AIR QUALITY IMPACT ASSESSMENT
PRONTO BINS, WETHERILL PARK

Pronto Bins

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Job Number 17110759

Prepared by

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Air Quality Impact Assessment
Pronto Bins, Wetherill Park

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1 INTRODUCTION

Todoroski Air Sciences has prepared this report for MRA Consulting Group on behalf of Pronto Bins. It provides an assessment of the potential air quality impacts associated with the proposed waste management facility located at Wetherill Park, New South Wales (NSW) (hereafter referred to as the Project).

To assess the potential air quality impacts associated with the Project, this report incorporates the following aspects:

- Background and description of the Project;
- Review of the existing meteorological and air quality environment in the general vicinity of the Project site;
- A description of the dispersion modelling approach used to assess potential air quality impacts;
- Presentation of the predicted operational air quality levels in the surrounding environment; and,
- Discussion of the potential air quality impacts.

This air quality assessment has been prepared in general accordance with the NSW Environment Protection Authority (EPA) document *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (**NSW EPA, 2017**) and the *Generic Guidance and Optimum Model Settings for the CALPUFF Modeling System for Inclusion into the 'Approved Methods for the Modeling and Assessments of Air Pollutants in NSW, Australia* (**TRC Environmental Corporation, 2011**)

2 PROJECT SETTING AND DESCRIPTION

2.1 Project setting

The Project is located at 115 Cowpasture Road, Wetherill Park, also known as Lot 1 DP 830767, approximately 8 kilometres (km) south of Blacktown, NSW. The site is situated in a general industrial area with the land use in the surrounding area characterised as a mix of commercial/industrial, rural, residential and recreational parklands.

Figure 2-1 presents the location of the Project and the sensitive receptor locations assessed as discrete receptors in this study. The nearest sensitive receptors to the Project are identified as the residences located along Cowpasture Road and Trivet Street, Wetherill Park located to the southwest, northwest and north of the Project boundary.

Figure 2-2 presents a pseudo three-dimensional visualisation of the topography surrounding the Project location. The Project area and land to the east is relatively flat, with a ridgeline located to the west of the Project along a north south axis. The Prospect Reservoir is located to the north of the Project.

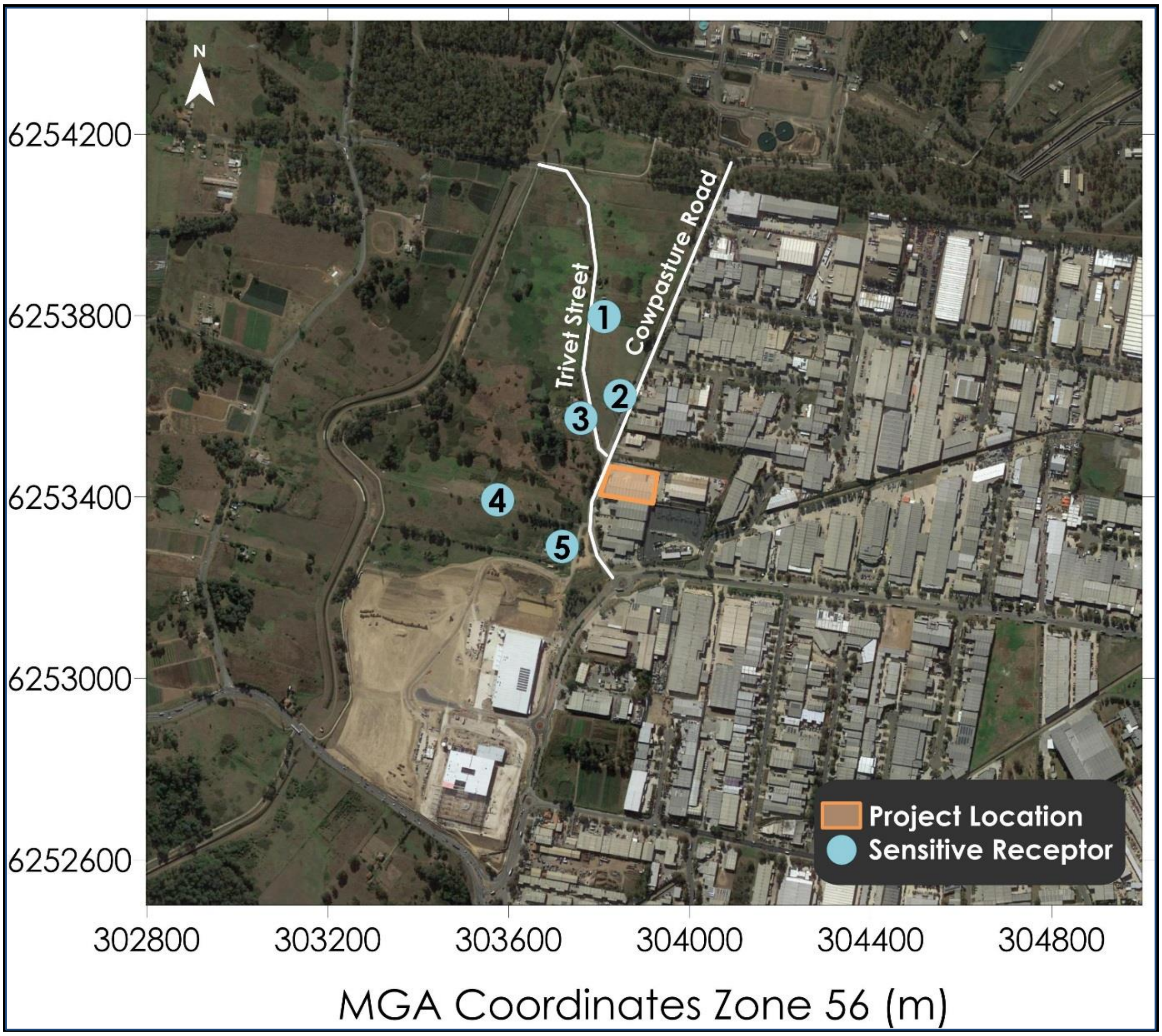

Figure 2-1: Project location

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

2.2 Project description

The Project seeks approval for the operation of the site as a waste management facility with a processing capacity of 20,000 tonnes per annum (tpa). The proposed development will utilise the existing site building for processing activities, with the addition of a weighbridge and installation of additional indoor plant equipment.

The Project activities are limited to the front section of the building on the lot and cover an area of approximately 1,500 metres squared (m^2). The remaining sections of the building are leased for furniture storage and formwork by different companies which are not considered in this application.

There are two stages to the development. Stage 1 involves manual processing while Stage 2 involves mechanical processing. This assessment has considered the Stage 2 development. Indicative site layouts of Stage 1 and Stage 2 are provided as **Figure 2-3** and **Figure 2-4** respectively

2.2.1 Proposed materials

The Project is proposing to accept construction and demolition waste materials which include the following:

- Bricks and roof tiles;
- Concrete;
- Timber;
- Plasterboard;
- Plastics;
- Metals; and,
- Mixed waste.

No putrescible/ odorous waste materials are proposed to be accepted on site.

2.2.2 Process description

The Project will sort construction and demolition waste materials into separate streams to be transported to appropriate recovery facilities for further recycling.

The basic process description of Project is to be as follows:

- Incoming materials are inspected at weighbridge;
- Materials are tipped on the sorting floor;
- Materials are inspected and large items removed;
- Materials are fed into the hopper;
- Small pieces of waste and soil are separated out with a vibrating screen;

- Manual sorting is conducted on the sorting platform;
- Metals are removed by the overhead magnet; and,
- Sorted materials are transported off site for further recycling. Waste which cannot be recycled would be transported to a licensed facility.

2.2.3 Operational hours

The proposed operational hours of the Project are as follows:

- Monday to Friday: 6am – 6pm;
- Saturday: 6am – 4pm; and,
- Closed on Sunday.

