AIBP Storage and Distribution Warehouse

Air quality impact assessment

Prepared for HB+B Property Pty Ltd

June 2025

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E241088 RP1

June 2025

Version	Date	Prepared by	Reviewed by	Comments
V1	14 March 2025	A Gilbert	S Fishwick	Draft for review
V2	12 May 2025	A Gilbert	S Fishwick	Final
V3	3 June 2025	A Gilbert	S Fishwick	Final – updated layout

Approved by

Scott Fishwick
National technical lead – air quality and climate
3 June 2025

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1 Introduction

1.1 Project context and overview

HB+B Property Pty Ltd (HBB) is seeking approval from the NSW Department of Planning, Housing and Infrastructure (DPHI) for the development of a storage and distribution warehouse for beverages (the proposed development), located within the Alspec Industrial Business Park (AIBP) at 221-235 Luddenham Road, Orchard Hills. The proposed development will be located at Site 8 at the western area of the AIBP (the site).

The proposed development comprises the establishment of a warehouse and distribution facility incorporating office spaces and a primarily automated transfer and racking storage system for retail beverages.

The total warehouse and services area of the proposed development is 45,512 square metres (m^2), with 43,607 m^2 allocated for storage and distribution and 1,905 m^2 allocated for offices. The local setting of the site is shown in Figure 1.1

HBB has engaged EMM Consulting Pty Ltd (EMM) to prepare this air quality impact assessment (AQIA) to meet the requirements the Secretary Environmental Assessment Requirements (SEARs) issued for the Alspec Warehouse, a State Significant Development Application (SSDA), issued by DPHI on 4 April 2025.

The air quality-related SEARs for the proposed development, and where they are addressed in this report, are listed in Table 1.1.

Table 1.1 Air quality related SEARs

Requirements	Section addressed
Air quality – including:	
• Identify significant air emission sources at the proposed development (during construction and operation), assess their potential to cause adverse off-site impacts, and detail proposed management and mitigation measures that would be implemented. Where air emissions during operation have the potential to cause adverse off-site impacts, provide a quantitative air quality impact assessment with the relevant NSW Environmental Protection Authority (EPA) guidelines.	This report

KEY

- Subject site

Existing environment

- Major road
- Minor road
- Named watercourse
- Cadastral boundary

INSET KEY

- Major road
- NPWS reserve
- State forest

Source: EMM (2025); ABS (2021); DCSSS (2024); ESRI (2025); GA (2009)

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Local setting

Alspec Distribution Warehouse
Air Quality Impact Assessment
Figure 1.1

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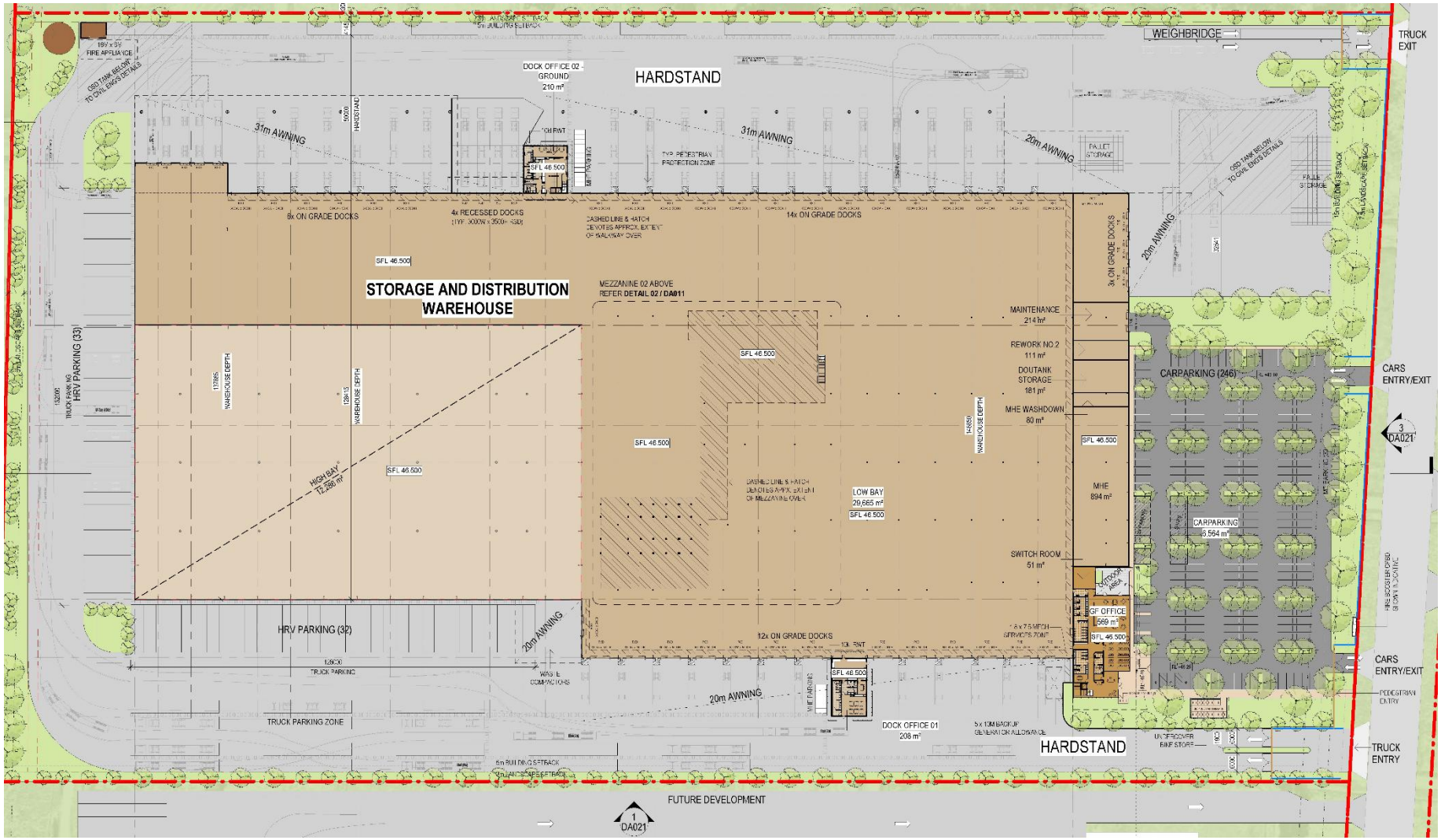
1.2 Proposed development

The proposed development will involve the storage and distribution of retail beverage products. Primarily, beverages will be delivered to the site in bulk either pre-packaged on pallets or prefilled in kegs. Some beverage products will be transported in bulk by liquid takers for storage in onsite chilled storage tanks. Stored beverage products are later collected for redistribution to the wider market.

The proposed development will involve the construction of a commercial warehouse and storage distribution centre, which will include the following areas, as shown in Figure 1.2:

- staging areas
- automated storage and retrieval systems with conveyors and racking
- Duotank Chilled Storage area
- empty keg returns and empty pallet storage area
- pallet wrapper and dispensers
- material handling equipment (MHE) storage and washdown area
- warehouse offices, dock offices and amenities
- forklift and automated guided vehicle (AGV) charging areas
- bulk product receiving and dispatch hardstands
- light and heavy vehicle parking.

Two vehicle entry points and two vehicle exit points are proposed at the site, with a separated light vehicle car park and heavy vehicle access points to the east of the site, within the AIBP internal road network.



Source: Nettletontribe

Figure 1.2 Proposed development layout

1.3 Assessment approach and requirements

This AQIA report has been conducted in general accordance with the guidelines specified by the NSW Environmental Protection Authority (EPA) in the *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (NSW EPA 2022), hereafter 'the Approved Methods for Modelling' and the NSW Department of Environment and Conservation (DEC) in the *Technical Framework: Assessment and Management of Odour from Stationary Sources in NSW* (DEC 2006a).

This report comprises the following sections:

- a description of the local setting and surrounding of the area
- relevant pollutants for assessment and applicable impact assessment criteria
- a description of the existing environment, specifically
    - meteorology and climate
    - existing air quality environment
- an air pollution emissions inventory.

