ADDENDUM REPORT

WILKINSON MURRAY

KEMBLA GRANGE RESOURCE RECOVERY FACILITY - SSD5300 MODIFICATION TO OPERATIONAL HOURS

50 WYLLIE ROAD, KEMBLA GRANGE

AIR QUALITY ASSESSMENT
RWDI # 2104404
November 4, 2021

SUBMITTED TO

Dr Mark Jackson
Director
Jackson Environment and Planning Pty Ltd
mark@jacksonenvironment.com.au

SUBMITTED BY

John Wassermann
Senior Technical Director
john.Wassermann@rwdi.com

RWDI Australia Pty Ltd (RWDI)
Level 4, 272 Pacific Highway
Crows Nest, NSW, 2065, Australia
T: +61.2.9437.4611
E-mail: solutions@rwdi.com
ABN: 86 641 303 871

DOCUMENT CONTROL

Version	Status	Date	Prepared By	Reviewed By
A	Draft	16 July 2021	John Wassermann	Ben Lawrence
B	Final	20 August 2021	John Wassermann	Ben Lawrence
C	Final	20 August 2021	John Wassermann	Ben Lawrence
D	Final	18 October 2021	John Wassermann	Ben Lawrence
E	Final	4 November 2021	John Wassermann	Ben Lawrence

NOTE

All materials specified by RWDI Australia Pty Ltd (RWDI) have been selected solely on the basis of acoustic performance. Any other properties of these materials, such as fire rating, chemical properties etc. should be checked with the suppliers or other specialised bodies for fitness for a given purpose.

The information contained in this document produced by RWDI is solely for the use of the client identified on the front page of this report. Our client becomes the owner of this document upon full payment of our **Tax Invoice** for its provision. This document must not be used for any purposes other than those of the document's owner. RWDI undertakes no duty to or accepts any responsibility to any third party who may rely upon this document.

WILKINSON MURRAY

In October 2020, Wilkinson Murray Pty Limited merged with RWDI Group, a leading international consulting firm. Wilkinson Murrays core practise areas of noise, acoustics, vibration and air quality consulting built since 1962 servicing Australia and Asia-Pacific region will complement RWDI practise areas. Combined, RWDI+Wilkinson Murray is one of the largest teams globally specialising in the area of noise, acoustics, vibration and air quality.

RWDI

RWDI is a team of highly-specialised consulting engineers and scientists working to improve the built environment through three core areas of practice: building performance, climate engineering and environmental engineering. More information is available at www.rwdi.com.

QUALITY ASSURANCE

RWDI Australia Pty Ltd operates a Quality Management System which complies with the requirements of AS/NZS ISO 9001:2015. This management system has been externally certified by SAI Global and Licence No. QEC 13457 has been issued for the following scope: The provision of consultancy services in acoustic engineering and air quality; and the sale, service, support and installation of acoustic monitoring and related systems and technologies.

TABLE OF CONTENTS

1 INTRODUCTION

Kembla Grange Recycling Pty Ltd (Kembla Grange Recycling) is the operator of the Kembla Grange Resource Recovery Facility, which has been successfully operating at 50 Wyllie Road in Kembla Grange (Lot 10 DP 878167) since 2013. In May 2017, Bingo Property Pty Ltd took ownership of the land and facility.

On 7 March 2016, approval was provided under State Significant Development SSD5300 to expand the facility's capacity to receive up to 230,000 tonnes per annum of construction, demolition, commercial, and industrial wastes. Subsequently, two modifications to the consent were approved to relocate a second weighbridge, enable installation of a larger weighbridge office, establish an indoor processing plant and for additional fire safety works including additional water storage and a pump room.

Bingo Industries is seeking to harmonise operational hours across its network of resource recovery facilities, and to enable operations in line with the 24/7 consent approval of their Eastern Creek Recycling Ecology Park Resource Recovery Facility. As such, Kembla Grange Recycling is seeking a planning consent modification (the Modification proposal) to extend operations from day only to 24 hours. This would enable more efficient use of the Kembla Grange facility to sort, pre-process, and accept material during the day, whilst transporting sorted material to the Eastern Creek facility in the evenings and nights. Sorting/ waste processing is not expected to occur during the evening and night periods.

No changes are sought to waste receival tonnages, overall traffic volumes, infrastructure, or existing buildings.

RWDI Australia was engaged by Jackson Environment and Planning Pty Ltd to conduct an air quality assessment to support the planning consent modification application.

This report provides an assessment of air quality impacts associated from the site including the proposed evening and night operations.

The assessment has been conducted in general accordance with the Approved Methods for the Modelling and Assessment of Air Pollutants in NSW, Department of Environment and Conservation (August 2015) (Approved Methods).

1.1 Response to Submissions

Following the public exhibition in relation to Kembla Grange Resource Recovery Facility (SSD-5300) Section 4.55(2) Modification for Loading and Transport 24 Hour Operation (MOD 3) three submissions relating to air quality were identified, namely:

- Department of Planning Environment & Industry;
- NSW EPA; and
- Wollongong City Council.

The submission and the responses to the submissions are presented in Table 1-1.

Table 1-1 : Air quality Submissions

Source of Submission	Submission	Summary of response in this report
Department of Planning Environment & Industry	Confirm that all existing and proposed new waste categories were included in air quality modelling assumptions.	Refer to Section 3. Crushing and screening of waste has been added to the dust emission inventory.
	Demonstrate that 2019-2020 was indicative of background conditions by comparing with previous background-years.	Refer to Section 6.1.1. The figures show the proportion of time that wind speed and wind direction are observed in certain ranges and compare these proportions for each year in the 2016-20 period over the entire 5-year period. Plots for individual years with the fewest and smallest deviations from the 5-year period are considered to best represent the 5-year period. Figure 6-1 and Figure 6-2, indicate that wind speed and wind direction during 2019 most closely represent the 5-year period.
	Identify the additional mitigation measures that are proposed to reduce air emissions from haulage activities and demonstrate these would reduce the emissions from the site.	Refer to Appendix B. Haul trucks are the primary source of dust. In order to reduce these dust emissions, mitigation in the form of watering the access roads have been included in the assessment. Watering of the access road (from the site office into the site) and truck turning/backing area has been included as mitigation, consistent with the original EIS and Air Quality Management Plan.

Source of Submission	Submission	Summary of response in this report
EPA	The emission inventory provided in table 9-1 of the AQIA does not cover all activities that occur at the Premises. For example, it does not include waste processing (crushing, screening etc) during daytime hours. Further, the total emissions caused by wind appears incorrect.	Crushing and screening of waste has be added to the dust emission inventory. Due to the addition of crushing and screening additional wind erosion area has been included in the emission inventory.
	The contour plots for PM10 and PM2.5 provided in Appendix C show relatively high impacts on neighbouring industrial premises.	The higher levels of dust are controlled within the boundary of the site (Refer to Appendix C). The Illawarra Water Filtration Plant and Dapto Patrick Autocare facility has incremental PM_{10} levels of between 5-10 µg/m³ and $PM_{2.5}$ levels of 1-2 µg/m³ which would not significantly impact these industrial premises.
	The EPA makes the following recommendation regarding air quality at the Premises: • Prior to approval, the proponent should commit to additional dust mitigation measures such as reducing emissions from haulage (noting that haulage makes up approximately 80% of total emissions).	Refer to Appendix B. Haul trucks are the primary source of dust. In order to reduce these dust emissions, mitigation in the form of watering the access roads have been included in the assessment. Watering of the access road (from the site office into the site) and truck turning/backing area has been included as mitigation, consistent with the original EIS and Air Quality Management Plan.
Wollongong City Council	1.3 Air Quality Assessment Air Quality Assessment RWDI Aus Pty Ltd dated August 2021 has assessed the Potential dust impacts associated with the day-to-day operational activities in accordance with the Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (EPA, 2016).	Noted

Source of Submission	Submission	Summary of response in this report
	It is understood the current Environment Protection Licence (EPL) for the facility has an ongoing air quality management plan condition for dust management strategies and control would be maintained for future operations. The deployment of these dust strategies and controls is considered to mitigate the potential occurrence of excessive dust emissions. The air quality assessment report has concluded "the results of the dispersion modelling indicate that PM_{10} and $PM_{2.5}$ particulate matter concentrations due to the Modification proposal can be adequately managed on site to mitigate impacts."	

2 LEGISLATIVE AND REGULATORY COMPLIANCE

The Minister's Conditions of Approval relevant to air quality are presented in Table 2-1.

Table 2-1 : Conditions of Approval relevant to Air Quality

Reference	Condition
B11	*The Applicant shall ensure the Development does not cause or permit the emission of any offensive odour (as defined under section 129 of the POEO Act)*
B12	*Prior to the commencement of construction of the Development, the Applicant shall prepare an Air Quality Management Plan to the satisfaction of the Secretary. The plan must:* a) *be prepared by a suitably qualified and experienced person(s) in consultation with the EPA* b) *describe the measures that would be implemented to ensure* i. *all reasonable and feasible measures are employed to minimise air emission, including details of water sprays for stockpiles, exposed areas and the dust suppression system for the crushing plant* ii. *compliance with the relevant conditions of this consent* iii. *contingency measures are employed to minimised impacts should adverse air emissions occur or appear likely to occur* c) *include well defined triggers for the deployment of construction and operational air quality measures* d) *include well defined triggers for ceasing or partly ceasing operations on suite during adverse air quality conditions* e) *include a protocol to determine the occurrence of an exceedance of any criteria in the EPL should an exceedance occur.*
B13	*The Applicant shall carry out the Development in accordance with the Air Quality Management plan approved by the Secretary (as revised and approved by the Secretary from time to time) unless otherwise agreed by the Secretary*

Environmental Protection Licence 20601 applies to the facility and associated activities, and contains conditions pertaining to air quality.

- Activities must be carried out in a manner that minimised the generation of dust;
- The premises must be maintained in a condition which prevents the emissions of dust from the premise;
- The licensee must ensure that no material, including sediment or oil, is tracked from the premise;
- Trucks entering and leaving the premise that are carrying loads must be covered at all times, expect during loading and unloading.

As required by condition B12 and B13 the site has an air quality management plan (Wollongong Recycling & Building Supplies Facility, May 2016). The air quality management plan presents detailed dust management strategies and controls that would be maintained for future operations.

The site does not accept putrescible waste or readily biodegradable wastes and has a Waste Monitoring Program (Approved by the Secretary DPE on 26/02/18) that ensures that all loads are monitored and if deemed to contain putrescible waste or asbestos are rejected from the site. Therefore, odour impacts associated with the site are expected to be negligible. Accordingly, odour impacts have not be considered further in this assessment.

3 PROPOSED DEVELOPMENT MODIFICATION DESCRIPTION

No changes are sought to waste receival tonnages, overall traffic volumes, or existing buildings. The planning modification is sought to broaden the operational hours under the development consent.

Current approved operational hours are as follows:

- Deliveries and operation of machinery: 7:00 am to 6:00 pm Monday to Saturday and 8:00 am to 4:00 pm Sundays;
- All other operational activities: 6:00 am to 6:00 pm Monday to Saturday, and 8:00 am to 4:00 pm Sundays; and
- Closed public holidays.

The existing and proposed operational hours are summarised in **Table 3-1**.

