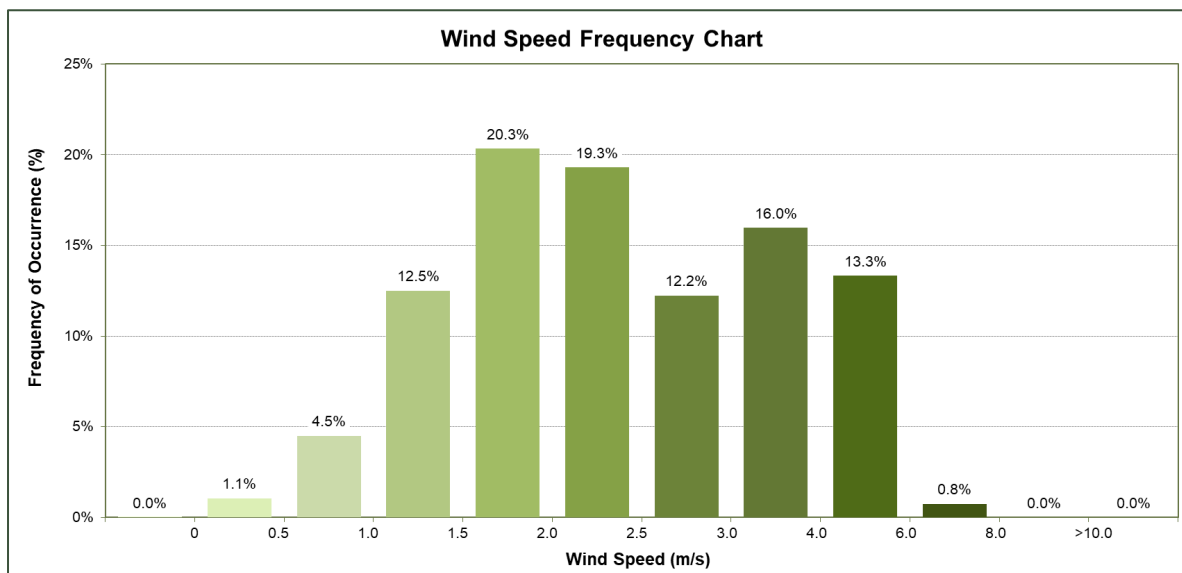
During summer low to moderate winds from the western quadrant are predominant. In autumn and winter winds from the south-east quadrant are predominant with very low frequency of winds from other directions. During Spring winds from western quadrant are predominant. Winds from east-southeast are also significant in Spring.



**Figure 9 Annual Wind Roses for the Project Site (Model-Predicted, 2023)**



**Figure 10 Wind Speed Frequency Plot for the Project Site (Model-Predicted, 2023)**



### 7.3.2 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 12**.

The predicted frequency of each stability class and the hourly distribution of stability class categories predicted at the Project site during 2023 are presented in **Figure 11**. The distributions presented in **Figure 11** showed a high frequency of stable conditions (E and F stability class), with a low frequency of very unstable conditions (Stability Class A). Stable atmosphere is reflective of poor dispersive conditions that inhibits dispersion.

### 7.3.3 Mixing Heights

Diurnal variations in maximum and average mixing depths predicted at the project site during 2023 are illustrated in **Figure 12**. As would be expected, an increase in the mixing depth during the morning is apparent, arising due to the onset of vertical mixing following sunrise. Maximum mixing heights occur in the mid to late afternoon, due to the dissipation of ground-based temperature inversions and the growth of the convective mixing layer.



**Table 12 Meteorological Conditions Defining Each PGT Stability Classes**

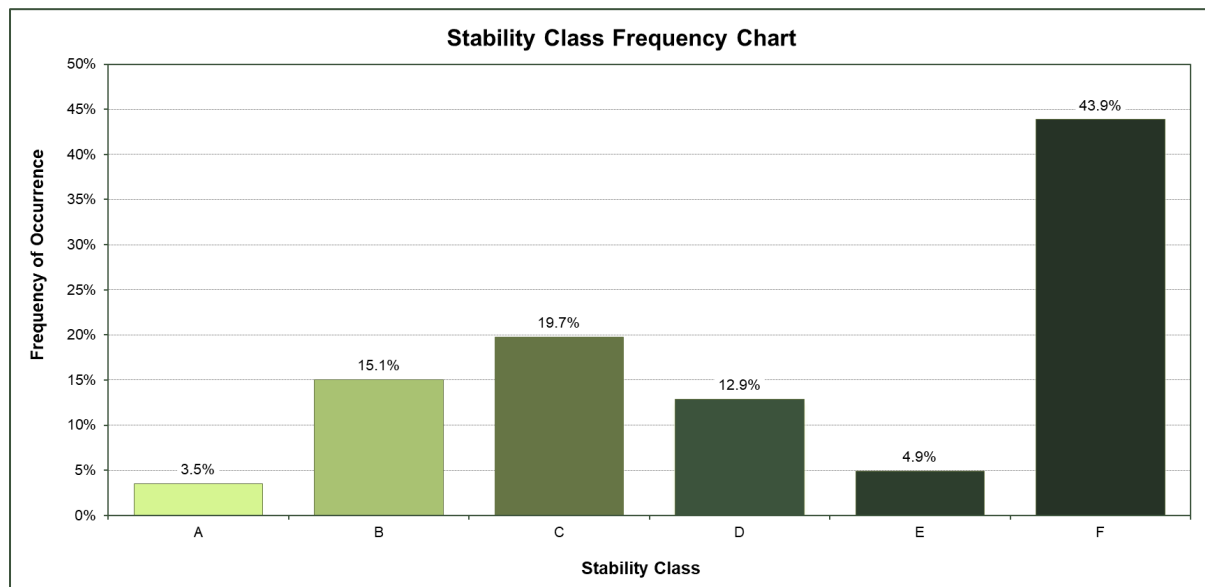
Surface Wind Speed (m/s)	Daytime Insolation			Night-Time Conditions	
	Strong	Moderate	Slight	Thin Overcast or > 4/8 Low Cloud	<= 4/8 Cloudiness
< 2	A	A - B	B	E	F
2 - 3	A - B	B	C	E	F
3 - 5	B	B - C	C	D	E
5 - 6	C	C - D	D	D	D
> 6	C	D	D	D	D

Notes:

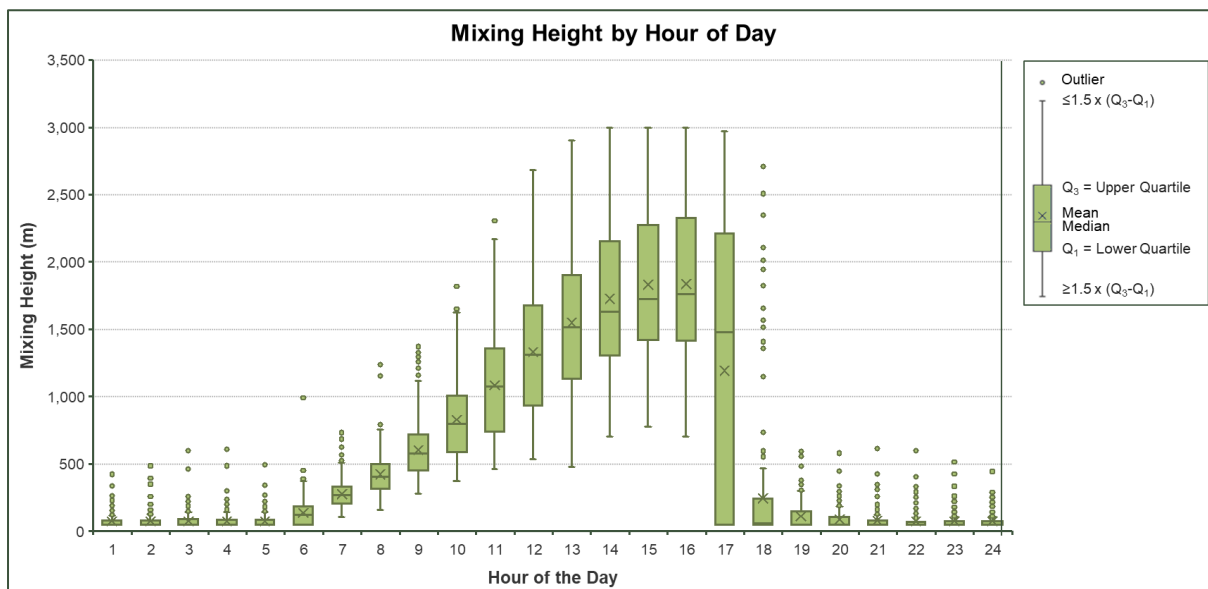
- Strong insolation corresponds to sunny midday in midsummer in England; slight insolation to similar conditions in midwinter.
- Night refers to the period from 1 hour before sunset to 1 hour after sunrise.
- The neutral category D should also be used, regardless of wind speed, for overcast conditions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