2 Site setting and sensitive receptors

2.1 Site and surrounding area

The AIBP is located at 221–235 Luddenham Road, Orchard Hills, approximately 41 kilometres (km) west of the Sydney CBD in the Greater Western Sydney region. The AIBP has recently been rezoned from RU2 Rural landscape to E4 General Industrial, with land classifications in the surrounding area including C2 Environmental Conservation and RU2 Rural landscape. The nearest residential zone is an area of R2 Low Density Residential within the suburb of St Clair, approximately 1.6 km north-east of the AIBP and an area of C4 Environmental Living within the Twin Creeks residential neighbourhood, approximately 1.0 km south of the AIBP.

2.2 Sensitive receptors

A selection of representative residential properties surrounding the site have been identified as potential sensitive receptors, these are presented in Table 2.1 and shown in Figure 2.1.

Table 2.1 Sensitive receptor locations

Location ID	Classification	Coordinate (MGA, 56)	
		Easting (m)	Northing (m)
R1	Residential	292749	6255740
R2	Residential	292736	6255687
R3	Residential	292758	6255639
R4	Residential	292763	6255603
R5	Residential	292762	6255547
R6	Residential	292772	6255509
R7	Residential	292780	6255456
R8	Residential	292793	6255410
R9	Residential	292797	6255354
R10	Residential	292825	6255304
R11	Residential	292824	6255246
R12	Residential	292823	6255209
R13	Residential	293251	6255198
R14	Residential	293264	6255156
R15	Residential	293248	6255109
R16	Residential	292662	6254625
R17	Residential	292537	6254646
R18	Residential	292378	6254671
R19	Residential	292502	6254384
R20	Residential	292568	6254244

Location ID	Classification	Coordinate (MGA, 56)	
		Easting (m)	Northing (m)
R21	Residential	292559	6254199
R22	Residential	292560	6254162
R23	Residential	292589	6254136
R24	Residential	292618	6254105
R25	Residential	291970	6254195
R26	Residential	292724	6255925
R27	Residential	292676	6255360
R28	Residential	292647	6255254
R29	Residential	292597	6255025
R30	Residential	292646	6254976
R31	Residential	291436	6254625
R32	Recreational	292498	6255414
R33	Industrial*	292342	6255519
R34	Industrial*	292179	6255490
R35	Industrial*	292193	6255617
R36	Industrial*	292550	6255695

*Location of future industrial development within ABIP

KEY

- Subject site
- Receptor

Existing environment

- Minor road
- Named watercourse
- Cadastral boundary

Source: EMM (2025); ABS (2021); DCSSS (2024); ESRI (2025); GA (2009)

0 250 500 m

GDA2020 MGA Zone 56

N

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Receptor locations

Alspec Distribution Warehouse
Air Quality Impact Assessment
Figure 2.1

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3 Pollutants and assessment criteria

3.1 Potential air pollutants

The proposed development has the potential to generate emissions of various air pollutants to the ambient atmosphere. Emission sources will consist mobile combustion sources (fuel combustion from vehicles) and fugitive emissions from vehicle movements.

The main air pollutants include:

- particulate matter, specifically
  - total suspended particulate matter (TSP)
  - particulate matter less than 10 micrometres in aerodynamic diameter (PM_{10})
  - particulate matter less than 2.5 micrometres in aerodynamic diameter ($PM_{2.5}$)
- oxides of nitrogen (NO_X)[1], including nitrogen dioxide (NO_2)
- sulfur dioxide (SO_2)
- carbon monoxide (CO)
- volatile organic compounds (VOCs).

Of the above listed pollutants, particulate matter (PM_{10} and $PM_{2.5}$) and gaseous pollutants (NO_2) are anticipated to be the key pollutants generated by the proposed development. This assessment will focus on the qualitative assessment of proposed development related emissions.

3.2 Applicable air quality assessment criteria

The NSW EPA's impact assessment criteria for particulate matter, as documented in section 7 of the Approved Methods for Modelling, are presented in Table 3.1. The assessment criteria for PM_{10} and $PM_{2.5}$ are consistent with the National Environmental Protection (Ambient Air Quality) Measure (AAQ NEPM) national reporting standards (Department of the Environment 2021).

TSP, which relates to air borne particulates less than 50 micrometres (µm) in diameter, is used as a metric for assessing amenity impacts (reduction in visibility, dust deposition and soiling of building and surfaces) rather than health impacts (NSW EPA 2013). Particles less than 10 µm and 2.5 µm in diameter are fine enough to enter the human respiratory system and can lead to adverse human health impacts. The NSW EPA impact assessment criteria for PM_{10} and $PM_{2.5}$ are, therefore, used to assess the potential impact to human health from particulate matter concentrations.

The Approved Methods for Modelling classifies TSP, PM_{10}, $PM_{2.5}$, dust deposition and NO_2 as 'criteria pollutants'. The impact assessment criteria for criteria pollutants are applied at the nearest existing or likely future off-site sensitive receptors[2].

[1] By convention NO_X = nitrous oxide (NO) + NO_2

[2] NSW EPA (2022) 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.

Table 3.1 Impact assessment criteria for primary pollutants

Pollutant	Averaging period	Assessment criteria
PM_{10}	24 hour	50 µg/m³
	Annual	25 µg/m³
$PM_{2.5}$	24 hour	25 µg/m³
	Annual	8 µg/m³
NO_2	1 hour	164 µg/m³
	Annual	31 µg/m³

Note: µg/m³: micrograms per cubic metre

4 Existing environment

4.1 Meteorology

4.1.1 Overview

Meteorological mechanisms govern the dispersion, transformation and eventual removal of pollutants from the atmosphere. In this assessment, local meteorological data measurements were analysed in characterising the annual patterns.

4.1.2 Monitoring data resources

There are no meteorological measurements taken at the AIBP. In reviewing the meteorological environment of the local area. Data were sourced from the Bureau of Meteorology (BoM) Automatic weather station (AWS) at Badgerys Creek (station 067108), located approximately 9.0 km south-west of the AIBP. One-hour average measurements of wind speed, wind direction, standard deviation of wind direction, temperature, station-level barometric pressure and relative humidity were analysed from this AWS.

4.1.3 Prevailing winds

The meteorological data recorded by the BoM Badgerys Creek AWS were analysed for the five-year period between 2020 and 2024(see Appendix A). The analysis demonstrated a similarity across years in the parameters relevant to pollutant dispersion, such as wind speed and wind direction winds. The inter-annual profiles for air temperature and relative humidity were also generally comparable between 2020 and 2024 (Appendix A).

A summary of the annual average wind speed, percentage of calms (wind speeds less than 0.5 metres per second (m/s)), and data recovery for each year is presented in Table 4.1.

The statistics in Table 4.1 show that there was a general inter-annual consistency in the recorded annual average wind speed and annual percentage of calms for each year.

Table 4.1 Summary of average wind speed, percentage of calms and data recovery for BoM Badgerys Creek AWS

Year	Average wind speed (m/s)	Calms (%)	Data recovery (%)*
2020	2.4	11.8%	100
2021	2.4	7.9%	99
2022	2.5	7.8%	99
2023	2.4	8.6%	85
2024	2.4	6.5%	99

*Note: based on availability of wind speed data.

It is noted that 2022 was affected by the La Niña phenomenon which resulted in significantly higher than average rainfall across the region.

Annual, seasonal and diurnal wind roses created from wind speed and direction data collected at the BoM Badgerys Creek AWS are presented in Figure A.6 to Figure A.8, respectively.

Annually the wind rose shows a prevailing wind alignment from the north-east and the south to south-west. On a seasonal basis, the autumn and winter months show prevailing south-westerly winds, while winds from the north-east through to the south-east are more dominant in the summer months. Diurnally, the wind direction patterns during the night hours are dominant from the south-west, while a notable north-east and south-west is experienced during the day. Average wind speeds were higher during the day and the percentage of calms was higher at night-time.

4.2 Background air quality

4.2.1 Existing sources of emissions

The proposed development is located in western Sydney, predominantly surrounded by rural landscapes and residential properties. Regarding neighbouring sources of industrial air pollutant emissions, the site is approximately 0.7 km south-east of Bingo Industries' Patons Lane Resource Recovery Centre and approximately 0.2 km south-west of the Alspec Industrial warehouse.

