ALBEMARLE®

Albemarle Lithium Pty Ltd

Albemarle Kemerton Plant Air Quality Impact Assessment - Part A

November 2017

GHD

Abbreviations and glossary

Abbreviation / term	Term
Acid Roasted Solids	Spodumene ore which has undergone all pyrometallurgical treatment including calcining, grinding and roasting
Air NEPM	National Environment Protection (Ambient Air Quality) Measure
Albemarle	Albemarle Lithium Pty Ltd
Albemarle Kemerton Plant	A Lithium Hydroxide Product manufacturing Plant and associated infrastructure which is proposed to be established wholly within Lot 510 Wellesley Road, Wellesley, and operated by Albemarle Lithium Pty Ltd
AFW	AMEC Foster Wheeler
AQMS	Air quality monitoring station
AWS	Automatic weather station
Background levels	Existing concentrations of pollutants in the ambient air
BoM	Bureau of Meteorology
CO	Carbon monoxide
Cumulative concentrations	Incremental pollutant concentrations plus background concentrations
DWER	Department of Water and Environmental Regulation
EPA	Environmental Protection Authority
EPP	Environmental Protection Policy
GHD	GHD Pty Ltd
Incremental concentrations	Predicted impacts due to the Albemarle Kemerton Plant's pollutant source alone
Kemerton Strategic Industrial Area (KSIA)	An Industrial Park 17 km north east of Bunbury established to provide a location for downstream processing and value adding to th South West's primary resources. It comprises a 2,024 ha Industry Zone, 284 ha Ancillary Industry zone and 5,200 ha Industry Buffer Zone.
km	Kilometre
Lithium Hydroxide Product	Lithium hydroxide monohydrate (the product)
m/s	Metres per second
Na_2SO_4	Sodium sulphate by-product
NEPM	National Environment Protection Measure
NPI	National Pollutant Inventory
NO_2	Nitrogen dioxide
NOx	Oxides of nitrogen
Plant	Industrial processing infrastructure used to manufacture Lithium Hydroxide Product from spodumene containing ore concentrate.
PM_{10}	Particulate matter less than or equal to 10 microns in diameter
$PM_{2.5}$	Particulate matter less than or equal to 2.5 microns in diameter
Stack	A vertical pipe used to vent pollutants from a process
Sensitive receptor	A location where people are likely to work or reside; this may include a dwelling, school, hospital, office or public recreational area
SO_2	Sulphur dioxide
SO_3	Sulphur trioxide

Abbreviation / term	Term
Spodumene ore concentrate	Naturally occurring lithium aluminosilicate material with crystalline zeolite structure (used as a 6.0% Li2O concentrate)
t	Tonnes
the Plant	Lithium Hydroxide Product manufacturing Plant
tpa	Tonnes per annum
µ	Microns
µg/m^3	Micro-grams per metre cubed
Vic EPA	Victorian Environment Protection Authority
VOC	Volatile organic compound

Table of contents

Table index

Figure index

1. Introduction

1.1 Background

Albemarle Lithium Pty Ltd (Albemarle) propose to construct and operate a Lithium Hydroxide Product manufacturing Plant (Albemarle Kemerton Plant) within the Kemerton Strategic Industrial Area (KSIA), approximately 17 km north-east of Bunbury, Western Australia. The Plant will process spodumene ore concentrate supplied from Talison's Greenbushes operation, located approximately 100 km south of the KSIA.

Albemarle intends to submit a formal referral of the Albemarle Kemerton Plant to the Environmental Protection Authority (EPA) under Section 38 of the *Environmental Protection Act 1986* (EP Act). This air quality impact assessment has been prepared to support the formal referral.

1.2 Scope of work

GHD was commissioned to assess the potential air impacts from the construction and the operation of the Albemarle Kemerton Plant. The study's scope is to:

- Outline the existing baseline air environment, including nearby sensitive receptors
- Undertake air dispersion modelling in order to predict pollutant concentrations at nearby sensitive receptors
- Assess predicted concentrations of pollutants at the nearest receptors against relevant air quality standards.
- Outline possible management and mitigation measures, which could be implemented at the Plant to manage any potential air impacts.

1.3 Limitations

This report has been prepared by GHD for Albemarle Pty Ltd (Albemarle) and may only be used and relied on by Albemarle for the purpose agreed between GHD and the Albemarle as set out in Section 1.2 of this report.

GHD otherwise disclaims responsibility to any person other than Albemarle arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD accepts no responsibility for the integrity of the software coding of the approved air dispersion model (AERMOD) used.

