Commodity Logistics & Import Project

Air Quality Impact Assessment

BlueScope Steel (AIS) Pty Ltd

09 November 2022

→ **The Power of Commitment**

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The Power of Commitment

Executive summary

GHD has conducted an air quality impact assessment to assess the construction and operation of the Commodity Logistics and Import Project at the Port Kembla Steelworks. The assessment was undertaken in accordance with relevant legislation and government guidance.

A qualitative based approach was adopted to assess the construction of the project. The construction assessment identified a low risk of potential air quality impacts as there will be a large separation distance between construction activities and sensitive receptors, and emissions to air during construction are expected to be relatively minor.

For the project's operations, a quantitative air quality assessment was undertaken using air quality dispersion modelling to predict incremental and cumulative particulate concentrations from the project. The modelling predicted compliance with the assessment criteria for all pollutants of interest at all receptors. In addition, the model predicted that incremental concentrations (concentrations due to project only) will be minor when compared with the assessment criteria, and the majority of cumulative concentrations were comprised of elevated background concentrations. It is noted that the cumulative assessment was considered conservative as background particulate concentrations were sourced from the maximum recorded value from either BlueScope's North Gate or Scouts Hall Air Quality Monitoring Stations. Use of this background data was considered conservative as it contains contributions from some existing emissions sources that will be replaced by the project and will therefore cease to cause emissions to air once the project is operational.

The design of the project incorporates several best practice design features to reduce dust emissions including a fully enclosed Continuous Ship Unloader (CSU) and enclosure of the coal transfer conveyors as much as practicable. These design features offer improvements to current site operations with respect to air emissions.

Based on the modelling and assessment undertaken, the project will have a minor impact on ambient air quality concentrations within the surrounding environment and the project is comparable to or better than current operations of the site with respect to air quality.

This report is subject to, and must be read in conjunction with, the limitations set out in Section 1.3 and the assumptions and qualifications contained throughout the report.

Contents

Table index

Figure index

Appendices

Terms and abbreviations

Term/acronym	Definition
$\mu g/m^3$	Micrograms per cubic metre
5BF	No. 5 Blast Furnace
6BF	No. 6 Blast Furnace
AMO	Aeronautical Meteorological Office
AQIA	Air Quality Impact Assessment
AQMS	Air Quality Monitoring Station
Background concentrations	Ambient pollutant concentrations
BlueScope	BlueScope Steel (AIS) Pty Ltd
BoM	Bureau of Meteorology
BSL	BlueScope Steel Limited
CALMET	CALMET is a meteorological model which includes a diagnostic wind find generator containing objective analysis and parameterised treatments of slope flows, kinematic terrain effects, terrain blocking effects, a divergence minimisation procedure, and a micro-meteorological model for overland and overwater boundary layers.
CALPUFF	CALPUFF is a non-steady-state Lagrangian Gaussian puff model which contains modules for complex terrain effects, overwater transport, coastal interaction effects, building downwash, wet and dry removal, and simple chemical transformation.
Cumulative impact	Incremental impact plus background
DPE	Department of Planning and Environment
EPA	NSW Environment Protection Authority
GHD	GHD Pty Ltd
IAQM Guidance	Institute of Air Quality Management
Incremental impact	Predicted impact from the Commodity Logistics and Import Project only
LNG	Liquified natural gas
Pasquill-Gifford	Stability classification used in atmospheric dispersion models to define the turbulent state of the atmosphere
PKSW	Port Kembla Steel Works
PM_{10}	Particulate matter with an equivalent aerodynamic diameter of 10 micrometres or less
$PM_{2.5}$	Particulate matter with an equivalent aerodynamic diameter of 2.5 micrometres or less
POEO Act	Protection of the Environment Operations Act 1997
SEARs	Requirements and specifications for an environmental assessment prepared by the Secretary of the Department of Planning and Environment
Sensitive receptor	A location where people are likely to work or reside; this may include a residential dwelling, school, hospital, office or public recreational area. An odour assessment should also consider the location of known or likely future receptors.
SS projects	State Significant projects
TAPM	TAPM is an air pollution model that predicts three-dimensional meteorology and air pollution concentrations.
tph	Tonnes per hour
TSP	Total Suspended Particulates
UTM	Universal Transverse Mercator coordinate system
WRF	Weather Research and Forecast model is a next-generation mesoscale numerical weather prediction system designed for both atmospheric research and operational forecasting applications

1. Introduction

1.1 Background and project overview

BlueScope Steel (AIS) Pty Ltd (BlueScope) is one of Australia’s leading manufacturers and is a global leader in finished and semi-finished steel products. Steelmaking operations are undertaken at the Port Kembla Steelworks (PKSW), within an industrial site of approximately 750 hectares located in the Wollongong Local Government Area.

PKSW is the largest steel production facility in Australia and is the only plant in Australia manufacturing upstream flat iron and steel products. PKSW supplies the essential feedstock that keeps all other domestic manufacturing facilities owned by BlueScope's parent entity, BlueScope Steel Limited (BSL), operational.

Recent and emerging disruptions to key commodity supply chains have highlighted the importance of an upgrade to three of the five berths operated by BlueScope, which is proposed as a key component of the Number 6 Blast Furnace (6BF) Reline Project. The upgrade will allow for the berths to accommodate the increase in premium hard metallurgical coal imports needed to replace the three-seam coal from South32’s Dendrobium mine. This coal is currently transported by rail and is expected to cease supply by 2028. The proposed upgrade is urgently required to support continued operations at PKSW, thus maintaining the provision of steel to the domestic and export markets, and the continuation of economic benefit to the Illawarra region.

The upgrade of PKSW’s raw material import capabilities is referred to as the Commodity Logistics and Import Project (CLIP) or “the project”. CLIP is part of a larger Critical State Significant Infrastructure (CSSI) project involving both the reline of 6BF and CLIP.

The project has been declared CSSI in accordance with section 5.13 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and Schedule 5 of the *State Environmental Planning Policy (Planning Systems) 2021*.

1.2 Purpose of this report

This Air Quality Impact Assessment (AQIA) report has been prepared by GHD Pty Ltd (GHD) as part of the EIS for the project and addresses the Secretary’s Environmental Assessment Requirements (SEARs) relevant to air quality.

The purpose of this report is to document the results of the AQIA which included:

– Definition of the existing environment at the project site, including identification of air quality sensitive receptors, and completing a review of available ambient air quality monitoring data for the previous 5 years.
– Review of project information related to sources of emissions to air. This includes construction methodology, operation of the project and emission controls, process drawings, process flow charts and emission rates.
– Preparation of a site-representative meteorological data set based on review of site-based weather station, and local Bureau of Meteorology data. Meteorological modelling was completed using the Weather Research and Forecast model (WRF) and CALMET models.
– Preparation of an emissions inventory for operation of the project.
– Air dispersion modelling using the CALPUFF model for operation of the project to quantitatively predict ground level pollutant concentrations for comparison against the EPA criteria.
– A qualitative air quality assessment of potentially emission generating construction activities and providing management measures to minimise potential air quality impacts at sensitive receptors during project construction activities.
– Discussion of the findings of dispersion modelling and an overview of proposed mitigation measures and controls associated with the project.

1.3 Limitations

The preparation of this AQIA relied on the following assumptions or was limited by the following:

– Project description, including details of the construction and operation of the project, was provided by BlueScope.
– An emissions inventory was prepared for the proposed operation of the project based on details provided by BlueScope as summarised in Section 6.2.
– Meteorological and dispersion modelling was undertaken in accordance with the methodology outlined in Section 3.3.
– The assessment focused on impacts from BlueScope PKSW only. Emissions caused by other sources and emissions from sources outside the PKSW site boundary, such as emissions from ships or rail transporting coal to Port Kembla and ships while at port were excluded from the assessment.
– The cumulative assessment assumed:
  - the maximum number of ships at berth at any one time would not change due to the project and therefore any changes in ambient air quality due to ships at berth would be minor.
  - Rail movements (and some other transfers such as coal truck haulage movements) would decrease as a result of the project however, the assessment was conservative using ambient air quality data that includes contributions from these existing sources.
– Cumulative impacts with the Port Kembla Gas Terminal project including ship and Floating Storage and Regasification Unit (FSRU) configuration (including fuel type) have been assumed based on best available information however are subject to change. The assessment has assumed a moderate worst case of FSRU using gas and an LNG carrier running on marine diesel oil. Some LNG carriers may run on gas which has lower emissions and the FSRU can run on marine diesel oil for up to 72 hours per year.

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

GHD otherwise disclaims responsibility to any person other than BlueScope Steel (AIS) Pty Ltd 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 has prepared this report on the basis of information provided by BlueScope Steel (AIS) Pty Ltd 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.

The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.

2. Legislative and policy context

2.1 Secretary’s Environmental Assessment Requirements

The SEARs relevant to air quality, together with a reference to where they are addressed in this report, are outlined in Table 2.1.

Table 2.1 Air quality SEARs

Requirement	Where address in report
Air quality – including:	
An assessment of the likely air quality impacts of the project in accordance with the Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (EPA, 2016).	This report
Consideration of the project’s ability to comply with the relevant regulatory framework, including the Protection of the Environment Operations Act 1997 and the Protection of the Environment Operations (Clean Air) Regulation 2010.	Section 2 (overview of regulatory frameworks), 7 and 8 (assessment of project against regulatory frameworks)
The likely greenhouse gas impacts of the project.	Refer GHG chapter of the EIS and GHD technical report

2.2 Legislative and policy context

The relevant legislation and government guidance for the air quality assessment of the project are:

- NSW *Protection of the Environment Operations Act 1997* (POEO Act)
- NSW *Protection of the Environment Operations (Clean Air) Regulation 2021* (POEO Clean Air Regulation)
- National Environment Protection Council (NEPC) National Environment Protection (Ambient Air Quality) Measure 2021 (the Air NEPM)
- Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales (DEC 2007)
- Technical framework - Assessment and management of odour from stationary sources in NSW (the Technical Framework), NSW Department of Environment and Conservation (DECC 2006)
- NSW EPA Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (2017) (the Approved Methods)
- Guidance on the assessment of dust from demolition and construction, Institute of Air Quality Management (2016) (IAQM Guidance)

The POEO Act provides the statutory framework for managing pollution in NSW, including the procedures for issuing licences for protection of environmental aspects such as waste, air, water and noise. Relevantly, the POEO Act:

- Makes it an offence for an occupier of premises to cause air pollution (including odour) through a failure to maintain equipment in an efficient condition, to operate or maintain equipment in a proper and efficient manner, or to deal with materials in a proper and efficient manner (sections 124 – 126).
- In the case of point source emissions, requires the occupier to meet the standard of concentration and/or rate for air impurities where specified by the POEO Clean Air Regulation (section 128(1)).
- For point source emissions where no standard of concentration and/or rate has been set, and for non-point source emissions, requires the occupier to take all practicable means to minimise and prevent air pollution (section 128(2)t).
- Defines the term ‘offensive odour’ (section 129) and makes it an offence for scheduled activities to emit ‘offensive odour’, subject to limited defences.

The POEO Clean Air Regulation provides regulatory measures to control emissions from motor vehicles, fuels, and industry.

The National Environment Protection Council of Environmental Ministers, now the National Environment Protection Council (NEPC), set uniform national standards for ambient air quality in February 2016. The document containing these standards is known as the Air NEPM, which also contains goals for the identified relevant pollutants inclusive of particulates and concentration limits, averaging periods and number of allowed exceedances for each of the identified pollutants.

The Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales (DEC 2007) lists the methods to be used for the sampling and analysis of air pollutants in NSW for statutory purposes. While no emission sampling was conducted as part of this assessment, BlueScope has a responsibility to undertake, where possible, all sampling in accordance with requirements outlined in the Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales (DEC 2007). This includes sampling type, duration, location and a number of other requirements.

The Technical Framework provides a legislative context for the control of odour and presents odour assessment criteria guidelines. It provides a framework for different levels of odour assessment, strategies to mitigate odour, and guidance for performance monitoring, regulation and enforcement.

The Approved Methods lists the statutory methods for modelling and assessing emissions of air pollutants from stationary sources in NSW. It considers the above-mentioned legislation and contains pollutant assessment criteria.

The IAQM Guidance provides guidance on the assessment of dust from demolition and construction activities. It provides a qualitative step by step process to assess the risk of dust impacts.

2.3 Air quality impact assessment criteria

Assessment criteria for the project was taken from the NSW EPA's Approved Methods. The intent of the criteria is to create an ambient air quality environment that minimises the risk of adverse health impacts from exposure to air pollution. Achieving compliance with the assessment criteria demonstrates the project will operate in a manner that protects human and environmental health.

The adopted air quality assessment criteria for the project are summarised in Table 2.2. Criteria is presented for the identified air quality pollutants of interest only (refer to Section 3.2.1 for discussion regarding the selection of the identified air quality pollutants of interest).

Table 2.2 Air quality impact assessment criteria

Pollutant	Averaging period	Statistic	Impact location	Impact type	Criteria (µg/m^3)	
					EPA Assessment Criteria	Air NEPM
TSP	Annual	Maximum	Sensitive receptor	Cumulative	90	-
PM_{10}	24 hour	Maximum	Sensitive receptor	Cumulative	50	50
	Annual	Maximum	Sensitive receptor	Cumulative	25	25
Deposited dust	Annual	Maximum	Sensitive receptor	Maximum increase and maximum total	2 g/m^2/month (maximum increase) 4 g/m^2/month (maximum total)	-

The application of each impact assessment criterion is variable for each pollutant based on the following factors:

– **Averaging period** – the period over which modelled concentrations are averaged.
– **Statistic** – the statistic of the modelled concentrations. As an example for a 1-hour averaging period, the 'maximum statistic' would be the highest predicted value at any receptor for the entire modelling period. The 99.9th percentile statistic would be (approximately) the ninth highest hour in a one year modelling period.
– **Impact location** – the location at which the impacts are to be assessed. For some pollutants, impacts are assessable only at sensitive receptor locations, while some impacts are assessable at and beyond the boundary of the site. The criteria apply at ground level where receptors are likely to be exposed.
– **Impact type** – the type of impact assessed. For some pollutants, the impacts are assessable only for the project's contribution to pollutant concentrations at the relevant impact location (referred to as 'incremental impacts'). For other pollutants, the cumulative impact (which includes both the incremental concentration as well as the background concentration) is assessed.

3. Methodology

3.1 General

This AQIA of the construction and operation of the project was completed in accordance with EPA and contemporary guidance to assess air quality impacts from the project. Atmospheric dispersion modelling was undertaken to evaluate the potential worst-case impacts from the project under routine operations and inform the recommendations for appropriate mitigation measures to minimise any potential impacts.

3.2 Approach

3.2.1 Air quality pollutants of interest

The air pollutants examined in this report were airborne particulate matter ('particulates'), including Total Suspended Particulates (TSP) and particulate matter with diameter smaller than 10 microns (PM_{10}). Whilst the project may result in some emissions of fine particulates (particulate matter with diameter smaller than 2.5 microns ($PM_{2.5}$)), it is expected that these emissions would be minor.

Guidance from the Queensland government[1] on the management of coal dust emissions notes that air quality has the potential to be impacted by the coal dust emissions from coal mining activities, the transportation of coal from mines to designated ports and the loading operations at the port's export terminals and that coal dust emissions predominantly comprise coarse dust particles (dustfall) of particle size generally between 50 and 200 microns in diameter.

A study undertaken for the NSW OEH[2] states that there is a clear distinction between particulate matter originating from combustion of fuel and mechanically generated crustal particulate matter. The study identifies that most particulate matter from mining is PM_{10}, and that the proportion of $PM_{2.5}$ from coal emission sources including wind erosion (coal), loaders (coal), unloading stockpiles (coal), trucks (dumping coal) and loading stockpiles (coal) only make up 6.3% of total PM_{10} emissions produced at coal mines in the study area. $PM_{2.5}$ emissions from handling and storage of coal are minimal when compared to PM_{10}.

Ambient air quality including $PM_{2.5}$ concentrations are discussed in Section 5.4. A review of the last five years of data shows annual average $PM_{2.5}$ levels below the ambient air quality goal of 8 µg/m^3 at the three nearest DPE sites (Kembla Grange, Albion Park South and Wollongong) for all years except 2019 which was heavily influenced by bushfires (noting that while 2020 was also impacted by bushfires, data for the 2020 calendar year shows compliance with the ambient air quality goal).

Consequently $PM_{2.5}$ emissions from the project were considered relatively minor and $PM_{2.5}$ was not identified as a critical pollutant (refer Section 2.3) with respect to existing ambient air concentrations. As a result, $PM_{2.5}$ was not included in the emission inventory or dispersion modelling and was not considered further in this assessment.

PKSW emits other air pollutants including common gaseous pollutants, odorous air pollutants and air toxics, however the project is not a significant source of these emissions. These pollutants have therefore not been included in the assessment as the project will not contribute to cumulative emissions.

3.2.2 Construction assessment methodology

Based on a review of the proposed construction methodology, agency requirements, and identification of emissions to air that could occur during construction, a qualitative-based approach that focused on management was adopted to assess the construction of the project. A risk-based approach in accordance with IAQM Guidance was adopted to assess potential particulate impacts during the construction of the project.

[1] Queensland Government, Coal dust management available online:
https://www.qld.gov.au/environment/pollution/monitoring/management/emissions

[2] Katestone Environmental Pty Ltd (2011), NSW Coal Mining Benchmarking Study: International Best Practice Measures to Prevent and/or Minimise Emissions of Particulate Matter from Coal Mining

3.2.3 Operation assessment methodology

A quantitative air quality assessment utilising air quality dispersion modelling was undertaken in accordance with the Approved Methods to assess potential worst-case air quality impacts from operation of the project. The modelling methodology adopted for this assessment is outlined in Section 3.3.

Air quality dispersion modelling was undertaken for project sources only (i.e. only the new sources that are proposed as part of the project; refer to Section 6.2.2 for source identification).

Potential cumulative air quality impacts with existing industry and facilities in the area were accounted for by including background air quality data recorded from the North Gate and Scouts Hall Air Quality Monitoring Stations (AQMS) operated by BlueScope (refer to Section 5.4.2 for further details). To account for potential worst-case cumulative impacts from the project, the worst-case impacts from existing site operations and other nearby industry needs to be quantified. To do this, the maximum air quality concentration recorded at North Gate or Scouts Hall Air AQMS was selected for use in the cumulative assessment (refer to Section 5.4.3 for a summary of the background data adopted).

The North Gate and Scouts Hall AQMS are located to the north and south of PKSW respectively. Given its location, the North Gate AQMS would experience worst case impacts from existing PKSW operations and other nearby industry within Port Kembla during southerly winds (i.e. winds blowing from the south towards the north). Conversely, the Scouts Hall AQMS would experience worst case impacts from PKSW and other nearby industry during northerly winds (i.e. winds blowing from the north towards the south). Therefore, use of the maximum recorded concentration from both the North Gate and Scouts Hall AQMS aims to collect the worst-case background irrespective of meteorological conditions.

This approach is considered conservative as the maximum background concentration recorded during each 24-hour period from either the North Gate or Scouts Hall AQMS was applied to all receptors regardless of their location and importantly, their direction from PKSW and other Port Kembla industry.

Additionally, it is noted that background concentrations recorded at North Gate or Scouts Hall AQMS contain contributions from current PKSW operations including current commodity receival and handling operations. Some of these activities are to be replaced by the project and would therefore cease to cause emissions to air. The contribution of these existing activities (which will be replaced by the project) to recorded background concentrations cannot be accurately quantified. Therefore, no subtraction to background concentrations was applied, but this additional layer of conservatism was noted.

Potential cumulative air quality impacts with proposed and approved major projects in the area were reviewed on a case-by-case basis, and potential cumulative impacts were incorporated where considered appropriate (refer Section 5.3.2).

The key project features such as conveyor alignments may change during detailed design. Shifting conveyors (for example conveyor C04 or conveyor C05 which are enclosed) to optimise the route around existing infrastructure would likely have minimal change to predicted impacts at off-site locations.

3.3 Modelling methodology

3.3.1 Dispersion model selection

A review of the surrounding terrain, air quality emission sources and distance to nearby receptors was undertaken to inform the choice of dispersion model for the assessment.

Given the site's location, which may be subject to coastal fumigation events, and the scale of the site where non-steady state wind fields will likely be occurring (i.e. the 10 m high weather station is not likely representative at all areas of the model domain, including heights) GHD found CALPUFF to be the most appropriate dispersion modelling software to use for the project. CALPUFF was also used in other recent assessments at the site.

CALPUFF is an advanced non-steady-state, Gaussian puff dispersion model that uses a three dimensions spatially varying wind field that is capable of accounting for complex terrain features and varying wind fields.

3.3.2 Emission inventory development

A particulate matter emissions inventory was prepared for the project based on assumed emissions factors and anticipated activity rates (based on throughput). Emission factors were taken from the *National Pollutant Emissions Estimation Technique Manual for Mining Version 3.1 (2012)*. Anticipated activity rates were provided by BlueScope. The particulate matter emissions inventory prepared for the project is summarised in Section 6.2.2 and detailed in Appendix B.

3.3.3 Dispersion modelling

Predicted air quality impacts were modelled in accordance with the Approved Methods using an approved computer software model, CALPUFF.

CALPUFF model settings were selected based on the recommendations provided in the *Generic Guidance and Optimum Model Settings for the CALPUFF Modelling System for Inclusion into the Approved Methods for the Modelling and Assessments of Air Pollutants in NSW, Australia* (J Barclay and J Scire, Atmospheric Studies Group TRC Environmental Corporation, 2011), with the exception of the model dispersion coefficient parameter for which the model default value was used.

For this assessment, the CALPUFF dispersion model was used to predict ground-level concentrations from the project. The CALPUFF dispersion model utilised a meteorological dataset of one year in duration. The grid size used in the CALPUFF model was equivalent to the CALMET domain (use of CALMET further discussed in Section 3.3.4). The same grid resolution of 250 metres used for the CALMET model was used in CALPUFF.

The source properties and emission rates utilised in the dispersion modelling are detailed in Section 6.

The dispersion model was configured to predict pollutant concentrations at identified sensitive receptor locations and for a sampling grid centred on the PKSW site.

3.3.4 Meteorological modelling

Local meteorology including long term wind speed and direction, as well as atmospheric stability, influence how air pollutants are dispersed into the local environment.

Site specific meteorological data used to drive the dispersion model was generated by use of the WRF and CALMET meteorological models to produce a three-dimensional wind field which also accounts for local variations in the terrain. Prognostic WRF data was used as an 'initial guess field' for the CALMET meteorological model.

