AIR QUALITY IMPACT ASSESSMENT
TYREX SMITHFIELD

Tyrex Australia Pty Ltd

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Job Number 23051588

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1 INTRODUCTION

Todoroski Air Sciences has prepared this report to support a development application by Mod Urban Pty Ltd on behalf of Tyrex Australia Pty Ltd (Tyrex) for a proposed tyre recycling facility at 68-70 Victoria Street, Smithfield, New South Wales (NSW) (hereafter referred to as the Project).

The proposed operations include the receival, consolidation and onforwarding of tyres for shredding and crumbing which would all occur within an industrial warehouse. The tyres are processed at an annual production rate of approximately 30,000 tonnes per annum (tpa) with between approximately 260tpa to 520tpa of thin wire collected from the tyres during processing.

The report presents an assessment of potential air quality impacts associated with the Project. This air quality impact assessment has been prepared in general accordance with the New South Wales (NSW) Environment Protection Authority (EPA) document *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (**NSW EPA, 2022**).

To assess the potential air quality impacts associated with the Project, this report comprises:

- A background to the Project and description of the proposed site and operations;
- A review of the existing meteorological and air quality environment surrounding the site;
- A description of the dispersion modelling approach and emission estimations used to assess potential air quality impacts; and,
- Presentation of the predicted results and discussion of the potential air quality impacts and associated mitigation and management measures.

2 PROJECT SETTING AND DESCRIPTION

2.1 Project setting

The Project site is located at 68-70 Victoria Street, Smithfield, approximately 1.4 kilometres (km) north of Fairfield Heights and approximately 7.1km southwest of Parramatta. The immediate area surrounding the Project site is predominantly comprised of industrial operations with the closest residential receptor located approximately 0.25km south of the Project.

Figure 2-1 presents the location of the Project with reference to the residential and industrial receptor locations considered in this assessment. **Table 2-1** identifies the approximate address for each of the assessment locations. These locations represent the nearest locations likely to experience any air quality effects due to the Project.

Table 2-1: Assessment locations

Assessment location ID	Address	Type
R1	118B Oxford Street	Residential
R2	718A The Horsley Drive	Residential
R3	110 Victoria Street	Residential
IND1	78 Victoria Street	Industrial
IND2	66 Victoria Street	Industrial

Figure 2-2 presents a pseudo three-dimensional visualisation of the topography in the general vicinity of the Project. The local topography is gently undulating with elevation increasing to the northwest of the site.

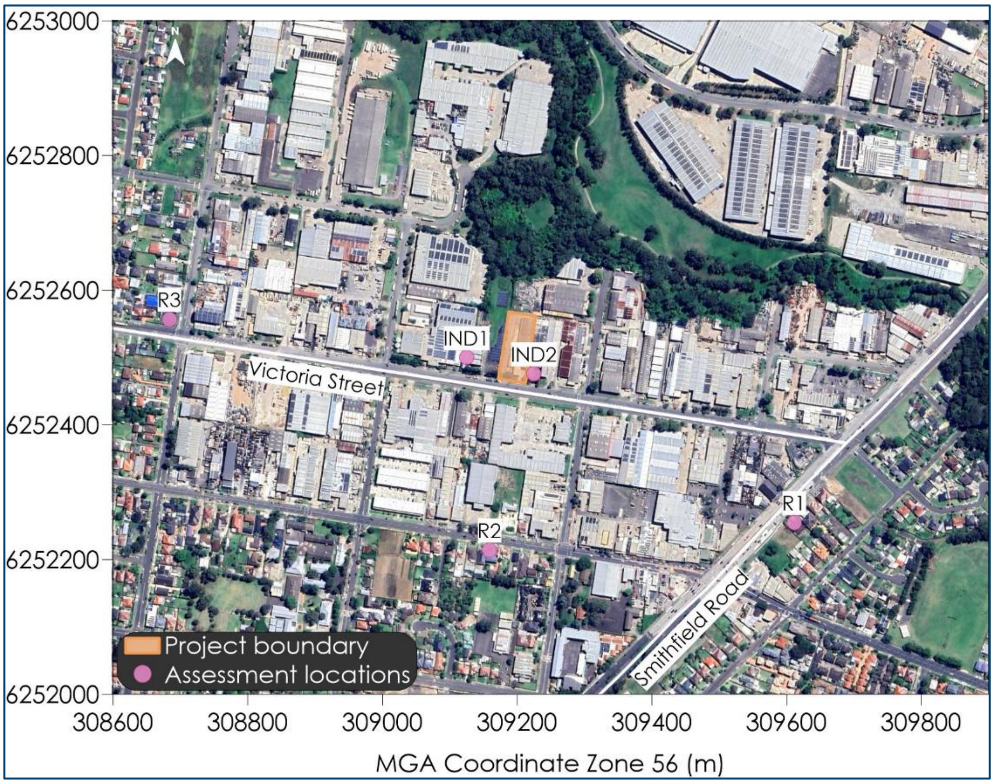

Figure 2-1: Project setting

Figure 2-2: Representative visualisation of topography in the area surrounding the Project

2.2 Project description

The Project involves processing approximately 20,000tpa of primarily heavy truck and bus tyres, followed by light truck and passenger vehicle tyres up to 50 millimetres (mm) to 150mm diameter pieces through a shredding operation. The shredded material will be reduced further in size to approximately 0.6mm in diameter via the crumbing process.

The activities at the Project would largely be contained within the northern section of the existing warehouse building, which has capacity to house new plant and equipment infrastructure to process the proposed material.

Table 2-2 presents the proposed operating hours per activity for the Project. Tyre processing activities (such as shredding and crumbing) would occur across two shifts with site cleaning, preparation and maintenance would occur during shift 3.

Table 2-2: Proposed operating hours

Activity	Shift	Time
Tyre processing	1	6:00am-3:00pm
	2	3:00pm-12:00am
Site cleaning, preparation and maintenance	3	12:00am-6:00am

Figure 2-3 provides an indicative layout of the Project site.

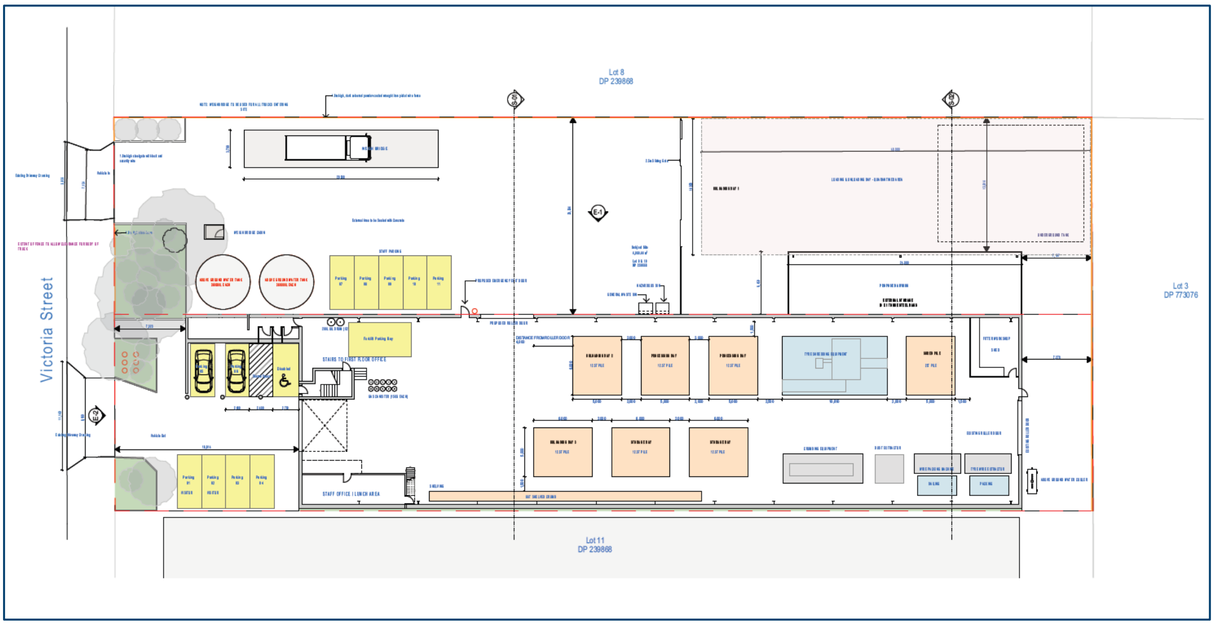

Figure 2-3: Indicative Project layout

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.

3.1 Particulate matter

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, 2022**).

The air quality goals for key pollutants relate to the total pollutant burden in the air and not just the contribution from the Project. Consideration of background pollutant levels needs to be made when using these goals to assess potential impacts.

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

Pollutant	Averaging Period	Criterion	Assessment location
TSP	Annual	90 µg/m³	Receptor
PM_{10}	Annual	25 µg/m³	Receptor
	24 hour	50 µg/m³	Receptor
$PM_{2.5}$	Annual	8 µg/m³	Receptor
	24 hour	25 µg/m³	Receptor
Deposited dust	Annual	2 g/m²/month	Receptor
		4 g/m²/month	Receptor

Source: **NSW EPA, 2022**
µg/m³ = micrograms per cubic metre
g/m²/month = grams per square metre per month

3.2 Other air pollutants

Emissions of other air pollutants will also potentially arise from operations and equipment used on-site. Emissions from diesel powered equipment generally include carbon monoxide (CO), nitrogen dioxide (NO_2) and other pollutants, such as sulphur dioxide (SO_2). The amount of CO, NO_2 and SO_2 emissions generated from diesel powered equipment at the Project site is generally considered to be too low to generate any significant off-site pollutant concentrations and have not been assessed further in this study.

Odour has a low potential for generation from the process as the material is not being thermally treated. The processing of the material would all occur within the warehouse enclosure which would mitigate any odour generated. The potential for any off-site odour impacts is therefore not considered significant to cause any off-site impacts and have not been assessed further in this study.

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 closest Bureau of Meteorology (BoM) weather station at Horsley Park Equestrian Centre AWS (Site No. 067119) were analysed to characterise the local climate in the proximity of the Project. Horsley Park Equestrian Centre AWS is located approximately 7.5km west of the Project.

Table 4-1 and **Figure 4-1** present a summary of data from the Horsley Park Equestrian Centre AWS collected over a 19-to-33-year period for the various meteorological parameters.

The data indicate that January is the hottest month with a mean maximum temperature of 29.9 degrees Celsius (ºC) and July is the coldest month with a mean minimum temperature of 5.9ºC.

Rainfall decreases during the second half of the year, with an annual average rainfall of 780.3 millimetres (mm) over 77.0 days. The data indicate that February is the wettest month with an average rainfall of 123.2mm over 7.5 days and August is the driest month with an average rainfall of 38.0mm over 4.0 days.

Relative humidity levels exhibit variability over the day and seasonal fluctuations. Mean 9am relative humidity ranges from 61% in October to 81% in March. Mean 3pm relative humidity levels range from 42% in August and September to 55% in June.