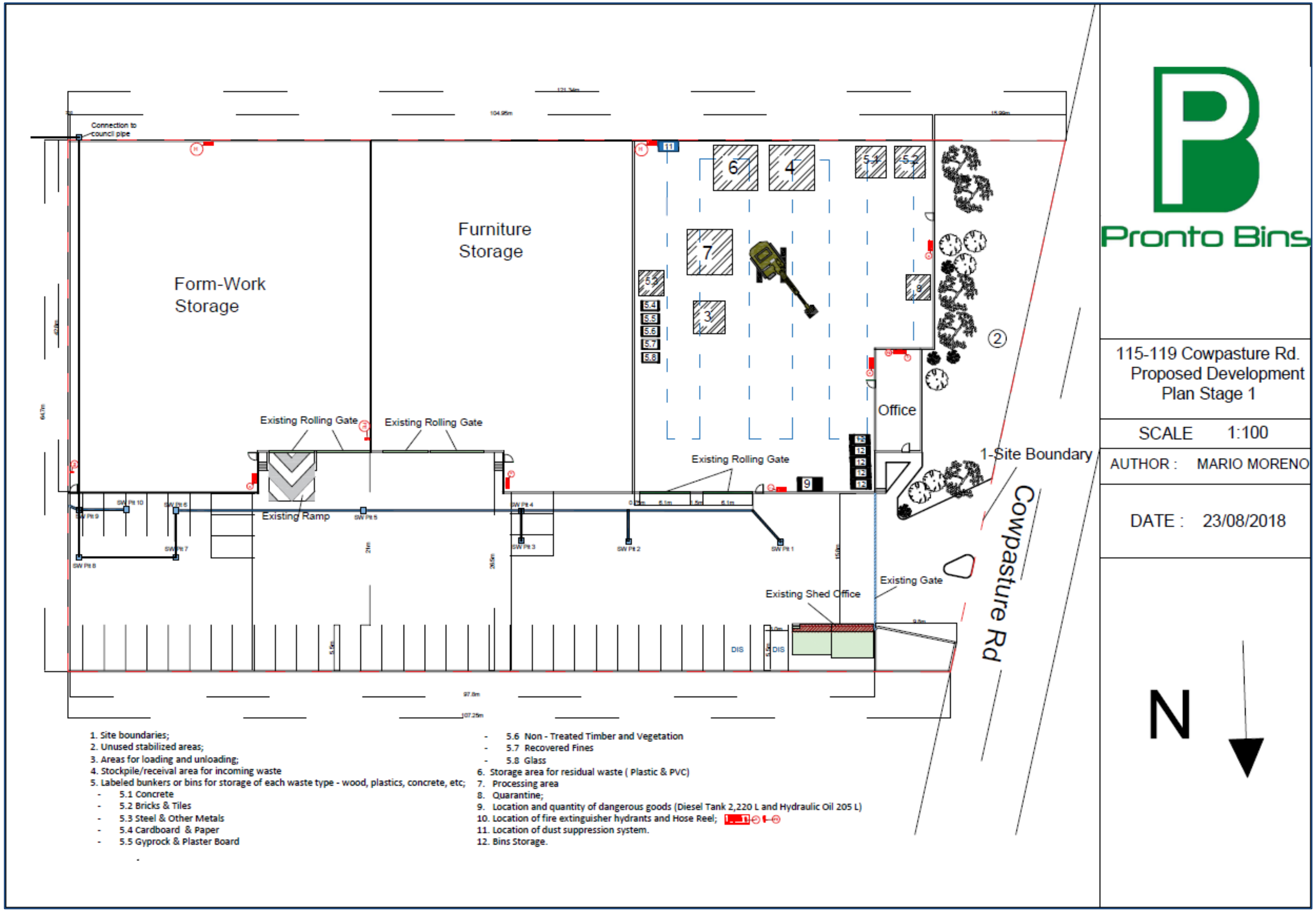

Figure 2-3: Indicative site layout – Stage 1

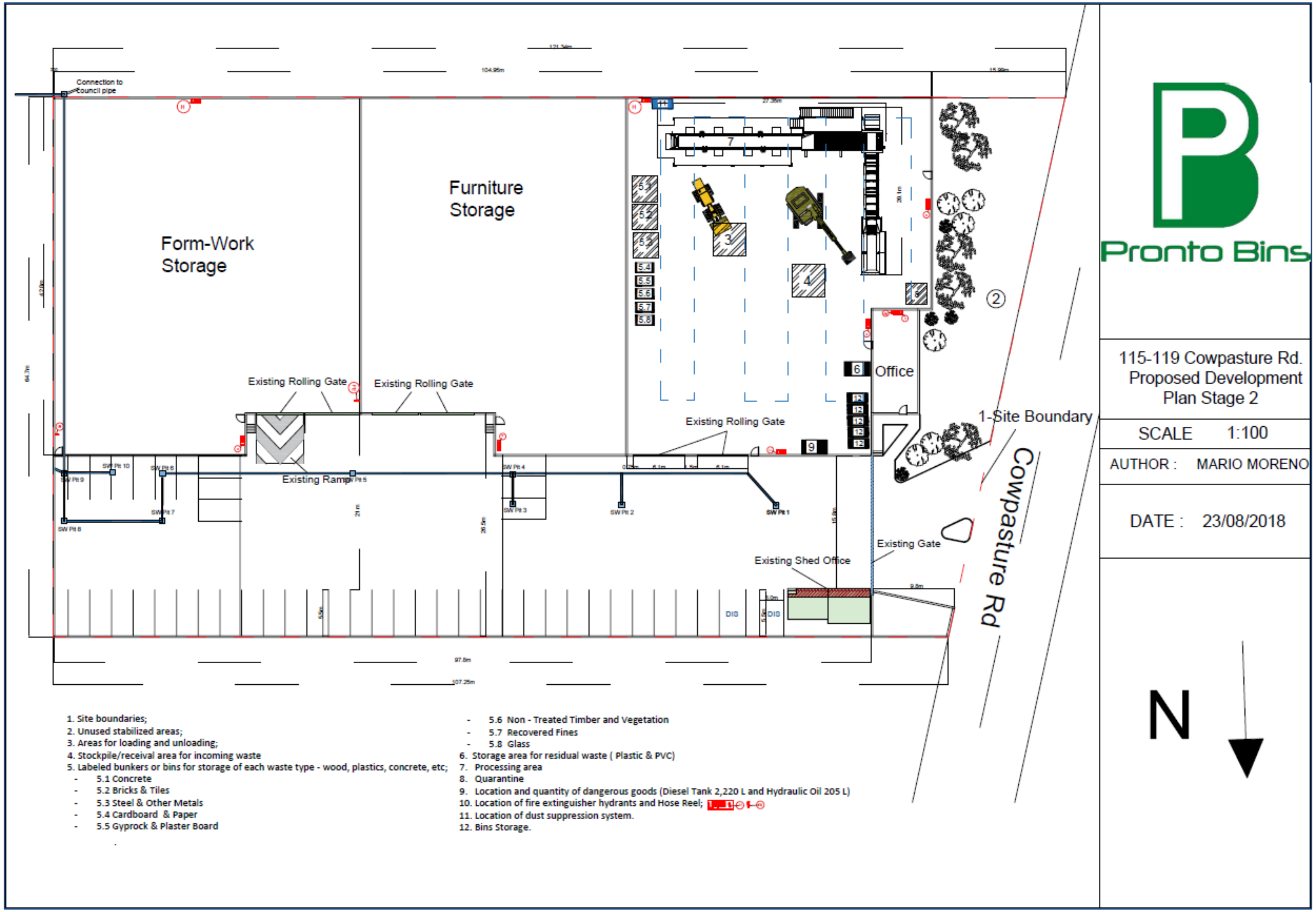

Figure 2-4: Indicative site layout – Stage 2

3 AIR QUALITY CRITERIA

Air quality criteria are benchmarks set to protect the general health and amenity of the community in relation to air quality. The sections below identify the potential air emissions generated by the Project and the applicable air quality criteria.

The air quality goals that are relevant to this study are sourced from the NSW EPA document "*Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*" (**NSW EPA, 2017**).

Particulate matter consists of dust particles of varying size and composition. The upper size range for Total Suspended Particulate matter (TSP) is nominally taken to be 30 micrometres (μm) as in practice particles larger than 30 to 50μm will settle out of the atmosphere too quickly to be regarded as air pollutants.

Two sub-classes of TSP are also included in the air quality criteria, namely PM_{10}, particulate matter with equivalent aerodynamic diameters of 10μm or less, and $PM_{2.5}$, particulate matter with equivalent aerodynamic diameters of 2.5μm or less.

Particulate matter, typically in the upper size range, that settles from the atmosphere and deposits on surfaces is characterised as deposited dust. The deposition of dust on surfaces may be considered a nuisance and can adversely affect the amenity of an area by soiling property in the vicinity.

3.1 NSW EPA impact assessment criteria

Table 3-1 summarises the air quality goals that are relevant to this assessment as outlined in the NSW EPA document *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (**NSW EPA, 2017**).

The air quality criteria for particulates refers to the cumulative impact and not just the dust from the Project. Consideration of background dust levels needs to be made when using these criterion to assess potential impacts.

Table 3-1: NSW EPA air quality impact assessment criteria

Pollutant	Averaging Period	Impact	Criterion
TSP	Annual	Cumulative	90μg/m³
PM_{10}	Annual	Cumulative	25μg/m³
	24 hour	Cumulative	50μg/m³
$PM_{2.5}$	Annual	Cumulative	8μg/m³
	24 hour	Cumulative	25μg/m³
Deposited dust (DD)	Annual	Incremental	2g/m²/month
		Cumulative	4g/m²/month

Source: NSW EPA, 2017
μg/m³ = micrograms per cubic metre
g/m²/month = grams per square metre per month

4 EXISTING ENVIRONMENT

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

4.1 Local climatic conditions

Long-term climatic data from the Bureau of Meteorology (BoM) weather station at Horsley Park Equestrian Centre Automatic Weather Station (AWS) (Site No. 067119) were used to characterise the local climate in the proximity of the Project. The Horsley Park Equestrian Centre AWS is located approximately 2.5km southwest of the Project.

Table 4-1 and **Figure 4-1** present a summary of data from the Horsley Park Equestrian Centre AWS collected over an approximate 13 to 20 year period for the various meteorological parameters.

The data indicate that January is the hottest month with a mean maximum temperature of 29.8 degrees Celsius (ºC) and July as the coldest month with a mean minimum temperature of 5.8ºC.

Rainfall generally peaks during the summer months and declines during winter. The data indicate that February is the wettest month with an average rainfall of 108.7 millimetres (mm) over 7.3 days and September is the driest month with an average rainfall of 34.1 mm over 4.8 days.

Humidity levels exhibit some variability and seasonal flux across the year. Mean 9am humidity levels range from 61 per cent (%) in October to 81% in March. Mean 3pm humidity levels range from 42% in August and September to 55% in June.

Mean 9am wind speeds range from 8.9 kilometres per hour (km/h) in March to 12.5km/h in October. Mean 3pm wind speeds range from 12.9km/h in June to 19.9km/h in December.

Table 4-1: Monthly climate statistics summary – Horsley Park Equestrian Centre AWS

Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann.
Temperature													
Mean max. temperature (ºC)	29.8	28.7	26.8	23.7	20.5	17.6	17.3	19	22.3	24.7	26.5	28.2	23.8
Mean min. temperature (ºC)	17.8	17.8	16.1	12.8	9.1	7.2	5.8	6.5	9.4	11.7	14.4	16.2	12.1
Rainfall													
Rainfall (mm)	78.6	108.7	80.6	76.3	45.1	77.1	37.5	39.2	34.1	54.9	81.3	64.6	769.2
Mean No. of rain days (≥1mm)	7.8	7.3	8	7.2	5.4	6.2	5.4	4.4	4.8	5.6	7.1	7	76.2
9am conditions													
Mean temperature (ºC)	22	21.5	19.4	17.5	13.8	11.1	10.3	12	15.6	18.1	19.2	20.9	16.8
Mean relative humidity (%)	73	77	81	76	77	80	78	70	65	61	70	71	73
Mean wind speed (km/h)	10.1	9.7	8.9	10.5	10.7	10.3	10.8	11.7	12.2	12.5	11.8	10.7	10.8
3pm conditions													
Mean temperature (ºC)	28.2	27.1	25.3	22.2	19.2	16.6	16.1	17.8	20.8	22.5	24.2	26.5	22.2
Mean relative humidity (%)	49	53	54	53	52	55	50	42	42	45	50	48	49
Mean wind speed (km/h)	19.4	17	14.8	14.4	13	12.9	13.9	16.1	18.1	19.8	19.5	19.9	16.6

Source: **Bureau of Meteorology (November 2017)**

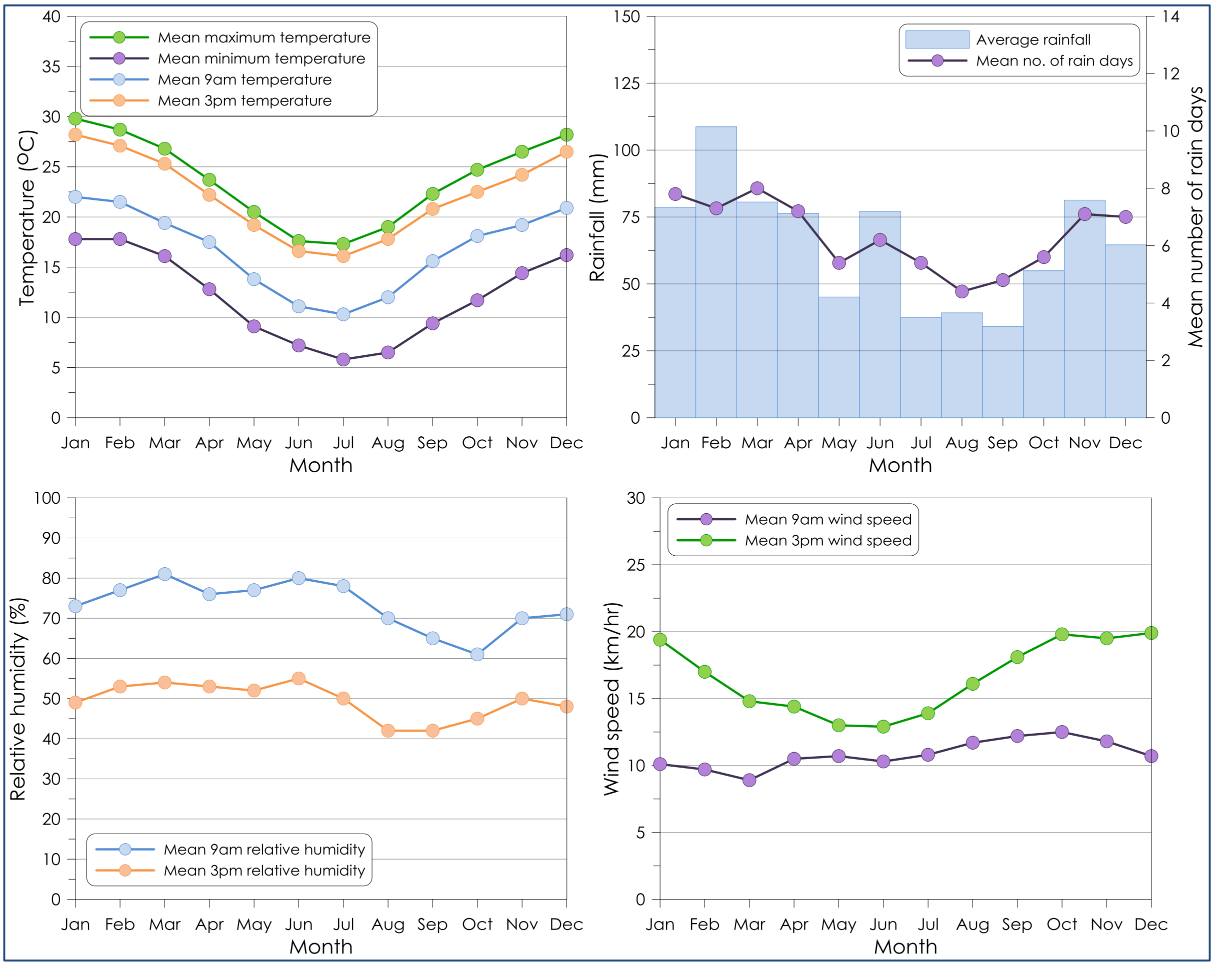

Figure 4-1: Monthly climate statistics summary – Horsley Park Equestrian Centre AWS

4.2 Local meteorological conditions

The Horsley Park Equestrian Centre Automatic Weather Station (AWS) has been used to represent local meteorological conditions that would be experienced at the Project site. From a review of the latest five years, the 2015 calendar period was found to be representative of the area based on a long-term meteorological analysis of data collected from the Horsley Park Equestrian Centre AWS. Details on the selection of the meteorological year are given in **Appendix A**.