Source: (Pasquill 1961)

**Figure 11 Stability Class Frequencies for the Project Site (Model-Predicted, 2023)**



**Figure 12 Mixing Heights at the Project Site (Model-Predicted, 2023)**



## 7.4 NO to NO<sub>2</sub> Conversion

NO<sub>x</sub> emissions from fossil fuel combustion are primarily nitric oxide (NO), with only a few volume percent as NO<sub>2</sub>. However, once the gases are discharged into the atmosphere, chemical reactions take place which result in the transformation of NO in the plume to NO<sub>2</sub>.

There are various methods for estimating NO<sub>2</sub> concentrations from model predictions of NO<sub>x</sub> as the plume is emitted from the emission point. Generally, these methodologies assume a higher NO to NO<sub>2</sub> conversion rate with increasing background ozone concentrations.

The US EPA has developed a procedure known as the Ozone Limiting Method (OLM), which allows a conservative estimate of the NO<sub>2</sub> concentration to be made in a NO<sub>x</sub> plume. The calculation requires knowledge of the background ozone (O<sub>3</sub>) concentration, which is usually derived from direct measurements. Such data are readily available in urban areas where the method is mostly used. For this study, a background ozone concentration of 56 parts per billion (ppb) (120 µg/m<sup>3</sup>) was used.

The OLM method can be summarised by the following equation:

$$[\text{NO}_2]_{\text{total}} = \{0.1 \times [\text{NO}_x]_{\text{predicted}}\} + \text{minimum of } \{0.9 \times [\text{NO}_x]_{\text{predicted}} \text{ or } (46/48) \times [\text{O}_3]_{\text{background}}\} + [\text{NO}_2]_{\text{background}}$$

Where:

[NO<sub>2</sub>]<sub>total</sub> = the predicted concentration of NO<sub>2</sub>, via OLM, in µg/m<sup>3</sup>

[NO<sub>2</sub>]<sub>predicted</sub> = the predicted concentration of NO<sub>2</sub> in µg/m<sup>3</sup> from the dispersion model in µg/m<sup>3</sup>

[O<sub>3</sub>]<sub>background</sub> = the background concentration of O<sub>3</sub> in µg/m<sup>3</sup>

46/48 = the molecular weight of NO<sub>2</sub> divided by the molecular weight of O<sub>3</sub>

[NO<sub>2</sub>]<sub>background</sub> = the background concentration of NO<sub>2</sub> in µg/m<sup>3</sup>

For the annual predictions, 100% NO<sub>x</sub> to NO<sub>2</sub> conversion was applied.



## 8.0 Air Quality Impact Assessment

The sections below summarise the air quality impacts predicted by the modelling. As outlined in **Section 5.1**, dispersion modelling was undertaken for one potential worst-case scenario, representing concurrent operations of open cut and underground mining activities alongside ore processing activities. Combustion emissions associated with the proposed power plant have also been assessed in this study.

Isopleth plots showing the predicted cumulative impacts surrounding the Site are presented in the following sections. The estimated background concentrations derived in **Section 4.9** were used to calculate the cumulative impacts.

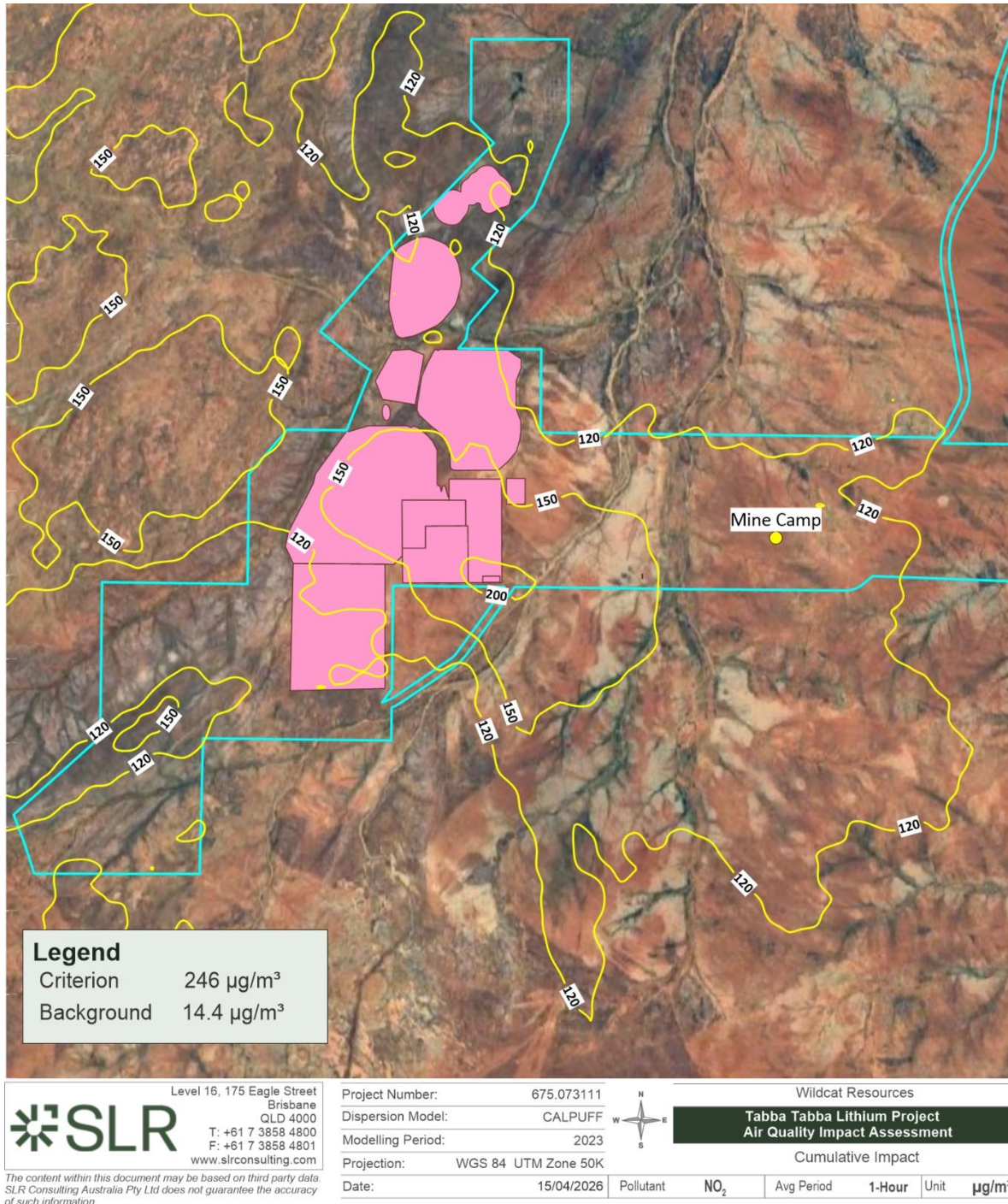
It is important to note that these plots do not represent the dispersion pattern for any individual period, but rather illustrate the maximum concentration predicted to occur at each model calculation point given the range of meteorological conditions occurring over the 2023 modelling period.

