BHP

MT ARTHUR COAL MINE
MODIFICATION 2

Modification Report

Appendix B
Air Quality Impact and Greenhouse Gas Assessment

Resource Strategies

AIR QUALITY IMPACT AND GREENHOUSE GAS ASSESSMENT

MT ARTHUR COAL MINE MODIFICATION 2

BHP

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Job Number 20111209

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Air Quality Impact and Greenhouse Gas Assessment

Mt Arthur Coal Mine Modification 2

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1 INTRODUCTION

Todoroski Air Sciences has prepared this Air Quality Impact and Greenhouse Gas Assessment report for Resource Strategies Pty Ltd on behalf of the Hunter Valley Energy Coal Pty Ltd (HVEC), a wholly owned subsidiary of BHP (hereafter referred to as the Proponent). This report provides an assessment of the potential air quality impacts associated with the proposed Mt Arthur Coal Mine (MAC) Modification 2 (hereafter referred to as the Modification). It also provides an estimate of the emissions of greenhouse gas to the atmosphere due to the Modification.

To assess the potential air quality impacts and greenhouse gas emissions associated with the Modification, this report incorporates the following aspects:

- A background and description of the Modification;
- An outline of the applicable criteria to assess air quality impacts from the Modification;
- Review of the existing meteorological and air quality environment surrounding the MAC;
- Description of the dispersion modelling approach used to assess potential air quality impacts;
- Presentation of the predicted results and discussion of the potential air quality impacts and associated mitigation measures; and
- An assessment of the potential greenhouse gas emissions associated with the Modification.

This air quality impact assessment forms part of a Modification Report which has been prepared to support an application to modify Project Approval MP 09_0062 (MP 09_0062). The report has been prepared in accordance with the *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (**NSW EPA, 2022**).

1.1 Overview of the Mt Arthur Coal Mine

The MAC is an existing open cut thermal coal mine located approximately 5 kilometres (km) south-west of Muswellbrook, within the Muswellbrook Local Government Area (LGA) in the Upper Hunter Valley of New South Wales (NSW).

The MAC is owned and operated by HVEC, a wholly owned subsidiary of BHP. The MAC is currently approved to operate until 30 June 2026 in accordance with MP 09_0062. Open cut mining operations at the MAC are approved to extract at a run-of-mine (ROM) coal extraction rate 32 of million tonnes per annum (Mtpa).

Coal mine development at the MAC commenced in the early 1960s in the Bayswater No. 2 Open Cut mining area. Coal production progressively increased and approval to extract coal from the Bayswater No. 3 Open Cut was granted in 1994.

In 2013, HVEC submitted an application to modify MP 09_0062 to extend the mine life of the MAC (MOD 1). Subsequent to the approval of MOD 1, MP 09_0062 permits the open cut mining operations until 30 June 2026.

1.2 Modification overview

In June 2022, HVEC announced a decision to cease mining at the MAC in 2030, as part of a plan to provide a pathway to closure of the operation. Accordingly, HVEC is planning to pursue a modification of the MP 09_0062 to approve a four-year extension of mining operations until 30 June 2030 and other associated changes (the Modification).

Key aspects of the Modification would include:

- a four-year extension of mining activities to 30 June 2030;
- a reduction in the approved open cut mining rate from 32 Mtpa of ROM coal to a maximum of 25 Mtpa ROM coal (similar to current actual ROM coal production);
- a reduction in the cumulative open cut and underground ROM coal handling rate from 36 Mtpa to 29 Mtpa;
- a reduction in maximum total (open cut and underground) coal rail transportation from 27 Mtpa of product coal to 20 Mtpa, and a reduction in train movements from 30 to 20 movements per day;
- a minor extension of the approved disturbance area in the north-west corner of the operation predominantly to allow for access and ancillary infrastructure (refer to Modification New Disturbance Area within **Figure 1-1**);
- an overall reduction (387 ha) in approved disturbance, as some previously approved disturbance areas are no longer intended to be disturbed (refer to Impact Minimisation Area within **Figure 1-1**); and
- a revised final landform and final void configuration, including an overall reduction in the approved height of the northern overburden emplacement areas and the final landform (to reflect the current actual height).

The Modification would involve no change to:

- existing mining tenements;
- existing coarse rejects and tailings management;
- existing workforce;
- the existing explosives facility;
- existing site accesses;
- existing electricity supply and distribution;
- existing offset and rehabilitation objectives;
- existing services, plant and equipment; and
- the existing hours of operation and associated activities (undertaken 24 hours per day, seven days a week).

The Modification would be sought under section 4.55(2) of the EP&A Act. **Table 1-1** provides a comparison of the approved MAC and the Modification. **Figure 1-1** shows the conceptual general arrangement of the Modification.

Table 1-1: Overview of the Approved MAC and the Proposed Modification

Component	Approved MAC MP 09_0062	Proposed Modification
Life-of-Mine	Approval for open cut mining to 30 June 2026.	Open cut mining for an additional four years until 30 June 2030.
Site Entrance	Various site accesses off Thomas Mitchell Drive and Edderton Road.	Unchanged.
Mining Method and Resource	Continuation of conventional truck and shovel open cut strip and terrace mining in the Windmill, Calool, Roxburgh, Ayredale and Saddlers (north and south) Pits.	Unchanged.
Annual ROM Coal Production Rate	Up to 32 Mtpa of ROM coal from the open cut mining operations.	Reduction in approved extraction, handling and processing of ROM coal from the open cut mining operations to 25 Mtpa (i.e. from 32 Mtpa).
Coal Processing Rate	Coal Handling and Preparation Plant (CHPP) processing of up to 36 Mtpa of ROM coal (including underground coal).	Continued use of the CHPP to facilitate the processing of up to 29 Mtpa of ROM coal from the total complex (including underground coal) (i.e. reduction from 36 Mtpa to 29 Mtpa).
Mining Areas	Open cut mining including the Northern Open Cut Pits (Windmill, Calool, Roxburgh and Ayredale) and Southern Open Cut Pits (Saddlers).	Minor extension of the Windmill Pit, predominately for access and ancillary infrastructure.
Overburden Emplacement	Development of northern overburden emplacement height to an average of 360 metres (m) Australian Height Datum (AHD) (maximum height of 375 m AHD). Development of Bayswater No 3 (Saddlers Pit) overburden emplacement height up to 250 m AHD. Development of Sublease CL 229 and Sublease CL 395 emplacement area up to 360 m AHD. Development of an out-of-pit overburden emplacement area up to 360 m AHD.	No requirement to develop the southern section of the out-of-pit emplacement. Reduction in height of the northern emplacement (from an average of approximately 360 m AHD to an average of approximately 340 m AHD).
Disturbance Areas	Total Mt Arthur Coal Mine disturbance area of approximately 6,710 hectares (ha).	Modification new disturbance area of 25 ha. Decrease in net total disturbance of approximately 387 ha (via the Impact Minimisation Area). The revised total for the Mt Arthur Coal Mine would be approximately 6,323 ha.
Mining Tenements	Mining Leases 1548, 1487, 1358, 1655, 1739, 1757, and 1593, Mining Purpose Lease (MPL) 263, Sublease Coal Leases (CL) 229 and 395, Coal Lease 396 and Consolidated Coal Lease (CCL) 744.	Unchanged.
Coarse Rejects and Tailings Management	Deposition of tailings in the tailings emplacement area at Bayswater No 2. Approval to dispose tailings in the void within Sublease CL 229. The tailings emplacement area up to 280 m AHD. Disposal of coarse reject within overburden emplacement areas.	Unchanged.
Product Coal Transport	Transport of up to 27 Mtpa product coal via rail. Maximum of 30 rail movements (i.e. 15-laden train departures) per day.	Reduced transport of product coal to 20 Mtpa from the Mt Arthur Coal Mine.

Component	Approved MAC MP 09_0062	Proposed Modification
		Maximum of 20 rail movements (or 10- laden train departures) per day.
Employment	Total workforce of approximately 2,600 full-time equivalents employees during peak production. A workforce of approximately 240 full-time equivalent employees during peak construction phases.	Continuation of a total workforce of approximately 2,200 full-time equivalent positions.
Hours of Operation	All coal operations and associated activities undertaken 24-hours per day, seven days a week. Construction on-site may be on a 24-hour, seven day roster consistent with operational requirements.	Unchanged.
Explosives Facilities	Fully bunded on-site explosives magazine for the storage of detonators and other materials.	Unchanged.
Progressive Rehabilitation	Progressive rehabilitation of areas consistent with the approved Rehabilitation Management Plan (BHP, 2021) and Rehabilitation Strategy (BHP, 2023).	Unchanged.
Final Landform	**Voids**: Approval for three final voids (i.e. Northern Open Cut Void, Belmont Void and McDonalds Void).	**Voids**: Retention of final voids. Reduction in number of final voids from three to two, comprising the Northern Open Cut Void and McDonalds Void. Change in location and shape of the Northern Open Cut Void due to proposed continuation of mining to 30 June 2030. The currently approved Belmont Void would be backfilled.
	Emplacements: Final landform associated with out-of-pit and in-pit waste rock emplacements. Requirement to rehabilitate waste rock emplacements consistent with the approved RMP and Rehabilitation Strategy.	**Emplacements:** No change to the requirement to rehabilitate waste rock emplacement areas. No requirement to develop or rehabilitate the southern out-of-pit emplacement area (Impact Minimisation Area). Reduction in final height of northern emplacement by approximately 20 m AHD.
	Tailings: Tailings dam dewatering and capping undertaken consistent with the RMP, Rehabilitation Strategy and Tailings Management Strategy approved at the time of closure.	**Tailings:** No change to tailings decommissioning and capping strategy.
	Infrastructure: All surface infrastructure decommissioned and removed unless a post-mining land use has been established and approved by the Resources Regulator in consultation with surrounding landholders (condition 41A of Schedule 3 of MP 09_0062).	**Infrastructure:** Unchanged. Surface infrastructure would be decommissioned and removed unless agreed upon by the Resources Regulator. This includes any additional infrastructure within the Modification New Disturbance Area.
Final Land Use	Supporting native ecosystem (woodland) and agriculture (pasture) meeting existing offset requirements.	No change to land uses comprising woodland corridors and pasture areas. Revised location of land use areas developed to meet existing offset and rehabilitation requirements.

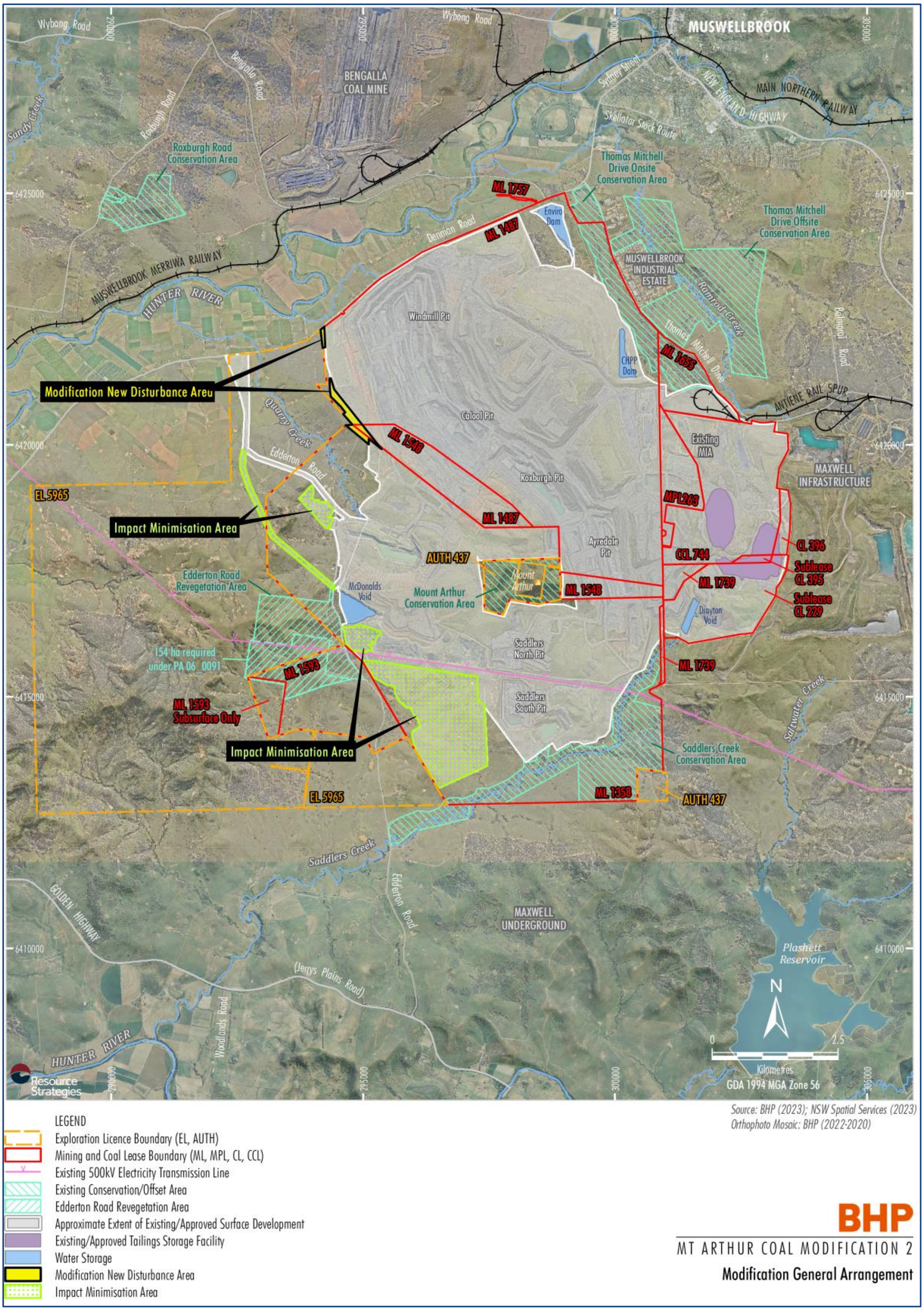


Figure 1-1: Modification General Arrangement

2 MODIFICATION SETTING

Figure 2-1 presents the location of the MAC in a regional context.

Figure 2-2 presents the location of the MAC in relation to the neighbouring coal mining operations and the identified receivers of relevance to this study. Neighbouring mines include Bengalla Coal Mine, Mount Pleasant Operations, Mangoola Coal, Maxwell Infrastructure and Maxwell Underground Mine Project.

Figure 2-3 presents a pseudo three-dimensional visualisation of the topography surrounding the MAC location. The topography in and immediately around the Modification is characterised by a southwest to north east orientated Hunter River running through the low lying areas to the north of the MAC. The terrain features of the surrounding area have a significant effect on the local wind distribution patterns and flows, as discussed further in **Section 5**.

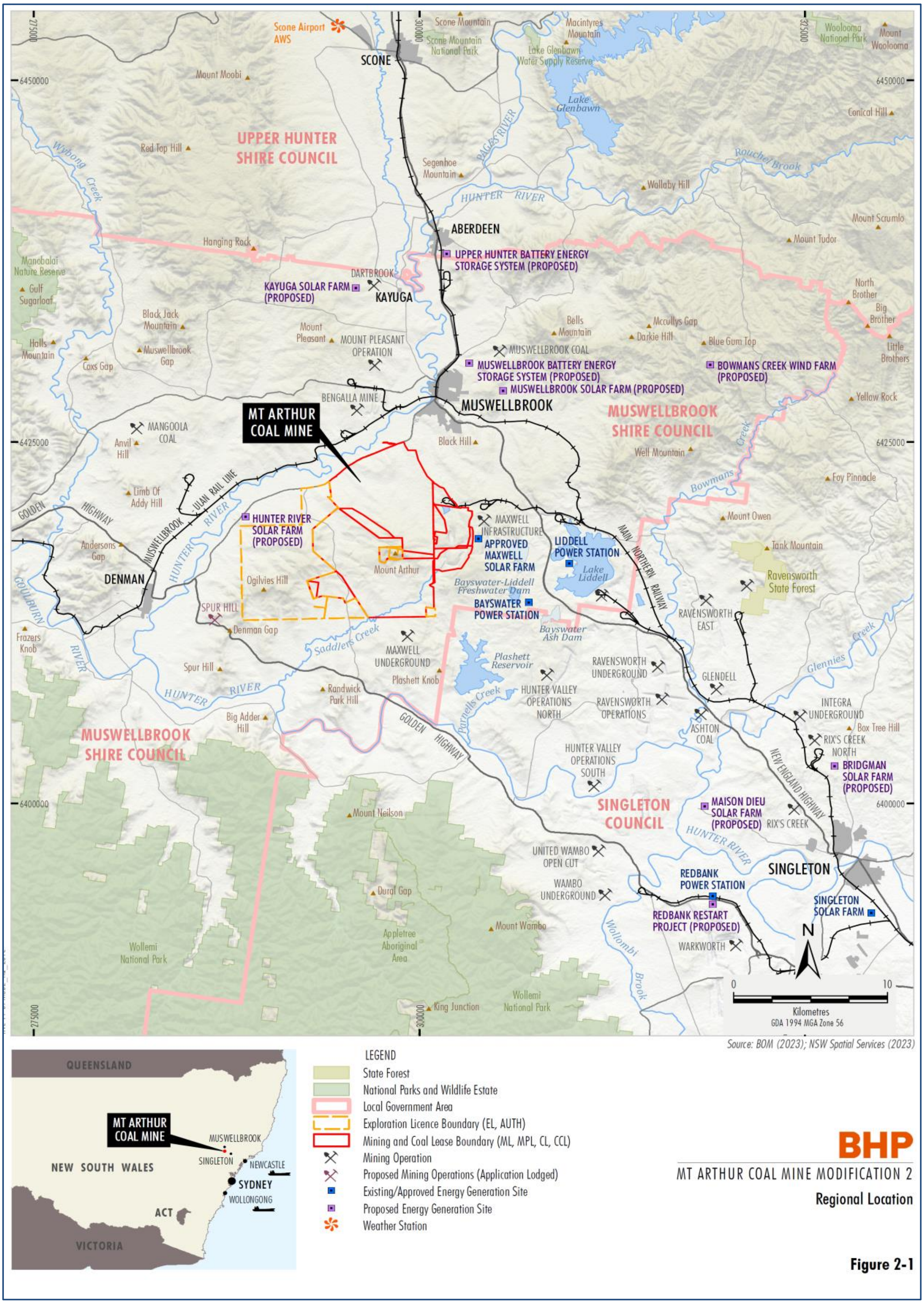


Figure 2-1: Regional location

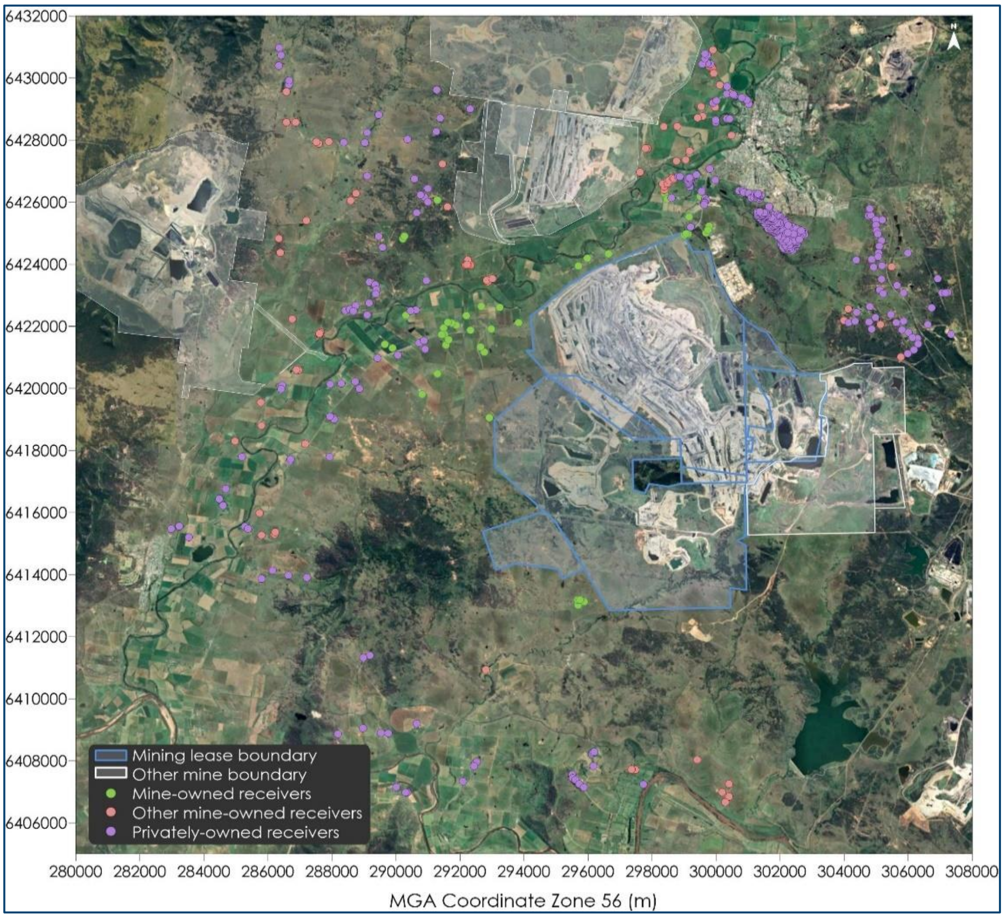


Figure 2-2: MAC location

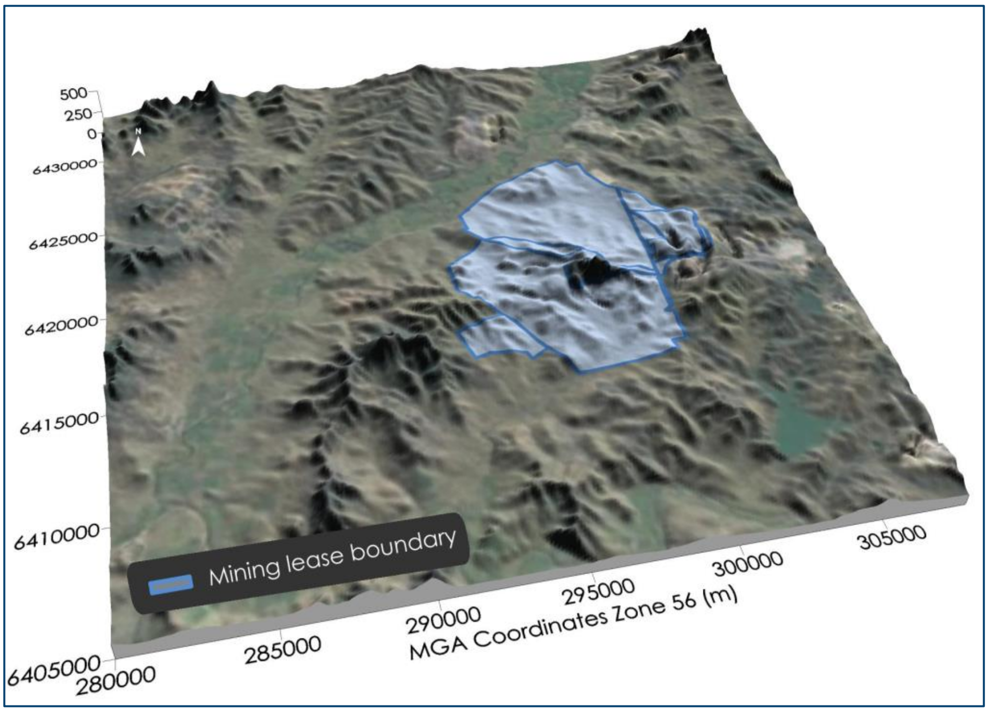


Figure 2-3: Representative view of topography surrounding the MAC location

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 applicable air quality criteria for the MAC and the Modification.