A representative year was chosen for modelling purposes based on review of Southern Oscillation Index (SOI) for the past 10 years and an analysis of BoM data recorded at Port Kembla Automatic Weather Station (AWS) for the last 5 calendar years (01/01/2016 – 31/12/2020). The review resulted in the selection of the 2017 calendar year (01/01/2017 – 01/01/2018) as the representative year for modelling purposes.

Details of the procedure undertaken to produce the site-specific meteorology are provided in Appendix A.

4. Description of the project

4.1 Project overview

The project will involve upgrade of raw materials berths, unloading and conveying infrastructure, which will allow BlueScope to import raw materials for continued operations following depletion of supply from Dendrobium Coal Mine and increased scrap usage.

The project includes construction of a new CSU at Berth 111, new conveying infrastructure to facilitate transportation materials from the berth to stockpiling areas, and modifications to the berth to allow the relocation of the existing Coke Loader and Ship Unloaders, No.2 Ore Unloader (2OUL) and No.3 Ore Unloader (3OUL). The project includes the following major components:

– Installation of a new CSU at Berth 111
– Relocation and modifications to 2OUL and 3OUL to operate across Berths 111, 112 and 113
– Installation of new conveyors to allow the separate transportation of iron ore to existing stockpiles and coal to the 4 Area storage location
– New truck wash at the exit of 4 Area
– Installation of crane rails, and relocation of the Coke Loader and its supply conveyors to Berth 113
– Modifications to berth infrastructure and supporting services infrastructure

Receival of coal and distribution to the coke making area will be undertaken within existing PKSW transportation and materials storage areas. A flow diagram showing how the CSU operates as part of the broader site raw materials supply chain is provided in Figure 4.1. More details including a drawing of the proposed conveyor location are provided in Section 6.2.

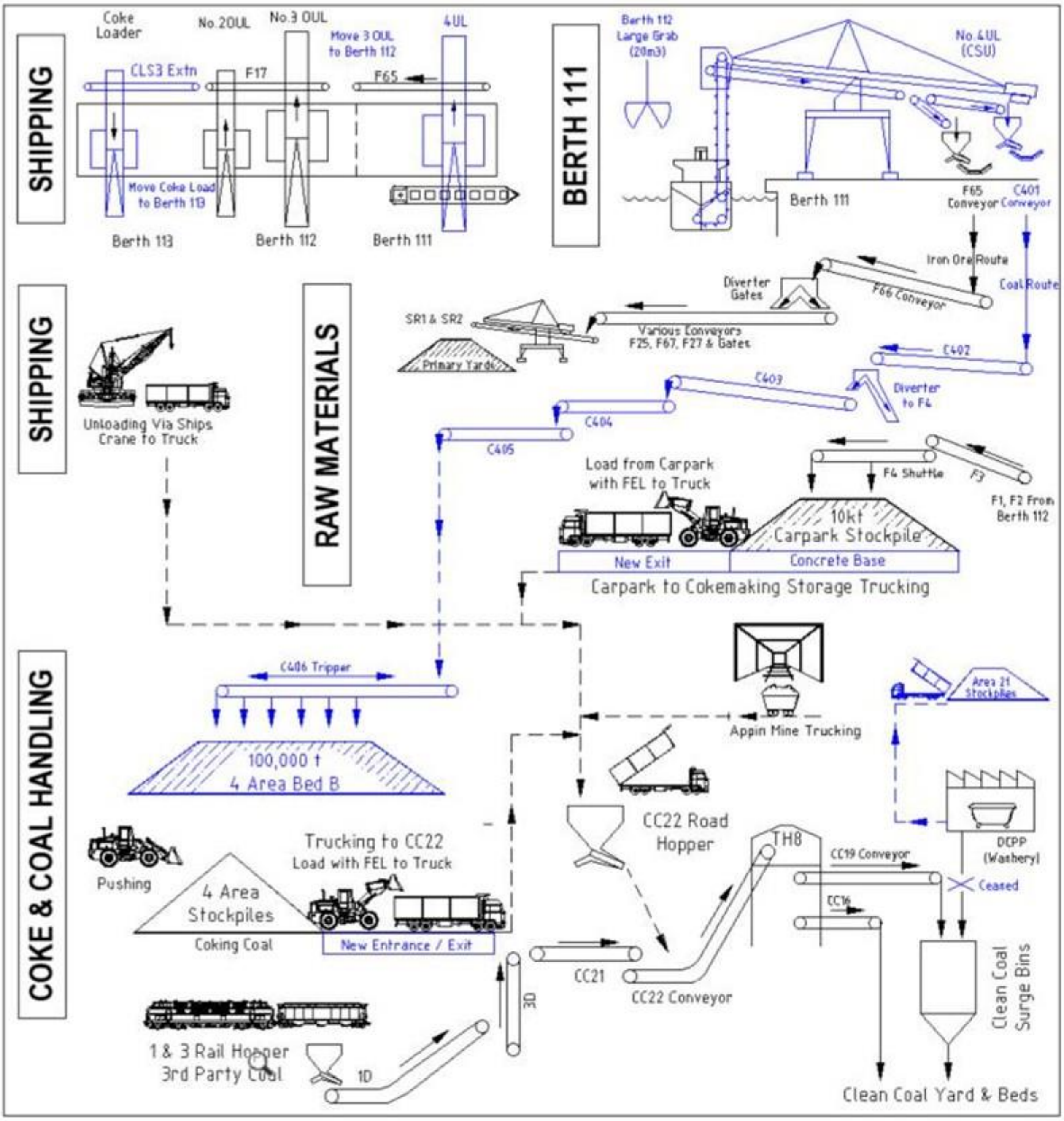


Figure 4.1 Simplified process flow diagram

4.2 Key changes relating to air quality

The key changes to site operations that will arise as a result of the project are summarised in Table 4.1, with supplementary commentary noting the expected change to air quality emissions.

Table 4.1 Summary of site operation changes due to project implementation on air quality

PKSW operational element	Existing PKSW operations	Changes to operation due to the project	Likely impact on air quality emissions
Delivery of coal to PKSW	– Coal delivery via rail	– Coal delivery via vessel	– No change in emissions expected
Handling of coal within PKSW	– Coal unloaded at underground rail drop point – Coal transport via haulage truck from rail drop point to 4 Area stockpiles	– Coal unloaded via enclosed CSU – Coal transport via conveyors from berths to 4 Area stockpiles	– Comparable or reduced dust emissions due to use of enclosed conveyors – Reduction in combustion pollutants from less haulage truck vehicle movements
Stockage of coal	– Coal stored in 4 Area	– Coal stored in 4 Area	– No change in emissions expected
Consumption of coal	– Coal is utilised in the coke ovens and other processes	– Coal is utilised in the coke ovens and other processes	– No change in emissions expected; coal consumption rates for operation of the project would be the same as current operations

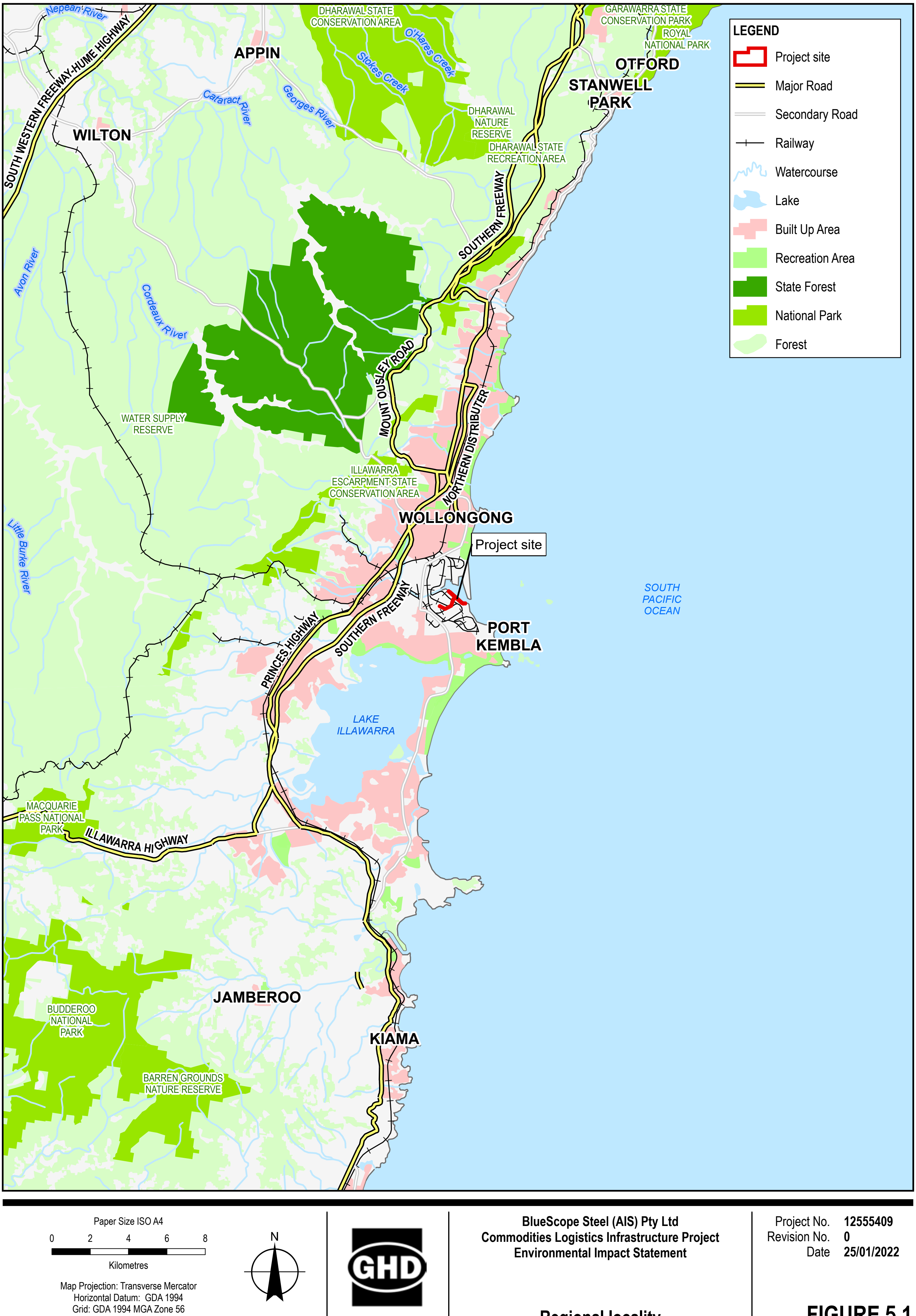
5. Existing environment

5.1 Project location

PKSW is located within an industrial site of approximately 750 ha in the Wollongong Local Government Area (LGA), approximately 80 km from Sydney and 2.5 km from the City of Wollongong (refer to Figure 5.1).

The PKSW site comprises the No.1 Works, No.2 Works, Steelhaven and the Recycling area. The No.2 Works is divided into two sections by Allans Creek. The southern half of the No.2 Works comprises the Cokemaking, Ironmaking and Steelmaking facilities, while the northern half includes the Rolling Mills and Recycling Area. BlueScope leases and operates five bulk berths in Port Kembla Inner Harbour to import raw materials, including coal, iron ore and limestone. All sectors of PKSW are internally linked by road and rail and are supplied with electricity, water and gas services.

Key features of the project including the project site boundary are shown in Figure 5.2. Ancillary facilities for existing and proposed uses are shown in Figure 5.3.



BlueScope Steel (AIS) Pty Ltd
Commodities Logistics Infrastructure Project
Environmental Impact Statement

Project No. 12555409
Revision No. 0
Date 25/01/2022

Regional locality

FIGURE 5.1

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Print date: 19 Oct 2022 - 14:10

Data source: Commonwealth of Australia (Geoscience Australia): 250K Topographic Data Series 3, 2006. .
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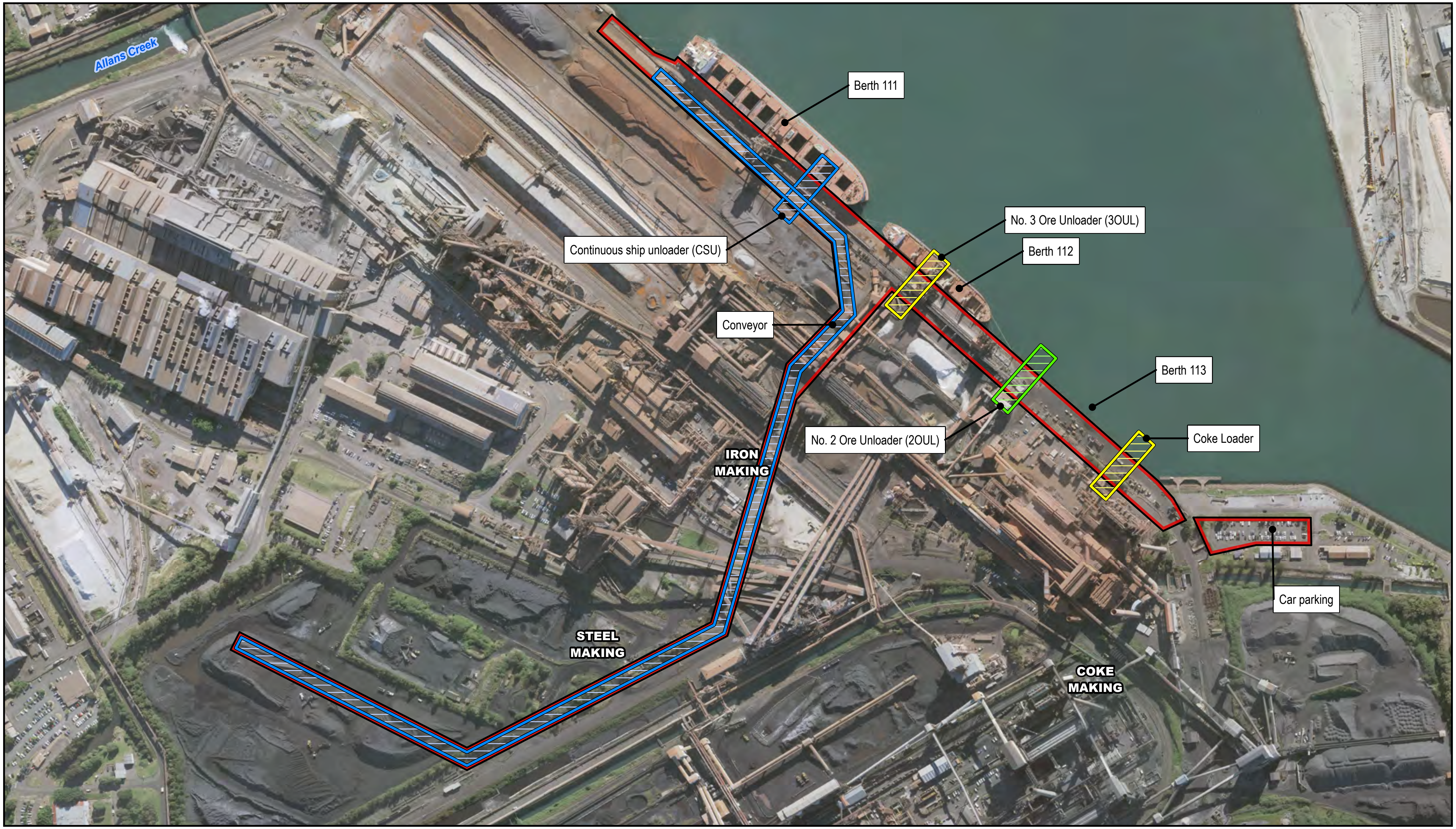

LEGEND

- Existing feature
- Proposed feature
- Relocated feature
- Project site

Paper Size ISO A4

0 40 80 120 160

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

GHD

BlueScope Steel (AIS) Pty Ltd
Commodities Logistics Infrastructure Project
Air Quality Assessment

Key project features

Project No. **12555409**
Revision No. **0**
Date **09/11/2022**

FIGURE 5-2

ID	Location	ID	Location
1	Berth T1-3 laydown	6	21 Area Laydown B
2	Tug berth laydown	7	Carpark Laydown
3	Christy Dr laydown	8	4BF Laydown
4	Sinter Plant laydown	9	Energy Services Laydown
5	21 Area Laydown A	10	4 Area Laydown

Paper Size ISO A4

0 125 250 375 500

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

GHD

BlueScope Steel (AIS) Pty Ltd
Commodities Logistics Infrastructure Project
Environmental Impact Statement

Project No. **12555409**
Revision No. **A**
Date **13/10/2022**

Ancillary facilities

FIGURE 5.3

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Print date: 19 Oct 2022 - 14:08

Data source: Roads, Suburbs, Waterbodies - LPI: DTDB, 2019. Imagery -Metromap Tile Service: 2022. Created by: pfernandes

5.2 Receiving environment

The receiving environment plays a critical role in the potential for air emissions to lead to air impacts. The terrain and land use within the receiving environment have an influence on the local meteorological conditions and subsequently impact how air pollutants disperse within an environment. The location and densities of land uses sensitive to air quality impacts (sensitive receptors) relative to the source of air emissions plays a significant role in the magnitude and extent of potential impacts.

The land use, terrain and sensitive receptors surrounding the project location are discussed below.

5.2.1 Land use

The PKSW site is zoned IN3 – Heavy Industrial under Chapter 5 of the *State Environmental Planning Policy (Transport and Infrastructure) 2021* which replaced *State Environmental Planning Policy (Three Ports) 2013* (Three Ports SEPP) in March 2022. PKSW and the adjacent Springhill Works together comprise the largest site in the Port Kembla industrial area, occupying approximately 750 ha, and are mostly built around the western and northern side of Port Kembla's Inner Harbour. The PKSW site is a multi-use industrial area which includes storage, manufacturing, port berths, private internal roads and offices. Access to PKSW is provided by Springhill Road, Five Islands Road, Flinders Street and Christy Drive, and then private internal roads in PKSW.

The port of Port Kembla is located between the Pacific Ocean and the Port Kembla heavy industrial area and is zoned SP1 – Special Activities. The Inner Harbour, specifically developed as an all-weather shipping port, covers approximately 60 ha with around 2,900 m of commercial shipping berths. BlueScope operates five berths in the Inner Harbour that supply materials for the PKSW.

The area surrounding the Port Kembla industrial area is primarily occupied by residential development. These urban areas provide small and large-scale retail outlets, community services (e.g. medical facilities, hospital, schools and sporting facilities) and commercial facilities (e.g. banking and post office). The closest urban developments to PKSW are the suburbs of Cringila, Berkeley, Lake Heights, Warrawong and Port Kembla to the south, and Unanderra, Cobblers Hill, Mount St Thomas, Coniston, and Figtree to the north and west. The urban area of Cringila is located adjacent to the No.1 Works and No.2 Works areas and is nearest to the project area, being approximately 1.5 km to the south-west.

1.1.1 Terrain

The PKSW site is generally flat and resides upon a base of artificial fill, including dredged sand and mud, rocks and local soil materials. The terrain within 10 km of the PKSW site is considered complex due to a land-sea interface bordering the site to the east and the Illawarra escarpment which is located approximately 6 km to the northwest.

1.1.2 Sensitive receptors

The Approved Methods defines a sensitive receptor as:

'A location where people are likely to work or reside; this may include a dwelling, school, hospital, office or public recreational area. An air quality impact assessment should also consider the location of known or likely future sensitive receptors.'

The selection of identified sensitive receptors is consistent with the previous air quality assessment undertaken by *BlueScope Steel, Port Kembla Site Air Emissions Modelling – PRP131* (Environ, 2012) and *Blast Furnace No. 6 Reline Project Air Quality Impact Assessment* (GHD, 2022) to readily allow comparison of predicted impacts between assessments and to analyse changes in predictions over time.

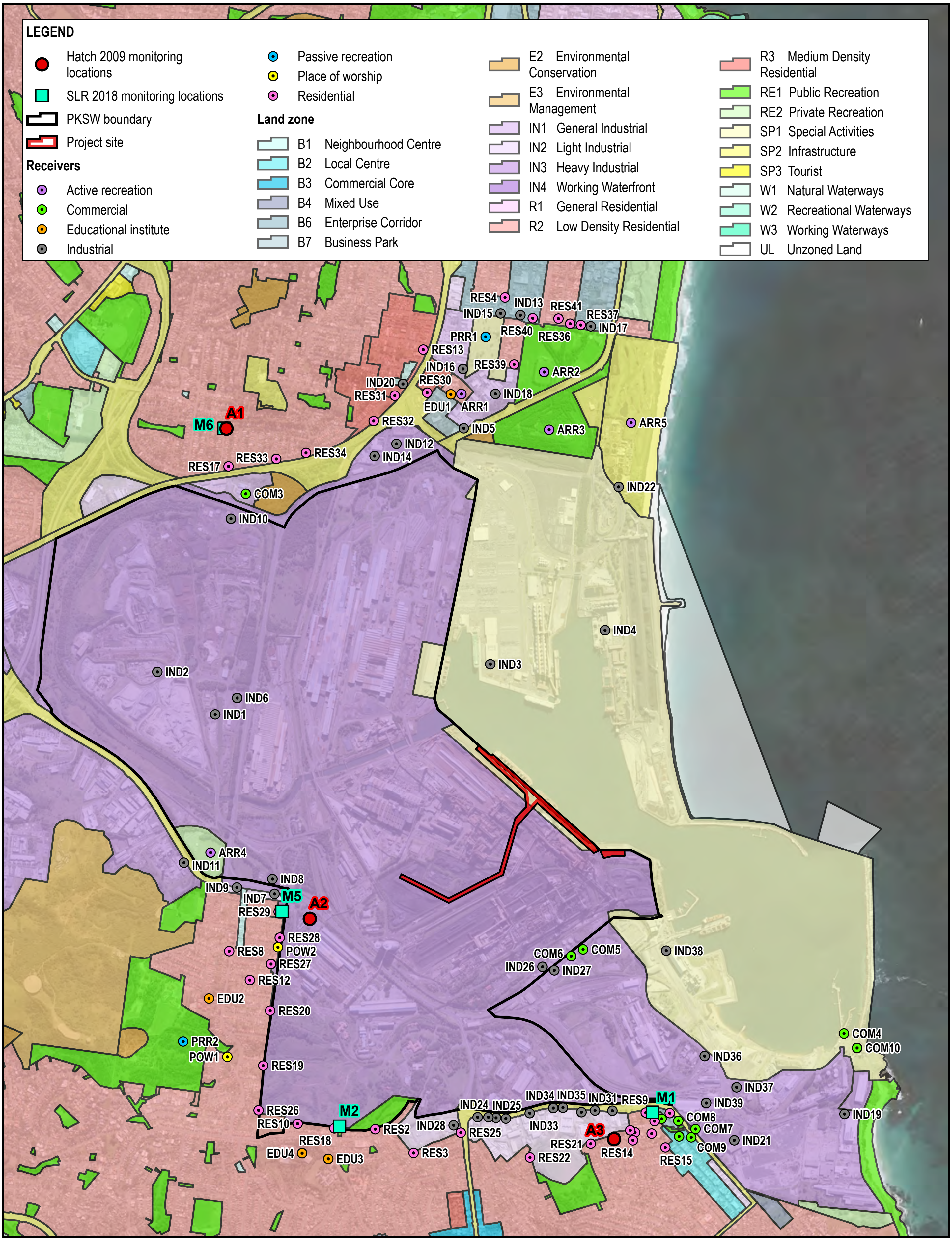
The locations of identified sensitive receptors are listed in Table 5.1, which details the universal transverse Mercator coordinates (eastings and northings), receptor type, locality with respect to the project, and description. The locations of representative sensitive receptors in the surrounding area are shown in Figure 5.4.