4.3 Ambient air quality

The main sources of particulate matter in the wider area around the Project include agricultural activities, emissions from local anthropogenic activities such as motor vehicle exhaust and domestic wood heaters, urban activity and various other commercial and industrial activities.

Available data from the nearby monitoring station at Prospect operated by the NSW Office of Environment and Heritage (OEH) are used to characterise the existing air quality levels. The Prospect OEH station is located approximately 6km northeast of the site.

4.3.1 PM_{10} and $PM_{2.5}$ monitoring

Table 4-2 presents a summary of the available particulate concentrations for the Prospect monitoring station from 2012 to 2016. Annual average PM_{10} concentrations were below the relevant criterion of 25µg/m³ and annual average $PM_{2.5}$ concentrations were above the relevant criterion of 8µg/m³ at Prospect in 2015 and 2016.

The maximum 24-hour average PM_{10} and $PM_{2.5}$ concentrations recorded were found on occasion to exceed the NSW EPA 24-hour average goal of 50µg/m³ and 25µg/m³ respectively during the period reviewed.

Figure 4-2 and **Figure 4-3** present the 24-hour average PM_{10} and $PM_{2.5}$ concentrations recorded at the Prospect monitoring station.

Table 4-2: Particulate levels from NSW OEH Prospect monitoring site (µg/m³)

Pollutant	Annual average					Maximum 24-hour average				
	2012	2013	2014	2015	2016	2012	2013	2014	2015	2016
PM_{10}	17.3	19.2	17.6	17.6	18.9	38.7	81.8	44.3	68.7	110.1
$PM_{2.5}$	-	-	-	8.2	8.7	-	-	-	29.6	84.9

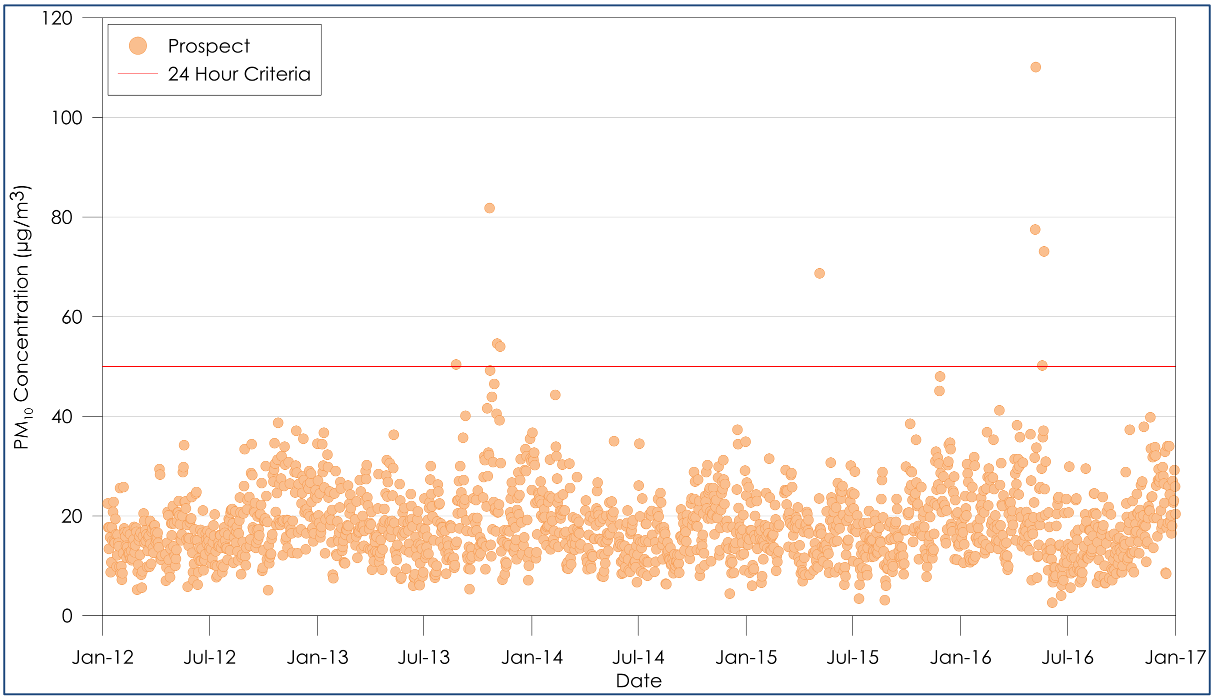

Figure 4-2: 24-hour average PM_{10} concentrations

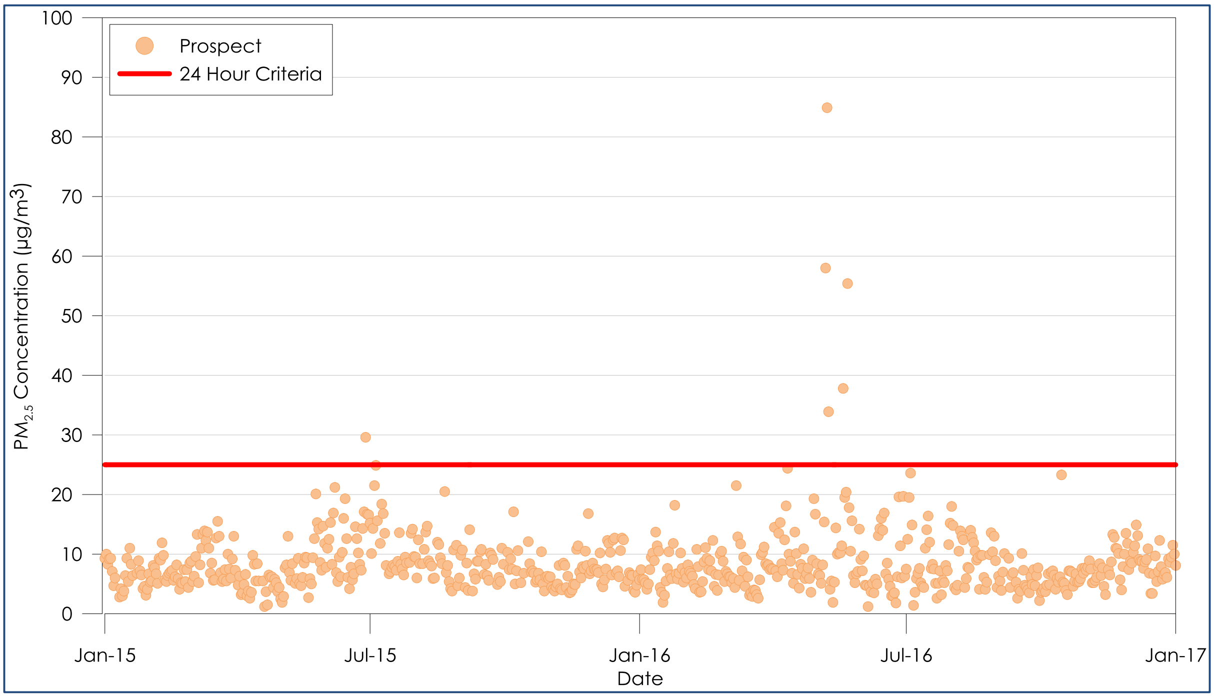

Figure 4-3: 24-hour average $PM_{2.5}$ concentrations

4.3.2 Estimated background air quality levels

4.3.2.1 PM_{10} and $PM_{2.5}$ concentrations

The available data from the Prospect monitor are considered the most representative of the background levels in the vicinity of the Project site and have therefore been used to quantify the existing ambient levels of air pollutants in this study. In correlation with the meteorological data used, the 2015 monitoring data were selected to represent background concentrations at the Project site and surrounding sensitive receptors.

4.3.2.2 TSP and Deposited dust

In the absence of available data, estimates of the annual average background TSP and deposited dust concentrations can be determined from a relationship between PM_{10}, TSP and deposited dust concentrations.

This relationship assumes that an annual average PM_{10} concentration of 25µg/m^3 corresponds to a TSP concentration of 90µg/m^3 and a dust deposition value of 4g/m^2/month. This assumption is based on the NSW EPA air quality impact criteria.

Applying this relationship with the measured annual average PM_{10} concentration of 17.6µg/m^3 indicates an approximate annual average TSP concentration and dust deposition value of 63.4µg/m^3 and 2.8g/m^2/month, respectively.

4.3.2.3 Summary of background pollutant concentrations

The annual average background air quality levels applied in this assessment are outlined in **Table 4-3**.

Table 4-3: Summary of background air quality levels

Pollutant	Averaging Period	Units	Value
PM_{10}	Annual	µg/m³	17.6
$PM_{2.5}$	Annual	µg/m³	8.2
TSP	Annual	µg/m³	63.4
Deposited dust	Annual	g/m²/month	2.8

Ambient (background) concentration data for PM_{10} and $PM_{2.5}$ data from Prospect have been applied in the Level 2 contemporaneous assessment of 24-hour average impacts.

5 DISPERSION MODELLING APPROACH

5.1 Introduction

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

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

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

5.2 Modelling methodology

5.2.1 Meteorological modelling

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

The centre of analysis for TAPM was 33deg50.5min south and 150deg53min east (303900mE, 6253400mN). The simulation involved an outer grid of 30km, with three nested grids of 10km, 3km and 1km with 35 vertical grid levels.

The 2015 calendar year was selected as the period for modelling the Project. This period was selected based on a review of the long-term meteorological and ambient air quality conditions representative of the prevailing conditions. Accordingly, the available meteorological data for January 2015 to December 2015 from one nearby meteorological monitoring site were included in the simulation. **Table 5-1** outlines the parameters used from the station.

Table 5-1: Surface observation station

Weather Stations	Parameters						
	WS	WD	CH	CC	T	RH	SLP
Horsley Park Equestrian Centre (BoM) (Station No. 067119)	✓	✓			✓	✓	

WS = wind speed, WD= wind direction, CH = cloud height, CC = cloud cover, T = temperature, RH = relative humidity, SLP = station level pressure

The seven critical parameters used in the CALMET modelling are presented in **Table 5-2**.

Table 5-2: Seven critical parameters used in CALMET

Parameter	Value
TERRAD	10
IEXTRP	-4
BIAS (NZ)	-1, -0.5, -0.25, 0, 0, 0, 0, 0
R1 and R2	2, 2
RMAX1 and RMAX2	4,4

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

Figure 5-1 presents a visualisation of the wind field generated by CALMET for a single hour of the modelling period. The wind fields are seen to follow the terrain well and indicate the simulation produces realistic fine scale flow fields (such as terrain forced flows) in surrounding areas.