3.1 Project Approval limits

A summary of the applicable air quality impact criteria for the MAC as outlined in MP 09_0062 is presented in **Table 3-1**.

HVEC must ensure that all reasonable and feasible avoidance and mitigation measures are employed so that particulate matter emissions generated by the development do not cause exceedance of the criteria in **Table 3-1** at any residence on privately-owned land (except for those residences with rights to acquisition upon request as listed in **Table 3-2**).

Table 3-1: Summary of applicable air quality criteria

Pollutant	Averaging period	[d] Criterion
Total suspended particulates (TSP)	Annual	[a] 90µg/m³
Particulate matter <10µm (PM_{10})	Annual	[a] 30µg/m³
	24-hour	[a] 50µg/m³
[c] Deposited dust	Annual	[b] 2g/m²/month
		[a] 4g/m²/month

Notes:

a. *Total impact (i.e incremental increase in concentrations due to the project plus background concentrations due to all other sources);*

b. *Incremental impact (i.e. incremental increase in concentrations due to the project on its own);*

c. *Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003 Methods for Sampling and Analysis of Ambient Air – Determination of Particulate Matter – Deposited Matter – Gravimetric Method; and*

d. *Excludes extraordinary events such as bushfires, prescribed burning, dust storms, fire incidents or any other activity agreed by the Secretary.*

µg/m³ = micrograms per cubic metre, µm = micrometres and g/m²/month = grams per square metre per month.

Table 3-2: Land subject to acquisition upon request

Acquisition Basis	Receiver No.[1]
Noise	101[2], 102
Air Quality	6, 226, 264[3]

Notes:

1. To interpret the locations referred to in Table 3-2, see the applicable figure in Appendix 4 of the MP 09_0062.
2. The Proponent (BHP) is only required to acquire this property if acquisition is no longer reasonably achievable under the approval for the Drayton mine.
3. The Proponent (BHP) is only required to acquire this property if acquisition is not reasonably achievable under a separate approval for the Bengalla mine.

If particulate matter emissions generated by the MAC exceed the criteria, or contribute to the exceedance of the relevant cumulative criteria in **Table 3-3** at any residence on privately-owned land then upon receiving a written request for acquisition from the landowner, HVEC shall acquire the land in accordance with the procedures in MP 09_0062.

Table 3-3: Summary of applicable air quality acquisition criteria

Pollutant	Averaging period	[d] Criterion
Total suspended particulates (TSP)	Annual	[a] 90µg/m³
Particulate matter <10µm (PM_{10})	Annual	[a] 30µg/m³
	24-hour	[a] 150µg/m³
	24-hour	[b] 50µg/m³
[c] Deposited dust	Annual	[b] 2g/m²/month
		[a] 4g/m²/month

Notes:

a. *Total impact (i.e incremental increase in concentrations due to the project plus background concentrations due to all other sources);*

b. *Incremental impact (i.e. incremental increase in concentrations due to the project on its own);*

c. *Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003 Methods for Sampling and Analysis of Ambient Air – Determination of Particulate Matter – Deposited Matter – Gravimetric Method; and*

d. *Excludes extraordinary events such as bushfires, prescribed burning, dust storms, fire incidents or any other activity agreed by the Secretary.*

µg/m³ = micrograms per cubic metre, µm = micrometres and g/m²/month = grams per square metre per month.

In addition to the above, Schedule 3, Condition 22 of MP 09_0062 allows some private landholders an opportunity to request additional air quality mitigation measures upon request.

3.2 Environment Protection Licence conditions

Environmental Protection Licence (EPL) 11457 for the Mt Arthur Coal Mine EPL 11457 includes condition O3 requiring the majority of dust-generating activity must be carried out in a manner that will minimise the generation, or emission from the premises, of wind-blown or traffic generated dust. The condition is stated as below:

O3 Dust

O3.1 The premises must be maintained in a condition which minimises or prevents the emission of dust from the premises.

O3.2 All operations and activities occurring at the premises must be carried out in a manner that will minimise the emission of dust from the premises.

O3.3 All trafficable areas, coal storage areas and vehicle manoeuvring areas in or on the premises must be maintained, at all times, in a condition that will minimise the generation, or emission from the premises, of wind-blown or traffic generated dust.

3.3 New South Wales Environmental Protection Authority impact assessment criteria

Table 3-4 summarises the air quality goals that are relevant to this assessment as outlined in the New South Wales Environmental Protection Authority (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 total impact relate to the total pollutant burden in the air and not just the pollutants from the MAC. Consideration of background pollutant levels needs to be made when using these goals to assess potential impacts. It is also noted that the annual average PM_{10} criterion is lower than that in the Project Approval (**Table 3-1**).

Table 3-4: Air quality impact assessment criteria

Pollutant	Averaging Period	Percentile	Impact	Criterion
Total Suspended Particulates (TSP)	Annual	100	Total	90 µg/m³
Particulate matter <10µm (PM_{10})	Annual	100	Total	25 µg/m³
	24 hour	100	Total	50 µg/m³
Particulate matter <2.5µm ($PM_{2.5}$)	Annual	100	Total	8 µg/m³
	24 hour	100	Total	25 µg/m³
Deposited dust	Annual	100	Incremental	2 g/m²/month
		100	Total	4 g/m²/month

µg/m³ = micrograms per cubic metre
g/m²/month = grams per square metre per month

3.4 NEPM ambient air quality goals

Table 3-5 summarises the air quality goals that are relevant to this assessment as outlined in the National Environment Protection (Ambient Air Quality) Measure (NEPM) (**NEPC, 2021**). The NEPM standards apply to locations representative of air quality likely to be experienced by the general population[1].

Table 3-5: NEPM ambient air quality standards

Pollutant	Averaging Period	Maximum concentration standard
Particulate matter ≤10µm (PM_{10})	Annual	25 µg/m³
	24 hour	50 µg/m³
Particulate matter ≤2.5µm ($PM_{2.5}$)	Annual	8 µg/m³
	24 hour	25 µg/m³

3.5 NSW Voluntary Land Acquisition and Mitigation Policy

Part of the NSW Voluntary Land Acquisition and Mitigation Policy (VLAMP) dated September 2018 describes the NSW Government's policy for voluntary mitigation and land acquisition to address particulate matter impacts from state significant mining, petroleum and extractive industry developments.

Voluntary mitigation rights may apply per the VLAMP where, even with best practice management, the development contributes to exceedances of the criteria in **Table 3-6** at any residence on privately owned land or workplace on privately owned land. [2]

1 NO_2/NOx has not been considered within this assessment as mining equipment is too widely dispersed over mine sites to cause goals to be exceeded even in mines that use large quantities of diesel.

2 Where the consequences of those exceedances, in the opinion of the consent authority, would be unreasonably deleterious to workers' health or carrying out of the business at that workplace.

Table 3-6: Particulate matter mitigation criteria

Pollutant	Averaging period	Mitigation criterion		Impact type
$PM_{2.5}$	Annual	8µg/m³*		Human health
$PM_{2.5}$	24 hour	25µg/m³**		Human health
PM_{10}	Annual	25µg/m³*		Human health
PM_{10}	24 hour	50µg/m³**		Human health
TSP	Annual	90µg/m³*		Amenity
Deposited dust	Annual	2g/m²/month**	4g/m²/month*	Amenity

Source: NSW Government (2018)

*Cumulative impact (i.e. increase in concentration due to the development plus background concentrations due to all other sources).

**Incremental impact (i.e. increase in concentrations due to the development alone), with zero allowable exceedances of the criteria over the life of the development.

Voluntary land acquisition rights may apply per the VLAMP where, even with best practice management, the development is predicted to contribute to exceedances of the criteria in **Table 3-7** at any residence on privately owned land[3], workplace on privately owned land or on more than 25 per cent (%) of any privately owned land where there is an existing dwelling or where a dwelling could be built under existing planning controls (vacant land).

Table 3-7: Particulate matter acquisition criteria

Pollutant	Averaging period	Acquisition criterion		Impact type
$PM_{2.5}$	Annual	8µg/m³*		Human health
$PM_{2.5}$	24 hour	25µg/m³**		Human health
PM_{10}	Annual	25µg/m³*		Human health
PM_{10}	24-hour	50µg/m³**		Human health
TSP	Annual	90µg/m³*		Amenity
Deposited dust	Annual	2g/m²/month**	4g/m²/month*	Amenity

Source: NSW Government (2018)

*Cumulative impact (i.e. increase in concentration due to the development plus background concentrations due to all other sources).

**Incremental impact (i.e. increase in concentrations due to the development alone), with up to five allowable exceedances of the criteria over the life of the development.

3.6 Adopted Assessment Criteria

For the purpose of this report, the air quality assessment criteria within the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* **(NSW EPA, 2022)** have been adopted for the assessment of impacts at any residence on privately-owned land (except for those residences with rights to acquisition upon request). The NSW EPA guidance includes criteria for $PM_{2.5}$ and a more stringent criterion for annual average PM_{10} than the criterion approved within MP 09_0062 (i.e. 25µg/m³ rather than 30µg/m³).

3 Where the consequences of those exceedances, in the opinion of the consent authority, would be unreasonably deleterious to workers' health or carrying out of the business at that workplace.

4 EXISTING ENVIRONMENT

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

4.1 Local climatic conditions

Long-term climatic data from the nearest operating Bureau of Meteorology (BoM) weather station with available data at Scone Airport Automatic Weather Station (AWS) (Site No. 061363) were used to characterise the local climate in the proximity of the MAC. The Scone Airport AWS is located approximately 30.3km north of the MAC (**Figure 2-1**).

Table 4-1 and **Figure 4-1** present a summary of data from the Scone Airport station collected over an approximate 20-to-33-year period for the various meteorological parameters.

The data indicate that January is the hottest month with a mean maximum temperature of 31.8 degrees Celsius (°C) and July is the coldest month with a mean minimum temperature of 3.4°C.

Rainfall is higher during the warmer months and lower during the cooler months of the year, with an average annual rainfall of 620.7 millimetres (mm) over 66.6 days. The data indicate that November is the wettest month with an average rainfall of 77.7mm over 6.7 days and April is the driest month with an average rainfall of 32.4mm over 4.0 days.

Humidity levels exhibit some variability and seasonal fluctuations across the year. Mean relative humidity levels at 9am range from 62 per cent (%) in October to 86% in June. Mean relative humidity levels at 3pm range from 41% in January to 58% in June.

Wind speeds have a relatively similar spread between the 9am and 3pm conditions throughout the year. Mean 9am wind speeds range from 7.0 kilometres per hour (km/h) in May and July to 12.7km/h in October and November. Mean 3pm wind speeds range from 16.0km/h in June to 20.6km/h in November.

Table 4-1: Monthly climate statistics summary – Scone Airport AWS

Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann.
Temperature													
Mean max. temp. (°C)	31.8	30.6	27.9	24.6	20.4	17.0	16.7	18.8	22.2	25.3	28.1	30.2	24.5
Mean min. temp. (°C)	17.1	16.6	14.4	10.1	6.6	4.8	3.4	3.7	6.7	9.7	13.0	15.3	10.1
Rainfall													
Rainfall (mm)	62.6	59.0	63.7	32.4	35.5	44.7	39.7	36.0	36.1	52.5	77.7	73.6	620.7
No. of rain days (≥1mm)	6.1	5.8	6.7	4.0	4.5	6.0	5.0	4.3	4.9	5.8	6.7	6.8	66.6
9am conditions													
Mean temp. (°C)	22.3	21.3	19.0	17.0	13.0	10.0	9.4	11.3	15.3	18.3	19.7	21.6	16.5
Mean R.H. (%)	70.0	77.0	82.0	77.0	81.0	86.0	83.0	73.0	66.0	62.0	66.0	67.0	74.0
Mean W.S. (km/h)	11.3	10.0	8.9	8.2	7.0	7.5	7.0	9.9	11.4	12.7	12.7	11.9	9.9
3pm conditions													
Mean temp. (°C)	29.9	28.9	26.7	23.4	19.4	16.1	15.6	17.7	20.8	23.6	26.0	28.4	23.0
Mean R.H. (%)	41.0	47.0	47.0	49.0	51.0	58.0	55.0	47.0	44.0	42.0	43.0	42.0	47.0
Mean W.S. (km/h)	19.2	18.7	18.6	18.0	16.1	16.0	16.5	18.7	18.9	19.1	20.6	20.0	18.4

Source: **Bureau of Meteorology, 2023**
RH = Relative Humidity
WS = Wind speed

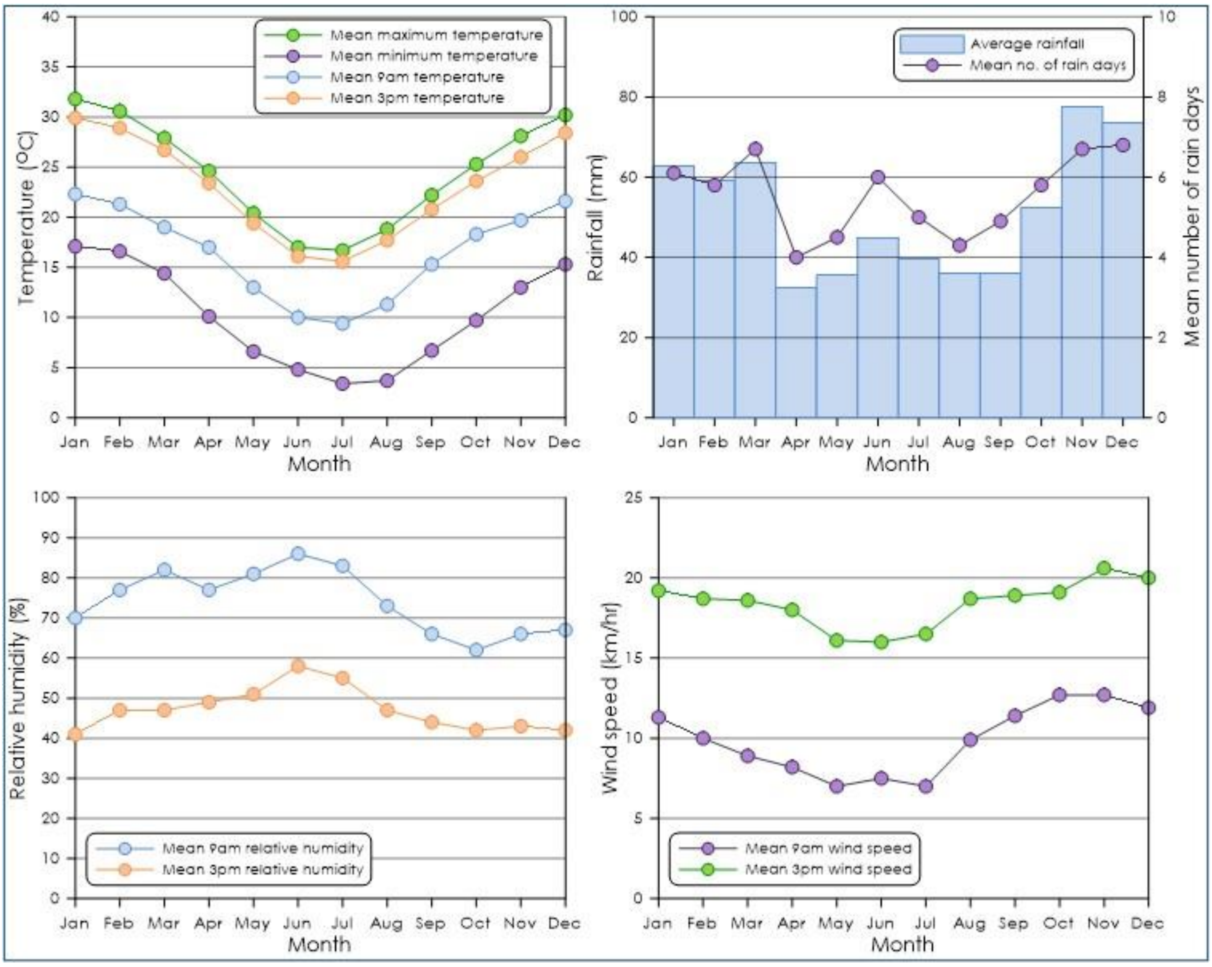


Figure 4-1: Monthly climate statistics summary – Scone Airport AWS

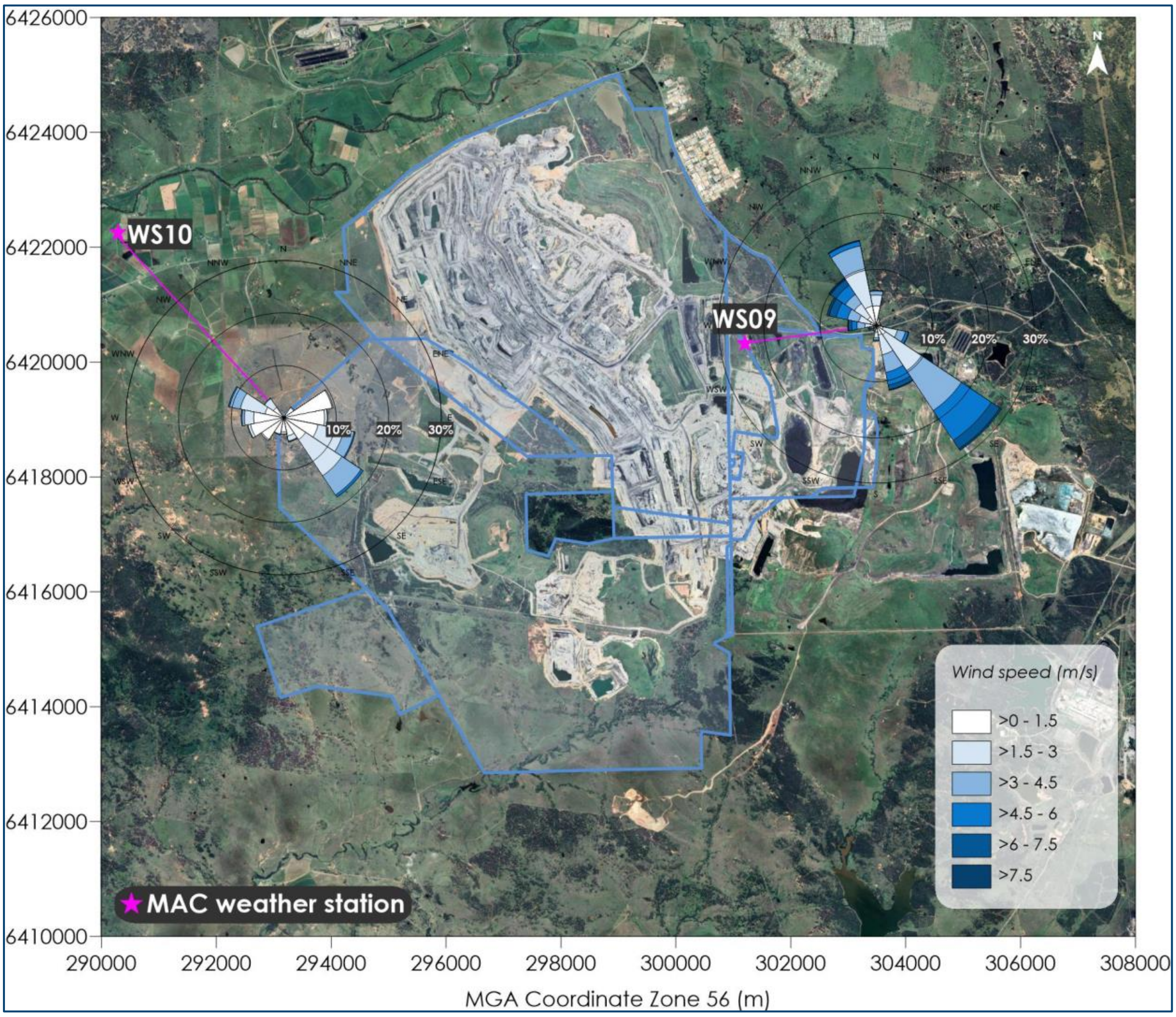
4.2 Local meteorological conditions

HVEC operates on-site weather stations at the MAC. The locations of the WS09 and WS10 weather stations are shown in **Figure 4-2**, which presents the locations of these stations overlaid with the annual windroses from the available data during 2015.

The 2015 calendar year has been selected as the meteorological year for the dispersion modelling based on analysis of eight contiguous years of data (2015 – 2022) against the long-term meteorological data trends and other factors discussed in detail in **Appendix B**.

For the WS09 weather station, on an annual basis, winds typically flow along a north-northwest to a southeast axis, with very few winds arising from the north-east and south-west quadrants.

At the WS10 station, winds are more varied and wind speeds are relatively lower in comparison to the WS09 weather station. Winds from the southeast dominate the distribution.



Note: m/s = metres per second

Figure 4-2: Annual windroses for 2015

4.3 Ambient air quality

The main sources of particulate matter in the wider area include active mining, agricultural activities, emissions from local anthropogenic activities such as motor vehicle exhaust and domestic wood heaters, urban activity and various other commercial and industrial activities including power generation associated with the Liddell and Bayswater power stations.

This section reviews the available ambient air quality monitoring data sourced from on-site monitoring and the nearest NSW Department of Planning and Environment (DPE) ambient air quality monitoring stations at Muswellbrook and Muswellbrook NW which are located approximately 5.4km and 7.2km northeast of the MAC, respectively.

4.3.1 PM₁₀ and TSP monitoring

Ambient PM_{10} and TSP monitoring data sourced from 47 stations have been reviewed. **Figure 4-3** shows the approximate location of each of the monitoring stations with reference to the MAC (except for the Mangoola D05-DC and D06-DC monitors). The type of air quality monitors used to measure ambient PM_{10} and TSP include Tapered Element Oscillating Microbalances (TEOMs), High Volume Air Samplers (HVAS) and Palas Fidas monitors.