GHD has prepared this report on the basis of information provided by Albemarle and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

2. Project overview

2.1 Project outline

The Albemarle Kemerton Plant will primarily consist of the Plant and associated supporting infrastructure, access roads and utilities covering an area of approximately 89.25 hectares.

The Plant will process lithium aluminosilicate ore (referred to as spodumene ore concentrate) transported from Talison's Greenbushes operation, located approximately 100 km south of the KSIA. The Plant will process up to one million tonnes per year (tpa) of spodumene ore concentrate (containing 6% lithium) via pyrometallurgical and hydrometallurgical unit operations to produce up to 100,000 tpa Lithium Hydroxide Product and Sodium Sulfate By-Product as the final products.

The Plant will comprise multiple process trains, with each train capable of producing 20,000 tpa of Lithium Hydroxide Product. The Plant will initially produce Lithium Hydroxide Product at a rate of 20,000 tpa from a single process train, with plans to increase up to a series of five 20,000 tpa trains.

A schematic flow diagram for each train is shown in Figure 2-1.

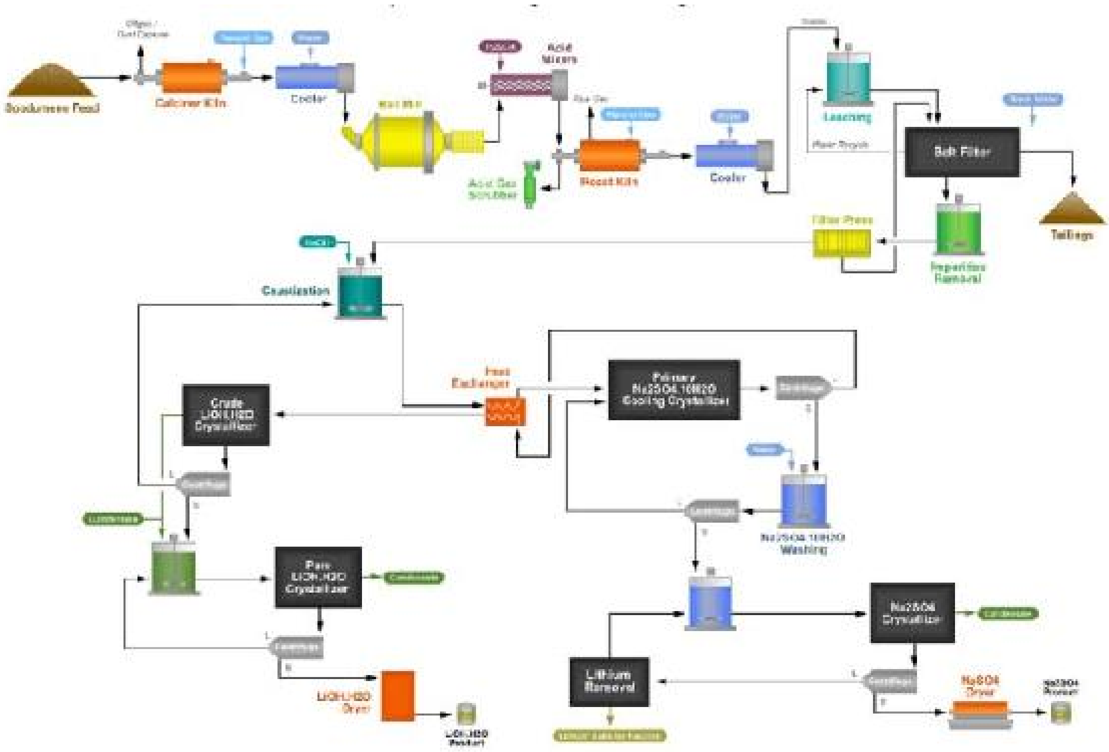


Figure 2-1 Spodumene refining process

2.2 Operational air emissions

Emissions from the Plant consist of nitrous oxide (NO_X), sulphur oxides (SO_2 and SO_3), carbon monoxide (CO), particulate matter less than or equal to 10 microns in diameter (PM_{10}) and particulate matter less than or equal to 2.5 microns in diameter ($PM_{2.5}$).