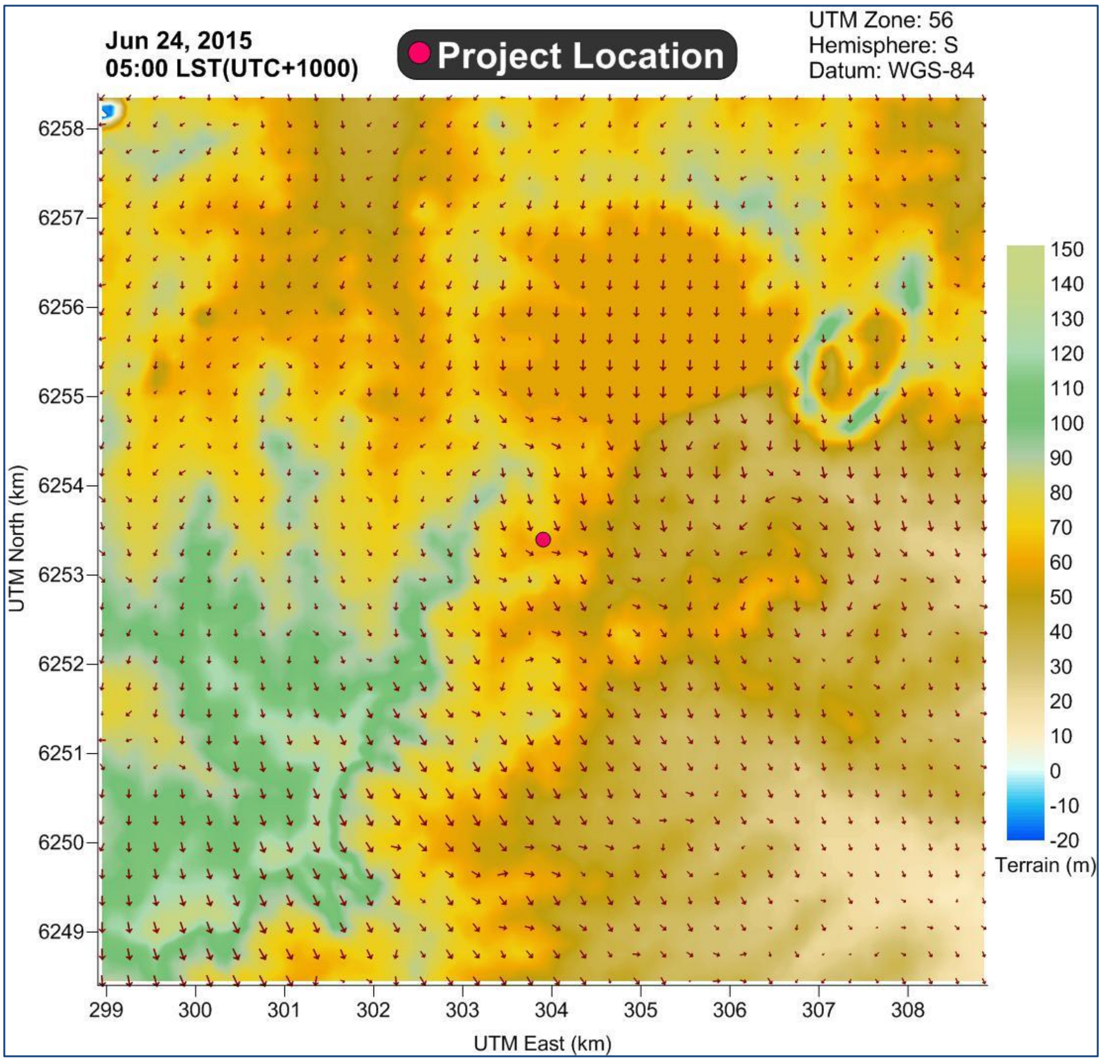

Figure 5-1: Example of the wind field for one of the 8,760 hours of the year that are modelled

CALMET generated meteorological data were extracted from a point within the CALMET domain and are represented in **Figure 5-2** and **Figure 5-3**.

Figure 5-2 presents the annual and seasonal windroses from the CALMET data. The CALMET modelling results reflect the expected wind distribution patterns of the area based on consideration of the measured data and the expected terrain effects on the prevailing winds.

Figure 5-3 includes graphs of the temperature, wind speed, mixing height and stability classification over the modelling period and is consistent with the conditions expected to occur in the area.

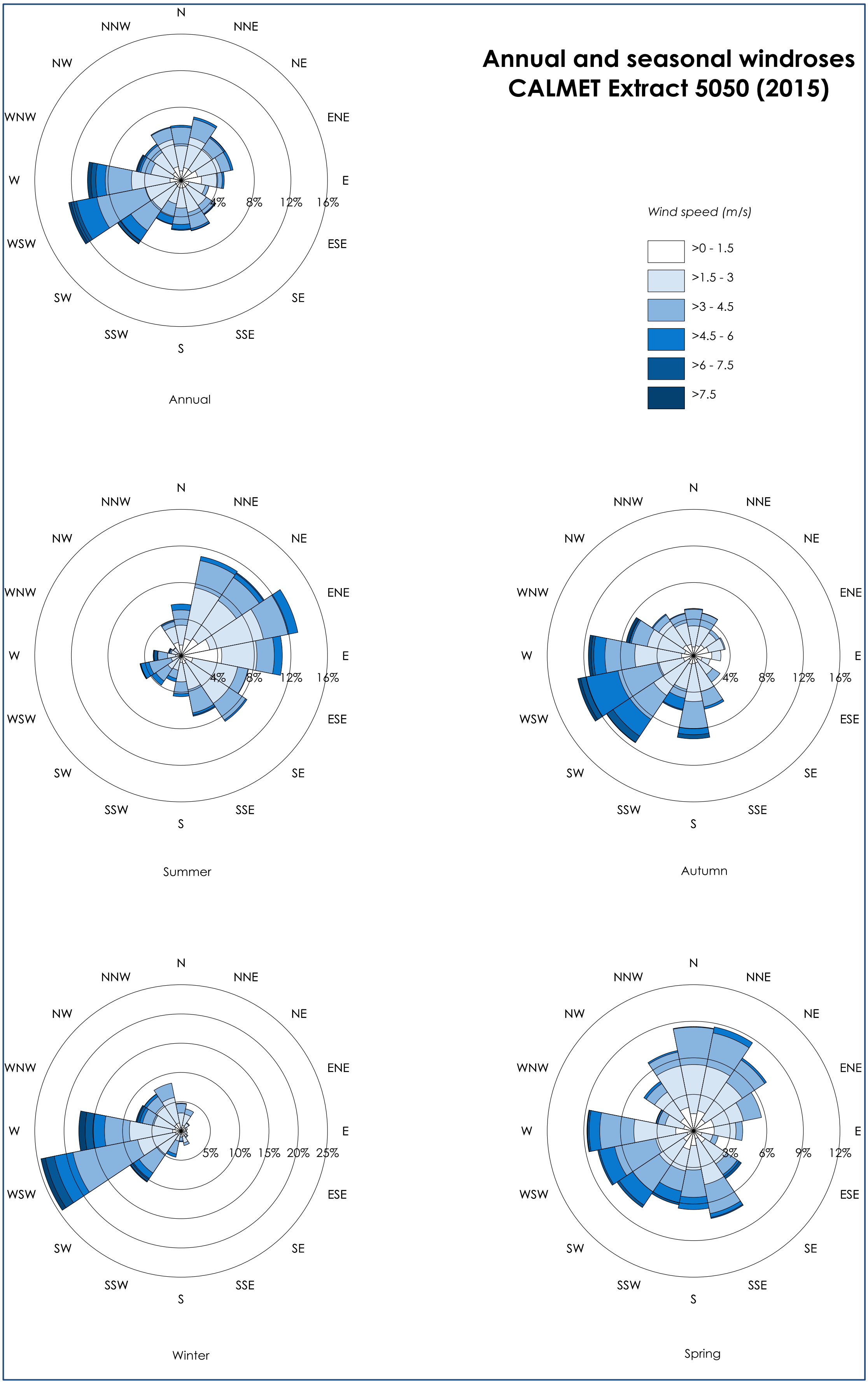

Figure 5-2: Windroses from CALMET extract (cell ref 5050)

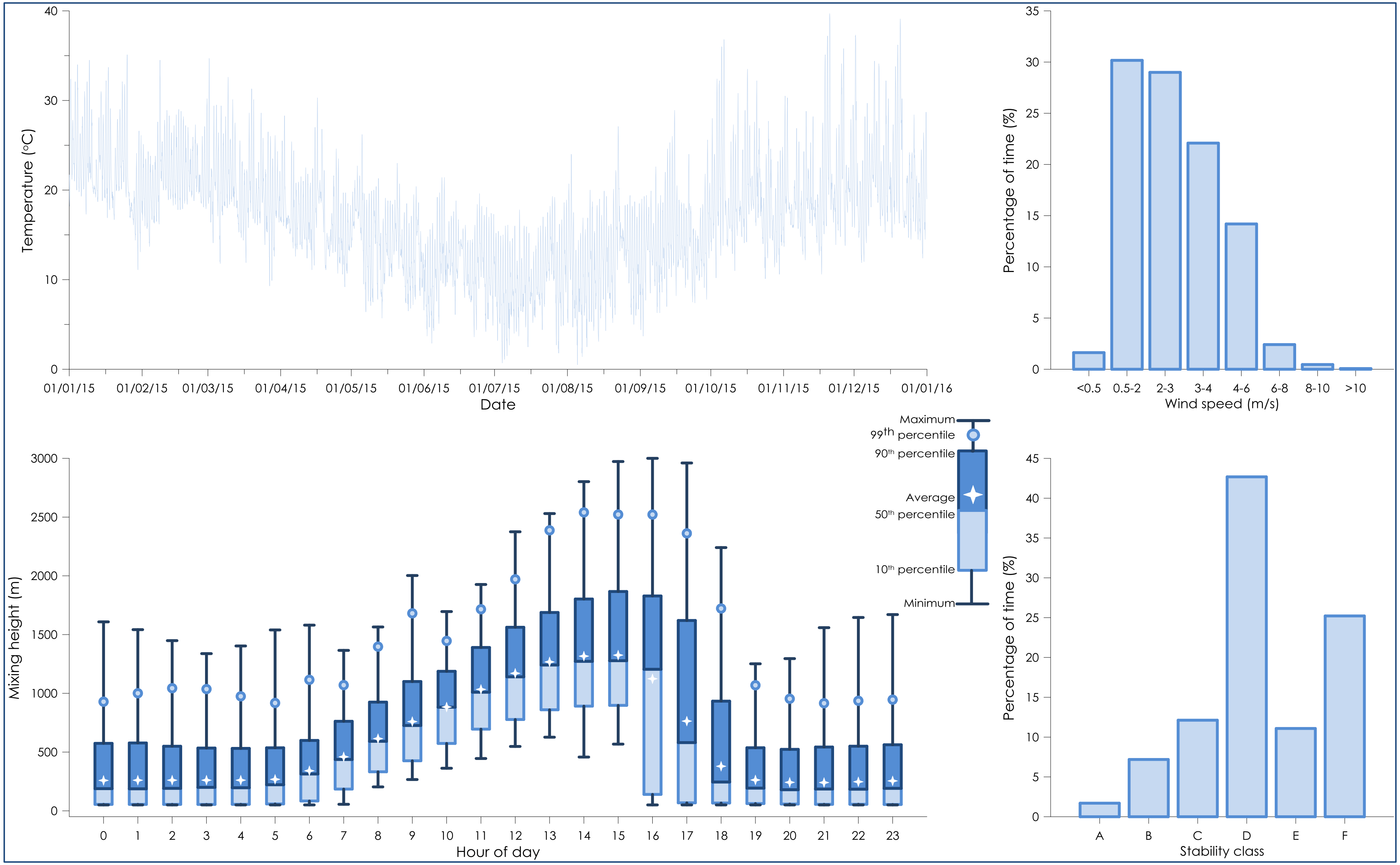

Figure 5-3: Meteorological analysis of CALMET extract (cell ref 5050)

5.2.2 Dispersion modelling

The CALPUFF dispersion model, in conjunction with a CALMET generated meteorological data file, was applied to provide predictions of the ground level concentrations of dust based on the estimated emissions.

Emissions from each modelled activity are represented by a series of volume sources and were included in the CALPUFF model via an hourly varying emission file.

5.3 Emission estimation

5.3.1 Dust

Activities associated with the Project have the potential to generate dust emissions from various activities including loading/unloading of material with excavators, sorting activities, conveying materials, screening materials, and dust lift-off (windblown dust) from hardstand areas. Movements of vehicles on the site (including excavators, forklift and trucks) may generate air emissions from the exhaust, brake wear and wheel generated dust when travelling on roads. **Table 5-3** provides a list of these activities and sources.

Dust emission estimates for the Project have been calculated by analysing the various types of dust generating activities taking place and utilising suitable emission factors sourced from both locally developed (**NPI, 2012 and 2014**) and US EPA developed documentation (**US EPA, 2011**). The estimated dust emissions for activities associated with the proposed operation are presented in **Table 5-3**. Detailed calculations of the dust emission estimates are provided in the emissions inventory **Appendix B**.

The dust emission estimates in **Table 5-3** have not taken into account the proposed dust mitigation and management measures for the Project. These dust emission estimates can be considered conservative as they would likely to be lower in reality.