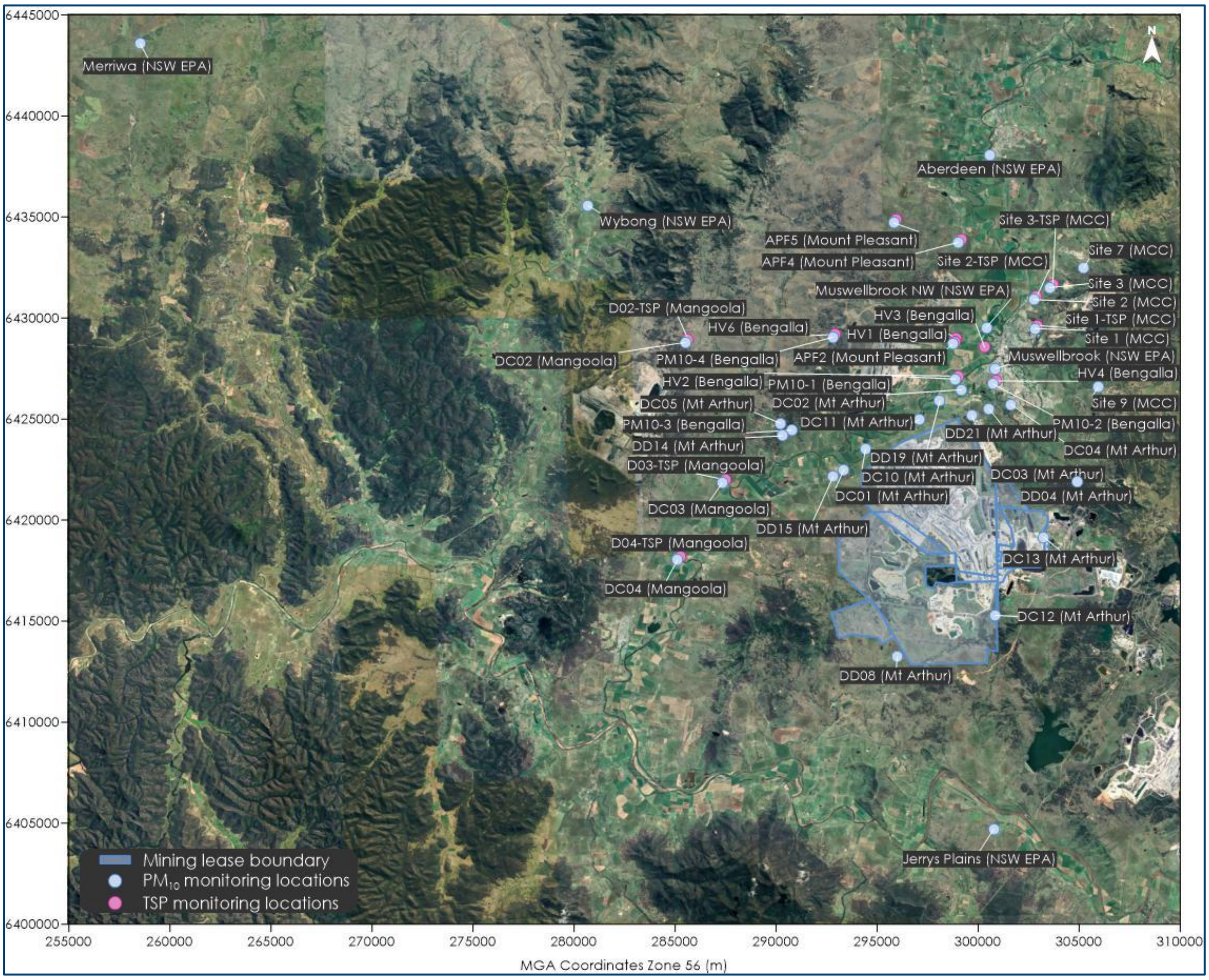


Figure 4-3: Ambient PM_{10} and TSP monitoring locations

The available PM_{10} monitoring data from the Upper Hunter air quality monitoring network (UHAQMN) monitoring stations are summarised in **Table 4-2**, and indicate that the annual average PM_{10} concentrations are below the relevant criterion of 25µg/m³, with the exception of Muswellbrook in 2018 and all stations in 2019. The maximum 24-hour average PM_{10} concentrations recorded at these stations exceed the relevant criterion of 50µg/m³ on at least one occasion per annum for majority of the review period.

Table 4-2: Summary of ambient PM_{10} levels from UHAQMN (µg/m³)

Location	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
	Annual average										
Muswellbrook NW	19.1	18.9	19.2	16.7	16.6	18.5	25.0	**33.7**	21	15.6	14.3
Muswellbrook	21.8	22.6	21.4	19.1	19.2	21.7	**27.2**	**34.4**	22.5	18.2	16.6
Aberdeen	17.0	17.3	17.9	15.2	15.6	17.6	22.3	**29.5**	17.8	12.9	12.3
Wybong	15.4	15.5	17.0	14.8	15.3	16.6	21.6	**28.5**	18.2	12.6	11.7
Jerrys Plains	10.8	18.6	18.2	15.5	16.8	18	24.3	**32.1**	20.5	13.6	13.3
Merriwa	14.2	14.9	15.2	13.2	13.5	14.2	19.2	**27.9**	18.2	11.7	11.2
	Maximum 24-hour average										
Muswellbrook NW	**55.8**	**52.4**	**50.8**	**72.9**	44.8	**51.0**	**195.4**	**244.6**	**238.6**	38.2	**55.5**
Muswellbrook	**51.0**	**55.6**	**53.0**	**72.6**	43.9	**56.5**	**185.9**	**231.3**	**181**	43.5	37.1
Aberdeen	45.8	42.7	**50.4**	**64.8**	41.2	**59.4**	**178.9**	**246.7**	**267.7**	33.2	32.1
Wybong	**54.4**	**83.0**	**67.7**	**79.5**	**52.1**	**64.3**	**179.6**	**277.2**	**373.6**	37.9	31.7
Jerrys Plains	43.7	**63.3**	**64.4**	**70**	42.9	**50.5**	**201.4**	**226.7**	**134.5**	42.8	41.6
Merriwa	**50.4**	43.3	**55.2**	**83**	41.6	49.7	**197.1**	**302.1**	**620.7**	35.4	27.4

The recorded 24-hour average PM_{10} concentrations include the contribution from all emission sources in the vicinity and are presented graphically in **Figure 4-4**.

The figure shows that PM_{10} concentrations are highest in the 2018, 2019 and 2020 periods. Elevated PM_{10} levels typically coincide with regional dust events and bushfires which affect a wide area. The high PM_{10} concentrations recorded in 2018, 2019 and 2020 are attributed to the drought period and widespread bushfires affecting NSW.

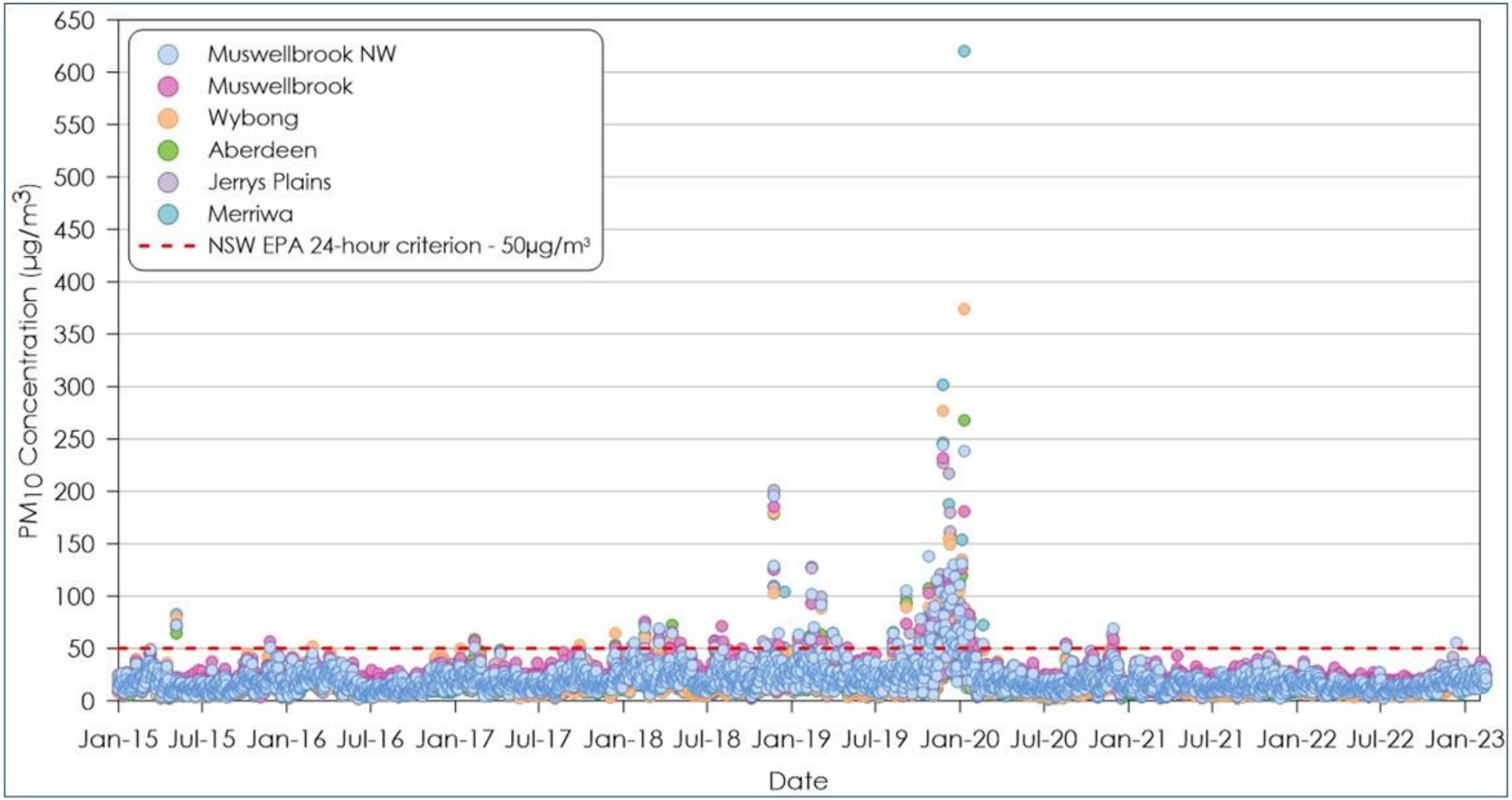


Figure 4-4: 24-hour average PM_{10} concentrations at UHAQMN monitoring stations

Figure 4-5 presents the annual average PM_{10} monitoring data for the period reviewed for a selection of UHAQMN monitoring stations. In 2019, the annual average PM_{10} levels at all monitors exceeded the relevant criterion of 25µg/m³. The graph shows there has been a significant increase in the dust levels during 2018 and 2019 compared to previous years. This increase occurs at all stations in the UHAQMN including the Merriwa monitor, which is generally considered to be unaffected by mining activities.

The increase in dust levels in 2018 is primarily due to drought conditions and the increase in 2019 is due to a combination of the intensifying drought conditions and a severe bushfire season. The increase in background dust levels due to these environmental conditions is considered to be the main cause of the elevated annual average readings.

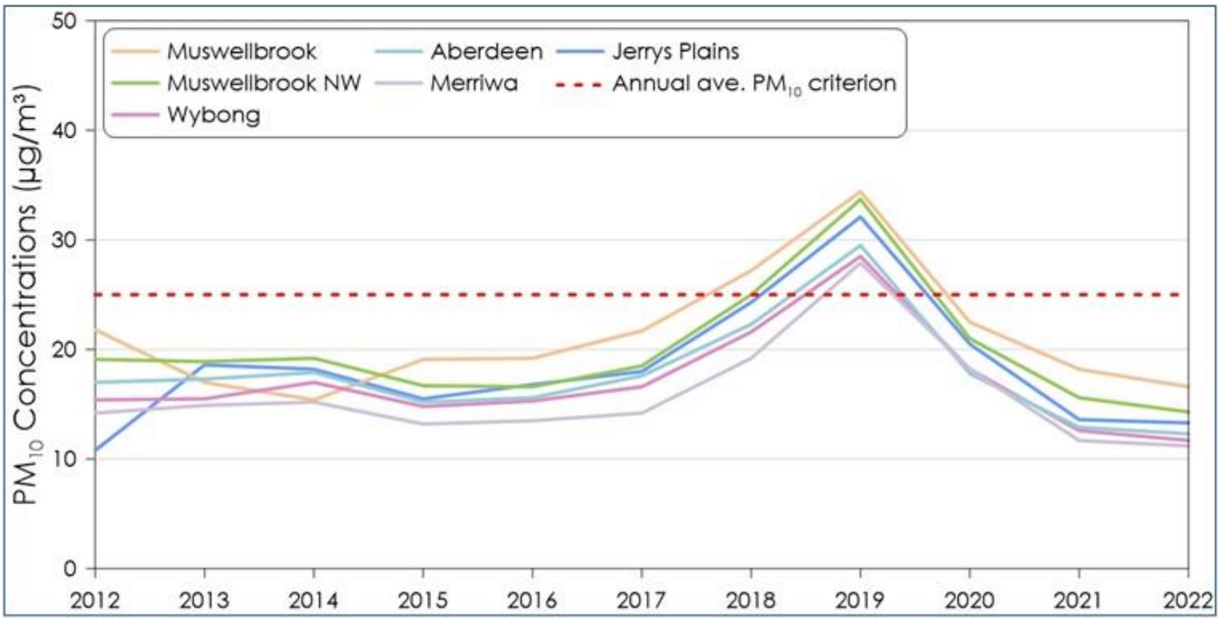


Figure 4-5: Annual average PM_{10} concentrations at UHAQMN monitoring stations

The diurnal profile of dust levels at the Muswellbrook monitor has been investigated. **Figure 4-6** presents an analysis of the measured PM_{10} and $PM_{2.5}$ levels per time of day.

The figure indicates the PM_{10} levels show only a slight trend with higher levels occurring in the early morning and evening periods compared to the middle of the day. This is as expected due to the better dispersion conditions occurring during daytime periods.

The $PM_{2.5}$ levels show a more noticeable trend with the higher levels occurring in the night-time periods compared to the day. Further analysis by season shows the maximum $PM_{2.5}$ levels occur in winter and spring compared to the other seasons, which coincides with a higher occurrence of inversions.

The likely cause of these elevated $PM_{2.5}$ levels can be attributed to domestic wood heater emissions from within the town. Whilst dust from mining would also contribute to these levels, it needs to be acknowledged that domestic wood smoke is a key issue for potential human health impacts as wood heaters are located inside living rooms and the chimney discharge is closer to residents, which means the air that the population breathes will be affected by wood heater emissions to a much greater degree than by mining operations.

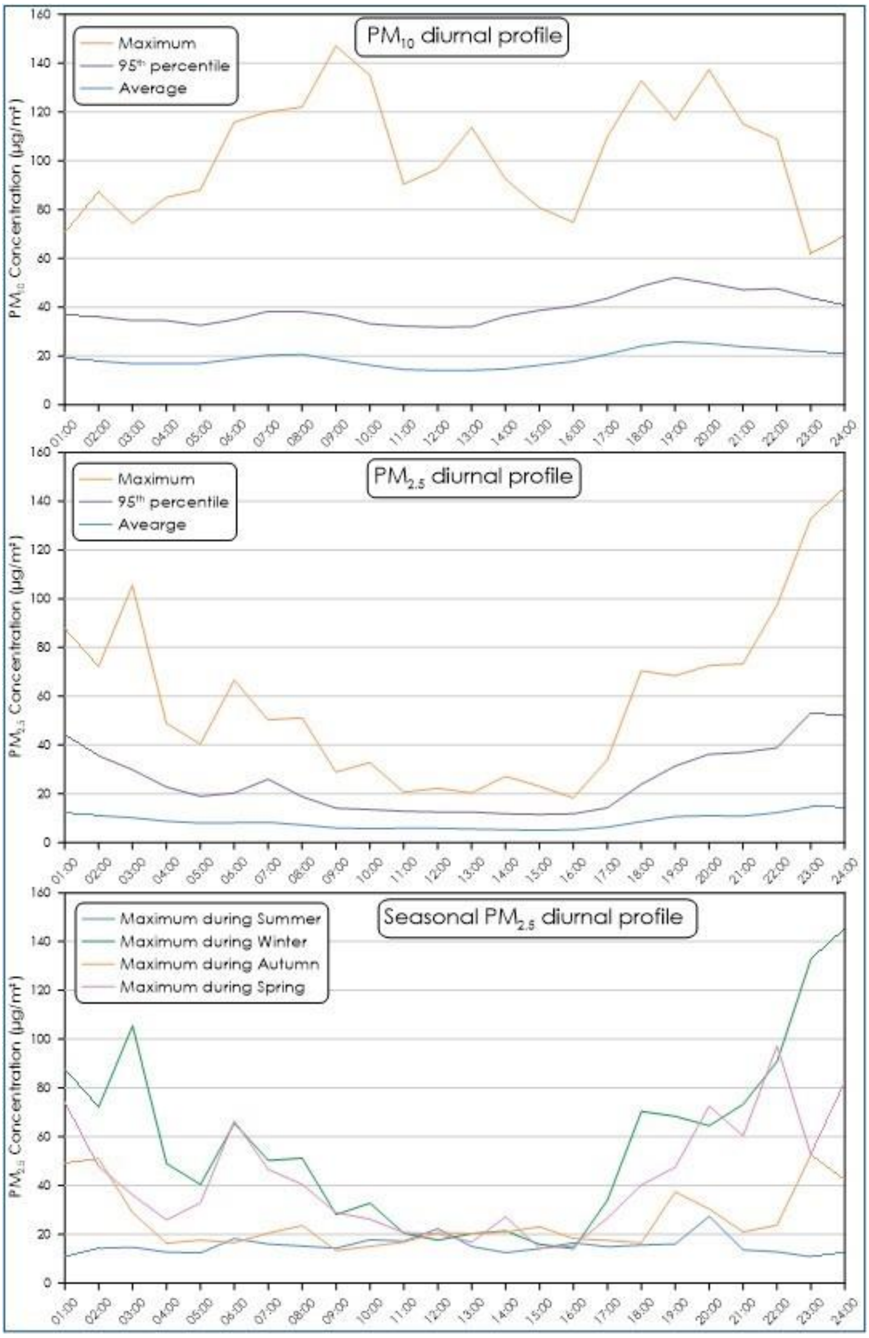


Figure 4-6: Diurnal PM_{10} and $PM_{2.5}$ levels at Muswellbrook monitor (2015)

Table 4-3 summarises the annual average PM_{10} levels from monitoring stations operated by the MAC and nearby mining operations, including; Mount Pleasant Operations, Mangoola Coal, Bengalla Coal Mine and Muswellbrook Coal Mine (MCM). The ambient air quality monitoring data for these stations were obtained from publicly available sources including annual reviews and published monitoring data records. It should be noted that some of the monitors may be used for operational purposes only and not for compliance purposes.

For the 2012 to 2021 period, all monitoring stations recorded levels below 25µg/m³ with the exception of the PM10-1 station in 2013, the PM10-4 station in 2017, the PM10-2 station in 2018 and 2019, the APF2 station in 2020, the APF4 station in 2020, the APF5 station in 2020, the Site 7 station in 2019 and DC02, PM10-1, PM10-3 and PM10-4 stations in 2018, 2019 and 2020.

The recorded annual average levels at these monitors typically show similar levels to those recorded at the UHAQMN stations for the same period. Monitoring stations located closer to mining operations generally indicate higher levels of PM_{10} compared to those located further away.

Table 4-3: Summary of annual average PM_{10} levels from surrounding mining operations (µg/m³)

Location	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
DC01 (Mt Arthur)	16.7	-	-	-	-	-	-	-	-	-
DC02 (Mt Arthur)	16.7	22.4	21.3	18.5	17.8	17.9	**29^**	**30^**	**27^**	20
DC03 (Mt Arthur)	18.9	-	-	-	-	-	-	-	-	-
DC04 (Mt Arthur)	18.3	20.8	20.4	18.4	18.0	19.6	22^	25^	20^	19^
DC05 (Mt Arthur)	10.8	16.1	16.3	14.1	12.2	11.5	19^	21^	13^	11^
DC06 (Mt Arthur)	18^	15^	17^	16^	15^	12^	13.2^	14^	19^	14^
DC07 (Mt Arthur)	-	-	15^	14^	14^	13.9^	18^	20^	20^	15^
DC09 (Mt Arthur)	-	-	17^	20^	14^	14.2^	21^	25^	23^	15^
APF2 (Mt Pleasant)	-	-	-	-	-	17.4	23.4*	23.4*	**44***	16.1
APF4 (Mt Pleasant)	-	-	-	-	-	8.9	16.0*	16.3*	**39.9***	11.8
APF5 (Mt Pleasant)	-	-	-	-	-	-	15.4*	17.5*	**40.7***	13.1
D02-DC (Mangoola)	13.3	14.5	14.4	11.4	11.7	12.9	17.2	17.6	12.3	12.8
D03-DC (Mangoola)	13.6	14.9	15.4	12.3	13.6	14.6	20.3	21.0	17.2	15.4
D04-DC (Mangoola)	11.1	12.2	12.2	9.9	9.9	12.7	18.0	20.6	13.6	13.2
D05-DC (Mangoola)	-	-	-	10.5	9.9	9.0	17.0	15.6	10.5	9.2
D06-DC (Mangoola)	-	-	-	-	-	-	20.9	20.0	14.6	12.3
PM10-1 (Bengalla)	24.4	**26.0**	23.5	20.0	18.1	23.1	**33.3**	**49.3**	**25.7**	20.1
PM10-2 (Bengalla)	25.0	22.5	23.6	18.9	17.0	19.2	**27.1**	**37.9**	22.7	17
PM10-3 (Bengalla)	16.2	17.7	23.7	18.9	17.9	20.9	**27.5**	**38.7**	**26.5**	15.6
PM10-4 (Bengalla)	20.1	20.2	23.7	22.7	21.1	**28.0**	**38.2**	**48.9**	**29.3**[1]	24.1
Site 1 (MCM)	-	16.6	17.2	14.9	14.3	17.1	-	-	-	-
Site 2 (MCM)	-	17.3	17.6	14.9	15.5	17.2	-	-	-	-
Site 3 (MCM)	-	18.6	15.3	13.7	12.3	15.7	-	-	-	-
Site 7 (MCM)	-	-	-	-	-	15.6	20.2	**26.7**	19.8	13.1
Site 9 (MCM)	-	-	-	-	-	16.7	17.8	24.2	20.5	14.1

Note: * Results exclude 'extraordinary events' (e.g. dust storms and bushfire activity).
^ Results are for financial year, not calendar year.
[1] Results exclude invalid reading on January 3rd, 2020.