### 8.1 Nitrogen Dioxide (NO<sub>2</sub>)

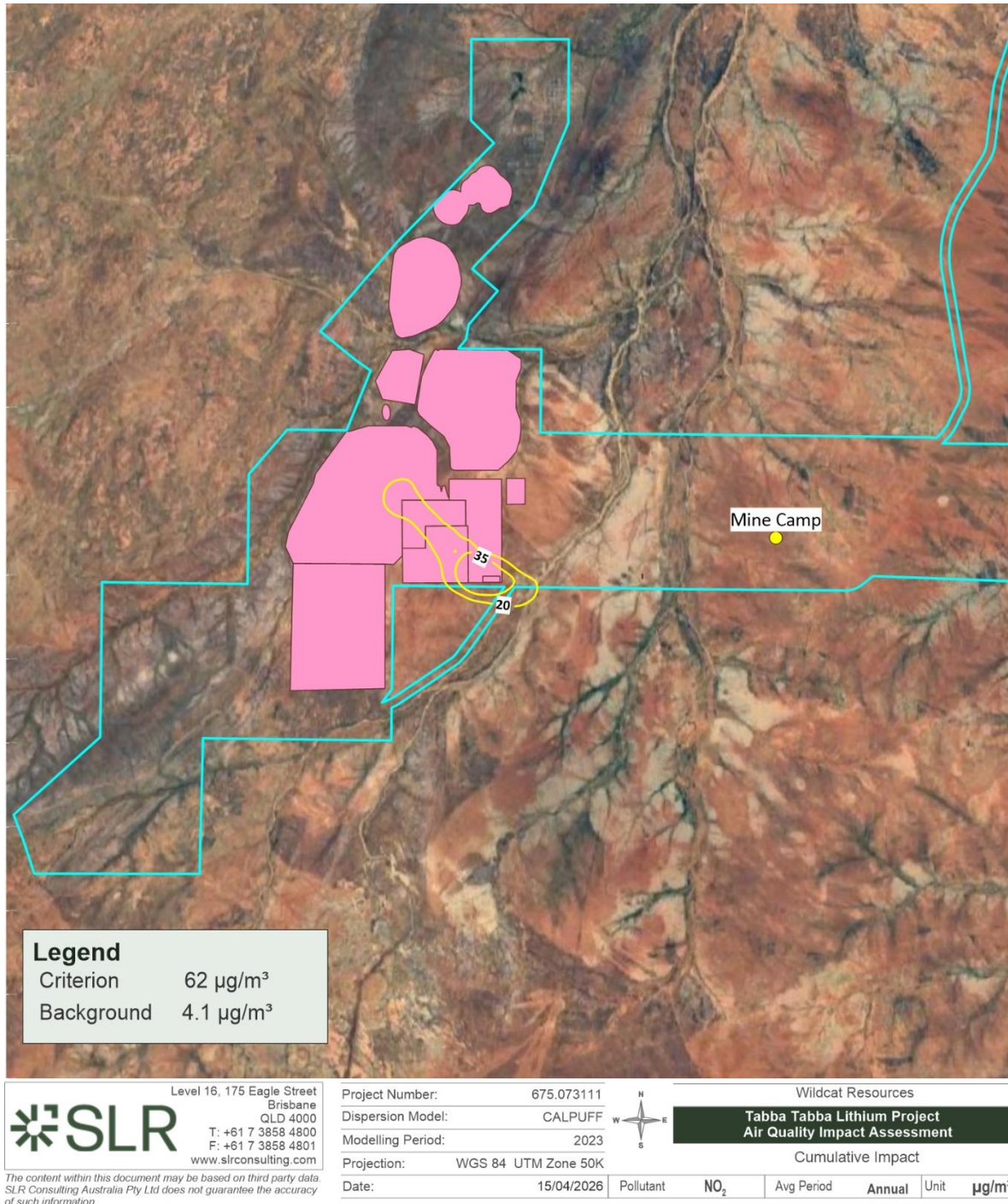
Cumulative NO<sub>2</sub> results are presented in **Figure 13** and **Figure 14** for 1-hour and annual averaging periods respectively. Modelling results presented in **Figure 13** and **Figure 14** indicate that the predicted cumulative NO<sub>2</sub> concentrations associated with the proposed power plant is minimal and predicted cumulative NO<sub>2</sub> concentrations are well below the relevant criteria at the vicinity of the Project site for all relevant averaging periods.



**Figure 13 Predicted Cumulative 1-hour Average NO<sub>2</sub> Concentrations**



**Figure 14 Predicted Cumulative Annual Average NO<sub>2</sub> Concentrations**



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## 8.2 Particulate Matter

### 8.2.1 PM<sub>2.5</sub>

Cumulative PM<sub>2.5</sub> results are presented in **Figure 15** and **Figure 16** for the 24-hour and annual averaging periods respectively. The modelling results indicate that the predicted 24-hour and annual average cumulative concentrations have the potential to exceed the relevant criteria within approximately 500 m (24-hour average) and 1.5 km (annual average) of the Development Envelope.

It is noted that a detailed mine progression footprint was not available at the time of preparing this assessment. Therefore, a number of conservative assumptions were adopted in estimating potential particulate emissions. These include the use of maximum annual ROM and overburden throughput rates, as well as maximum exposed areas that were calculated based on the full footprint of pits, overburden dumps and the dry tailing stockpile areas.

As a result of these assumptions, the modelling results are likely to overestimate actual PM<sub>2.5</sub> concentrations during operations.

### 8.2.2 PM<sub>10</sub>

Cumulative PM<sub>10</sub> results are presented in **Figure 17** and **Figure 18** for the 24-hour and annual averaging periods respectively. The modelling results indicate that the predicted 24-hour and annual average cumulative concentrations have the potential to exceed the relevant criteria at up to approximately 6 km from the Development Envelope.

As discussed above, the modelling results are likely to overestimate the actual PM<sub>10</sub> concentrations during operations due to the use of conservative activity data and assumptions regarding maximum disturbance footprints for pit, overburden dumps and dry tailing stockpile areas.