Table 3-1: Existing and Proposed Operational Hours

Hours	Currently Approved	Proposed
Deliveries and Operational		
Monday – Saturday	7:00 am – 6:00 pm	24-hours
Sunday	8:00 am – 4:00 pm	24-hours
No times on public holidays	NA	NA
Other Operational		
Monday – Saturday	6:00 am – 6:00 pm	24-hours
Sunday	8:00 am – 4:00 pm	24-hours
No times on public holidays	NA	NA

During the proposed evening and night hours, the equipment proposed to be operating on site would consist of a front-end loader, an excavator, and heavy vehicle movements for load out activities only. No waste sorting and processing will occur between the hours of 6:00 pm and 7:00 am Monday through Saturday, and between 4.00 pm and 8.00 am on Sundays. This would allow more efficient use of the Kembla Grange facility to sort, pre-process, and accept material during the day, whilst transporting sorted material in the evenings (after 6:00 pm Monday through Saturday and after 4:00 pm on Sundays) to the Eastern Creek facility. The result would be faster servicing of small vehicle drop-off of waste during the day, efficient vehicle traffic movements, and safer onsite conditions.

Figure 3-1 shows a layout of the existing facility.

Bingo aims to employ a "clean floor" policy, which would ensure most waste material received into their facilities during the day is sorted and transferred to their Eastern Creek facility in the evening or at night. As such, it would provide more space the following day for customer movements in the drop-off area, and for the preliminary sorting of waste to occur efficiently. To do this, modifications to existing planning consents for the site will be required to change the existing approved operational hours.

No changes are sought to overall traffic volumes or the overall numbers of vehicles arriving and departing from the facility. Under the proposed new hours, it is expected to have the following vehicle movements:

- Daytime: 580 vehicle movements; and
- Night time: 46 vehicle movements.

Trucks would access the site from the Princes Motorway, using Northcliffe Drive, Princes Highway, West Dapto Road, and Wyllie Road.

The Modification Proposal also seeks to allow for the receival of a small number of additional waste "categories" including:

- Non-chemical waste generated from manufacturing services (including metal, timber, paper, ceramics, plastics, thermosets and composites);
- Glass, plastic, rubber, plasterboard, ceramics, bricks, concrete or metal; and
- Office and packaging waste (including paper, plastics, glass, metal, timber) that is not contaminated or mixed with any other type of waste.

Whilst individually the waste types in the above categories are approved for receival under SSD5300 (with the exception of thermosets and composites and rubber), Bingo Industries are seeking to harmonise the broader definition of waste categories that can be received across its network of resource recovery facilities. These waste materials will be received and sorted in accordance with existing waste management practices. No changes are sought to waste receival tonnages, overall traffic volumes or existing buildings. As such, no impacts are expected from this amendment.

The Crushers and screens could operate on site. It is expected that the annual throughput for the crusher and screens is approximately 78,000 tonnes per annum with the outputs consisting of segregated concrete, brick, ceramics, Virgin Excavated Natural Material (VENM), asphalt waste, railway ballast, and cured concrete waste as well as sorted bricks and concrete. On a daily basis, the maximum through is expected to be 214 tonnes per day.

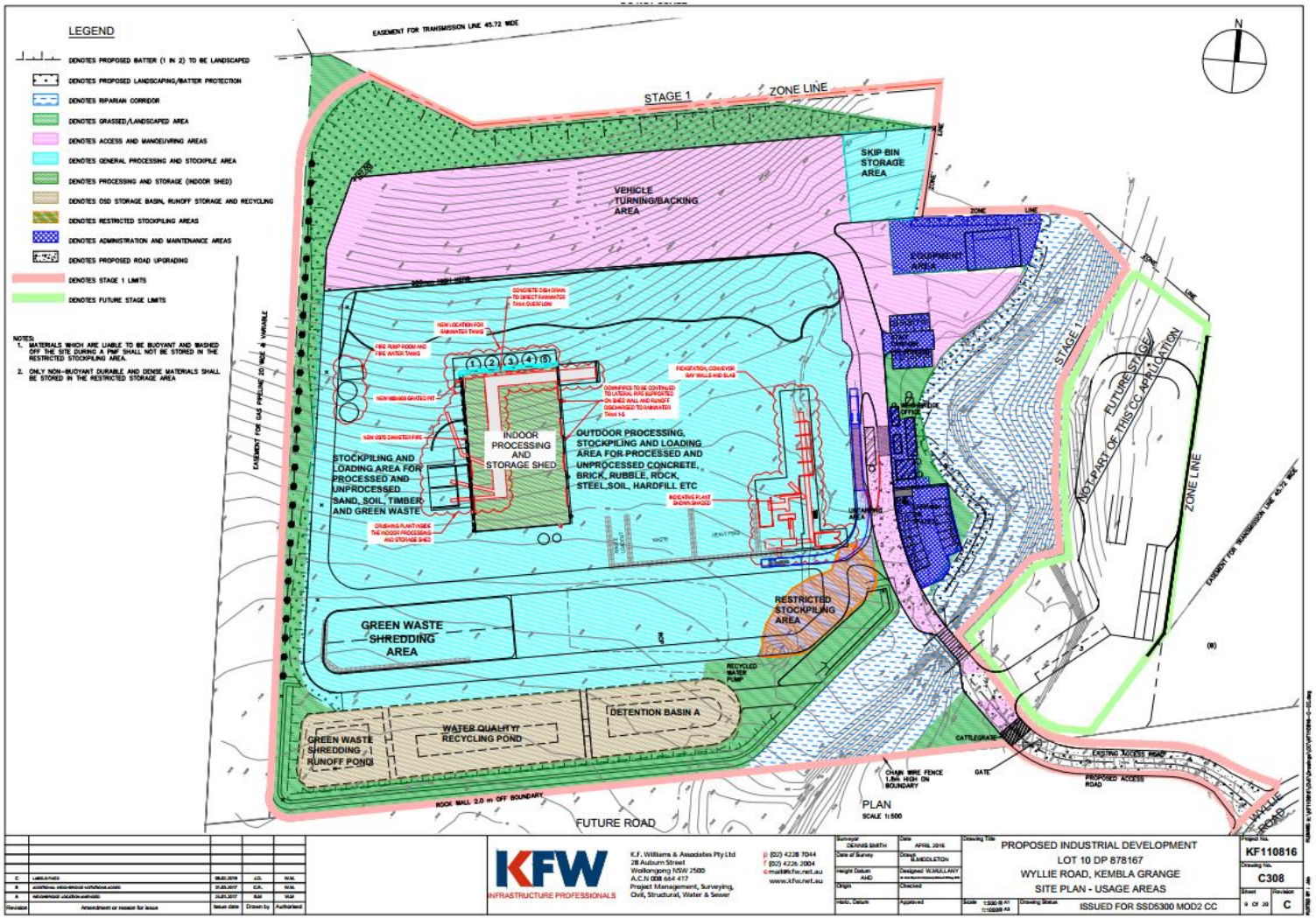


Figure 3-1: Kembla Grange Resource Recovery Facility Site Layout

4 SENSITIVE RECEIVERS

The Kembla Grange Resource Recovery Facility is located at 50 Wyllie Road in Kembla Grange (Lot 10 DP 878167). The sensitive receivers identified for the assessment of air quality generated by the facility are summarised in **Table 4-1** and shown in **Figure 4-1**.

Compliance at those receivers would infer compliance at all surrounding sensitive receivers.

Table 4-1 : Sensitive Receivers

Receiver ID	Receiver Type	Approx. Distance to Proposed Site Activities	Address / Description
R1	Residential	530 m	6 Bardess Crescent, Farmborough Heights
R2	Residential	500 m	55 Fairloch Avenue, Farmborough Heights
R3	Residential	500 m	65 Fairloch Avenue, Farmborough Heights
R4	Residential	950 m	421 Princes Highway, Kembla Grange
R5	Residential	1,290 m	14A Kingston Town Drive Kembla Grange
R6	Accommodation	460 m	Farmborough Heights Rural Fire Brigade Station
R7	Place of worship	560 m	Macedonian Church Sveta Petka
A1	Active recreation area	620 m	Sir Ian McLennan Oval
I1	Industrial premises	170 m	Veolia Water Technologies
I2	Industrial premises	200 m	Dapto Patrick Autocare - East carpark

Note: m = metres

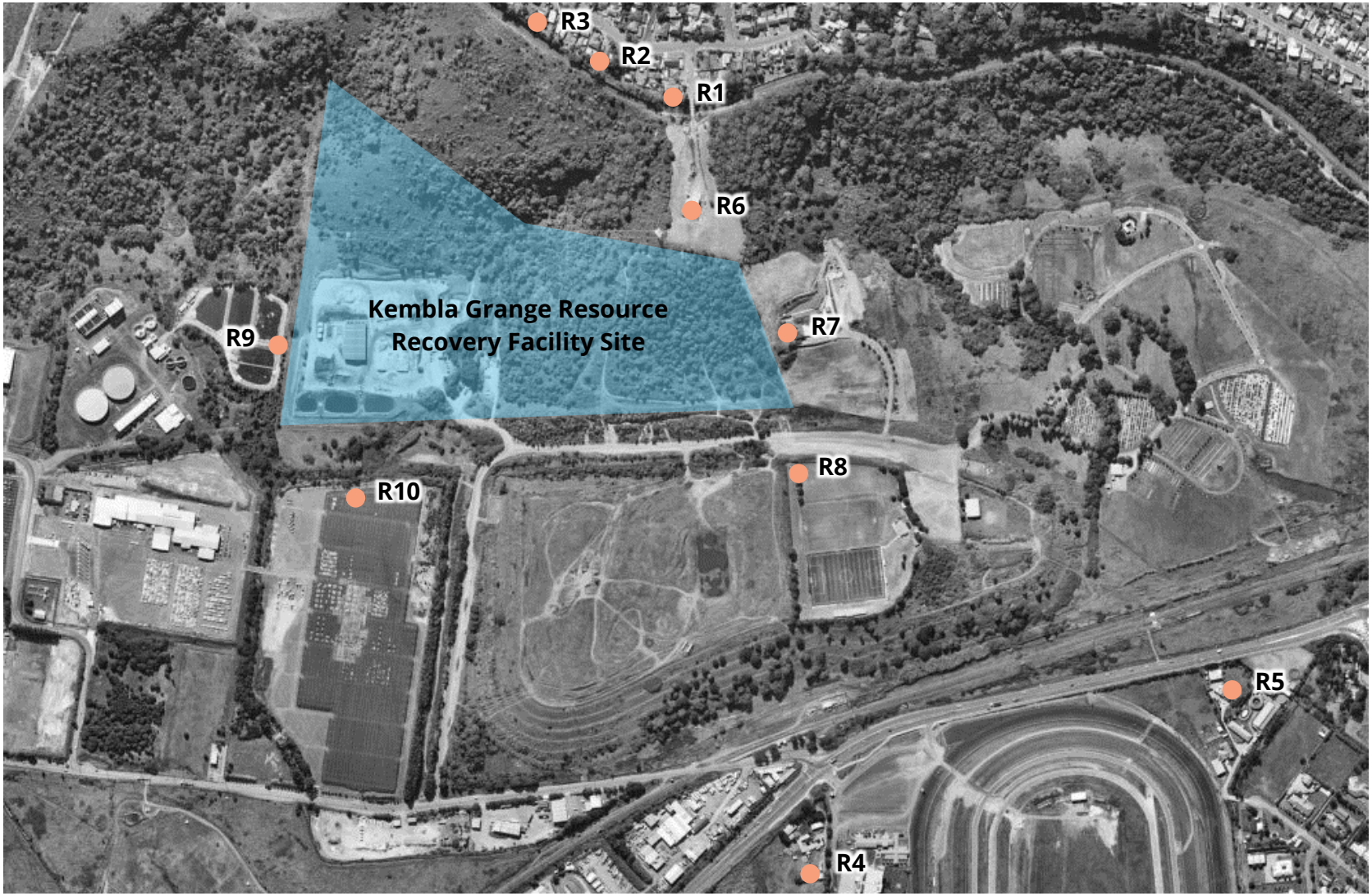


Figure 4-1 : Kembla Grange Resource Recovery Facility Site and Surrounding Receivers

5 AIR QUALITY CRITERIA

The NSW EPA's *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (the *Approved Methods*) sets out applicable impact assessment criteria for a number of air pollutants. 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 pollutants of interest in this study and the application air quality criteria for each pollutant.