Wind speeds exhibit seasonal variations with a greater spread between 9am and 3pm conditions in the warmer months. 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. temp. (ºC)	29.9	28.6	26.7	23.9	20.6	17.6	17.4	19.1	22.3	24.7	26.3	28.3	23.8
Mean min. temp. (ºC)	17.9	17.8	16.1	12.9	9.1	7.1	5.9	6.4	9.3	11.9	14.3	16.1	12.1
Rainfall													
Rainfall (mm)	75.2	123.2	94.5	69.2	44.7	68.6	53.0	38.0	38.3	64.3	77.4	64.2	780.3
No. of rain days (≥1mm)	7.9	7.5	8.9	6.7	5.2	6.1	5.5	4.0	5.0	6.1	7.0	7.1	77.0
9am conditions													
Mean temp. (ºC)	22.0	21.5	19.4	17.5	13.8	11.1	10.3	12.0	15.6	18.1	19.2	20.9	16.8
Mean R.H. (%)	73.0	77.0	81.0	76.0	77.0	80.0	78.0	70.0	65.0	61.0	70.0	71.0	73.0
Mean W.S. (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 temp. (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 R.H. (%)	49.0	53.0	54.0	53.0	52.0	55.0	50.0	42.0	42.0	45.0	50.0	48.0	49.0
Mean W.S. (km/h)	19.4	17.0	14.8	14.4	13.0	12.9	13.9	16.1	18.1	19.8	19.5	19.9	16.6

Source: **Bureau of Meteorology, 2023**

R.H. – Relative Humidity, W.S. – wind speed

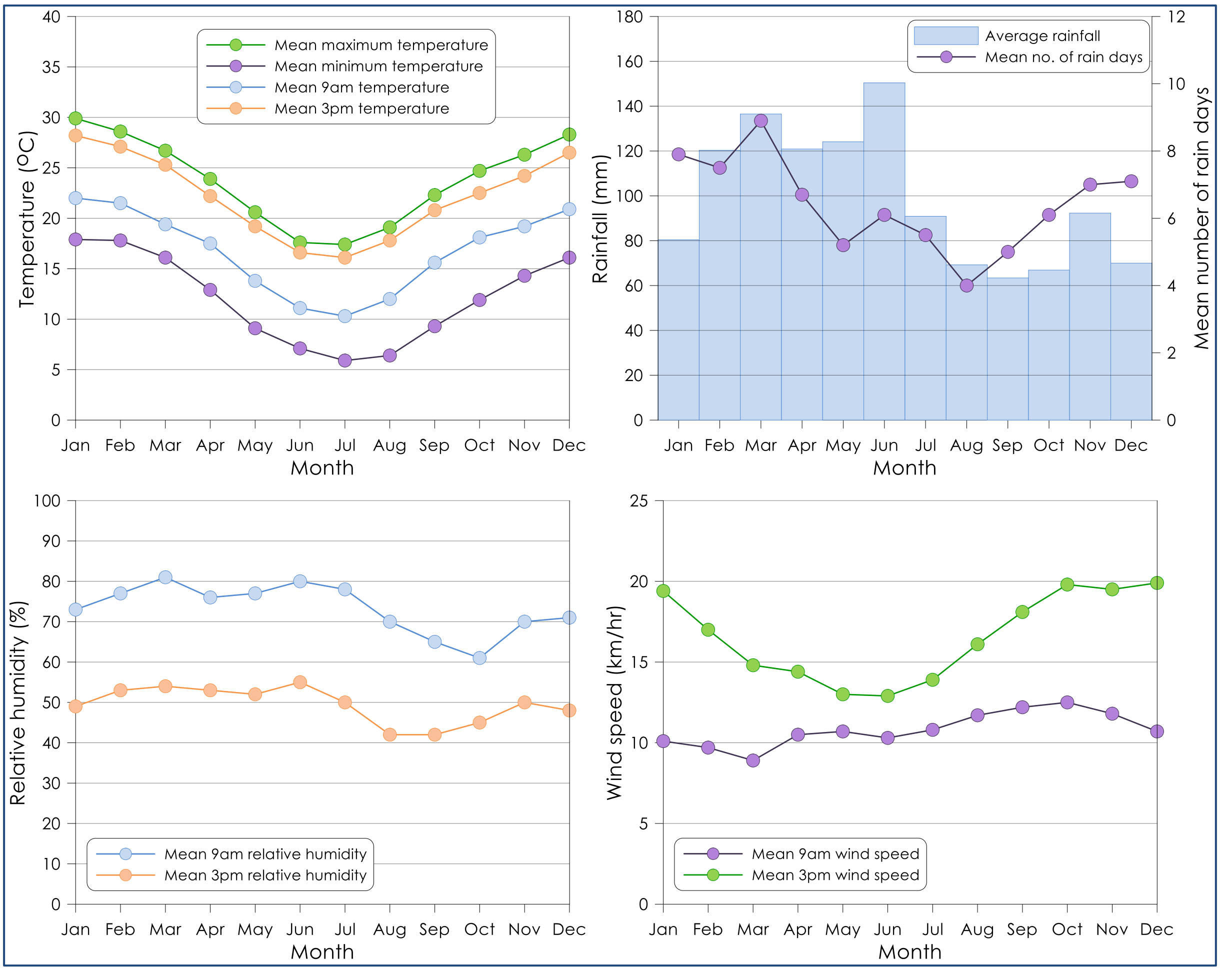

Figure 4-1: Monthly climate statistics summary – Horsley Park Equestrian Centre AWS

4.2 Local meteorological conditions

Annual and seasonal windroses for the Horsley Park Equestrian Centre AWS during the 2020 calendar period are presented in **Figure 4-2**.

The 2020 calendar period corresponds to the period of meteorological modelling based on an analysis of data trends in meteorological data and appropriate monitoring data recorded for the area as outlined in **Appendix A**.

Analysis of the annual windrose shows that the wind directions are predominately from the southwest with variable winds from the other directions. During summer, winds predominately occur from the southeast quadrant. The autumn and winter wind directions follow a similar distribution to the annual windrose with winds predominately occurring from the southwest with variable winds in other directions. In spring, winds are generally varied from all directions.

Figure 4-2 : Annual and seasonal windroses – Horsley Park Equestrian Centre AWS (2020)

4.3 Local air quality monitoring

The main sources of air pollutants in the area are emissions from surrounding industrial and commercial operations and from other anthropogenic activities such as motor vehicle exhaust and wood heater emissions.

Available data from the nearest air quality monitors operated by the NSW Department of Planning and Environment (DPE) at Parramatta North and Prospect were used to quantify the existing background level for the assessed pollutants at the Project site.

Both the Parramatta North and Prospect DPE monitors are located within 10km of the Project site. The Parramatta North monitor is located closer to the industrial/ commercial operations at Parramatta North that is considered more similar to the industrial setting of the Project site and would likely better represent the background concentrations. The Prospect DPE monitor is located in a more residential setting in the middle of a sporting field. Therefore, data recorded at the Parramatta North monitoring station have been used to represent the background levels for the Project.

4.3.1 $PM_{2.5}$ monitoring

A summary of the available $PM_{2.5}$ data for the DPE monitoring stations from 2018 to 2022 is presented in **Table 4-2** and **Figure 4-3**. These data include levels measured during all extraordinary event days. Extraordinary event days are characterised as those days influenced by exceptional events such as bushfires, dust storms and hazard reduction burns.

A review of **Table 4-2** indicates that the annual average $PM_{2.5}$ concentrations at all monitoring stations were above the relevant criterion of 8µg/m^3 for all years, except in 2021 and 2022. The maximum 24-hour average $PM_{2.5}$ concentrations were found to exceed the relevant criterion of 25µg/m^3 for all years of the review period except in 2022.

Elevated $PM_{2.5}$ concentrations in 2018 can be attributed to a 4-day dust storm event and hazard reduction burns (**DPIE, 2020**). High $PM_{2.5}$ concentrations in 2021 are a result of hazard reduction burning (**DPE, 2023**) It is noted that there was a significant increase in the frequency of exceedances of the 24-hour average $PM_{2.5}$ criterion in the 2019/ 2020 summer, predominately due to smoke associated with the widespread bushfires occurring at this time (**DPIE, 2021**) (refer to **Figure 4-3**).

In 2020, there were several days where the Sydney region was impacted by smoke from bushfires and are considered to be exceptional event days and are not representative of the underlying background level. As a result, the adopted background levels used to assess cumulative impacts for $PM_{2.5}$ are based on excluding measurements recorded as extraordinary event days and discussed further in **Section 4.3.3**.

Table 4-2: Summary of $PM_{2.5}$ levels from monitoring stations (µg/m³)

Year	Parramatta North	Prospect	Criterion
	Annual average		
2018	**9.2**	**8.5**	**8**
2019	**10.5**	**11.9**	**8**
2020	**8.2**	**8.6**	**8**
2021	6.6	6.9	**8**
2022	5.2	5.3	**8**
Year	**Maximum 24-hour average**		**Criterion**
2018	**42.1**	**47.5**	**25**
2019	**130.1**	**134.1**	**25**
2020	**72.9**	**70.8**	**25**
2021	**27.4**	**37.3**	**25**
2022	16.9	18.2	**25**

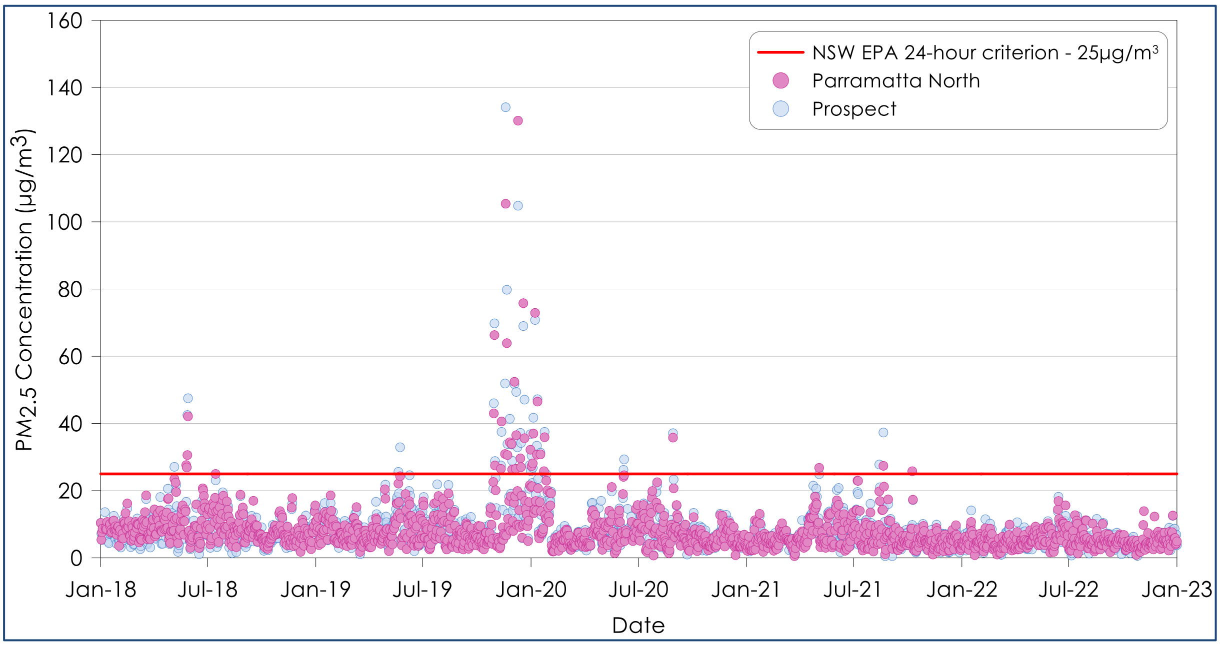

Figure 4-3: 24-hour average $PM_{2.5}$ concentrations

4.3.2 PM_{10} monitoring

A summary of the available PM_{10} monitoring data from 2018 to 2022 for the Parramatta North and Prospect monitoring stations is presented in **Table 4-3** and **Figure 4-4**. These data include levels measured during all extraordinary event days. Extraordinary event days are characterised as those days influenced by exceptional events such as bushfires, dust storms and hazard reduction burns.

A review of **Table 4-3** indicates that the annual average PM_{10} concentrations for the DPE monitoring stations were below the relevant criterion of 25µg/m³ for all years except 2019. The maximum 24-hour average PM_{10} concentrations were found to exceed the relevant criterion of 50µg/m³ for all years of the review period except in 2021 and 2022.

Elevated PM_{10} concentrations can be attributed to the same extraordinary events that affected the $PM_{2.5}$ data. High PM_{10} concentrations in 2018 can be attributed to a 4-day dust storm event and hazard reduction burning (**DPIE, 2020**). The significant increase in the frequency of exceedances of the 24-hour average $PM_{2.5}$ criterion in the 2019/ 2020 summer, predominately due to smoke associated with the widespread bushfires occurring at this time (**DPIE, 2021**) (refer to **Figure 4-4**). Elevated PM_{10} concentrations seen in 2021 can be attributed to hazard reduction burning (**DPE, 2023**).

Similar to the $PM_{2.5}$ levels in 2020, there were several days where the Sydney region was impacted by smoke from bushfires and are considered to be exceptional event days and are not representative of the underlying background level. As a result, the adopted background levels used to assess cumulative impacts for PM_{10} are based on excluding measurements recorded as extraordinary event days.