### 8.2.3 TSP

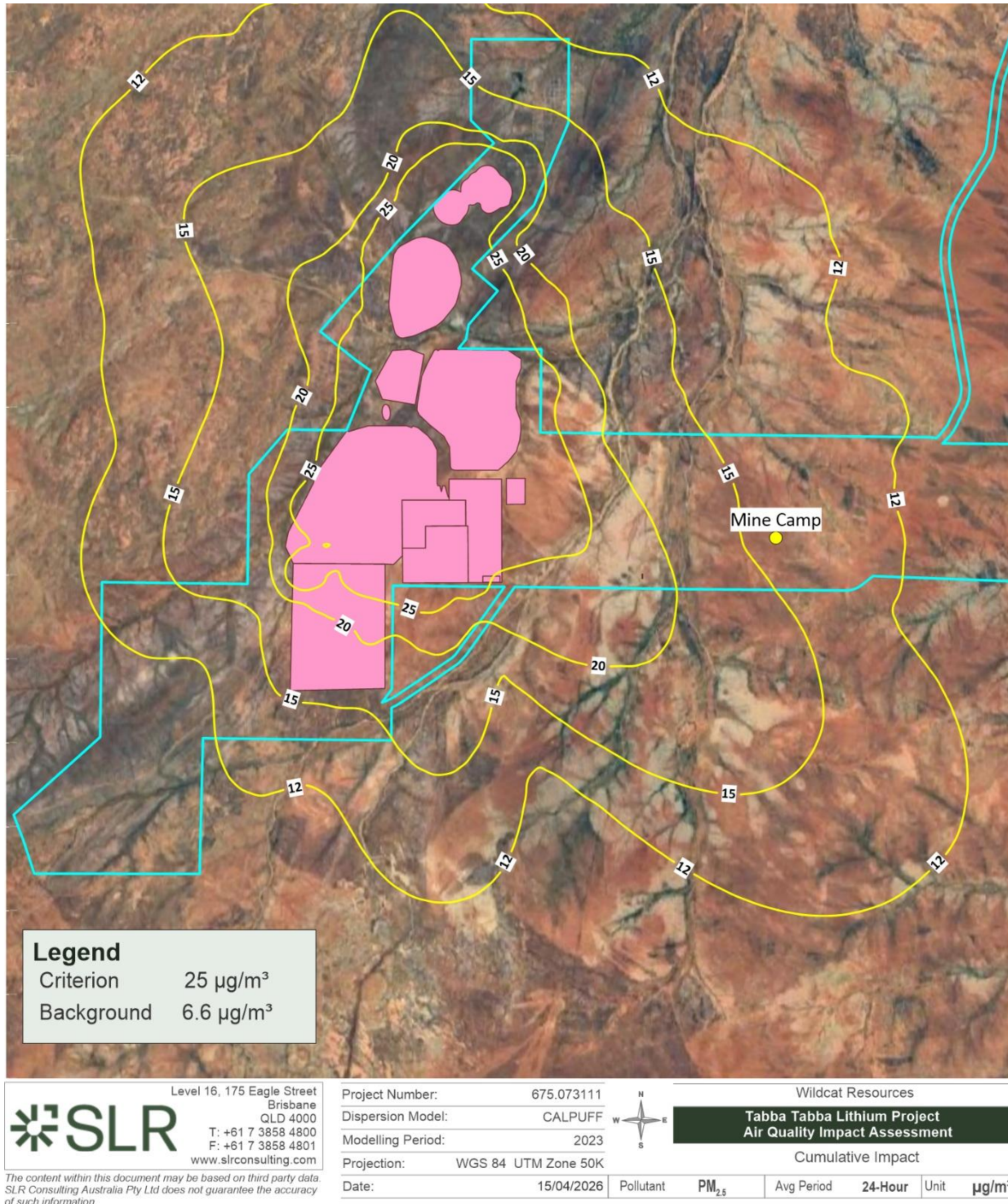
Predicted cumulative 24-hour averaged TSP concentrations are presented in **Figure 19**. Similar to PM<sub>10</sub>, the modelling results indicate that predicted 24-hour averaged TSP concentrations have the potential to exceed the relevant criteria at distances up to approximately 6 km from the Development Envelope.

### 8.2.4 Deposited Matter

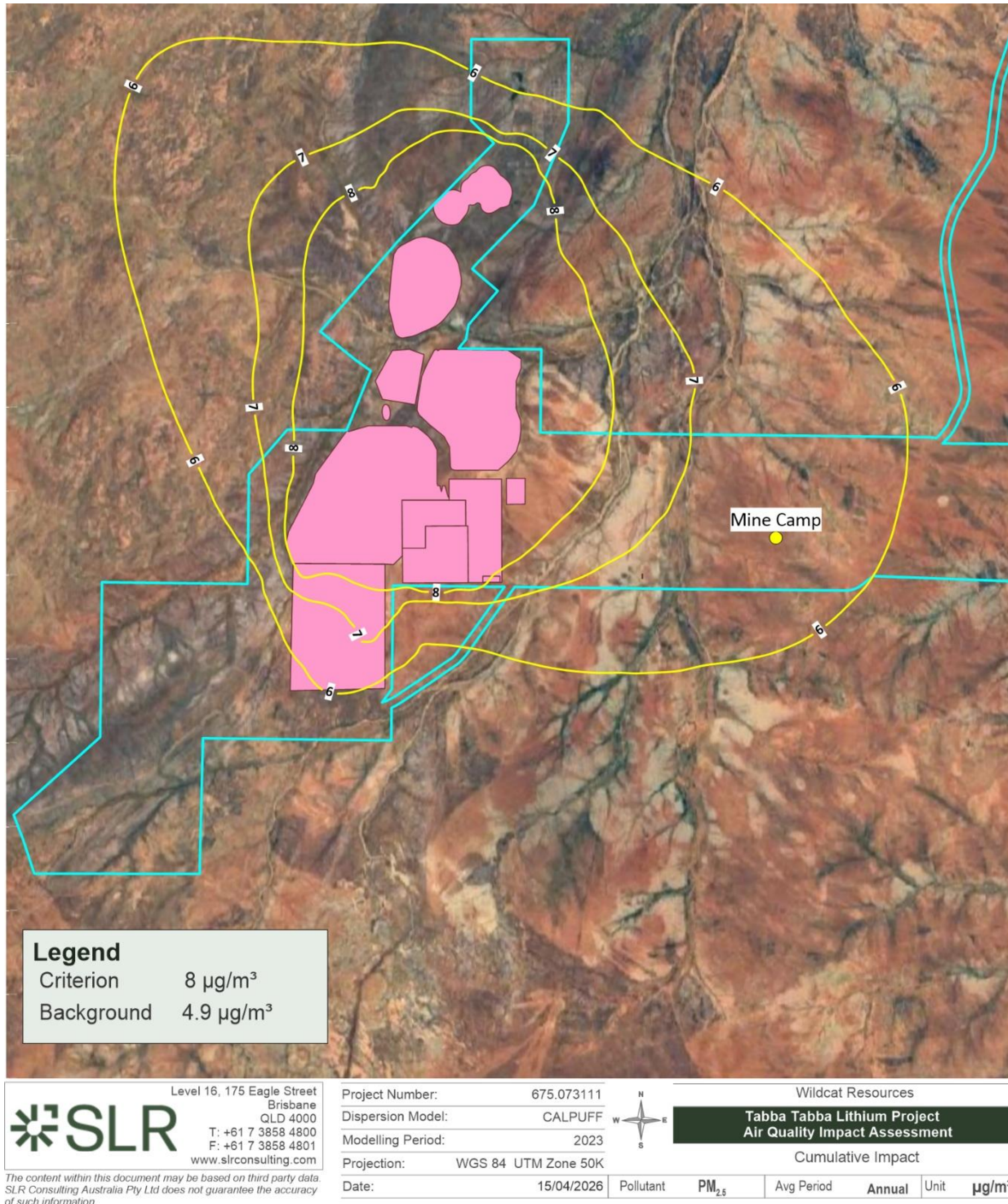
The predicted cumulative maximum monthly dust deposition rates are presented in **Figure 20**. The predicted cumulative dust deposition rates are largely compliant with the relevant criteria beyond the Development Envelope, although slight exceedances are predicted in close proximity to the pit areas.