5.1 Pollutants of Interest

Potential air pollutants associated with the Project comprise particulate matter (dust). Specifically, the following pollutants are identified requiring assessment:

- Particulate Matter (PM_{10}); and
- Particulate Matter ($PM_{2.5}$).

Total Suspended Particulates (TSP) and dust deposition, which are considered as an annual average, have not been considered as the modification does not change annual waste receival tonnages. The Modification proposal is only sought to broaden the operational hours under the development consent to 24 hours, therefore only PM_{10} and $PM_{2.5}$ 24-hour average pollutions concentrations are considered in this assessment.

5.2 Impact Assessment Criteria

The EPA Approved Methods specifies air quality assessment criteria for assessing impacts from dust generating activities. **Table 5-1** summarises the air quality goals for particulate matter that are relevant to this study. The air quality goals relate to the total concentrations of particulate matter in the air and not just that from the project. Therefore, some consideration of background levels needs to be made when using these goals to assess impacts.

Table 5-1 : Air Quality Assessment Criteria

Receiver	Averaging Period	Impact	Criteria
Particulate matter ≤10 µm (PM_{10})	24hour	Total	50 µg/m³
Particulate matter ≤2.5 µm ($PM_{2.5}$)	24hour	Total	25 µg/m³

6 EXISTING ENVIRONMENT

6.1 Local Meteorology

Meteorological conditions strongly influence air quality. Most significantly, wind speed, wind direction, temperature, relative humidity, and rainfall affect the dispersion of air pollutants, and are key inputs into dispersion models. The following sub-sections discuss the local meteorology near the Proposal site and identify a representative set of meteorological data for use in the dispersion modelling to be undertaken for this assessment.

6.1.1 Long-Term Climate

Long-term meteorological data for the area surrounding the site is available from the Bureau of Meteorology (BoM). Long-term climate statistics are presented in **Table 6-1**. Temperature data recorded indicates that January is the hottest month of the year, with a mean daily maximum temperature of 25.0°C July is the coolest month with a mean daily minimum temperature of 10.1°C. February is the wettest month with an average rainfall of 144.8 mm falling over 13.5 days. There are, on average, 129 rain days per year, delivering 1,128 mm of rain.

Table 6-1 : Long Term Climate Statistics

Obs.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
9am Mean Observations													
Temp (°C)	21.8	21.9	20.7	19.4	16.6	14.3	13.4	14.4	16.8	18.2	18.9	20.8	18.1
Hum (%)	75	76	74	66	63	63	60	56	59	62	72	71	66
3pm Mean Observations													
Temp (°C)	23.2	23.3	22.6	20.7	18.5	16.5	15.8	16.7	18.1	19.1	20.3	22.2	19.7
Hum (%)	72	74	70	67	61	59	56	54	61	64	70	69	65
Daily Minimum and Maximum Temperatures													
Min (°C)	19.1	19.2	18.1	15.6	13.1	11.1	10.1	10.5	12.4	14.1	15.8	17.6	14.7
Max (°C)	25.0	24.8	24.0	22.3	19.9	17.6	17.1	18.0	20.2	21.6	22.4	24.0	21.4
Rainfall													
Rain (mm)	82.0	144.8	126.0	89.4	79.1	121.2	77.0	93.8	54.8	75.0	92.1	74.6	1127.9
Rain (days)	12.2	13.5	13.8	9.9	8.7	10.7	8.5	8.0	8.8	11.0	12.2	11.9	129.2

6.1.1 Wind

Department of Planning Industry and Environment have an automatic weather station (AWS) in Kembla Grange approximately 1,200 m from the recycling facility. A detailed analysis of wind speed and wind direction observations at Kembla Grange over the period 2016-2020 are provided in **Figure 6-1** and **Figure 6-2**, respectively. The figures show the proportion of time that wind speed and wind direction are observed in certain ranges and compare these proportions for each year in the 2016-20 period over the entire 5-year period. Plots for individual years with the fewest and smallest deviations from the 5-year period are considered to best represent the 5-year period. **Figure 6-1** and **Figure 6-2**, indicate that wind speed and wind direction during 2019 most closely represent the 5-year period.