ERM (2021) conducted a peer review of the BlueScope Air Emission Site Wide Model produced in 2011. In its review ERM states that there have been no material changes to land use or occupancy surrounding the facility since the production of the 2011 model. Based on this, ERM concluded that sensitive receptor locations did not require significant review or amendment.

In addition to the identified sensitive receptor locations, the assessment predicted pollutant concentrations for a sampling grid centred on PKSW so that results can be determined at any location within the sampling grid.

Table 5.1 Location of identified sensitive receptors

Receptor ID	UTM coordinates (m)		Receptor type	Approximate distance and direction from project site	Approximate distance and direction from nearest ancillary site	Approximate distance and direction from PKSW boundary	Description
	Easting	Northing					
R01	303054	6186079	Residential	1,500 m north-west	1,500 m north-west	410 m north-west	Residence 1
R02	304458	6186662	Residential	890 m north	890 m north	180 m north	Residence 2
R03	305835	6187128	Educational	1,840 m north-west	1,840 m north-west	360 m north-west	Coniston Primary School
R04	301769	6185029	Residential	2,770 m west	2,770 m west	1,630 m west	Unanderra Community Centre
R05	304332	6183457	Educational	1680 m west	1680 m west	460 m west	Cringila Primary School
R06	307138	6182455	Residential	1,790 m south	1,790 m south	400 m south	Warrawong Community Centre



Paper Size ISO A4

0 0.25 0.5 0.75 1

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

GHD

BlueScope Steel (AIS) Pty Ltd
Commodities Logistics Infrastructure Project
Environmental Impact Statement

Project No. **12555409**
Revision No. **0**
Date **14/10/2022**

Noise sensitive receivers

FIGURE 5.4

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Print date: 19 Oct 2022 - 14:09

Data source: Data source: Roads, Suburbs, Waterbodies - LPI: DTDB, 2019. Imagery -Metromap Tile Service: 2022; Zoning: DPE, 2019; Monitoring locations: Hatch, 2009, SLR, 2018.
Created by: pfernandes

5.3 Existing and future sources of air pollutants

5.3.1 Facilities reporting to the National Pollutant Inventory

The National Pollutant Inventory (NPI), operated under the *National Environment Protection (National Pollutant Inventory) Measure 1998*, provides publicly available information about emissions of 93 pollutants throughout Australia. Facilities that exceed prescribed threshold values are required to report their emissions to the NPI on a yearly basis.

A review of facilities reporting to the NPI in the area surrounding the project site revealed 18 facilities within a 5 km radius of the site; of these, one was identified to emit emissions of a relevant pollutant of interest (refer Section 3.2.1) that are assessable as cumulative impacts (PM_{10} being the relevant pollutant of interest). Details of this facility along with relevant annual emissions is provided in Table 5.2.

Table 5.2 Existing operations reporting emissions to the NPI

Name of operation	Proximity to the PKSW boundary	Description of operation	Annual PM_{10} emissions
IXOM Port Kembla Site	~1,500 m southeast	Sulfuric acid regeneration/manufacture, sodium bisulfite manufacture, sulphuric acid import, storage and despatch	183.5 kg/year

5.3.2 State significant projects

A review of the DPE Major Projects website was completed to understand future sources of air pollutants which may contribute to cumulative impacts with the project. New state significant projects (SS projects), that is, both State Significant Developments and State Significant Infrastructure, with potential for air emissions are summarised in Table 5.3.

Table 5.3 Summary of nearby state significant projects with emissions to air

Name of SS project	Proximity to the PKSW boundary	Project status	Description of project	Expected impact on air quality at project sensitive receptors
Port Kembla Gas Terminal	~500 m east	Approved	Development of a liquefied natural gas (LNG) import terminal to receive and distribute LNG shipments sourced from global suppliers.	Emissions of particulates, combustion pollutants (NOx and SO_2) and volatile organic compounds from engines on board the Floating Storage and Regasification Unit (FSRU) and LNG carrier vessels.
Tallawarra B Power Station	~8 km south-west	Approved	Construction and operation of the proposed Tallawarra Stage B Gas Turbine Power Station. The power station will consist of 2 or 3 open cycle gas turbine generators with a nominal capacity of 300-450MW, or one combined cycle gas turbine generator with a nominal capacity of 400MW.	Emissions of particulates, combustion pollutants (NOx and SO_2) and volatile organic compounds from operation of gas turbine(s).
Port Kembla Power Station by Australian Industrial Power (AIP) / Squadron Energy group	N/A	N/A	Development of a dual-fuel (gas and green hydrogen) power station at Port Kembla.	Project is in its early stages and information about the anticipated emissions is not yet available.

Name of SS project	Proximity to the PKSW boundary	Project status	Description of project	Expected impact on air quality at project sensitive receptors
Blast Furnace 6 Reline	Within PKSW boundary	Approved	Reline of No.6 Blast Furnace	This project is a sub-project of the No. 6 Blast Furnace Upgrade. Emissions of particulates, combustion pollutants (NO_x and SO_2) and H_2S would occur from operation of the project.

Based on a review of project characteristics, the following was determined for each SS project:

– Port Kembla Gas Terminal – there is potential for cumulative impacts from the Port Kembla Gas Terminal due to close proximity of the CLIP project. Background pollutant concentrations from the Port Kembla Gas Terminal project should be included in the cumulative assessment.

– Tallawarra B Power Station – it is considered unlikely that cumulative impacts will occur from the Tallawarra B Power Station project due to significant separation distance between projects and relative location of sensitive receptors with respect to both projects (i.e. sensitive receptors are located between both projects, therefore receptors will only be impacted by one project at a time based on prevailing meteorological conditions). No allowance for pollutant concentrations from the future operating Tallawarra B Power Station was considered necessary.

– Blast Furnace 6 Reline – the findings of the *Blast Furnace No. 6 Reline Project Air Quality Impact Assessment* (GHD, 2022) noted that ground level particulate matter concentrations from operation of the No. 6 Blast Furnace would be comparable to those from current No. 5 Blast Furnace operations. The assessment predicted that cumulative particulate matter concentrations would change by less than 1% due to operation of No. 6 Blast Furnace. In the assessment, it was noted that the changes in particulate matter concentrations, albeit minor, were attributed to the assumptions adopted in the assessment as historic sampling data was used to estimate emissions. Therefore, future improvements (reductions in emissions) were not accounted for as they could not be quantified until the No. 6 Blast Furnace is operational and sampling can be undertaken. Due to the minor impact of the No. 6 Blast Furnace, no allowance for pollutant concentrations from the future operating Blast Furnace 6 Reline project was considered necessary.

5.4 Background air quality

An assessment of the total impact, which includes the project impact as well as the background concentrations, is required for the following pollutants of interest:

– TSP

– PM_{10}

To assess the total impact, representative background levels of each pollutant must be established.

5.4.1 Background DPE AQMS data

DPE operates AQMSs in many locations across NSW. A summary of data available from the nearest DPE AQMSs is provided in Table 5.4.

Table 5.4 Summary of data reviewed as part of the assessment

Station name	Distance to the PKSW boundary	Pollutants of interest that are measured
Wollongong	~4 km north	PM_{10} and $PM_{2.5}$
Kembla Grange	~6.5 km west	PM_{10} and $PM_{2.5}$
Albion Park South	~17 km southwest	PM_{10} and $PM_{2.5}$

A summary of the ambient air quality data recorded at each AQMS over the last 5 years is provided in Table 5.5.

Table 5.5 5 year summary of available background air quality data recorded by DPE

Pollutant	Averaging period	Recorded background concentration by year (µg/m^3)				
		2016	2017	2018	2019	2020
Wollongong						
PM_{10}	24 hour maximum	52.9	55.2	59.7	117.6	121.6
	Maximum 24 hour (below assessment criteria)	49.5	47.2	47.3	48.7	48.1
	70th percentile	20.7	20.6	23.1	25.1	20.4
	Annual average	17.3	18.1	19.8	22.6	18.8
$PM_{2.5}$	24 hour maximum	33.7	24.7	47.6	81.5	100.9
	Maximum 24 hour (below assessment criteria)	20.1	24.7	21.8	24.5	22.0
	70th percentile	8.3	8.3	8.3	9.0	7.4
	Annual average	7.4	7.1	7.3	9.0	7.8
Kembla Grange						
PM_{10}	24 hour maximum	56.3	67.7	71.8	115.8	187.7
	Maximum 24 hour (below assessment criteria)	47.3	48.0	49.1	49.8	48.3
	70th percentile	23.9	23.5	26.4	29.5	22.5
	Annual average	20.0	20.5	22.7	25.5	21.5
$PM_{2.5}$	24 hour maximum	32.0	21.3	21.9	70.1	100.4
	Maximum 24 hour (below assessment criteria)	18.2	21.3	21.9	24.6	22.6
	70th percentile	7.8	8.0	8.0	8.9	6.5
	Annual average	6.6	6.9	7.1	8.8	6.8
Albion Park South						
PM_{10}	24 hour maximum	43.1	44.6	94.4	104.3	153.3
	Maximum 24 hour (below assessment criteria)	43.1	44.6	49.9	47.0	45.4
	70th percentile	18.3	17.5	20.4	21.3	17.7
	Annual average	14.9	15.3	17.8	19.5	17.1
$PM_{2.5}$	24 hour maximum	30.7	19.3	29.4	49.4	96.3
	Maximum 24 hour (below assessment criteria)	20.8	19.3	20.6	24.8	21.4
	70th percentile	8.0	7.3	7.7	9.4	6.5
	Annual average	7.2	6.6	6.8	8.6	6.8

5.4.2 Background data recorded by BlueScope

BlueScope currently operates two AQMSs, North Gate and Scouts Hall. North Gate AQMS is located approximately 2.3 km northwest of the project and has been in operation since December 2015. Scouts Hall AQMS is located approximately 1.8 km southwest of the project and has been in operation for approximately 34 years. Refer Figure 5.4 for station locations.

A summary of the ambient PM_{10} data recorded at North Gate AQMS and Scouts Hall AQMS over the last 5 years is provided in Table 5.6.

Table 5.6 5 year summary of available background PM_{10} data recorded by BlueScope[3]

Pollutant	Averaging period	Recorded background concentration by year ($\mu g/m^3$)				
		2016	2017	2018	2019	2020
North Gate						
PM_{10}	24 hour maximum	176.5	499.7	205.8	499.7	499.4
	Maximum 24 hour (below assessment criteria)	49.0	49.7	49.5	48.8	49.1
	70th percentile	26.0	24.4	29.2	31.4	27.1
	Annual average	22.6	26.2	27.8	39.1	37.4
Scouts Hall						
PM_{10}	24 hour maximum	63.1	76.2	79.5	109.5	131.2
	Maximum 24 hour (below assessment criteria)	48.3	47.9	49.6	48.1	49.1
	70th percentile	21.2	21.4	27.1	28.7	21.3
	Annual average	17.6	18.8	22.7	24.2	19.9

5.4.3 Adopted background data

Background particulate data was adopted from data recorded at BlueScope's North Gate and Scouts Hall AQMS. It is noted that BlueScope AQMSs are not fully compliant with the Australian Standard, however use of the data was considered appropriate based on the following rationale:

- The adopted approach to assessment methodology – the assessment focused on modelling the incremental concentrations from the project sources only. As such, background concentrations were used to quantify existing emissions from current PKSW operations and undertake a cumulative assessment. The BlueScope AQMSs are located closer to the PSKW site than the DPE AQMSs and are therefore more likely to capture the full extent of emissions from PKSW existing operations.
- Project source type – the new project sources are ground-based (i.e. not stacks with vertical velocity) and therefore are likely to predominantly contribute to air quality impacts in the near field, so that an understanding of the near field air quality environment is preferred. As BlueScope AQMS's are located closer to the PSKW site than the DPE AQMS's, they were considered more appropriate for use in the assessment.
- Conservative dataset – a review of particulate monitoring concentrations shows that BlueScope AQMS's recorded higher particulate concentrations compared to DPE stations.

A summary of the background air quality data adopted in this assessment is provided in Table 5.7. As noted in Section 3.2.3, inclusion of background data is considered conservative as the background data contains contributions from existing PKSW operations. Using the background data may result in a 'doubling up' of concentrations from PKSW activities that would cease once the project is operational, however it was decided to include the background data in this assessment to provide a conservative assessment.

Table 5.7 Adopted background air quality data

Pollutant	Averaging period	Adopted background value
TSP	Annual	56.8 $\mu g/m^3$, equal to twice the annual PM_{10} concentration of the adopted background dataset. Refer to PM_{10} below for explanation of adopted PM_{10} concentrations.
PM_{10}	24 hour	Maximum daily value of 49.7 $\mu g/m^3$.

Summary statistics and the top 10 ranked PM_{10} concentrations from adopted background data are shown in Table 5.8 and Table 5.9, noting that any 24 hour background values greater than the assessment criteria (50 $\mu g/m^3$) was excluded from the dataset.

[3] Extraneous data was removed from dataset. Due to unrepresentative 'spikes' identified in the recorded data, any 3 minute average PM_{10} concentration greater than 500 ug/m^3 was filtered out of dataset.

Table 5.8 Summary statistics of adopted background air quality data

Pollutant	Averaging period	Adopted background concentrations (μg/m^3)
TSP	Annual	56.8
PM_{10}	Maximum 24 hour (below assessment criteria)	49.7
	70th percentile	27.7
	Annual average	28.4

Table 5.9 Top 10 ranked PM_{10} concentrations from adopted background data

Rank	Date of recorded concentration	PM_{10} concentration (μg/m^3)
1	14/12/2017	49.7
2	24/09/2017	48.7
3	9/01/2017	47.9
4	2/12/2017	47.9
5	19/10/2017	46.3
6	11/10/2017	45.5
7	13/01/2017	45.3
8	31/01/2017	43.9
9	18/09/2017	43.6
10	17/02/2017	43.4

5.5 Climate and meteorology

The local climate and meteorology (weather) within the study area is of critical importance when assessing the potential for air quality impacts at sensitive receptors.

The meteorological environment relevant to a project site is best understood through the review of data collected from long-running monitoring weather stations, most commonly operated by the Bureau of Meteorology (BoM) as well as state authorities (DPE in this case) and in some instances private entities (such as BlueScope). Simulation of the meteorological environment (modelling) is a useful tool in understanding the environment where suitable meteorological observations are not available.

1.1.3 Available observations

The BoM operates a network of Automatic Weather Stations (AWS) across Australia. A BoM AWS typically measures critical meteorological parameters including wind speed, wind direction, temperature, relative humidity, and pressure, with some stations also measuring cloud coverage.

The nearest AWS to the project site include:

– Port Kembla AWS (068253) – 2 km southeast
– Bellambi AWS (068228) – 11 km north
– Albion Park (Shellharbour Airport) (068241) – 15 km southwest

It is noted that long term climate statistics of temperature and rainfall are not available from the closest BoM station (Port Kembla AWS), therefore climate statistics were sourced from the second closest station (Bellambi AWS).

BlueScope's North Gate and Scouts Hall air quality monitoring stations record wind speed and direction, however they do not include temperature or rainfall and are not fully compliant with Australian Standards for wind speed and direction and therefore weren't referenced in this section. A review of the wind roses recorded at BlueScope's North Gate and Scouts Hall air quality monitoring stations is provided in Appendix A.

5.5.1.1 Temperature

Figure 5.5 shows monthly temperature statistics for data measured at BoM Bellambi AWS for the period 1997 through 2021. The median monthly maximum temperature and median monthly minimum temperature are used to show the typical temperature range for each month of the year. This is shown along with the monthly average temperature.

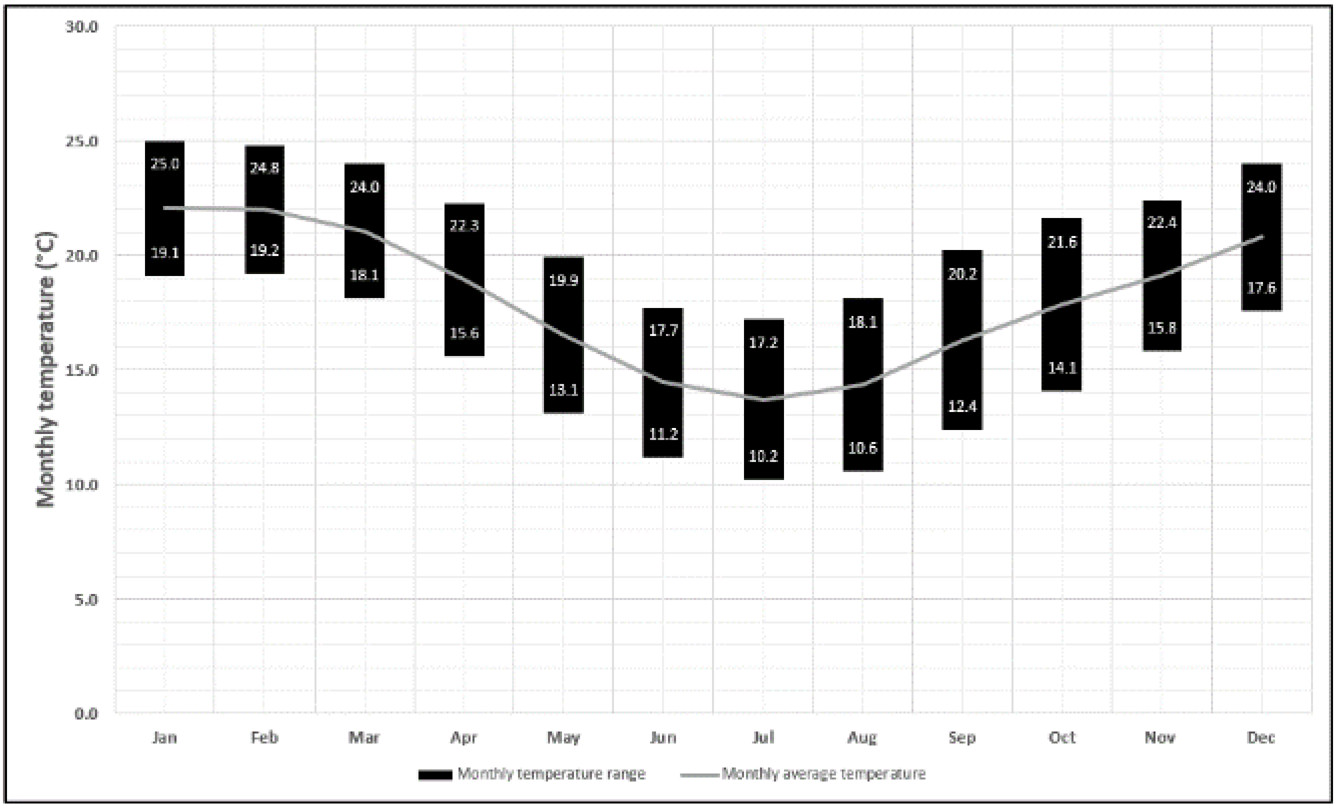

Figure 5.5 Monthly climate temperature statistics from BoM Bellambi AWS (1997-2021)

5.5.1.2 Rainfall

Figure 5.6 shows monthly rainfall statistics for data measured at BoM Bellambi AWS for the period 1997 through 2021. The statistics shown include average monthly rainfall amount (mm) and average number of days per month where rainfall is greater than 1 mm (number of 'rain days').

The data shows that the number of rain days and the total rainfall amounts are greater during the summer and autumn months.

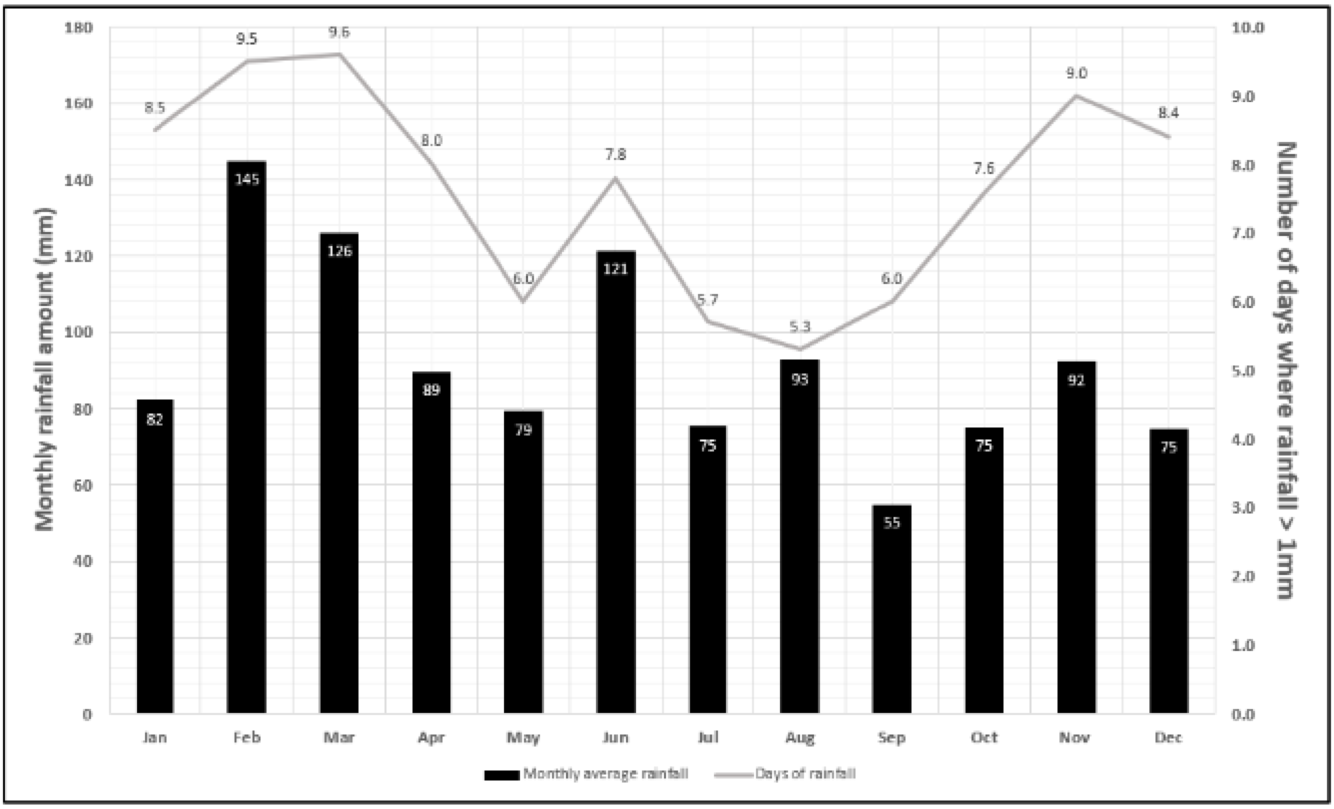

Figure 5.6 ***Monthly climate rainfall statistics from BoM Bellambi AWS (1997-2021)***

6. Project air emissions

6.1 Project construction

6.1.1 Construction overview

Construction of the project, including relocation of existing infrastructure and construction of the CSU and new conveying alignment, would be completed in two stages each up to 28 months in duration with the time between each stage to be determined by operational requirements. The stages being:

– Stage 1- Relocation of the Coke Loader and associated Ship Unloader Movements
– Stage 2- Installation of a CSU and associated coal conveyors to 4 Area

A summary of construction activities proposed in each stage of works is provided in Table 6.4.