Other sources that contribute to particulate matter concentrations in the vicinity of the site include:

- dust entrainment and tyre break wear due to vehicle movements along public roads
- petrol and diesel emissions from vehicle movements along public roads
- wind generated dust from exposed areas within the surrounding region.

Other remote sources which contribute episodically to suspend particulate in the region include dust storms and bushfires.

4.2.2 Monitoring data

There are no air quality measurements available for the site. The NSW Department of Climate Change, Energy, the Environment and Water (DCCEEW) maintains air quality monitoring stations (AQMS) at St Marys approximately 2.7 km north of the site and at Bringelly approximately 10.8 km south of the site. Data from the two stations were collated for the period between 2020 and 2024.

Throughout the collated data period there were a number of missing data points for both PM_{10} and $PM_{2.5}$ at the St Marys AQMS. To complete the gaps in the St Marys AQMS dataset for 2020 to 2024, missing data points were substituted with the corresponding measurements by the Bringelly AQMS (approximately 13.5 km south of the St Marys AQMS).

4.2.3 Existing air quality environment

i PM_{10}

A timeseries of 24-hour average PM_{10} concentrations recorded at the St Marys AQMS between 2020 and 2024 is presented in Figure 4.1. Recorded 24-hour average PM_{10} concentrations fluctuate throughout the presented period. Recorded 24-hour average PM_{10} concentrations throughout the period are typically below the applicable NSW EPA impact assessment criterion of 50 $\mu g/m^3$; however, a higher frequency of elevated concentrations occurred in early 2020 relative to the later years of the data period.

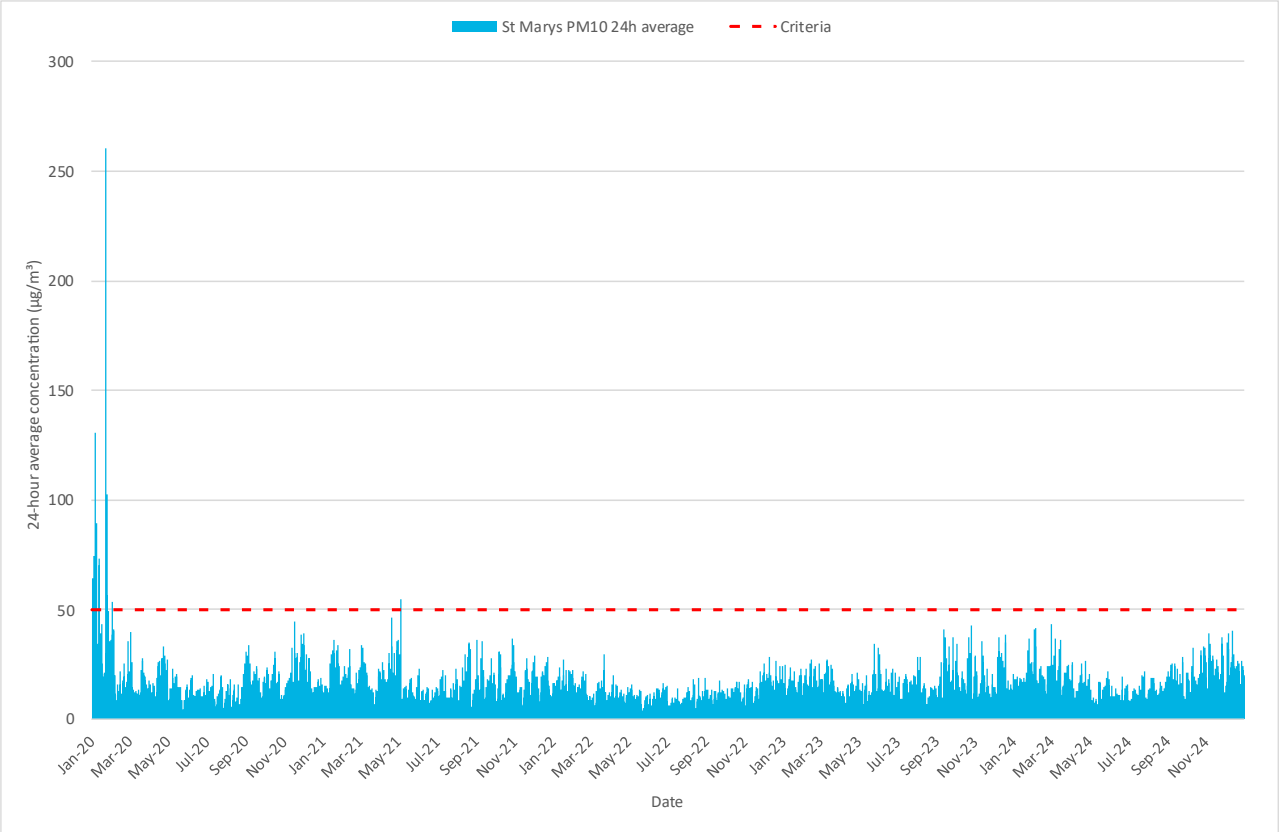

Figure 4.1 Time series of 24-hour average PM_{10} concentrations – St Marys AQMS dataset – 2020 to 2024

Key statistics for the five years of data from the St Marys AQMS dataset are presented in Table 4.2.

Table 4.2 Statistics for PM_{10} concentrations – St Marys AQMS dataset – 2020 to 2024

Year	Maximum	75th percentile	Average	Days > 50 µg/m³
	24-hour average PM_{10} concentration (µg/m³)			
2020	260.3	21.1	18.8	12
2021	54.9	20.0	15.6	1
2022	29.7	14.7	11.8	0
2023	42.5	19.5	15.6	0
2024	43.2	20.8	16.4	0

Exceedance of the 24-hour average criterion occurred in two of the five years studied between 2020 and 2024, ranging from 12 days in 2020 to no days between 2022 and 2024. There was a high trend in the magnitude of recorded concentrations in early 2020, coinciding with the Black Summer bushfires between October 2019 and February 2020.

The recorded PM_{10} concentrations decrease during 2020, associated with the onset of La Niña conditions (i.e. increasing rainfall and reduction in drought conditions). Annual average PM_{10} concentrations are below the applicable criterion of 25 µg/m³ for all years.

ii $PM_{2.5}$

A time series of recorded 24-hour average $PM_{2.5}$ concentrations from the St Marys AQMS recorded between 2020 and 2024 is presented in Figure 4.2. Similar to PM_{10} concentrations, the recorded 24-hour average $PM_{2.5}$ concentrations fluctuate throughout the presented period. Recorded 24-hour average $PM_{2.5}$ concentrations were generally below the NSW EPA impact assessment criterion of 25 µg/m³.