The main air emission sources within the Albemarle Kemerton Plant are:

- Calciner flue – flue gas and dust from direct fired calciner is treated in three stages of dust removal (gravity, cyclones, bag filter) prior to being vented into atmosphere.
- Ball mill vent- air is drawn through the mill to facilitate material movement and treated in a bag filter prior to venting to atmosphere.
- Acid Roast Kiln flue vent - flue gas is kept separate from the process gas by utilising an indirect heating design. Combustion gases are vented to the atmosphere without treatment.
- Acid Roast scrubber vent - Process off gas from the Acid Roast Kiln, which contains sulphuric acid mist and sulphur trioxide (SO_3), is scrubbed in four stages: (1) venturi; (2) packed with water; (3) packed with sodium hydroxide and (4) electrostatic precipitator (ESP) prior to venting to atmosphere.
- Acid Roast rotary kiln cooler vent – Acid roasted solids are indirectly water cooled in a rotary kiln. Dust from the rotary kiln is removed in a bag filter prior to venting the off-gas to atmosphere .
- Lithium hydroxide monohydrate dryer – Moist vapour from the dryer is vented to atmosphere via a wet spray scrubber.
- Lithium hydroxide monohydrate cooler – Moist vapour from the cooler is vented to atmosphere via a wet spray scrubber.
- Sodium sulphate dryer vent – The sodium sulfate flash dryer is direct fired with natural gas. Off gases are treated with a combination of a cyclone and a bag filter prior to being vented to atmosphere.
- Steam boiler flue – the steam boiler is natural gas fired and combustion gases are vented to the atmosphere without treatment.

There is potential for spodumene ore concentrate dust and acid roasted solids to be released from the boundary of the Albemarle Kemerton Plant as a result of the operating process. However, it should be noted that the Plant is designed so that it undertakes all materials handling and transfers within covered storage or conveyor systems in order to minimise dust emissions.

3. Existing environment

This section provides a summary of the existing environmental aspects relevant to assessment of air quality impacts from the Plant, including existing ambient air quality, meteorology and sensitive receptors.

3.1 Physical environment

The primary land uses within close proximity of the Plant are rural, industrial and conservation; with a number of specific operations/facilities currently occurring in the area including landfill, quarries, processing plants and a wastewater treatment plant.

3.2 Existing air environment

When assessing the impacts to air quality it is important to understand the existing air quality in order to quantify the cumulative l impact.

The Department of Water and Environmental Regulation (DWER) maintains a number of air quality monitoring stations (AQMS's) in the Perth and Southwest region of Western Australia.

Bunbury AQMS is located approximately 13 km southwest of the Plant is the closest DWER monitoring station. Bunbury AQMS monitors particulates less than or equal to 10 microns in diameter (PM_{10}) and particulates less than or equal to 2.5 microns in diameter ($PM_{2.5}$). The station does not monitor NO_2, SO_2 or CO.

South Lake AQMS is located approximately 140 km north of the Plant. It is the closest DWER station that monitors NO_2, SO_2 and CO. South Lake AQMS can be considered representative of the Plant's ambient air quality as it lies within an industrial area, which is of a similar land use for the Plant. Furthermore, South Lake AQMS is situated not far from urbanised areas, as opposed to the Plant, which is within a rural area. This provides a conservative estimation for existing air quality, as South Lake is expected to have a higher level of pollution contributions from urban activities.

2015 air quality monitoring data for the Bunbury (PM10, PM2.5), and South Lake (O2, SO2 and CO) AQMS is shown in Table 3.1. The 75th percentile values for 1 hour averaging periods are shown for PM10, PM2.5, NO2, SO2 and CO as it is considered a stable and representative figure of the existing air quality. The averaging period for each air concentration presented in is equivalent to the averaging period of the relevant regulatory air quality criteria (refer Section 4).The values shown are considered to represent background air quality for the KSIA 2015 data was selected as it pairs with the 2015 meteorological data used in this assessment (refer to Section 3.3).

Table 3-1 Existing air quality for the KSIA based on Bunbury and South Lake AQMS 2015 monitoring results (DWER 2016)

Pollutant	Averaging period	Concentration (µg/m³)
PM_{10}	24 hour (75th percentile)	21
	Annual	18
$PM_{2.5}$	24 hour (75th percentile)	10
	Annual	9
NO_2	1 hour (75th percentile)	41
	Annual	13
SO_2	1 hour (75th percentile)	21
	24 hour (75th percentile)	8
	Annual	5
CO	8 hour (75th percentile)	575

3.3 Meteorology

The proposed area has a Mediterranean climate, with warm dry summers and cool wet winters, with the majority of the rain falling in the winter. The closest Bureau of Meteorology (BoM) weather station to the study site, which records wind speeds and directions as well as temperatures, is the Bunbury automatic weather station (AWS) (station number 009965). This has been operating since 1995. A summary of basic meteorological data from this weather station is provided in Table 3-2.