Table 4-3: Summary of PM_{10} levels from monitoring stations (µg/m³)

Year	Parramatta North	Prospect	Criterion
	Annual average		
2018	21.6	21.9	**25**
2019	**25.5**	**26.0**	**25**
2020	19.3	20.2	**25**
2021	17.1	17.2	**25**
2022	14.1	13.4	**25**
Year	**Maximum 24-hour average**		**Criterion**
2018	**107.4**	**113.3**	**50**
2019	**195.3**	**182.8**	**50**
2020	**188.9**	**245.8**	**50**
2021	42.5	44.6	**50**
2022	42.7	29.2	**50**

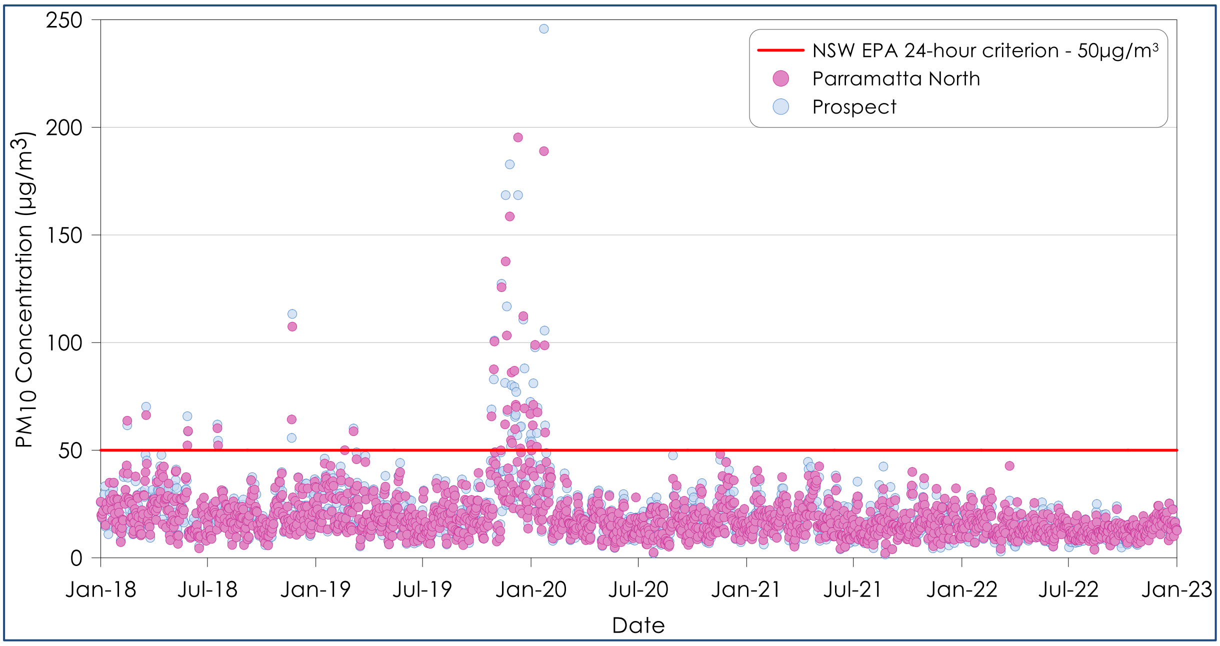

Figure 4-4: 24-hour average PM_{10} concentrations

4.3.3 Estimated background levels

There are no readily available site-specific monitoring data, and therefore the background air quality levels from the Parramatta North DPE monitor were used to represent the background levels for the Project.

The data collected during the 2020 calendar period, which correspond to the period of meteorological modelling has been applied. As noted, the exceptional event days during this period have been excluded when calculating the annual average background level.

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 and the measured PM_{10} levels. 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 17.3µg/m^3 indicates an approximate annual average TSP concentration and deposition value of 69.6µg/m^3 and 3.1g/m^2/month, respectively.

The background air quality levels applied in this assessment are summarised in **Table 4-4**.

Table 4-4: Summary of background levels

Pollutant	Background level	Units
24-hour average $PM_{2.5}$	Daily varying	g/m^3
Annual average $PM_{2.5}$	7.0*	µg/m^3
24-hour average PM_{10}	Daily varying	-
Annual average PM_{10}	17.3*	µg/m^3
Annual average TSP	69.6	µg/m^3
Annual average deposited dust	3.1	g/m^2/month

*Excluding extraordinary days

5 DISPERSION MODELLING APPROACH

5.1 Introduction

The following sections are included to provide the reader with an understanding of the model and modelling approach applied for the assessment. The CALPUFF is an advanced air dispersion model which can deal with the effects of complex local terrain on the dispersion meteorology over the modelling domain in a three-dimensional, hourly varying time step.

The model was setup in general accord with the methods provided in the NSW EPA document *Generic Guidance and Optimum Model Setting for the CALPUFF Modeling System for Inclusion into the 'Approved Methods for the Modeling and Assessments of Air Pollutants in NSW, Australia'* (**TRC**, **2011**).

5.2 Modelling methodology

The meteorological modelling methodology applied a 'hybrid' approach which includes a combination of prognostic model data from TAPM with surface observations.

Modelling was undertaken using a combination of the CALPUFF Modelling System and The Air Pollution Model (TAPM). The CALPUFF Modelling System includes three main components: CALMET, CALPUFF and CALPOST and a large set of pre-processing programs designed to interface the model to standard, routinely available meteorological and geophysical datasets.

5.2.1 Meteorological modelling

The TAPM model was applied to the available data to generate a three-dimensional upper air data file for use in CALMET. The centre of analysis for the TAPM modelling used is 33deg 52min south and 150deg 57.5min east. The simulation involved an outer grid of 30km, with three nested grids of 10km, 3km and 1km with 35 vertical grid levels.

The CALMET domain was run on a domain of 10 x 10km with a 0.1km grid resolution. The available meteorological data the year 2020 from the Horsley Park Equestrian Centre AWS (BoM) and Bankstown Airport AWS (BoM) were included in the simulation.

Local land use and detailed topographical information was included to produce realistic fine scale flow fields (such as terrain forced flows) in surrounding areas, as shown in **Figure 5-1**.

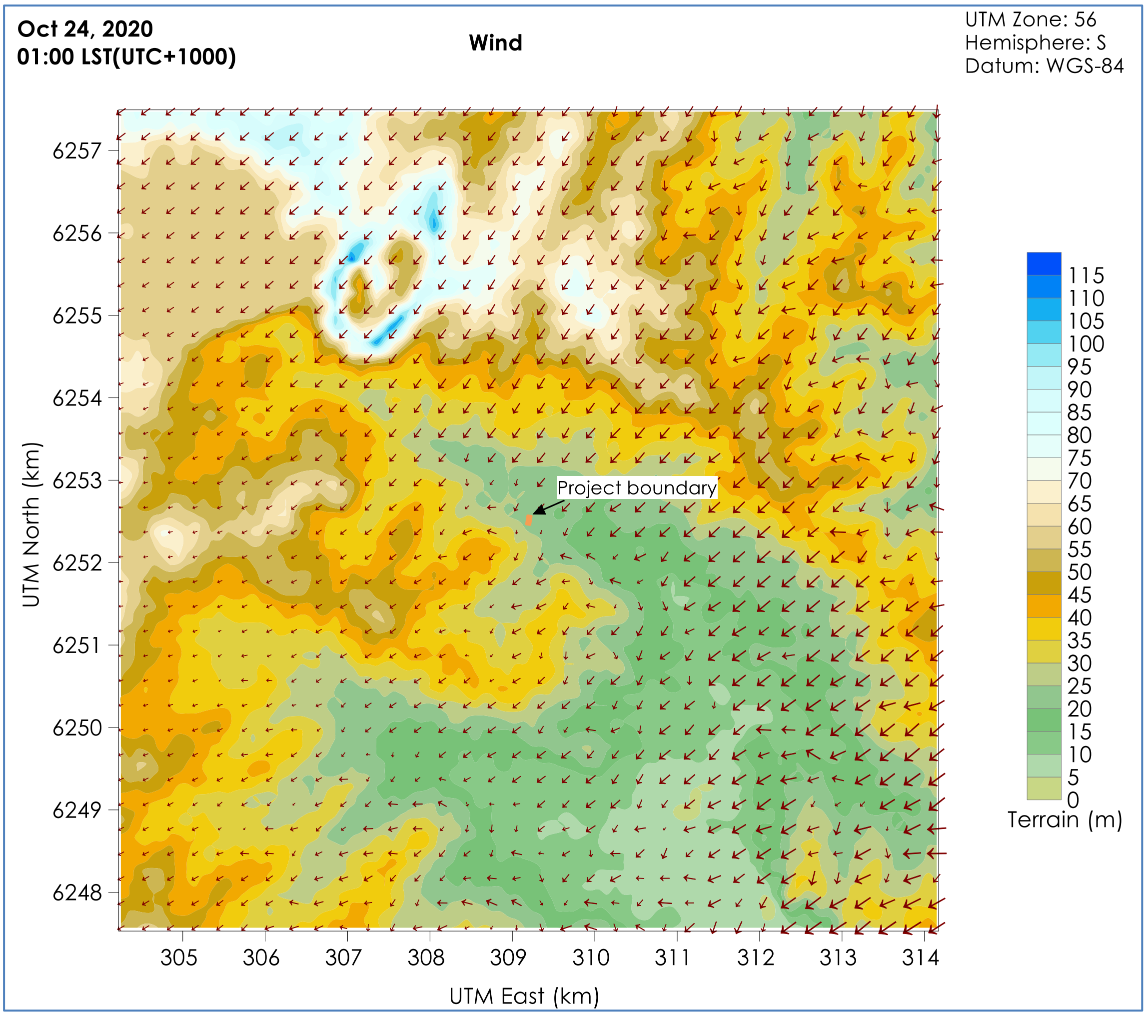

Figure 5-1: Representative 1-hour average snapshot of wind field for the Project

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

Figure 5-2 presents the annual and seasonal windroses from the CALMET data. Overall, the windroses generated in the CALMET modelling reflect the expected wind distribution patterns of the area as determined based on the available 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 shows sensible trends considered to be representative of the area.

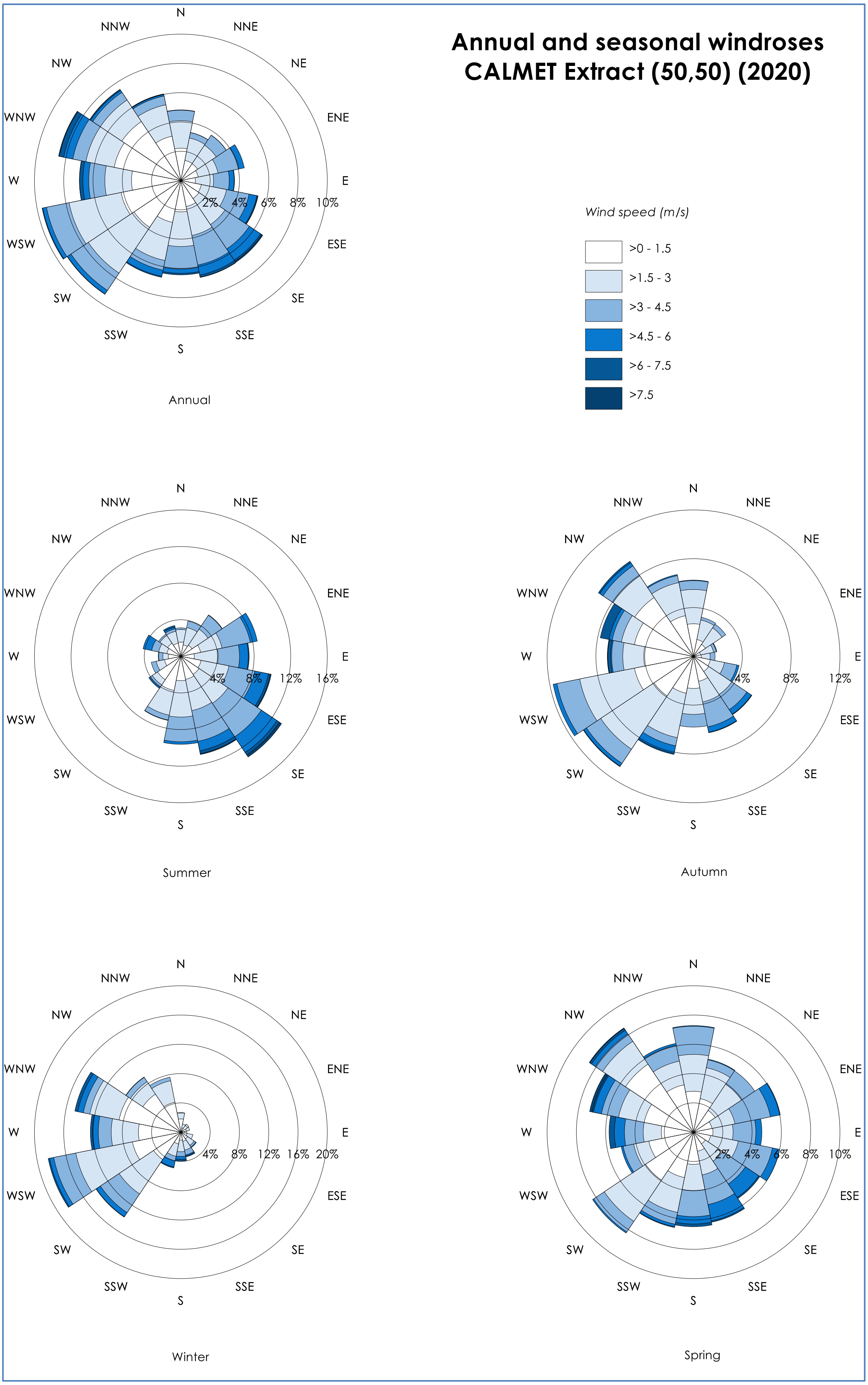

Figure 5-2: Annual and seasonal windroses from CALMET (Cell ref 5050)