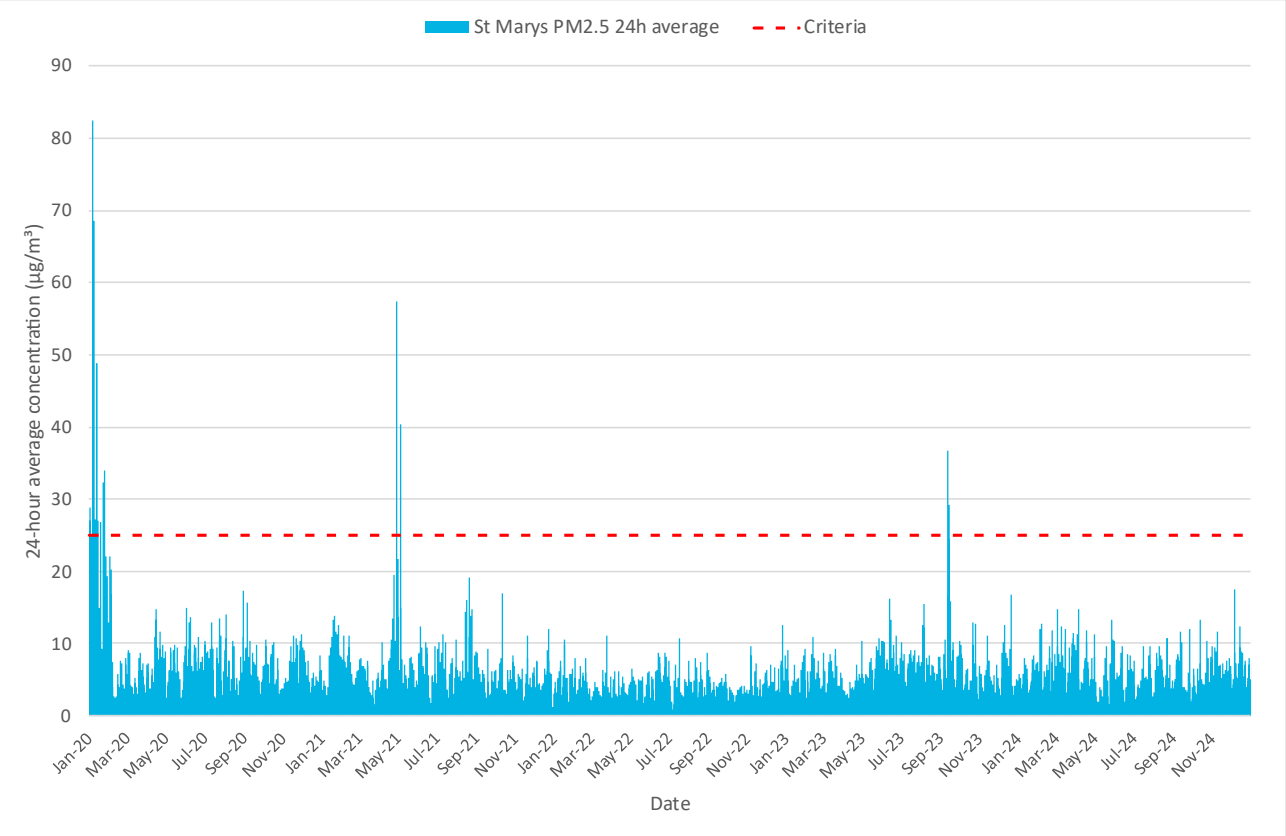

Figure 4.2 Time series of 24-hour average $PM_{2.5}$ concentrations – St Marys AQMS dataset – 2020 to 2024

Key statistics for the five years of data from the St Marys AQMS dataset are presented in Table 4.3.

Table 4.3 Statistics for $PM_{2.5}$ concentrations – St Marys AQMS dataset – 2020 to 2024

Year	Maximum	75th percentile	Average	Days > 25 µg/m³
	24-hour average $PM_{2.5}$ concentration (µg/m³)			
2020	82.5	8.7	7.6	12
2021	57.4	7.1	6.0	2
2022	12.6	4.8	3.9	0
2023	36.8	7.3	5.9	2
2024	17.5	7.4	5.7	0

Across the five years of analysed data 2020 feature a notably higher occurrence of elevated concentrations and 2022 feature a high occurrence of lower concentrations. The remaining three years of data are reasonably comparable.

Exceedance of the 24-hour average criterion occurred in two of the five years studied between 2020 and 2024, ranging from two days in 2020 to no days in 2022 and 2024. There was a high trend in the magnitude of recorded concentrations in early 2020, coinciding with the Black Summer bushfires between October 2019 and February 2020. Annual average $PM_{2.5}$ concentrations were below the applicable criterion of 8 µg/m³ for all years.

Recorded exceedances of $PM_{2.5}$ in 2023 were largely attributed to hazard reduction burns and low wind conditions impacting the region.

iii NO_2

A time series of recorded 1-hour average NO_2 concentrations from the St Marys AQMS recorded between 2020 and 2024 is presented in Figure 4.3.

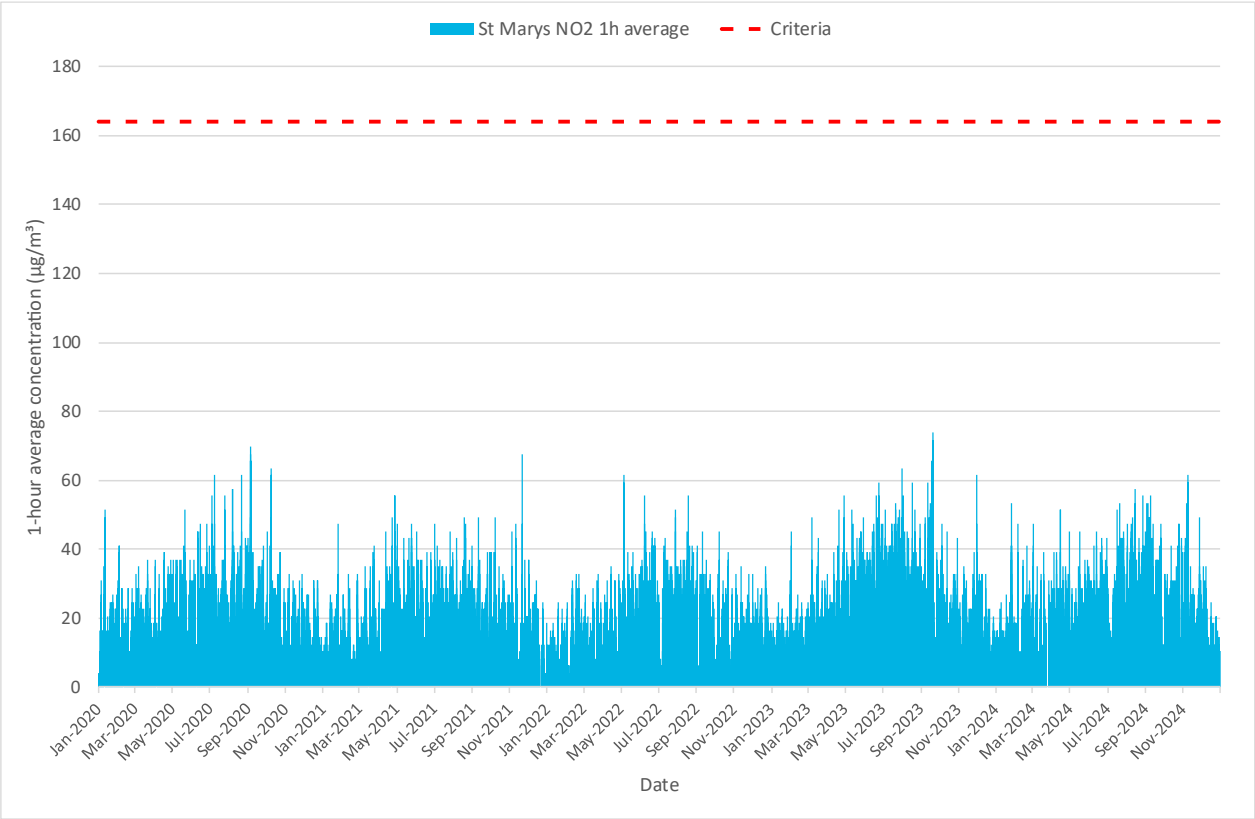

Figure 4.3 Time series of 1-hour average NO_2 concentrations – St Marys AQMS dataset – 2020 to 2024

Summary statistics for NO_2 for the period between 2020 and 2024 at the St Marys AQMS are presented in Table 4.4. Recorded 1-hour average NO_2 concentrations were below the NSW EPA impact assessment criterion of 164 µg/m³ in all years.

Table 4.4 Statistics for NO_2 concentrations – St Marys AQMS dataset – 2020 to 2024

Year	Maximum	75th percentile	Average	Hours >164 µg/m³
	1-hour average NO_2 concentration (µg/m³)			
2020	69.7	12.3	7.9	0
2021	67.7	12.3	8.1	0
2022	61.5	12.3	8.7	0
2023	73.8	14.4	11.6	0
2024	61.5	14.4	10.5	0

5 Emissions inventory

5.1 Construction phase emissions

The proposed development will include the construction of a single-story warehouse, hardstand and vehicle parking facilities. The construction of the proposed development would generate dust from activities including, earthworks, construction and movement of vehicles and plant machinery on-site.

A construction AQIA was undertaken by EMM (EMM 2023) for the initial bulk earthworks for the AIBP as a part of HBB's Development Application (DA) to the Penrith City Council. The construction AQIA determined the risk of dust soiling impacts to be medium to low, and the risk of human health impacts to be low. Mitigation measures listed in the construction AQIA were considered sufficient to ensure off-site impacts were effectively managed.