Table 3-2 Bunbury AWS climate statistics

Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Annual
Mean max temp (°C)	30	30	28	24	21	19	17	18	19	21	24	27	23
Mean min temp (°C)	16	16	14	12	9	8	7	8	9	10	12	14	11
Mean rainfall (mm)	12	8	19	37	99	132	142	120	84	32	24	18	728
Mean 9:00 wind speed (km/hr)	18	18	17	14	12	13	13	13	16	17	18	17	16
Mean 15:00 wind speed (km/hr)	22	22	20	18	17	18	19	19	21	21	23	22	20

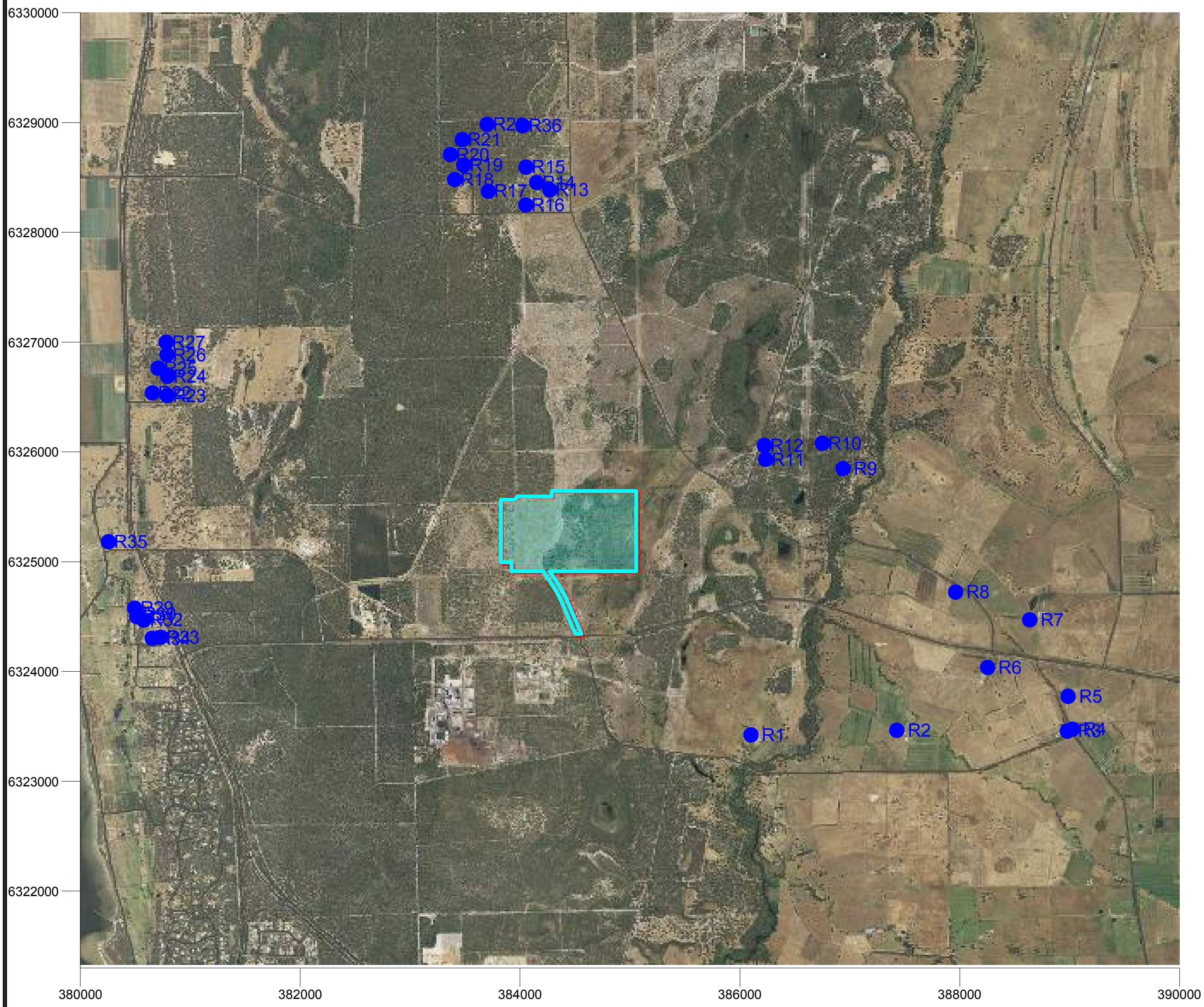
3.4 Sensitive receptors

Sensitive receptors are defined as a location where people are likely to work or reside; this may include a dwelling, school, hospital, office or public recreational area (EPA, 2017). There are residential areas located to the north, east and west of the proposed Plant. There are some reserves located east of the Plant.