Table 4-4 summarises the available annual average TSP levels for monitoring stations operated by nearby mining operations. For the 2012 to 2021 period, all monitoring stations recorded levels below 90µg/m³, with the exception of HV6 in 2017, 2018, 2019 and 2020, HV1 and HV2 in 2018 and 2019 and HV4 in 2019.

Table 4-4: Summary of annual average TSP levels from surrounding mining operations (µg/m³)

Location	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
APF2 (Mt Pleasant)	-	-	-	-	-	52.9	89.6*	80.6*	51.8*	43.9
APF4 (Mt Pleasant)	-	-	-	-	-	30.5	45.5*	46.7*	32.7*	27.6
APF5 (Mt Pleasant)	-	-	-	-	-	25.4	43.7*	48.3*	31.6*	29.8
DC02 (Mt Arthur)	40.7	54.1	58.6	49	47.5	44	71	75	68	50
DC04 (Mt Arthur)	33.7	47.8	50.5	50	45	46	55	61	50	47
DC05 (Mt Arthur)	25.5	46.5	43.9	40	35	26	47	53	33	27
DC06 (Mt Arthur)	37.1	42.6	40.9	31	30	33	35	46	35	27
DC07 (Mt Arthur)	-	-	37.9	36	35	35	44	51	50	38
DC09 (Mt Arthur)	-	-	42.5	36	35	35	51	61	58	38
D02-TSP (Mangoola)	41.4	42.9	47	37.3	35.4	42.9	61.2	54.0	34.5	27.8
D03-TSP (Mangoola)	37.7	43.5	50	38	41.7	41.7	60.0	62.1	42.1	30.3
D04-TSP (Mangoola)	28.7	36.7	38.6	39.5	35.0	37.8	50.4	49.9	32.9	23.8
HV1 (Bengalla)	50.1	45.5	60.3	45.8	52.8	58.9	**94.3**	**124**	74	64.1
HV2 (Bengalla)	60.9	61.3	67.3	54.1	52.7	60.0	**91.4**	**112.5**	70.2	55.3
HV3 (Bengalla)	43.5	42.6	49.3	39.1	37.6	43.9	69.7	85.2	50.9	41.7
HV4 (Bengalla)	55	51.6	60.9	44.5	44.9	49.6	71.5	**95.1**	58.8	44.7
HV6 (Bengalla)	64.6	66.1	80.1	73.1	68.7	**96.4**	**112.0**	**143**	**91.7**[1]	76
Site 1 (MCM)	-	33.0	39.5	29.8	28.2	32.6	-	-	-	-
Site 2 (MCM)	-	37.5	39.4	29.7	30.1	32.9	-	-	-	-
Site 3 (MCM)	-	38.2	51.4	32.9	35.9	36.7	-	-	-	-

Note: * Results exclude 'extraordinary events' (e.g. dust storms and bushfire activity)
[1] Results exclude invalid reading on January 3rd, 2020.

4.3.2 $PM_{2.5}$ monitoring

A summary of the available $PM_{2.5}$ monitoring data from the UHAQMN Muswellbrook and Merriwa monitoring stations is provided in **Table 4-5**, and is presented graphically in **Figure 4-7**.

Table 4-5 indicates that the annual average $PM_{2.5}$ concentrations in Muswellbrook were above the relevant criterion of 8µg/m³ for the periods reviewed, with exception in 2021 and 2022, which was a period when above average rainfall prevailed. The annual average $PM_{2.5}$ concentrations at Merriwa were below the relevant criterion 8µg/m³ for all periods since the monitoring station began $PM_{2.5}$ measurements in late 2020. The maximum 24-hour average $PM_{2.5}$ concentrations exceeded the relevant criterion of 25µg/m³ at Muswellbrook from 2012 to 2020 and were below the criterion at Muswellbrook and Merriwa in 2021 and 2022.

Table 4-5: Summary of ambient $PM_{2.5}$ levels from UHAQMN Muswellbrook (µg/m³)

Location	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
	Annual average										
Muswellbrook	10.1	9.4	9.7	8.7	8.4	9.4	9.4	12.2	9.3	7.3	6.2
Merriwa	-	-	-	-	-	-	-	-	-	4.2	3.4
	Maximum 24-hour average										
Muswellbrook	26.4	36.6	27.4	31.2	29.4	31.1	26.5	77.4	49.1	19.7	16.3
Merriwa	-	-	-	-	-	-	-	-	-	14.7	13.6

A seasonal trend in 24-hour average $PM_{2.5}$ concentrations for the Muswellbrook monitoring station can be seen in **Figure 4-7** with elevated levels occurring during the cooler months, and are likely a result of local background sources such as wood heaters and motor vehicles. Similar to the PM_{10} monitoring data, there was a significant increase in the frequency of 24-hour average $PM_{2.5}$ exceedances in 2019 and 2020, predominately due to smoke associated with the 2019/2020 bushfires.

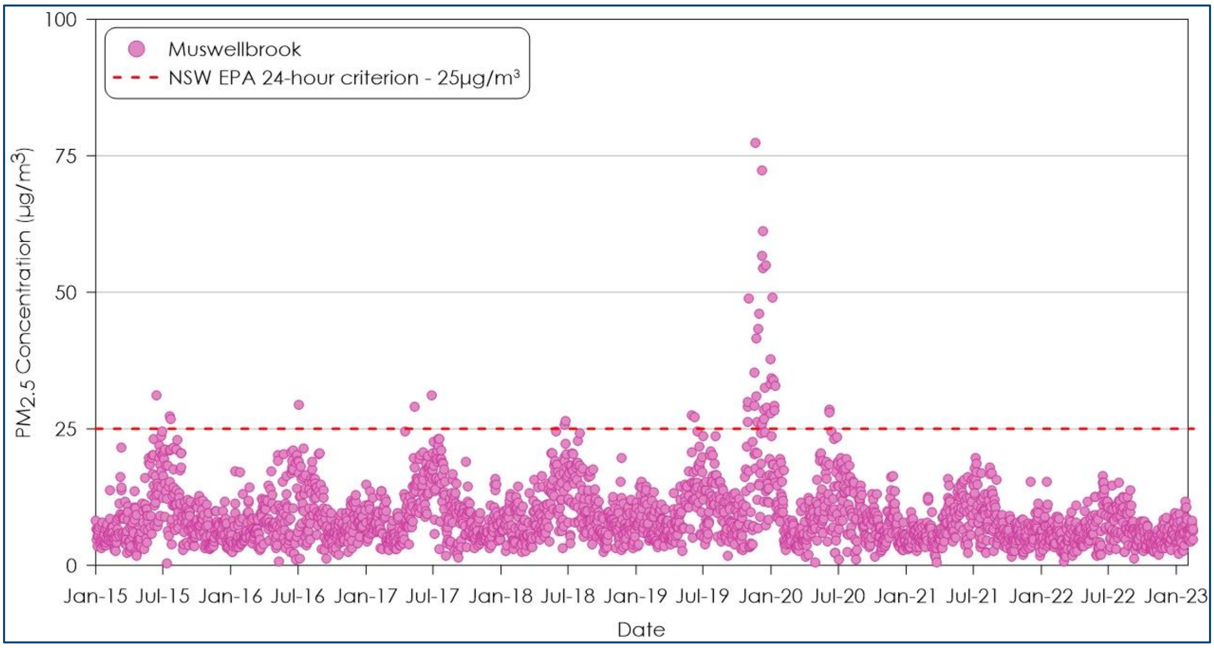


Figure 4-7: 24-hour average $PM_{2.5}$ concentrations from UHAQMN Muswellbrook monitoring station

Ambient $PM_{2.5}$ levels at the Muswellbrook monitoring station would be governed by non-mining background sources such as wood heaters. The wintertime peak in $PM_{2.5}$ levels would arise due to emissions from urban wood heaters in the nearby residential areas.

$PM_{2.5}$ monitors located near mining operations (away from towns) are found to have little seasonal trend in comparison to the Muswellbrook monitoring station (**Todoroski Air Sciences, 2014**). This suggests that the influence of anthropogenic sources on $PM_{2.5}$ levels is localised to the towns and does not significantly affect the more remote areas that are generally sparsely populated.

4.3.3 Dust deposition monitoring

Dust deposition monitoring conducted by the MAC has been reviewed. **Figure 4-8** presents the approximate location of the dust deposition gauges.

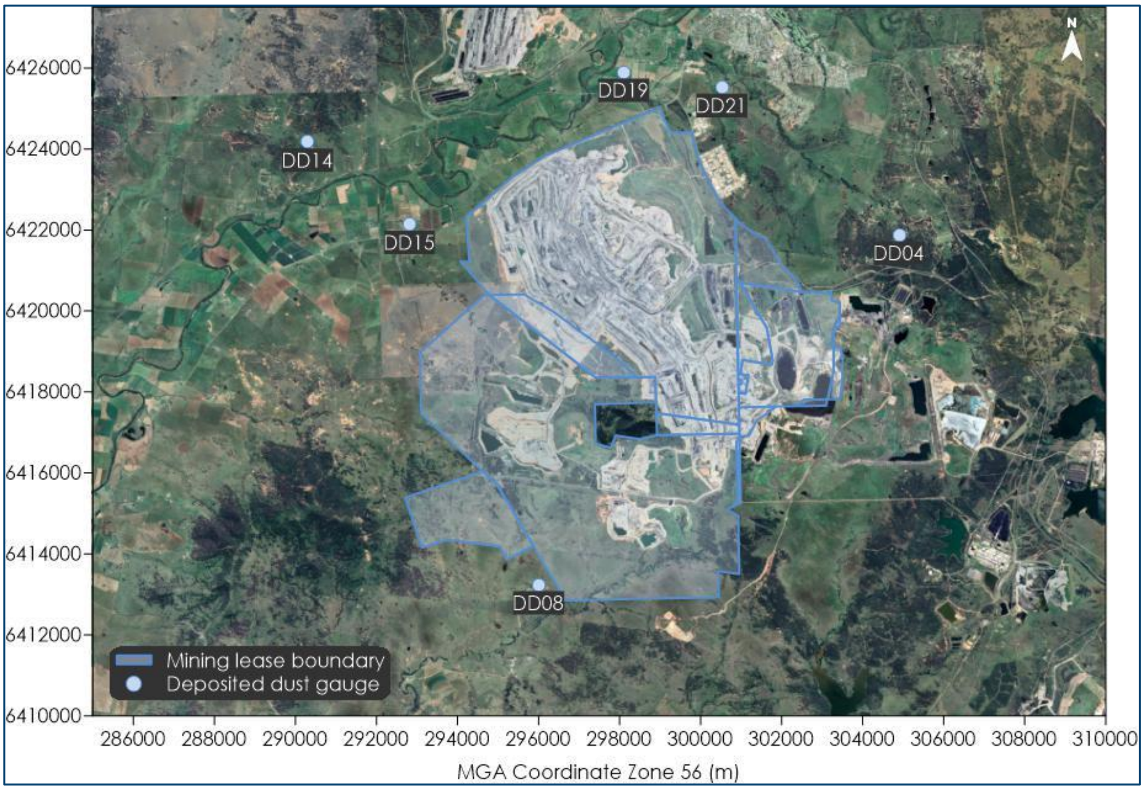


Figure 4-8: Dust deposition monitoring locations

Table 4-6 presents the annual average dust deposition levels during 2011 to 2021. The results indicate that dust deposition levels are typically highest near mining activity, such as at DD15. All other monitors recorded levels below the relevant criterion of 4g/m²/month and indicate dust deposition levels are generally good in the vicinity of the MAC, with the exception of gauge DD15 and DD19 in 2018.

Table 4-6: Summary of dust deposition levels (g/m²/month)

Location	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
DD04	2.1	1.7	1.9	2.2	2.7	2.3	2.1	2.5	-	-	-
DD08	1	1.3	2	1.6	1.1	1.6	1.4	1.4	2	2	1.7
DD14	1.3	1.5	1.9	2.1	2.1	1.8	1.6	2.3	2.6	3	2.7
DD15	1.8	2.7	3.6	3.1	2.9	3	4	**4.7**	-	-	-
DD19	2.9	2.8	3.4	3.7	3.3	3.1	2.7	**4.6**	-	-	-
DD21	1.6	1.7	2.2	2	2.2	2.2	1.7	2.3	-	-	-

5 DISPERSION MODELLING APPROACH

The dispersion modelling approach applies the CALPUFF modelling suite, as per previous assessments for the MAC and similar recent projects conducted by Todoroski Air Sciences and in accordance with the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (**EPA, 2022**).

The model was set up in general accordance with the NSW EPA's *Generic Guidance and Optimum Model Settings for the CALPUFF Modeling System for Inclusion into the 'Approved Methods for the Modeling and Assessments of Air Pollutants in NSW, Australia'* (**TRC Environmental Corporation, 2011**).

5.1 Meteorological modelling

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

TAPM was applied to generate prognostic upper air data for use in CALMET. The centre of analysis for the TAPM modelling used is 32deg15min south and 150deg49.5min east. The TAPM simulation involved an outer grid of 30km, with three nested grids of 10km, 3km and 1km with 35 vertical grid levels.

The CALMET modelling used a nested approach where the wind field from the coarser grid outer domain is used as the initial (or starting) field for the finer grid inner domains. The CALMET initial domain was an 85 x 85km grid with a 1.7km grid resolution, the second domain used a 50 x 50km grid with a 1.0km grid resolution and final, high resolution domain used a 33 x 33km grid with a 0.3km grid resolution.

The 2015 calendar year was selected as the period for modelling the Modification based on the evaluation in **Appendix B**. The available meteorological data from eleven nearby meteorological monitoring sites were included in the simulation. **Table 5-1** outlines the parameters used from each station.

Table 5-1: Surface observation stations

Weather Stations	Parameters						
	WS	WD	CH	CC	T	RH	SLP
WS08	✓	✓			✓	✓	✓
WS09	✓	✓			✓	✓	
WS10	✓	✓			✓	✓	
Muswellbrook NW (DPE)	✓	✓			✓	✓	
Muswellbrook (DPE)	✓	✓			✓	✓	
Jerrys Plains (DPE)	✓	✓			✓	✓	
Scone Airport AWS (BoM) (Station No. 061363)	✓	✓			✓	✓	✓
Murrurundi Gap AWS (BoM) (Station No. 061392)	✓	✓	✓	✓	✓	✓	✓
Merriwa (Roscommon) Weather Station (BoM) (Station No, 061287)	✓	✓	✓	✓	✓	✓	✓
Cessnock Airport AWS (BoM) (Station No. 061260)	✓	✓			✓	✓	✓
Nullo Mountain AWS (BoM) (Station No. 062100)	✓	✓			✓	✓	

WS = wind speed, WD= wind direction, CH = cloud height, CC = cloud cover, T = temperature, RH = relative humidity, SLP = station level pressure, DPE = Department of Planning and Environment and AWS = Automatic Weather Station

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

Table 5-2: Seven critical parameters used in CALMET

Parameter	Value		
	Domain 3	Domain 2	Domain 1
TERRAD	10		
IEXTRP	-4		
BIAS (NZ)	-1, -0.5, -0.25, 0, 0, 0, 0, 0		
R1 and R2	2.5,2.5	5,5	15,15
RMAX1 and RMAX2	5,5	10,10	25,25

5.2 Meteorological modelling evaluation

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

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

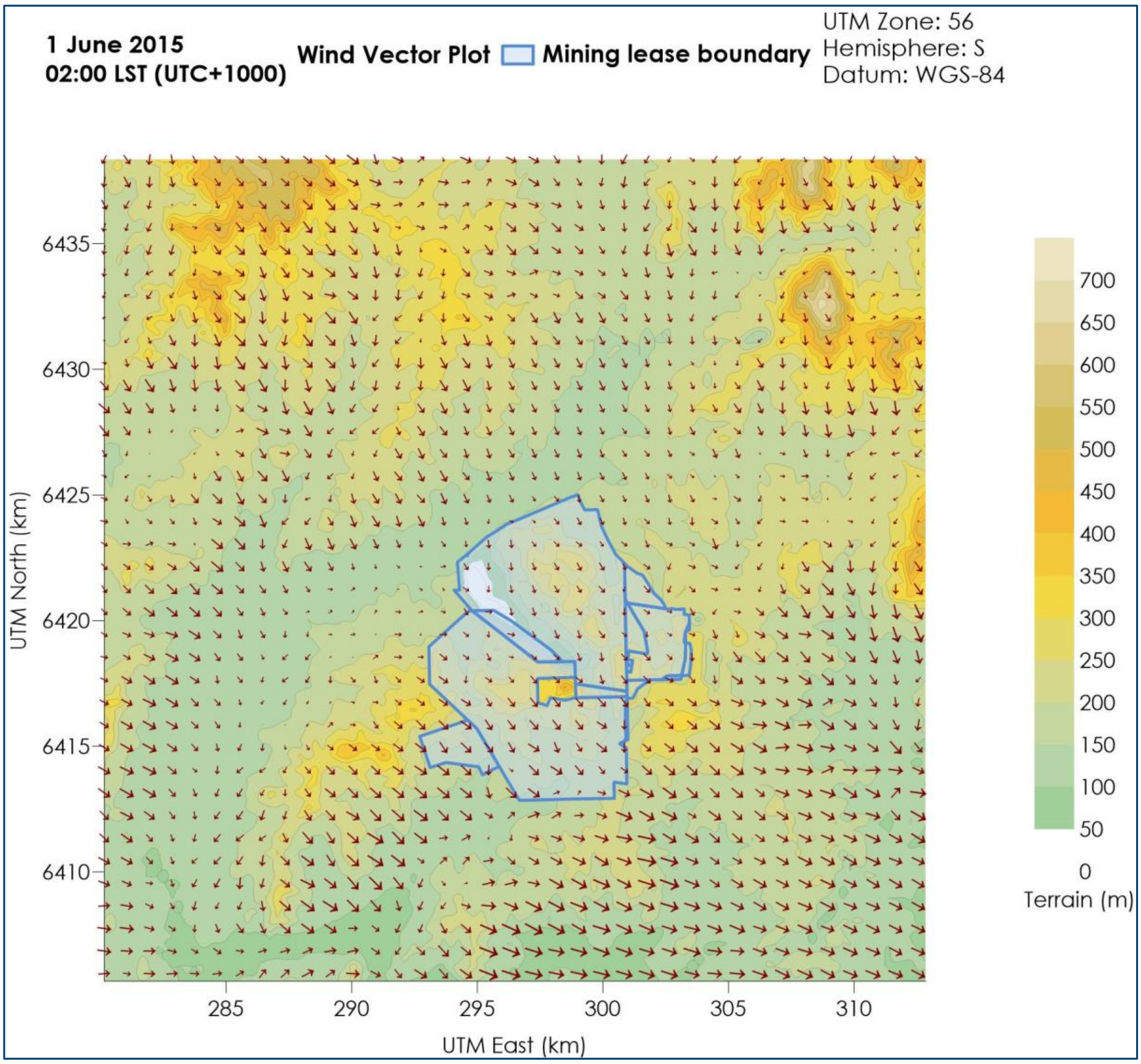


Figure 5-1: Example of the wind field for one of the 8,760 hours of the year that are modelled

CALMET-generated meteorological data were extracted at a location within the CALMET domain (see **Figure 5-1**) and are graphically represented in **Figure 5-2** and **Figure 5-3**.

Figure 5-2 presents annual and seasonal windroses extracted at a location within the CALMET domain. On an annual basis, winds from the southeast are most frequent followed by winds from the northwest. During summer, winds from the southeast dominate the distribution. The autumn and spring wind distribution patterns are similar to the annual distribution, with most winds originating from the southeast and northwest. In winter, winds from the north-western quadrant are the most predominant.

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. This is evident as the windroses based on the CALMET data also compare well with the windroses generated with the measured data.

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.