The total footprint assessed in the construction AQIA for the AIBP encompassed the location of the proposed development. As such, the scale of construction activities and emissions potential are expected to be less than those outlined in the construction AQIA; on this basis, the impacts from construction of the proposed development are expected to be low.

As identified in the construction AQIA for the AIBP (EMM 2023), dust emission mitigation measures routinely implemented as 'good practice' at a construction site should be sufficient in managing off-site impacts for the construction of the proposed development.

5.2 Operational phase emissions

Operations from the proposed development would involve the following processes:

- receival and unloading of pallets/kegs of beverage products to site by trucks
- receival and unloading of bulk liquid beverages to site by liquid tankers for storage in Duotank Chilled Storage tanks
- receival of empty kegs for storage and return
- handling and transportation of pallets/kegs of beverage products within the warehouse by electric forklift and MHE
- loading of empty kegs and pallets to trucks for dispatch to production facility
- loading of beverage products to trucks for dispatch to market.

The proposed development would be operational 24 hours a day, 7 days a week.

The potential sources of air pollutant emissions from the above processes at the proposed development are expected to be the following:

- vehicle exhaust emissions from the movement of trucks and light vehicles around the site
- wheel-generated particulate matter emissions from the movement of trucks, forklifts and light vehicles within the site on paved surfaces.

The Traffic Impact Assessment (Arcadis 2025) for the proposed development identified that the peak daily movements are expected to be 180 incoming and 165 outgoing for heavy vehicles and rigid delivery vans.

Emissions from these activities are expected to be minor due to the short term nature of occurrence and separation from sensitive receptors. As stated in Section 2.2, the nearest residential areas to the AIBP are located approximately 1.6 km to the north-east and approximately 1.0 km to the south. Consequently, no quantification of operational emissions or associated impacts have been undertaken for this assessment.

No other significant sources of air pollutant emissions were identified from the proposed development. As a result, potential impacts to air quality from the proposed development are anticipated to be negligible and unlikely to adversely impact upon the surrounding environment.

5.2.1 Odour emissions

Activities at the proposed development will primarily involve the handling and storage of various pre-packaged beverages. Some beverage products will be transported unpackaged by liquid tankers and will be transferred to on-site storage tanks via hose. No brewing or processing of beverage products will occur at the proposed development.

On this basis, odour emissions and impacts from the proposed development are assumed to be negligible and therefore are not considered further in this assessment.

6 Conclusion

This AQIA presents a qualitative assessment of potential air quality and odour impacts from the proposed development.

The existing environment was characterised using meteorological data from the BoM Badgerys Creek AWS and background air quality data from the DCCEEW St Marys and Bringelly AQMS over the five-year period between 2020 and 2024.

Air pollutant emissions generated during the construction phase were determined to be low and will be managed through 'good practice' construction dust mitigation measures.

Operational activities for the proposed development were reviewed. The main emission sources from the proposed development were determined to be dust entrainment from the movement of vehicles on paved surfaces (particulate matter) and fuel combustion emissions from vehicle exhaust (particulate matter and NO_x). These emission sources are expected to be minor.

No other significant sources of air pollutant emissions were identified from the proposed development. As a result, potential impacts to air quality from the proposed development are anticipated to be negligible and unlikely to adversely impact upon the surrounding environment.

References

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Abbreviations

AAQNEPM	Ambient Air Quality National Environment Protection Measure
AIBP	Alspec industrial business park
AQIA	Air quality impact assessment
AQMS	air quality monitoring station
AWS	Automatic weather station
BoM	Bureau of Meteorology
CO	carbon monoxide
DA	development application
DCCEEW	NSW Department of Climate Change, Energy, the Environment and Water
DoE	Commonwealth Department of the Environment
DPHI	NSW Department of Planning, Housing and Infrastructure
EMM	EMM Consulting Pty Limited
km	kilometres
LGA	local government area
EPA	NSW Environment Protection Authority
NO_x	oxides of nitrogen
PM_{10}	Particulate matter less than 10 microns in aerodynamic diameter
$PM_{2.5}$	Particulate matter less than 2.5 microns in aerodynamic diameter
SEARs	Secretary's Environmental Assessment Requirements
SO_2	sulphur dioxide
SSD	State Significant Development
TSP	Total suspected particulates
VOC	Volatile organic compounds

Appendix A
Meteorological analysis

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A.1 Meteorological data analysis for the Badgerys Creek AWS – 2020 to 2024

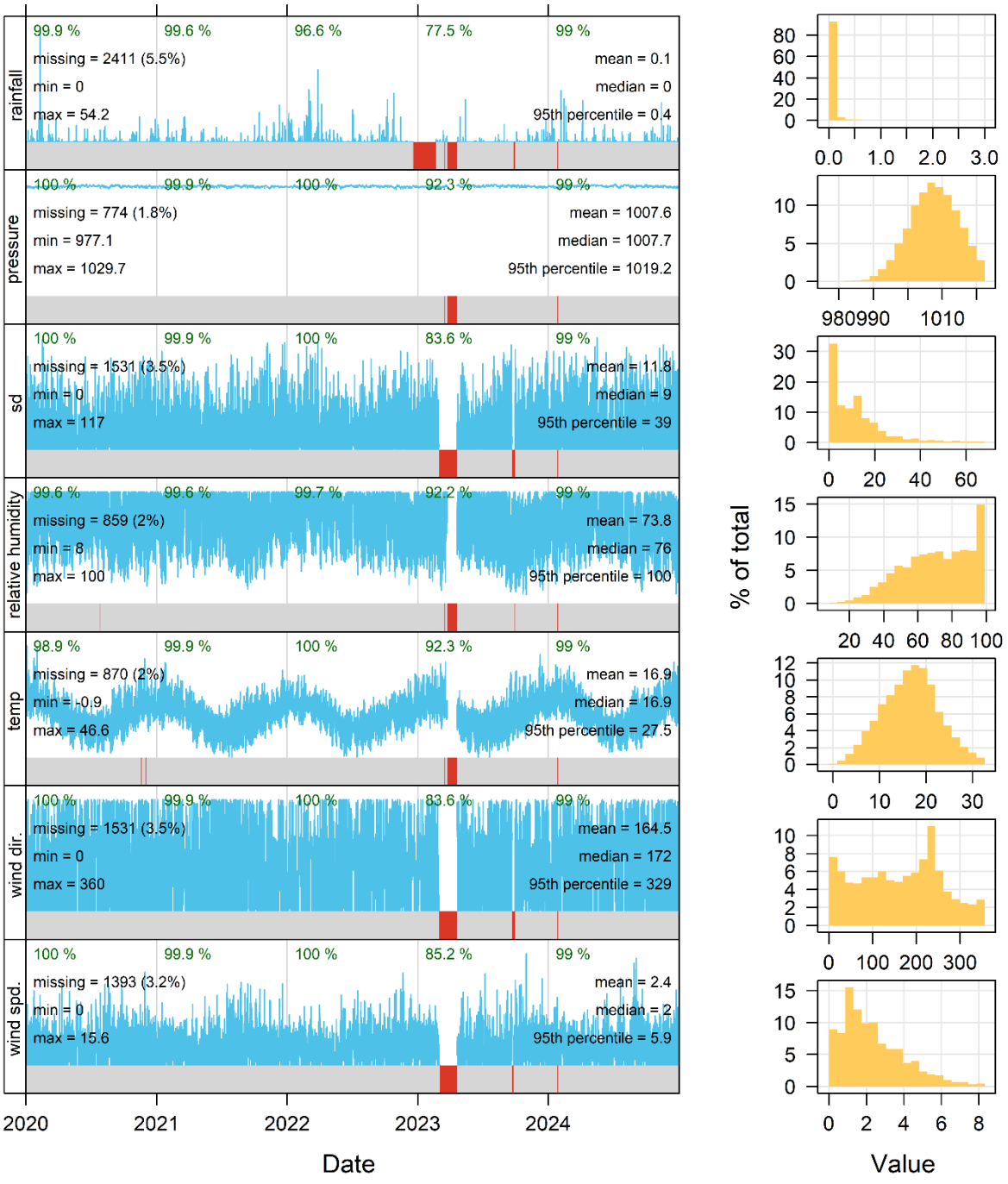

Figure A.1 Data completeness analysis plot – BoM Badgerys Creek AWS – 2020 to 2024