Thirty-six sensitive receptors (rural residential houses) have been included in this assessment (R1 to R36), which were identified by cadastral data and are listed in Table 3-3 and are shown in Figure 3-1.

Table 3-3 Sensitive receptor locations

ID	Easting (m)	Northing (m)	Elevation (m AHD)
R1	386,101	6,323,421	20
R2	387,428	6,323,464	19
R3	388,979	6,323,457	20
R4	389,026	6,323,474	19
R5	388,987	6,323,775	9
R6	388,255	6,324,037	1
R7	388,637	6,324,471	47
R8	387,962	6,324,723	38
R9	386,939	6,325,848	1
R10	386,752	6,326,078	54
R11	386,235	6,325,931	58
R12	386,224	6,326,057	54
R13	384,270	6,328,386	38
R14	384,150	6,328,453	36
R15	384,056	6,328,595	31
R16	384,051	6,328,248	42
R17	383,711	6,328,374	38
R18	383,406	6,328,480	34
R19	383,488	6,328,612	30
R20	383,366	6,328,707	27
R21	383,474	6,328,844	23
R22	380,655	6,326,537	36
R23	380,790	6,326,511	37
R24	380,793	6,326,688	32
R25	380,707	6,326,762	29
R26	380,789	6,326,883	25
R27	380,782	6,326,998	22
R28	383,700	6,328,983	18
R29	380,494	6,324,577	40
R30	380,517	6,324,525	42
R31	380,514	6,324,500	42
R32	380,577	6,324,469	44
R33	380,729	6,324,312	49
R34	380,651	6,324,301	49
R35	380,254	6,325,182	20
R36	384,026	6,328,971	19



0 500 1000 1500 2000

Legend

Proposed plant boundary

Sensitive receptor

ALBEMARLE
KEMERTON INDUSTRIAL PARK
LITHIUM ADVANCED MATERIAL PLANT
AIR QUALITY ASSESSMENT

Sensitive receptors

FIGURE 3-1

4. Assessment criteria

Air quality impacts are assessed by comparing monitoring results or model predictions with appropriate criteria. The criteria referred to during assessment of the Albemarle Kemerton Plant include:

- National Environmental Protection Measures (NEPM)
- Victorian Environment Protection Authority (Vic EPA) design criteria

State specific air quality criteria is gradually being developed for Western Australia. DWER recommends to adopt the NEPM for ambient air quality criteria (DEC, 2011) in the absence of State regulation.

4.1 National Environment Protection Measures

The *National Environment Protection (Ambient Air Quality) Measure* (Air NEPM) was developed to provide benchmark standards for ambient air quality to ensure all Australians have protection from the potential health effects of air pollution. Air NEPM standards have been developed for six criteria pollutants, including PM_{10}, $PM_{2.5}$, NO_2, SO_2 and CO.

4.2 Environment Protection Authority Victoria Design Criteria

The Victoria State Environment Protection Policy (Air Quality Management) (SEPP-AQM) was used to substitute criteria where the NEPM standards did not have the applicable criteria. This was only required to obtain criteria for SO_3.

Air quality criteria used in this assessment is shown in Table 4-1.

Table 4-1 Ambient air quality criteria

Pollutant	Averaging period	Criteria (µg/m^3)
Air NEPM		
PM_{10}	24 hour	50
	Annual	25
$PM_{2.5}$	24 hour	25
	Annual	8
NO_2	1 hour	246
	Annual	62
SO_2	1 hour	570
	24 hour	228
	Annual	60
CO	8 hour	10,000
SEPP-AQM		
SO_3		0.2 g/m^3 (stack emissions limit for stationary sources)

5. Construction assessment

This section outlines assessment of air emissions likely to result during construction of the Plant. Sources of potential air quality impacts during construction and site establishment will be emissions from heavy vehicle exhausts and dust generation from heavy equipment during earthworks, and wind erosion from disturbed soil surfaces.

5.1 Gaseous emissions

Emissions from heavy machinery and equipment used during the construction phase will consist of products of combustion, including NO_x, SO_2, PM_{10} and volatile organic compounds (VOCs)

Vehicle emissions will arise from diesel powered equipment used during construction. Emissions from heavy equipment will be minimised by ensuring all vehicles on-site are well maintained and operated in an efficient manner.