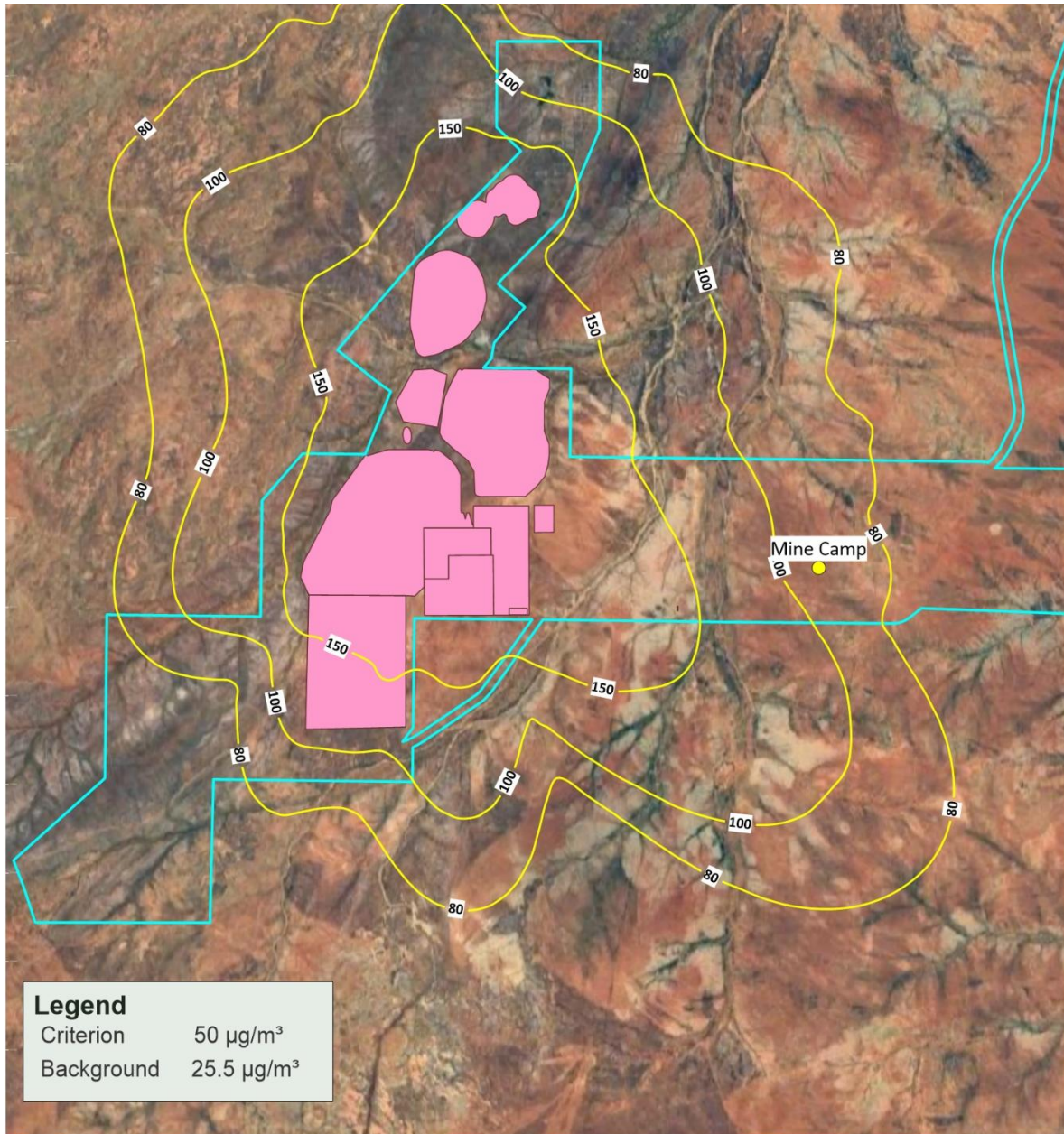
**Figure 15 Predicted Cumulative 24-hour Average PM<sub>2.5</sub> Concentrations**



**Figure 16 Predicted Cumulative Annual Average PM<sub>2.5</sub> Concentrations**



**Figure 17 Predicted Cumulative 24-hour Average PM<sub>10</sub> Concentrations**



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Project Number: 675.073111  
 Dispersion Model: CALPUFF  
 Modelling Period: 2023  
 Projection: WGS 84 UTM Zone 50K  
 Date: 15/04/2026

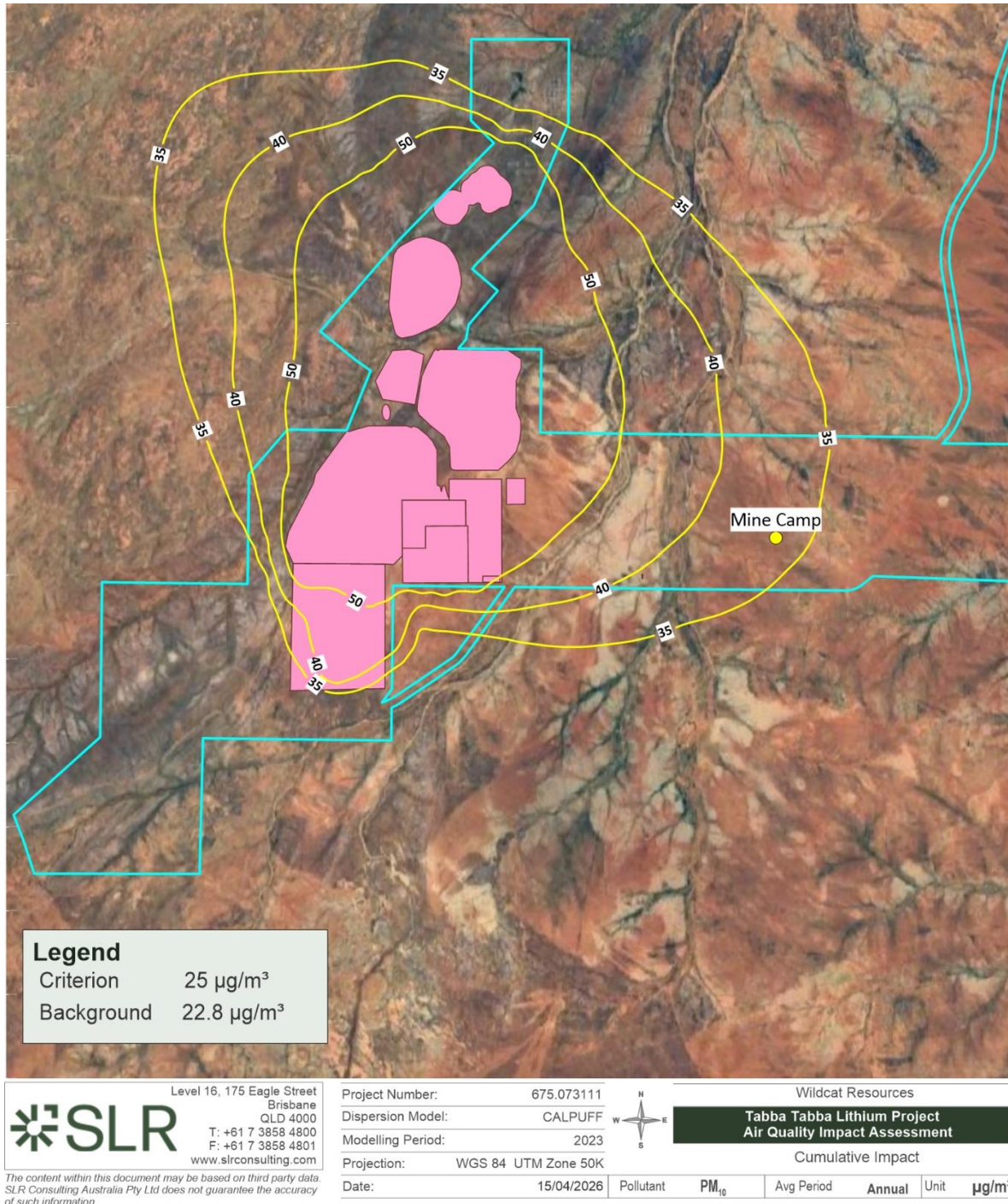


Wildcat Resources  
**Tabba Tabba Lithium Project**  
**Air Quality Impact Assessment**  
 Cumulative Impact