Table 6.1 Construction activity summary

Activity	Anticipated duration	Works description and hours
Stage 1 - Relocation of the Coke Loader and associated Ship Unloader Movements		
Pre-work and site preparation	1 – 6 months	Activities are expected to occur during standard construction hours. Activities include: – Mobilisation of contractors and equipment and removal of temporary structures within the proposed work site – Establishment of construction facilities, such as fencing, site offices and temporary infrastructure (such as lighting and power).
Berth modifications at Berth 113	18 – 28 months	Activities will occur both during and outside standard construction hours. Activities include: – Excavation, piling and construction of reinforced concrete structures to support new crane rail beams, which will allow the extension of crane rails from Berth 112 to Berth 113 – All below ground infrastructure installation.
Coke Loader relocation.	12 – 24 months	Activities will occur both during and outside standard construction hours. Work outside of standard construction hours will usually be associated with large crane lifts. Activities include: – Relocation of the existing conveyors and transfer house – Construction of new connecting conveyor and transfer house – Relocation of electrical supplies for the Coke loader – Modifications to allow 2OUL to operate on Berths 112 and 113 – Modifications to allow 3OUL to operate on Berths 111 and 112 – Modifications to existing infrastructure to facilitate these works at Berth 113 – Reconfiguration of internal roads – Commissioning of Coke Loader and 2OUL in new positions.
Demobilisation of construction site	1 – 6 months	Activities include: – Removal of construction compound and layout down areas – Return of construction areas to their previous use – Fine tuning equipment – Commence operation

Activity	Anticipated duration	Works description and hours
Stage 2 - Installation of a CSU and associated coal conveyors to 4 Area.		
Pre-work and site preparation	6 months	Activities are expected to occur during standard construction hours and include: – Removal of temporary and mobile structures within the proposed work site – Establishment of construction facilities, including fencing, site offices and temporary infrastructure (such as lighting and power).
Commodity clearance from the berth and transfer to 4 Area	18 – 28 months	Activities will occur both during and outside standard construction hours. Work outside of standard construction hours will usually be associated with large crane lifts. Activities include: – Construction of new conveyors and transfer houses – Piling and excavation – Establishing foundations and retaining walls – Installation of electrical services – Minor modifications to the Berths to accommodate the new conveyors.
Installation of CSU at Berth 111	12 – 18 months	Activities will occur both during and outside standard construction hours. Work outside of standard construction hours will usually be associated with large crane lifts. Activities include: – Unloading of CSU from ship onto Berth 111 – Connection of services to CSU – Relocation of 3OUL to Berth 112 – Reconfiguration of internal roads.
Demobilisation of construction site and commission CSU and conveyors	1 – 6 months	Activities include: – Removal of construction compound and laydown areas – Return of construction areas to their previous use – Commissioning of overall system, including trial unloading of ships and trial of distribution systems – Fine tuning equipment – Commence operation.

A list of indicative equipment required for the project is presented in Table 6.2.

Table 6.2 Indicative construction equipment

Construction equipment		
Excavators- Various Sizes	Concrete Trucks	Welding machines
Bulldozers	Contractor service vehicles	Site Sheds
Semi-trailers and rigid body trucks	Concrete trucks	Vacuum Trucks
Dump Trucks	Rollers – compactor and vibratory	Boring machines
Mobile Cranes-up to 750 tonnes	Piling Rigs	Asphalting machines
Elevated Work Platforms	Semi-Trailers	Rockbreakers
Concrete pumps	Welding machines	Forklifts up to 5 tonnes
Excavators up to 50 tonnes	Heavy lift ship (for import of CSU only)	-

The delivery of materials and equipment to the work sites will be staged as required with minimal storage close to the berths. Indicative laydown areas are shown on Figure 5.3 and summarised in Table 6.3.

Table 6.3 Ancillary facilities existing and proposed use

ID	Location	Activity	Size (m^2)	Indoor/Outdoor
1	Berth 113 laydown	Main construction area laydown and staging area, equipment, materials and site sheds	5,806	Outdoor
2	Tug berth laydown	Piling rig, piles and equipment	1,278	Outdoor
3	Christy Dr laydown	Containers for covered storage, equipment	845	Indoor using containers
4	Sinter Plant laydown	Piles, conveyors and large equipment, excavation spoil	2,328	Outdoor
5	21 Area Laydown A	Large equipment, excavation spoil	7,430	Outdoor
6	21 Area Laydown B	Large equipment, excavation spoil	4,864	Outdoor
7	Carpark Laydown	Materials, equipment, excavation spoil	3,616	Outdoor
8	4BF Laydown	Materials, equipment, excavation spoil, piles	1,161	Outdoor
9	Energy Services Laydown	Materials, equipment, excavation spoil, piles	1,617	Outdoor
10	4 Area Laydown	Materials, equipment, excavation spoil, piles	8,726	Outdoor

Ancillary facilities for existing and proposed uses are shown in Figure 5.3.

6.1.2 Construction emissions

The key potential emissions to air from construction of the project were identified upon review of the construction methodology as follows:

– Emissions of particulate matter (dust including TSP and PM_{10}) generated from mechanical movements of loose material associated with:
  - Establishment of construction facilities and temporary infrastructure
  - Relocation of the existing infrastructure
  - Berth modifications works including excavation and piling activities
  - Construction of new infrastructure
  - Use of ancillary facilities and laydown areas

– Minor quantities of gaseous combustion pollutants will be emitted from vehicle exhaust

The total excavation spoil associated with the works includes 5,000 m^3 from the conveyors, 28,000 m^3 from Berth 113, and spoil generated from piling associated with the works. Excavating, moving and storing this material could generate dust with potential to lead to off-site impacts if not appropriately managed.

The risk of particulate emissions during construction will vary based on the specific activities being undertaken at any time (i.e. particulate emissions will not occur at all times). It is anticipated that some particulate emissions may include contaminants and heavy metals from removal of infrastructure. With dust management measures in place, contaminant emission will be minor and will be controlled at the source.

Minor vehicle exhaust emissions are expected throughout the construction period, however, sources will be discontinuous, transient, and mobile, and therefore the air quality risk associated with vehicle emissions during construction is low.

An overview of potential emissions to air that could occur during construction of the project is summarised in Table 6.1.

Table 6.4 Summary of potential construction emissions to air

Activity	Overview of potential emission sources
Stage 1 - Relocation of the Coke Loader	
Pre-work and site preparation	– Minor particulate emissions from use of plant/equipment – Minor particulate emissions from disturbance of loose material during installation of prefabricated and temporary infrastructure
Berth modifications at Berth 113	– Particulate emissions from excavation and piling works noting some material may have a high moisture content due to its proximity to water. A high moisture content will minimise particulate emissions.
Coke loader relocation	– Minor particulate emissions from use of plant to relocate conveyors and transfer house – Minor particulate emissions from disturbance of loose material during installation of new conveyor and transfer house – Minor particulate emissions from berth modifications
Demobilisation of construction site	– Minor particulate emissions from use of plant/equipment – Minor particulate emissions from disturbance of loose material during removal of construction compound and lay down areas
Stage 2 - Installation of a CSU and conveyors sequence	
Pre-work and site preparation	– Minor particulate emissions from disturbance of loose material during removal of temporary structures within the proposed work site and establishment of construction facilities
Commodity clearance from the berth and transfer to Cokemaking	– Particulate emissions from some excavation and piling works noting some material may have a high moisture content due to its proximity to water, which will minimise particulate emissions – Minor particulate emissions from disturbance of loose material during construction of new conveyors and transfer house
Installation of CSU at Berth 111	– Particulate emissions from reconfiguration of internal roads – Minor particulate emissions from disturbance of loose material during unloading and positioning of the CSU
Demobilisation of construction site and commission CSU and conveyors	– Minor particulate emissions from use of plant/equipment – Minor particulate emissions from disturbance of loose material during removal of construction compound and lay down areas
Miscellaneous throughout stages 1 and 2	
Use of ancillary facilities and laydown areas	– Minor particulate emissions from use of plant/equipment – Minor particulate emissions from disturbance of loose material during removal of construction compound and lay down areas

The assessment did not identify any high risk of dust impacts during construction. Excavation and piling works present the highest potential for particulate emissions however, with controls in place, these works are not expected to emit significant particulate emissions.

Material and plant storage areas (which account for majority of ancillary areas) are not expected to emit significant particulate emissions. It is assumed that any material with potential to release particulate emissions will be stored in designated storage areas.

6.2 Project operation

6.2.1 Operational overview

Operation of the project will generally be consistent with current operations except for some coal handling activities based around the addition of a CSU and new conveying infrastructure. Similarities with current operations include:

– The general operation of the berths, including processing and transportation of raw materials (iron ore, scrap, coal, limestone).
– Operation of the project, 24 hours per day, seven days per week.
– Trucking operations will continue to move raw materials from BlueScope's berths in a similar manner. The additional volumes of metallurgical coal that are imported will all be moved to the stockpiling area by conveyors and no additional truck movements will be required.

Differences in operation due to the project relate to use of the CSU and new conveyor infrastructure. Key features of the CSU including an operational description are as follows:

– The CSU is equipped with a bucket-elevator unloading device that is suspended from a boom. The material to be unloaded is scooped from the ship by the bucket elevator then transported vertically to the top of the CSU boom, where it is unloaded onto a conveyor belt.
– The CSU conveying system is enclosed from the pickup in the ship's hold until the material is discharged. As the CSU is not lifting a bucket of material over the side of the ship, spillage is almost eliminated. This removes the need for additional controls such as catch tarpaulins or bins to be set up alongside the ship and reduces dust emissions and material spillage.
– The CSU proposed for construction at Berth 111 will allow for the handling of both coal and iron ore and will be capable of achieving an average discharge rate of 20,000 tonnes per day for coal and an average rate of 40,000 tonnes per day for iron ore.

Key features of the new conveyor infrastructure including an operational description is as follows:

– The conveyor sequence will be sized to transport around 1,500 tonnes per hour (tph) of coal to meet the discharge rate of the CSU. The sequence consists of seven new conveyors, C01, C02, C03, C04, C05, C06, and C07.
– C01 conveyor will run along Berth 111 parallel to the existing iron ore conveyor (F65). C01 will be an open conveyor to allow for the movement of the CSU while discharging material onto C01.
– C02 conveyor will transfer and elevate the coal from C01 to C02 to above the existing conveyor which directs to the raw materials handling area (F4). C02 includes a diverter at the head chute, allowing coal to be transferred onto C03 towards 4 Area or diverted to C07 towards the F4A Stockpile. C02 conveyor will be enclosed on three sides and includes a walkway.
– C03, C04, and C05 conveyors will transport coal from the C02 diverter towards 4 Area. These conveyors are positioned to avoid several large structures and sections of plant. These conveyors will be enclosed on 3.5 sides and will include walkways.
– C06 conveyor is a tripping conveyor that will receive coal from C05 and deliver it to the stockpile in 4 Area. The conveyor is open to allow for unlimited discharge points along its length to evenly distribute the coal into a single pile, or multiple smaller piles. The stockpile capacity under the tripper will be approximately 100,000 tonnes to allow for the discharge of a full Panamax size ship while providing capacity to reclaim the previous shipment of coal.
– C07 is a short belt feeder linking the C02 diverter discharge and the existing F4 conveyor to deliver coal types that are not suitable for 4 Area to the F4A Stockpile.

The proposed location and route of the new conveyors is shown on Figure 6.1.

Best practice design features which are proposed as part of the project that will reduce dust emissions include:

– The CSU will be fully enclosed to prevent spillage of material and reduce dust emissions.
– Where practicable, conveyors will be enclosed are much as possible (on 3.5 sides) to reduce loss of material leading to dust emissions during transportation of coal.

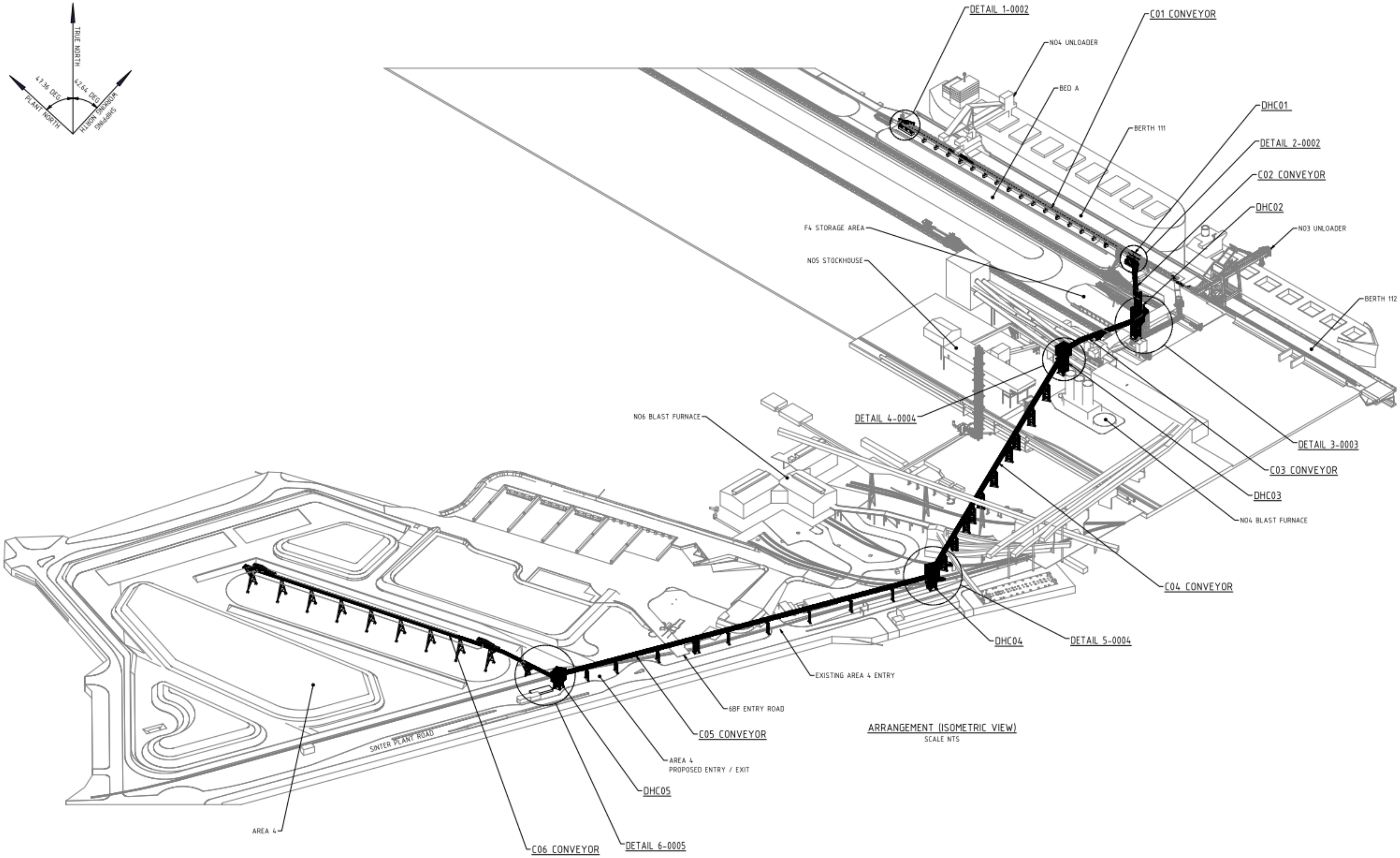

Figure 6.1 Coal Conveyor Route From Berth to 4 Area

6.2.2 Operation emissions

The primary potential emissions to air from the operation of the project have been identified as particulates (TSP and PM_{10}) generated from mechanical movements of coal handling including:

– Transfer of coal via conveyors, noting that most conveyors will be enclosed as described above.
– Loading coal stockpiles.

A summary of particulate matter emission rates is provided in Table 6.5. A detailed emissions inventory with all assumptions is provided in Appendix B.

The emissions inventory for the project was prepared based on the following assumptions:

– Conveyors operate at maximum activity rate of 1,500 tph of coal to meet the discharge rate of the CSU. Note that this is the peak activity rate at which the conveyors would operate. The daily average rate is 833 tph meaning annual average predictions are overestimated in this assessment.
– A base level of dust suppression mitigation was applied consistent with current operations of the site and proposed project operations. The mitigation included:
  - The CSU is fully enclosed and therefore no emissions were modelled from this source.
  - Conveyors C01 and C06 are open, therefore no mitigation factor was applied.
  - Conveyors C02, C03, C04 and C05 will be enclosed on 3.5 sides, therefore a mitigation factor of 70% was applied to account for enclosure reducing emissions in accordance with the estimated control factors provided in the NPI.
  - Conveyor C07 is a short belt feeder that is used to remove coal types that are not suitable for 4 Area from the main conveyor system; it is therefore understood that C07 will handle a relatively small quantity of coal. Use of C07 will remove coal from the main conveyor system and will therefore decrease the quantity of coal handled by the main conveyor and the corresponding amount of coal delivered to 4 Area. C07 is located to the north-eastern edge of the main conveyor system which is significantly further away from identified sensitive receptors compared to the main conveyor system and 4 Area. Due to the low coal handling rate of C07 and its greater separation distance from receptors, C07 was assumed to not be operational for the worst-case modelling scenario.
  - Mitigation in the form of dust suppression was applied to loading of coal stockpiles at 4 Area (i.e. conveyors stockpiling material in 4 Area) to account for existing water sprays (50% reduction achieved) and variable height stacker (25% reduction achieved).
– An average wind speed of 5.2 m/s was used in emission factor calculations based on outputs from the CALMET modelling. Observations from BoM’s Port Kembla AWS, Bellambi AWS, Albion Park (Shellharbour Airport) and BlueScope’s North Gate and Scouts Hall AQMSs recorded lower average wind speeds than 5.2 m/s (refer to Appendix A for wind roses and average wind speeds). Therefore, use of the higher average wind speed is considered conservative as it results in a higher calculated emissions factor.
– An average coal moisture content of 9.85% was assumed based on sampling data provided by BlueScope.
– No change to the operation of 4 Area or the 4 Area coal stockpile arrangement is proposed, therefore any additional sources of dust emissions from 4 Area (such as wind erosion and handling of coal) will be accounted for in the background data (refer Section 3.2.3).
– All sources were modelled to operate constantly (i.e. 24 hours per day, 7 days per weeks) to account for worst-case operations.
– Sources were modelled at their design locations shown in Figure 5.2 and Figure 6.1.

Table 6.5 Dust emissions summary

Source	Emission rate (g/s)	
	TSP	PM_{10}
CSU	N/A	N/A
C01	0.162	0.064
C02	0.049	0.073
C03	0.049	0.073
C04	0.049	0.073
C05	0.049	0.073
C06	0.162	0.064
Loading coal stockpile	0.625	0.266
Total	**1.14**	**0.69**

7. Construction air quality assessment

A risk-based approach in accordance with IAQM Guidance was adopted to assess potential particulate impacts during construction of the project.

The IAQM Guidance recommends a detailed risk assessment be undertaken where there is a human receptor within 350 m, or an ecological receptor within 50 m of the construction footprint, or where there is a human or ecological receptor within 50 m of any haulage routes up to 500 m from the site entrance.

It is noted that the majority of construction activities will occur at the berths on the eastern portion of the PKSW site which is a significant distance from any identified sensitive receptors. The locations of identified sensitive receptors with respect to the site boundary and the construction activities area are provided in Table 5.1. A 350 metre buffer distance from the project site and ancillary facilities and laydown areas is shown on Figure 7.1. All sensitive receptors were identified to be located outside the buffer distance (>350 m from construction activities) of the project site and ancillary facilities construction areas.

As all sensitive receptors are located outside the construction area buffer distance (>350 m from construction activities) by a significant margin and particulate emissions during construction are expected to be relatively minor (refer Section 6.1.2), it is considered that there is a low risk of particulate impacts and no further assessment is considered necessary in accordance with IAQM guidance.

Emissions to air during construction will be managed and reduced by implementation of the mitigation measures outlined in Section 9.1 to minimise the likelihood and severity of any potential air quality impacts.

BlueScope Steel (AIS) Pty Ltd
Commodities Logistics Infrastructure Project
Air Quality Assessment

Location of proposed construction activities with buffer zone

Project No.	12555409
Revision No.	0
Date	29/06/2022

FIGURE 7.1

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Print date: 19 Oct 2022 - 15:34

Data source: LPI: DTDB/DCDB, 2017. Metromap Tile Service: .
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8. Operational air quality assessment

8.1 Operational assessment overview

Air quality dispersion modelling was undertaken to predict potential worst-case air quality impacts from the project in accordance with the methodology outlined in Section 3. The assessment results have been compared with the relevant state and national air quality criteria and standards which exist to protect human health and the environment from air pollution.

The model predictions are presented as tabulated results providing ground level concentrations at each sensitive receptor (with criteria exceedances highlighted) and as contour plots to illustrate the predicted pattern of dispersion and allow interpretation of predicted model results at any location within the sampling grid. The averaging period, statistic/percentile, impact location and impact type presented for each pollutant was chosen to align with assessment criteria (refer Section 2.3).