Emissions from vehicles on-site will be short-lived and are not considered to represent a significant source of emissions.

5.2 Construction dust

The construction process will involve the operation of loaders, dozers, graders, excavators and trucks. The equipment will be used to excavate and remove material from construction areas and deposit and spread the material on-site (cut-and-fill). Dust has potential to be generated during these activities as material is transported, spread and compacted on-site.

The three key dust causing mechanisms are:

- The ongoing movement of vehicles and Plant around the Site (unsealed road dust emissions during working hours).
- The action of excavating, spreading and compacting (during working hours).
- Wind erosion dust emissions from exposed and disturbed soil surfaces under elevated wind speeds during construction (all hours with elevated wind speeds).

Dust emissions may be reduced by managing the level of disturbance from equipment movement and operation and by managing the mechanisms that act to increase dust emissions.

5.3 Construction dust management

As the reference design does not specify the schedule of operations and the exact type and number of dozers, scrapers, trucks and other earthmoving equipment, it is not possible to characterise construction dust sources. A management framework would be developed and to allow effective management of dust emissions.

Dust emissions would be controlled by application of a dust management process, defined as part of the Albemarle Kemerton Plant EMP (GHD, 2017). Using this approach, a staged dust management plan for dust mitigation and management measures would be influenced by the proximity of sensitive receptors. Due to the separation distance between the Plant and the nearest sensitive receptor, the dust management measures would detail actions for typical dust control.

5.3.1 Typical dust management and mitigation measures

From the identification of potential dust emission sources, appropriate dust management and mitigation measures for a typical level of control would include:

- All construction and maintenance equipment/vehicles to be operated and maintained to manufacturer's specifications in order to minimise exhaust emissions.
- Defined routes to be used wherever it is necessary for vehicles to traverse unsealed surfaces or unformed roads.
- Vehicular speeds on-site would be limited to 25 km/h on areas of unconsolidated or unsealed soil associated with the project.
- Prompt mitigation of excessive visible dust emissions, which may involve a combination of:
  - Stabilisation of surface silt content through application of localised water sprays, or the use of appropriate chemical dust suppressants (suitable for access roads which are traversed less frequently).
  - Control of mechanically induced dust emissions (from clearing, excavation, loading, dumping filling and levelling activities) by application of water sprays.
  - Awareness of operational areas more frequently exposed to higher winds and the predominant wind directions in these areas at various times of the year. Temporary wind barriers may be employed where necessary.
  - Review of daily weather updates from BoM, or a private meteorology service provider, to give warning of likely strong winds to assist with daily management of windblown dust from unconsolidated soil surfaces and material stockpiles.
  - All haulage vehicles are to have their loads covered while transporting material to or from the work area through off-site routes that may have sensitive receptors.

6. Methodology

6.1 Emission sources

The pollutant sources identified in Section 2.2 that have potential to cause emissions to air during operation include:

- Calciner
- Ball mill
- Roast cooler, scrubber and gas vent
- LiOH cooler and dryer
- Na_2SO_4 dryer
- Steam Boiler
- Spodumene handling, transfers and storage
- Acid Roasted Solids storage

Table 6-1 summarises the stack characteristics and emissions rates from each piece of equipment. Emission data provided by AFW to generate the emission rates is shown in Table 6-1. Emissions factors for the burning of natural gas were sourced from the *National Pollutant Inventory (NPI) Emissions Estimate technique manual for Combustion in Boilers,* Version 3.6 (2011).

One scenario was modelled as part of the assessment. Modelling of the Plant's operations were conducted for a 100,000 tpa operational scenario, with all trains operating. The model developed for this assessment was based on the description of the air emission sources described in Section 2.2.