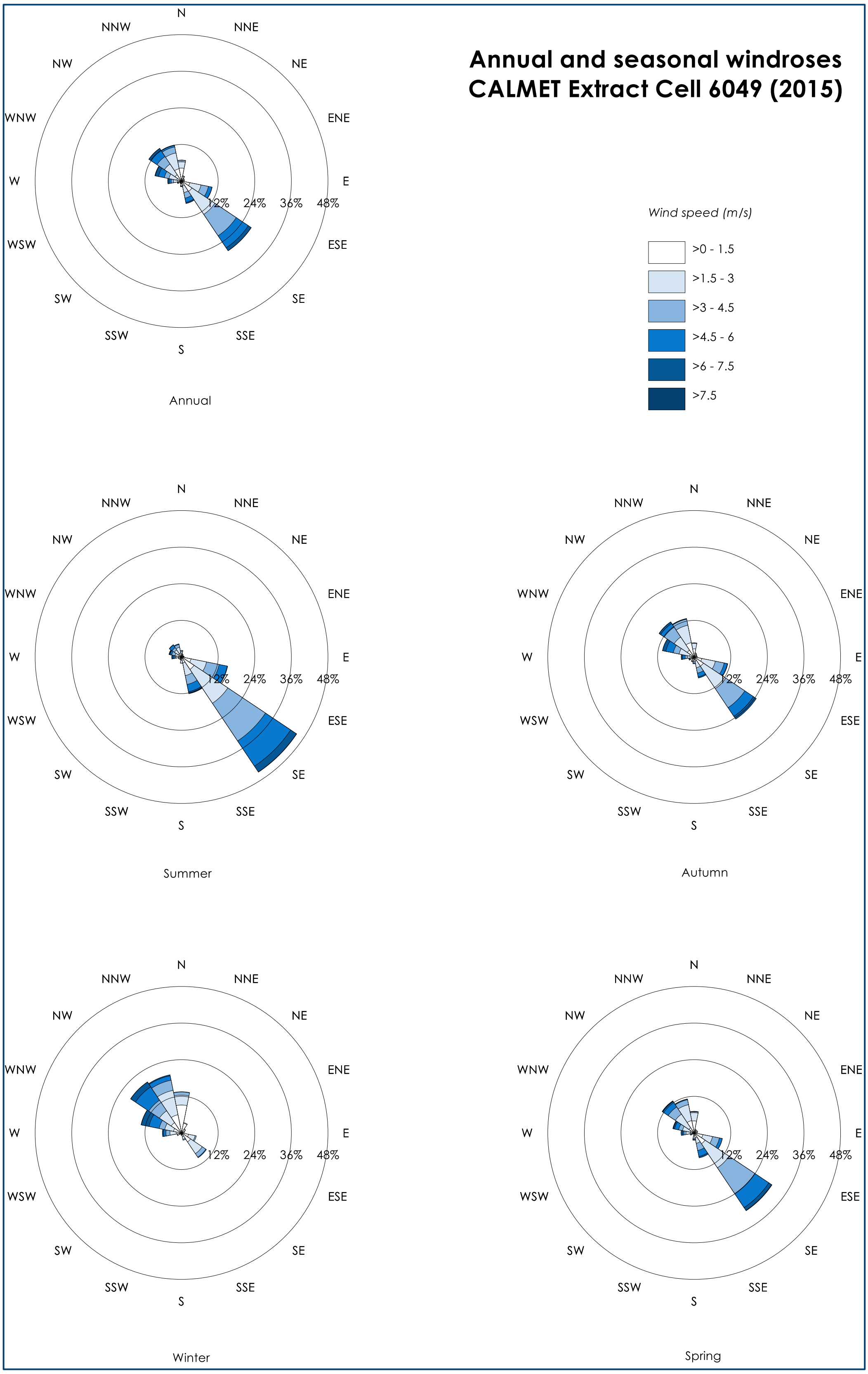


Figure 5-2: Windroses from CALMET extract Cell ref 6049 (2015)

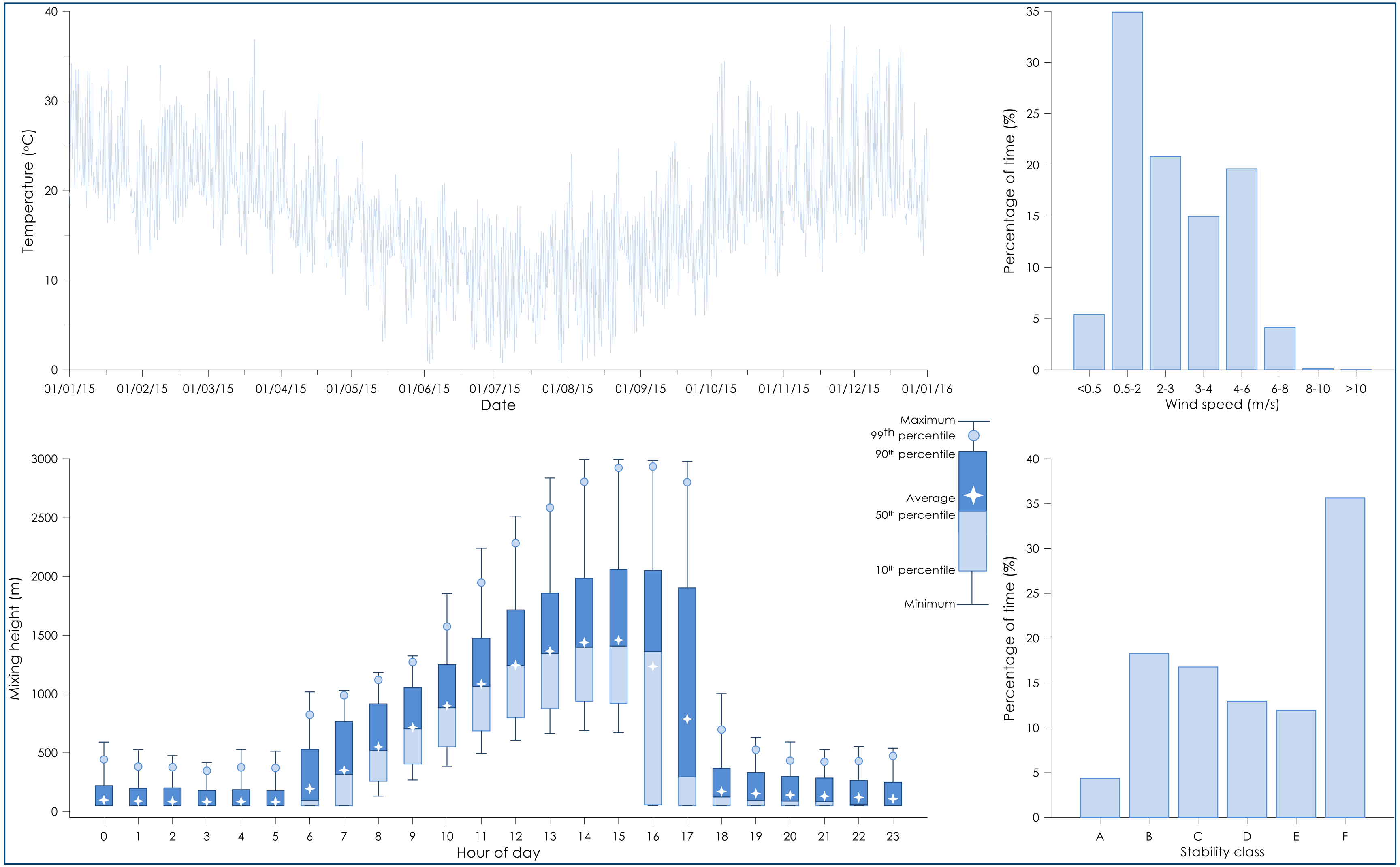


Figure 5-3: Meteorological analysis of CALMET extract Cell ref 6049 (2015)

5.3 Dispersion modelling

CALPUFF modelling is based on the distribution of particles for each particle size category derived from the applied emission factor equations. Emissions from each activity 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. It should be noted that as a conservative measure, the effect of the precipitation rate (rainfall) in removing dust emissions from the atmosphere has not been considered in this assessment.

5.4 Modelling scenario

The assessment considers one indicative mine plan year (scenario) to represent the Modification. The approximate FY30 scenario was chosen to represent potential worst-case impacts with consideration of:

- the location of the activity and the potential to generate dust at the sensitive receptor locations – operations are at their westernmost extent; and
- the quantity of material extracted and handled in each year – production from FY29 was used as it is the last full production year scheduled before operations ease down to closure on 30 June 2030.

Accordingly, the scenario selected is a conservative combination of operations occurring at their westernmost extent at (or very near) the maximum proposed production rate prior to closure. Mining operations would consist of a drill and blast, truck and shovel operation to remove overburden material and extract the coal resources. For the FY30 scenario, mining activity would occur in the Windmill, Calool and Roxburgh pits at a ROM coal mining rate of 24.9Mtpa. Overburden emplacement would typically occur behind the progression of the mine extraction with rehabilitation of emplacement areas progressing as they are completed.

An indicative mine plan for the FY30 scenario is presented in **Figure 5-4**.

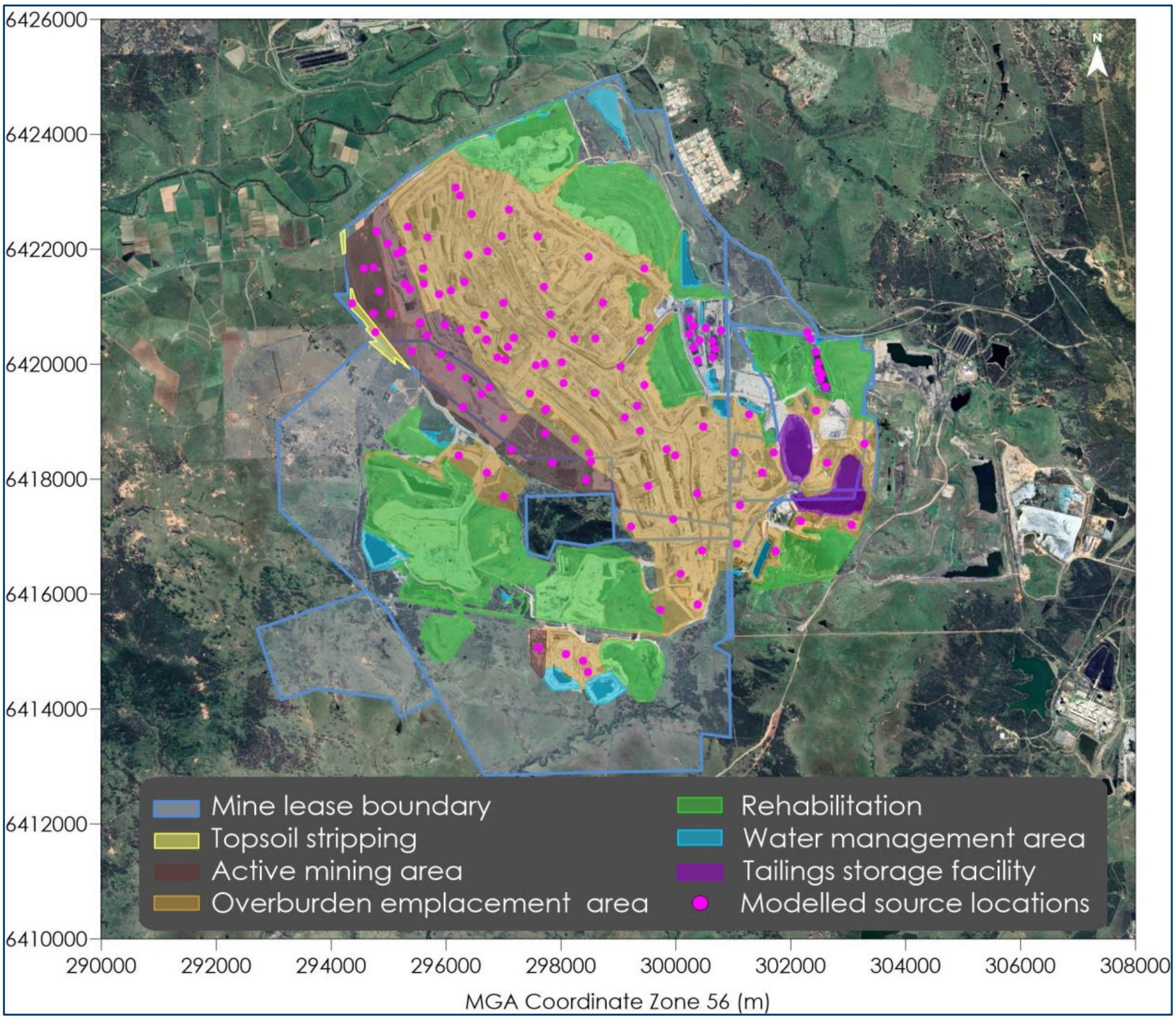


Figure 5-4: Indicative mine plan for FY30 scenario

5.4.1 Emission estimation

For each of the chosen modelling scenarios, emission estimates have been calculated by analysing the various types of dust-generating activities taking place and utilising suitable emission factors.

The emission factors were sourced from both locally developed and United States Environmental Protection Agency (US EPA) developed documentation. Total TSP emissions from all significant activities for the Modification are presented in **Table 5-3**. Full emission inventories for TSP, PM_{10} and $PM_{2.5}$ and associated calculations are presented in **Appendix C**.

The estimated emissions presented in **Table 5-3** are commensurate with a mining operation utilising reasonable and feasible best practice dust mitigation applied where applicable. Further details on the dust control measures applied for the Modification are outlined in **Sections 5.5** and **6.2.2**.

Table 5-3: Estimated emission for the Modification (kg of TSP)

Activity	FY30
Topsoil – Stripping topsoil	4,698
Topsoil – Loading topsoil to trucks	45
Topsoil – Hauling topsoil to emplacement area	2,097
Topsoil – Emplacing topsoil at emplacement area	45
OB – Drilling – CA	16,272
OB – Drilling – RX	16,743
OB – Drilling – WM	11,220
OB – Blasting – CA	141,817
OB – Blasting – RX	145,924
OB – Blasting – WM	97,789
OB – Sh/Ex/FELs loading – Haul 1	17
OB – Sh/Ex/FELs loading – Haul 2	34,057
OB – Sh/Ex/FELs loading – Haul 3	17,813
OB – Sh/Ex/FELs loading – Haul 4	32,375
OB – Sh/Ex/FELs loading – Haul 5	715
OB – Sh/Ex/FELs loading – Haul 6	35,461
OB – Sh/Ex/FELs loading – Haul 7	4,218
OB – Sh/Ex/FELs loading – Haul 8	9,658
OB – Hauling to emplacement area – Haul 1	403
OB – Hauling to emplacement area – Haul 2	533,761
OB – Hauling to emplacement area – Haul 3	438,346
OB – Hauling to emplacement area – Haul 4	387,455
OB – Hauling to emplacement area – Haul 5	20,786
OB – Hauling to emplacement area – Haul 6	794,773
OB – Hauling to emplacement area – Haul 7	65,066
OB – Hauling to emplacement area – Haul 8	361,414
OB – Emplacing at dump – Haul 1	17
OB – Emplacing at dump – Haul 2	34,057
OB – Emplacing at dump – Haul 3	17,813
OB – Emplacing at dump – Haul 4	32,375
OB – Emplacing at dump – Haul 5	715
OB – Emplacing at dump – Haul 6	35,461
OB – Emplacing at dump – Haul 7	4,218
OB – Emplacing at dump – Haul 8	9,658
OB – Sh/Ex/FELs loading – Crusher (4x)	333
OB – Crushing rock (4x)	1,556
OB – Unloading from Crusher (4x)	333
OB – Rehandle material (4x)	333
OB – Dozers on O/B – CA	125,706
OB – Dozers on O/B – RX	129,347
OB – Dozers on O/B – WM	86,680
OB – Dozers on O/B – Dump 1	47,598
OB – Dozers on O/B – Dump 2	86,510
OB – Dozers on O/B – Dump 3	96,713
OB – Dozers on O/B – Dump 4	102,275
OB – Dozers on O/B – Dump 5	25,808
CL – Dozers ripping – CA	150,420
CL – Dozers ripping – RX	264,203
CL – Dozers ripping – WM	143,995
CL – Loading ROM coal to trucks – CA	320,140
CL – Loading ROM coal to trucks – RX	562,306
CL – Loading ROM coal to trucks – WM	306,466
CL – Hauling ROM coal to dump hopper – CA	458,826
CL – Hauling ROM coal to dump hopper – RX	513,649
CL – Hauling ROM coal to dump hopper – WM	439,227

Activity	FY30
CL – Unloading all ROM coal to raw coal stockpile	178,337
Transporting Rejects	262,993
Grading roads	49,237
WE – Clearing	36,061
WE – Pit	499,112
WE – Dump	1,326,694
WE – Stabilised areas	642,939
WE – ROM stockpile (eastern)	40,068
WE – Product stockpile (eastern)	9,616
WE – Product stockpile (western)	5,342
CL – Reclaimer unloading ROM coal to ROM bin in the CHPP	594,456
CL – Crushing ROM coal	14,914
CL – Screening ROM coal	27,341
CL – Screening product coal	19,160
CL – Unloading product coal to stockpile (western)	248
CL – Unloading bypass product coal stockpile (western)	73
CL – Unloading product coal to stockpile (eastern)	447
CL – Unloading bypass product coal stockpile (eastern)	131
CL – Loading coal to trains	2,725
Diesel mining equipment	52,566
Locomotive idling	515
CL – Dozers on ROM	82,256
CL – Dozers on bypass product stockpile (western)	82,256
CL – Dozers on product stockpile (eastern)	47,086
Underground ROM/crushing stockpile area	360,000
Underground CHPP area	360,000
Total emissions (kg/yr)	**11,864,280**

OB – overburden, CL – coal, WE – wind erosion, Sh – Shovel, Ex – Excavator, FEL – Front end loader, kg = kilograms, kg/yr = kilograms per year
WM – Windmill Pit, CA – Calool Pit, RX – Roxburgh Pit

5.4.2 Emissions from other mining operations

In addition to the estimated dust emissions from the Modification, emissions from all nearby approved mining operations were also modelled in accordance with their current consent (or current proposed project inclusive of any extensions/expansions), to assess potential cumulative dust effects.

Emissions estimates from these sources were derived from information provided in the air quality assessments available in the public domain at the time of modelling. These estimates are likely to be conservative, as in many cases, mines do not continually operate at the maximum extraction rates assessed in their respective environmental assessments. This is evident when examining Annual Reviews for coal mines in the Hunter Valley that show that the mines' actual rates of activity are generally below the approved level of activity.

Table 5-4 summarises the emissions adopted in this assessment for each nearby mining operation.

Table 5-4: Estimated emissions from nearby mining operations

Operation	Annual emissions (kg TSP/yr)
Bengalla Coal Mine(1)	8,777,549
Mount Pleasant(2)	5,122,089
Mangoola Coal(3)	1,995,455
Maxwell Project(4)	377,021

(1) Todoroski Air Sciences (2013 & 2021a) (2) Todoroski Air Sciences (2020) (3) Jacobs (2019) (4) Todoroski Air Sciences (2019 & 2022)

5.5 Dust mitigation and management

Consideration has been made of the possible range of mitigation measures that can be applied for the MAC.

The measures applied are commensurate with those for the approved MAC, and outlined in the NSW EPA document, *NSW Coal Mining Benchmarking Study: International Best Practice Measures to Prevent and/or Minimise Emissions of Particulate Matter from Coal Mining*, prepared by Katestone Environmental (**Katestone Environmental, 2010**).

A summary of the key dust control measures for the approved MAC *Air Quality Management Plan* (**BHP, 2019**) which would continue to be applied is shown in **Table 5-5**. Where applicable these controls have been applied in the dust emission estimates shown in **Table 5-3**. Further specific detail on the level of control applied is set out in **Appendix C**.

Table 5-5: Key air quality control measures applied at the MAC

Activity	Dust control
Areas disturbed by mining activity	Disturb minimum area necessary for mining
	Reshape, topsoil and rehabilitate completed overburden emplacement areas as soon as practicable
	Activate Trigger Action Response Plan (TARP) to reduce real-time dust levels
Hardstand areas	Site speed limits apply.
	Apply dust suppressant on hardstand areas used regularly for access.
Overburden emplacement and coal handling	Temporarily vegetate exposed surface of unused overburden emplacement areas
	Maintain unsealed coal handling areas in a moist condition
Unsealed roads	Apply dust suppressant on major haul roads
	Use of water (i.e. wet suppression) to minimise dust emissions
	All roads are speed limited (i.e. to limit dust generation from movements on unsealed roads)
Drilling & Blasting	Drill rigs fitted with water sprays
	Assessment of weather conditions prior to blasting
CHPP & Rail loading facility	Conveyors shielded and water sprays fitted at transfer points
	Water sprays on plant feed and clean coal stockpiles
	Raw coal hopper bins shielded (to reduce wind erosion) and water sprays fitted

Source: MAC Air Quality Management Plan - MAC-ENC-MTP-040 (**BHP, 2019**)

The Trigger Action Response Plan described in the MAC *Air Quality Management Plan* is a reactive dust mitigation strategy which includes alarms to alert staff of the potential for dust impacts to arise. High dust concentration alarms trigger the implementation of dust management actions that appropriately modify any mining activities depending on weather conditions. Alarm triggers are set on a range of time intervals to ensure excessive dust levels due to the operations do not occur.

The actions can include modifying the on-site operations, causing dust levels recorded at monitoring locations to achieve the criterion level, or rescheduling operations that are likely to have a significant off-site impact due to adverse weather conditions.

A predictive system is also utilised to supplement the reactive operational dust mitigation strategies. This system provides daily forecast meteorological and dust dispersion predictions which allows the mine operators to make proactive operational adjustments and allow for the prospect of averting any triggering of the reactive controls due to excessive dust levels.

Further detail regarding the reactive operational dust mitigation strategies and management measures and the predictive system are outlined in the MAC *Air Quality Management Plan* (**BHP, 2019**).

5.6 Accounting for background dust levels

To account for the contribution from other non-mining sources of particulate matter in the wider area, an allowance has been added to the modelling predictions to assess the total potential impact.

The contribution to the prevailing annual average background dust level of other non-modelled dust sources was estimated by modelling the past (known) mining activities (including the MAC, Bengalla Coal Mine, Mangoola Coal, Muswellbrook Coal Mine and the former Drayton Mine [now Maxwell Infrastructure]) during 2012 to 2015 and comparing model predictions with the actual measured data from the corresponding monitoring stations.

The background levels for the assessment spans the 2012-2015 period, allowing for variations in predicted contributions from ongoing mining operations due to changes in activity rates. It also helps smooth out inter-annual fluctuations in the background level.

Background level variability is primarily influenced by regional conditions like droughts, dust storms and bushfires. The chosen 2012-2015 period is characterised by limited influence from these external factors.

The average difference between the measured and predicted PM_{10}, TSP and deposited dust levels from each of the monitoring points was considered to be the contribution from other non-modelled dust sources, and was added to the future predicted values to account for the background dust levels (not explicitly in the model and arising from numerous small or distant, non-modelled dust sources).

Due to the high density of available PM_{10} monitors in the central area of the modelling domain, and the presence of Muswellbrook, a large but unmodelled source of emissions, it is possible to apply various spatially varying background levels to account for the variation in the background dust level in the central modelling domain. This provides a more realistic representation of background dust levels in this area compared with adding a constant level across the domain. **Figure 5-5** presents the spatially varying background levels for PM_{10} applied in the assessment.

Local anthropogenic sources occurring during the colder months, i.e. wood heater emissions (**Todoroski Air Sciences, 2014**), appear to be significantly influencing $PM_{2.5}$ levels at the UHAQMN Muswellbrook monitor. As such, the $PM_{2.5}$ contribution from non-modelled dust sources has been sourced from the cumulative impact assessment of Mt Arthur Coal Mine, Bengalla Coal Mine and Mangoola Coal (**Todoroski Air Sciences, 2014**) based on monitoring data from other stations less influenced by wood heater emissions.

Thus, the annual average $PM_{2.5}$ level taken to account for non-modelled other sources applied in this assessment is 2.9µg/m³. Using this level in the assessment reasonably represents the levels at the nearest, potentially most affected locations around the MAC which are of primary relevance to the assessment, but would not represent the already elevated levels recorded within Muswellbrook caused by local sources.

Consistent with the methodology used in the Mount Pleasant Optimisation Project (**Todoroski Air Sciences, 2021b**), residual background $PM_{2.5}$ levels in the "transition" zones between the mine and Muswellbrook were conservatively derived based on the differences in recorded levels at MACH's and the Muswellbrook $PM_{2.5}$ monitors.