Table 5-3: Estimated annual dust emission rate for the Project (kg/year)

Activity	TSP emissions	PM_{10} emissions	$PM_{2.5}$ emissions
Hauling of waste/materials (paved road)	537	103	25
Unloading of materials from truck	32	15	2
Rehandling	32	15	2
Transfer of materials to stockpile	32	15	2
Loading to hopper	32	15	2
Conveying	32	15	2
Screening	250	86	21
Sorting	32	15	2
Rehandling	32	15	2
Transfer of material to stockpile bunkers	32	15	2
Loading to trucks for export off-site	32	15	2
Hauling material off-site	537	103	25
Wind erosion of the site	1,612	806	121
Total emissions	**3,227**	**1,235**	**212**

5.3.2 Odour

As the proposed materials accepted by the site are limited to non-putrescible construction and demolition waste materials, the potential for odour emissions arising from these materials would be low.

All incoming loads will be checked prior to unloading and processing at the site, with any loads identified to be malodourous to be removed immediately from the site.

Based on the above, it is unlikely that the Project would generate any significant odour emissions or impact and therefore odour has not been considered further in this assessment.

6 DISPERSION MODELLING RESULTS

6.1 Predicted dust concentrations

Table 6-1 presents the predicted particulate dispersion modelling results at each of the assessed sensitive receptor locations. The results show minimal incremental effects would arise at the sensitive receptor locations due to the Project.

Table 6-1: Particulate dispersion modelling results for sensitive receptor – Incremental impact

Receptor ID	$PM_{2.5}$ (µg/m³)		PM_{10} (µg/m³)		TSP (µg/m³)	DD (g/m²/month)
	Incremental impact					
	24-hour average	Annual average	24-hour average	Annual average	Annual average	Annual average
	-	-	-	-	-	2
R1	0.2	0.0	1.0	0.1	0.2	0.0
R2	0.6	0.1	3.2	0.3	0.6	0.1
R3	0.6	0.1	3.1	0.3	0.7	0.1
R4	0.2	0.0	1.1	0.1	0.2	0.0
R5	0.4	0.0	2.3	0.2	0.5	0.0
Maximum	**0.6**	**0.1**	**3.2**	**0.3**	**0.7**	**0.1**

A summary of the cumulative annual average $PM_{2.5}$, PM_{10}, TSP and dust deposition levels is shown in **Table 6-2**. The predicted cumulative levels are based on applying the estimated background levels in **Section 4.3.3**. The results indicate they would be below the relevant criteria for PM_{10}, TSP and dust deposition levels at the sensitive receptor locations.

The predicted cumulative $PM_{2.5}$ levels exceed the 8µg/m^3 criterion as the applied background concentration is already above the criterion. The predicted incremental $PM_{2.5}$ impact from the Project is minimal, 0.1 µg/m^3 or 1% of the 8µg/m^3 criterion and as such the contribution from the Project is unlikely to be discernible above existing background levels.

Table 6-2: Maximum annual particulate dispersion modelling results for sensitive receptors – Cumulative impact

Pollutant	Maximum incremental impact at receptor	Background concentration	Maximum cumulative impact at receptor	Criteria	Units
$PM_{2.5}$	0.1	8.2	8.3	8	µg/m³
PM_{10}	0.3	17.6	17.9	25	µg/m³
TSP	0.7	63.4	64.1	90	µg/m³
DD	0.1	2.8	2.9	4	g/m²/month

Figure 6-1 to **Figure 6-6** present pollutant concentration isopleths showing the spatial distribution of the predicted incremental impacts associated with the operation of the Project (alone) over the modelling domain for maximum 24-hour average $PM_{2.5}$ and PM_{10}, and annual average $PM_{2.5}$, PM_{10}, TSP and deposited dust levels.

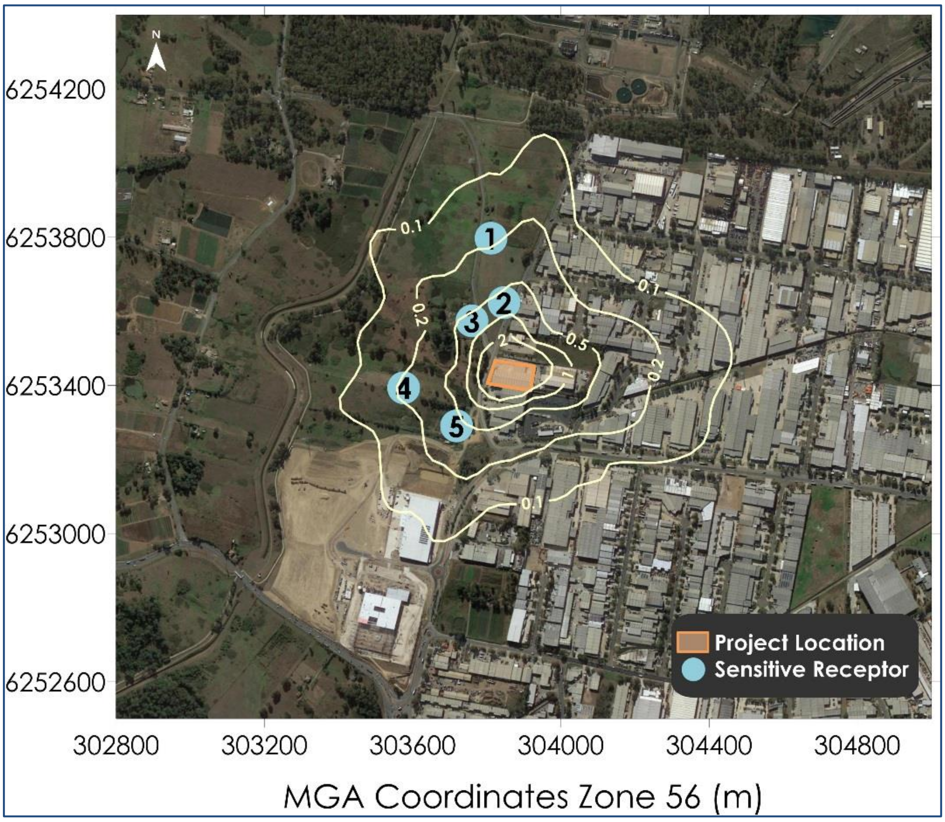

Figure 6-1: Predicted incremental maximum 24-hour average $PM_{2.5}$ concentrations (µg/m³)

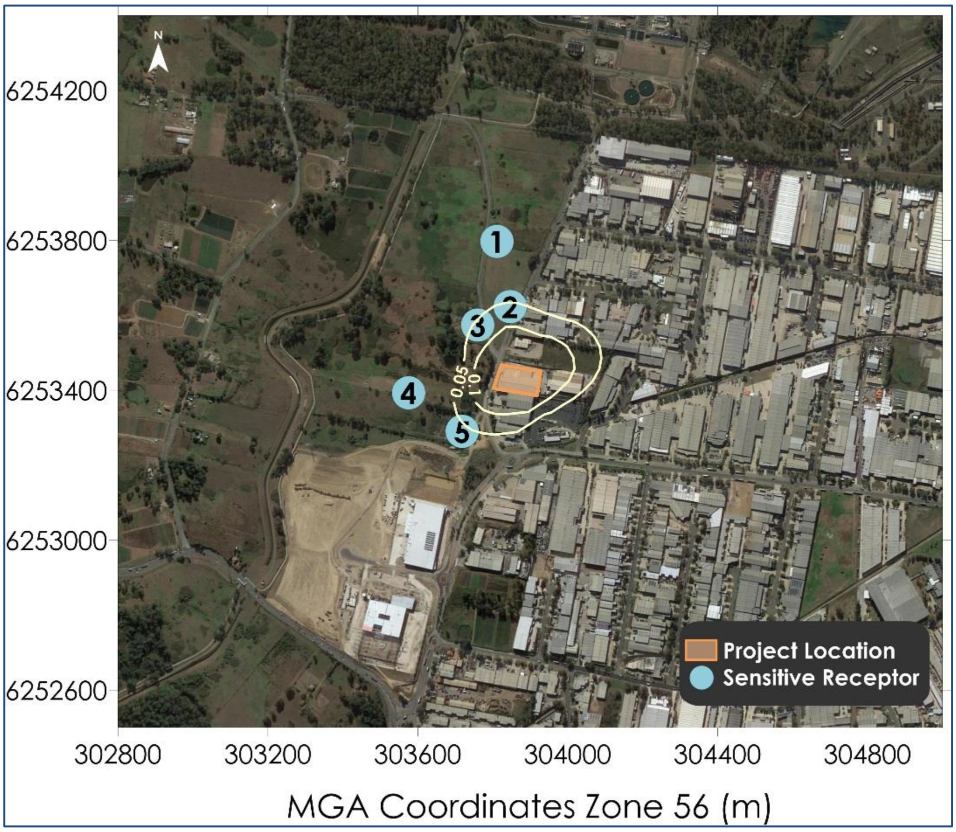

Figure 6-2: Predicted incremental annual average $PM_{2.5}$ concentrations (µg/m³)

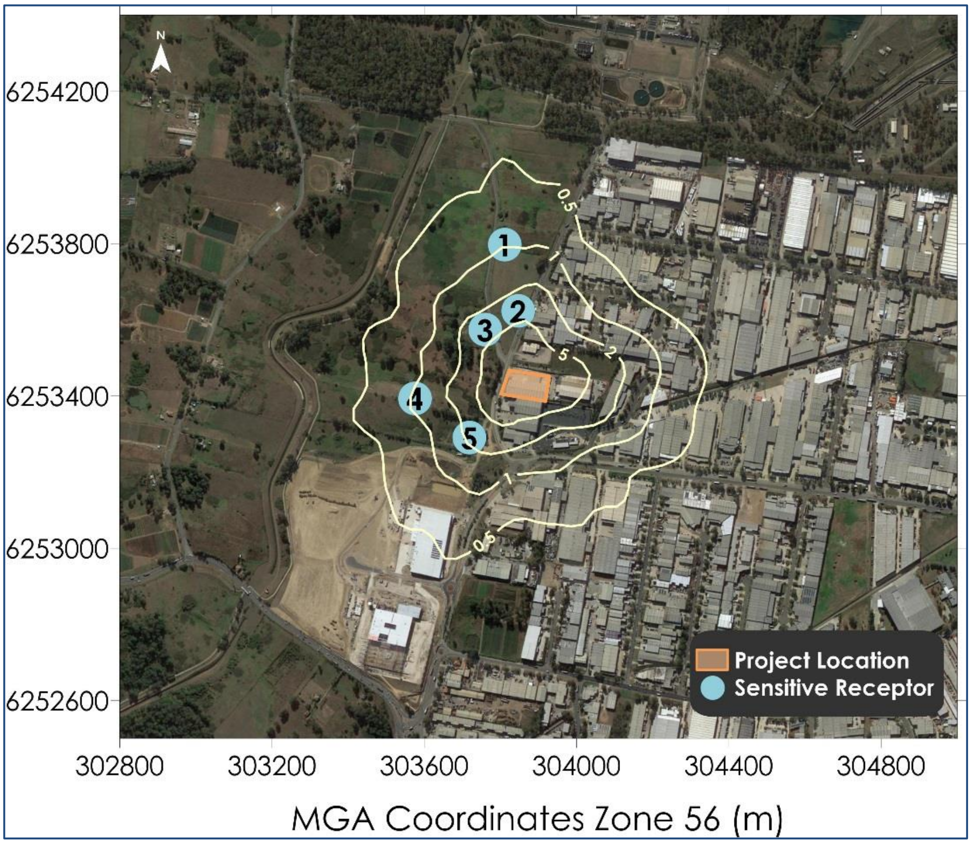

Figure 6-3: Predicted incremental maximum 24-hour average PM_{10} concentrations (µg/m³)