Figure 6-1: Wind Speed Comparison, Kembla Grange

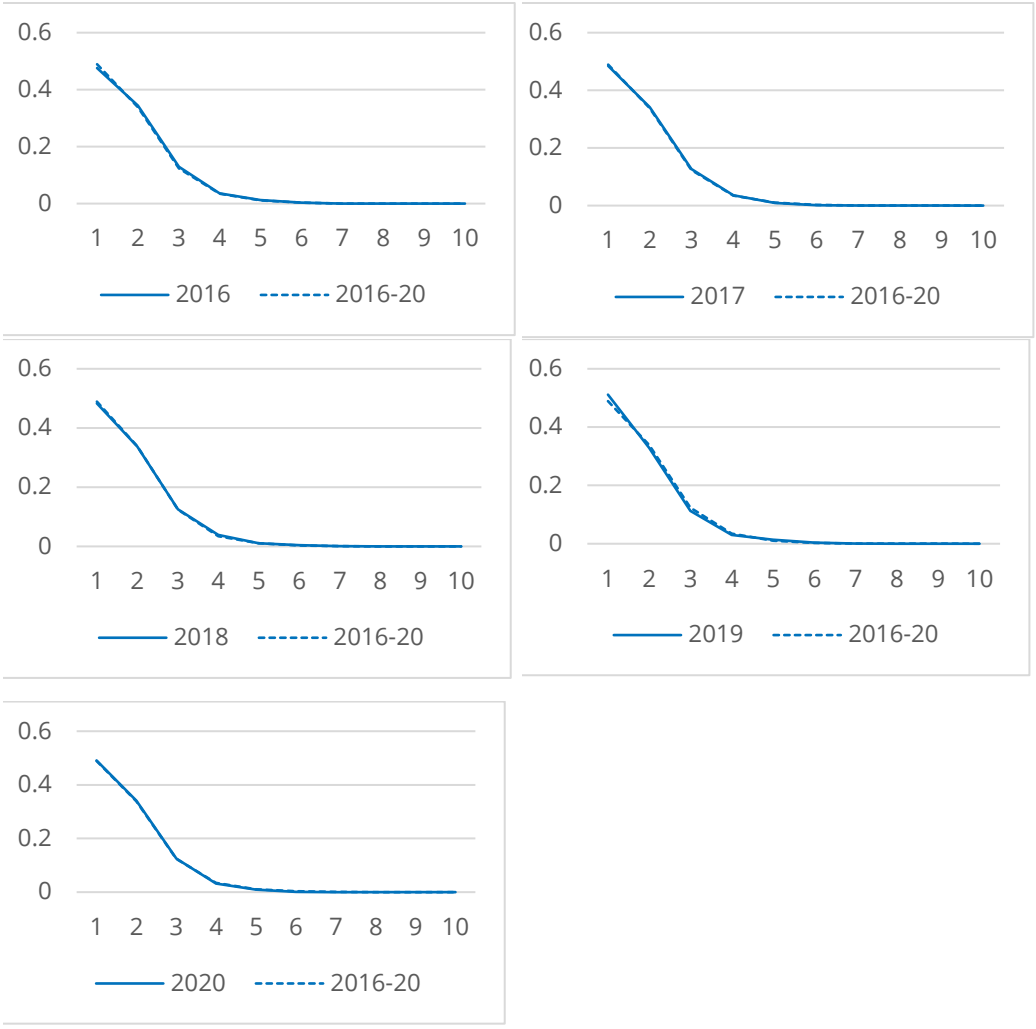


Figure 6-2: Wind Direction Comparison, Port Kembla BOM

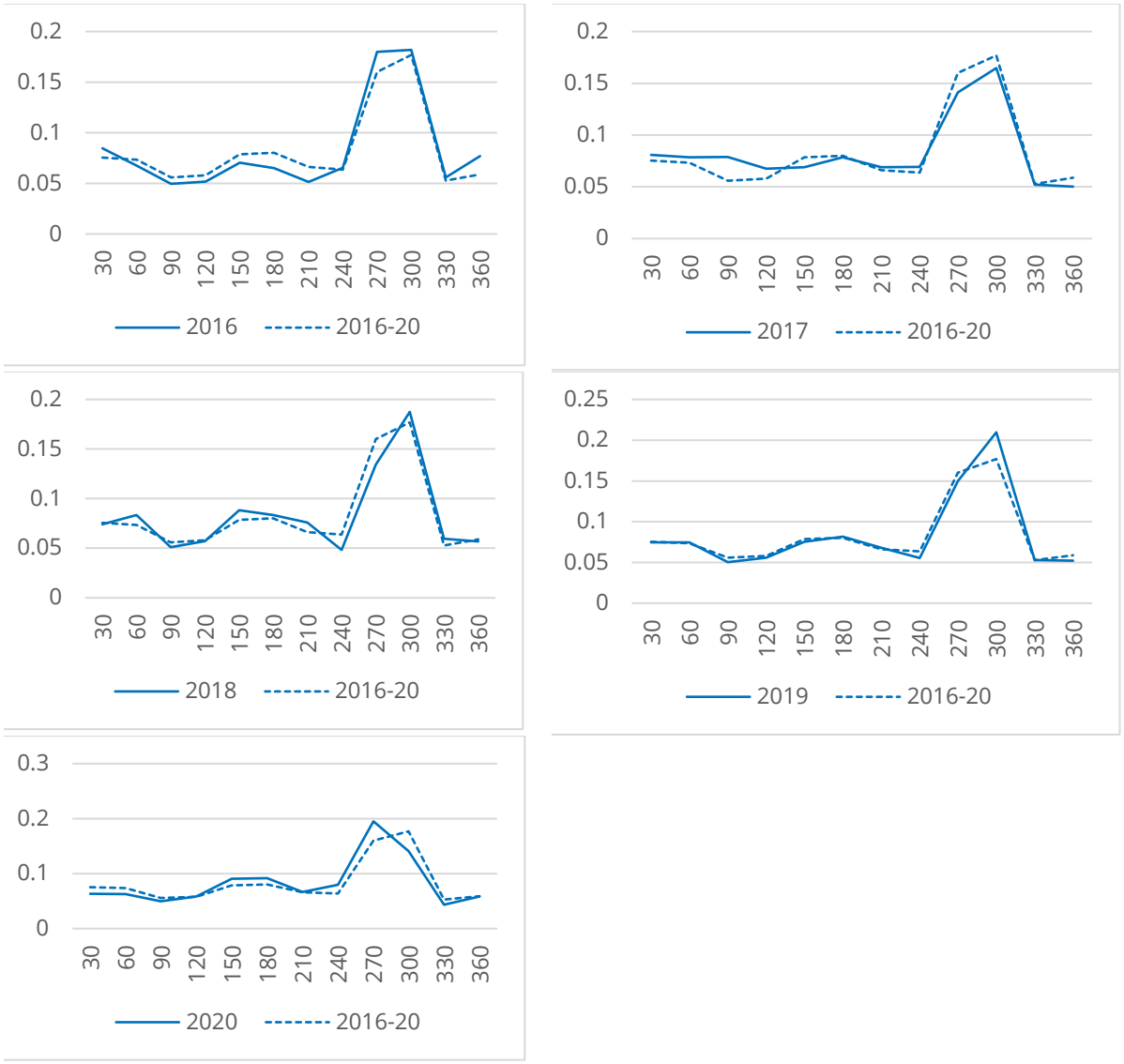
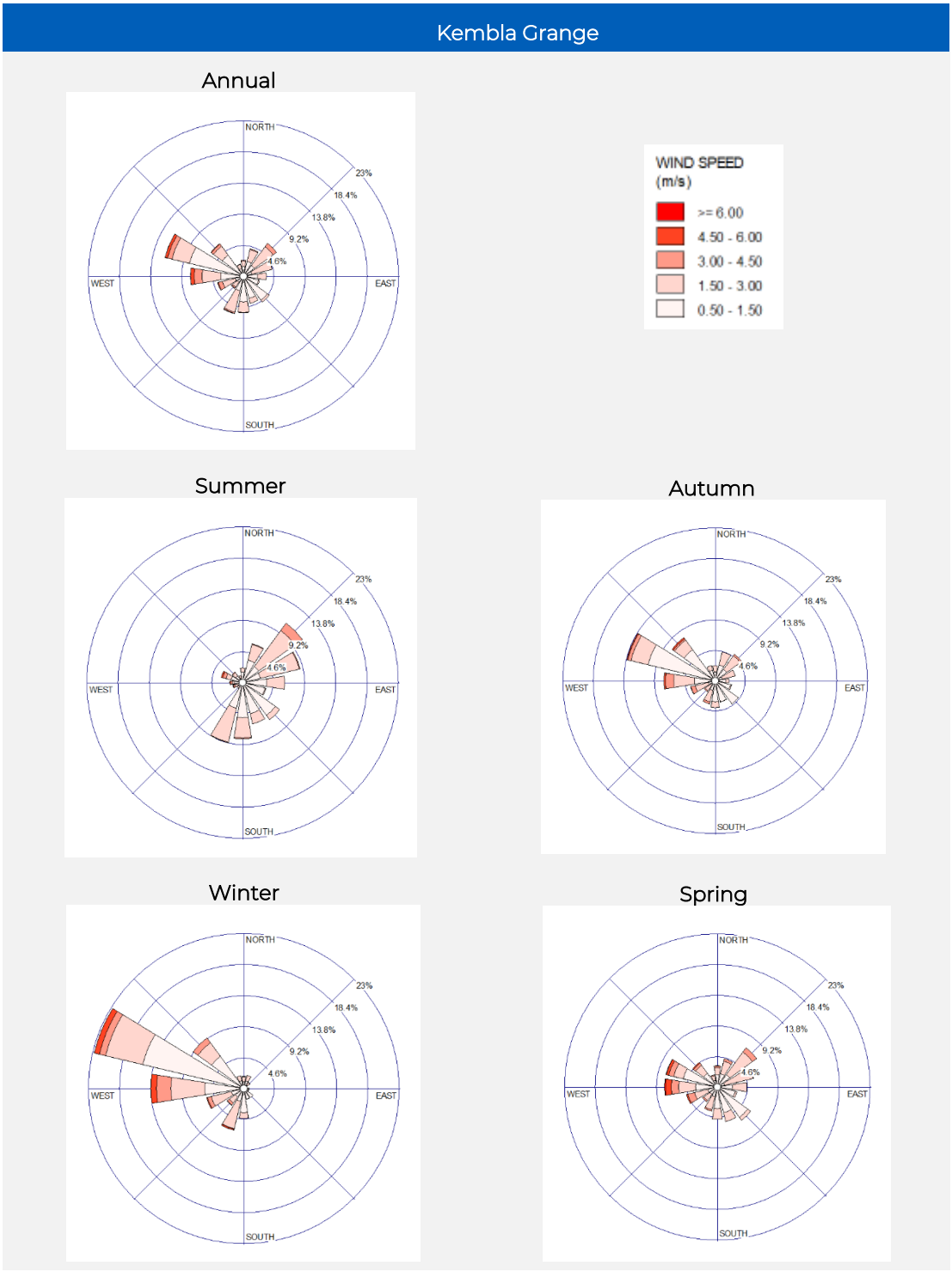


Figure 6-3 presents annual and seasonal "wind rose" plots for the Kembla Grange meteorological station for the period 2019. The plots show similar patterns of wind speed and wind direction over the five-year period, with north-westerly winds being prevalent in autumn and winter, north-easterly winds being prevalent in summer.

Figure 6-3: Wind Rose, Kembla Grange AWS, 2019



7 EXISTING AIR QUALITY

Air quality standards and goals refer to pollutant levels which include the project and existing sources. To fully assess impacts against all the relevant air quality standards and goals it is necessary to have information or estimates on existing pollutant concentrations in the area in which the project is likely to contribute to these levels.

There has been no monitoring undertaken specifically for this project, but there is data available from the Department of Planning, Industry and Environment (DPIE) air monitoring network. The station that is expected to be most representative of the site is Kembla Grange approximately 1,200 m from recycling facility.

A summary of the PM_{10} and $PM_{2.5}$ monitoring results collected at the Kembla Grange monitoring site during between 2016-2020 is presented in **Table 7-1**.

Table 7-1: 20-16-2020 Particulate matter monitoring results – Kembla Grange

Pollutant	Annual Average (µg/m³)	
	PM_{10}	$PM_{2.5}$
2016	20	6.6
2017	20.5	6.9
2018	22.7	7
2019	25.5 (115.8 Maximum)	8.8 (47.6 Maximum)
2020	21.5	7

The daily PM_{10} and $PM_{2.5}$ monitoring results collected at the Kembla Grange monitoring site during 2019 is presented in **Figure 7-1** and **Figure 7-2.**

When characterising typical ambient air quality, impacts from extreme events such as bushfires and dust storms are usually excluded. The highest 24-hour average PM_{10} and $PM_{2.5}$ concentrations measured at Kembla Grange air quality monitoring station (AQMS) during 2019 were 115.8 µg/m^3 and 47.6 µg/m^3 and were due to bushfires.

For an air quality impact assessment of $PM_{2.5}$ and PM_{10} 24-hour average, consistent with the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* there are two assessment methodologies available, namely:

- Level 1 assessment; and
- Level 2 assessment.

The methodology for each assessment is presented below:

Level 1 assessments

- Obtain ambient monitoring data that includes at least one year of continuous measurements.
- Determine the maximum background concentration of the pollutant being assessed for each relevant averaging period.
- At the maximum exposed off-site receptor, add the maximum background concentration and the 100th percentile dispersion model prediction to obtain the total impact for each averaging period.

Level 2 assessments

- Obtain ambient monitoring data that includes at least one year of continuous measurements and is contemporaneous with the meteorological data used in the dispersion modelling.
- At each receptor, determine the 100th percentile (maximum) total impact for the relevant averaging.
- At each receptor, add each individual dispersion model prediction to the corresponding measured background concentration to obtain predictions of total impact and calculate if any additional exceedance of the air quality assessment criteria would occur with the project,

Since the background $PM_{2.5}$ and PM_{10} are already high for 24-hour average $PM_{2.5}$ and PM_{10}, a detailed level 2 contemporaneous assessment has been conducted whereby the measured ambient concentrations at the Kembla Grange AQMS are added to the dispersion model results for each day of the simulation.

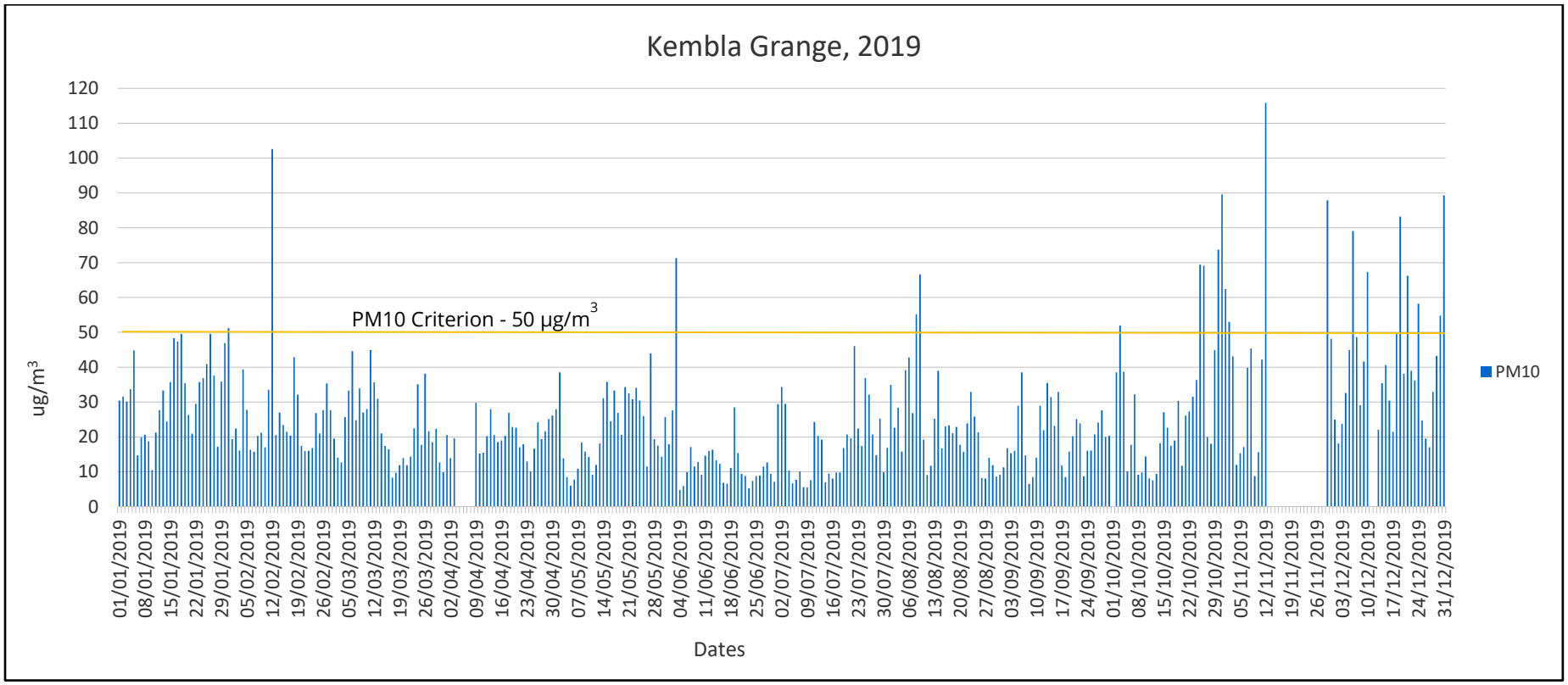


Figure 7-1: Ambient PM_{10} (24hr average) concentrations measured at Kembla Grange in 2019