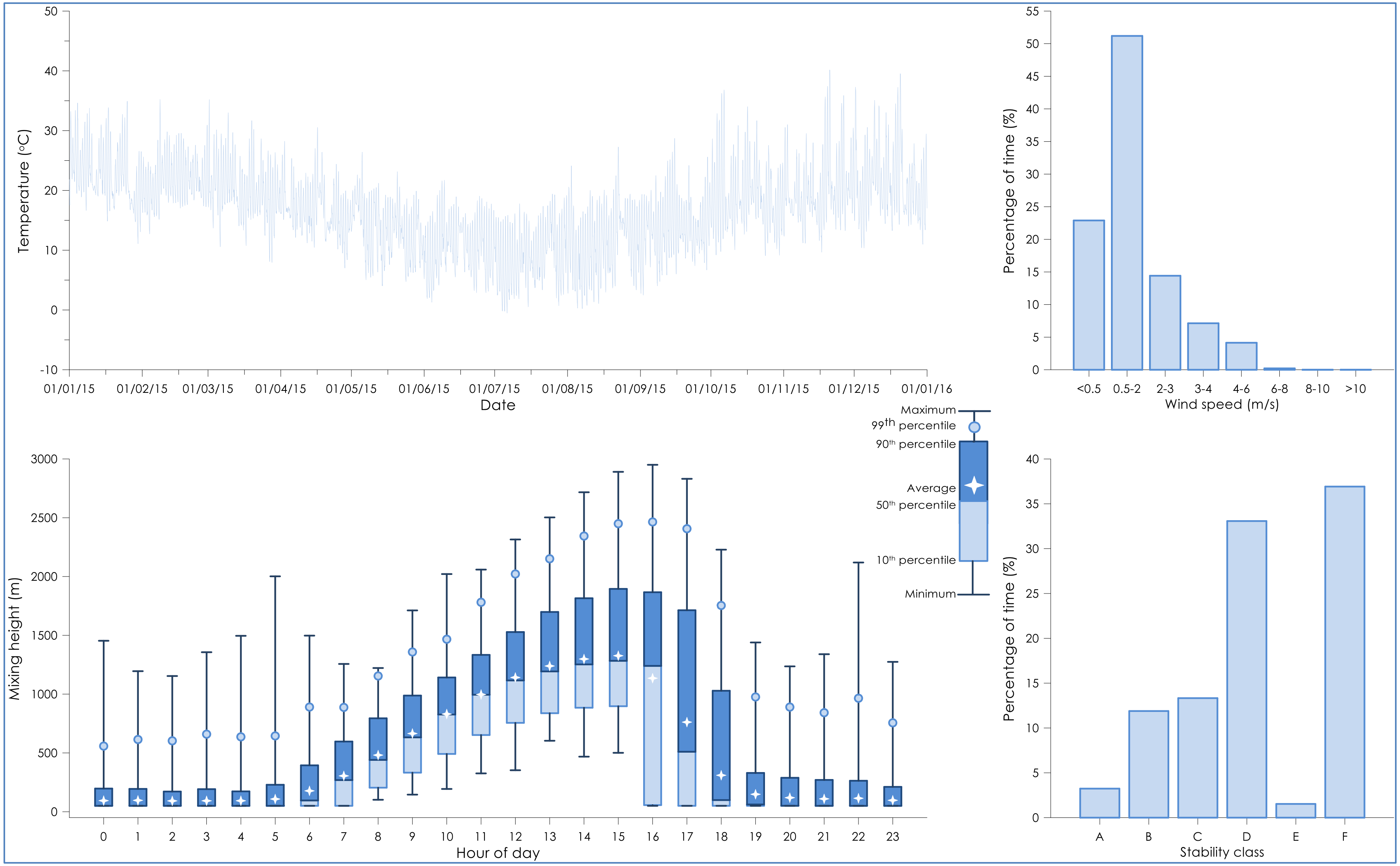

Figure 5-3: Meteorological analysis of CALMET (Cell REF 5050)

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 potential pollutant concentrations associated with the operation of the Project.

Ground based operational activity of the Project were represented by a series of volume sources and were included in the CALPUFF model via an hourly varying emission file. Meteorological conditions associated with dust generation (such as wind speed) and levels of dust generating activity were considered in calculating the hourly varying emission rate for each source.

A dust collector is installed at the right side of the crumbing machine and services the key dust generating plant. It will operate at all times that the crumbing machine is running. Air from the dust collector is vented internally into the building.

Dust collectors using bag filters are consistent with best practice for tyre shredding activities where relatively small quantities of dust are generated in the first instance due to the nature of the rubber material being processed. The "dust" generated is primarily cotton/ fibre fluff originating from the internal structure of the tyres as the rubber itself makes very little dust.

Two roof mounted stacks use fans to draw air and heat out from the building above the main plant. Unlike whirlybird type ventilators, these are driven by fans to ensure ventilation is available under all weather conditions. As outlined above, there is minimal dust generated by the process, the main dust (or fluff) generating plant is serviced by the dust collector to capture any significant dust (which is in the form of fluff from cotton/ fibre in the tyres).

The two roof mounted stacks are modelled conservatively to account for possible fugitive "dust" that may exit the building in the air dispelled by the stacks. These have been modelled as point sources with parameters outlined in **Table 5-1**.

Table 5-1: Modelled stack parameters

ID	Stack height (m)	Stack diameter (m)	Temperature (°C)	Exit velocity (m/sec)	TSP concentration (mg/m³)
S1	11.1	0.6	25	2.95	5
S2	11.1	0.6	25	2.95	5

The modelled stack source locations for the Project are shown in **Figure 5-4**. The model included consideration of potential "building" wake effects on air dispersion which arise due to the effect of winds passing over the buildings surrounding the Project site.

Figure 5-4: Stack source locations

5.2.3 Emission estimation

The dust generating activities associated with operation of the Project are identified as the handling and processing of the material and vehicles travelling on-site. The vehicles also have the potential to generate particulate emissions from the diesel exhaust. Dust emission estimates have been calculated by analysing the various types of dust generating activities taking place and utilising suitable emissions sourced from both locally developed and United States various types of activities taking Environmental Protection Agency (US EPA) developed documentation.

A summary of the estimated annual TSP, PM_{10} and $PM_{2.5}$ emissions are presented in **Table 5-2**. Detailed calculations of the dust emission estimates are provided in **Appendix B**.

Table 5-2: Summary of estimated emissions for the Project (kg/year)

Activity	TSP Emissions	PM_{10} emissions	$PM_{2.5}$ emissions
Delivering material to site (outdoor)	30.4	5.8	1.4
Delivering material to site (indoor)	5.2	1.0	0.24
Unloading material to stockpile (indoor)	11	5	1
Rehandle material at stockpile (indoor)	11	5	1
Loading material to shredder (indoor)	11	5	1
Shredding material (indoor)	24	11	2
Granulating material (indoor)	113	39	3
Granulating material (indoor)	113	39	3
Unloading processed material to stockpile (indoor)	11	5	1
Rehandle material at stockpile (indoor)	11	5	1
Loading processed material to truck (indoor)	11	5	1

Activity	TSP Emissions	PM_{10} emissions	$PM_{2.5}$ emissions
Hauling processed material offsite (indoor)	5.2	1.0	0.24
Hauling processed material offsite (outdoor)	30	5.8	1.4
Exhaust emissions	30	30	29
Stack emissions	264	264	132
Total emissions (kg/yr.)	**681**	**427**	**176**

6 DISPERSION MODELLING RESULTS

The dispersion model predictions presented in this section include those for the operation of the Project in isolation (incremental impact) and the operation of the Project with consideration of other sources (total impact). The results show the predicted:

- Maximum 24-hour average $PM_{2.5}$ and PM_{10} concentrations;
- Annual average $PM_{2.5}$, PM_{10} and TSP concentrations; and,
- Annual average dust (insoluble solids) deposition rates.

It is important to note that when assessing impacts per the maximum 24-hour average levels, these predictions are based on the highest predicted 24-hour average concentrations which were modelled at each point within the modelling domain for the worst day (i.e. a 24-hour period) during the one year long modelling period.

Associated isopleth diagrams of the dispersion modelling results are presented in **Appendix C**.

The total (cumulative) impact is defined as the operation of the Project combined with the estimated ambient background levels in **Section 5.3.**

Table 6-1 presents the predicted incremental and cumulative particulate dispersion modelling results at each of the assessed receptor locations.

The predicted incremental results show that minimal incremental effects would arise at the receptor locations due to the Project. The predicted cumulative results indicate that the receptor locations are predicted to experience levels below the relevant criteria for each of the assessed dust metrics.

Table 6-1: Dust dispersion modelling results for sensitive receptors

Receptor ID	$PM_{2.5}$ (µg/m³)		PM_{10} (µg/m³)		TSP (µg/m³)	DD* (g/m²/mth)	$PM_{2.5}$ (µg/m³)	PM_{10} (µg/m³)	TSP (µg/m³)	DD* (g/m²/mth)
	Incremental						Cumulative			
	24-hr ave.	Ann. ave.	24-hr ave.	Ann. ave.	Ann. ave.	Ann. ave.	Ann. ave.	Ann. ave.	Ann. ave.	Ann. ave.
	Air quality impact criteria									
	-	-	-	-	-	2	8	25	90	4
R1	0.2	0.02	0.5	0.06	0.08	0.001	7.0	17.4	69.7	3.1
R2	0.2	0.03	0.6	0.08	0.1	0.002	7.0	17.4	69.7	3.1
R3	0.1	0.01	0.3	0.03	0.04	0.001	7.0	17.3	69.6	3.1
IND1	1.0	0.2	2.9	0.5	1.0	0.04	7.2	17.8	70.6	3.1
IND2	3.1	0.5	8.5	1.4	3.0	0.14	7.5	18.7	72.6	3.2

*Deposited dust

6.1 Assessment of Cumulative 24-hour average $PM_{2.5}$ and PM_{10} Concentrations

The results for incremental 24-hour average $PM_{2.5}$ and PM_{10} concentrations indicate there are no predicted exceedances of the relevant criteria at the assessed receptors.

When assessing the cumulative 24-hour average impacts based on model predictions, an assessment of cumulative 24-hour average $PM_{2.5}$ impacts was undertaken in accordance with Section 7.1 of the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (**NSW EPA**,**2022**).

A "Level 1 assessment – Maximum impact" and a "Level 2 assessment - Contemporaneous impact and background approach" has been applied to assess the potential cumulative 24-hour average $PM_{2.5}$ and PM_{10} impacts.

In simple terms, the Level 1 assessment involves adding the maximum background level with the maximum predicted Project only level and the Level 2 assessment involves matching one year of ambient air quality monitoring data with the corresponding Project only level predicted using the same day's weather data to account for the spatial and temporal variation in background levels on a given day.

Table 6-2 provides a summary of the findings from the Level 1 and Level 2 assessments for the assessment locations.

The results in **Table 6-2** indicate that the Project does not increase the number of days above the 24-hour average criterion at the assessed residential and industrial receptors for $PM_{2.5}$ and PM_{10}.

Detailed tables of the contemporaneous assessment results are provided in **Appendix D**.

Table 6-2: NSW EPA contemporaneous assessment - maximum number of additional days above 24-hour average criterion

Receptor ID	$PM_{2.5}$	PM_{10}
R1	0	0
R2	0	0
R3	0	0
IND1	0	0
IND2	0	0

Time series plot of the predicted cumulative 24-hour average $PM_{2.5}$ and PM_{10} concentrations for the Receptor R2 is presented in **Figure 6-1**.

The orange bars in the figures represent the contribution from the Project and the blue bars represent the applied background levels. It is clear from the figures that the Project has a small influence at the assessed receptor location and would be difficult to discern beyond the existing background level.