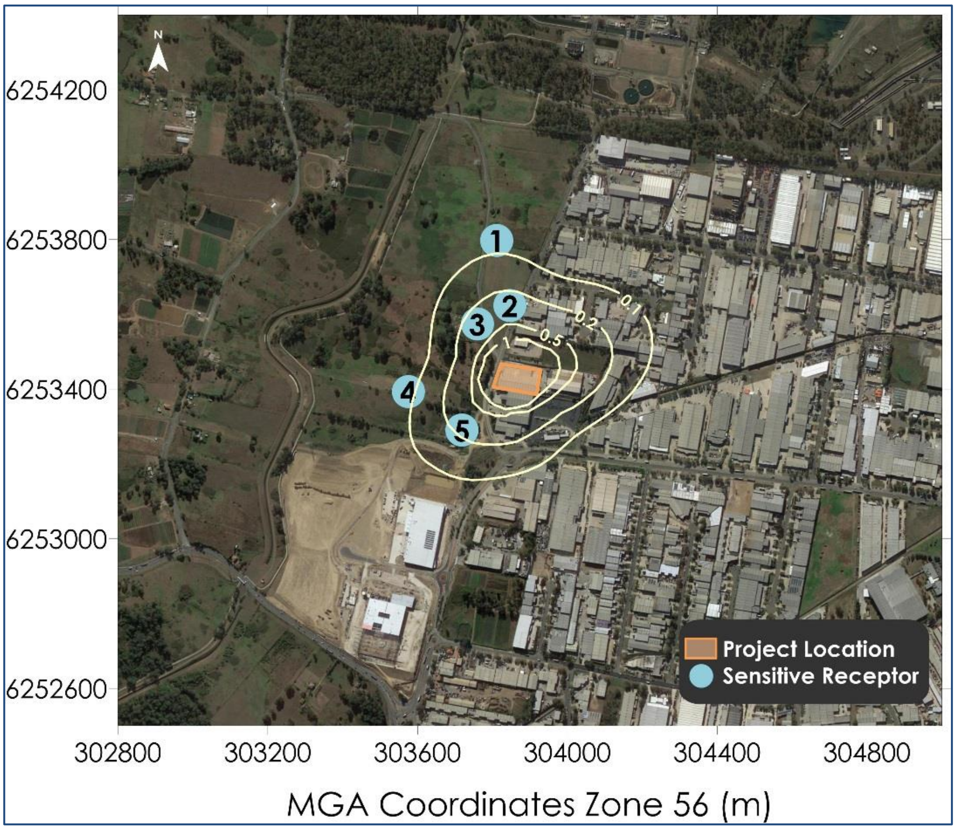

Figure 6-4: Predicted incremental annual average PM_{10} concentrations (µg/m³)

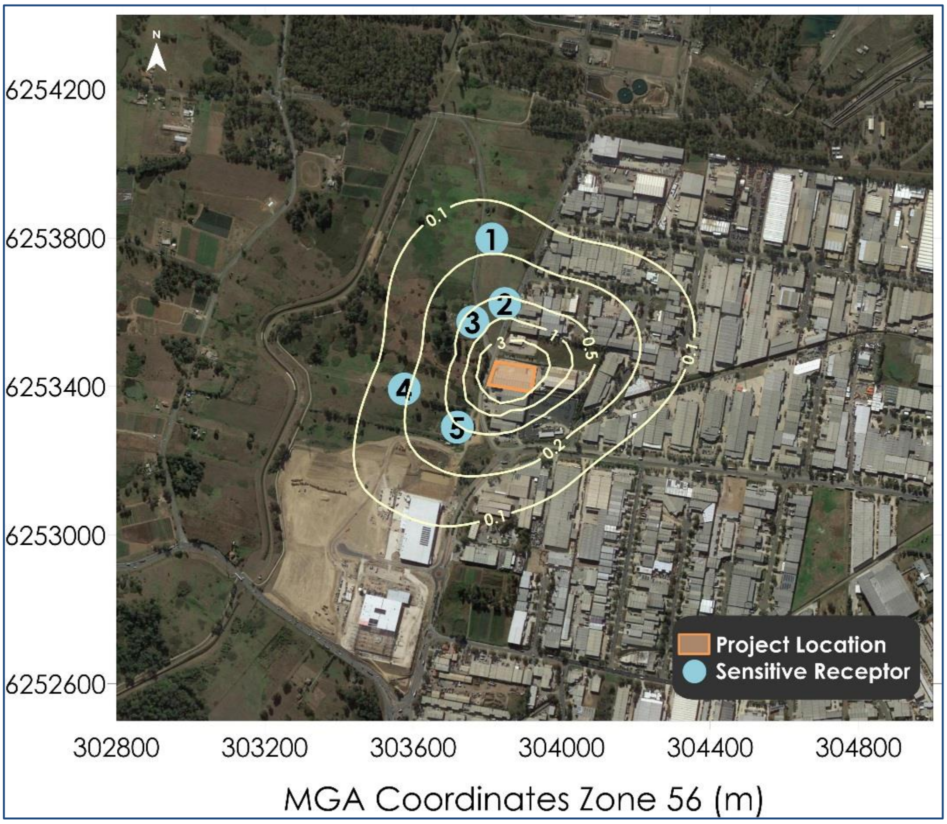

Figure 6-5: Predicted incremental annual average TSP concentrations (µg/m³)

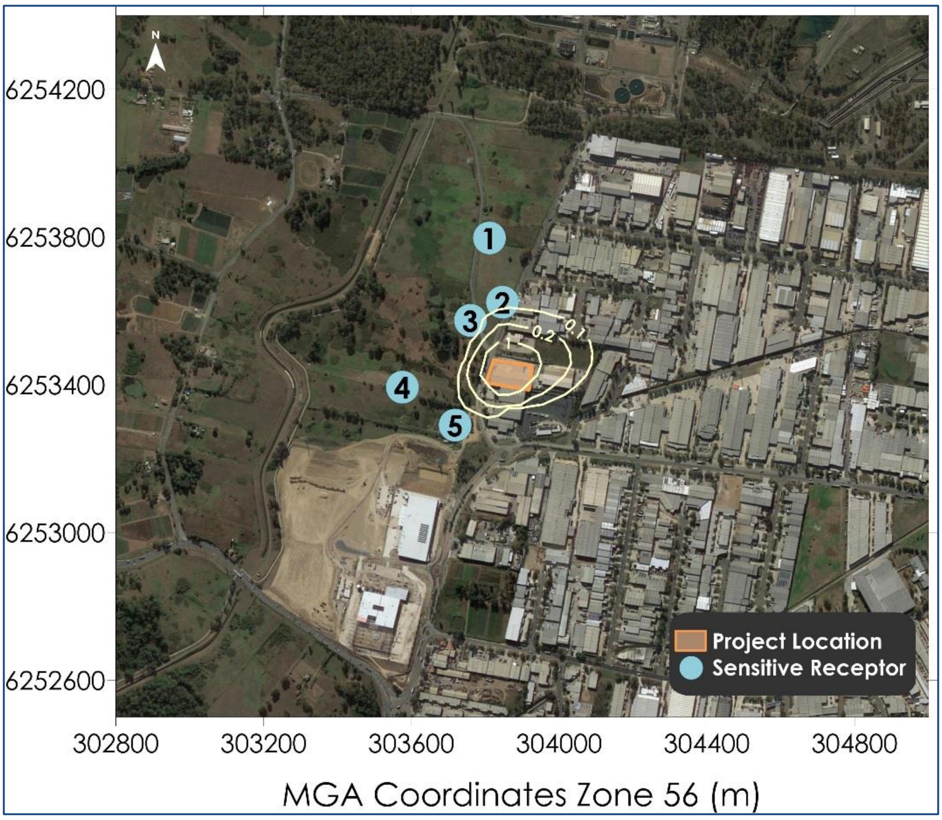

Figure 6-6: Predicted incremental annual average dust deposition levels (g/m²/month)

6.2 Assessment of Total (Cumulative) 24-hour average $PM_{2.5}$ and PM_{10} Concentrations

An assessment of total (cumulative) 24-hour average $PM_{2.5}$ and PM_{10} impacts was undertaken in accordance with the methods outlined in the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (**NSW EPA**, **2017**).

As shown in **Section 4.3** maximum background level data available for this assessment have in the past exceeded or come close to criterion level on occasion. As a result, the Level 1 NSW EPA approach of adding maximum background levels to maximum predicted levels from the Project would show levels above the criterion whether or not the Project was operating.

In such situations, the NSW EPA applies a Level 2 contemporaneous assessment approach where the measured background levels are added to the day's corresponding predicted dust level from the Project site. Ambient (background) dust concentration data corresponding with the year of modelling (2015) from the NSW OEH monitoring site at Prospect have been applied in this case to represent the prevailing background levels in the vicinity of the Project site and surrounding sensitive receptors.

Assessment of cumulative 24-hour average $PM_{2.5}$ and PM_{10} was therefore conducted per the NSW EPA Level 2 contemporaneous assessment method as outlined in the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (**NSW EPA**, **2017**) to examine the potential maximum total (cumulative) 24-hour average $PM_{2.5}$ and PM_{10} impacts for the proposed Project

Table 6-3 provides a summary of the findings from the Level 2 assessment at each assessed receptor location. The results in **Table 6-3** indicate that it is unlikely that cumulative impacts would arise at the assessed receptor locations due to the Project. Detailed tables of the full assessment results are provided in **Appendix C**.

Table 6-3: NSW EPA contemporaneous assessment – maximum number of additional days above 24-hour average criterion

Receptor ID	PM_{10}	$PM_{2.5}$
R1	0	0
R2	0	0
R3	0	0
R4	0	0
R5	0	0

7 MITIGATION MEASURES

The proposed activities at the Project site will generate dust emissions, therefore it is prudent to take reasonable and practicable measures to prevent and minimise excessive generation of dust emissions to the surrounding environment.

To ensure that dust generation during operational activities is managed and the potential for off site impacts is reduced, appropriate operational and physical mitigation measures would be utilised.

Table 7-1 summarises the potential mitigation strategies which may be employed.

Table 7-1: Dust mitigation and management options

Source	Mitigation Measure
General	Activities to be assessed during adverse weather conditions and modified as required (e.g. cease activity where reasonable levels of dust cannot be maintained using the available means)
	Engines of on-site vehicles and plant switched off when not in use
	Maintain and service vehicles according to manufacturer's specifications
Wind Erosion	Restrict handling, processing and storage activities to within the building
	Minimise the amount of material stockpiled
	Use of a sweeper vehicle in the sorting area to prevent build-up and limit potential for dusts to be tracked off site by trucks
Hauling Activities	Sealed haul roads to be cleaned regularly with sweeper vehicle
	Impose on site speed limits
	Covering vehicle loads when transporting material off site
Material Handling / Sorting Activities	Install water spray system along building ceiling to be used during sorting operations
	Close doors to sorting floor while sorting activities are undertaken

8 SUMMARY AND CONCLUSIONS

This report has assessed the potential worst-case air quality impacts associated with the proposed Pronto Bins waste recycling facility in Wetherill Park, NSW.

Air dispersion modelling using the CALPUFF model was used to predict the potential for off site air quality impacts in the surrounding area due to the operation of the Project. The estimated air emissions applied in the modelling are likely to be conservative as they have not accounted for all of the proposed dust mitigation and management measures and therefore the results of the modelling would overestimate the actual impacts.

It is predicted that all assessed air pollutants attributable to the Project would be within the applicable assessment criteria at all sensitive receivers at all times, and therefore would not lead to any unacceptable level of environmental harm or impact in the surrounding area.

Nevertheless, the site would apply appropriate air quality management measures to ensure it minimises the potential occurrence of excessive air emissions from the site.

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

9 REFERENCES

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"Generic Guidance and Optimum Model Settings for the CALPUFF Modeling System for Inclusion into the Approved Methods for the Modeling and Assessments of Air Pollutants in NSW, Australia", Prepared for the NSW Office of Environment and Heritage by TRC Environmental Corporation.

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Appendix A

Selection of meteorological year

Selection of meteorological year

The 2015 calendar year has been selected as the meteorological year for the dispersion modelling based on an analysis of long-term data trends in the recorded meteorological data and wind patterns which reflect those patterns experienced in other years.

A statistical analysis of long-term meteorological data from the nearest BoM weather station with suitable available data, Horsley Park Equestrian Centre AWS, is presented in **Table A-1**. The standard deviation of five years of meteorological data spanning 2012 to 2016 was analysed against the long-term measured wind speed, temperature and relative humidity spanning an approximate 13-year period recorded at the station.

The analysis indicates that 2013 is closest to the long-term average for wind speed. 2014 and 2015 are the closest to the long-term average for temperature and 2015 is closest for relative humidity.

Therefore, based on this analysis it was determined that 2015 is generally representative of the long-term trends compared to other years and is thus suitable for the purpose of modelling.