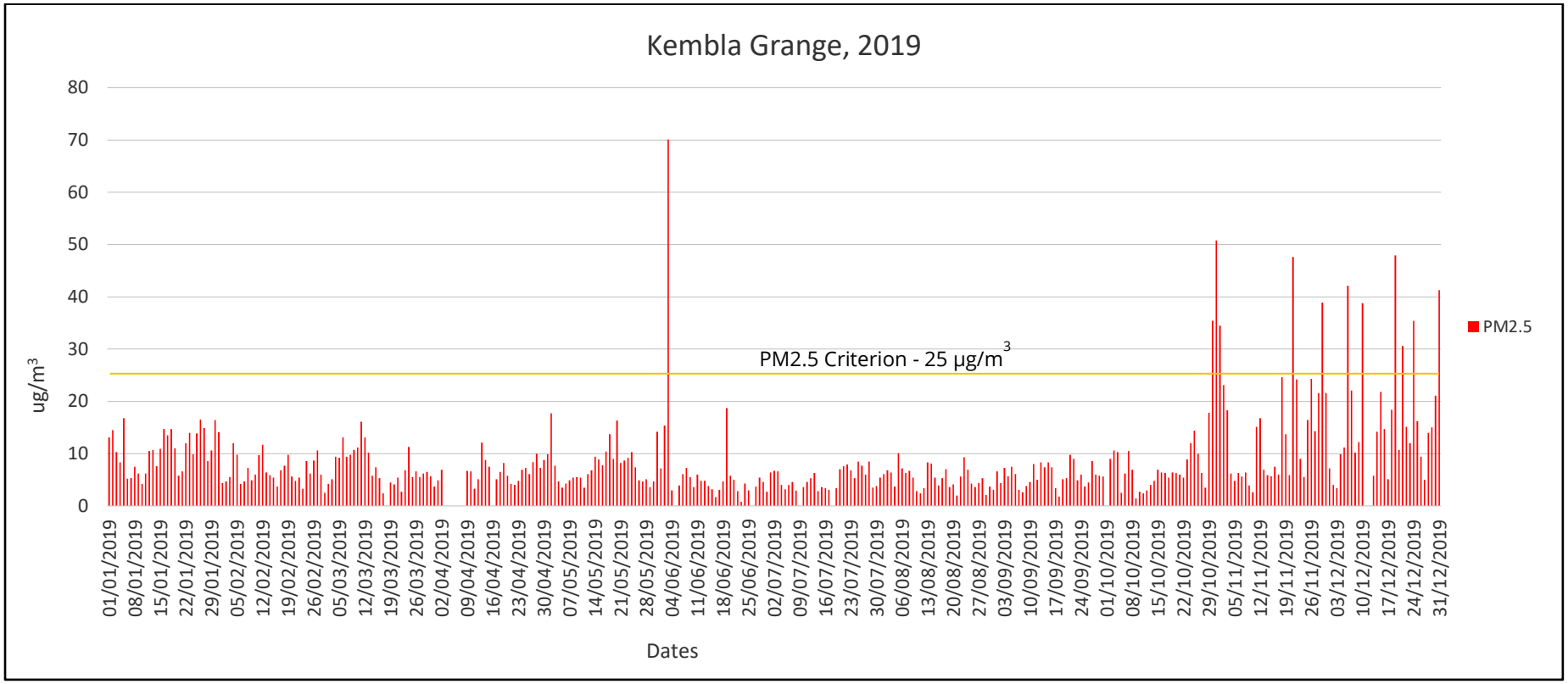


Figure 7-2: Ambient $PM_{2.5}$ (24hr average) concentrations measured at Kembla Grange in 2019

8 DISPERSION MODELLING

8.1 Meteorological Modelling

No meteorological observation data is available for the site. Therefore, site-specific meteorological data was generated through the use of a prognostic model. The prognostic model used was The Air Pollution Model (TAPM), developed and distributed by the Commonwealth Scientific and industrial Research Organisation (CSIRO).

TAPM is an incompressible, non-hydrostatic, primitive equations prognostic model with a terrain-following vertical coordinate for three-dimensional simulations. It predicts the flows important to local scale air pollution, such as sea breezes and terrain induced flows, against a background of large-scale meteorology provided by synoptic analyses. TAPM benefits from having access to databases of terrain, vegetation and soil type, leaf area index, sea-surface temperature, and synoptic scale meteorological analyses for various regions around the world.

The prognostic modelling domain was centred at 34.46° S, 150.81° E and involved four nesting grids of 30 km, 10 km, 3 km and 1km with 41 grids in the lateral dimensions and 25 vertical levels.

The TAPM model included assimilation of wind data collected at the Port Kembla BOM monitoring station during 2019. As discussed above, observations of wind speed and wind direction during 2019 at Port Kembla are representative of longer term trends and have therefore been selected for modelling purposes.

8.2 AERMET

AERMET is the meteorological pre-processor in the AERMOD modelling system. AERMET accepts input data for local meteorology and land use to produce “surface” and “profile” files for AERMOD.

Outputs of the following meteorological parameters from the TAPM simulation were used as inputs to AERMET:

- Temperature;
- Humidity;
- Wind speed;
- Wind direction;
- Rainfall; and
- Cloud cover.

Surface conditions strongly influence meteorology and dispersion, and AERMET uses three parameters to characterise the surface conditions:

- Albedo;
- Bowen ratio; and
- Surface roughness length.

Albedo described the amount of incident solar radiation that is reflected by the Earth's surface and Bowen ratio is a measure of the moisture of the surface. These parameters are important in modelling "thermal" mixing of pollutants during convective conditions. The surface roughness length is a measure of the roughness of the surface and is important in determining the degree of "mechanical" mixing of pollutants.

The Albedo, Bowen ratio and surface roughness length in the model were designated based on land use, which was determined by reviewing aerial imagery.

Figure 8-1 presents annual and seasonal wind rose plots for the dataset generated using AERMET. The plots show reasonable agreement with the observations at the Kembla Grange AWS.

8.3 Dispersion Modelling

8.3.1 AERMOD

The dispersion model chosen for this assessment was AERMOD – the US EPA regulatory Gaussian plume air dispersion model.

AERMOD is a steady state plume model that incorporates air dispersion based on planetary boundary layer turbulence structure and scaling concepts. It includes treatment of both surface and elevated sources, and both simple and complex terrain.

AERMOD was selected by the Victorian EPA to replace AUSPLUME from 1 January 2014, and its use is accepted by NSW EPA.

2019	AERMET

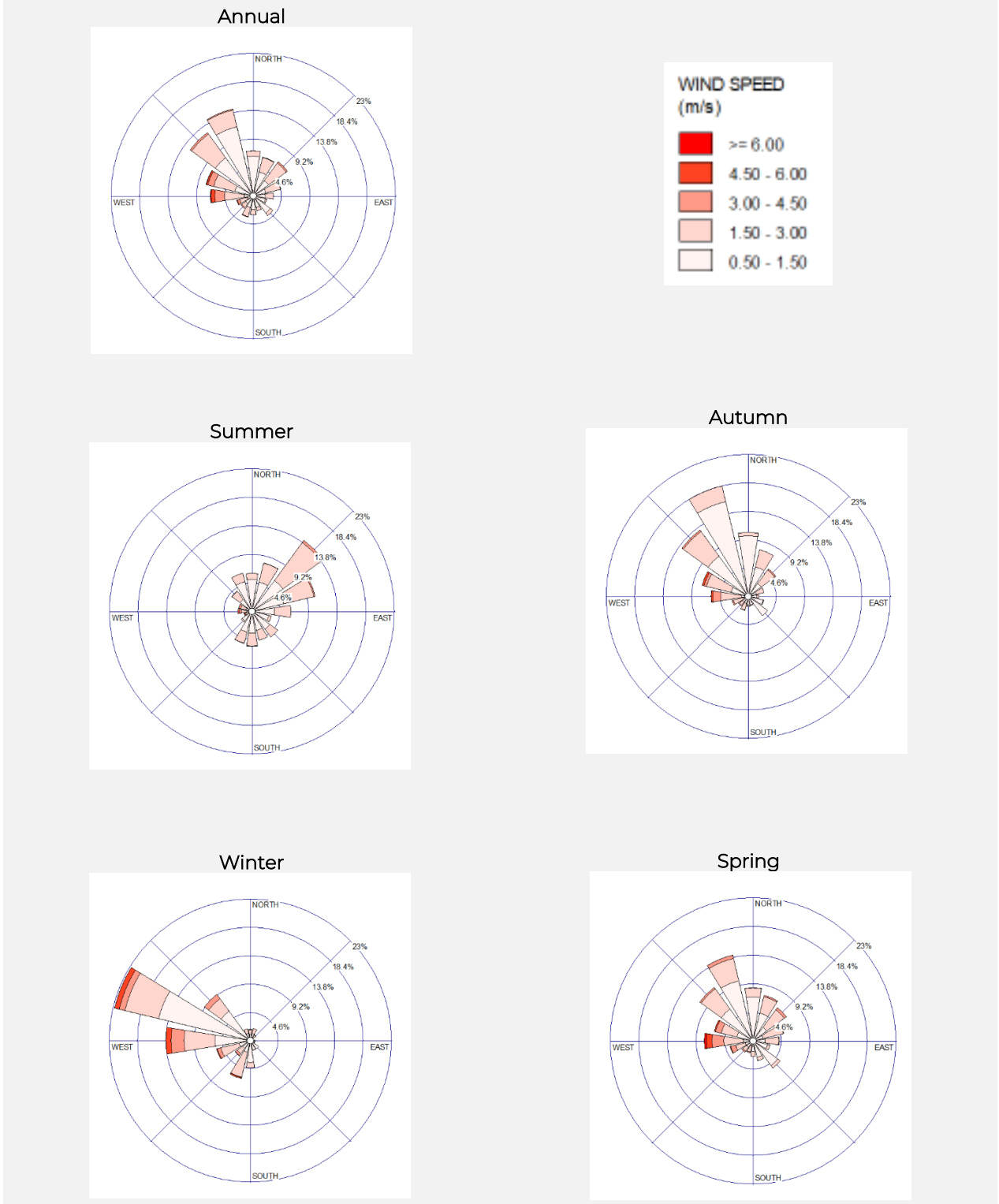


Figure 8-1: Wind Rose Plots, AERMET Dataset

9 EMISSIONS TO AIR

The main emission from the facility is likely to be particulate matter with potential sources as listed below:

- movement of trucks when entering and leaving the site;
- unloading of waste from truck upon delivery to site;
- dozer operating;
- placement of materials in stockpiles;
- loading of waste to truck; and
- wind erosion.

The site receives Construction & Demolition (C&D) waste, recyclable C&I waste and dry co-mingled recyclable waste types already approved. Emission factors from the United States Environmental Protection Agency (US EPA, 1995) and National Pollution Inventory NPI (2012) have been used to calculate emissions from all loading, dumping and wind erosion processes, taking into account the likely silt and moisture content of the materials. The details of the calculations are shown in **Appendix B**. **Table 9-1** summarises the surface emissions.