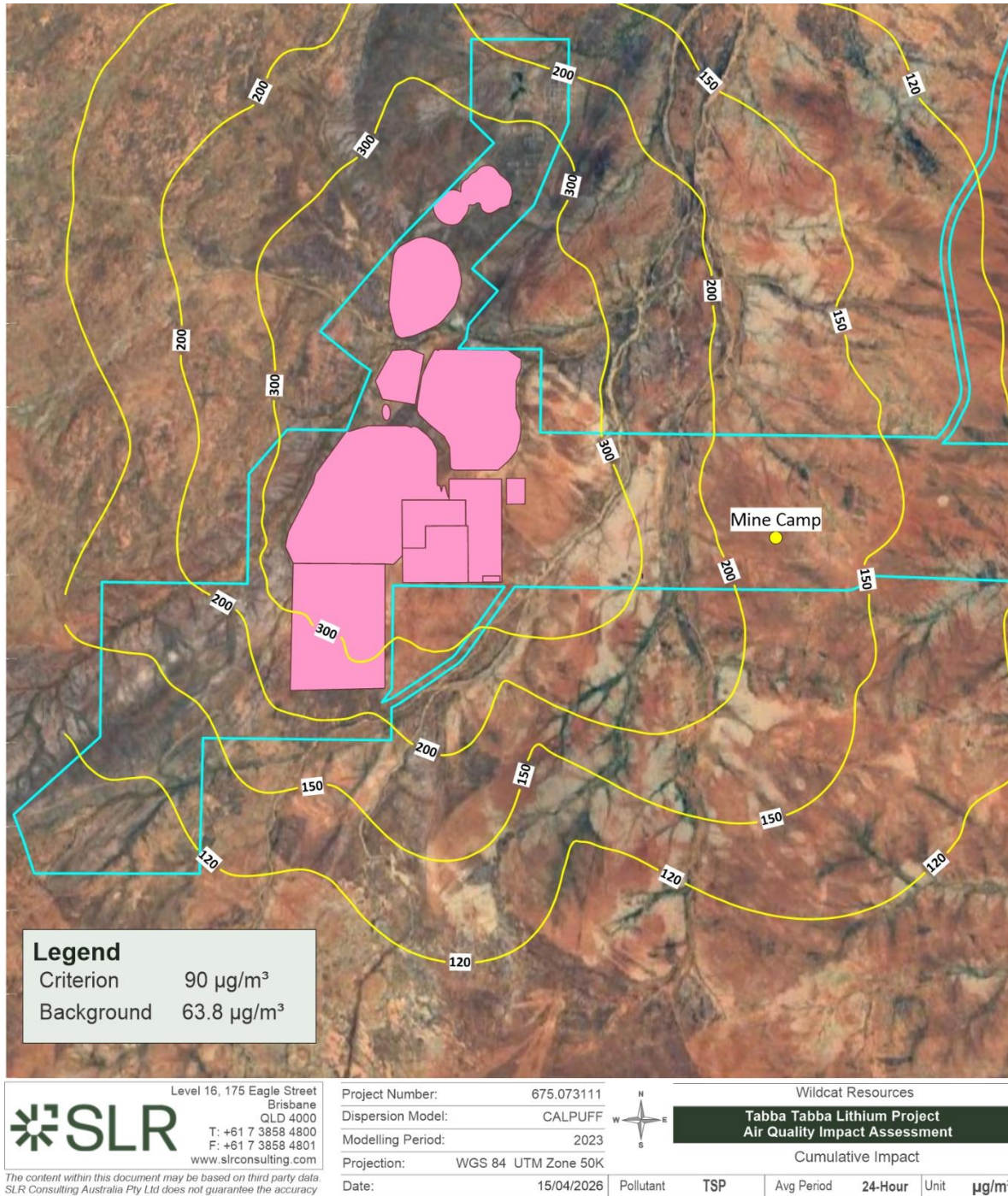
Pollutant	Avg Period	Unit
PM <sub>10</sub>	24-Hour	µg/m <sup>3</sup>



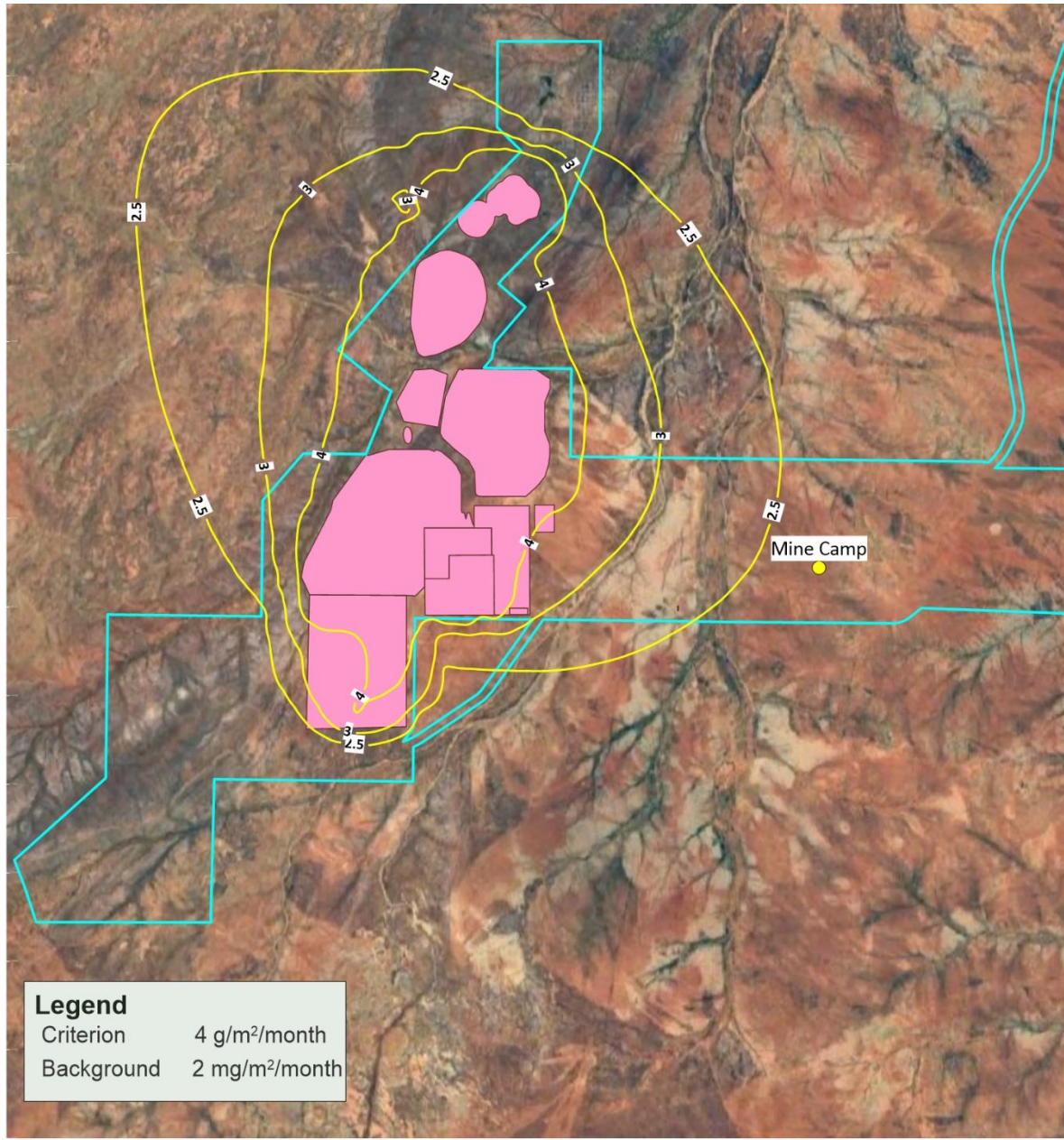
**Figure 18 Predicted Cumulative Annual Average PM<sub>10</sub> Concentrations**



**Figure 19 Predicted Cumulative TSP Concentrations**



**Figure 20 Predicted Cumulative Deposited Dust Concentrations**



**Legend**  
 Criterion 4 g/m<sup>2</sup>/month  
 Background 2 mg/m<sup>2</sup>/month

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Project Number: 675.073111  
 Dispersion Model: CALPUFF  
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 Projection: WGS 84 UTM Zone 50K  
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Wildcat Resources  
**Tabba Tabba Lithium Project**  
**Air Quality Impact Assessment**

Cumulative Impact

Pollutant	Dust	Avg Period	30-Days	Unit	g/m <sup>2</sup> /month
-----------	------	------------	---------	------	-------------------------



## 9.0 Mitigation Measures and Contingency Plans

While no sensitive receptors within 6 km of the Development Envelope have been identified surrounding the project site, no material potential human health risks are anticipated. The following mitigation measures are recommended to minimise dust emissions and support best practice at the Site.