Table A-1: Statistical analysis results of standard deviation from long-term meteorological data at Horsley Park Equestrian Centre AWS

Year	Wind speed	Temperature	Relative humidity
2012	1.0	1.2	3.3
2013	0.9	1.0	3.6
2014	1.0	0.9	3.2
2015	1.1	0.9	2.7
2016	1.0	1.0	4.3

Annual and seasonal windroses prepared from data collected for the 2015 calendar year are presented in **Figure A-1**.

On an annual basis winds from the southwest are predominant, with other winds spread across all directions. Low winds appear to predominantly occur from the north-western quadrant and south-westerly directions.

During summer, winds are predominantly distributed between the east-northeast to the southwest. The autumn wind distribution is similar to the annual pattern, typically dominated by winds from the southwest. In winter the distribution shows winds predominately occur from the southwest and west-southwest. The spring wind distribution is similar to the annual but with reduced frequency from the southwest.

A five year annual and seasonal windrose for the Horsley Park Equestrian Centre AWS spanning 2012 to 2016 is presented in **Figure A-2**. The windrose indicates little variation when compared to the individual year presented in **Figure A-1** for the 2015 period. This further suggests that the 2015 calendar year is representative of the available data and is a suitable period for modelling.

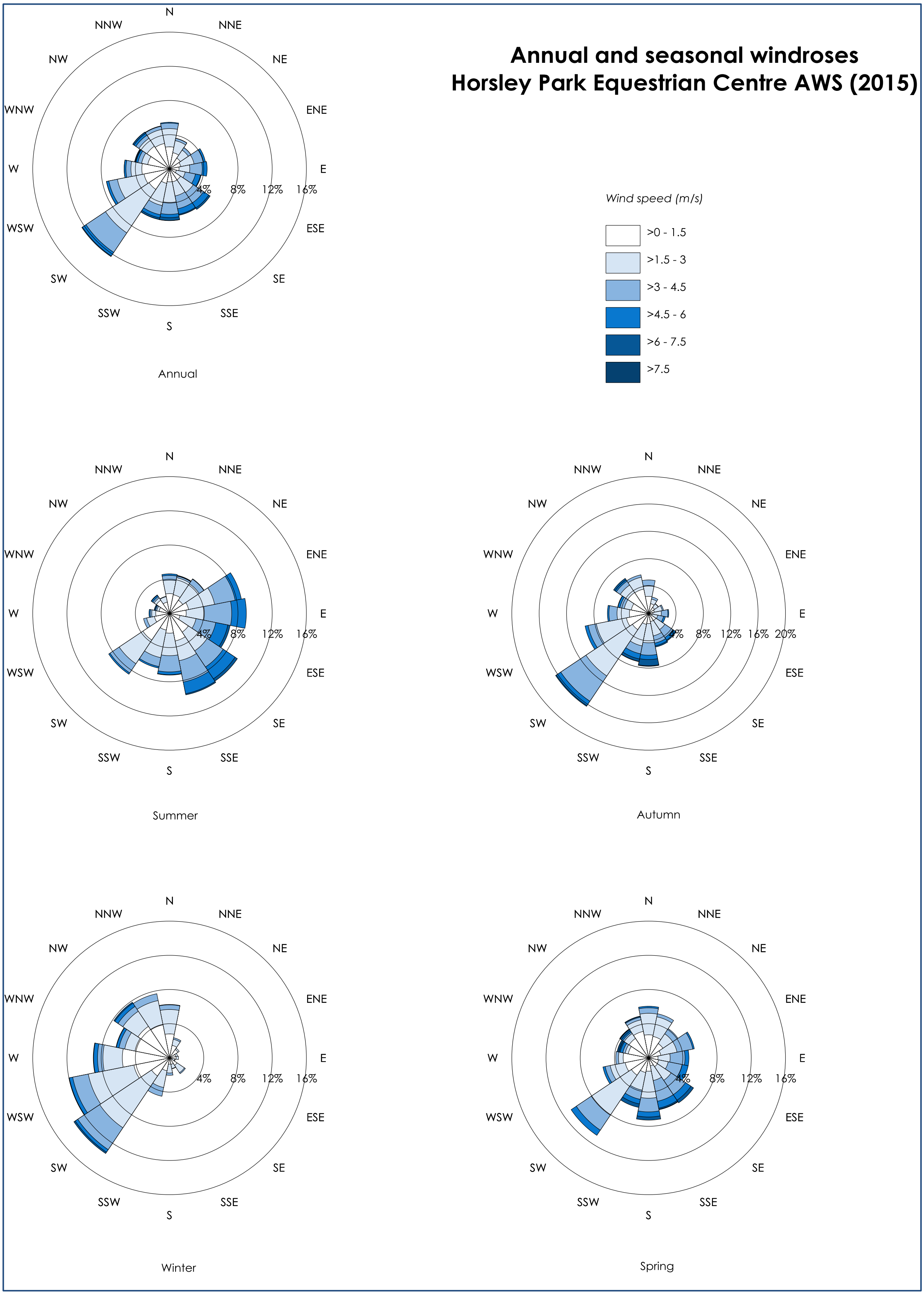

Figure A-1: Annual and seasonal windroses for Horsley Park Equestrian Centre AWS (2015)

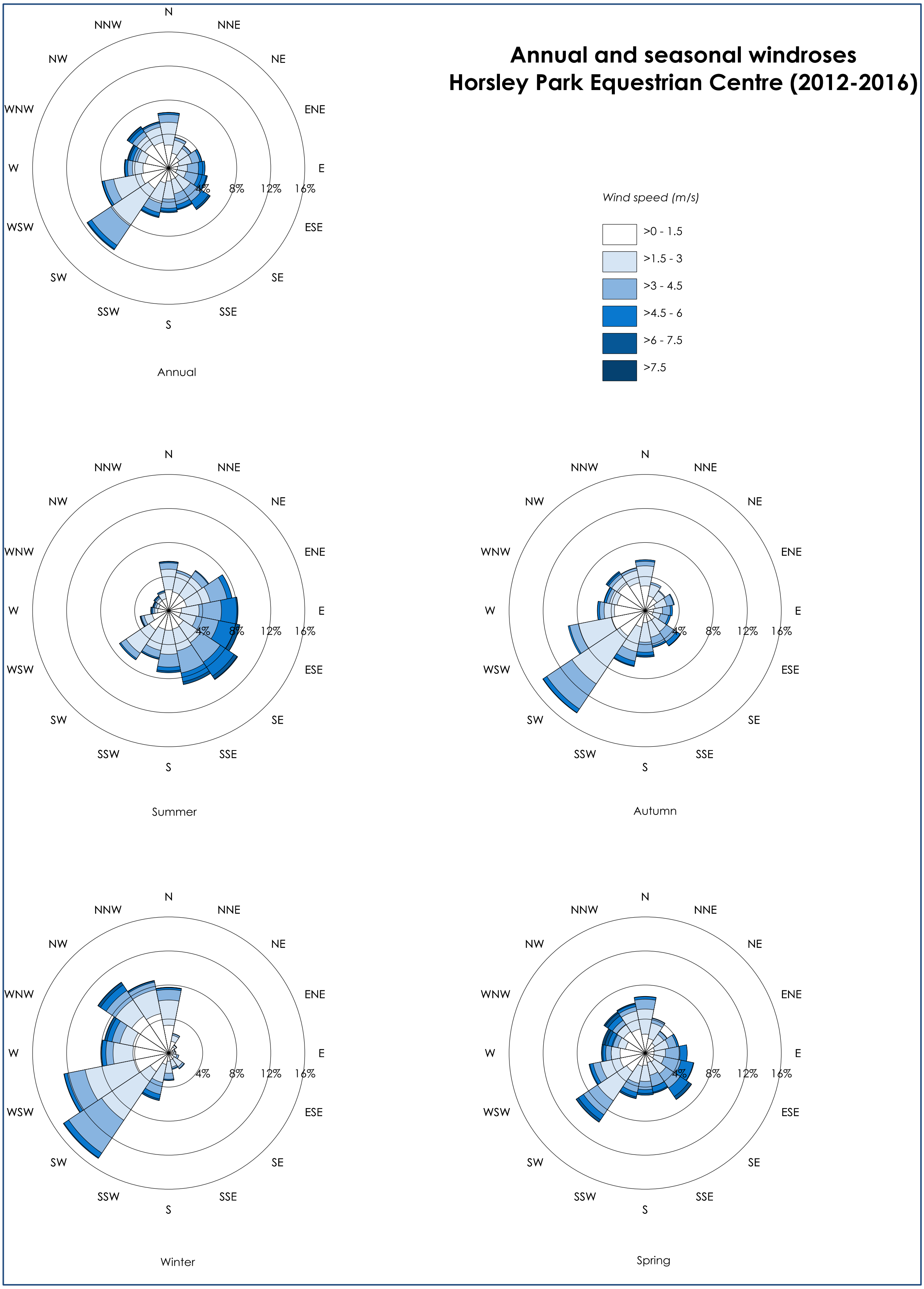

Figure A-2: Annual and seasonal windroses for Horsley Park Equestrian Centre AWS (2012-2016)

Appendix B

Emissions Inventory

Proposed Waste Management Facility

The dust emissions from the Project have been estimated from the operational description of the proposed activities provided by the Proponent and have been combined with emissions factor equations that relate to the quantity of dust emitted from particular activities based on intensity, the prevailing meteorological conditions and composition of the material being handled.

Emission factors and associated controls have been sourced from the National Pollutant Inventory Emission Estimation Technique Manuals (**NPI 2012** and **NPI 2014**) and US EPA AP42 Emission Factors (**US EPA, 2011**)

Table B-1: Emission factor equations

Activity	Emission factor equation	Variable
Material handling	$EF_{TSP} = k \times 0.0016 \times \left(\frac{U}{2.2}^{1.3} / \frac{M}{2}^{1.4}\right) kg/tonne$	K_{tsp} = 0.74 U = wind speed (m/s) M = moisture content (%)
Hauling on sealed surfaces	$EF_{TSP} = k \times (sL)^{0.91} \times (W)^{1.02} kg/VKT$	k_{TSP} = 3.23 (g/VKT) sL = road surface silt loading (g/m²) W = average weight of vehicles (tons)
Wind erosion	$EF_{TSP} = 0.4\, kg/ha\,/hour$	-
Screening	$EF_{TSP} = 0.0125$ kg/tonne	-

Table B-2: Emissions Inventory

Activity	TSP emission (kg/y)	PM10 emission (kg/y)	PM25 emission (kg/y)	Intensity	Units	Emission Factor TSP	Emission Factor PM10	Emission Factor PM25	Units	Variable 1	Units	Variable 2	Units	Variable 3	Units	Variable 4 - TSP	Variable 4 - PM10	Variable 4 - PM25	Units	Variable 5	Units
Hauling of waste/ materials (paved road)	537	103	25	20,000	tonnes / year	0.0269	0.0052	0.0012	kg/t	2	tonnes/load	15	Vehicle gross (tonnes)	0.2	km/return trip	0.316	0.061	0.015	kg/VKT	7	road surface silt loading (g/m²)
Unloading of materials from truck	32	15	2	20,000	tonnes / year	0.0016	0.0008	0.0001	kg/t	1.36	average of (wind speed/2.2)^1.3 in m/s	2	moisture content in %								
Rehandling	32	15	2	20,000	tonnes / year	0.0016	0.0008	0.0001	kg/t	1.36	average of (wind speed/2.2)^1.3 in m/s	2	moisture content in %								
Transfer of material to stockpiles	32	15	2	20,000	tonnes / year	0.0016	0.0008	0.0001	kg/t	1.36	average of (wind speed/2.2)^1.3 in m/s	2	moisture content in %								
Loading to hopper	32	15	2	20,000	tonnes / year	0.0016	0.0008	0.0001	kg/t	1.36	average of (wind speed/2.2)^1.3 in m/s	2	moisture content in %								
Conveying	32	15	2	20,000	tonnes / year	0.0016	0.0008	0.0001	kg/t	1.36	average of (wind speed/2.2)^1.3 in m/s	2	moisture content in %								
Screening	250	86	21	20,000	tonnes / year	0.0125	0.0043	0.0010	kg/t												
Sorting	32	15	2	20,000	tonnes / year	0.0016	0.0008	0.0001	kg/t	1.36	average of (wind speed/2.2)^1.3 in m/s	2	moisture content in %								
Rehandling	32	15	2	20,000	tonnes / year	0.0016	0.0008	0.0001	kg/t	1.36	average of (wind speed/2.2)^1.3 in m/s	2	moisture content in %								
Unload materials to stockpile bunkers	32	15	2	20,000	tonnes / year	0.0016	0.0008	0.0001	kg/t	1.36	average of (wind speed/2.2)^1.3 in m/s	2	moisture content in %								
Loading to trucks for export off-site	32	15	2	20,000	tonnes / year	0.0016	0.0008	0.0001	kg/t	1.36	average of (wind speed/2.2)^1.3 in m/s	2	moisture content in %								
Hauling material off-site	537	103	25	20,000	tonnes / year	0.0269	0.0052	0.0012	kg/t	2	tonnes/load	15	Vehicle gross (tonnes)	0.2	km/return trip	0.316	0.061	0.015	kg/VKT	7	road surface silt loading (g/m²)
Wind Erosion	1,612	806	121	0.5	ha	0.4	0.2	0.03	kg/ha/hour	8760	hours										
Total	**3,227**																				