Table 9-1: Emissions Inventory – Kembla Grange

Activity	Total Emission [kg/day]		
	$PM_{2.5}$	PM_{10}	TSP
	24 Hours		
Wind	0.15	1.5	3.0
	Daytime 7am-6pm		
Haulage - incoming and outgoing waste/ - unpaved - day movements	1.47	14.7	63.4
Dumping material on floor	0.18	0.12	0.25
Dozer operating	1.23	2.41	11,67
Materials placed into stockpiles	0.18	0.12	0.25
Crushing	0.013	0.13	0.29
Screens	0.046	0.46	1.34
	Night Time 7pm-6am		

Activity	Total Emission [kg/day]		
	$PM_{2.5}$	PM_{10}	TSP
Materials loaded to outgoing trucks	0.18	0.12	0.25
Haulage - outgoing waste - unpaved	0.16	1.6	6.87
Total	3.305	22.39	89.95

The distribution of particles in each particle size range is as follows (SPCC, 1983):

- PM2.5 (FP) is 4.7% of the TSP;
- PM2.5-10 (CM) is 34.4% of TSP; and
- PM10-30 (Rest) is 60.9% of TSP.

These fractions of fine, inhalable, and coarse particle were used to estimate the PM_{10} and $PM_{2.5}$ concentrations.

10 ASSESSMENT OF IMPACTS

This section presents the dispersion modelling results and discusses the likely off-site air quality impacts associated with the operation of the Modification Proposal.

Table 10-1 presents the predicted ground level concentrations of $PM_{2.5}$ and PM_{10} due to the Modification Proposal and the existing background concentrations, consistent with a Level 2 air quality assessment.

Table 10-1: Predicted 24-hour Average $PM_{2.5}$ and PM_{10} Concentrations at Sensitive Receptors

Receptor	Maximum 24-hour Average $PM_{2.5}$ (µg/m³)			Maximum 24-hour Average PM_{10} (µg/m³)		
	Increment Proposal only	Total Proposal + Background[1]	Additional Exceedances	Increment Proposal only	Total Proposal + Background[1]	Additional Exceedances
R1	0.34	47.94	0	2.2	118.0	0
R2	0.44	48.04	0	3.4	119.2	0
R3	0.33	47.93	0	2.08	117.08	0
R4	0.13	47.73	0	0.71	116.51	0
R5	0.17	47.77	0	0.69	116.29	0
R6	0.34	47.94	0	2.66	118.46	0
R7	0.48	48.08	0	2.95	118.75	0
A1	0.31	47.85	0	1.71	118.75	0
Criteria	-	25	0	-	50	0

Note 1: As required by the *Methods for the Modelling and Assessment of Air Pollutants in New South Wales* the maximum background level measured was added to the calculated increment from the project. The maximum background level was due to extreme events such as bushfires, dust storms and hazard reduction burns.

The results in **Table 10-1** show that the Proposal is not predicted to result in any additional exceedances of the impact assessment criteria for $PM_{2.5}$ or PM_{10} compared to background levels. Therefore, in accordance with the Approved Methods, no additional measures to reduce $PM_{2.5}$ or PM_{10} emissions is considered necessary.

Appendix C presents contour plots of incremental 24-hour average $PM_{2.5}$ and PM_{10} and an example of the contemporaneous assessment for the closest residential area at Farmborough Heights (R2).

The neighbouring industrial land (locations I1and I2) have not been specifically predicted as they are large industrial properties. The air quality impacts at these locations can be inferred by way of the contour plots in **Appendix C**.

11 MITIGATION

The sites air quality management plan presents detailed dust management strategies and controls that would be maintained for future operations. The deployment of these dust strategies and controls will minimise the potential occurrence of excessive dust emissions.

A summary of the proposed mitigation measures is provided below:

No.	Mitigation Measures and safeguards
AQM1	The Facility will operate a meteorological station that will provide data on daily conditions and will comply with data collection requirements and methods outlined in the *Approved Methods for Sampling of Air Pollutants in New South Wales*.
AQM2	Prevailing wind conditions and weather forecast information to be reviewed daily by the Site Supervisor from the onsite weather station and Bureau of Meteorology (www.bom.gov.au).
AQM3	Weather warnings and strong winds prediction will be reported to the Site Supervisor. Works will be ceased when conditions are excessively dusty until dust suppression can be adequately carried out in accordance with relevant conditions of the project.
AQM4	All vehicles, plant and equipment will be maintained in accordance with their maintenance schedule and daily inspections to identify any vehicle, plant or equipment that is causing visible emissions (should not be longer than 10 sec of continuous visible emissions) will be undertaken. The Site Manager will be notified of any defective emission control.
AQM5	Plant and equipment will be operated in a competent way, that is vehicles will be turned off when not in use or idling for long periods of time.
AQM6	Existing vegetated areas will be kept undisturbed for as long as possible to minimise the potential for dust generation. Stockpiles or surfaces that are to be left standing for extended periods will be revegetated.
AQM7	Apply water to exposed surfaces that are causing dust generation. Surfaces may include unpaved roads, stockpiles; hardstand areas other exposed (for example recently graded areas).
AQM8	Daily construction activities (including dust generating activities and emissions from plant/equipment) will be visually monitor to confirm that dust and emission controls are effective.

No.	Mitigation Measures and safeguards
AQM9	Weekly environmental inspections will be conducted by the Site Supervisor (or Site Environmental Officer) and recorded on the ***Site Audit Checklist***. Any actions will be raised on the ***Environmental Inspection Actions Form*** and will be closed out within a designated period
AQM10	Where possible, remove and prevent mud and dirt from being tracked onto sealed road surfaces.

Visual monitoring will be conducted on site when wind speeds are over 7.5m/s, regardless of direction, visual monitoring of dust will be carried out to assess whether there is potential for the dust to be blown beyond the site boundaries.

If dust plumes are seen, the Site Operations Manager will be notified immediately, and mitigations measure will be implemented.

12 CONCLUSION

This report has assessed the potential dust impacts associated with the proposed Kembla Grange Resource Recovery Facility.

Potential dust impacts associated with the day-to-day operational activities for the Proposal have been assessed in general accordance with the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (EPA, 2016).

Quantitative assessments of potential dust impacts from the operation of the Proposal have been conducted, based on TAPM meteorological simulations and the AERMOD dispersion modelling system.

As required by existing Approval site has an air quality management plan. The air quality management plan presents detailed dust management strategies and controls that would be maintained for future operations. The deployment of these dust strategies and controls will minimise the potential occurrence of excessive dust emissions.

The results of the dispersion modelling indicate that PM_{10} and $PM_{2.5}$ particulate matter concentrations due to the Modification proposal can be adequately managed on site to mitigate impacts.

13 REFERENCES

Australian and New Zealand Environment Council (1990)

"Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration"

NPI (2008)

"Emission Estimation Technique Manual for Combustion Engines, Version 3.0", National Pollutant Inventory, June 2008

NPI (2012)

"Emission Estimation Technique Manual for Mining, Version 3.1", National Pollutant Inventory, January 2012

NSW Department of Environment and Climate Change (2009)

"Interim Construction Noise Guideline"

NSW Department of Environment and Conservation (2006)

"Assessing Vibration: a technical guideline"

NSW Environment Protection Authority (2000)

"NSW Industrial Noise Policy"

NSW Department of Environment and Conservation (2005)

"Approved Methods for the Modelling and Assessment of Air Pollutants in NSW", August 2005.

NSW Minerals Council (2000)

"Technical Paper – Particulate Matter and Mining Interim Report"

SPCC (1983)

"Air Pollution from Coal Mining and Related Developments", State Pollution Control Commission.

US EPA (1985 and updates)

"Compilation of Air Pollutant Emission Factors", AP-42, Fourth Edition, United States Environmental Protection Agency.

APPENDIX A: GLOSSARY OF AIR QUALITY TERMS

Air Pollution – The presence of contaminants or pollutant substances in the air that interfere with human health or welfare or produce other harmful environmental effects.

Air Quality Standards – The level of pollutants prescribed by regulations that are not to be exceeded during a given time in a defined area.

Air Toxics – Any air pollutant for which a national ambient air quality standard (NAAQS) does not exist (i.e. excluding ozone, carbon monoxide, PM-10, sulphur dioxide, nitrogen oxide) that may reasonably be anticipated to cause cancer; respiratory, cardiovascular, or developmental effects; reproductive dysfunctions, neurological disorders, heritable gene mutations, or other serious or irreversible chronic or acute health effects in humans.

Airborne Particulates – Total suspended particulate matter found in the atmosphere as solid particles or liquid droplets. Chemical composition of particulates varies widely, depending on location and time of year. Sources of airborne particulates include dust, emissions from industrial processes, combustion products from the burning of wood and coal, combustion products associated with motor vehicle or non-road engine exhausts, and reactions to gases in the atmosphere.

Area Source – Any source of air pollution that is released over a relatively small area, but which cannot be classified as a point source. Such sources may include vehicles and other small engines, small businesses and household activities, or biogenic sources, such as a forest that releases hydrocarbons, may be referred to as nonpoint source.

Concentration – The relative amount of a substance mixed with another substance. Examples are 5 ppm of carbon monoxide in air and 1 mg/l of iron in water.

Emission – Release of pollutants into the air from a source. We say sources emit pollutants.

Emission Factor – The relationship between the amount of pollution produced and the amount of raw material processed. For example, an emission factor for a blast furnace making iron would be the number of pounds of particulates per ton of raw materials.

Emission Inventory – A listing, by source, of the amount of air pollutants discharged into the atmosphere of a community; used to establish emission standards.

Flow Rate – The rate, expressed in gallons -or litres-per-hour, at which a fluid escapes from a hole or fissure in a tank. Such measurements are also made of liquid waste, effluent, and surface water movement.

Fugitive Emissions – Emissions not caught by a capture system.

Hydrocarbons (HC) – Chemical compounds that consist entirely of carbon and hydrogen.

Hydrogen Sulphide (H_2S) – Gas emitted during organic decomposition. Also, a by-product of oil refining and burning. Smells like rotten eggs and, in heavy concentration, can kill or cause illness.

Inhalable Particles – All dust capable of entering the human respiratory tract.

Nitric Oxide (NO) – A gas formed by combustion under high temperature and high pressure in an internal combustion engine. NO is converted by sunlight and photochemical processes in ambient air to nitrogen oxide. NO is a precursor of ground-level ozone pollution, or smog.

Nitrogen Dioxide (NO_2) – The result of nitric oxide combining with oxygen in the atmosphere; major component of photochemical smog.

Nitrogen Oxides (NOx) – A criteria air polluant. Nitrogen oxides are produced from burning fuels, including gasoline and coal. Nitrogen oxides are smog formers, which react with volatile organic compounds to form smog. Nitrogen oxides are also major components of acid rain.

Mobile Sources – Moving objects that release pollution; mobile sources include cars, trucks, buses, planes, trains, motorcycles and gasoline-powered lawn mowers.

Particulates; Particulate Matter (PM-10) – A criteria air pollutant. Particulate matter includes dust, soot and other tiny bits of solid materials that are released into and move around in the air. Particulates are produced by many sources, including burning of diesel fuels by trucks and buses, incineration of garbage, mixing and application of fertilizers and pesticides, road construction, industrial processes such as steel making, mining operations, agricultural burning (field and slash burning), and operation of fireplaces and woodstoves. Particulate pollution can cause eye, nose and throat irritation and other health problems.

Parts Per Billion (ppb)/Parts Per Million (ppm) – Units commonly used to express contamination ratios, as in establishing the maximum permissible amount of a contaminant in water, land, or air.

PM10/PM2.5 – PM10 is measure of particles in the atmosphere with a diameter of less than 10 or equal to a nominal 10 micrometers. PM2.5 is a measure of smaller particles in the air.

Point Source – A stationary location or fixed facility from which pollutants are discharged; any single identifiable source of pollution; e.g. a pipe, ditch, ship, ore pit, factory smokestack.