**Table 13 Recommended Dust Mitigation Measures**

<b>Operational Management and Training</b>
Deliver inductions to all new employees and relevant site personnel, as well as regular follow up training, to highlight the importance of dust control
Check forecast weather conditions prior to shift and communicate any high risks of dust to staff
Select work areas (excavation and dumping) considering level of exposure to wind and off-site visible dust plumes from work activities
<b>Disturbed Areas</b>
Minimise disturbed areas as much as possible
Use water cart and/or cannon to wet down work areas if required
Locate stockpiles in shielded/sheltered areas where possible
Stabilise overburden dump and dry tailing stockpile areas (e.g. grass or encrusting agent) that are not in use for longer periods
<b>Loading/Unloading</b>
Minimise/reduce drop heights for loading and unloading as much as possible
Do not overload trucks
Ensure material loads are sufficiently wetted where possible (visual assessment) to reduce dust, with sprinklers and water carts deployed as required (at loading and unloading areas in summer and/or windy and dry conditions)
Manage stockpile area to prevent buildup of spilled material in loading and unloading areas
Relocate loading and tipping/unloading activities to more sheltered areas in high winds if possible
Modify operations to focus on handling of material with less fines and higher moisture content (lower dust generation potential) in high wind conditions if possible
<b>Wheel-Generated Dust</b>
Ensure speeds are safe and are minimised to reduce wheel generated dust at all times.
Maintain unsealed haul roads and work areas to reduce silt build up and road surface deterioration with regular grading and dressing with aggregates, as required
Perform daily visual assessment of vehicle routes and re-route vehicles from problem areas until issue is remediated
Deploy water cart in dry and windy conditions, when required



## 10.0 Conclusions

SLR Consulting Australia Pty Ltd was engaged by Wildcat Resources Limited to undertake an air quality impact assessment for the proposed Tabba Tabba Lithium Mine.

The assessment considered potential air quality impacts associated with mining, processing and power generation activities, including emissions of particulate matter and combustion related pollutants. Emission rates for particulate matter were estimated using established emission factors from the USEPA AP42, ACARP and the National Pollutant Inventory (NPI) guidelines in conjunction with the project specific activity data. Emissions from the gas fired power plant were estimated using information and data available to SLR at the time of preparing this assessment.

Combustion emissions associated with the operation of mobile and fixed mining equipment were not modelled in detail as these sources are spatially dispersed and are expected to result in relatively minor ground level concentrations at offsite locations. In addition, emissions of CO, SO<sub>2</sub> and VOCs emissions associated with the power plant were not modelled, based on a screening assessment indicating that these emissions are expected to be low and therefore unlikely to result in significant offsite impacts.

Dispersion modelling was undertaken using the CALPUFF model that uses three-dimensional site specific meteorological data generated using a combination of TAPM/CALMET models as an input.

The modelling results indicate that predicted cumulative 1-hour and annual average NO<sub>2</sub> concentrations associated with emissions from the proposed gas fired power plant comply with the relevant air quality criteria across the modelling domain.

Predicted cumulative PM<sub>2.5</sub>, PM<sub>10</sub> and TSP concentrations for the relevant averaging periods indicate the potential for exceedances of the relevant criteria in areas proximate to the Development Envelope, particularly under worst-case operating and meteorological conditions. However, no sensitive receptors have been identified within these areas. Furthermore, the assessment adopted a number of conservative assumptions as detailed operational information and mine progression data were not available at the time of preparing this assessment. Given this, the predicted impacts are considered likely to overestimate actual conditions during operations.

Predicted dust deposition rates are generally compliant with the relevant criteria beyond the Development Envelope, with only minor exceedances predicted in close proximity to operational areas.

Based on the results of the modelling study and taking into account the conservative nature of the modelling and emission estimates and considering that no sensitive receptors are located within 6 km of the Development Envelope, no material air quality constraints are anticipated for this Project. Implementation of the recommended mitigation and management measures will further minimise potential air quality impacts in surrounding areas during the operational phase of the Project.



## 11.0 References

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# Appendix A Emission Factors

## Tabba Tabba Lithium Mine

**Air Quality Impact Assessment**

**Wildcat Resources Limited**

SLR Project No.: 675.073111.00001

22 May 2026

ACTIVITY	Annual Average Emission Rate (kg/y)			Intensity	Units	TSP Emission Factor	PM10 emission factor	Pm2.5 emission factor	Units
	TSP emission (kg/y)	PM10 emission (kg/y)	PM2.5 emission (kg/y)						
Dozer	6,294	583	58	17,900	hours/year	0.4	0.03	0.003	kg/h
Drilling	30,682	15,955	1,436	52,003	holes/year	0.5900	0.3068	0.0276	kg/hole
Blasting	17,267	8,979	518	260	blasts/year	66	35	2	kg/blast
Loading waste to truck - open cut	55,056	26,040	3,943	37,200,000	t/year	0.00148	0.00070	0.00011	kg/t
Loading waste to truck - portal	622	294	45	420,000	t/year	0.00148	0.00070	0.00011	kg/t
Loading ROM to trucks -open cut	18,000	7,200	720	3,600,000	tonnes/year	0.005	0.0020	0.00020	kg/t
Loading ROM to trucks -Portal	5,550	2,220	222	1,110,000	tonnes/year	0.005	0.0020	0.00020	kg/t
Hauling waste on unpaved roads - open cut	2,557,542	622,069	62,207	37,200,000	tonnes/year	0.275	0.067	0.007	kg/t
Hauling waste on unpaved roads -Portal	14,700	3,576	358	420,000	tonnes/year	0.140	0.034	0.003	kg/t
Hauling ROM on unpaved roads - Open cut	234,004	56,917	5,692	3,600,000	tonnes/year	0.260	0.063	0.006	kg/t
Hauling ROM on unpaved roads - Portal	69,376	16,874	1,687	1,110,000	tonnes/year	0.250	0.061	0.006	kg/t
Emplacing waste at WRL - open cut	55,056	26,040	3,943	37,200,000	t/year	0.00148	0.00070	0.00011	kg/t
Emplacing waste at WRL- portal	622	294	45	420,000	t/year	0.00148	0.00070	0.00011	kg/t
Loading ROM to stockpiles	23,550	9,420	942	4,710,000	tonnes/year	0.0050	0.0020	0.00020	kg/t
Unloading ROM from stockpile	23,550	9,420	942	4,710,000	tonnes/year	0.005	0.002	0.0002	kg/t
Primary crushing	11,250	4,500	450	4,500,000	tonnes/year	0.01	0.004	0.0004	kg/t
Secondary crushing	33,750	13,500	1,350	4,500,000	tonnes/year	0.030	0.012	0.0012	kg/t
Hauling rejects	186,620	47,953	4,795	3,850,000	tonnes/year	0.194	0.050	0.005	kg/t
Grading roads	4,063	1,796	126	85,500	km	0.19	0.08	0.01	kg/VKT
Wind erosion - Exposed areas	282,440	141,220	13,218	322	ha	0.40	0.20	0.02	kg/ha/hour
<b>Total emissions (kg/yr)</b>	<b>3,629,994</b>	<b>1,014,848</b>	<b>102,697</b>						
<b>Total emissions (t/yr)</b>	<b>3,630</b>	<b>1,015</b>	<b>103</b>						





# **Appendix B Variable Emission Rates**

## **Tabba Tabba Lithium Mine**

**Air Quality Impact Assessment**

**Wildcat Resources Limited**

SLR Project No.: 675.073111.00001

22 May 2026

A brief summary of the steps used in calculating the hourly varying emission rates for each source are presented below.