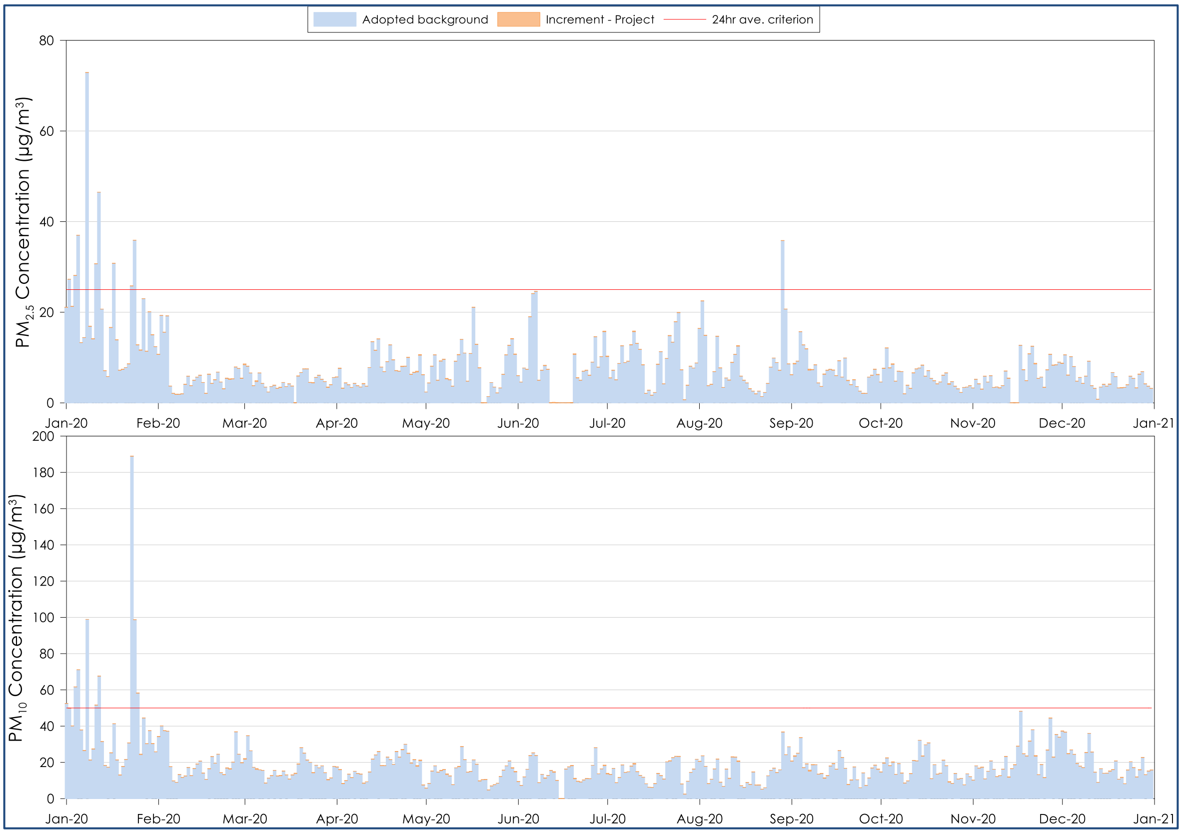

Figure 6-1: 24-hour cumulative $PM_{2.5}$ and PM_{10} concentrations – R2

7 MITIGATION AND MANAGEMENT

The proposed operations of the Project have the potential to generate dust emissions. To ensure that activities associated with the Project have a minimal effect on the surrounding environment, it is recommended that all reasonable and practicable dust mitigation measures be utilised.

Suggested reasonable and practicable dust mitigation measures for the Project are listed in **Table 7-1**.

Table 7-1: Potential operational dust mitigation measures

Source	Mitigation Measure
General	Engines of on-site vehicles and plant to be switched off when not in use.
	Vehicles and plant are to be fitted with pollution reduction devices where practicable.
	Vehicles are to be maintained and serviced according to manufacturer's specifications.
	Visual monitoring of activities is to be undertaken to identify dust generation.
	Dust collector with bag filters to be maintained and operated in accordance with manufacturer's specification.
Material handling	Reduce drop heights from loading and handling equipment where practical.
Hauling activities	Spills on trafficked areas to be cleaned immediately.
	Driveways and hardstand areas to be swept/cleaned regularly as required etc.
	Vehicle traffic is to be restricted to designated routes.
	Co-ordinate the delivery schedule to avoid a queue of the incoming or outgoing trucks for extended periods of time.
	Speed limits are to be enforced.
	Vehicle loads are to be covered/ secured when travelling off-site to prevent spillage.
	Regularly inspect roads and maintain surfaces to remove potholes or depressions.

8 SUMMARY AND CONCLUSIONS

This report has examined the air quality impacts associated with the proposed operations of a tyre recycling facility located at 68-70 Victoria Street, Smithfield.

Air dispersion modelling was used to predict the potential for off-site dust impacts in the surrounding area due to the operation of the Project with generally conservative assumptions.

It is predicted that all the assessed air pollutants generated by the operation of the Project would comply with the applicable assessment criteria at the assessed receptors and therefore would not lead to any unacceptable level of environmental harm or impact in the surrounding area. The Project would not result in air pollution that would significantly impact upon the amenity of residential and industrial land uses.

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

Overall, the assessment demonstrates that even using conservative assumptions, the Project can operate without causing any significant air quality impact at receptors in the surrounding environment.

9 REFERENCES

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Climate statistics for Australian locations, Bureau of Meteorology website, accessed June 2023. http://www.bom.gov.au/climate/averages

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"An Australian incremental guideline for particulate matter (PM2.5) to assist in development and planning decisions", December 2019.

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"Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales", NSW Environment Protection Authority, September 2022.

TRC (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", Prepared for the NSW Office of Environment and Heritage by TRC Environmental Corporation.

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"Compilation of Air Pollutant Emission Factors", AP-42, Fourth Edition United States Environmental Protection Agency, Office of Air and Radiation Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina 27711.

Appendix A

Selection of Meteorological Year

Selection of meteorological year

A statistical analysis of the latest seven contiguous years of meteorological data from the nearest BoM weather station with suitable available data, Horsley Park Equestrian Centre AWS weather station, is presented in **Table A-1**.

The standard deviation of the latest seven years of meteorological data spanning 2016 to 2022 was analysed against the available measured wind speed, temperature and relative humidity. The analysis indicates that the 2018 dataset is closest to the mean for wind speed and 2020 is closest for temperature and relative humidity. Therefore, based on this analysis it was determined that 2020 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 for Horsley Park Equestrian Centre AWS

Year	Wind speed	Temperature	Relative humidity	Score
2016	0.8	0.9	5.0	6.7
2017	0.7	0.8	5.2	6.7
2018	0.6	0.9	7.0	8.5
2019	0.8	0.9	5.5	7.2
2020	0.9	0.5	2.7	4.1
2021	0.9	0.6	3.1	4.6
2022	0.9	0.7	6.2	7.8

Figure A-1 shows the frequency distributions for wind speed, wind direction, temperature and relative humidity for the 2020 year compared with the mean of the 2016 to 2022 data set. The 2020 year data appear to be reasonably well aligned with the mean data.

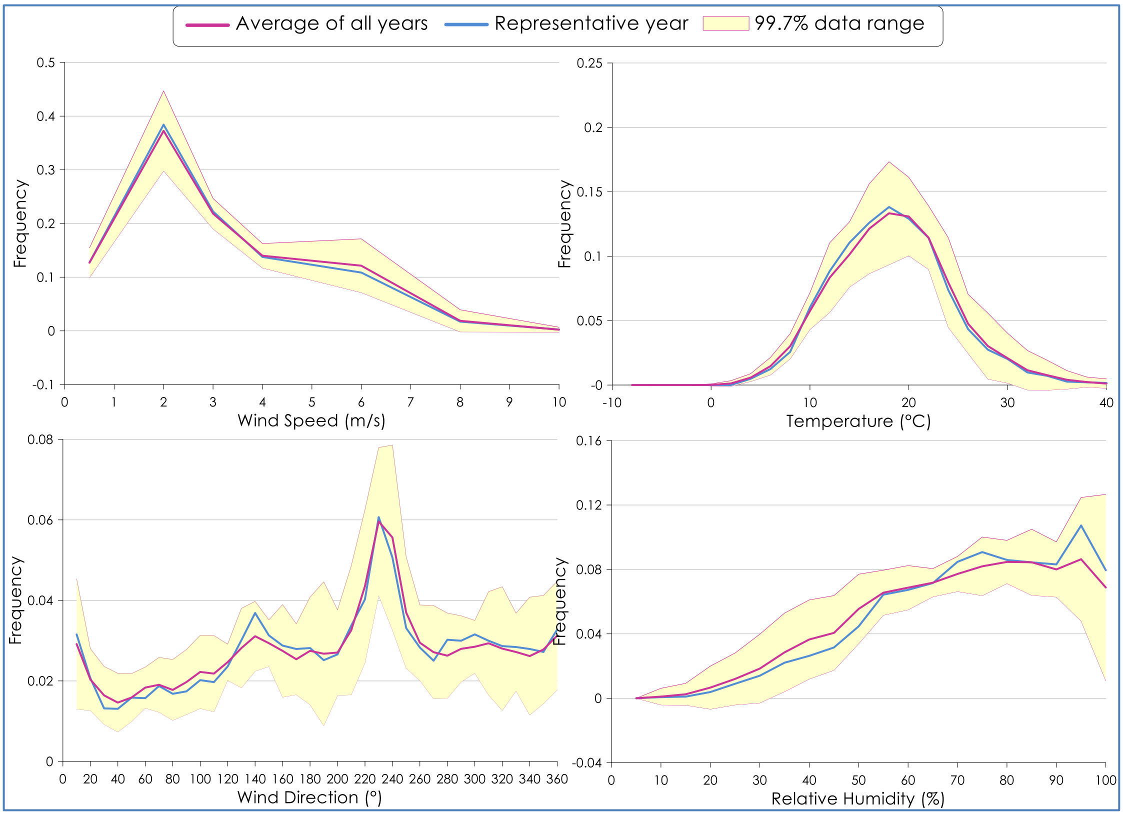

Figure A-1: Frequency distributions for wind speed, wind direction, temperature and relative humidity

Appendix B
Emission Calculations

Emission Calculation

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 and utilising suitable emission and load factors which 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 United States (US) EPA AP42 Emission Factors (**US EPA, 1985 and Updates**).

The emission factor equations used for each dust generating activity are outlined in **Table B-1** below. A detailed dust emission inventory for the modelled scenario is presented in **Table B-2**.

Control factors include the following:

- Activities that occur within the warehouse - 70% control for enclosure.

Table B-1: Emission factor equations

Activity	Emission factor equation: TSP	Emission factor equation: PM10	Emission factor equation: PM2.5
Loading / emplacing material	$EF = 0.74 \times 0.0016 \times \left(\frac{U}{2.2}^{1.3} \Big/ \frac{M}{2}^{1.4}\right) kg/tonne$	$EF = 0.35 \times 0.0016 \times \left(\frac{U}{2.2}^{1.3} \Big/ \frac{M}{2}^{1.4}\right) kg/tonne$	$EF = 0.053 \times 0.0016 \times \left(\frac{U}{2.2}^{1.3} \Big/ \frac{M}{2}^{1.4}\right) kg/tonne$
Hauling on sealed surfaces	$EF = 3.23 \times s.L.^{0.91} \times (1.1023 \times W)^{1.02} kg/VKT$	$EF = 0.62 \times s.L.^{0.91} \times (1.1023 \times W)^{1.02} kg/VKT$	$EF = 0.15 \times s.L.^{0.91} \times (1.1023 \times W)^{1.02} kg/VKT$
Shredding material	$EF = 0.0027\ kg/tonne$	$EF = 0.0012\ kg/tonne$	$EF = 0.0002\ kg/tonne$
Granulating material	$EF = 0.0125\ kg/tonne$	$EF = 0.0043\ kg/tonne$	$EF = 0.0003\ kg/tonne$
Exhaust	*EF = 99kg/yr x ((100-70)/100)*	*EF = 99kg/yr x ((100-70)/100)*	*EF = 96kg/yr x ((100-70)/100)*

EF = emission factor, U = wind speed (m/s), s.L. = silt loading (g/m^2), W = average weight of vehicle (tonne), VKT = vehicle kilometres travelled (km)