Scrubber – An air pollution device that uses a spray of water or reactant or a dry process to trap pollutants in emissions.

Source – Any place or object from which pollutants are released.

Stack – A chimney, smokestack, or vertical pipe that discharges used air.

Stationary Source – A place or object from which pollutants are released and which does not move around. Stationary sources include power plants, gas stations, incinerators, houses etc.

Temperature Inversion – One of the weather conditions that are often associated with serious smog episodes in some portions of the country. In a temperature inversion, air does not rise because it is trapped near the ground by a layer of warmer air above it. Pollutants, especially smog and smog-forming chemicals, including volatile organic compounds, are trapped close to the ground. As people continue driving and sources other than motor vehicles continue to release smog-forming pollutants into the air, the smog level keeps getting worse.

APPENDIX B: EMISSIONS INVENTORY

EMISSION FACTOR FOR UNPAVED ROADS:

$$EF_{TSP}=\frac{0.4536}{1.6093}\times 4.9\times\left(\frac{s}{12}\right)^{0.7}\times\left(\frac{W\times 1.1023}{3}\right)^{0.45} \qquad EF_{PM_{10}}=\frac{0.4536}{1.6093}\times 1.5\times\left(\frac{s}{12}\right)^{0.9}\times\left(\frac{W\times 1.1023}{3}\right)^{0.45}$$

EMISSION FACTOR FOR DUMPING:

$$EF_{TSP}=0.74\times 0.0016\times\frac{(U/2.2)^{1.3}}{(M/2)^{1.4}} \qquad EF_{PM_{10}}=0.35\times 0.0016\times\frac{(U/2.2)^{1.3}}{(M/2)^{1.4}}$$

EMISSION FACTORS FOR WIND EROSION:

NPI[10]
$EF_{TSP}=0.4$
$EF_{PM10}=0.2$

EMISSION FACTORS FOR DOZER:

$$EF_{TSP}=2.6\times\frac{(s)^{1.2}}{(M)^{1.3}} \qquad EF_{PM_{10}}=0.34\times\left(\frac{(s)^{1.5}}{(M)^{1.4}}\right)$$

EMISSION FACTORS FOR CRUSHING AND SCREENING:

Crushing and screening Particulate emission factors for crushing and screening concrete, bricks, etc have been taken from the US EPA (US EPA, 1985 and updates) and are summarised below:

Activity	Emission Factor [kg/t]		
	TSP	PM10	PM2.5
Tertiary crushing (uncontrolled)	0.0027	0.0012	*
Screening (uncontrolled)	0.0125	0.0043	*

* No emissions data available

ASSUMPTIONS:

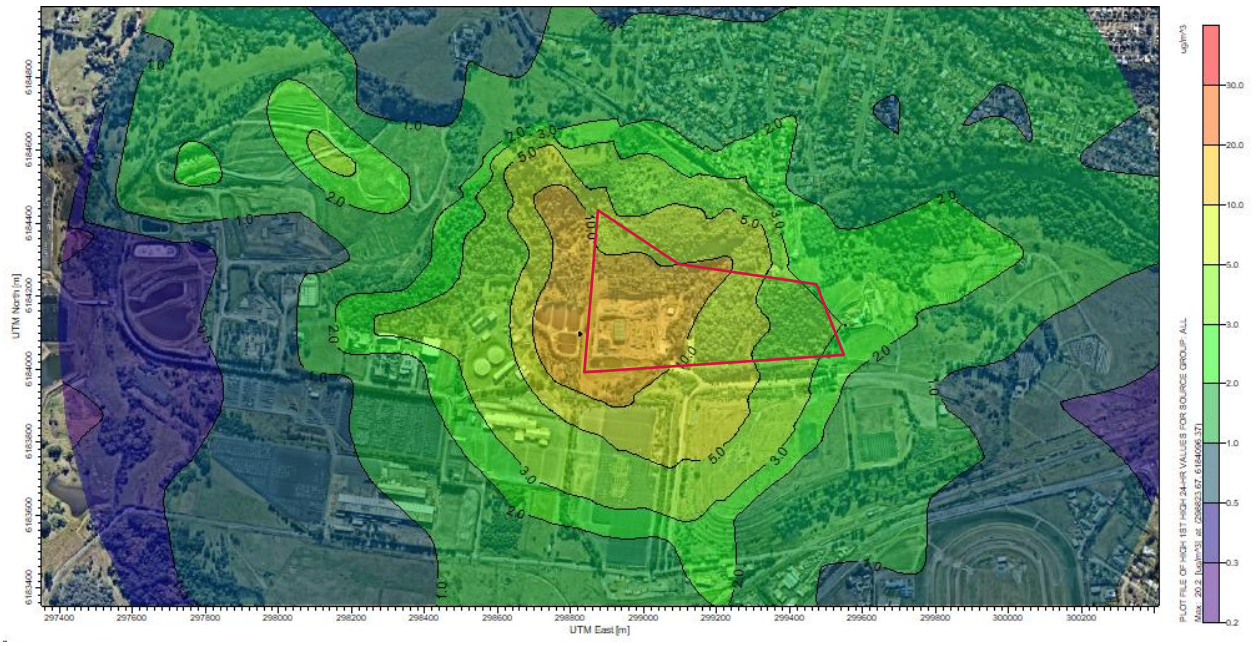
- Assume a maximum total quality of waste processed of 871 tonnes per day;
- Assume a maximum total quality of waste crushed and screened of 214 tonnes per day; and
- Use water carts to suppress visible dust leaving from unsealed roads from on the Site (Level 2 watering in excess of 2l/m^2/hour or chemical suppressant).

EMISSIONS INVENTORY:

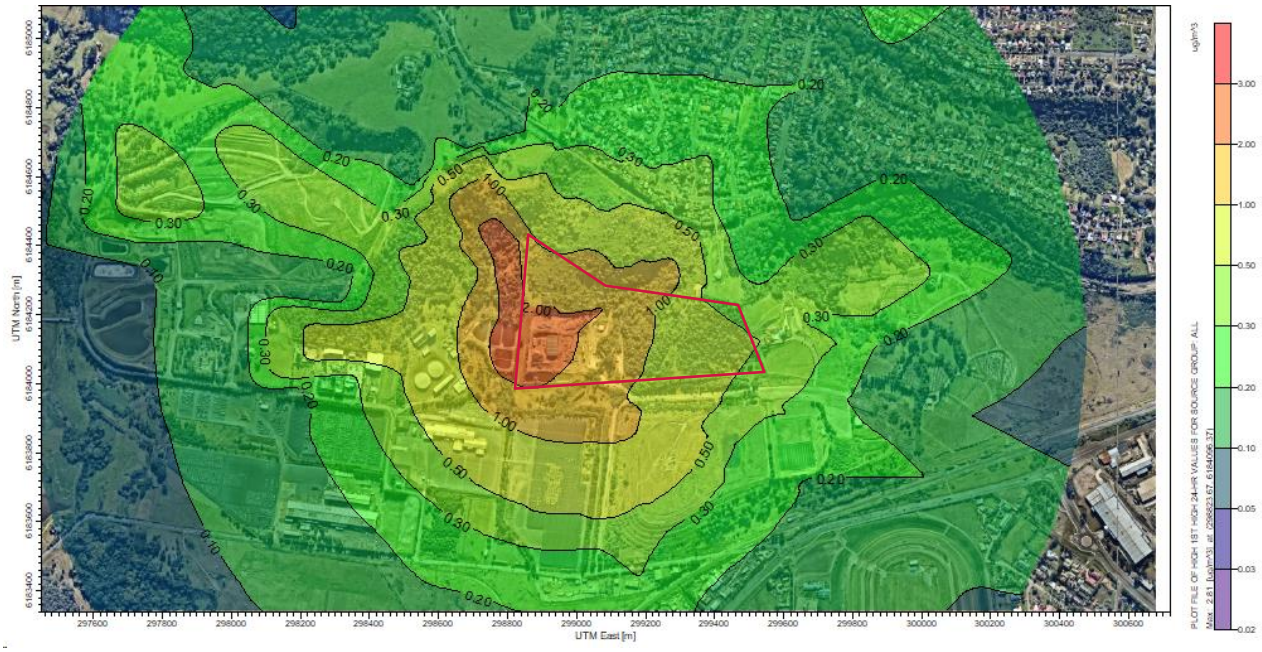
	Total Emission [kg/day]					Emission Factor									
Daytime	**PM2.5**	**PM10**	**TSP**	**Intensity**	**units**	**PM2.5**	**PM10**	**TSP**	**units**	**Variable 1**	**units**	**Variable 2**	**units**	**Control [%]**	**Description**
Wind	0.1500	1.5000	3.0000			0.0200	0.2000	0.4000	kg/ha/h	3	ha	5	hr/day	50%	
Daytime 7am-6pm															
Haulage - incoming and outgoing waste/ - unpave	1.4718	14.7180	63.4403	232.0000	VKT/da	0.0254	0.2538	1.0938	kg/VKT	14	vehicle mass [t]	3	silt loading [g/m^2]	75%	Haul 400m with 580 vehicles
Dumping material on tipping floor	0.0181	0.1195	0.2526	871.0000	t/day	0.0000	0.0001	0.0003	kg/t	2	wind speed [m/s]	5	moisture content [%]		
Dozer operating	1.23	2.41	11.67	6.0000	hr	0.409	0.802	3.891	kg/hr	8.000	silt content [%]	5	moisture content [%]	50%	
Materials placed into stockpiles	0.0181	0.1195	0.2526	871.0000	t/day	0.0000	0.0001	0.0003	kg/t	2	wind speed [m/s]	5	moisture content [%]		
Crushing	0.0128	0.1284	0.2889	214.0000	t/day	0.0001	0.0012	0.0027	kg/t					50%	
Screening	0.0460	0.4601	1.3375	214.0000	t/day	0.0004	0.0043	0.0125	kg/t					50%	
Dumping material on tipping floor	0.1850	1.2218	2.5832	871.0000	t/day	0.0002	0.0014	0.0030	kg/t	11.96	wind speed [m/s]	5	moisture content [%]		
Night time 6pm-7am															
Materials loaded to outgoing trucks	0.0181	0.1195	0.2526	871.0000	t/day	0.0000	0.0001	0.0003	kg/t	2	wind speed [m/s]	5	moisture content [%]		
Haulage - outgoing waste - unpaved	0.1595	1.5946	6.8732	18.4000	VKT/da	0.0347	0.3466	1.4942	kg/VKT	28	vehicle mass [t]	3	silt loading [g/m^2]	75%	Haul 400m with 46 trucks
Total	**3.305**	**22.388**	**89.953**												