Appendix C

Contemporaneous 24-hour PM_{10} and $PM_{2.5}$ assessment

Table C-1: 24-hour average PM_{10} concentration – Sensitive receptor location R1

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
06/05/2015	68.7	0.0	**68.7**	-	-	-	-
27/11/2015	48	0.1	48.1	02/05/2015	12.3	1.0	13.3
26/11/2015	45.1	0.0	45.1	12/01/2015	10.1	0.8	10.9
07/10/2015	38.5	0.1	38.6	28/01/2015	7.9	0.7	8.6
17/10/2015	35.3	0.1	35.4	27/10/2015	16.8	0.7	17.5
14/12/2015	34.7	0.0	34.7	01/05/2015	9.9	0.6	10.5
12/12/2015	34.3	0.1	34.4	13/03/2015	19.9	0.6	20.5
15/12/2015	33.4	0.0	33.4	02/02/2015	18.1	0.6	18.7
20/11/2015	32.9	0.0	32.9	03/11/2015	12.3	0.6	12.9
23/11/2015	31.7	0.1	31.8	03/04/2015	18.4	0.6	19.0
09/02/2015	31.5	0.1	31.6	22/10/2015	11.3	0.5	11.8

Table C-2: 24-hour average PM_{10} concentration – Sensitive receptor location R2

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
06/05/2015	68.7	0.0	**68.7**	-	-	-	-
27/11/2015	48	0.3	48.3	21/04/2015	ND	3.2	3.2
26/11/2015	45.1	0.0	45.1	20/04/2015	ND	2.7	2.7
07/10/2015	38.5	0.6	39.1	02/05/2015	12.3	2.6	14.9
17/10/2015	35.3	0.4	35.7	28/01/2015	7.9	2.6	10.5
14/12/2015	34.7	0.0	34.7	27/10/2015	16.8	2.2	19.0
12/12/2015	34.3	0.5	34.8	22/10/2015	11.3	2.1	13.4
15/12/2015	33.4	0.0	33.4	12/01/2015	10.1	1.9	12.0
20/11/2015	32.9	0.1	33.0	25/09/2015	12	1.9	13.9
23/11/2015	31.7	0.4	32.1	03/04/2015	18.4	1.7	20.1
09/02/2015	31.5	0.3	31.8	26/09/2015	8.3	1.7	10.0

ND – No data

Table C-3: 24-hour average PM_{10} concentration – Sensitive receptor location R3

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
06/05/2015	68.7	0.0	**68.7**	-	-	-	-
27/11/2015	48	0.1	48.1	07/10/2015	38.5	3.1	41.6
26/11/2015	45.1	0.0	45.1	24/08/2015	10.1	2.7	12.8
07/10/2015	38.5	3.1	41.6	27/10/2015	16.8	2.6	19.4
17/10/2015	35.3	0.6	35.9	14/11/2015	11.5	2.6	14.1
14/12/2015	34.7	0.0	34.7	04/04/2015	8.5	2.5	11.0
12/12/2015	34.3	0.4	34.7	15/11/2015	12.9	2.2	15.1
15/12/2015	33.4	0.1	33.5	22/12/2015	11.3	2.2	13.5
20/11/2015	32.9	0.0	32.9	27/01/2015	6.6	2.2	8.8
23/11/2015	31.7	0.3	32.0	13/10/2015	17	2.1	19.1
09/02/2015	31.5	1.7	33.2	11/01/2015	6	2.0	8.0

Table C-4: 24-hour average PM_{10} concentration – Sensitive receptor location R4

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
06/05/2015	68.7	0.0	**68.7**	-	-	-	-
27/11/2015	48	0.2	48.2	07/12/2015	14.5	1.1	15.6
26/11/2015	45.1	0.0	45.1	20/01/2015	13.4	1.0	14.4
07/10/2015	38.5	0.0	38.5	05/01/2015	25.8	0.8	26.6
17/10/2015	35.3	0.0	35.3	02/01/2015	26.7	0.8	27.5
14/12/2015	34.7	0.2	34.9	21/01/2015	ND	0.7	0.7
12/12/2015	34.3	0.2	34.5	06/01/2015	15.3	0.7	16.0
15/12/2015	33.4	0.5	33.9	01/01/2015	24.1	0.7	24.8
20/11/2015	32.9	0.0	32.9	10/02/2015	23.7	0.6	24.3
23/11/2015	31.7	0.0	31.7	18/10/2015	26.7	0.6	27.3
09/02/2015	31.5	0.0	31.5	31/03/2015	11.6	0.6	12.2

ND – No data

Table C-5: 24-hour average PM_{10} concentration – Sensitive receptor location R5

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
06/05/2015	68.7	0.0	**68.7**	-	-	-	-
27/11/2015	48	0.0	48.0	31/10/2015	17.8	2.3	20.1
26/11/2015	45.1	0.0	45.1	09/01/2015	22.7	2.0	24.7
07/10/2015	38.5	0.0	38.5	05/11/2015	9.8	1.8	11.6
17/10/2015	35.3	0.0	35.3	16/02/2015	16.3	1.7	18.0
14/12/2015	34.7	0.3	35.0	03/01/2015	15.7	1.6	17.3
12/12/2015	34.3	0.0	34.3	08/01/2015	17.1	1.6	18.7
15/12/2015	33.4	0.1	33.5	13/12/2015	26.5	1.4	27.9
20/11/2015	32.9	0.1	33.0	09/10/2015	26.2	1.4	27.6
23/11/2015	31.7	0.0	31.7	17/03/2015	18.5	1.3	19.8
09/02/2015	31.5	0.0	31.5	11/02/2015	13.1	1.3	14.4

Table C-6: 24-hour average $PM_{2.5}$ concentration – Sensitive receptor location R1

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
28/06/2015	29.6	0.1	**29.7**	-	-	-	-
05/07/2015	24.9	0.0	24.9	02/05/2015	1.9	0.2	2.1
04/07/2015	21.5	0.0	21.5	27/10/2015	5	0.2	5.2
07/06/2015	21.2	0.0	21.2	28/01/2015	4.6	0.2	4.8
21/08/2015	20.5	0.0	20.5	12/01/2015	4.2	0.1	4.3
25/05/2015	20.1	0.0	20.1	21/04/2015	3.7	0.1	3.8
14/06/2015	19.3	0.0	19.3	01/05/2015	2.5	0.1	2.6
09/07/2015	18.4	0.0	18.4	22/10/2015	5.3	0.1	5.4
27/06/2015	17.1	0.0	17.1	13/03/2015	11	0.1	11.1
07/10/2015	17.1	0.0	17.1	02/02/2015	5.5	0.1	5.6
06/06/2015	16.9	0.0	16.9	16/05/2015	6.1	0.1	6.2

Table C-7: 24-hour average $PM_{2.5}$ concentration – Sensitive receptor location R2

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
28/06/2015	29.6	0.2	**29.8**	-	-	-	-
05/07/2015	24.9	0.0	24.9	21/04/2015	3.7	0.6	4.3
04/07/2015	21.5	0.0	21.5	20/04/2015	1.2	0.5	1.7
07/06/2015	21.2	0.0	21.2	28/01/2015	4.6	0.5	5.1
21/08/2015	20.5	0.0	20.5	02/05/2015	1.9	0.5	2.4
25/05/2015	20.1	0.0	20.1	27/10/2015	5	0.5	5.5
14/06/2015	19.3	0.0	19.3	22/10/2015	5.3	0.4	5.7
09/07/2015	18.4	0.0	18.4	25/09/2015	ND	0.4	0.4
27/06/2015	17.1	0.0	17.1	12/01/2015	4.2	0.4	4.6
07/10/2015	17.1	0.1	17.2	26/09/2015	4.9	0.3	5.2
06/06/2015	16.9	0.0	16.9	27/12/2015	6.4	0.3	6.7

ND – No data

Table C-8: 24-hour average $PM_{2.5}$ concentration – Sensitive receptor location R3

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
28/06/2015	29.6	0.0	**29.6**	-	-	-	-
05/07/2015	24.9	0.0	24.9	07/10/2015	17.1	0.6	17.7
04/07/2015	21.5	0.0	21.5	27/10/2015	5	0.5	5.5
07/06/2015	21.2	0.0	21.2	24/08/2015	5.4	0.5	5.9
21/08/2015	20.5	0.0	20.5	04/04/2015	3.2	0.5	3.7
25/05/2015	20.1	0.0	20.1	14/11/2015	3.5	0.4	3.9
14/06/2015	19.3	0.1	19.4	15/11/2015	3.6	0.4	4.0
09/07/2015	18.4	0.0	18.4	22/12/2015	4.6	0.4	5.0
27/06/2015	17.1	0.0	17.1	27/01/2015	4.2	0.4	4.6
07/10/2015	17.1	0.6	17.7	13/10/2015	ND	0.4	0.4
06/06/2015	16.9	0.0	16.9	11/01/2015	2.8	0.4	3.2

ND – No data

Table C-9: 24-hour average $PM_{2.5}$ concentration – Sensitive receptor location R4

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
28/06/2015	29.6	0.0	**29.6**	-	-	-	-
05/07/2015	24.9	0.0	24.9	07/12/2015	4.5	0.2	4.7
04/07/2015	21.5	0.0	21.5	20/01/2015	6.4	0.2	6.6
07/06/2015	21.2	0.0	21.2	02/01/2015	10	0.2	10.2
21/08/2015	20.5	0.0	20.5	05/01/2015	9.3	0.2	9.5
25/05/2015	20.1	0.0	20.1	06/01/2015	7.1	0.1	7.2
14/06/2015	19.3	0.0	19.3	01/01/2015	9.3	0.1	9.4
09/07/2015	18.4	0.0	18.4	21/01/2015	ND	0.1	0.1
27/06/2015	17.1	0.0	17.1	31/03/2015	7.3	0.1	7.4
07/10/2015	17.1	0.0	17.1	07/01/2015	4.7	0.1	4.8
06/06/2015	16.9	0.0	16.9	06/12/2015	5	0.1	5.1

ND – No data

Table C-10: 24-hour average $PM_{2.5}$ concentration – Sensitive receptor location R5

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
28/06/2015	29.6	0.0	**29.6**	-	-	-	-
05/07/2015	24.9	0.0	24.9	31/10/2015	5.9	0.4	6.3
04/07/2015	21.5	0.0	21.5	09/01/2015	ND	0.4	0.4
07/06/2015	21.2	0.0	21.2	05/11/2015	4.5	0.3	4.8
21/08/2015	20.5	0.1	20.6	03/01/2015	8.3	0.3	8.6
25/05/2015	20.1	0.1	20.2	16/02/2015	7.3	0.3	7.6
14/06/2015	19.3	0.0	19.3	08/01/2015	6	0.3	6.3
09/07/2015	18.4	0.2	18.6	13/12/2015	6.5	0.3	6.8
27/06/2015	17.1	0.0	17.1	12/11/2015	4.4	0.3	4.7
07/10/2015	17.1	0.0	17.1	09/10/2015	7.2	0.2	7.4
06/06/2015	16.9	0.0	16.9	17/03/2015	5.7	0.2	5.9

ND – No data