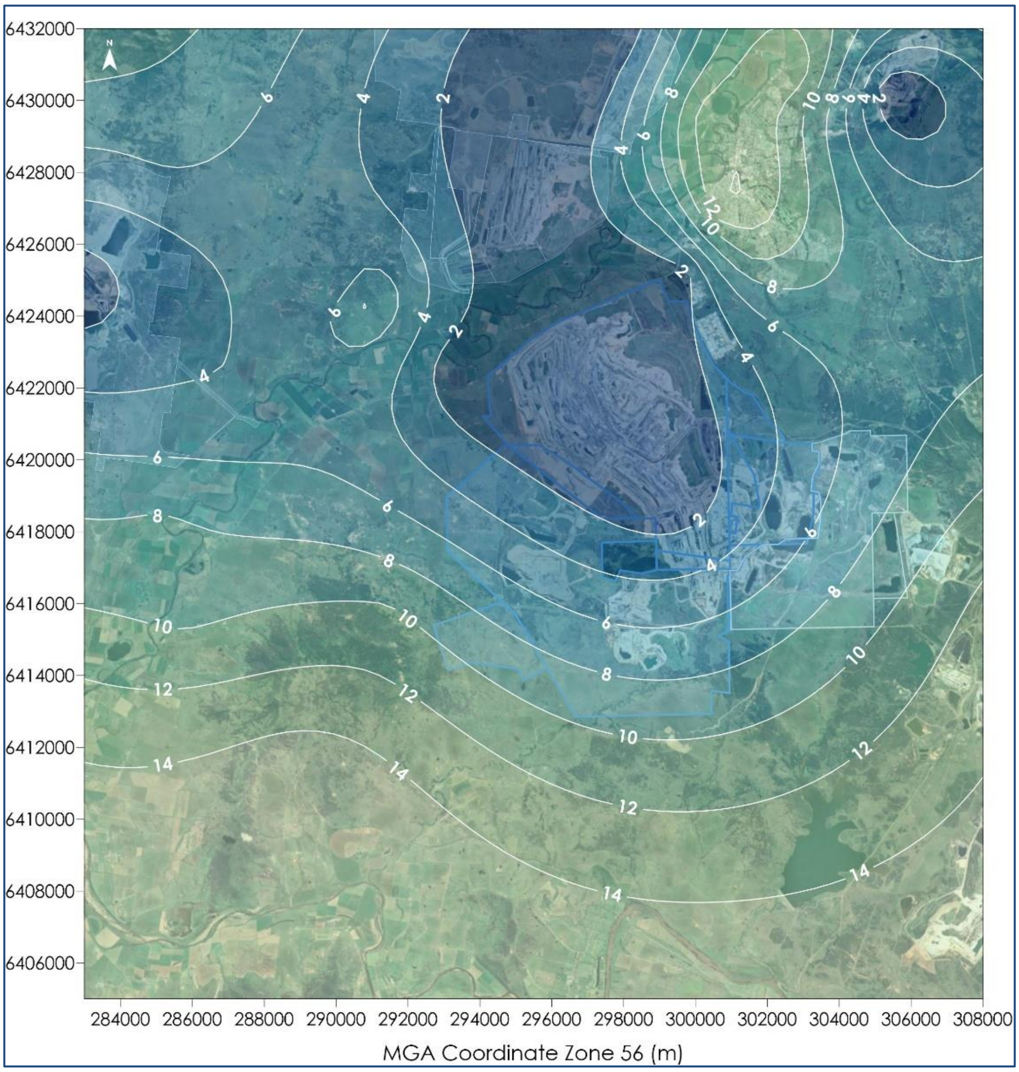


Figure 5-5: Spatially varying background level (due to non-modelled sources) for annual average PM_{10}

The estimated annual average contribution from other non-modelled dust sources applied in the assessment is presented in **Table 5-6**.

Table 5-6: Estimated contribution from other non-modelled dust sources

Dust metric	Averaging period	Unit	Estimated contribution
TSP	Annual	µg/m³	34.0
PM_{10}	Annual	µg/m³	Spatially variable
$PM_{2.5}$	Annual	µg/m³	Spatially variable
Dust deposition	Annual	g/m²/month	2.2

It is important that the above values are not confused with measured background levels, background levels excluding only the MAC, or the change in existing levels as a result of the Modification. The values above are not background levels in that sense, but are the residual amount of the background dust that is not accounted for directly in the air dispersion modelling of the Modification and other local mining operations.

6 DISPERSION MODELLING RESULTS

The dispersion modelling predictions for the assessed scenario are presented in this section. The results presented include those for the operation in isolation (incremental impact) and the operation with other sources and background levels (total [cumulative] impact).

Each of the receivers of relevance to this study detailed in **Appendix A**, were assessed individually as discrete receptors with the predicted results presented in tabular form for each of the assessed years in **Appendix D**. Associated isopleth diagrams of the dispersion modelling results are presented in **Appendix E**.

6.1 Summary of modelling results

6.1.1 Cumulative annual average impacts

The predicted cumulative impacts considering the extent of the approved/proposed period of mining for each of the nearby mining operations (refer to **Table 5-4**) are summarised in **Table 6-1**.

There is one privately-owned receptor where impacts are predicted to exceed relevant annual average PM_{10} assessment criteria. All other privately-owned receptors are predicted to comply with the relevant NSW EPA impact assessment criteria for annual average PM_{10} and $PM_{2.5}$.

The results in **Table 6-1** indicate the Modification is predicted to contribute approximately 11% of the predicted cumulative PM_{10} level at the receptor 264. Given the predicted exceedance would occur with or without the Modification, it is considered that the Modification would increase the magnitude of this exceedance rather than cause it.

It is noted that receptor 264 currently has acquisition upon request rights in MP 09_0062 for potential air quality impacts.

Table 6-1: Summary of modelling results where a residential receptor is predicted to exceed criteria (µg/m³)

Dust metric	Receptor ID	Rights to acquisition upon request?	Modification-only annual ave. (µg/m³)	Other mines + background (µg/m³)	Cumulative annual ave. (µg/m³)	Criteria (µg/m³)
PM_{10}	264	Yes	3.2	26.7	29.9	**25**

6.1.2 Modification-only 24-hour average impacts

There are no privately-owned receptors where Modification-only 24-hour average impacts are predicted to exceed relevant NSW EPA impact assessment criteria for PM_{10} and $PM_{2.5}$.

6.1.3 Assessed mine-owned receptors

The modelling results also indicate predicted levels will exceed relevant assessment criteria at several MAC and other mine-owned properties surrounding the MAC. The predicted levels are detailed in **Appendix D**.

6.2 Assessment of Cumulative 24-hour average $PM_{2.5}$ and PM_{10} concentrations

It is important to note that when assessing impacts per the maximum 24-hour average $PM_{2.5}$ and PM_{10} criteria, the predictions show the highest predicted 24-hour average concentrations that were modelled at each point within the modelling domain for the worst day (a 24-hour period).

When assessing the total (cumulative) 24-hour average impacts based on model predictions, challenges arise with identification and quantification of emissions from non-modelled sources over the 365 separate 24-hour periods modelled in the year.

Due to these factors, an assessment of cumulative 24-hour average $PM_{2.5}$ and PM_{10} impacts was undertaken in accordance with Section 11.2 of the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (**NSW EPA, 2022**). The "Level 2 assessment - Contemporaneous impact and background approach" was applied to assess potential impacts. In simple terms, the Level 2 assessment involves matching one year of ambient air quality monitoring data with meteorological data representing the same period.

The analysis has focussed on the privately-owned receivers at which the data required to conduct this assessment are available and represent the closest and most likely impacted privately owned receiver locations surrounding the MAC.

There are six surrounding PM_{10} monitoring stations where suitable ambient monitoring data are available (DC02, DC04, DC05, DC06, DC07 and DC09) and there are three surrounding $PM_{2.5}$ monitoring stations where suitable ambient monitoring data are available (DC02, DC05 and DC06). The assessment of cumulative impact uses the monitoring data from the closest monitor. As the MAC was operational during 2015, it would have contributed to the measured levels of dust in the area on some occasions. Due to this, it is important to account for these existing activities in the cumulative assessment.

Modelling of the actual mining scenario for the 2015 period (in which the weather and background dust data were collected) was conducted to determine the existing contribution of the MAC to the measured levels of dust. The results were applied in the cumulative assessment to minimise potential double counting of existing MAC operations (as they would occur in both the measured data and in the predicted levels), and thus to make a more reliable prediction of the likely cumulative total dust level.

Figure 6-1 and **Figure 6-2** show the location of each of these PM_{10} and $PM_{2.5}$ monitors respectively in relation to the MAC and assessed receiver locations.

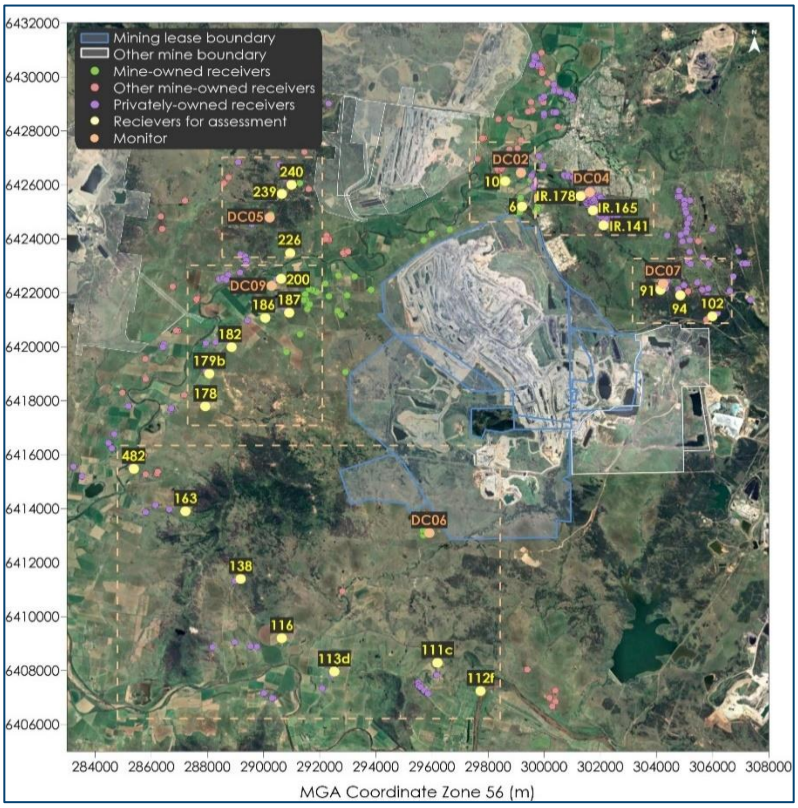


Figure 6-1: Locations available for contemporaneous maximum 24-hour average PM10 cumulative impact assessment

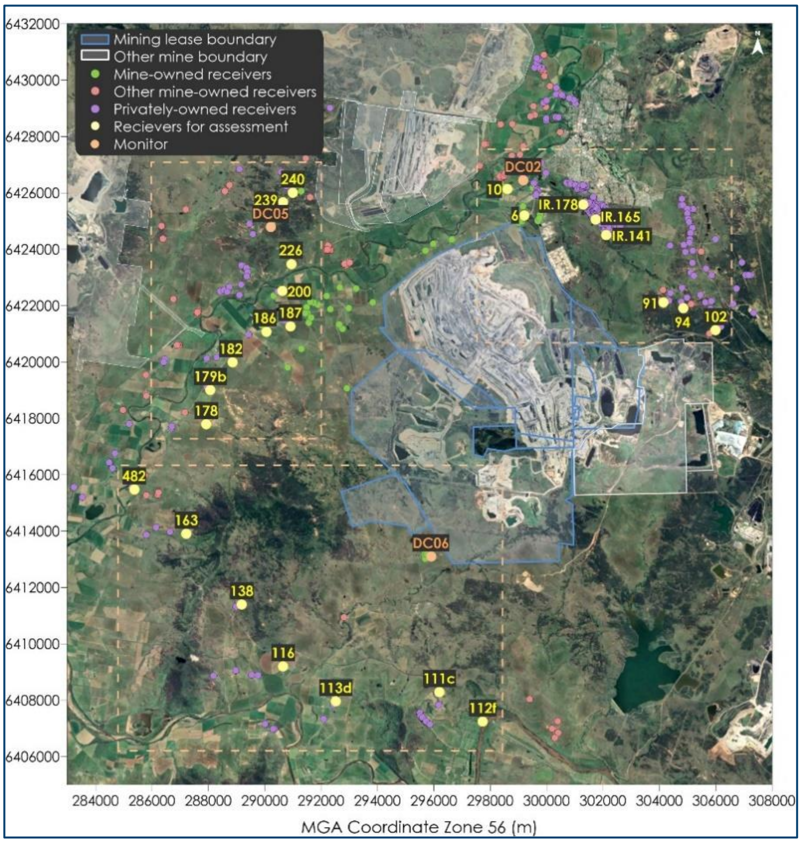


Figure 6-2: Locations available for contemporaneous maximum 24-hour average $PM_{2.5}$ cumulative impact assessment

6.2.1 Impacts without implementation of predictive/reactive measures

Table 6-2 provides a summary of the contemporaneous assessment at each assessed receiver location. The results in **Table 6-2** indicate that for the assessed sensitive receptors, potential cumulative 24-hour average $PM_{2.5}$ and PM_{10} impacts may occur without proactive/reactive mitigation.

Detailed tables of the full assessment results are provided in **Appendix F** and **Appendix G**.

Table 6-2: NSW EPA contemporaneous assessment - maximum number of additional days in a year above 24-hour average criterion depending on background level at monitoring sites

Receptor ID	PM_{10} analysis	$PM_{2.5}$ analysis
6	0	0
10	0	0
91	0	0
94	0	0
102	0	0
111c	0	0
112f	0	0
113d	0	0
116	0	0
138	0	0
163	0	0
178	0	0
182	0	0
186	0	0
187	0	0

Receptor ID	PM_{10} analysis	$PM_{2.5}$ analysis
200	2	0
226	7	1
239	0	0
240	0	0
482	0	0
179b	0	0
IR.141	0	0
IR165	0	0
IR.178	0	0

Further analysis of the predicted cumulative PM_{10} and $PM_{2.5}$ impacts at Receptor 226 (where some exceedances are predicted without the implementation of predictive/reactive measures) is presented in **Figure 6-3** and **Figure 6-4** respectively. The figure shows time series plots of the 24-hour average concentrations predicted to be experienced as a result of the MAC incorporating the Modification. The light blue bars represent the existing ambient background level at the monitoring location, the dark blue bars represent the potential reduction in background level due to the Modification and the approved MAC in the future modelled year and the orange bars represent the predicted incremental contribution due to the Modification and the approved MAC in the future modelled year.

6.2.2 Impacts with adoption of predictive/reactive measures

To demonstrate the effectiveness of the implementation of predictive/reactive measures at the MAC, the dispersion modelling was re-run to consider the effects of temporarily pausing activities in the pit and overburden areas during periods of elevated dust. These periods tend to occur under conditions that would likely activate the real-time response trigger levels in the MAC *Air Quality Management Plan* (**BHP, 2019**) for the different locations assessed.

Only activities in the pit and overburden areas were ceased for dust control in the model (including topsoil stripping, drilling, blasting, handling and hauling overburden, dozers on overburden, transporting ROM coal to the CHPP), and dust from other sources such as wind erosion, activities at the CHPP, underground operations and trains were still assumed for the purpose of the modelling.

Analysis of the predicted cumulative PM_{10} and $PM_{2.5}$ impacts at Receptors 200 and 226 with the implementation of predictive/reactive measures are presented in **Figure 6-5** and **Figure 6-6** respectively.

The results indicate that all of the predicted PM_{10} and $PM_{2.5}$ additional exceedance days due to the Modification can be prevented using the reactive controls.

Overall, the reactive controls would be effective at reducing the incremental contribution of the Modification to cumulative levels.

While the modelling methodology is inherently conservative, the effectiveness of these measures would be further enhanced on a case-by-case basis as required.

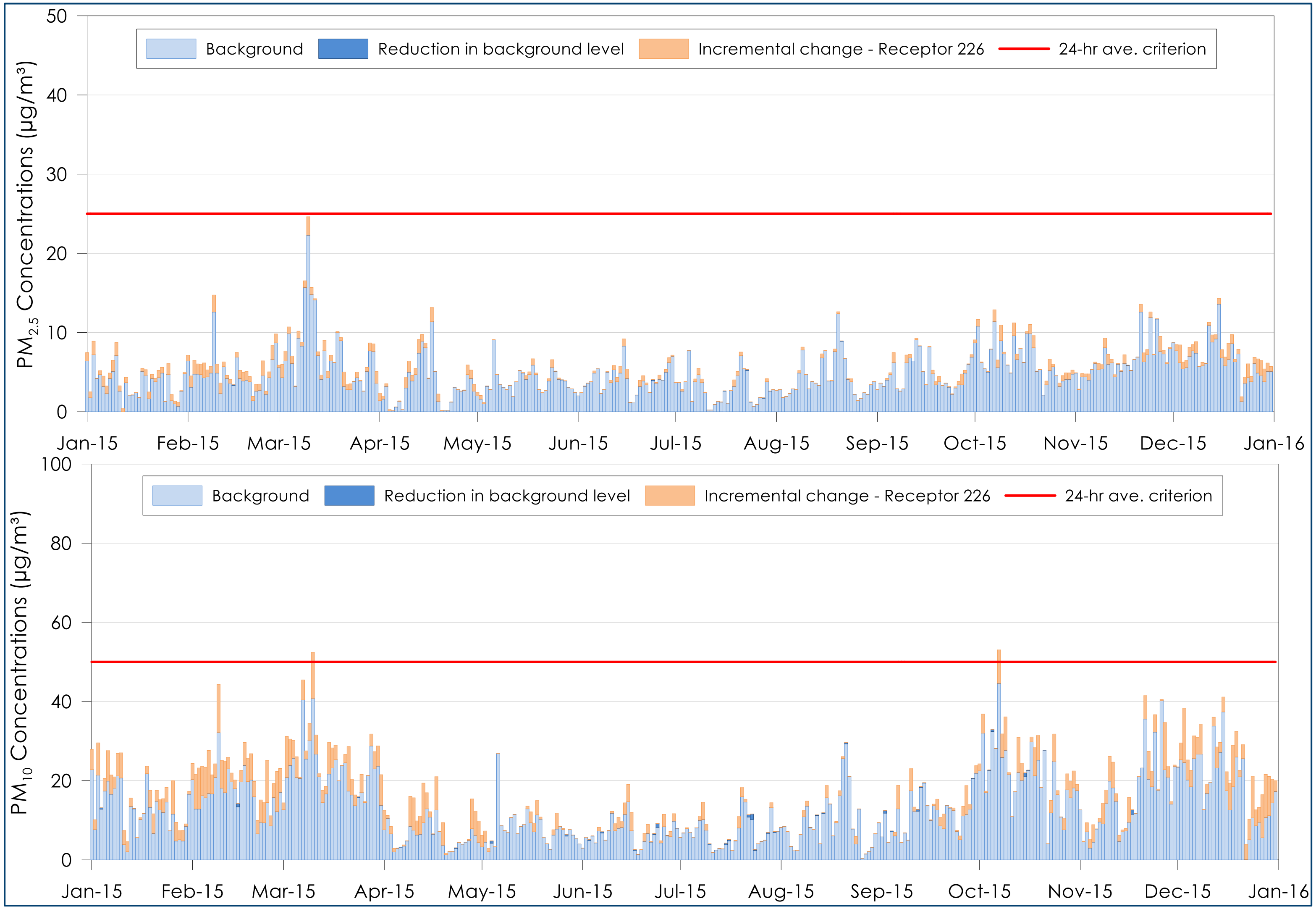


Figure 6-3: Predicted 24-hour average PM_{10} and $PM_{2.5}$ concentrations for receptor location 200 (without predictive/reactive mitigation)

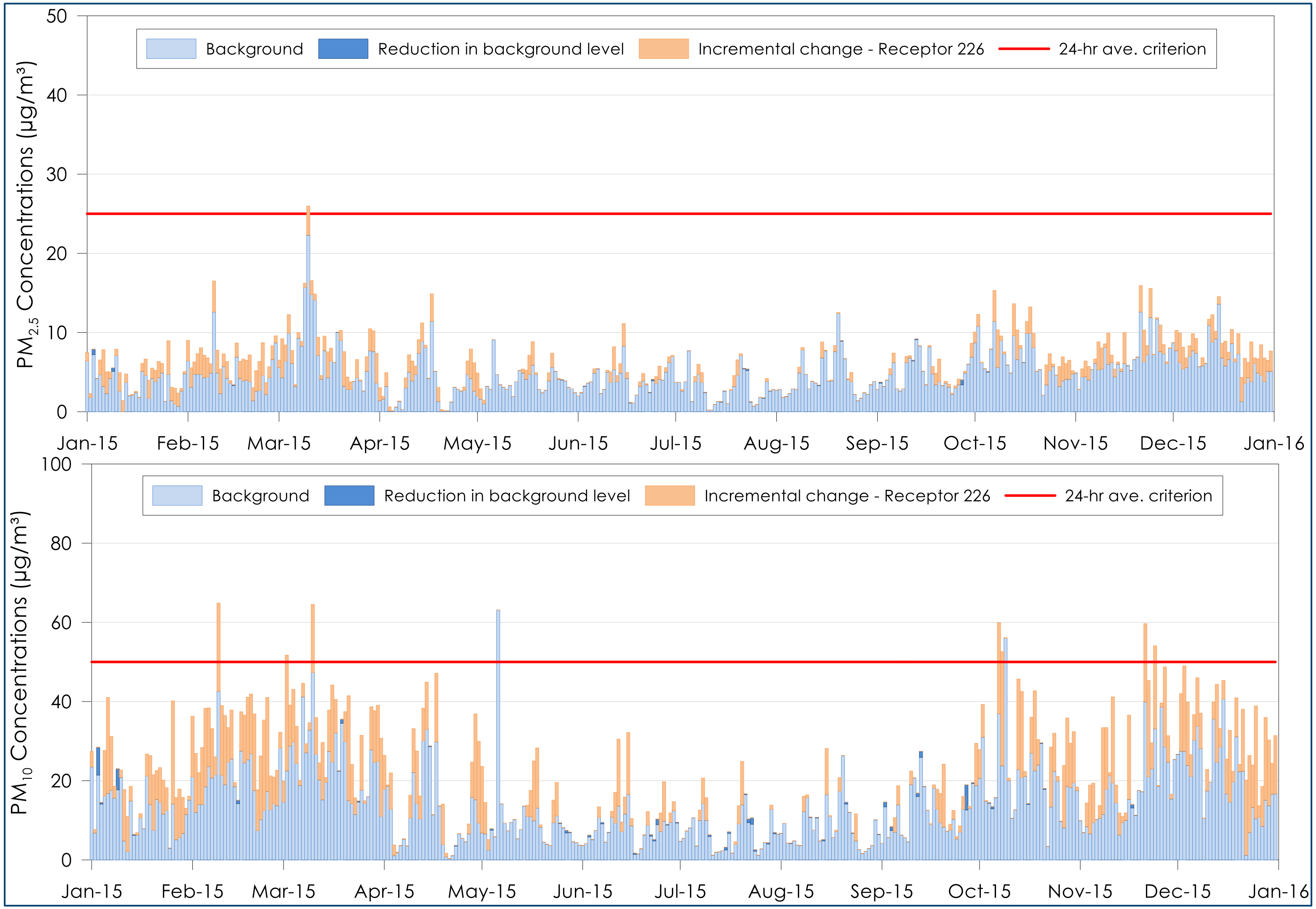


Figure 6-4: Predicted 24-hour average PM_{10} and $PM_{2.5}$ concentrations for receptor location 226 (without predictive/reactive mitigation)