Table 6-1 Stack characteristics and emission rates per 20,000 tpa process train

Parameter	Calcining off-gas	Ball mill off-gas	Roast scrubber vent	Roast flue gas	Roast cooler off-gas	LiOH dryer off gas	LiOH cooler off gas	Na_2SO_4 dryer flue gas	Steam boiler flue gas	Spodumene dust (diffuse source)	Acid Roasted Solids (diffuse source)
Location (Easting, Northing MGA94)											
Train 1	384498, 6325505	384537, 6325343	384537, 6325318	384537, 6325303	384546, 6325233	384674, 6325233	384674, 6325458	384825, 6325462	384607, 6325376	384538, 6325585	384546, 6325188
Train 2	384538, 6325505	384497, 6325343	384497, 6325318	384497, 6325303	384506, 6325233	384674, 6325468	384674, 6325458	384825, 6325462	-	-	384506, 6325188
Train 3	384458, 6325505	384457, 6325343	384457, 6325318	384457, 6325303	384466, 6325233	384674, 6325468	384227, 6325458	384024, 6325460	384331, 6325376	384458, 6325585	384466, 6325188
Train 4	384418, 6325505	384417, 6325343	384417, 6325318	384417, 6325303	384426, 6325233	384674, 6325468	384227, 6325458	384024, 6325460	-	-	384426, 6325188
Train 5	384378, 6325505	384377, 6325343	384377, 6325318	384377, 6325303	384386, 6325233	384094, 6325468	384674, 6325458	383966, 6325460	384115, 6325376	384418, 6325585	384386, 6325188
Stack height (m)[1]	30	30	30	30	20	20	20	20	20	-	-
Stack diameter (m)	2	1.5	1	1.5	1	0.25	0.25	1	1	-	-
Exit velocity (m/s)	5	5	5	5	5	5	5	5	5	-	-
Exit temp (°C)	70	156	33	135	80	90	50	300	300	-	-
Emission rates											
PM_{10} (g/s)	0.7	0.3	-	-	0.1	0.002	0.0005	0.07	-	0.004	0.02
$PM_{2.5}$ (g/s)	0.4	0.2	-	-	0.05	0.001	0.0002	0.03	-	0.002	0.010
NO_x (g/s)	0.5	-	-	0.1	-	-	-	0.03	0.1	-	-
SO_2 (g/s)	0.0	-	0.002	0.002	0.001	-	-	0.0004	0.002	-	0.002
CO (g/s)	0.7	-	-	0.3	-	-	-	0.04	0.2	-	-

1 Assumption for stack heights were estimated based on engineering design process

6.2 Dispersion modelling

Modelling was completed using the AERMOD dispersion model. AERMOD is an advanced Gaussian plume model and extends on the Pasquill-Gifford atmospheric stability categorisation by modelling the turbulence using micro-meteorological parameters to calculate the Monin-Obukhov length. This provides a continuously varying measure of atmospheric turbulence from one hour to the next – in contrast to the seven Pasquill-Gifford categories used in AUSPLUME. The following general settings were used in the model:

- Site topography and three-dimensional terrain has been used in the model, with 30 m resolution.
- The effect of building wakes on stack sources were not considered.
- A surface roughness length of 0.3 m was selected to represent the modelling domain.
- All discrete and gridded receptors were modelled at ground level.

6.2.1 Meteorological data

Meteorological data for this assessment was based on measurements taken at the Bunbury AWS (Site ID: 009965).

Meteorological data from 1 January 2015 to 31 December 2015 was used to produce a meteorological data file for input into AERMOD. 2015 was used as it was considered the most representative of climate conditions within the Bunbury area. The process for producing the meteorological file was as follows:

- Missing data were interpolated from surrounding data and hourly averages calculated.
- Wind speeds less than 0.5 m/s were allocated a nominal wind speed of 0.5 m/s.
- Sigma theta was calculated using the variation in wind direction values reported on a minute basis.
- The sigma theta method was used to calculate Pasquill-Gifford (P-G) stability classes.
- Stability classes used to determine turbulence parameters required by AERMOD.

Figure 6-1 shows the seasonal wind roses for Bunbury. The following are observed:

- The average wind speed was highest during summer (3.9 m/s) compared with spring (3.3 m/s), autumn (3.0 m/s) and winter (2.6 m/s).
- Predominant spring wind directions were south to south-southwest, as well as west-southwest and east-southeast. South-southwest winds had the highest proportion of wind speeds over 6 m/s.
- Predominant summer wind directions were east to south, with an additional dominant west-southwest wind direction. The highest proportion of winds over 6 m/s observed were from these directions.
- Predominant autumn wind directions were east to south-southwest, however the highest proportion of winds over 6 m/s were observed from the southeast.
- Predominant winter wind directions were east-north-east to south east, with an additional dominant northerly wind component. The highest proportion of winds over 6 m/s were observed from the north.