Table B-2: Dust Emissions Inventory

Activity - Average	TSP emission (kg/year)	PM10 emission (kg/y)	PM25 emission (kg/y)	Intensity	Units	Emission Factor - TSP	Emission Factor - PM10	Emission Factor - PM25	Units	Var. 1	Units	Var. 2	Units	Var. 3	Units	Var. 4	Units	Var. 5	Units	Var. 6	Units	Var. 7	Units
Delivering material to site (outdoor)	30.4	5.8	1.4	30,000	t/yr	0.0010	0.00019	0.000047	kg/t	7	t/load	0.088	km	0.08	0.02	0.004	kg/VKT	2	S.L/ g/m2	12	Ave GMV (tonnes)		
Delivering material to site (indoor)	5.2	1.0	0.24	30,000	t/yr	0.0006	0.00011	0.000027	kg/t	7	t/load	0.050	km	0.08	0.02	0.004	kg/VKT	2	S.L/ g/m2	12	Ave GMV (tonnes)	70	%
Unloading material to stockpile (indoor)	11	5	1	30,000	t/yr	0.00124	0.00059	0.00009	kg/t	1.048	ave. wind speed (m/s)	2	M.C. %									70	%
Rehandle material at stockpile (indoor)	11	5	1	30,000	t/yr	0.00124	0.00059	0.00009	kg/t	1.048	ave. wind speed (m/s)	2	M.C. %									70	%
Loading material to shredder (indoor)	11	5	1	30,000	t/yr	0.00124	0.00059	0.00009	kg/t	1.048	ave. wind speed (m/s)	2	M.C. %									70	%
Shredding material (indoor)	24	11	2	30,000	t/yr	0.0027	0.0012	0.0002	kg/t													70	%
Granulating material (indoor)	113	39	3	30,000	t/yr	0.0125	0.0043	0.0003	kg/t													70	%
Granulating material (indoor)	113	39	3	30,000	t/yr	0.0125	0.0043	0.0003	kg/t													70	%
Unloading processed material to stockpile (indoor)	11	5	1	30,000	t/yr	0.00124	0.00059	0.00009	kg/t	1.048	ave. wind speed (m/s)	2	M.C. %									70	%
Rehandle material at stockpile (indoor)	11	5	1	30,000	t/yr	0.00124	0.00059	0.00009	kg/t	1.048	ave. wind speed (m/s)	2	M.C. %									70	%
Loading processed material to truck (indoor)	11	5	1	30,000	t/yr	0.00124	0.00059	0.00009	kg/t	1.048	ave. wind speed (m/s)	2	M.C. %									70	%
Hauling processed material offsite (indoor)	5.2	1.0	0.24	30,000	t/yr	0.0006	0.00011	0.000027	kg/t	7	t/load	0.050	km	0.08	0.02	0.004	kg/VKT	2	S.L/ g/m2	12	Ave GMV (tonnes)	70	%
Hauling processed material offsite (outdoor)	30	5.8	1.4	30,000	t/yr	0.0010	0.00019	0.000047	kg/t	7	t/load	0.088	km	0.08	0.02	0.004	kg/VKT	2	S.L/ g/m2	12	Ave GMV (tonnes)		
Exhaust emissions	30	30	29																			70	%
Stack emissions	264	264	132																				
Total TSP emissions (kg/yr.)	**681**	**427**	**176**																				

Appendix C

Isopleth Diagrams

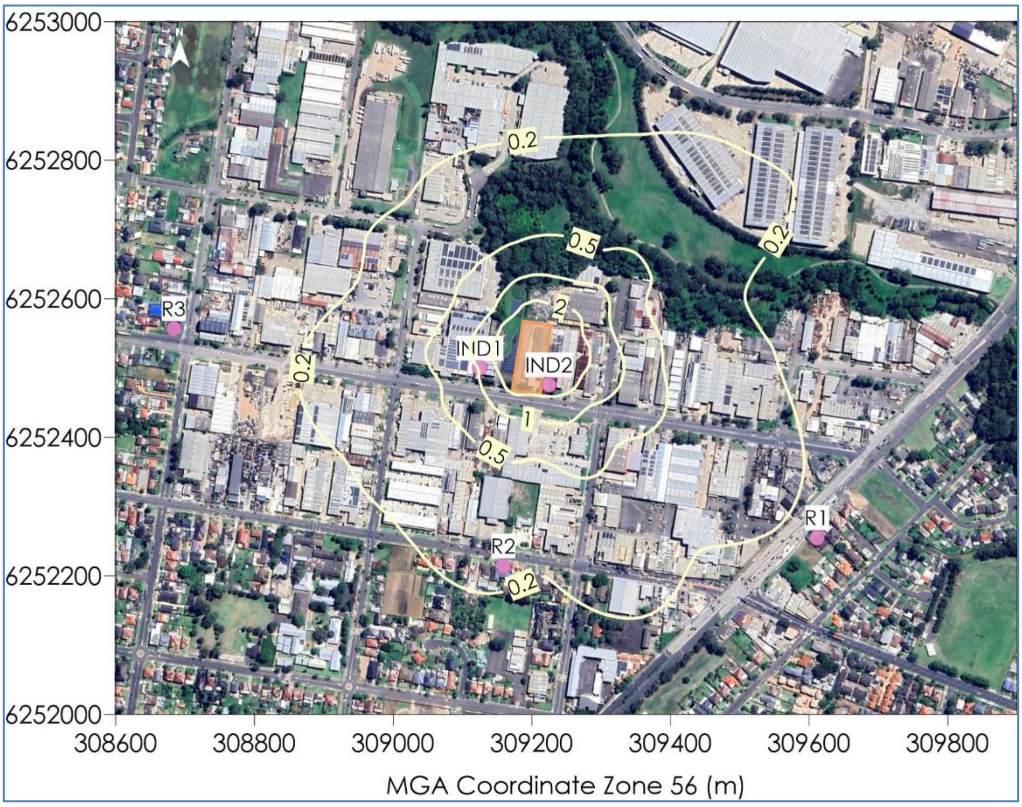

Figure C-1: Predicted incremental maximum 24-hour average $PM_{2.5}$ concentrations (µg/m³)

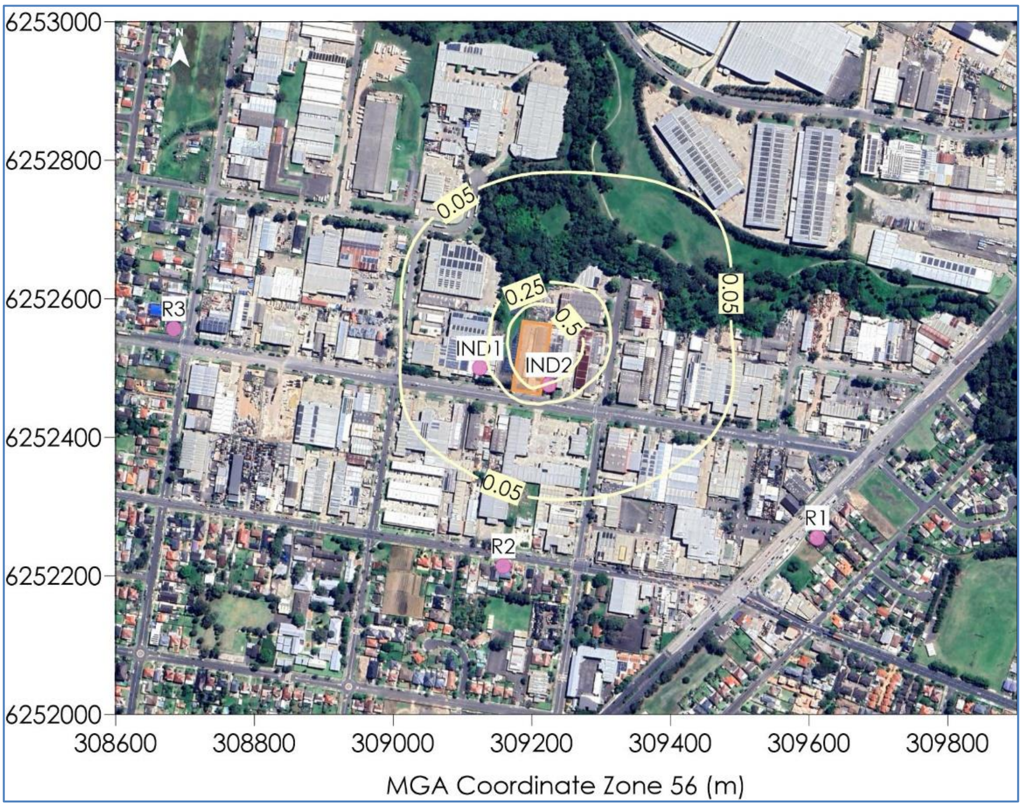

Figure C-2: Predicted incremental annual average $PM_{2.5}$ concentrations (µg/m³)

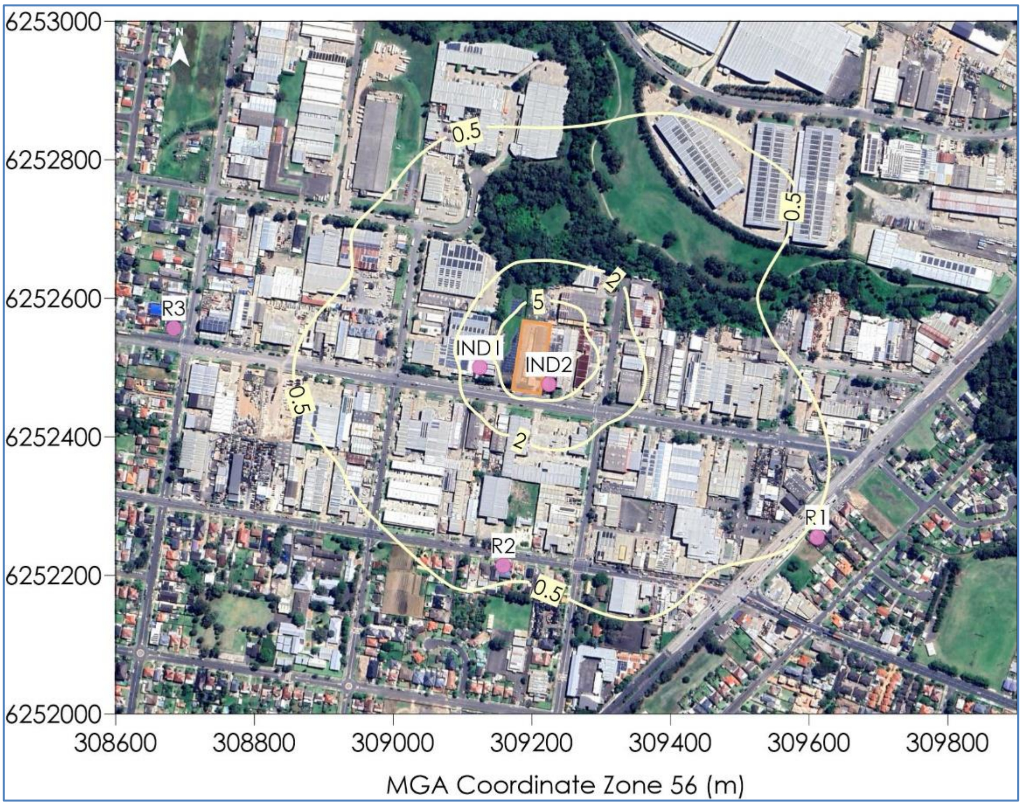

Figure C-3: Predicted incremental maximum 24-hour average PM_{10} concentrations (µg/m³)

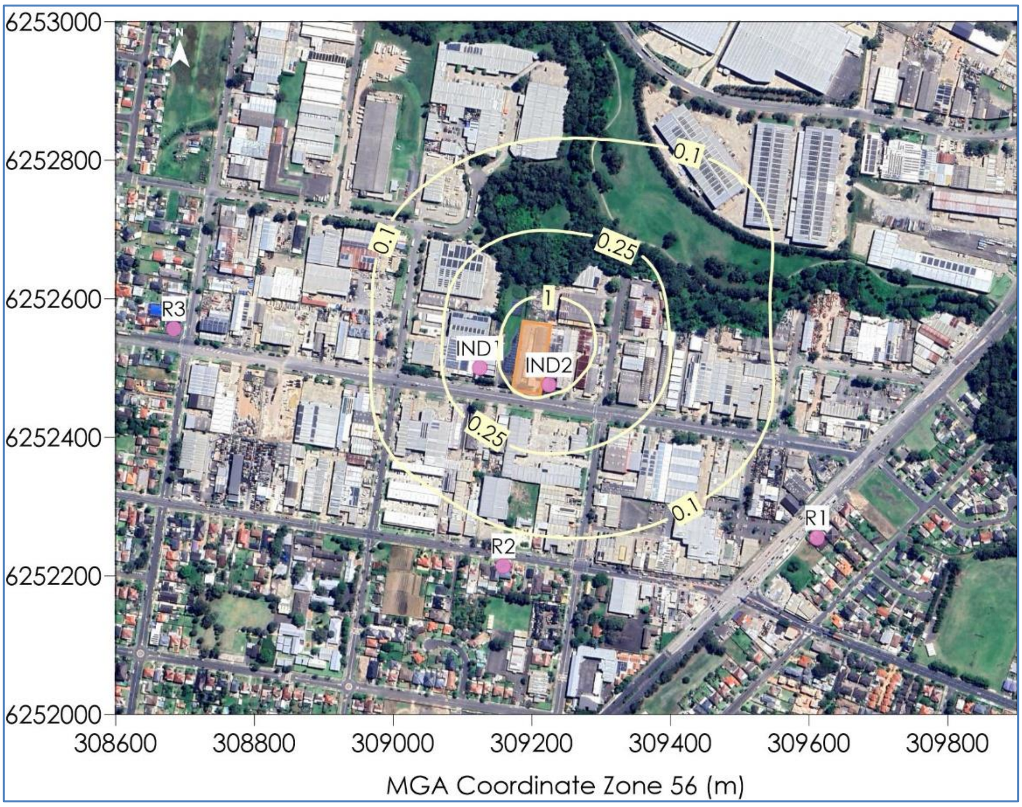

Figure C-4: Predicted incremental annual average PM_{10} concentrations (µg/m³)