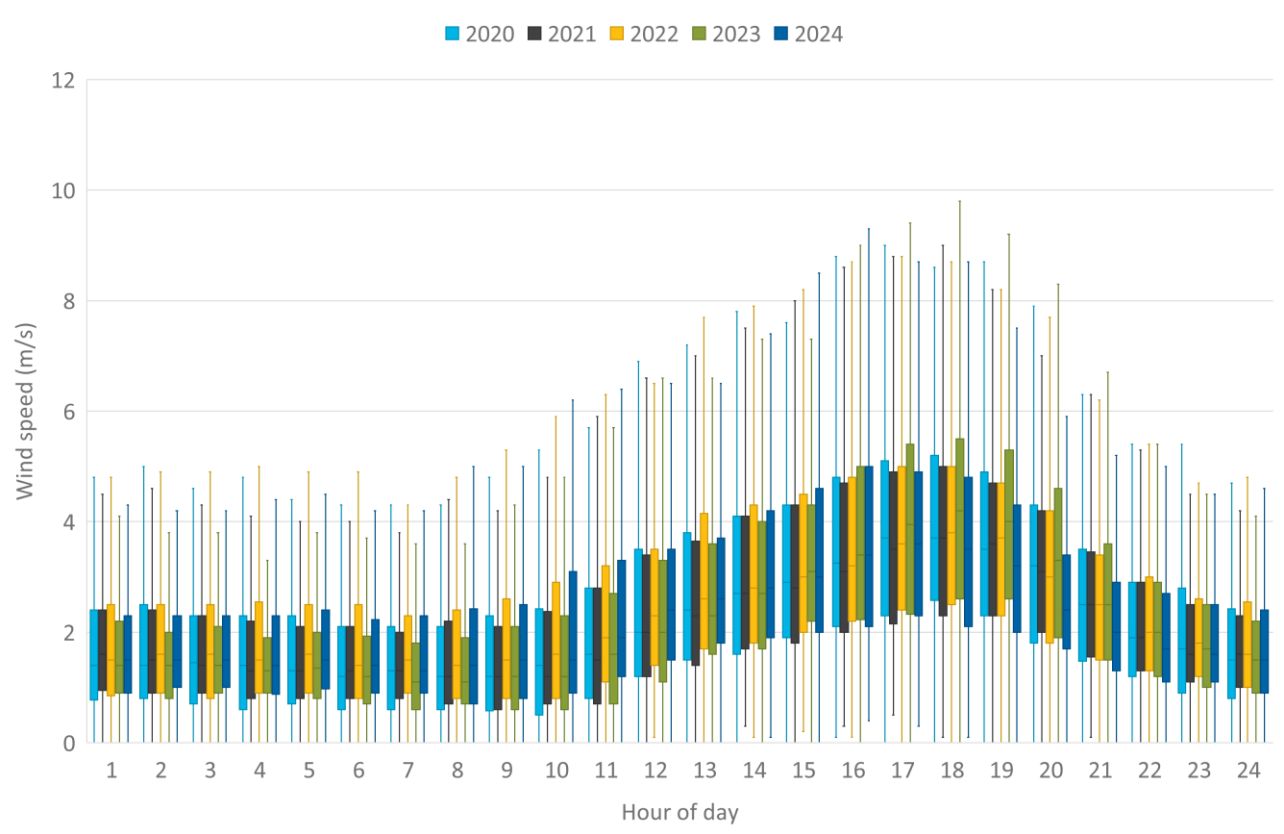

Figure A.2 **Inter-annual variability in diurnal wind speed – Badgerys Creek– 2020 to 2024**

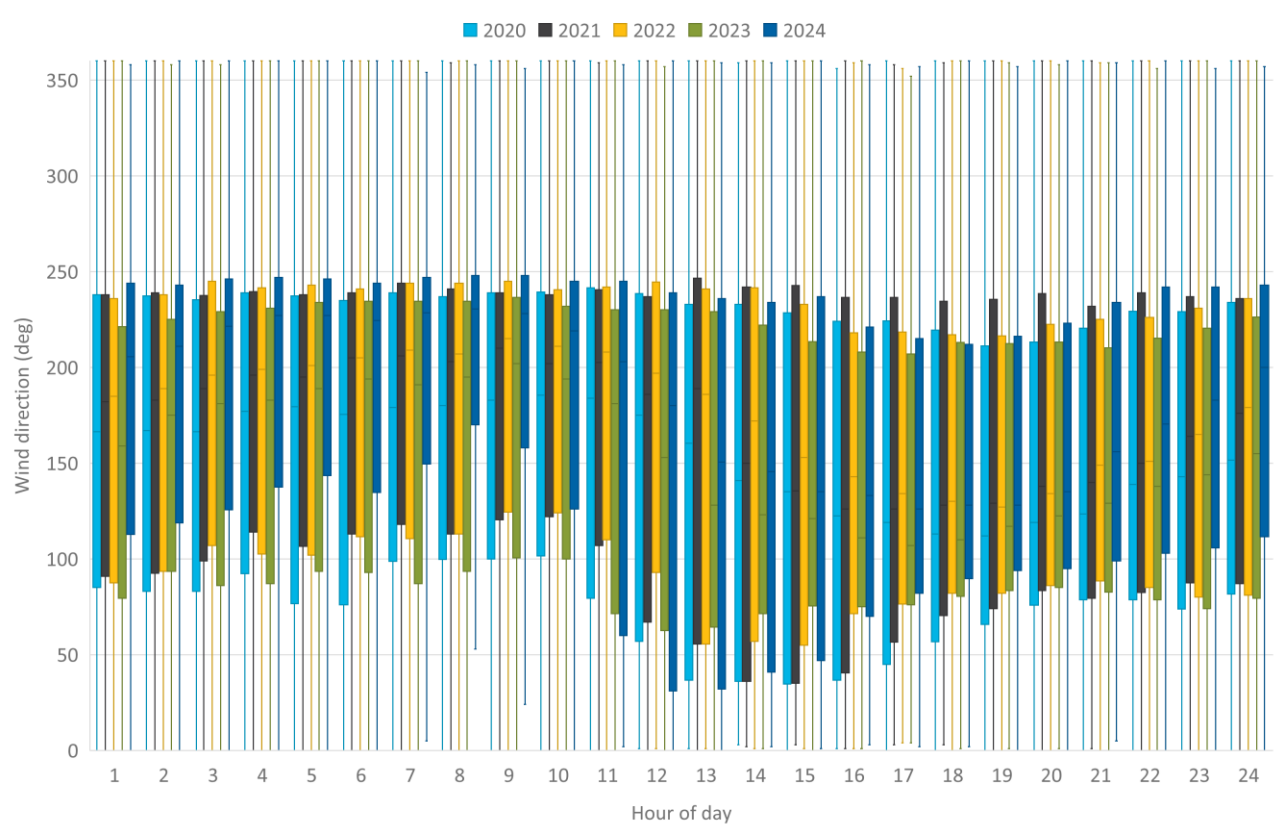

Figure A.3 **Inter-annual variability in diurnal wind direction – Badgerys Creek– 2020 to 2024**