Step 1: Calculate annual average emission rate (kg/year) for FP, CM and RE

$FP_{\text{annual}} = PM_{2.5, \text{annual}}$	(FP) <b>Fine Particulate</b> – particulate of size less than 2.5 $\mu\text{m}$
$CM_{\text{annual}} = PM_{10, \text{annual}} - PM_{2.5, \text{annual}}$	(CM) <b>Coarse Particulate</b> – particulate of size between 2.5 $\mu\text{m}$ and 10 $\mu\text{m}$
$RE_{\text{annual}} = TSP_{\text{annual}} - PM_{10, \text{annual}}$	(RE) <b>Remaining Particulate</b> – particulate of size greater than 10 $\mu\text{m}$

Step 2: Identify the operating hours for each activity

Step 3: Classify the sensitivity of each type of activity to wind speed

- Wind insensitive: Activities with emission factor that is independent of wind speed (e.g. blasting)
- Wind sensitive: Activities with emission factor that is a function of (wind speed/2.2)<sup>1.3</sup> (e.g. loading)
- Wind erosion: Emission from exposed areas/stockpiles

Step 4: Identify the number of sources associated with each activity.

Note that each wind erosion source is modelled as an independent source.

Step 5: Calculate the hourly average emission rate for each activity per source

$FP_{AC,i,h} = \frac{FP_{\text{annual},i} \times 1000}{N_{\text{days}} \times OH_i \times 3600 \times N_{s,i}} \times WSFactor_{i,h}$ $CM_{AC,i,h} = \frac{CM_{\text{annual},i} \times 1000}{N_{\text{days}} \times OH_i \times 3600 \times N_{s,i}} \times WSFactor_{i,h}$ $RE_{AC,i,h} = \frac{RE_{\text{annual},i} \times 1000}{N_{\text{days}} \times OH_i \times 3600 \times N_{s,i}} \times WSFactor_{i,h}$ <p>For wind insensitive activities:  <math display="block">WSFactor_{i,h} = 1</math></p> <p>For wind sensitive activities:  <math display="block">WSFactor_{i,h} = \frac{\left(\frac{WS_h}{2.2}\right)^{1.3}}{\frac{\sum_{j=1}^n \left(\frac{WS_j}{2.2}\right)^{1.3}}{n}}</math></p> <p>For wind erosion activities:  <math display="block">WSFactor_{i,h} = \frac{(WS_h)^3}{\frac{\sum_{j=1}^n (WS_j)^3}{n}}</math></p>	<p>Where:</p> <p><math>FP_{AC,i,h}</math> = Fine particulates emission rate for activity i (g/s) at hour h</p> <p><math>CM_{AC,i,h}</math> = Coarse particulates emission rate for activity i (g/s) at hour h</p> <p><math>RE_{AC,i,h}</math> = Remaining particulates emission rate for activity i (g/s) at hour h</p> <p><math>OH_i</math> = Daily operating hours (1- 24) for activity i</p> <p><math>N_{\text{days}}</math> = Number of days in the meteorological data file</p> <p><math>N_{s,i}</math> = Number of sources associated with activity i</p> <p><math>WS_h</math> = Wind speed at the hour</p> <p><math>n</math> = number of hours in the meteorological data file</p>
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Note: If the activity was modelled as area source, the equation on the left column of the table needs to be divided by the area of that activity

Step 6: Calculate hourly average emission rate for each source

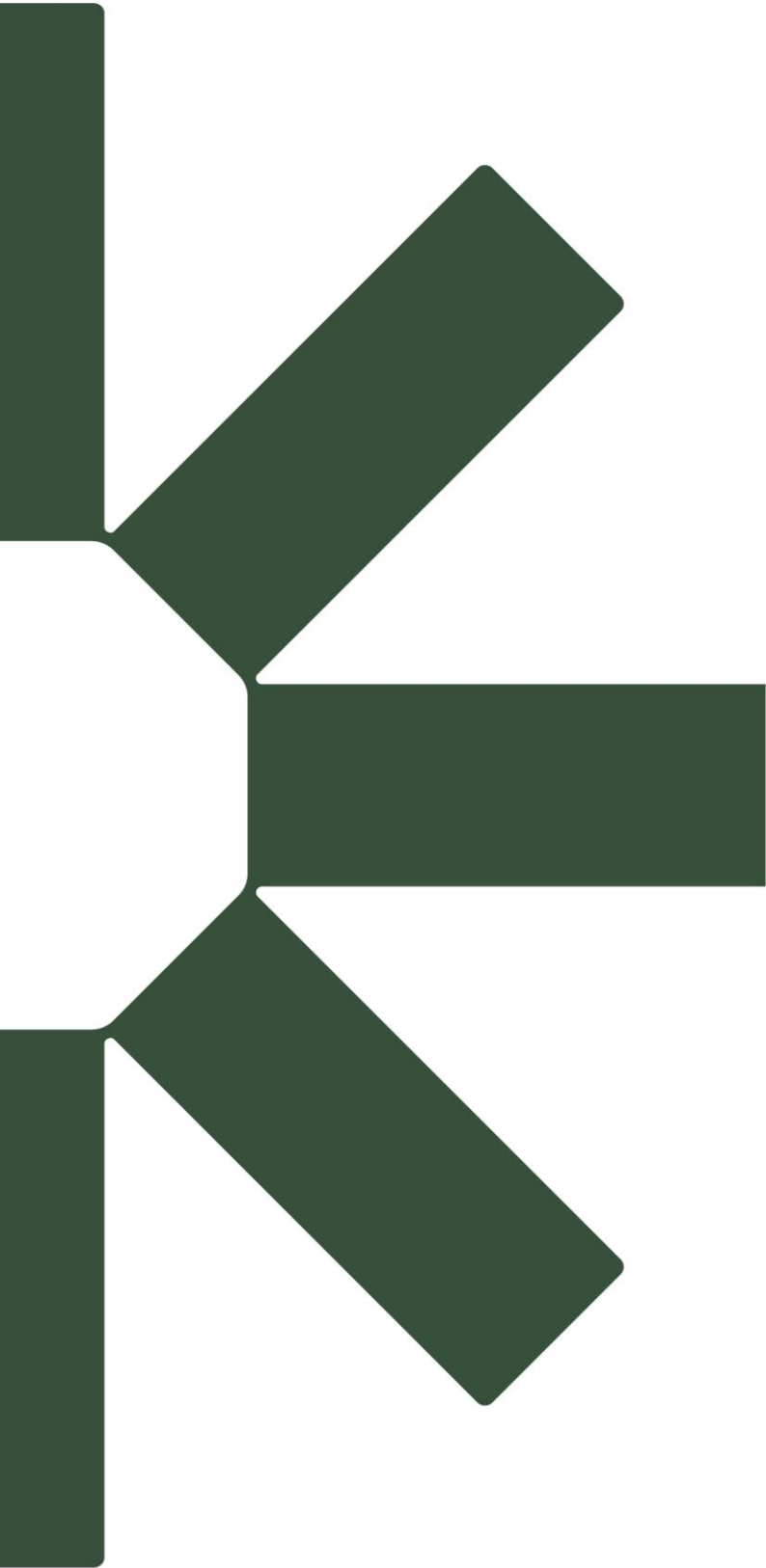


To calculate the emission rate for a particular source for a particular hour, add up the calculated emission rate for each activity associated with that source.

For example, if Source 1 is associated with Activity 1, Activity 2 and Activity 3, then:

- $ER_{S1,h,FP} = FP_{AC,1,h} + FP_{AC,2,h} + FP_{AC,3,h}$
- $ER_{S1,h,CM} = CM_{AC,1,h} + CM_{AC,2,h} + CM_{AC,3,h}$
- $ER_{S1,h,RE} = RE_{AC,1,h} + RE_{AC,2,h} + RE_{AC,3,h}$





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