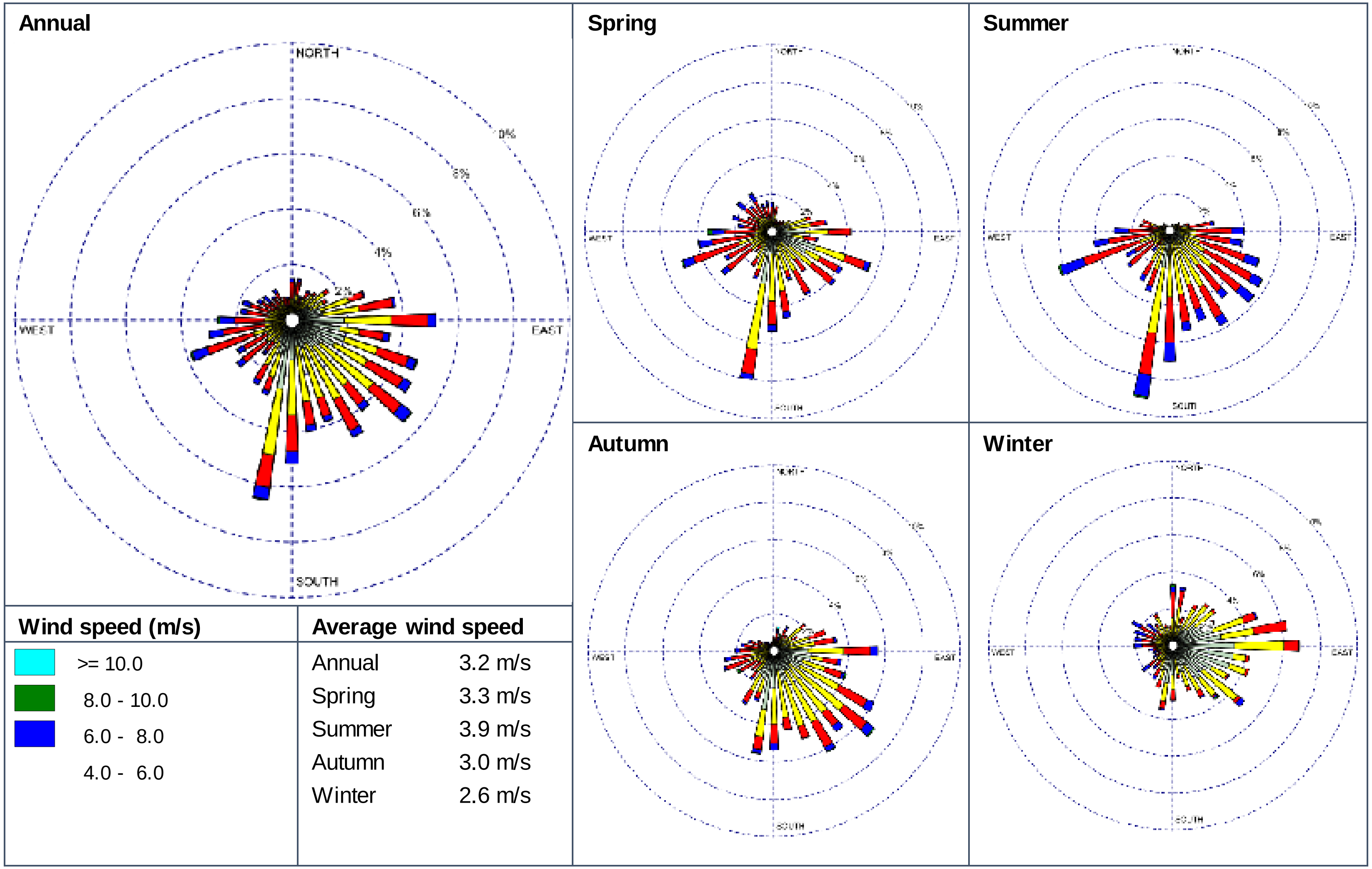


Figure 6-1 Seasonal and annual wind roses for Bunbury AWS – 1 January 2015 to 31 December 2015

6.2.2 Modelling year selection

An assessment of meteorological conditions indicated that the majority of years had similar dust environments. However, the 2015 calendar year displayed slightly elevated concentrations. As such, this year was selected to represent the worst case dust concentration year during the modelling process.

6.2.3 Terrain and building wake effects

Terrain effects were not considered in this model because the area is relatively flat. Building wake effects were not considered in the model.

6.3 Background air quality

The 75th percentile of one year (2015) of observed hourly concentrations was used as a constant background in modelling for 1 hour and 24 hour concentrations.

As per Section 3.2, the measured pollutants from the Bunbury and South Lake AQMS (Table 3-2) are considered to be representative of KSIA local airshed and have been adopted for the modelling assessment.

6.4 NO_X to NO_2 conversion

It is to be noted that the modelled emission rates for NO_2 are 30% of the emissions rates for NO_x based on assumed photochemical NO_X to NO_2 conversion rate of 30% (Katestone, 2012)