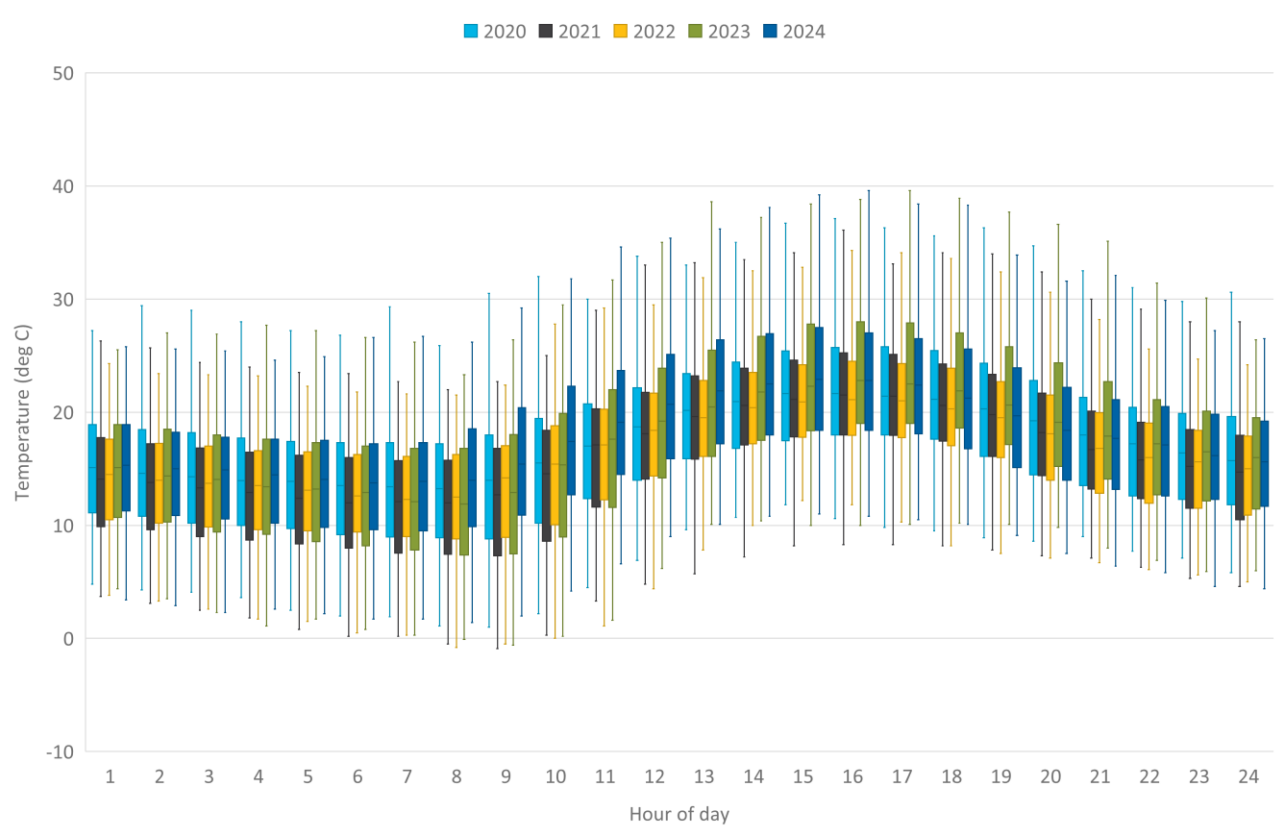

Figure A.4 **Inter-annual variability in diurnal air temperature – Badgerys Creek– 2020 to 2024**

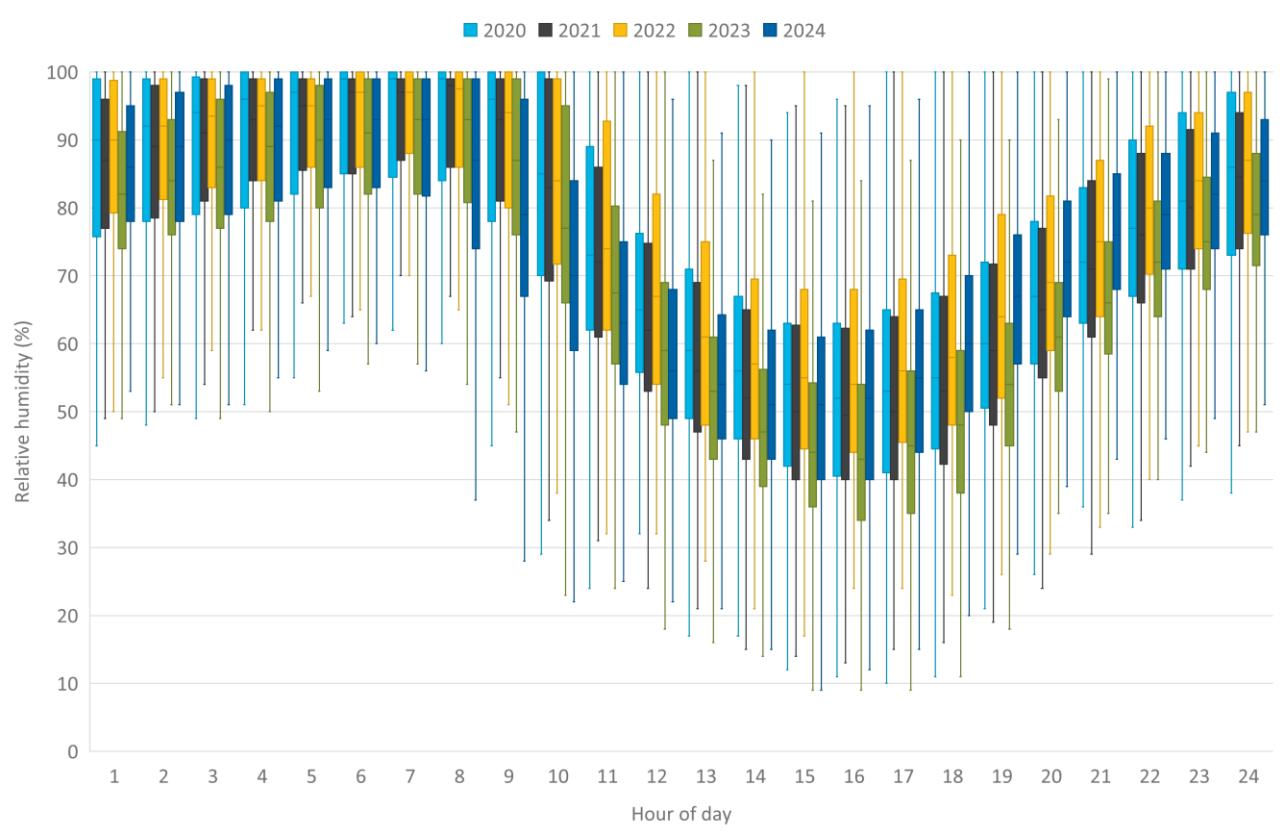

Figure A.5 **Inter-annual variability in diurnal relative humidity – Badgerys Creek– 2020 to 2024**