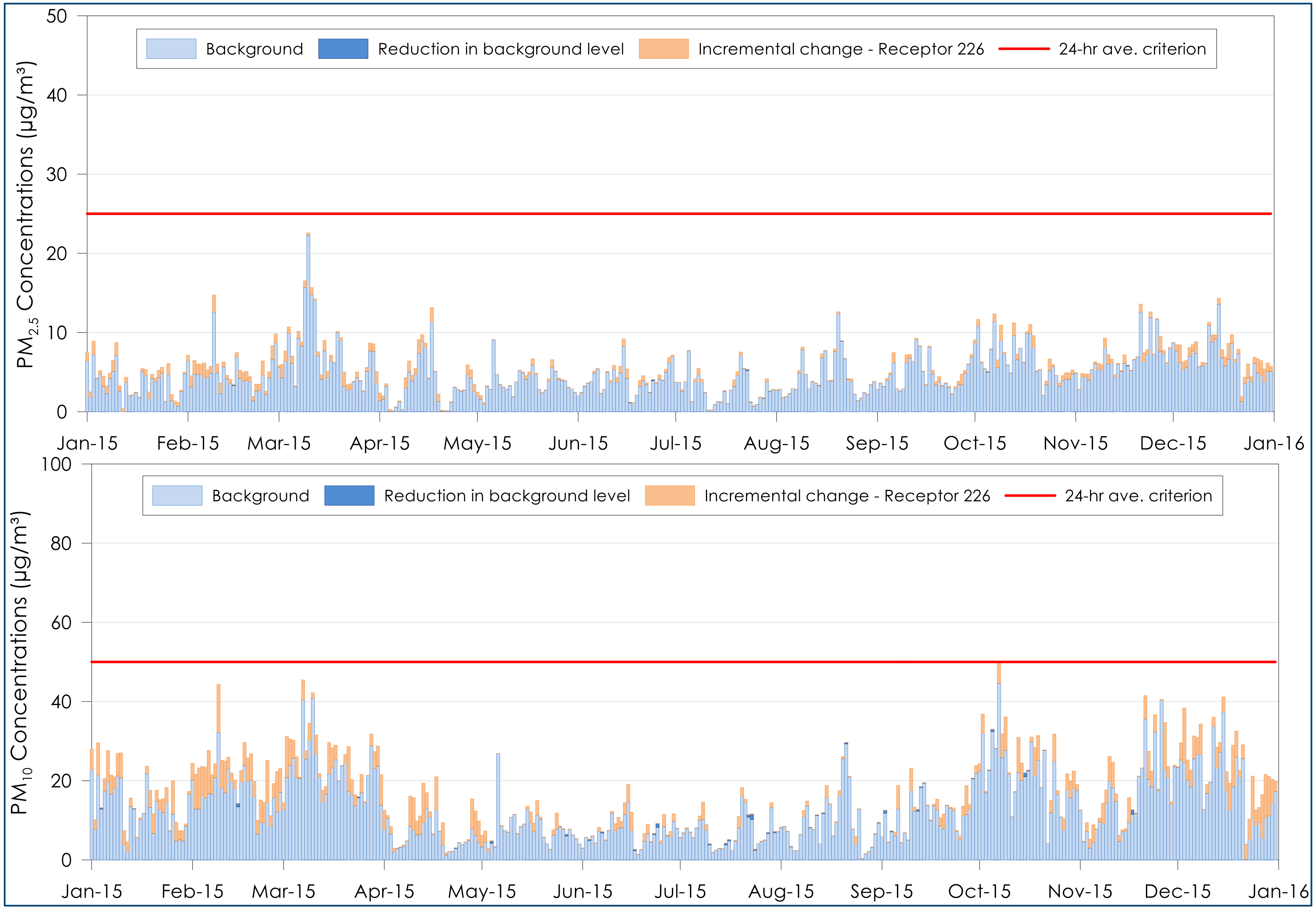


Figure 6-5: Predicted 24-hour average PM_{10} and $PM_{2.5}$ concentrations for receptor location 200 (with predictive/reactive mitigation)

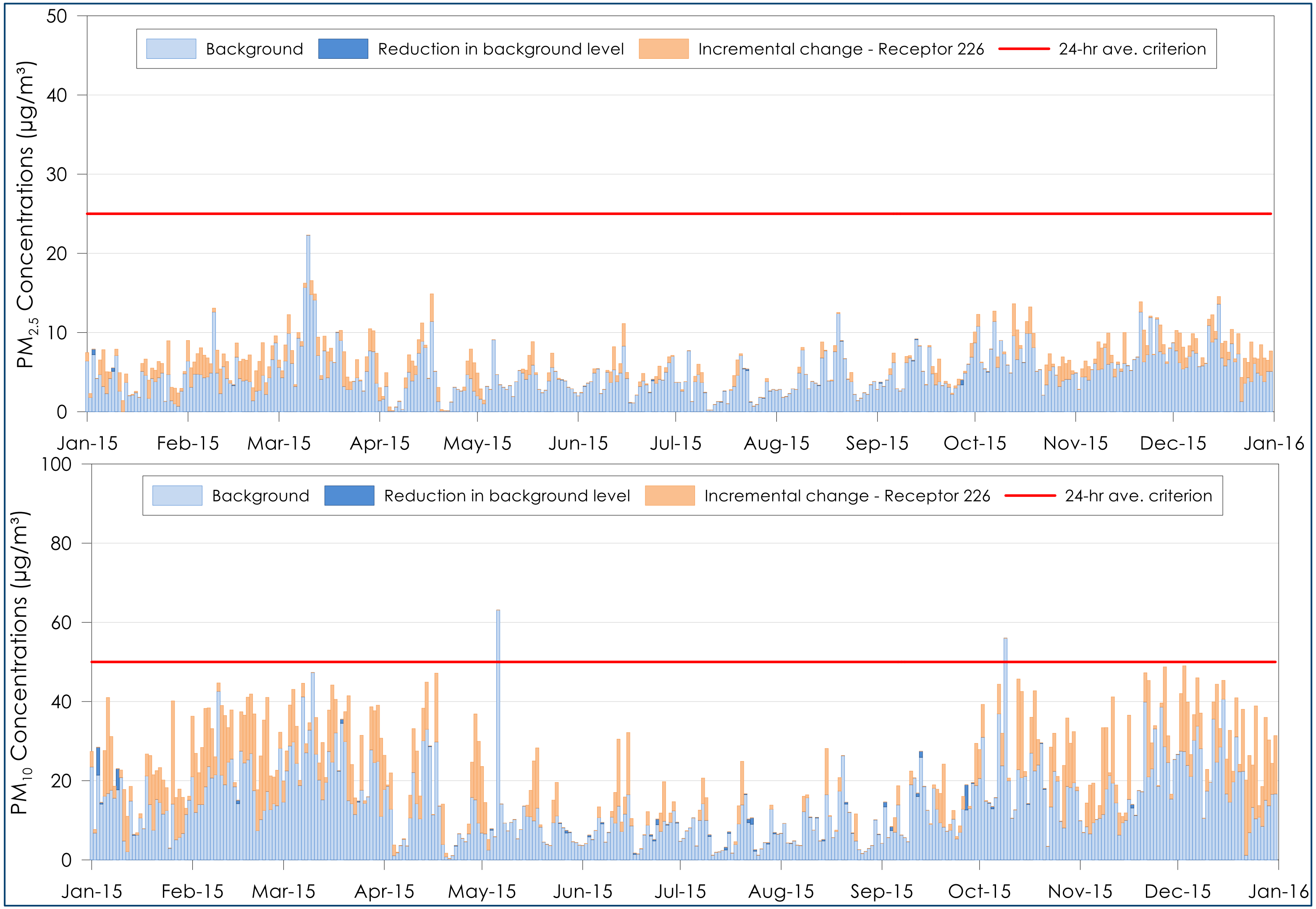


Figure 6-6: Predicted 24-hour average PM_{10} and $PM_{2.5}$ concentrations for receptor location 226 (with predictive/reactive mitigation)

6.3 Dust impacts on more than 25 per cent of privately-owned land

The potential impacts due to the Modification, extending over more than 25% of any privately-owned land (consistent with the VLAMP), have been evaluated using the predicted pollutant dispersion contours.

The 6th highest 24-hour average PM_{10} levels were found to have the greatest extent of any of the other assessed dust metrics relevant to the application of acquisition upon request rights on privately-owned land in accordance with the VLAMP. **Figure 6-7** presents the extent of the 6th highest 24-hour average PM_{10} level (50µg/m³) due to the Modification in isolation. The 6th highest 24-hour average PM_{10} levels accounts for five exceedances (i.e. five days) above the criteria, consistent with the VLAMP.

The isopleth in **Figure 6-7** indicates no privately-owned land parcels would be considered air quality-affected.

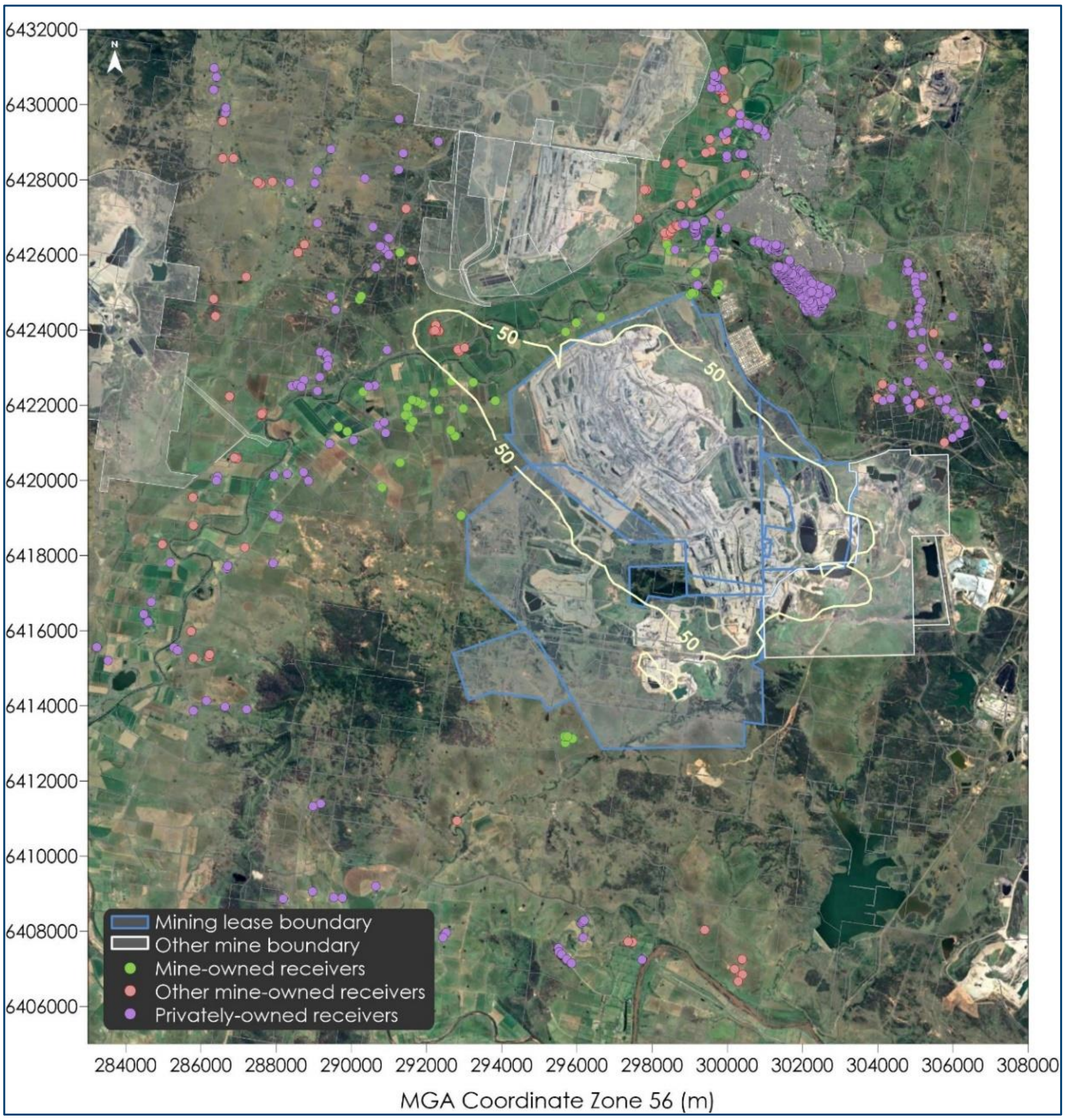


Figure 6-7: Predicted 6th highest 24-hour average PM_{10} level

6.4 Comparison with existing approved operations

Modelling predictions in the *Air Quality and Greenhouse Gas Assessment Mt Arthur Coal Open Cut Modification* (**PAEHolmes, 2013**) identifies several residences predicted to experience impacts for various dust metrics.

These include 24-hour average PM_{10} and annual average $PM_{2.5}$, PM_{10} and dust deposition. Each of these impacted residences are identified to be within an existing zone of acquisition.

In comparison, the Modification predicts impacts at only one privately-owned receptor (receptor 264) for annual average $PM_{2.5}$ and PM_{10}. This particular receptor is also included in the impacted residences identified in the previous assessment report and already possesses existing acquisition rights upon request, as stipulated in MP 09_0062 for potential air quality impacts.

7 ASSESSMENT OF TRAIN DUST IMPACTS

7.1 Introduction

Coal dust emissions from train wagons hauling product coal have the potential to originate from the coal surface of loaded wagons, leakage from wagon doors, re-suspension and wind erosion of coal spilled in the rail corridor, residual coal in unloaded wagons, and parasitic load on sills, shear plates and bogies of wagons.

The surface of loaded wagons provides a significant exposed area, which is subject to wind erosion and air movement during transport. The amount of dust potentially generated during transport is related to the inherent dustiness of the coal material and the interactions of the air with the exposed coal surface (**Connell Hatch, 2008**).

Coal dust can potentially leak from the bottom doors of train wagons and fall into the ballast of the train line. This occurs when the doors of the wagon are not completely sealed. The amount of material released will depend on the material properties of the coal, and the vibrational forces experienced by the coal in the wagons that potentially break down the coal material. Dust impacts from this source are considered to be low as the ballast would provide a sufficient shielding effect to prevent particle lift-off (**Connell Hatch, 2008**).

During the loading process and in transit, there is potential for coal material to be spilled into the train corridor and cause parasitic loading on the sills, shear plates and bogies. These sources of emissions are easily prevented by careful loading of the material and profiling the shape of the load (**Connell Hatch, 2008**).

Residual coal remaining in an unloaded wagon can dry and become airborne during travel back to the site. This source is dependent on meteorological conditions, the train travel speed and the extent of any turbulent air generated in the unloaded wagon space causing the residual coal particles to become airborne.

7.2 Potential coal dust emissions from train wagons

As a result of the Modification, the approved product coal production would be reduced, hence the approved rail movements and existing route to domestic markets or the Port of Newcastle for export would be reduced (i.e. from 15 laden trains per day to 10).

Any approved dust emissions associated with this activity would similarly reduce with the Modification. A number of previous studies (**Connell Hatch (2008)**, **Ryan and Wand (2014)**, **Malecki and Ryan (2015)** and **Todoroski Air Sciences (2017a & 2017b)**) have concluded that dust emissions from this general source (i.e. rail-generated dust emissions caused by rail pass-bys) are not anticipated to generate any significant impact.

Notwithstanding, as the transport of product coal would continue for a further four years due to the Modification, HVEC would continue to control dust emissions from rail wagons to minimise emissions where possible through application of appropriate mitigation measures such as streamlining and consistent profiling of the coal surface within the rail wagons, minimising spillage and parasitic loading and regular collection and cleaning of any coal spillage consistent with existing operations.

8 ASSESSMENT OF BLAST FUME EMISSIONS

Nitrogen dioxide (NO_2) impacts from blasting would be rare, but are possible particularly if unforeseeable complications with a blast that causes high levels of NO_2 or dust emissions occurs during unfavourable air dispersion conditions. Blasts of this nature would cause elevated levels of NO_2 or dust emissions and are managed under the MAC *Blast Management Plan* (**BHP**, **2021**) (**Section 8.1**). This is the case for any blast at any mine and has always been the case for the existing mine.

There is no specific or unusual circumstance (i.e. mining techniques or ground condition changes) that would arise due to the Modification that would lead to any changes in this situation or that would alter the current, potential risk of impacts from blasting.

However, it is also reasonable to ensure that best practice blast management measures are being applied such that that blasting activities would continue to be managed in a manner that would minimise the risk of impacts arising in the future.

8.1 Management of potential air quality impacts from blasting

Air quality impacts of blast operations for the Modification would be managed in accordance with the MAC *Blast Management Plan* (**BHP, 2021**). The purpose of this document is to address the likely causes of noxious gases that are produced from blasting activities, the controls that should be used to mitigate excessive blast fumes and the procedure for management of excessive blast fumes when they occur.

It is noted that HVEC has implemented a predictive management system to aid with management of blasting operations. Such a system uses actual conditions for each blast to predict the potential impact which may occur. The prediction is made on the basis of forecast weather data, allowing operators to schedule a blast to the time of least impact over the course of the upcoming day. In effect, the system updates the blasting permissions for each individual blast on the basis of predicted impact. The system thus deals with the spatially and temporally varying weather and terrain influences and is generally more reliable than depending on a fixed set of wind speed and wind direction restrictions.

Overall, it is anticipated that with due care, potential blast impacts to air quality would be averted.

9 GREENHOUSE GAS ASSESSMENT

The National Greenhouse Accounts (NGA) Factors as outlined in the 2008 Measurement Determination document (amended 2023) published by the Department of Climate Change, Energy, the Environment and Water (DCCEEW) defines three scopes (Scope 1, 2 and 3) for different emission categories based on whether the emissions generated are from "direct" or "indirect" sources.

Scope 1 emissions encompass the direct sources from the Modification defined as:

> *"...from sources within the boundary of an organisation and as a result of that organisation's activities"* (**DCCEEW, 2023a**).

Scope 2 and 3 emissions occur due to the indirect sources from the Modification as:

> *"...emissions generated in the wider economy as a consequence of an organisation's activities (particularly from its demand for goods and services), but which are physically produced by the activities of another organisation"* (**DCCEEW, 2023a**).

All three scopes of emissions defined above have been taken into consideration in assessing the total GHG emissions that would be generated from the Modification.

9.1 Emission sources

Scope 1 identified from the operation of the Modification are the on-site combustion of diesel fuel for stationary and transport purposes, liquified petroleum gas (LPG), explosives use, vegetation clearing, petroleum-based oils and greases, and emissions of methane (CH_4) from the exposed coal seams. Scope 2 GHG emission sources include on-site consumption of electricity.

Scope 3 emissions have been identified as resulting from the production and transportation of diesel, liquified petroleum gas (LPG), petroleum-based oils and greases, electricity for use on-site and the transport of and final use of product coal from MAC.

Estimated quantities of materials that have the potential to emit GHG emissions associated with Scope 1 and 2 emissions for the Modification have been summarised in **Table 9-1** below. These estimates are based on a conservative upper limit of the assumed maximum production throughout the life of the Modification. The assessment provides a reasonable worst case approximation of the potential GHG emissions for the purpose of this assessment.

Table 9-1: Summary of annual quantities of materials estimated for the Modification[4]

Period		ROM coal (Mt)	UG ROM coal (Mt)	Diesel - Stationary (ML)	LPG (kL)	Diesel - Transport (ML)	Petroleum - based oils (ML)	Petroleum - based greases (ML)	Electricity (GWh)	Explosives (kt)
FY27		25.0	4.0	211.3	4	2.5	3.3	0.5	126.6	62.6
FY28		23.7	4.0	200.5	3	2.4	3.1	0.5	120.2	61.0
FY29		24.9	4.0	210.4	3	2.5	3.2	0.5	126.1	50.6
FY30		16.3	4.0	138.0	2	1.8	2.1	0.4	82.7	30.2
Decommissioning	1	-	-	13.8	0.2	0.2	0.2	0.04	8.3	-
	2	-	-	13.8	0.2	0.2	0.2	0.04	8.3	-
	3	-	-	13.8	0.2	0.2	0.2	0.04	8.3	-
	4	-	-	13.8	0.2	0.2	0.2	0.04	8.3	-
	5	-	-	13.8	0.2	0.2	0.2	0.04	8.3	-

Notes: kL – Kilolitres, ML – Megalitres, GWh – Gigawatt hour

Scope 3 emissions for the transport and final use of the coal may have the potential to vary in the future depending on the market situation at the time. These assumptions include emission factors for the transport modes of rail and shipping and the associated average weighted distance travelled for the export coal.

During the progression of the mining operation some land clearing will take place, however as waste emplacement landforms are rehabilitated this would act to offset any previous GHG emissions associated with land clearing. The carbon storage of the rehabilitated land would continue beyond the life of the Project. The likely GHG emissions associated with vegetation clearing during construction have been calculated using a conservative estimation approach described in the Greenhouse Gas Assessment Workbook for Road Projects (**Transport Authorities Greenhouse Group [TAGHGG], 2013**). This approach conservatively assumes all carbon pools are removed with the vegetation clearing, all carbon removed is converted to CO_2 and sequestration from revegetation is not included. The assumed annual land clearing is approximately 9 hectares (ha) for the life of the Project[5].

The construction phase of the Modification has not been considered, as the mine is already operational. During decommissioning, there would be diesel use associated with plant and equipment required for the rehabilitation of the site and some electricity use. The decommissioning phase would involve the majority of intensive bulk earthworks and final landform shaping, however, does not include the establishment of vegetation nor attainment of completion criteria required by MLs. The decommissioning phase is expected to occur over approximately 5 years and the amount of diesel, LPG, oil and grease, and electricity required is estimated as 10% of the last year of operation for the decommissioning phase.

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4 Quantities of materials are scaled according to only the projected ROM amount in each year, and therefore waste is not considered in the estimates.

5 This assessment models 36 ha as a conservative estimate however the actual Modification New Disturbance Area has been reduced to 25 ha.

9.2 Emission factors

To quantify the amount of carbon dioxide equivalent (CO_2-e) material generated from the Modification, emission factors obtained from the latest NGA Factors at the time of writing the assessment (**DCCEEW, 2023a**), explosives emission factor from the *National Greenhouse Accounts (NGA) Factors Updating and replacing the AGO Factors and Methods Workbook* (**Department of Climate Change, 2008**) emission factors for land clearing (**TAGHGG, 2013**), emission factors for Scope 3 rail transport used for other similar coal mining operations in the Hunter Valley and emission factors for Scope 3 ship transport from the *Greenhouse gas report: conversion factors 2022* website (**UK Government, 2023**) are summarised in **Table 9-2**.