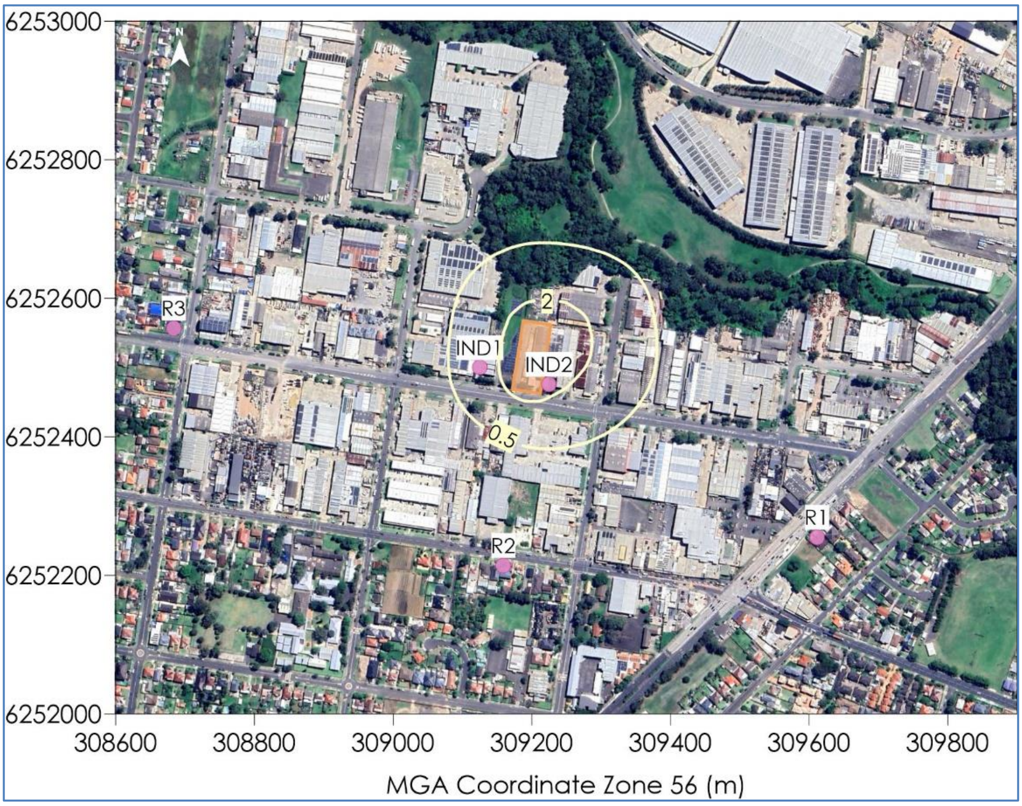

Figure C-5: Predicted incremental annual average TSP concentrations (µg/m³)

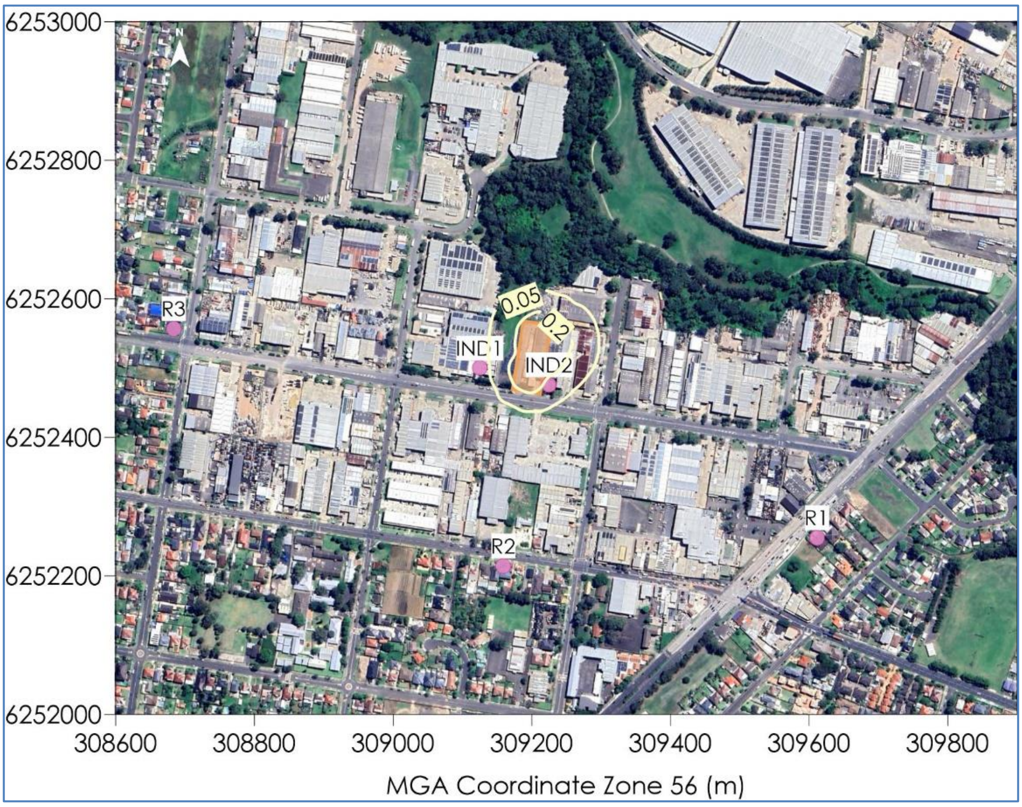

Figure C-6: Predicted incremental annual average dust deposition levels (g/m²/month)

Appendix D

Further detail regarding 24-hour $PM_{2.5}$ and PM_{10} analysis

Further detail regarding 24-hour average $PM_{2.5}$ and PM_{10} analysis

The analysis below provides a cumulative 24-hour $PM_{2.5}$ and PM_{10} impact assessment in accordance with the NSW EPA Approved Methods; refer to the worked example on Page 46 to 47 of the Approved Methods.

The background level is the ambient level at the Parramatta North monitoring station.

The predicted increment is the predicted level to occur at the receptor due to the Project.

The total is the sum of the background level and the predicted level. The totals may have minor discrepancies due to rounding.

The left half of the table examines the cumulative impact during the periods of highest background levels and the right half of the table examines the cumulative impact during the periods of highest contribution from the project.

Exceptional event days as documented in the *New South Wales Annual Compliance Report 2020* (**DPIE, 2021**) have been included in the tables.

The green shading represents days ranked per the highest background level but below the criteria.

The blue shading represents days ranked per the highest predicted increment level but below the criteria.

The orange shading represents days where the measured background level is already over the criteria.

Any value above the $PM_{2.5}$ criterion of 25µg/m^3 and the PM_{10} criterion of 50µg/m^3 is shown in **bold red.**

Table D-1: Cumulative 24-hour average $PM_{2.5}$ concentration (µg/m³) – Receptor R1

Ranked by Highest to Lowest Background Concentrations				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
8/01/2020	**72.9***	<0.1	**72.9**				
12/01/2020	**46.5***	<0.1	**46.5**				
5/01/2020	**37***	<0.1	**37.0**				
24/01/2020	**35.9***	<0.1	**35.9**				
29/08/2020	**35.8**	0.1	**35.9**				
17/01/2020	**30.8***	<0.1	**30.8**				
11/01/2020	**30.7***	<0.1	**30.7**				
4/01/2020	**28.1***	<0.1	**28.1**				
2/01/2020	**27.3***	<0.1	**27.3**				
23/01/2020	**25.8***	<0.1	**25.8**				
7/06/2020	24.6	<0.1	24.6	11/07/2020	13.1	0.2	13.3
6/06/2020	24.1	<0.1	24.1	15/06/2020	ND	0.2	0.2
27/01/2020	23	<0.1	23.0	23/06/2020	7	0.1	7.1
2/08/2020	22.5	<0.1	22.5	16/08/2020	5	0.1	5.1
3/01/2020	21.3	<0.1	21.3	30/03/2020	4	0.1	4.1
1/01/2020	21.1	<0.1	21.1	3/08/2020	14.9	0.1	15.0

Ranked by Highest to Lowest Background Concentrations				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
17/05/2020	21.1	<0.1	21.1	21/06/2020	5.5	0.1	5.6
13/01/2020	20.7	<0.1	20.7	13/09/2020	7.2	0.1	7.3
30/08/2020	20.7	0.1	20.8	16/06/2020	ND	0.1	0.1
29/01/2020	20.1	<0.1	20.1	20/04/2020	9.5	0.1	9.6

***** Exceptional event day, ND – no data

Table D-2: Cumulative 24-hour average $PM_{2.5}$ concentration (µg/m³) – Receptor R2

Ranked by Highest to Lowest Background Concentrations				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
8/01/2020	**72.9***	<0.1	**72.9**				
12/01/2020	**46.5***	<0.1	**46.5**				
5/01/2020	**37***	<0.1	**37.0**				
24/01/2020	**35.9***	<0.1	**35.9**				
29/08/2020	**35.8**	<0.1	**35.8**				
17/01/2020	**30.8***	<0.1	**30.8**				
11/01/2020	**30.7***	<0.1	**30.7**				
4/01/2020	**28.1***	<0.1	**28.1**				
2/01/2020	**27.3***	<0.1	**27.3**				
23/01/2020	**25.8***	<0.1	**25.8**				
7/06/2020	24.6	<0.1	24.6	7/09/2020	7.2	0.2	7.4
6/06/2020	24.1	0.1	24.2	1/03/2020	8.4	0.2	8.6
27/01/2020	23	<0.1	23.0	5/03/2020	4.7	0.2	4.9
2/08/2020	22.5	<0.1	22.5	28/04/2020	6.8	0.2	7.0
3/01/2020	21.3	<0.1	21.3	29/04/2020	10.5	0.2	10.7
1/01/2020	21.1	<0.1	21.1	10/07/2020	15.7	0.2	15.9
17/05/2020	21.1	<0.1	21.1	14/08/2020	12.5	0.2	12.7
13/01/2020	20.7	<0.1	20.7	1/07/2020	10.2	0.2	10.4
30/08/2020	20.7	<0.1	20.7	24/10/2020	4.1	0.1	4.2
29/01/2020	20.1	<0.1	20.1	22/11/2020	8.6	0.1	8.7

***** Exceptional event day

Table D-3: Cumulative 24-hour average $PM_{2.5}$ concentration (µg/m³) – Receptor R3

Ranked by Highest to Lowest Background Concentrations				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
8/01/2020	**72.9***	<0.1	**72.9**				
12/01/2020	**46.5***	<0.1	**46.5**				
5/01/2020	**37***	<0.1	**37.0**				
24/01/2020	**35.9***	<0.1	**35.9**				
29/08/2020	**35.8**	<0.1	**35.8**				

Ranked by Highest to Lowest Background Concentrations				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
17/01/2020	**30.8***	<0.1	**30.8**				
11/01/2020	**30.7***	<0.1	**30.7**				
4/01/2020	**28.1***	<0.1	**28.1**				
2/01/2020	**27.3***	<0.1	**27.3**				
23/01/2020	**25.8***	<0.1	**25.8**				
7/06/2020	24.6	<0.1	24.6	10/06/2020	8.2	0.1	8.3
6/06/2020	24.1	<0.1	24.1	27/04/2020	6.7	0.1	6.8
27/01/2020	23	<0.1	23.0	17/02/2020	2.1	0.1	2.2
2/08/2020	22.5	<0.1	22.5	21/12/2020	3.3	0.1	3.4
3/01/2020	21.3	0.1	21.4	10/02/2020	4.1	0.1	4.2
1/01/2020	21.1	<0.1	21.1	16/12/2020	3.7	0.1	3.8
17/05/2020	21.1	<0.1	21.1	7/10/2020	7	0.1	7.1
13/01/2020	20.7	<0.1	20.7	11/03/2020	3.9	0.1	4.0
30/08/2020	20.7	<0.1	20.7	25/07/2020	19.9	0.1	20.0
29/01/2020	20.1	<0.1	20.1	13/04/2020	13.5	0.1	13.6