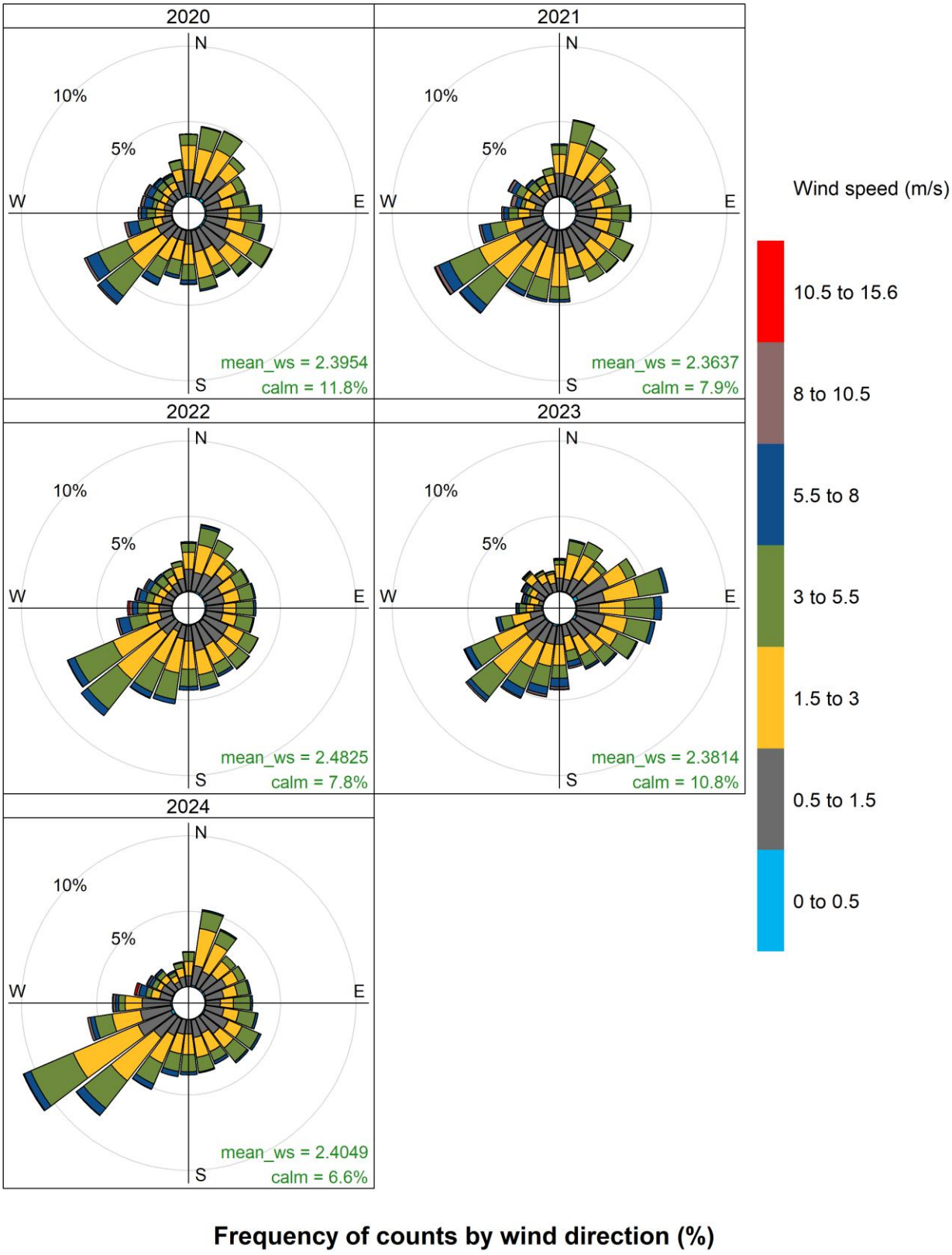

Figure A.6 **Inter-annual comparison of recorded wind speed and direction – Badgerys Creek AWS – 2020 to 2024**

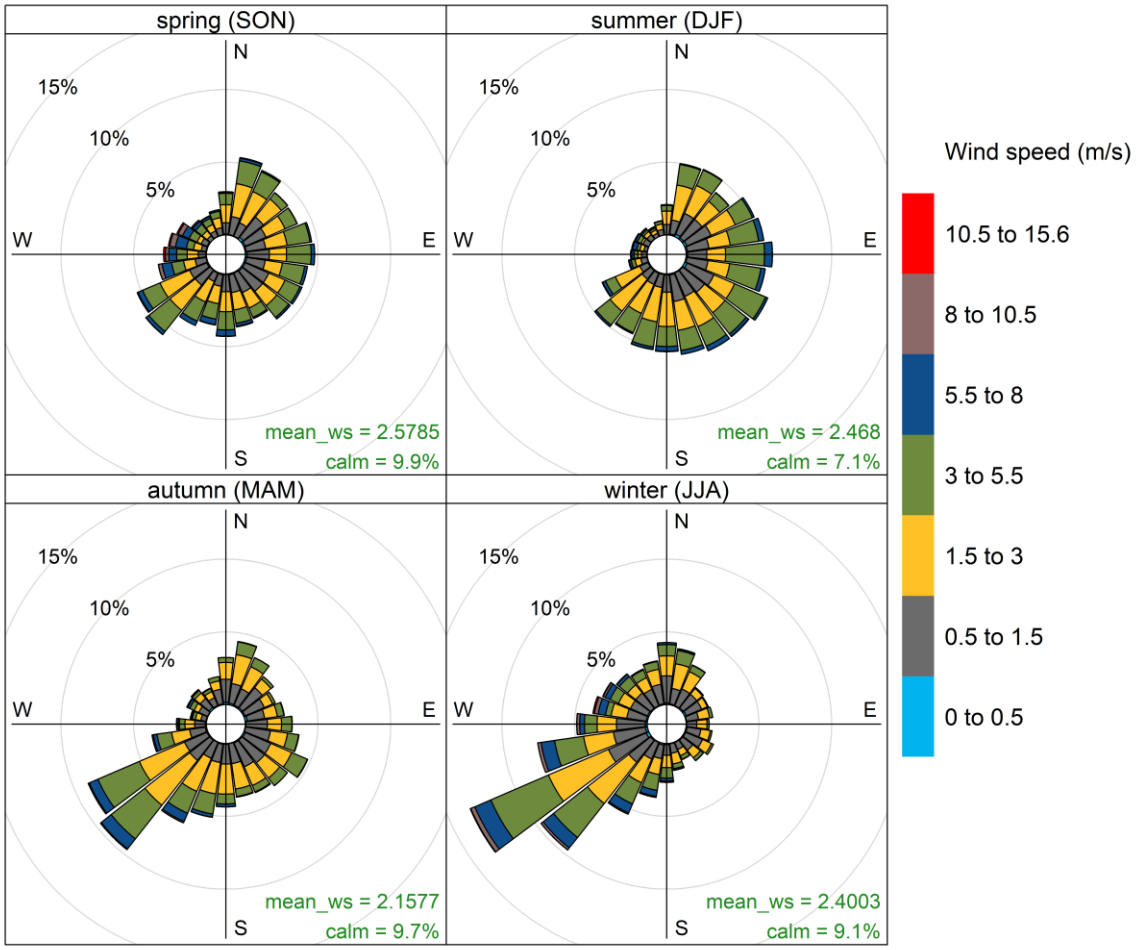

Figure A.7 **Seasonal wind speed and direction – Badgerys Creek AWS – 2020 to 2024**

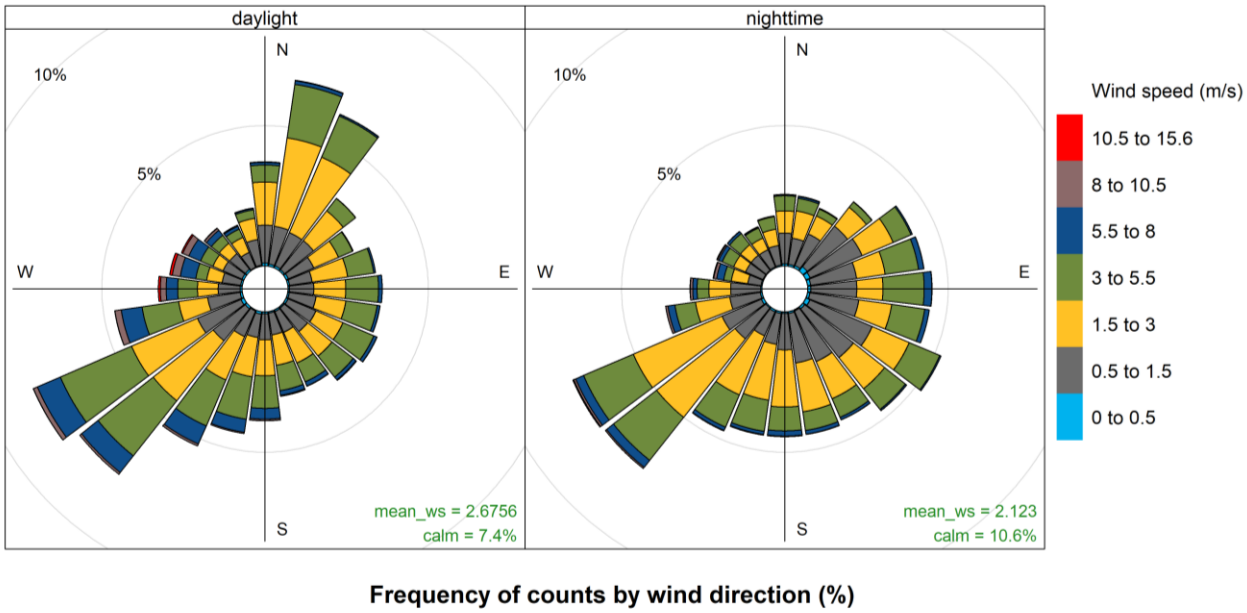

Figure A.8 **Diurnal wind speed and direction – Badgerys Creek AWS – 2020 to 2024**

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