To assess incremental and potential cumulative air quality impacts, predicted pollutant concentrations were presented for the following cases:

- **Incremental (project only)** – predicted concentrations from project sources only.
- **Cumulative with BlueScope AQMS** – cumulative concentrations were calculated using project only predictions (as above) and worst-case maximum background concentrations from BlueScope's North Gate and Scouts Hall AQMS (refer Section 5.4.3).
- **Cumulative with BlueScope AQMS and SS projects** – cumulative concentrations were calculated using project only predictions and worst-case background concentrations from BlueScope's AQMS and contributions from SS projects (refer Section 5.3.2). Contributions from the Port Kembla Gas Terminal project were accounted for by including additional sources in the dispersion model in accordance with scenario 1 presented in *East Coast Gas Project Modification Air Quality Assessment* (GHD, 2019). Scenario 1 was considered the worst-case scenario operational situation that will likely occur, consisting of two gas fuelled engines active on board the FSRU and two liquid engines active on board the fuelled LNG carrier. This case accounts for potential cumulative impacts with existing facilities and future projects. In the absence of modelled TSP concentrations from the Port Kembla Gas Terminal project, a TSP/PM_{10} ratio of 2 was assumed to predict annual TSP concentrations.

The following modelling methodologies and assumptions were adopted in the operational air quality assessment:

- A contemporaneous approach to calculating cumulative particulate concentrations was adopted. Predicted incremental concentrations were added to recorded daily variable background concentration for the same 24-hour period to calculate predicted cumulative particulate concentration.
- The modelled emissions rates are summarised in Section 6.2.2 and detailed in Appendix B.
- All sources were modelled to operate constantly (i.e. 24 hours per day, 7 days per week) to account for worst-case operations.
- Conveyor sources were modelled at height based on their estimated height taken from design drawings provided by BlueScope.
- Conveyor sources were modelled as area sources (each conveyor modelled as an individual source) and loading coal to stockpiles was modelled as a volume source.

8.2 Project air quality predictions

Predicted incremental and cumulative particulate concentrations and dust deposition rates are presented in Table 8.1 and a contour dispersion plot of incremental 24 hour PM_{10} is shown on Figure 8.1. No exceedances of the assessment criteria were predicted at sensitive receptor locations.

It is noted that predicted incremental concentrations are relatively minor compared to the predicted cumulative concentrations. At the worst impacted receptor, predicted incremental concentrations account for:

– 0.1% of the annual TSP assessment criteria
– 1.8% of the 24 hour PM_{10} assessment criteria
– 0.3% of the annual PM_{10} assessment criteria

Background dust deposition data was not available, therefore only incremental predictions from the project were provided. The predicted dust deposition rates are orders of magnitude below the assessment criteria.

Table 8.1 Predicted particulate concentrations and deposition

Receptor	Predicted particulate concentrations (µg/m^3) and depositions (g/m^2/month)									
	Incremental (project only)				Cumulative with BlueScope AQMS			Cumulative with BlueScope AQMS and SS projects		
	Deposited dust	TSP	PM_{10}		TSP	PM_{10}		TSP	PM_{10}	
	Annual	Annual	24 hour	Annual	Annual	24 hour	Annual	Annual	24 hour	Annual
Criteria	**2**	**90**	**50**	**25**	**90**	**50**	**25**	**90**	**50**	**25**
R01	0.0011	0.01	0.2	0.01	56.9	49.7	22.4	56.9	49.7	22.4
R02	0.0024	0.02	0.3	0.02	56.9	49.7	22.4	56.9	49.7	22.4
R03	0.0046	0.02	0.2	0.03	56.9	49.7	22.4	57.0	49.7	22.4
R04	0.0007	0.01	0.2	0.01	56.9	49.7	22.4	56.9	49.7	22.4
R05	0.0088	0.07	0.9	0.07	56.9	49.8	22.4	57.0	50.0	22.5
R06	0.0039	0.05	0.6	0.06	56.9	49.7	22.4	57.0	49.8	22.5

Paper Size ISO A4

0 0.2 0.4 0.6 0.8 1

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

GHD

BlueScope Steel (AIS) Pty Ltd
Commodities Logistics Infrastructure Project
Air Quality Assessment

Predicted incremental 24 hour PM_{10} concentration for project only ($\mu g/m^3$, 100th percentile)

Project No.	**12555409**
Revision No.	**0**
Date	**29/06/2022**

FIGURE 8.1

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Print date: 19 Oct 2022 - 15:34

Data source: LPI: DCDB/DTDB, 2017. Commonwealth of Australia (Geoscience Australia) 250K Topographic Data Series 3, 2006. Metromap Tile Service: . Created by: dbbanatin

9. Management and mitigation

Air quality management and mitigation measures to reduce emissions to air from the project and minimise any potential air quality impacts are provided below. These controls are in addition to the fugitive dust emission controls detailed in Condition O3 of BlueScope's EPL for PKSW. The BlueScope "Fugitive Dust Management System" procedure (MA-ENV-02-02) will be applied throughout construction and operation of the project.

9.1 Construction

While general construction activities are not expected to exceed air quality goals at nearby receptors, the following mitigation measures are recommended:

– Prepare a dust management plan for use during construction activities.
– Regular opportunistic visual monitoring of construction work during dust generating construction activities or adverse weather conditions to recommend changes to activities to reduce dust generation where practical.
– If any contaminated areas are identified during demolition or relocation of existing infrastructure works, take extra precautions to prevent dust leaving the work area.
– During excavation and piling works at the berths, take extra precautions to prevent dust leaving the work area if dust is generated as a result of the activity.
– Reduce or cease dust generating activities if clearly visible plumes of dust go off the site or monitoring shows excessive particulate levels.
– Operations with high dust emission potential conducted in areas of low moisture content material will be suspended during high wind speed events and dust suppression will be used.
– Aim to minimise the size of storage piles where possible. Development of any new stockpile areas must be in accordance with the BlueScope Risk Assessment Process.
– Limit cleared areas of land and stockpiles and clear only when necessary to reduce fugitive dust emissions. All material stockpiles will have appropriate dust controls in place.
– Control on-site traffic by designating specific routes for haulage and access. Traffic on any unpaved construction areas should be limited to 25 kilometres per hour.
– All trucks carrying dry bulk material that is loaded on site must be loaded and operated so as to prevent spillage of any material from the load (which generates dust). Trucks must be covered prior to leaving the site boundary.

These measures will assist in reducing impact on all areas off-site during construction activities.

9.2 Operation

Operational air quality concentrations are anticipated to comply with the air quality assessment criteria and are expected to be comparable with existing operations.

Dust mitigation measures that will be implemented as part of the design of the project include:

– Use of water cannons to provide dust suppression for the coal stockpiles in 4 Area when weather condition require.
– Use of wheel wash at the exit of 4 Area to reduce wheel generated dust from haulage trucks transporting material around the PKSW site.
– Enclosed CSU bucket-elevator unloading device and conveyor system to prevent spillage and reduce dust emissions.
– Enclosure conveyors as much as practicable (enclosed on 3.5 sides for the main conveyor system consisting of conveyors C02 – C05) to minimise dust emissions from conveyors.

10. Conclusion

GHD has conducted an air quality impact assessment to assess the construction and operation of the Commodity Logistics and Import Project at the Port Kembla Steelworks. The assessment was undertaken in accordance with relevant legislation and government guidance.

A qualitative approach was adopted to assess the construction of the project. The construction assessment identified a low risk of potential air quality impacts as there will be a large separation distance between construction activities and sensitive receptors, and emissions to air during construction are expected to be relatively minor.

A quantitative air quality assessment was undertaken using air quality dispersion modelling to predict incremental and cumulative particulate concentrations from the operation of the project. The modelling predicted compliance with the assessment criteria for all assessed pollutants at all receptors. In addition, the modelling predicted that incremental concentrations (concentrations due to project only) would be minor compared against the assessment criteria and that the majority of cumulative concentrations comprised of elevated background concentrations. It is noted that the cumulative assessment was considered conservative as background particulate concentrations were sourced from the maximum recorded value from either BlueScope's North Gate or Scouts Hall AQMSs. Use of this background data was considered conservative as it contains contributions from some existing emissions sources that would be replaced by the project and will therefore cease to cause emissions to air once the project is operational.

The design of the project incorporates several best practice design features to reduce dust emissions including a fully enclosed CSU and enclosing the coal transfer conveyors as much as practicable. These design features offer improvements to current site operations with respect to causing emissions to air.

Based on the modelling and assessment undertaken, the project would have a minor impact on ambient air quality concentrations within the surrounding environment and the project is comparable to or better than current operations of the site with respect to air quality.

11. References

Australian Government, Department of Agriculture, Water and the Environment, *National Pollutant Inventory Emission Estimation Technique Manual for Iron and Steel Production (1999)*

Barclay J and Scire J (2011) *Generic Guidance and Optimum Model Settings for the CALPUFF Modelling System for Inclusion into the Approved Methods for the Modelling and Assessments of Air Pollutants in NSW, Australia*. Atmospheric Studies Group TRC Environmental Corporation

Bureau of Meteorology (2021) *Climate Data Online*. http://www.bom.gov.au/ accessed September 2021

Environ (2011) *BlueScope Steel, Port Kembla Sub-hourly Modelling of Hydrogen Sulphide*

Environ (2012) *BlueScope Steel, Port Kembla Site Air Emissions Modelling – PRP131*

GHD (2019) *East Coast Gas Project Modification Air Quality Assessment*

GHD (2022) *Blast Furnace No. 6 Reline Project Air Quality Impact Assessment*

Institute of Air Quality Management (2016) Guidance on the assessment of dust from demolition and construction

National Environmental Protection Council (2021) *National Environment Protection (Ambient Air Quality) Measure - Variation 2021*

New South Wales Environmental Protection Authority (NSW EPA) (2017) *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*. EPA 2016/0666. ISBN 978 1 76039 565 0

Appendices

Appendix A

Meteorological modelling methodology

A-1 Overview

Local meteorology, including long term wind speed and direction as well as atmospheric stability, can influence how pollutants are dispersed into the local environment.

This appendix outlines the methodology used to synthesise site-representative meteorology for the project. The meteorology is used in CALPUFF to drive the dispersion model.

A-2 Methodology

The meteorology modelling methodology is summarised below:

- Selection of a model period
- Development of coarsely gridded prognostic meteorological data set using the Weather Research and Forecast model (WRF) model
- Development of refined gridded meteorological data set which takes into account local terrain features using the CAMET diagnostic meteorological model
- Verification of model performance using data measured at BoM and BlueScope meteorological monitoring stations
- Extraction of predicted meteorological parameters from the CALMET model

A-2-1 Nearby BoM station review

A review of nearby BoM station is provided in Table A.1.

Table A.1 Nearby BoM station review

BoM station	Approximate distance from Site	Availability of meteorological data	BoM station setting
Port Kembla AWS (BoM ID: 68253)	0.5 km east of the Site	Began operation in 1990. All desired meteorological parameters except cloud data available.	Located on eastern most wharf in Port Kembla
Bellambi AWS (BoM ID: 68228)	12 km North of the site	Began operation in 1988. All desired meteorological parameters available.	Located on exposed headland
Albion Park (Wollongong airport) (BoM ID: 68241)	14 km southwest of the site	Began operation in 1999. All desired meteorological parameters available.	Located in cleared airport setting

Due to its close proximity to the project, the Port Kembla AWS was selected for inclusion in the representative year analysis.

A-2-2 Representative year selection

A representative year was chosen for modelling purposes based on review of Southern Oscillation Index (SOI) for the past 10 years and an analysis of BoM data recorded at Port Kembla AWS for the last five calendar years (01/01/2016 – 31/12/2020).

The SOI indicates the intensity of El Nino or La Nina events in the Pacific Ocean. A value of less than -7 often indicates El Nino episodes (typically accompanied by sustained warming of the central and eastern tropical Pacific Ocean, a decrease in the strength of the Pacific Trade Winds, and a reduction in winter and spring rainfall over much of eastern Australia and the Top End) while a value of greater than 7 often indicates La Nina episodes (typically associated with stronger Pacific trade winds and warmer sea temperatures to the north of Australia, waters in the central and eastern tropical Pacific Ocean become cooler during this time). Together, these give an increased probability that eastern and northern Australia will be wetter than normal[4].

[4] SOI data and description of El Nino and La Nina episodes sourced from Australian Government BoM, available online: **http://www.bom.gov.au/climate/current/soi2.shtml**

The SOI for the past 10 years is shown in Figure A.1.

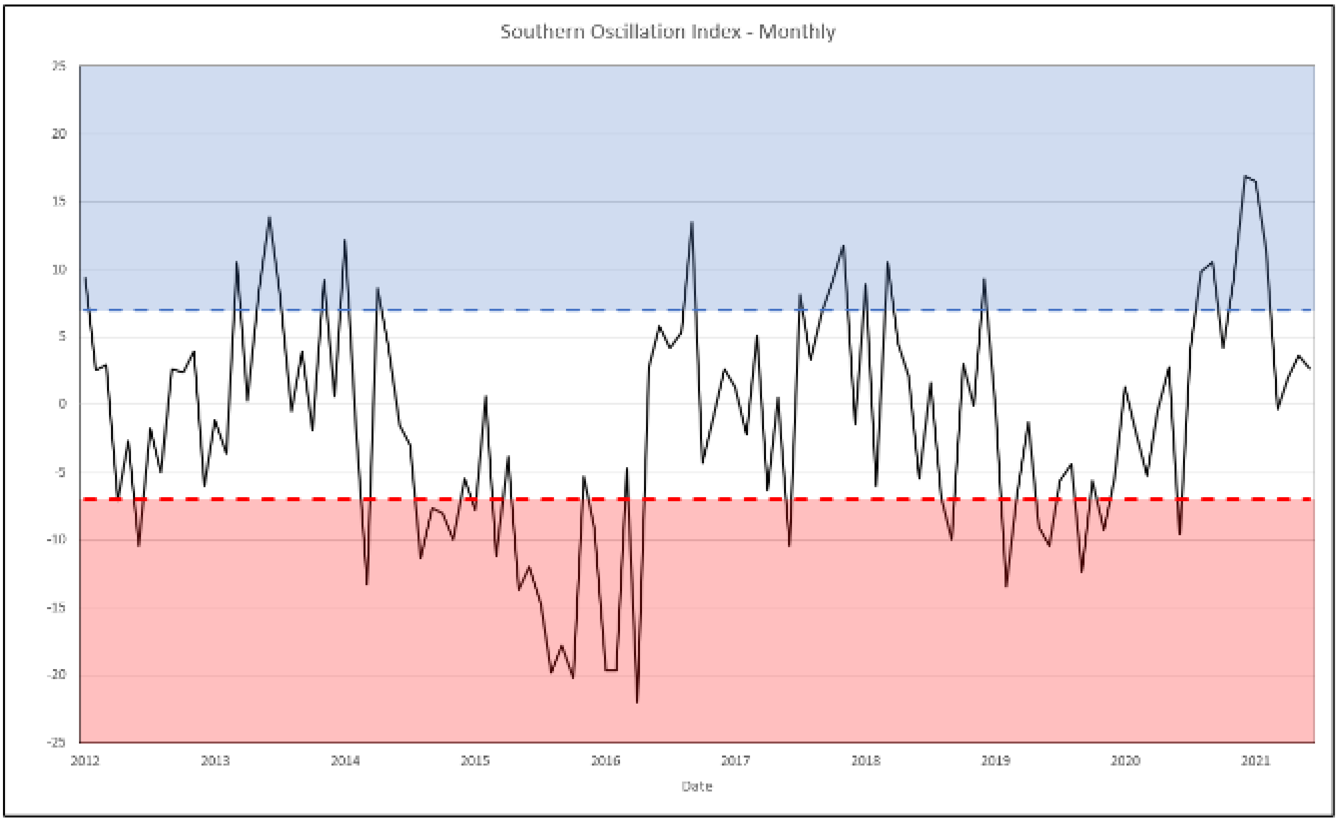


Figure A.1 Southern Oscillation Index for last 10 years (2012 – 2021)

Probability density function plots of Port Kembla AWS data (2016-2020) for wind speed, wind direction and temperature are provided in Figure A.2, Figure A.3 and Figure A.4 respectively.

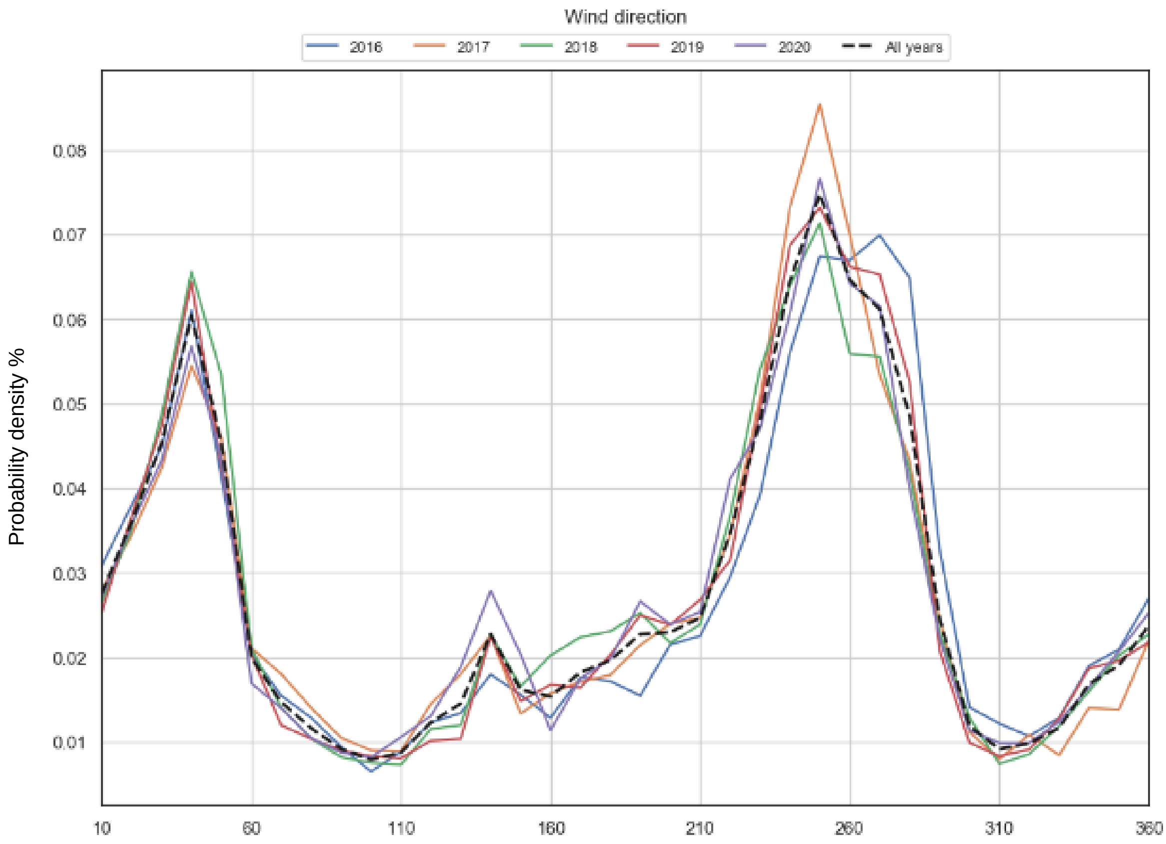


***Figure A.2		Wind direction plot, degrees (Port Kembla AWS, 2016 – 2020)***

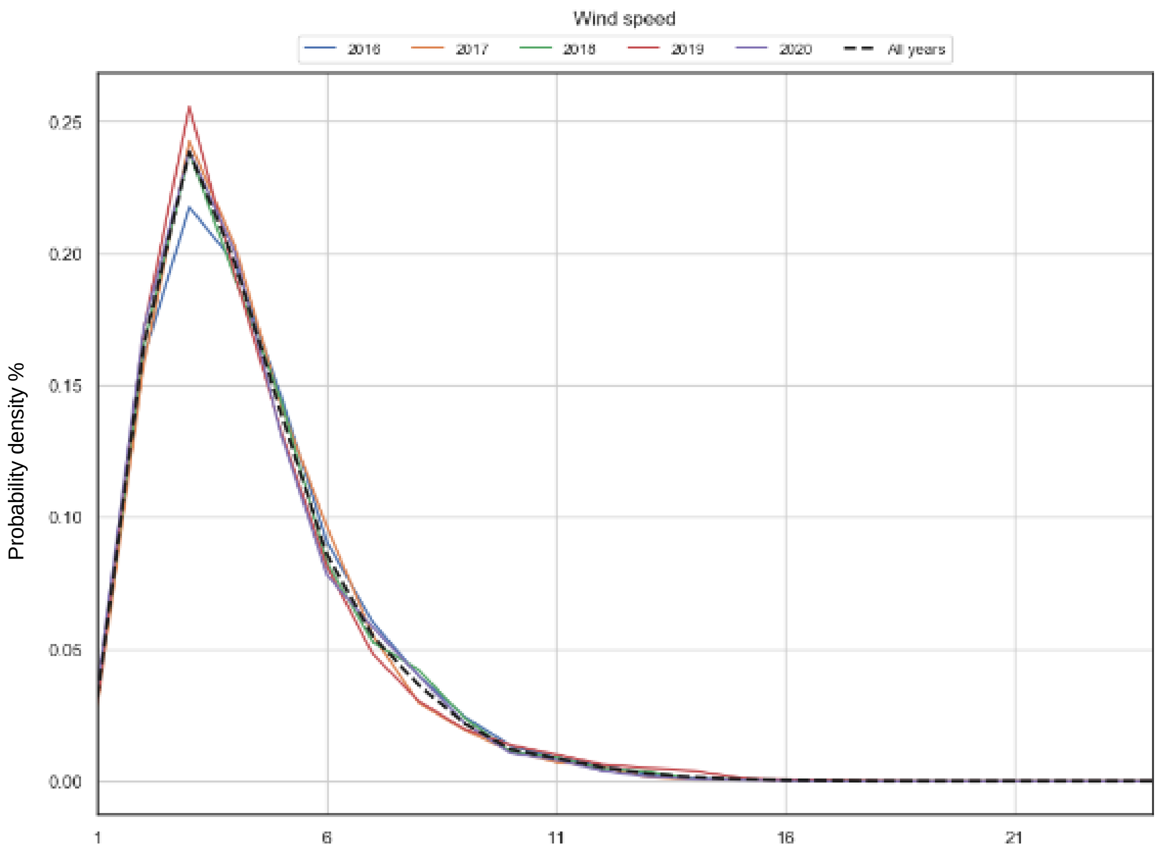


***Figure A.3		Wind speed plot, m/s (Port Kembla AWS, 2016 – 2020)***

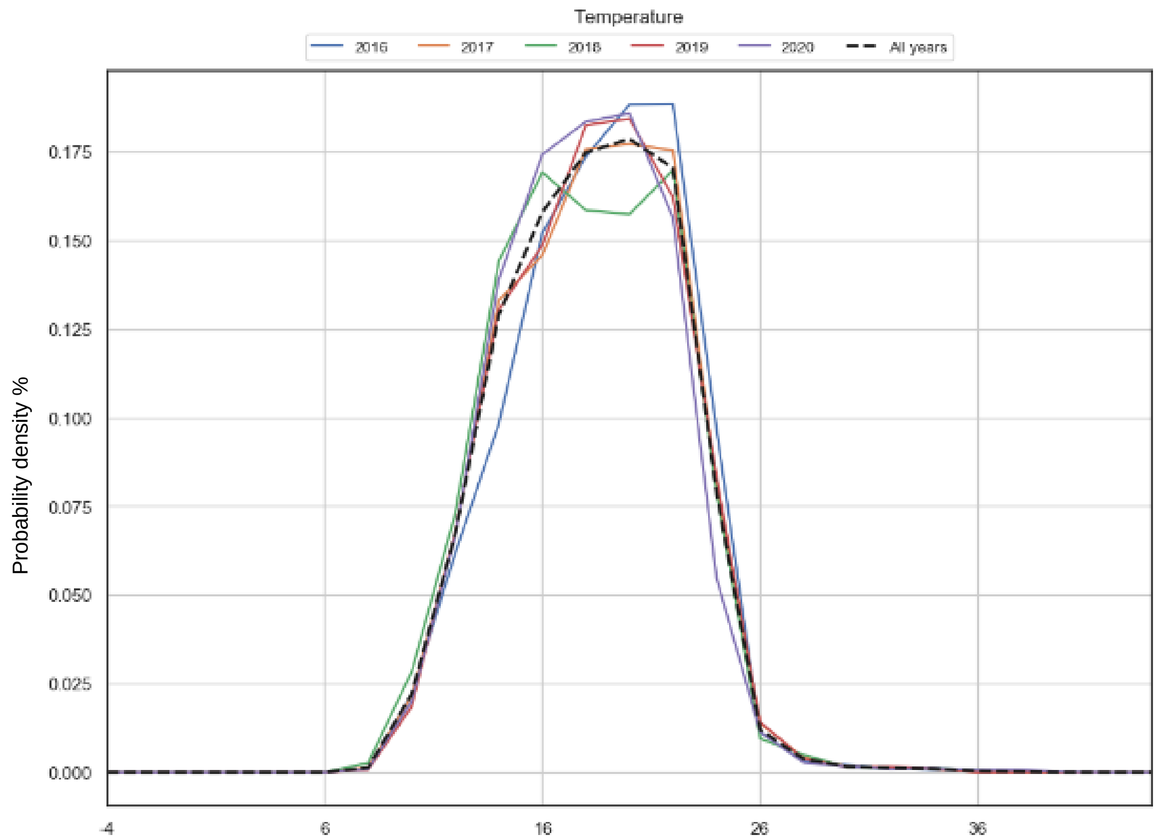


Figure A.4 Temperature plot, degrees Celsius (Port Kembla AWS, 2016 – 2020)

Based on the review of SOI data and meteorological conditions recorded at Port Kembla AWS, the representative year selected for modelling purposes was 1 January 2017 through 1 January 2018.