***** Exceptional event day

Table D-4: Cumulative 24-hour average $PM_{2.5}$ concentration (µg/m³) – Receptor IND1

Ranked by Highest to Lowest Background Concentrations				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
8/01/2020	**72.9***	<0.1	**72.9**				
12/01/2020	**46.5***	<0.1	**46.5**				
5/01/2020	**37***	<0.1	**37.0**				
24/01/2020	**35.9***	<0.1	**35.9**				
29/08/2020	**35.8**	0.3	**36.1**				
17/01/2020	**30.8***	<0.1	**30.8**				
11/01/2020	**30.7***	<0.1	**30.7**				
4/01/2020	**28.1***	0.1	**28.2**				
2/01/2020	**27.3***	<0.1	**27.3**				
23/01/2020	**25.8***	<0.1	**25.8**				
7/06/2020	24.6	<0.1	24.6	13/06/2020	ND	1.0	1.0
6/06/2020	24.1	0.3	24.4	28/04/2020	6.8	0.9	7.7
27/01/2020	23	0.5	23.5	10/02/2020	4.1	0.9	5.0
2/08/2020	22.5	0.2	22.7	10/06/2020	8.2	0.9	9.1
3/01/2020	21.3	0.5	21.8	23/02/2020	3.1	0.8	3.9
1/01/2020	21.1	0.1	21.2	21/10/2020	4.6	0.8	5.4
17/05/2020	21.1	<0.1	21.1	25/01/2020	12.8	0.8	13.6
13/01/2020	20.7	0.5	21.2	5/03/2020	4.7	0.8	5.5
30/08/2020	20.7	<0.1	20.7	5/02/2020	3.7	0.8	4.5
29/01/2020	20.1	<0.1	20.1	21/12/2020	3.3	0.8	4.1

***** Exceptional event day, ND – no data

Table D-5: Cumulative 24-hour average $PM_{2.5}$ concentration (µg/m³) – Receptor IND2

Ranked by Highest to Lowest Background Concentrations				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
8/01/2020	72.9*	<0.1	72.9				
12/01/2020	46.5*	0.1	46.6				
5/01/2020	37*	<0.1	37.0				
24/01/2020	35.9*	0.2	36.1				
29/08/2020	35.8	0.9	36.7				
17/01/2020	30.8*	<0.1	30.8				
11/01/2020	30.7*	<0.1	30.7				
4/01/2020	28.1*	0.8	28.9				
2/01/2020	27.3*	<0.1	27.3				
23/01/2020	25.8*	1.2	27.0				
7/06/2020	24.6	0.1	24.7	8/05/2020	5.3	3.1	8.4
6/06/2020	24.1	0.9	25.0	20/05/2020	ND	2.4	2.4
27/01/2020	23	<0.1	23.0	2/07/2020	5.5	2.2	7.7
2/08/2020	22.5	0.5	23.0	16/04/2020	7.9	2.2	10.1
3/01/2020	21.3	<0.1	21.3	18/08/2020	3.1	2.2	5.3
1/01/2020	21.1	<0.1	21.1	24/10/2020	4.1	2.2	6.3
17/05/2020	21.1	0.1	21.2	13/11/2020	5.4	2.2	7.6
13/01/2020	20.7	<0.1	20.7	10/07/2020	15.7	2.2	17.9
30/08/2020	20.7	1.1	21.8	20/06/2020	10.7	2.1	12.8
29/01/2020	20.1	<0.1	20.1	7/05/2020	9.6	2.1	11.7

* Exceptional event day, ND – no data

Table D-6: Cumulative 24-hour average PM_{10} concentration (µg/m³) – Receptor R1

Ranked by Highest to Lowest Background Concentrations				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
23/01/2020	188.9*	0.1	189.0				
8/01/2020	98.9*	<0.1	98.9				
24/01/2020	98.7*	<0.1	98.7				
5/01/2020	71.1*	<0.1	71.1				
12/01/2020	67.6*	<0.1	67.6				
4/01/2020	61.6*	<0.1	61.6				
25/01/2020	58.2*	<0.1	58.2				
1/01/2020	52.5*	<0.1	52.5				
11/01/2020	51.6*	<0.1	51.6				
2/01/2020	49.9*	<0.1	49.9	11/07/2020	14.8	0.5	15.3
17/11/2020	48.2	<0.1	48.2	15/06/2020	ND	0.4	0.4
27/01/2020	44.5	<0.1	44.5	3/08/2020	17.8	0.3	18.1
27/11/2020	44.4	<0.1	44.4	30/03/2020	11.4	0.3	11.7
17/01/2020	41.3*	<0.1	41.3	16/06/2020	ND	0.3	0.3
3/01/2020	40.1*	<0.1	40.1	23/06/2020	10.3	0.3	10.6
2/02/2020	40.1*	0.1	40.2	21/06/2020	9.5	0.3	9.8
21/11/2020	38	<0.1	38.0	13/09/2020	12.7	0.3	13.0

Ranked by Highest to Lowest Background Concentrations				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
6/01/2020	37.9	<0.1	37.9	10/07/2020	19	0.3	19.3
29/01/2020	37.5	<0.1	37.5	20/04/2020	18.9	0.3	19.2
3/02/2020	37.5	<0.1	37.5	16/08/2020	6.2	0.3	6.5

***** Exceptional event day, ND – no data

Table D-7: Cumulative 24-hour average PM_{10} concentration (µg/m³) – Receptor R2

Ranked by Highest to Lowest Background Concentrations				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
23/01/2020	**188.9***	0.1	**189.0**				
8/01/2020	**98.9***	<0.1	**98.9**				
24/01/2020	**98.7***	<0.1	**98.7**				
5/01/2020	**71.1***	<0.1	**71.1**				
12/01/2020	**67.6***	<0.1	**67.6**				
4/01/2020	**61.6***	0.1	**61.7**				
25/01/2020	**58.2***	0.1	**58.3**				
1/01/2020	**52.5***	<0.1	**52.5**				
11/01/2020	**51.6***	<0.1	**51.6**				
2/01/2020	49.9*	<0.1	49.9	7/09/2020	15.2	0.6	15.8
17/11/2020	48.2	<0.1	48.2	5/03/2020	16.1	0.5	16.6
27/01/2020	44.5	<0.1	44.5	10/07/2020	19	0.5	19.5
27/11/2020	44.4	0.1	44.5	28/04/2020	17.8	0.5	18.3
17/01/2020	41.3*	<0.1	41.3	1/03/2020	21.7	0.5	22.2
3/01/2020	40.1*	<0.1	40.1	29/04/2020	20.9	0.4	21.3
2/02/2020	40.1*	<0.1	40.1	14/08/2020	20.4	0.4	20.8
21/11/2020	38	<0.1	38.0	1/07/2020	13.6	0.4	14.0
6/01/2020	37.9	<0.1	37.9	13/06/2020	14.5	0.4	14.9
29/01/2020	37.5	<0.1	37.5	2/09/2020	23.3	0.4	23.7
3/02/2020	37.5	<0.1	37.5	22/11/2020	23.4	0.4	23.8

***** Exceptional event day

Table D-8: Cumulative 24-hour average PM_{10} concentration (µg/m³) – Receptor R3

Ranked by Highest to Lowest Background Concentrations				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
23/01/2020	**188.9***	<0.1	**188.9**				
8/01/2020	**98.9***	<0.1	**98.9**				
24/01/2020	**98.7***	<0.1	**98.7**				
5/01/2020	**71.1***	<0.1	**71.1**				
12/01/2020	**67.6***	<0.1	**67.6**				
4/01/2020	**61.6***	<0.1	**61.6**				

Ranked by Highest to Lowest Background Concentrations				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
25/01/2020	**58.2***	0.1	**58.3**				
1/01/2020	**52.5***	<0.1	**52.5**				
11/01/2020	**51.6***	<0.1	**51.6**				
2/01/2020	49.9*	<0.1	49.9	10/06/2020	11.2	0.3	11.5
17/11/2020	48.2	<0.1	48.2	27/04/2020	21.4	0.2	21.6
27/01/2020	44.5	0.1	44.6	10/02/2020	12.5	0.2	12.7
27/11/2020	44.4	<0.1	44.4	21/12/2020	11.6	0.2	11.8
17/01/2020	41.3*	<0.1	41.3	17/02/2020	10.6	0.2	10.8
3/01/2020	40.1*	0.1	40.2	18/06/2020	17.5	0.2	17.7
2/02/2020	40.1*	0.1	40.2	11/03/2020	15.6	0.2	15.8
21/11/2020	38	<0.1	38.0	7/10/2020	19.3	0.2	19.5
6/01/2020	37.9	0.1	38.0	31/07/2020	21.7	0.2	21.9
29/01/2020	37.5	<0.1	37.5	13/04/2020	21.8	0.2	22.0
3/02/2020	37.5	<0.1	37.5	16/12/2020	14	0.2	14.2

* Exceptional event day

Table D-9: Cumulative 24-hour average PM_{10} concentration (µg/m³) – Receptor IND1

Ranked by Highest to Lowest Background Concentrations				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
23/01/2020	**188.9***	<0.1	**188.9**				
8/01/2020	**98.9***	<0.1	**98.9**				
24/01/2020	**98.7***	0.2	**98.9**				
5/01/2020	**71.1***	<0.1	**71.1**				
12/01/2020	**67.6***	0.2	**67.8**				
4/01/2020	**61.6***	0.2	**61.8**				
25/01/2020	**58.2***	2.3	**60.5**				
1/01/2020	**52.5***	0.2	**52.7**				
11/01/2020	**51.6***	<0.1	**51.6**				
2/01/2020	49.9*	0.1	50.0	13/06/2020	14.5	2.9	17.4
17/11/2020	48.2	0.1	48.3	28/04/2020	17.8	2.8	20.6
27/01/2020	44.5	1.4	45.9	10/06/2020	11.2	2.6	13.8
27/11/2020	44.4	1.5	45.9	10/02/2020	12.5	2.5	15.0
17/01/2020	41.3*	<0.1	41.3	27/04/2020	21.4	2.4	23.8
3/01/2020	40.1*	1.3	41.4	15/01/2020	17.3	2.3	19.6
2/02/2020	40.1*	0.3	40.4	21/10/2020	14	2.3	16.3
21/11/2020	38	0.3	38.3	25/01/2020	**58.2***	2.3	**60.5**
6/01/2020	37.9	0.8	38.7	18/06/2020	17.5	2.2	19.7
29/01/2020	37.5	0.2	37.7	12/03/2020	12.5	2.2	14.7
3/02/2020	37.5	<0.1	37.5	23/02/2020	13.2	2.2	15.4

* Exceptional event day

Table D-10: Cumulative 24-hour average PM_{10} concentration (µg/m³) – Receptor IND2

Ranked by Highest to Lowest Background Concentrations				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
23/01/2020	**188.9***	3.4	**192.3**				
8/01/2020	**98.9***	<0.1	**98.9**				
24/01/2020	**98.7***	0.4	**99.1**				
5/01/2020	**71.1***	<0.1	**71.1**				
12/01/2020	**67.6***	0.4	**68.0**				
4/01/2020	**61.6***	2.0	**63.6**				
25/01/2020	**58.2***	0.6	**58.8**				
1/01/2020	**52.5***	<0.1	**52.5**				
11/01/2020	**51.6***	<0.1	**51.6**				
2/01/2020	49.9*	<0.1	49.9	8/05/2020	13.3	8.5	21.8
17/11/2020	48.2	<0.1	48.2	20/05/2020	10.4	6.6	17.0
27/01/2020	44.5	<0.1	44.5	10/07/2020	19	6.5	25.5
27/11/2020	44.4	0.4	44.8	1/07/2020	13.6	6.4	20.0
17/01/2020	41.3*	<0.1	41.3	18/08/2020	7.8	6.3	14.1
3/01/2020	40.1*	0.1	40.2	31/05/2020	14.7	6.2	20.9
2/02/2020	40.1*	0.2	40.3	20/06/2020	10.9	6.1	17.0
21/11/2020	38	<0.1	38.0	13/11/2020	11.8	6.1	17.9
6/01/2020	37.9	0.1	38.0	16/04/2020	18.2	6.0	24.2
29/01/2020	37.5	<0.1	37.5	2/07/2020	13.3	6.0	19.3
3/02/2020	37.5	0.1	37.6	24/10/2020	9.1	5.9	15.0

* Exceptional event day