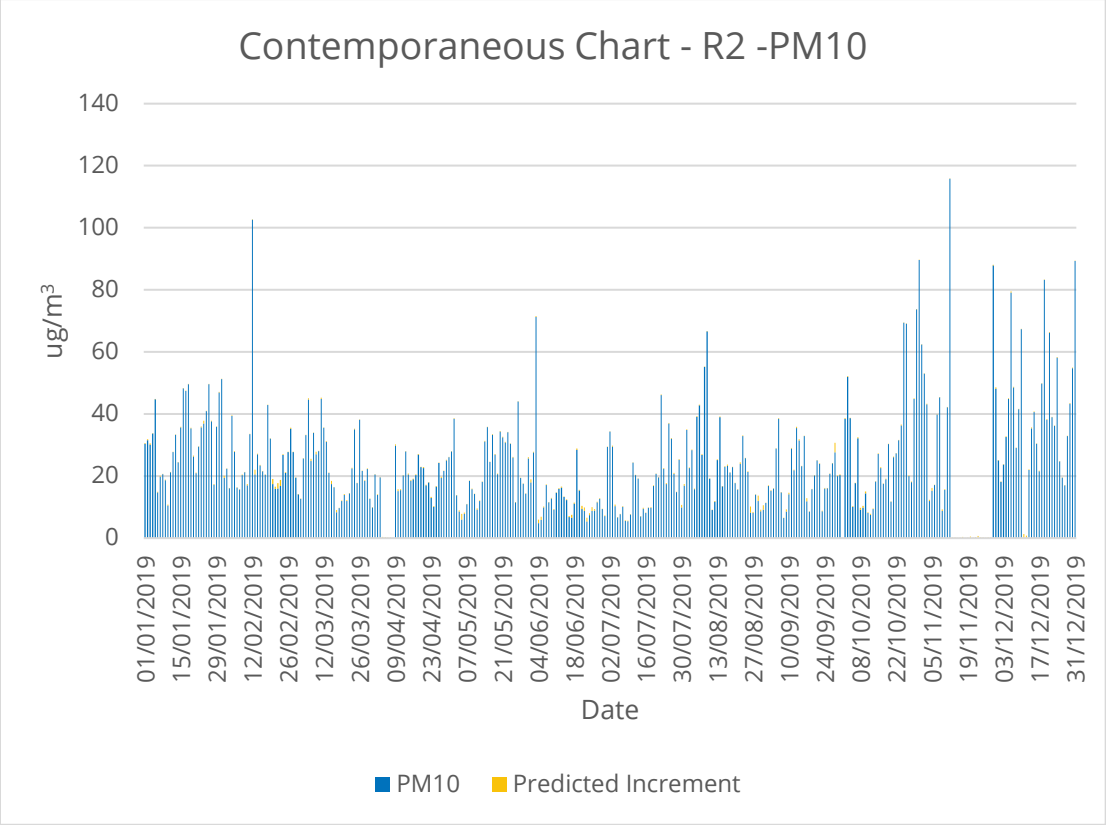
APPENDIX C: CONTOURS AND CONTEMPORANEOUS ASSESSMENT

PM10 24Hr Average - Increment



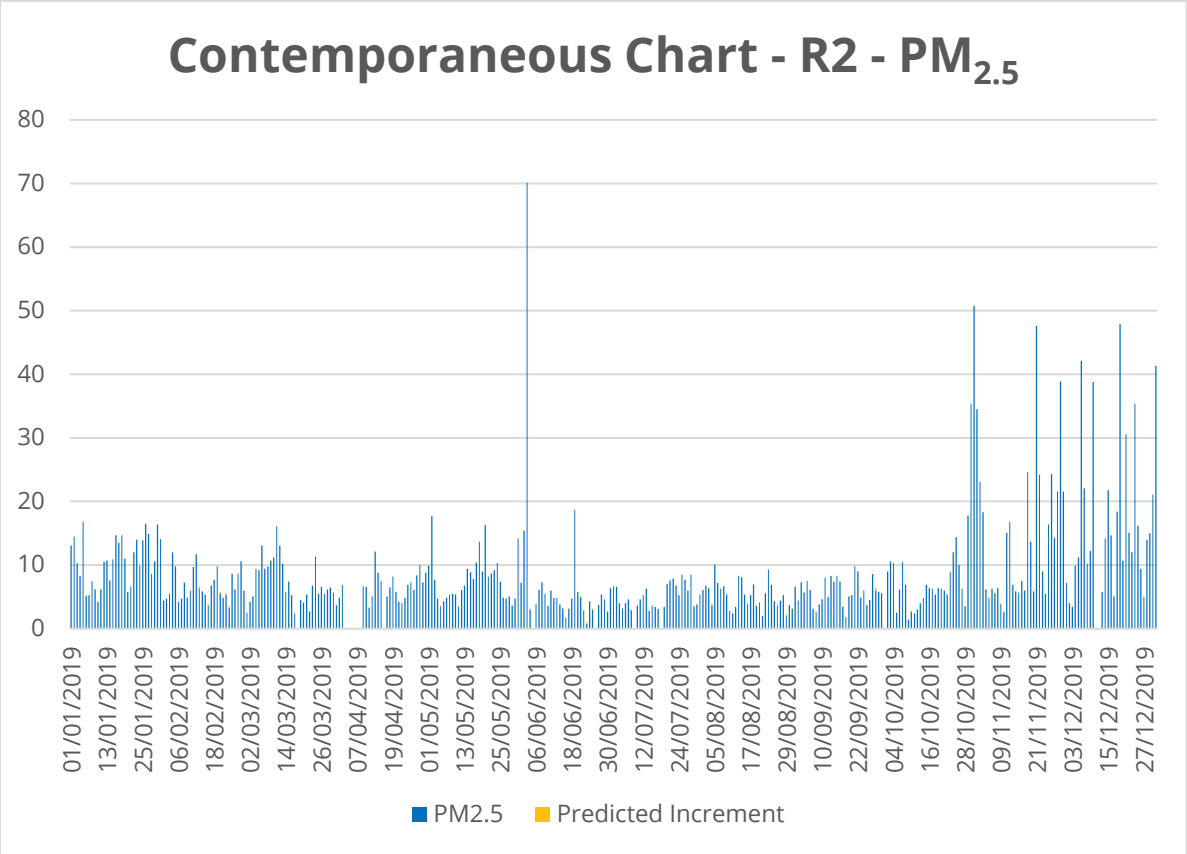
PM2.5 24Hr Average - Increment





PM_{10} 24hr average (Highest Background)				PM_{10} 24hr average (Highest Increment)			
Date	**Background PM_{10}**	**Predicted Increment**	**Total**	**Date**	**PM10**	**Predicted Increment**	**Total**
12/11/2019	115.80	0.06	115.86	28/09/2019	27.60	3.12	30.72
12/02/2019	102.60	0.07	102.67	26/08/2019	8.20	1.99	10.19
31/10/2019	89.60	0.13	89.73	23/02/2019	16.80	1.91	18.71
31/12/2019	89.30	0.16	89.46	05/05/2019	6.00	1.87	7.87
29/11/2019	87.90	0.15	88.05	29/08/2019	11.90	1.77	13.67
19/12/2019	83.20	0.13	83.33	22/02/2019	16.00	1.71	17.71
06/12/2019	79.10	0.44	79.54	20/02/2019	17.40	1.71	19.11
30/10/2019	73.70	0.09	73.79	13/02/2019	20.50	1.56	22.06
03/06/2019	71.30	0.23	71.53	31/08/2019	9.20	1.41	10.61
25/10/2019	69.40	0.10	69.50	23/06/2019	5.30	1.33	6.63
26/10/2019	69.10	0.04	69.14	25/06/2019	8.80	1.20	10.00
10/12/2019	67.30	0.17	67.47	04/06/2019	4.80	1.17	5.97
09/08/2019	66.60	0.03	66.63	22/06/2019	8.80	1.09	9.89
21/12/2019	66.20	0.18	66.38	17/09/2019	11.80	1.08	12.88

PM_{10} 24hr average (Highest Background)				PM_{10} 24hr average (Highest Increment)			
Date	Background PM_{10}	Predicted Increment	Total	Date	PM10	Predicted Increment	Total
01/11/2019	62.40	0.05	62.45	15/03/2019	17.40	1.06	18.46
24/12/2019	58.20	0.13	58.33	01/06/2019	17.90	1.02	18.92
08/08/2019	55.20	0.10	55.30	21/06/2019	9.40	1.00	10.40
30/12/2019	54.80	0.21	55.01	05/06/2019	5.90	0.98	6.88
02/11/2019	53.00	0.08	53.08	24/01/2019	36.90	0.97	37.87
03/10/2019	52.00	0.14	52.14	17/06/2019	6.60	0.96	7.56
31/01/2019	51.20	0.16	51.36	05/11/2019	15.30	0.88	16.18
18/12/2019	49.80	0.07	49.87	09/03/2019	27.00	0.84	27.84
18/01/2019	49.60	0.15	49.75	17/03/2019	8.30	0.81	9.11
26/01/2019	49.60	0.01	49.61	30/07/2019	9.90	0.80	10.70
07/12/2019	48.60	0.19	48.79	07/03/2019	24.80	0.78	25.58
30/11/2019	48.20	0.33	48.53	09/09/2019	8.50	0.74	9.24



PM2.5-24 Hour average (Highest Background)				PM2.5-24 Hour average (Highest Predicted Increment)			
Date	Background	Predicted increment	Total	Date	Background	Predicted increment	Total
03/06/2019	70.1	0.03046	70.13046	28/09/2019	6	0.43942	6.43942
31/10/2019	50.8	0.01565	50.81565	26/08/2019	3.6	0.30449	3.90449
19/12/2019	47.9	0.01592	47.91592	23/02/2019	3.3	0.25562	3.55562
21/11/2019	47.6	0.01948	47.61948	20/02/2019	5.6	0.25431	5.85431
06/12/2019	42.1	0.05536	42.15536	29/08/2019	2.1	0.24687	2.34687
31/12/2019	41.3	0.01924	41.31924	22/02/2019	5.4	0.24322	5.64322
29/11/2019	38.9	0.01791	38.91791	05/05/2019	3.5	0.23888	3.73888
10/12/2019	38.8	0.02185	38.82185	13/02/2019	6.4	0.21465	6.61465
24/12/2019	35.4	0.02274	35.42274	31/08/2019	3.1	0.18815	3.28815
30/10/2019	35.4	0.01074	35.41074	23/06/2019	0.8	0.17856	0.97856
01/11/2019	34.5	0.00497	34.50497	25/06/2019	3	0.16845	3.16845
21/12/2019	30.6	0.0222	30.6222	04/06/2019	3	0.15345	3.15345

PM2.5-24 Hour average (Highest Background)				PM2.5-24 Hour average (Highest Predicted Increment)			
Date	Background	Predicted increment	Total	Date	Background	Predicted increment	Total
18/11/2019	24.6	0.01703	24.61703	17/09/2019	3.4	0.14978	3.54978
26/11/2019	24.3	0.00665	24.30665	15/03/2019	7.4	0.14676	7.54676
22/11/2019	24.2	0.03328	24.23328	24/01/2019	9.9	0.14448	10.04448
02/11/2019	23.1	0.01013	23.11013	22/06/2019	2.8	0.13901	2.93901
07/12/2019	22.1	0.02364	22.12364	17/03/2019	2.4	0.13266	2.53266
15/12/2019	21.8	0.02532	21.82532	01/06/2019	7.2	0.13168	7.33168
30/11/2019	21.6	0.04209	21.64209	17/06/2019	3.1	0.13127	3.23127
28/11/2019	21.6	0.02269	21.62269	21/06/2019	5	0.12704	5.12704
30/12/2019	21.1	0.02628	21.12628	09/03/2019	10.7	0.11613	10.81613
19/06/2019	18.7	0.04606	18.74606	05/11/2019	4.8	0.11436	4.91436
18/12/2019	18.4	0.00803	18.40803	21/02/2019	4.8	0.11393	4.91393
03/11/2019	18.3	0.02948	18.32948	30/07/2019	3.8	0.1076	3.9076
29/10/2019	17.8	0.0178	17.8178	01/02/2019	4.4	0.10638	4.50638
02/05/2019	17.7	0.02273	17.72273	07/03/2019	9.4	0.102	9.502