A-2-3 Prognostic meteorology

The parameters for the prognostic WRF model are summarised in Table A.2.

Table A.2 WRF model parameters

Parameter	Value
Modelled period	1 January 2017 to 31 December 2017
Domain centre	Latitude: 34.602506 S Longitude: 150.6581 E
Domain grid spacing	1 km
Domain size	100 x 100 km
Number of vertical levels	25

A-3 CALMET modelling

CALMET (Version 7) was used to resolve the wind field around the subject site to 250 metres spatial resolution. The application of CALMET for this purpose is an approved modelling approach in NSW as per the Approved Methods with model guidance documentation provided.

Upon completion of the broad scale WRF modelling runs, a CALMET simulation was set up to run for the model period using the three-dimensional gridded data output from the WRF model as an initial guess field. This approach is consistent with guidance documentation.

CALMET was run using the ‘No-Obs’ mode (i.e. surface observational data was not included in the model). Given the site is located within a complex land-sea interface, it was deemed that introduction of observational data into the model would lead to inconsistencies/irregularities in the predicted wind field, where blending of the observations and initial guess field is carried out. This is especially true at wind field levels above the surface level on the coastline, which are critical in this instance when assessing dispersion of pollutants from the ship loading vent sources.

A comparison of the predicted and observed wind field was carried out which showed good agreement with respect to frequency and pattern of various wind speeds. The level of agreement is deemed sufficient for dispersion modelling purposes, especially where peak 1-hour averaging periods are of concern and further the error associated with the model prediction is deemed preferable in comparison to the errors associated with the introduction of surface data (as described above).

All model settings were selected based on the recommendations provided in the Generic Guidance and Optimum Model Settings for the CALPUFF Modelling System for Inclusion into the Approved Methods for the Modelling and Assessments of Air Pollutants in NSW, Australia (J Barclay and J Scire, Atmospheric Studies Group TRC Environmental Corporation, 2011) except for MDISP (parameter for dispersion coefficients) for which the default value was used.

The southwest corner of the CALMET domain, or the origin, was located at UTM Zone 56 coordinates 285 kilometres east and 6164 kilometres north. The CALMET domain extended 40 kilometres to the east and north.

The CALMET domain consisted of 160 grids in both the east and north directions, with a grid resolution of 0.25 kilometre.

The CALMET model parameters are summarised in Table A.3. The TERRAD value was selected based on inspection of the terrain elevations in the immediate vicinity of the subject site. It should be noted that multiple TERRAD values were tested and the value producing the best results was selected.

Terrain and land use data used for the CALMET modelling are presented in Figure A.5 and Figure A.6.

Table A.3 Summary of CALMET model parameters

Parameter	Value
Modelled period	1 January 2017 to 31 December 2017
Mode	No obs (NOOBS = 2)
UTM zone	56
Domain origin (south-west corner)	Easting: 285 km Northing: 6164 km
Domain size	160 x 160 at 0.25 km resolution (40.0 km x 40.0 km)
Number of vertical levels	11
Vertical levels (m)	0, 20, 40, 80, 160, 320, 640, 1200, 2000, 3000, 4000,
CALMET settings for hybrid mode Settings selected in accordance with (OEH, 2011)	TERRAD = 1.75 km
Initial guess field	WRF .m3d file used as an initial guess field for CALMET
Surface data	N/A
Upper air data	No site-specific upper air data is used. Upper air data is included within the WRF .m3d initial guess field.
Land use and terrain data	Land use data was manually developed through assessment of aerial imagery to accurately reflect the land use in the area. High-resolution terrain data was sourced from the STRM 1-second (~30 m) database.

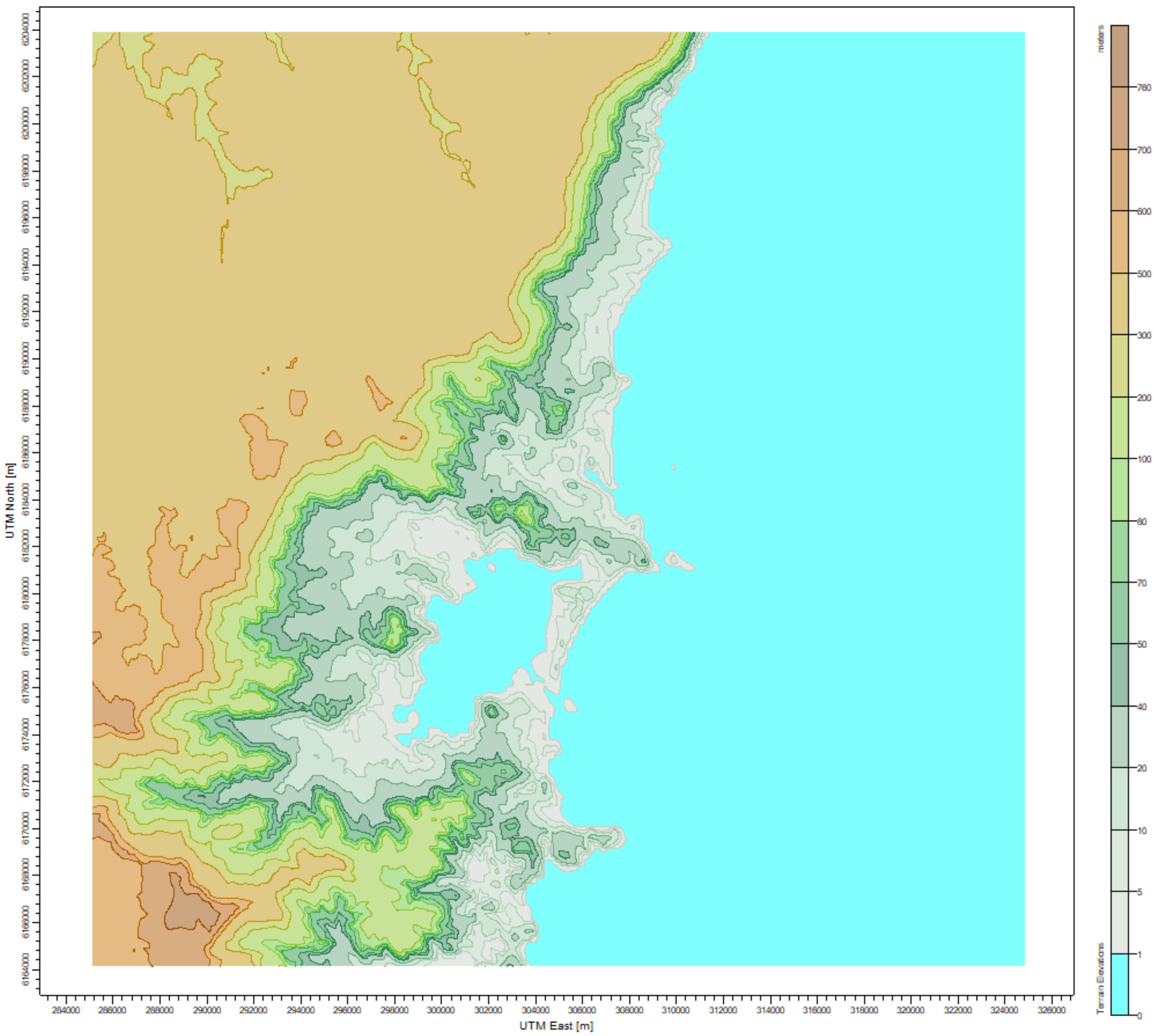


Figure A.5 Terrain data used for CALMET modelling

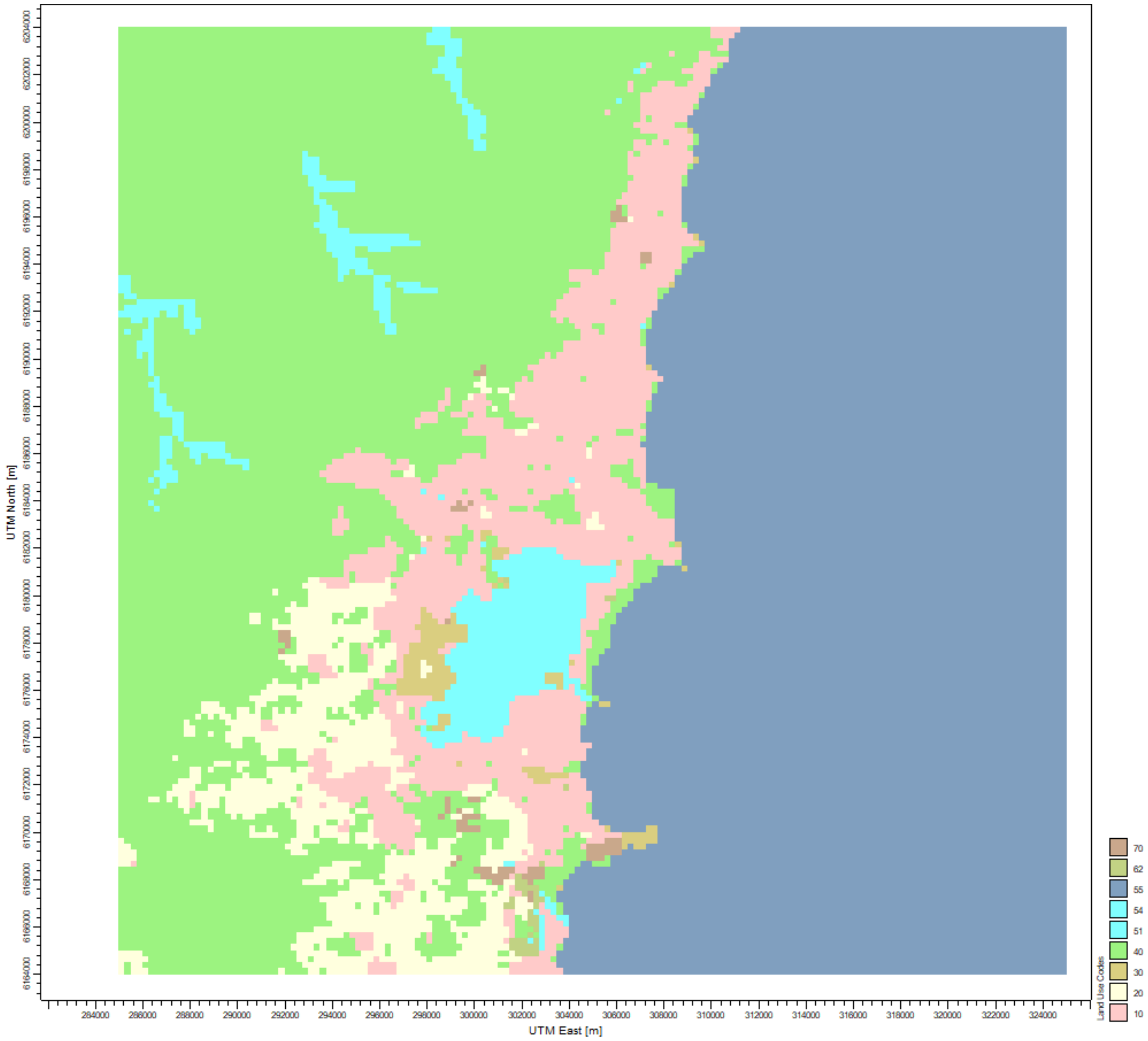


Figure A.6 Land use data used for CALMET modelling

The local meteorology largely determines the pattern of off-site air quality impact on receptors (houses, businesses and industry). The effect of wind on dispersion patterns can be examined using the wind and stability class distributions at the site from the dataset that is produced by CALMET. The winds at the site are most readily displayed by means of wind rose plots, giving the distribution of winds and the wind speeds from these directions.

The features of particular interest in this assessment are (i) the dominant wind directions and (ii) the relative incidence of stable light wind conditions that yield minimal mixing (defines peak impacts from ground-based sources).

A-3-1 Annual wind patterns

The wind rose for the entire data period taken at the project site is shown in Figure A.7 and shows the following features:

– The predominant annual average wind directions are from the west.
– Lower wind speeds (0.5 – 1 m/s) are rare but can occur from any direction.
– The average wind speed predicted was 5.2 metres per second.
– Calm conditions (wind speeds less than 0.5 m/s) occurred 0.3 per cent of the time.

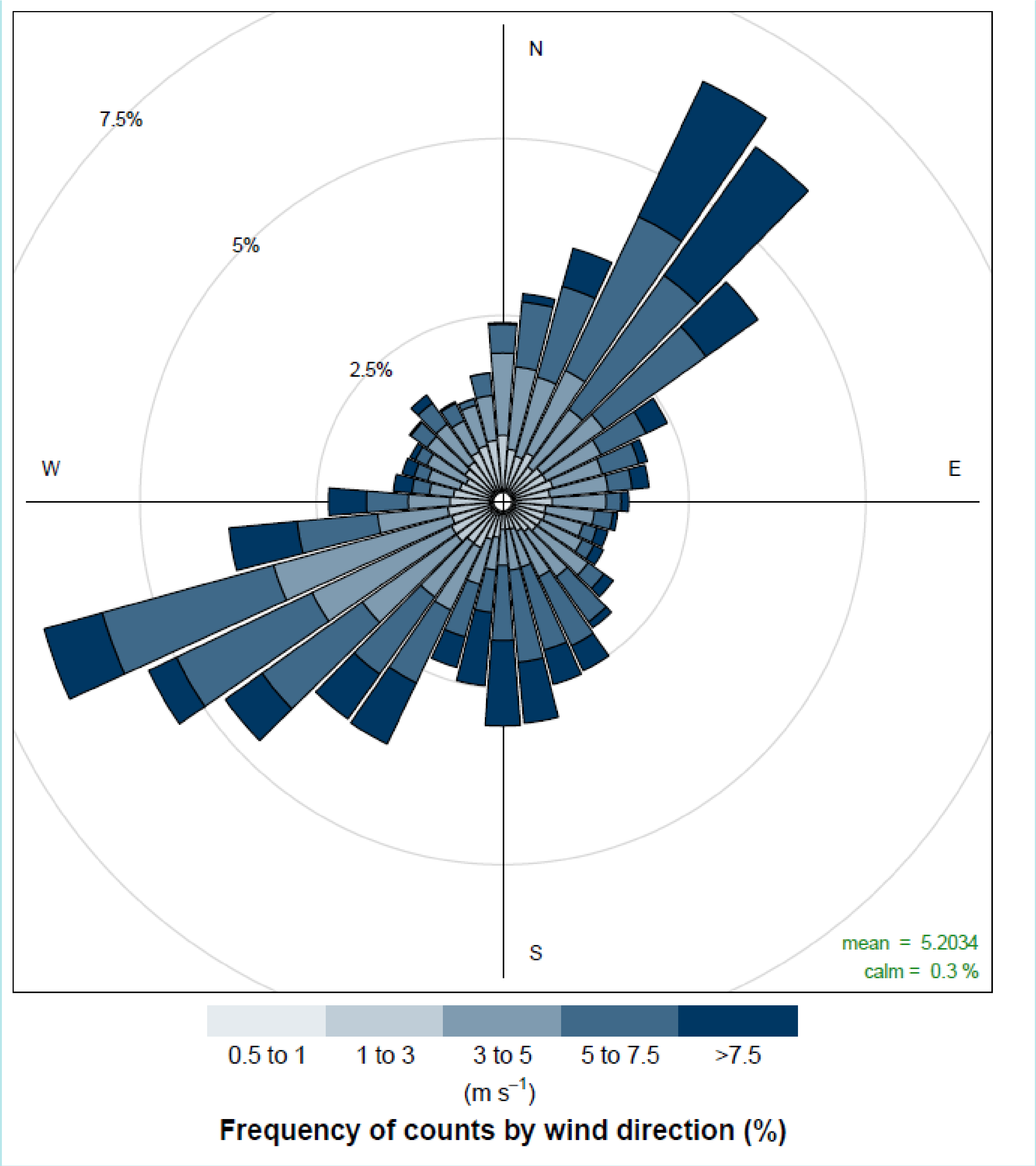


Figure A.7 Wind rose at site from CALMET (2017)

A-3-2 Pattern of atmospheric stability

Atmospheric stability substantially affects the capacity of a pollutant such as gas, particulate matter or odour to disperse into the surrounding atmosphere upon discharge and is a measure of the amount of turbulent energy in the atmosphere.

There are six Pasquill-Gifford classes (A-F) used to describe atmospheric stability and these classes are grouped into three stability categories; stable (classes E-F), neutral (class D), and unstable (classes A-C). The climate parameters of wind speed, cloud cover and insolation (solar radiation) are used to define the stability category as shown in Table A.4. As these parameters vary from day to night, there is a corresponding variation in the occurrence of each stability category.

Stability is most readily displayed by means of stability rose plots, giving the frequency of winds from different directions for various stability classes A to F.

Table A.4 Stability category relationship to wind speed and stability characteristics

Stability category	Wind speed range (m/s)[a]	Stability characteristics
A	0 – 2.8	Extremely unstable atmospheric conditions, occurring near the middle of day, with very light winds, no significant cloud.
B	2.9 – 4.8	Moderately unstable atmospheric conditions occurring during mid-morning/mid-afternoon with light winds or very light winds with significant cloud.
C	4.9 – 5.9	Slightly unstable atmospheric conditions occurring during early morning/late afternoon with moderate winds or lighter winds with significant cloud.
D	≥6	Neutral atmospheric conditions. These occur during the day or night with stronger winds, during periods of total cloud cover or during the twilight period.
E	3.4 – 5.4 b	Slightly stable atmospheric conditions occurring during the night-time with significant cloud and/or moderate winds.
F	0 – 3.3 [b]	Moderately stable atmospheric conditions occurring during the night-time with no significant cloud and light winds.

Note: [a] Data sourced from the Turner's Key to the P-G Stability Categories, assuming a Net Radiation Index of +4 for daytime conditions (between 10:00 am and 6:00 pm) and –2 for night-time conditions (between 6:00 pm and 10:00 am)

[b] Assumed to only occur at night, during Net Radiation Index categories of –2.

Figure A.8 shows the frequency of stability class for all hours of the model generated dataset. The following observations were made:

- Unstable atmospheres (classes A, B and C) occur 21 per cent of the time
- Neutral atmosphere conditions (class D) are the dominant stability state of the atmosphere occurring 49 per cent of the time
- Stable conditions (classes E and F) occur 30 per cent of the time

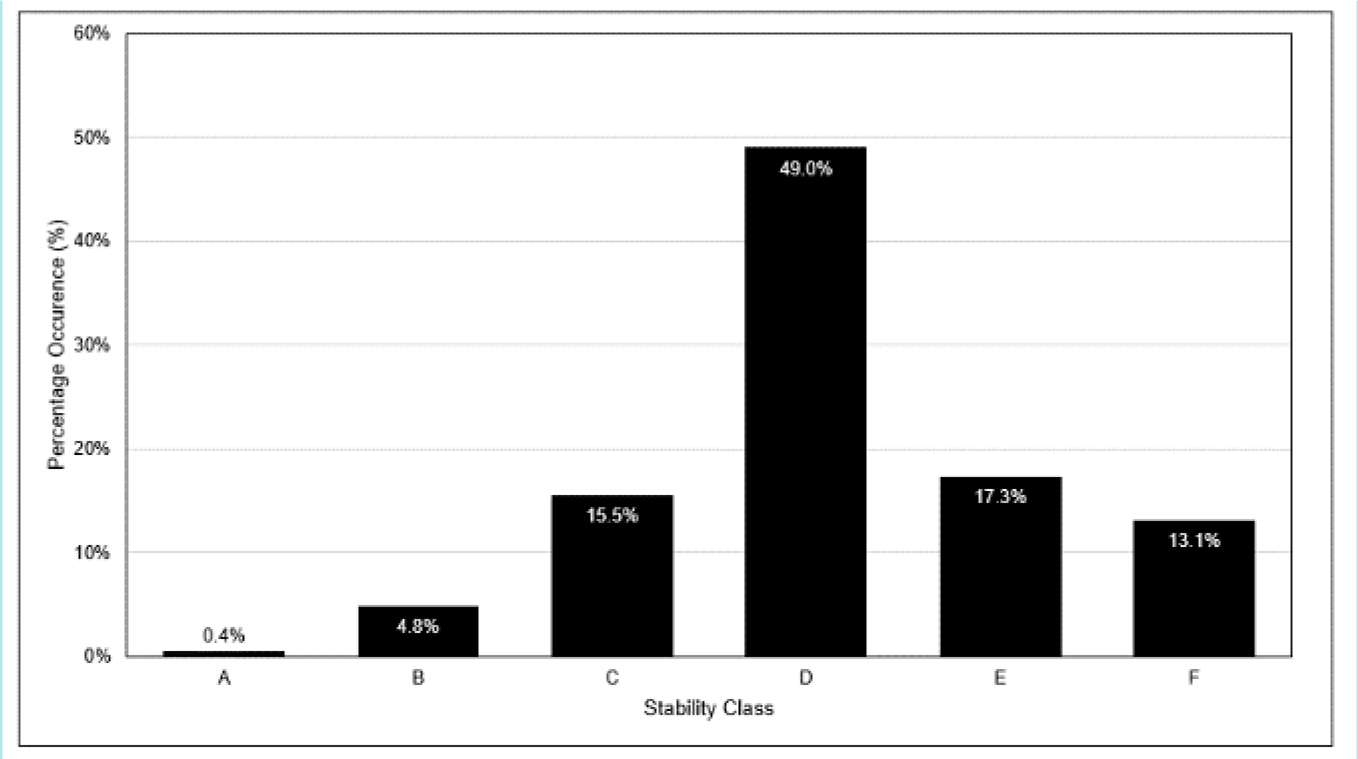


Figure A.8 Distribution of stability class for the model period

A-3-3 Mixing height

Mixing height signifies the height above the surface of the earth throughout which a pollutant can be dispersed. It is often associated with a sharp increase in temperature with height (inversion), and a sharp decrease in pollutant concentration.

A box plot of CALMET predicted mixing heights for the project is shown in Figure A.9. During the night and early morning hours, mixing heights are lower with an average of approximately 890 m (7:00 pm to 7:00 am), which then increase after sunrise to an average of approximately 1,160 m during the day (7:00 am to 7:00 pm).

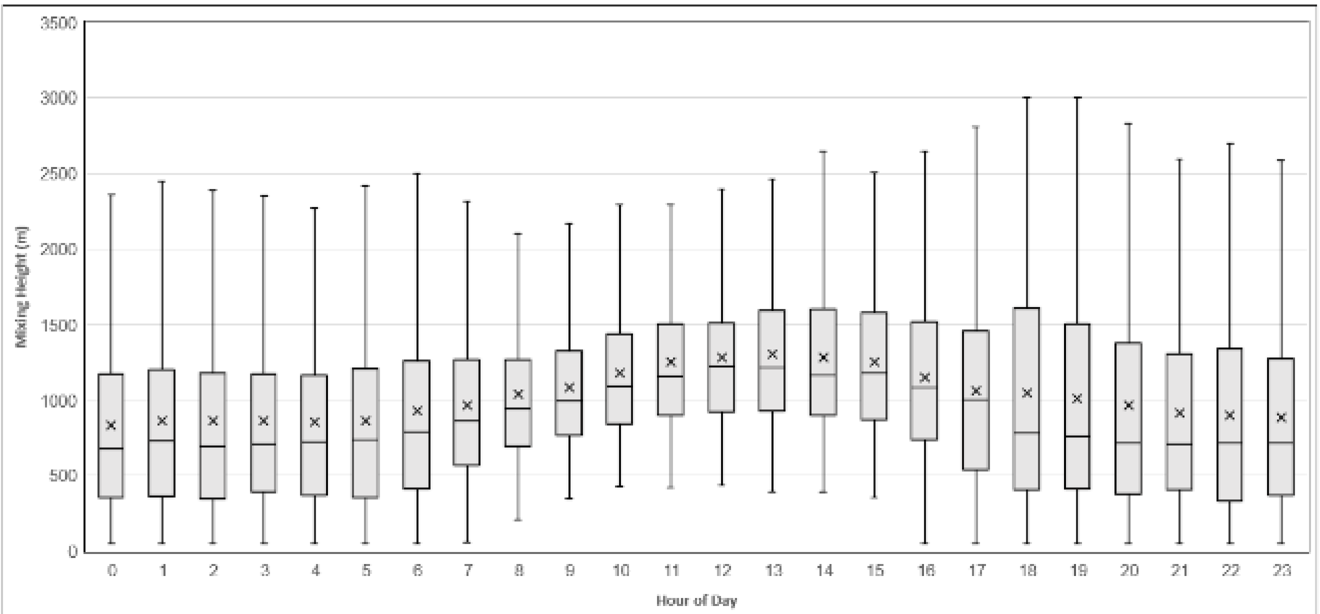


Figure A.9 Mixing heights predicted by CALMET at the project

A-4 Model verification

Verification of the meteorological model performance was carried out by comparison of model outputs to BOM observations at the Port Kembla AWS, Bellambi AWS and Albion Park (Wollongong airport) and BlueScope meteorological observations at Old Scout Hall and North Gate.

BoM and BlueScope observation data was sourced for the same time period as that of the CALMET model period (01/01/2017 through 01/01/2018) for verification.

It is noted that comparisons against BlueScope meteorological observations were provided for high level indicative purposes only as they are not fully compliant with the Australian Standard for wind speed and direction due to insufficient height above ground and nearby obstructions that could influence recorded meteorology.

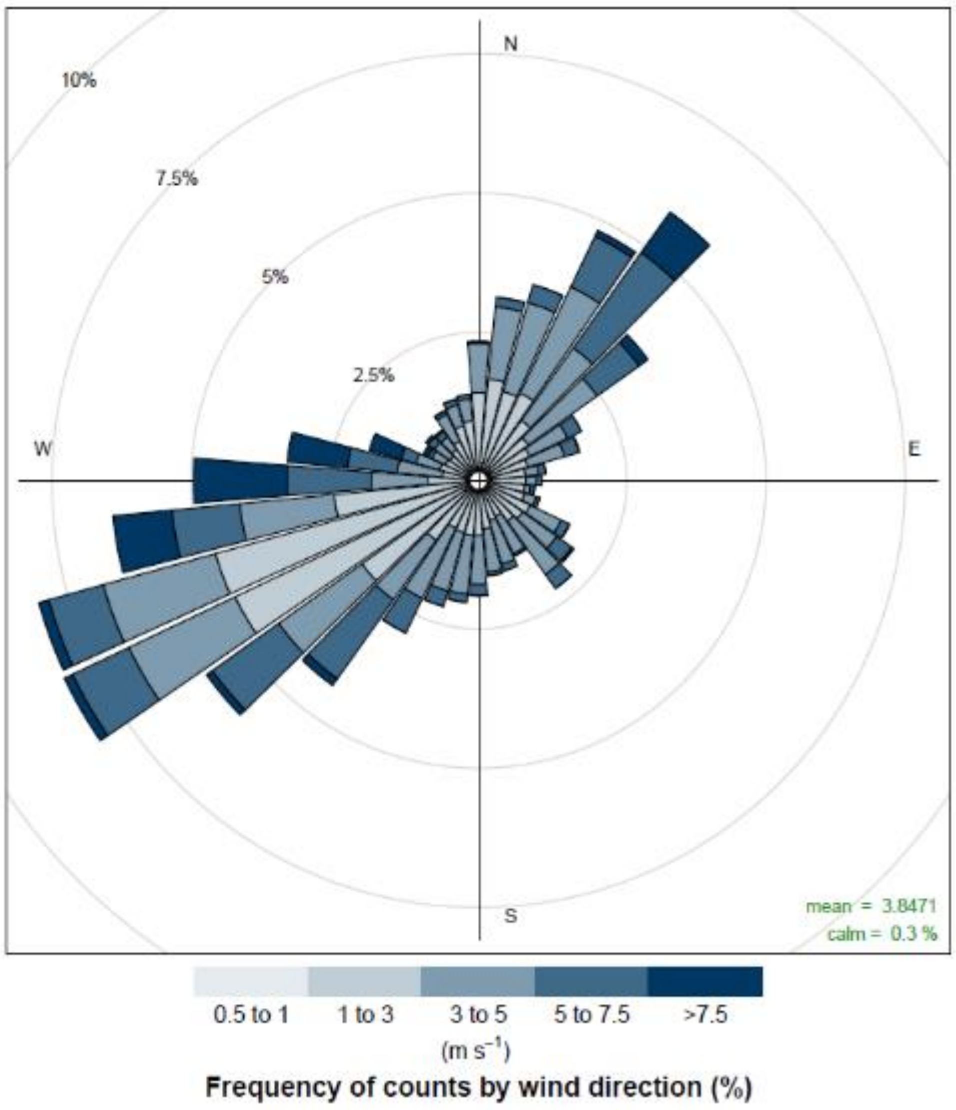
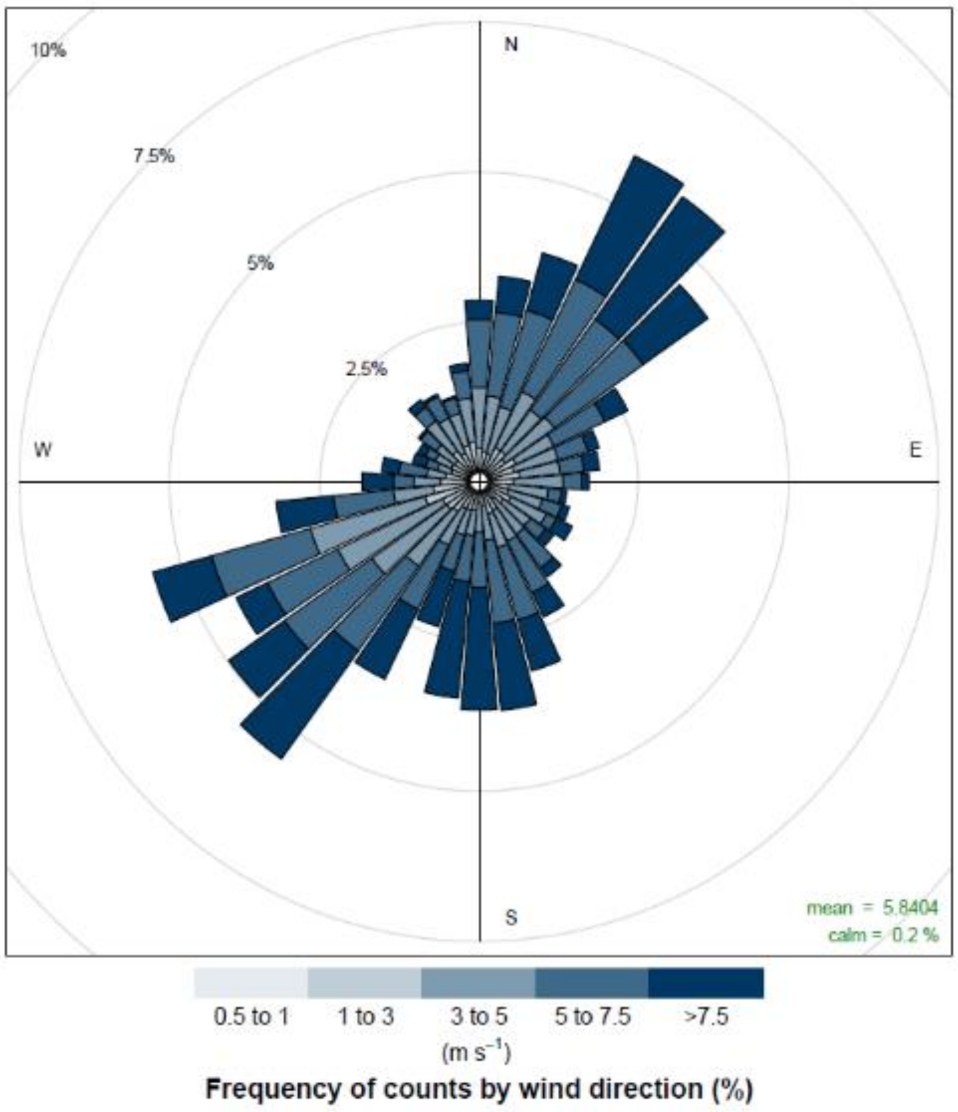
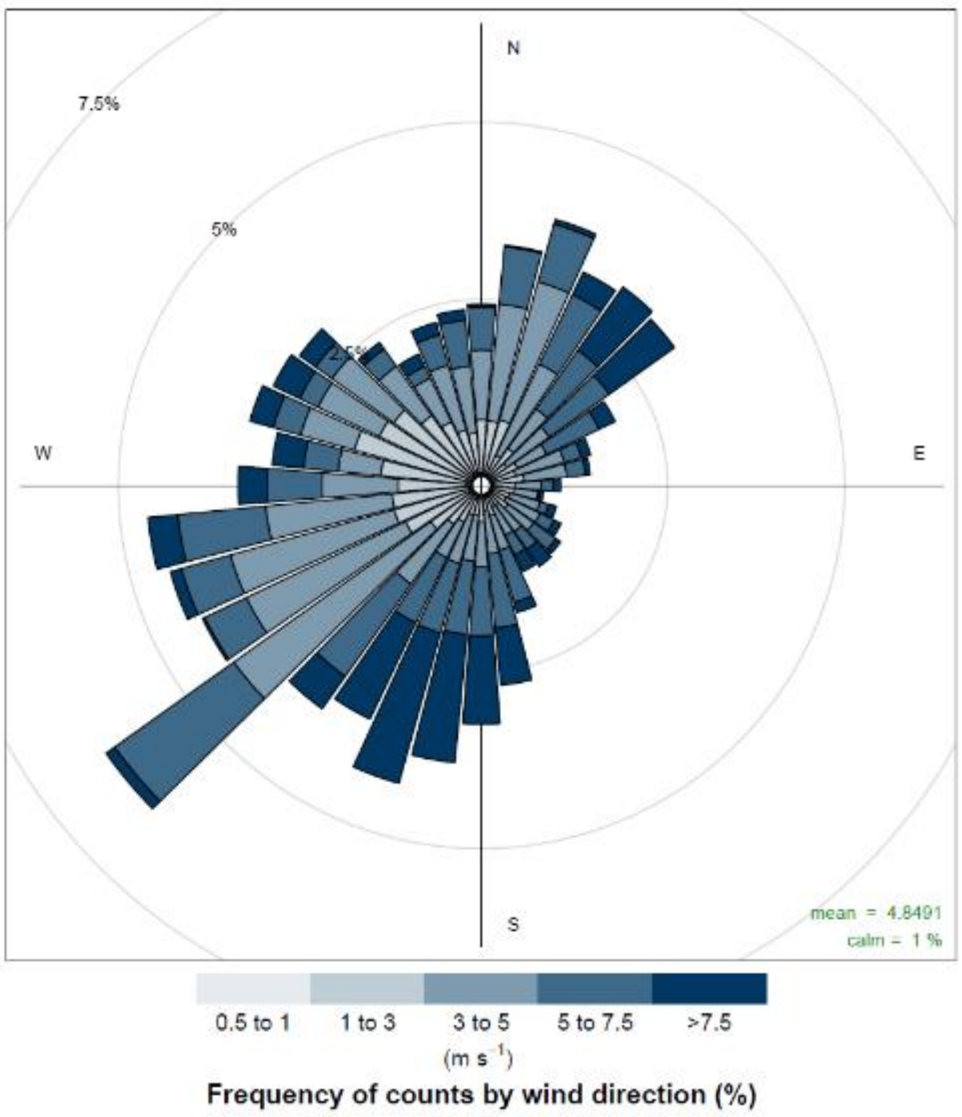
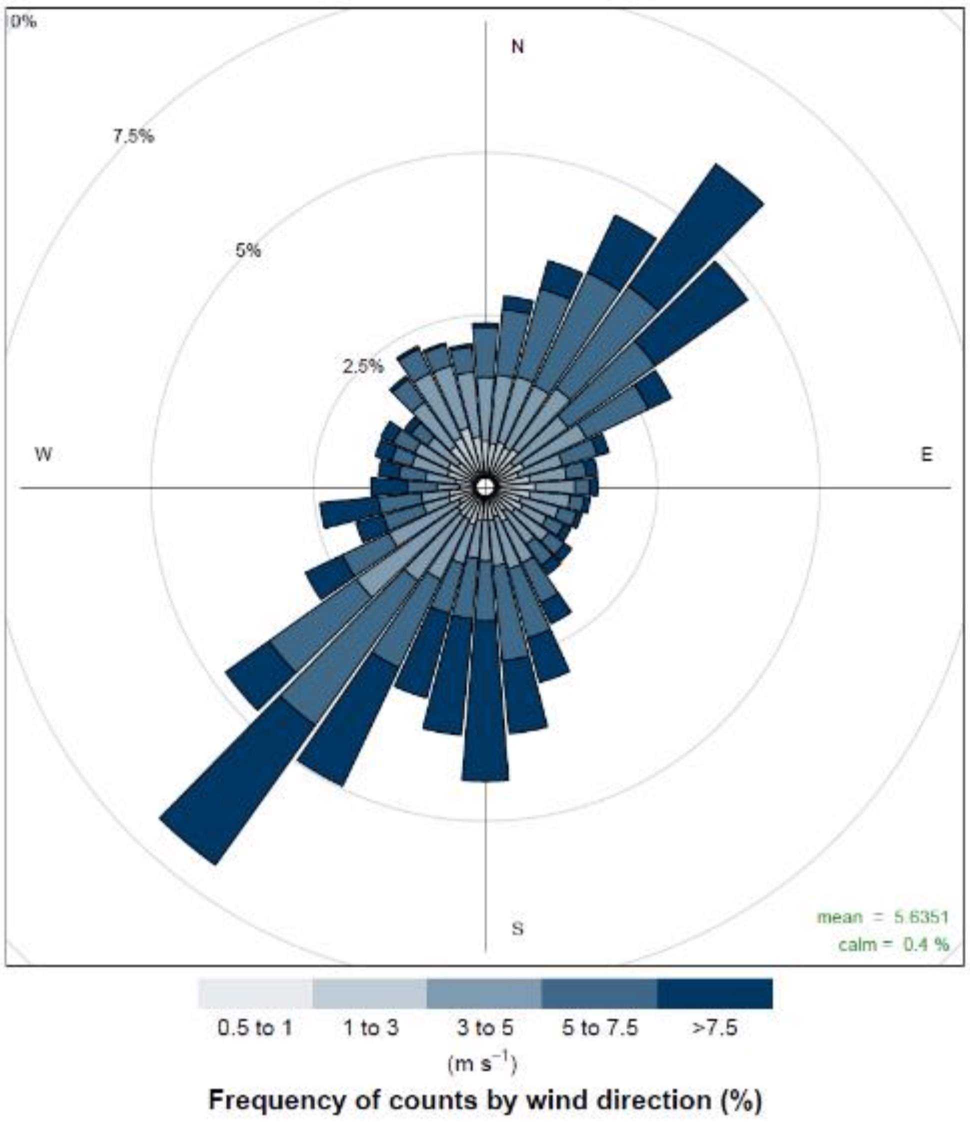
Figures comparing the observations and the CALMET output are presented in Table A.5 and described below:

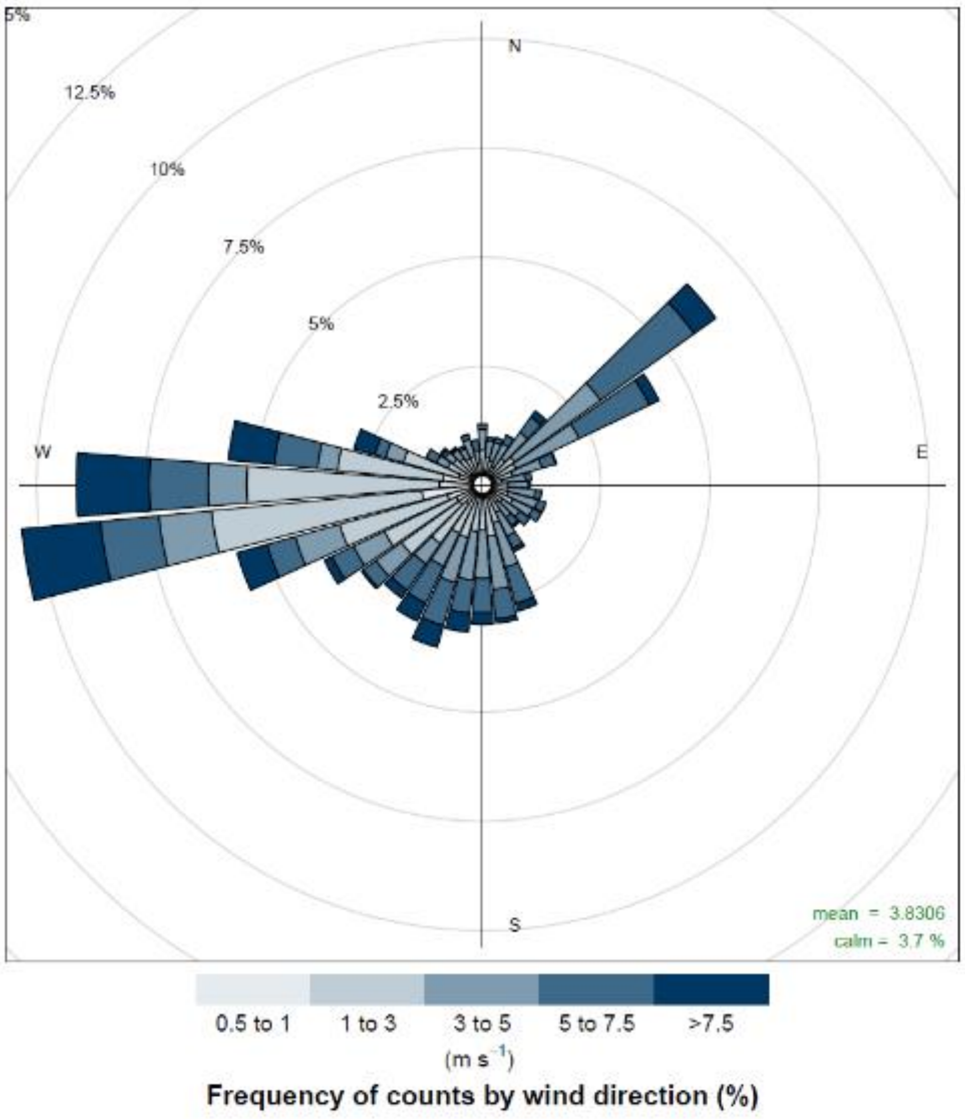
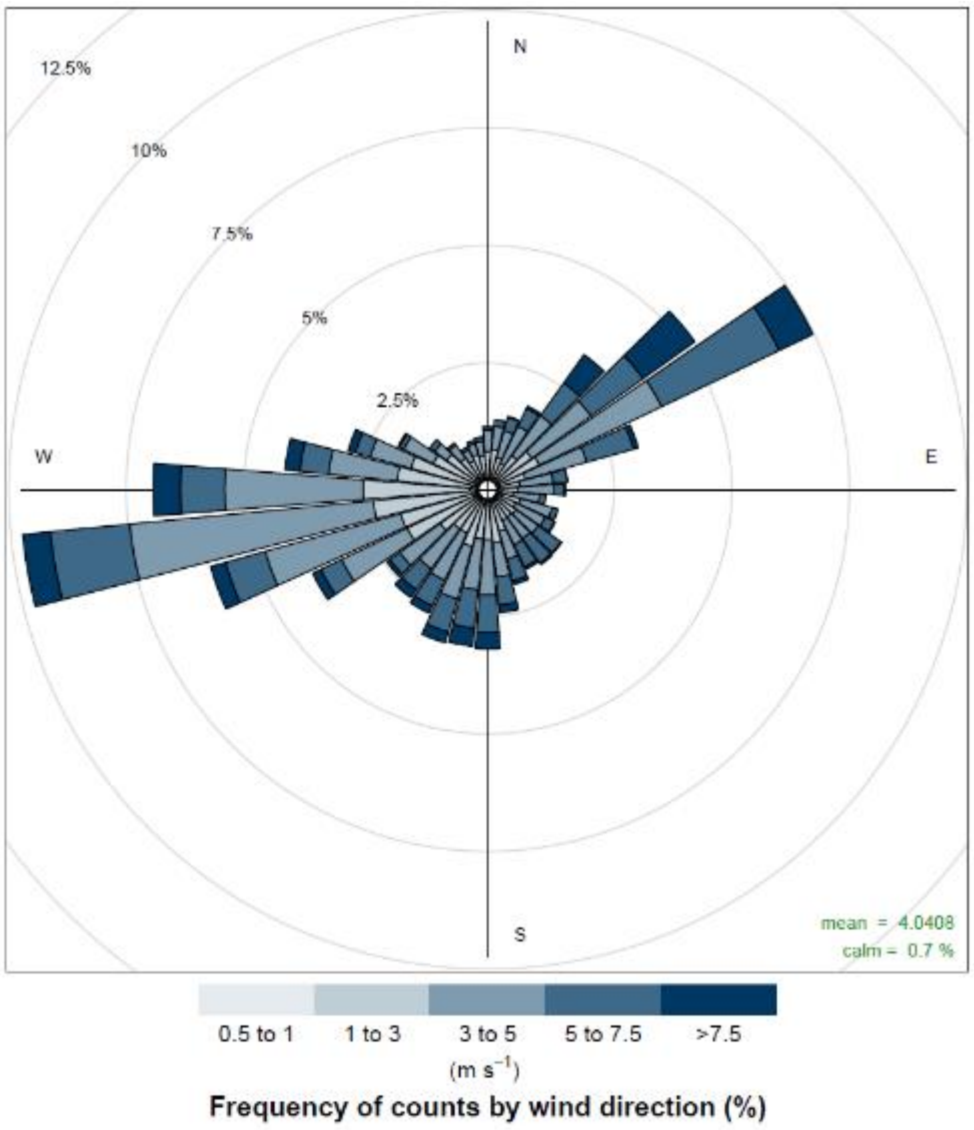
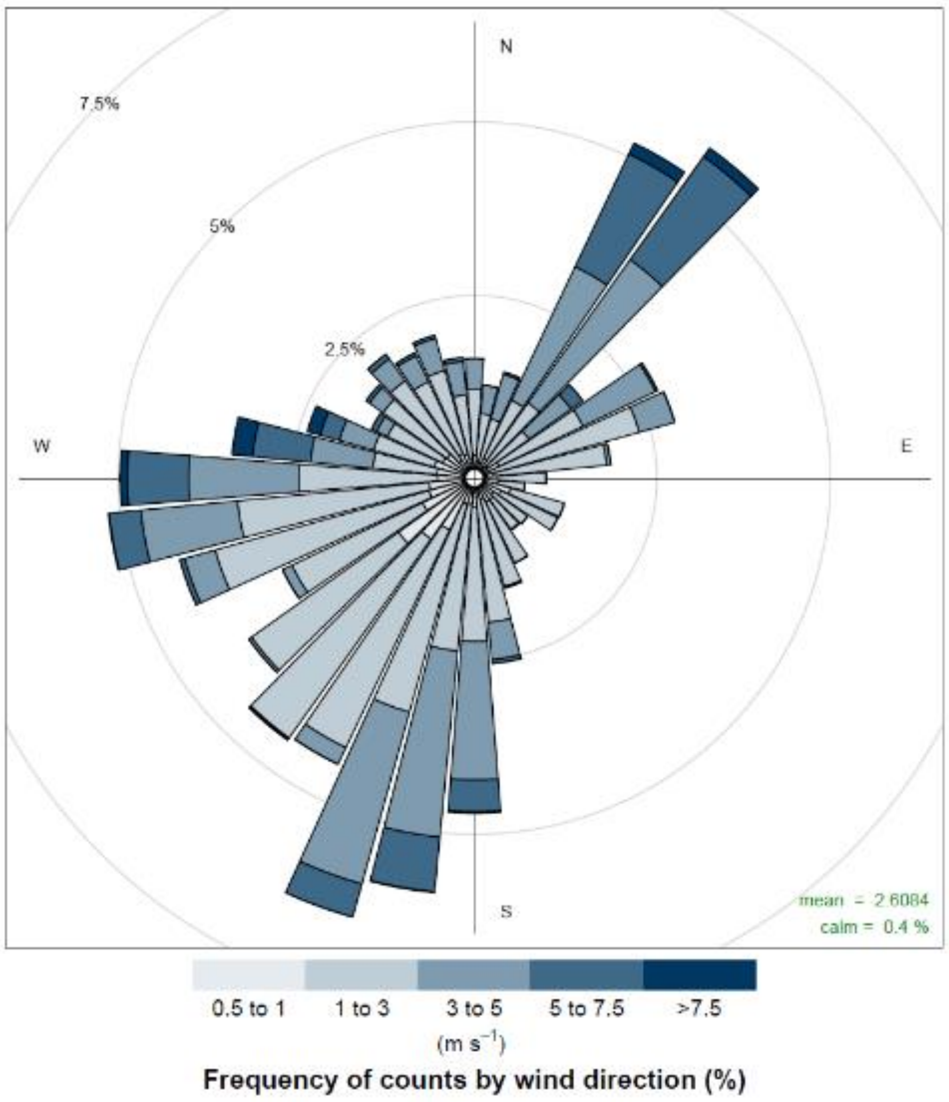
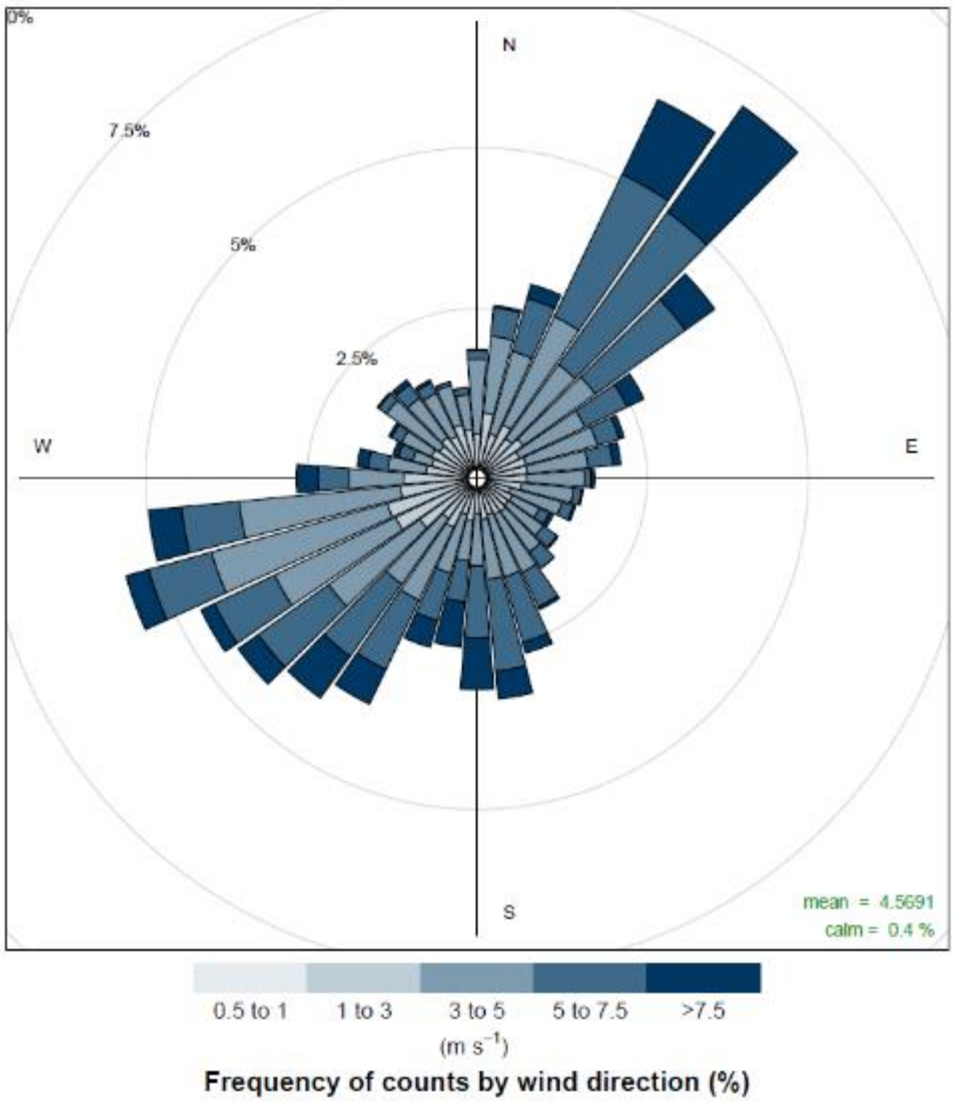
– Comparison to BoM stations shows relatively good agreement between the observed and modelled data set. The wind patterns including the primary wind directions (winds from the northeast and southwest at the Port Kembla AWS and Bellambi AWS and winds from the northeast and west at the Albion Park station) are replicated in the model outputs. The observed data contains a higher percentage of lower wind speeds than the CALMET output and consequently the CALMET output shows a higher mean wind speed. The frequency of calm winds (<0.5 m/s) predicted by the CALMET model aligns well with that observed at Port Kembla AWS and Bellambi AWS, while the model predicts slightly less occurrence of calms at Albion Park compared to BoM station observations.

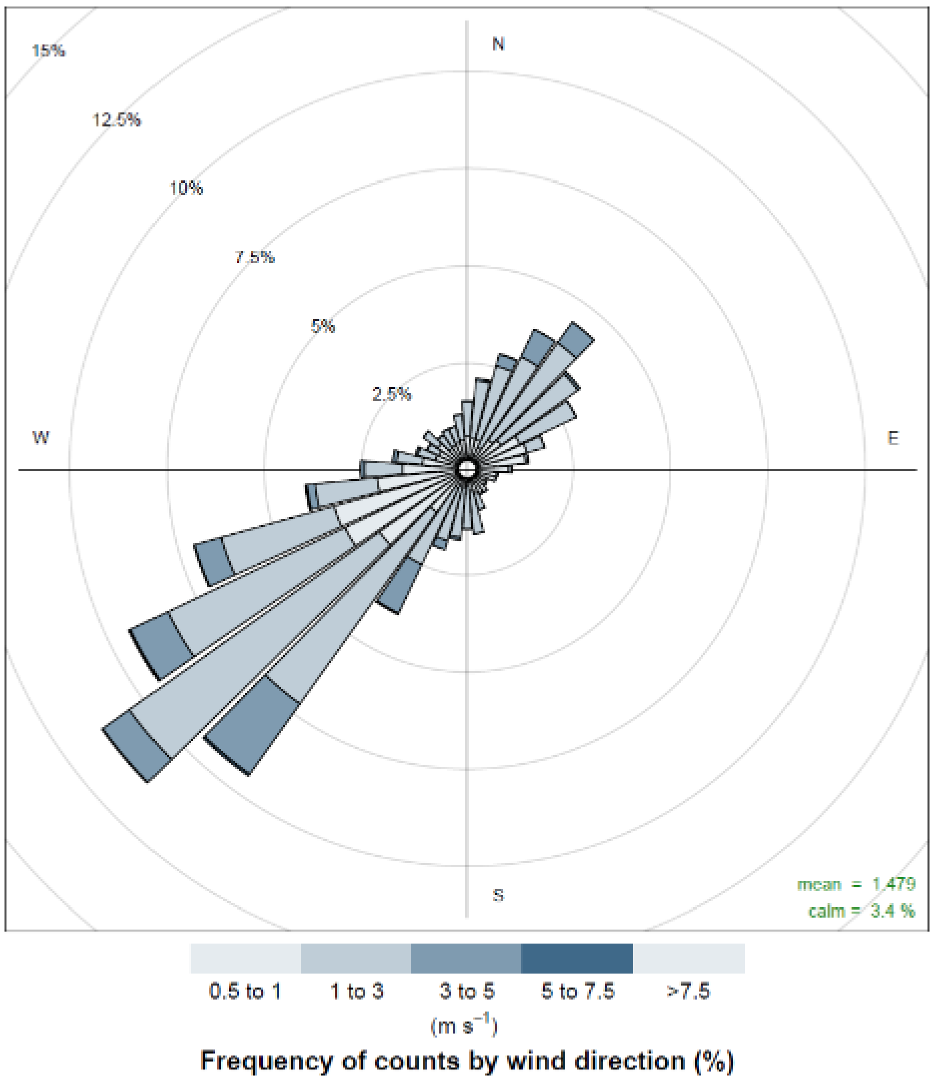
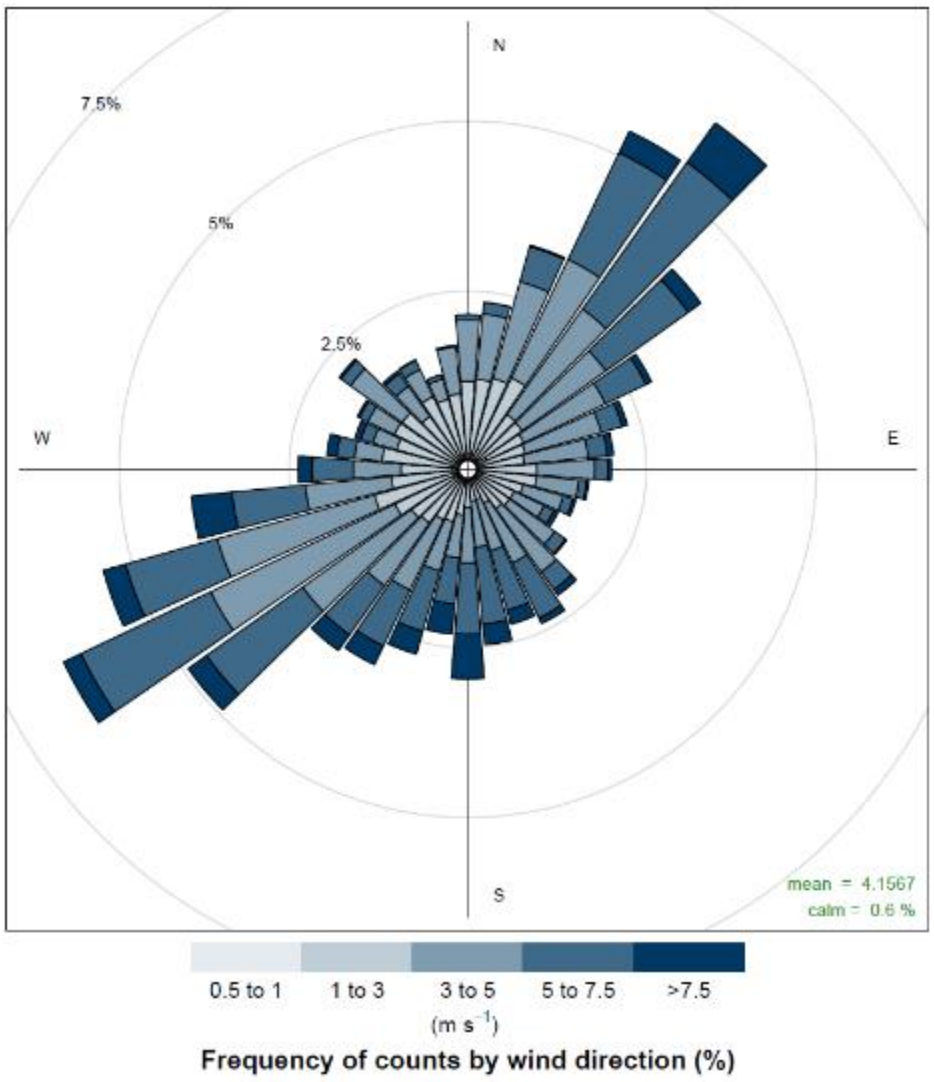
– Comparison to BlueScope shows relatively good agreement of wind direction patterns between the observed and modelled data set, however observed wind speeds are significantly lower than those predicted by the model. As noted above, BlueScope's meteorological observations are not fully compliant with the Australian Standard for wind speed and direction as the anemometer is lower than 10 metres as specified by the Australian Standard and the nearby wind field is more heavily influenced by buildings, vegetation and other obstacles due to its lower height compared to a anemometer located at 10 metres above the ground, which means that the BlueScope anemometer is subject to increased wind turbulence resulting in less/slower winds. Consequently, it is expected that the BlueScope observations have a greater percentage of lower wind speed compared to the modelled data set.

– The analysis demonstrates that the performance of the CALMET model is acceptable.

Table A.5 Model verification of CALMET model output compared to observation data

Observation	CALMET output
BOM observations	
BOM observation – Port Kembla AWS – 01/01/2017-01/01/2018 	CALMET output – Port Kembla AWS – 01/01/2017-01/01/2018 
BOM observation – Bellambi AWS – 01/01/2017-01/01/2018 	CALMET output – Bellambi AWS – 01/01/2017-01/01/2018 

Observation	CALMET output
BOM observation – Albion Park (Wollongong airport) – 01/01/2017-01/01/2018	CALMET output – Albion Park (Wollongong airport) – 01/01/2017-01/01/2018
	
BlueScope observations	
BlueScope observation – BlueScope Old Scout Hall – 01/01/2017-01/01/2018	CALMET output – BlueScope Old Scout Hall – 01/01/2017-01/01/2018
	

Observation	CALMET output
BlueScope observation – BlueScope North Gate – 01/01/2017-01/01/2018	CALMET output – BlueScope North Gate – 01/01/2017-01/01/2018
	

Appendix B

Emissions inventory

Table B.1 Detailed emissions inventory

ID	Source	Modelled source type	Emission factor source	Intensity		Emissions factors			Emissions control		Emission rates (g/s)		Assumptions
				Activity rate	Units	TSP	PM_{10}	EF units	Control	Reduction factor	TSP	PM_{10}	
CSU	CSU unloading coal from ships	N/A – not modelled	NPI Mining Version 3.1 (2012) - Miscellaneous transfer points (including conveying)	1,500	t/hour	0.00039	0.00018	kg/t/transfer point	Fully enclosed	100%	-	-	Fully enclosed, no emissions
C01	C01 coal conveyor	Area	NPI Mining Version 3.1 (2012) - Miscellaneous transfer points (including conveying)	1,500	t/hour	0.00039	0.00018	kg/t/transfer point	-	0%	0.162	0.0642	Open conveyor, 1 transfer point
C02	C02 coal conveyor	Area	NPI Mining Version 3.1 (2012) - Miscellaneous transfer points (including conveying)	1,500	t/hour	0.00039	0.00018	kg/t/transfer point	Enclosure (70%)	70%	0.0486	0.0729	Conveyor enclosed on 3.5 sides, 1 transfer point
C03	C03 coal conveyor	Area	NPI Mining Version 3.1 (2012) - Miscellaneous transfer points (including conveying)	1,500	t/hour	0.00039	0.00018	kg/t/transfer point	Enclosure (70%)	70%	0.0486	0.0729	Conveyor enclosed on 3.5 sides, 1 transfer point
C04	C04 coal conveyor	Area	NPI Mining Version 3.1 (2012) - Miscellaneous transfer points (including conveying)	1,500	t/hour	0.00039	0.00018	kg/t/transfer point	Enclosure (70%)	70%	0.0486	0.0729	Conveyor enclosed on 3.5 sides, 1 transfer point
C05	C05 coal conveyor	Area	NPI Mining Version 3.1 (2012) - Miscellaneous transfer points (including conveying)	1,500	t/hour	0.00039	0.00018	kg/t/transfer point	Enclosure (70%)	70%	0.0486	0.0729	Conveyor enclosed on 3.5 sides, 1 transfer point
C06	C06 coal conveyor	Area	NPI Mining Version 3.1 (2012) - Miscellaneous transfer points (including conveying)	1,500	t/hour	0.00039	0.00018	kg/t/transfer point	-	0%	0.162	0.0642	Open conveyor, 1 transfer point
DUMP	Conveyor dumping material on 4 Area	Volume	NPI Mining Version 3.1 (2012) - Loading stockpiles	1,500	t/hour	0.004	0.0017	kg/t	Water sprays (50%) Variable height stacker (25%)	63%	0.625	0.266	Water sprays and variable height stacker are used
C07	C07 coal conveyor	N/A – not modelled	NPI Mining Version 3.1 (2012) - Miscellaneous transfer points (including conveying)	-	t/hour	0.00039	0.00018	kg/t/transfer point	-	0%	-	-	Open conveyor
TOTAL											**1.14**	**0.686**	

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