Table 9-2: Summary of emission factors

Type	Energy content factor (GJ/kL)	Emission factor			Units	Scope
		CO_2	CH_4	N_2O		
Diesel - Stationary	38.6	69.9	0.1	0.2	kg CO_2-e/GJ	1
		17.3	-	-		3
LPG	25.7	60.2	0.2	0.2	kg CO_2-e/GJ	1
		20.2				3
Diesel - Transport	38.6	69.9	0.01	0.5	kg CO_2-e/GJ	1
		17.3	-	-		3
Petroleum-based oils	38.8	13.9	-	-	kg CO_2-e/GJ	1
		18.0	-	-		3
Petroleum-based greases	38.8	3.5	-	-	kg CO_2-e/GJ	1
		18	-	-		3
Electricity	-	0.73	-	-	kg CO_2-e/kWh	2
		0.06	-	-		3
Fugitive emissions	-	0.00020	0.00195	-	t CO_2-e/t ROM	1
Explosives - ANFO	-	0.17	-	-	t CO_2-e/t explosive	1
Land clearing – woodland/ forest	-	521	-	-	t CO_2-e/ha	1
Land clearing - grassland	-	110	-	-	t CO_2-e/ha	1
Rail transport	-	16.6	-	-	t CO_2-e/Mt-km	3
Ship transport – 100,000-199,999 dwt	-	0.00068	-	-	kg CO_2-e/t-km	3
Ship transport – 60,000-99,999 dwt	-	0.00093	-	-	kg CO_2-e/t-km	3
Thermal coal*	27.0	90	0.04	0.2	kg CO_2-e/GJ	3

* Assumes type of coal is bituminous.

Note: GJ = gigajoule, GJ/kL = gigajoule per kilolitre, kg CO_2-e = kilograms of carbon dioxide equivalent, t CO_2-e = tonnes of carbon dioxide equivalent, kWh = kilowatt hour, t = tonnes, t-km = tonne-kilometres, dwt = deadweight tonnage, CO_2 = Carbon Dioxide, CH_4 = Methane and N_2O = Nitrous Oxide

Product coal is transported to the Port of Newcastle by rail and then transferred to coal loaders before being shipped to its final destination. The approximate rail distance is taken to be 240km (return distance). The approximate shipping distance varies depending on the customer with destinations predominately in the Asian market.

The end use of coal produced by the Modification has been assumed to be power generation and emissions from that use have been assumed to be equivalent to the emissions generated by coal fired power stations in NSW. The type of thermal coal consumed is conservatively assumed to be bituminous.

9.3 Summary of greenhouse gas emissions

Table 9-3 summarises the estimated annual CO_2-e emissions due to the Modification.

Table 9-3: Summary of CO_2-e emissions for the Modification (kt CO_2-e)

Year		Fugitive emissions	Diesel - Stationary		LPG	Diesel - Transport		Oil		Grease		Explosives	Vegetation clearing	Electricity		Rail transport	Ship transport	Thermal coal
		Scope																
		1	1	3	1	1	3	1	3	1	3	1	1	2	3	3	3	3
FY27	Operation	53.8	572.4	141.1	0.005	6.8	1.7	1.8	2.3	0.1	0.4	10.7	1.7	92.4	7.6	84.2	317.5	51,507
FY28	Operation	51.1	543.4	133.9	0.005	6.5	1.6	1.7	2.2	0.1	0.4	10.4	1.7	87.7	7.2	80.5	303.6	49,257
FY29	Operation	53.6	570.1	140.5	0.005	6.8	1.7	1.8	2.3	0.1	0.4	8.6	1.7	92.0	7.6	83.9	316.4	51,324
FY30	Operation	35.1	373.9	92.1	0.004	4.8	1.2	1.1	1.5	0.05	0.2	5.1	1.7	60.4	5.0	59.0	222.6	36,109
1	Decommissioning	-	37.4	9.2	3.6E-04	0.5	1.2E-04	0.5	0.1	4.8E-03	2.5E-02			6.0	0.5	-	-	-
2	Decommissioning	-	37.4	9.2	3.6E-04	0.5	1.2E-04	0.5	0.1	4.8E-03	2.5E-02			6.0	0.5	-	-	-
3	Decommissioning	-	37.4	9.2	3.6E-04	0.5	1.2E-04	0.5	0.1	4.8E-03	2.5E-02			6.0	0.5	-	-	-
4	Decommissioning	-	37.4	9.2	3.6E-04	0.5	1.2E-04	0.5	0.1	4.8E-03	2.5E-02			6.0	0.5	-	-	-
5	Decommissioning	-	37.4	9.2	3.6E-04	0.5	1.2E-04	0.5	0.1	4.8E-03	2.5E-02			6.0	0.5	-	-	-

9.4 Contribution of greenhouse gas emissions

Table 9-4 summarises the emissions associated with the Modification based on Scopes 1, 2 and 3.

Table 9-4: Summary of CO_2-e emissions per scope (kt CO_2-e)

Period	Scope 1	Scope 2	Scope 3
Average Annual*	582	83	47,554
Total	2,516	363	190,265

*Excludes decommissioning phase

The estimated annual GHG emissions for Australia during 2020 was 498.1 million tonnes of carbon dioxide equivalent (Mt CO_2-e) (**DCCEEW, 2023b**). In comparison, the estimated annual average GHG emission for the Modification is 0.66Mt CO_2-e (Scope 1 and 2 excluding the decommissioning phase). Therefore, the annual contribution of GHG emissions from the Modification as a percentage of the Australian GHG emissions for the 2020 period is estimated to be approximately 0.13%.

At a state level, the estimated GHG emissions for NSW in the 2020 period were 132.4Mt CO_2-e (**DCCEEW, 2023c**). The annual contribution of GHG emissions from the Modification (Scopes 1 and 2) in comparison to the NSW GHG emissions for the 2020 period is estimated to be approximately 0.5%.

It should be noted that, MP 09_0062 approves the handling of an additional 4 Mtpa of ROM coal from the underground operations which would be processed through the same CHPP as the 24.9 Mtpa of ROM extracted from the open cut operations. Although the underground mine is not currently producing coal (and HVEC has no current intent to commence underground mining), the handling, processing and transport of this 4 Mtpa has conservatively been considered in this Assessment. The emissions associated with the additional ROM coal estimated within the rail transport, shipping transport and thermal coal Scope 3 emissions summarised in Table 9-3**.**

The estimated GHG emissions generated in all three scopes are based on approximated quantities of materials and, where applicable, generic emission factors. Therefore, the estimated emissions for the Modification are considered conservative.

9.5 Greenhouse gas management

HVEC undertakes regular reviews and monitoring of GHG emissions and energy efficiency initiatives to ensure that GHG emissions per tonne of product coal are kept to the minimum practicable level. Energy efficiency initiatives and opportunities are evaluated in the context of:

- their compatibility with the mine's production output and needs;
- energy and carbon costing;
- capital cost; and
- overall operating cost effectiveness including maintenance costs.

Unfortunately, given the relatively short duration remaining for operations, abatement measures involving large capital expenditure are not considered feasible by BHP.

Following the assessment, reasonable and feasible measures (emissions reduction and/or energy efficiency initiatives) that are deemed effective at reducing GHG emissions would be implemented including:

- Consideration of ways to reduce energy consumption during project planning phases and consider practicality of more energy efficient alternatives;
- Participation in the Federal Government's Energy Efficiency Opportunities program which included a review of energy usage and identified areas for potential energy efficiency improvement;
- Regular scheduled maintenance of equipment and plant;
- Maintain records of monthly electricity use and monthly ROM coal production to allow calculation of GHG emissions;
- Turn off unnecessary lighting around the mine site; and
- Participation in the Federal Government's Safeguard Mechanism under the NGERs Act.

10 SUMMARY AND CONCLUSIONS

This study has examined the potential air quality and GHG impacts that may arise from the Mt Arthur Coal Mine Modification.

The air dispersion modelling methodology uses local weather and dust monitoring data, incorporates conservative emission estimation and considers activities at other nearby coal mining operations.

The results indicate that dust impacts may potentially arise at a number of privately-owned receptor locations surrounding the MAC, however, with mitigation, these impacts can be avoided with the exception of one receiver as discussed below.

One privately-owned receptor (264) is predicted to experience exceedances of the relevant cumulative annual average PM_{10} criteria, with the Modification estimated to contribute approximately 11% of the predicted cumulative PM_{10} level at this location. It is noted that Receptor 264 currently has acquisition upon request rights in MP 09_0062 for potential air quality impacts. Given the predicted exceedances would occur with or without the Modification, it is considered the Modification would increase the magnitude of this exceedance rather than cause it.

No privately-owned receptors are predicted to exceed the NSW EPA impact assessment 24-hour average $PM_{2.5}$ or PM_{10} criteria for Modification-only impacts.

Cumulative 24-hour average $PM_{2.5}$ and PM_{10} levels exceeding the NSW EPA impact assessment criteria were predicted to occur in the surrounding environment in the absence of the implementation of reactive measures (receiver 226 and 200). It should be noted that receiver 226 is already under to acquisition rights and receiver 200 has the right to additional air quality mitigation upon request in accordance with MP 09_0062.

With the application of a reactive dust mitigation strategy and incorporation of real-time/predicted management systems, no privately-owned receivers are predicted to exceed the cumulative 24-hour average PM_{10} or $PM_{2.5}$ criteria.

No parcels of land are predicted to exceed the relevant VLAMP criteria for privately-owned land.

In conclusion, the Modification would result in a continuation of air quality emissions to 2030 at a reduced rate relative to the approved Project. As an outcome of this assessment, one receptor (264) would be afforded acquisition upon request rights for potential air quality impacts. Note that this receptor already currently has acquisition upon request rights in MP 09_0062 for air quality impacts and was previously identified as impacted in the previous assessment for the approved Project.

There are no likely adverse air quality impacts associated with rail transport for the Modification. Any potential blast fume impacts would be mitigated using existing management practices.

This study has assessed the potential GHG emissions associated with the Modification.

A contemporary and conservative GHG assessment of the Modification has been completed. The estimated annual average GHG emission is 0.66Mt CO_2-e (Scope 1 and 2), which is calculated to be approximately 0.13% of the Australian GHG emissions and approximately 0.5% of the NSW GHG emissions for the 2020 period.

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Appendix A

Receiver Locations

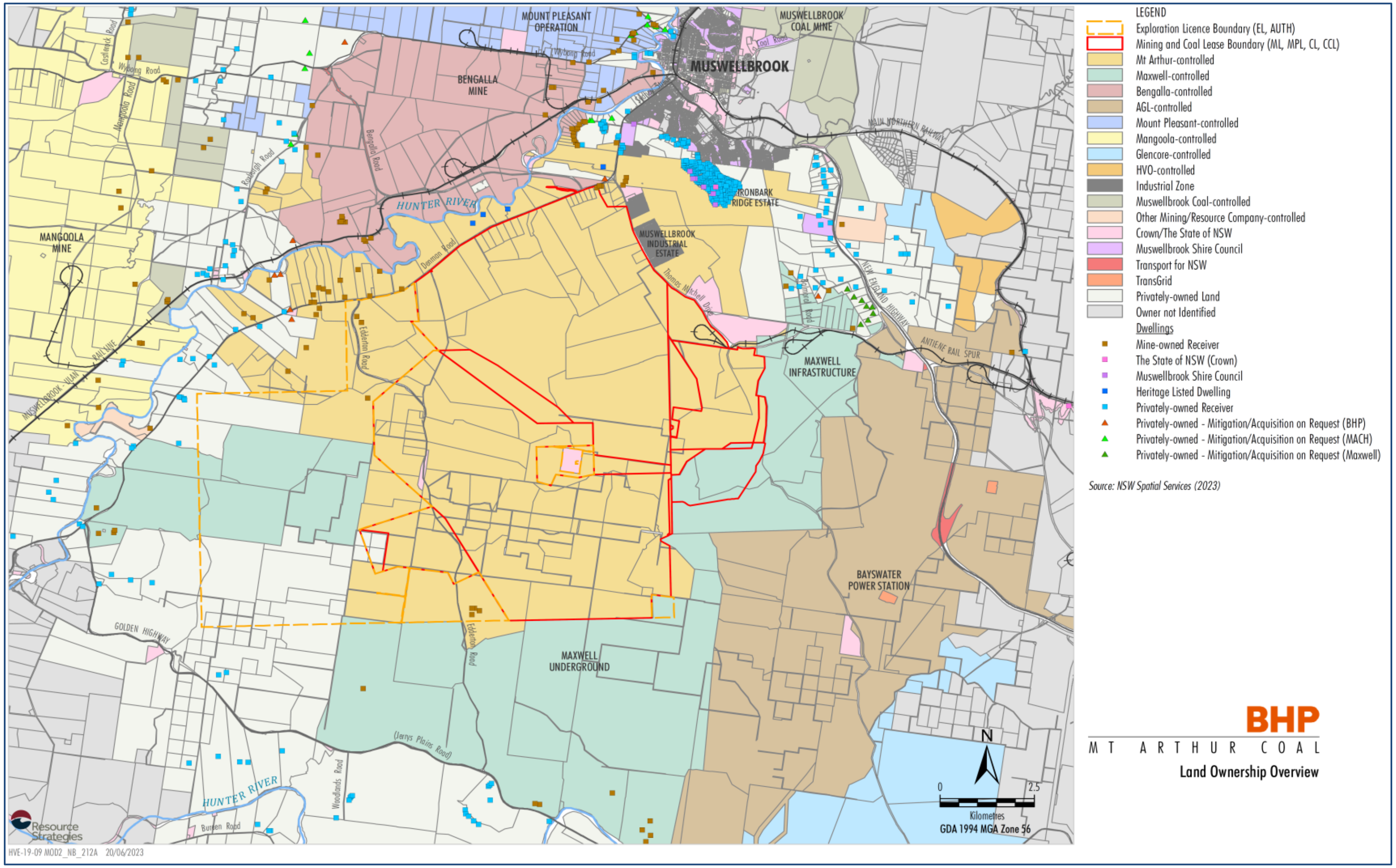

Figure A-1: Receivers Overview

Table A-1: Receiver locations

Receiver ID	Easting	Northing	Landowner
			Privately owned
6	299204	6425199	JIM ROD SCRIVEN
10	298604	6426138	MUSWELLBROOK RACE CLUB LIMITED
12	299568	6426382	CAROLINE JOY TUBB, DANIEL RUDOLPH TUBB
12	299544	6426340	CAROLINE JOY TUBB, DANIEL RUDOLPH TUBB
14	299097	6426729	DOROTHY LYNETTE ROBINSON
15	299126	6426722	LESA JOAN DOBIE, MICHAEL CRAIG DOBIE
16	299152	6426716	ELIZABETH ANN SWEENEY, MARK LESLIE SWEENEY
17	299208	6426699	JASON ROGER GLEESON, MELANIE RUTH CRANFIELD
18	299197	6426668	ROBERT RICHARD ALLAN FARNSWORTH
19	299191	6426638	NARELLE JOY KEEVERS
19	299215	6426621	NARELLE JOY KEEVERS
20	299187	6426609	CHRISTINE BERNADETTE MCINTOSH, WILLIAM JOHN MCINTOSH
21	299180	6426558	AMBER LYNN THOMSON-WEIR, RHYS COWAN WEIR
22	299175	6426542	ENGLEBRECHT RACING STABLES PTY. LIMITED
23	299177	6426503	RITA HELEN ENGLEBRECHT
24	299137	6426582	SUSAN YVONNE JOHNSON
25	299134	6426597	GAVIN LESLEY ANDREWS, KIRRALEE LOUISE ANDREWS
26	299145	6426635	MICHAEL ADAM MOLLER, REBECCA ANN BYRNES
27	299149	6426680	TREVOR DOUGLAS BARRON
27	299113	6426701	LESA JOAN DOBIE, MICHAEL CRAIG DOBIE
28	298804	6426823	MARK JAMES MCGOLDRICK
29	298865	6426827	JOSEPHINE ANNE BARNETT, KENNETH BRIAN BARNETT
30	299120	6426780	DOUGLAS PETER ENGLEBRECHT
32	299175	6426784	NITA MARY ENGLEBRECHT, PAMELA MAY HUME, WALTER DAVID GEORGE ALMOND
33	299389	6426888	KERRY LYN BARKLEY, SCOTT WILLIAM BARKLEY
34	299807	6427072	WALTER JAMES HARDES
36	299981	6428578	CHRISTOPHER HORNE
36	299987	6428649	CHRISTOPHER HORNE
38	299661	6426121	MONADELPHOUS PROPERTIES PTY LTD
40	299692	6426052	JOHN RICHARD BUCKLEY, JUDITH ANN BUCKLEY
41	299634	6425991	RUTH FRANCES RAY, STANLEY RICHARD PHILLIP RAY
42	299632	6425966	DULCIE JOAN HALLETT, JAMES EWEN ANDERSON, JOHN CAMPBELL, KIM LEE CAMPBELL, MELISSA VIVIAN HALLETT, SUE ELLEN HALLETT, TREVLYN PETER HALLETT
43	299621	6425918	DULCIE JOAN HALLETT, JAMES EWEN ANDERSON, JOHN CAMPBELL, KIM LEE CAMPBELL, MELISSA VIVIAN HALLETT, SUE ELLEN HALLETT, TREVLYN PETER HALLETT
56	300712	6426365	JOHN TERRANCE BANCROFT, SHARYN ELAINE BANCROFT
57	300833	6426376	GARY JOHN MEYER
58	300860	6426319	ANTONY REGINALD MASTERS
59	301018	6426278	DEBRA ANNE OSBORN, RAYMOND JOHN DOUGLAS OSBORN
60	301102	6426135	DAVIN PERCY LARGE, LYNETTE ANN LARGE
61	301171	6426169	JAYSON RAYMOND HALL
62	301287	6426131	BARBARA MARIE KILLEN
66	304767	6425562	JOHN GRANT ABERCROMBIE
66	304829	6425572	JOHN GRANT ABERCROMBIE
68	305190	6425431	BRUCE LESLIE BENNETT, JO-ANNE MARGARET BENNETT
69	304990	6425435	BRIAN STUART WELLS, MARILYN BROWN WELLS
70	304989	6425269	DEBBIE ROSE FOLPP, JOHN ALBERT FOLPP
71	305016	6425085	IAN ELIJAH HUNT, LINDA FLORENCE HUNT
72	305051	6424972	JEANETTE MARY BUDDEN, WALTER RONALD BUDDEN
73	305176	6424761	PATRICK JOHN HOGAN
75	305097	6424577	DOUG HARRIS
76	305079	6424360	MERLAUST PTY LIMITED

Receiver ID	Easting	Northing	Landowner
77	304864	6424159	MARY TERESA PERRAM
77	305059	6424243	MARY TERESA PERRAM
78	304376	6424137	KARL CASBEN
82	305106	6423175	JODIE WHITE, MARK THOMAS BARRY
83	305174	6423525	JULIE FOX
85	305221	6423060	RODNEY WALTER KERR
86	305453	6422383	IRENE DALE BAXTER, RONALD ERIC BAXTER
87	304976	6422282	ROBERT BOURNE HALLORAN
88	304794	6422638	JOHN WILLIAM NASH
89	304389	6422458	KYLE THOMAS RYAN
91	304139	6422116	AFRICK VERONICA DOHERTY, MICHAEL FRANCIS DOHERTY
92	304348	6422171	COLIN JOHN DUCK, LEANNE ELIZABETH DUCK
93	304780	6422140	DEBRA ANN OSBORN, RAYMOND JOHN DOUGLAS OSBORN
94	304853	6421916	LORRAINE TERESE SKINNER, ROGER CAMPBELL SKINNER
95	305624	6422117	GERRIT HENDRIK JOHAN DE BOER, PAMELA HARCOURT DE BOER
96	305849	6422167	PAUL ANDREW CAVANAGH, KELLIE MELISSA CAVANAGH
97	305807	6421894	PAUL CLIFTON, KATHLEEN CLIFTON
98	306007	6421800	BARBARA JONES
99	306292	6421610	LOUISE KATHERINE NASH
99	306136	6421635	LOUISE KATHERINE NASH
100	306310	6421439	ERIC JOHN SHARMAN, MAUREEN CAMILLA SHARMAN
101	306175	6421247	PETER GUY HORDER
102	305984	6421127	NGAIRE HELOISE ROBERTSON
116	290653	6409203	HYNKEN PTY LIMITED
117	290350	6406976	HYNKEN PTY LIMITED
118	290014	6407156	NOEL EDGAR RAY
121	289756	6408885	JEFFREY NEVILLE WOLFGANG, JENNIFER ELIZABETH WOLFGANG
122	288968	6409056	WILLIAM ROBIN LAURIE WOLFGANG
125	288192	6408863	TIMOTHY LAURIE WOLFGANG
138	289188	6411398	PETER MARK WOLFGANG, BRADLEY ROBERT WOLFGANG, DEANNA ELIZABETH WOLFGANG
139	288978	6411330	PETER MARK WOLFGANG, BRADLEY ROBERT WOLFGANG, DEANNA ELIZABETH WOLFGANG
157	285804	6413872	GIUSEPPE MEDIATI
163	287221	6413909	WONARUA SUPER PTY LTD, MARCUS HUMPHREY WOLFGANG, MARCUS HUMPHREY WOLFGANG
178	287925	6417792	BLAKEFIELD PTY LIMITED
179	287988	6419082	MARGARET BURGMANN, PHILIP RICHARD BURGMANN
182	288861	6419989	KAREN MAREE PAULSEN, TONY ROSS PAULSEN
186	290061	6421069	MARK WILLIAM TURNER
187	290912	6421269	MALCOLM JAMES DUNCAN, MARILYN JOY DUNCAN
189	287951	6420135	RODNEY WILLIAM JONES
190	288292	6420167	DANIEL JOHN PHILLIPS
191	288729	6420219	RAYMOND LESLIE WILKS
195	289424	6420979	CAMILLA ANN MACPHERSON, LACHLAN ALEXANDER MACPHERSON
198	290718	6421467	MALCOLM JAMES DUNCAN, MARILYN JOY DUNCAN
200	290619	6422528	GEOFFREY ROGER WALSH, MELISSA KAY WALSH
200	290459	6422499	GEOFFREY ROGER WALSH, MELISSA KAY WALSH
201	290871	6421547	CAROL ANNE DENTON, EDWARD JAMES DENTON
213	288413	6422516	S.R. & J. W. LAWSON (LINDISFARNE) PTY. LIMITED
216	289101	6422375	ANTHONY ANDREW MEYER, BELINDA THERESE MEYER
226	290948	6423469	TREVOR WAYNE ROOTS
231	289166	6423423	PETER JOHN BROWN
232	289352	6423345	JUNE IRENE BROWN, PETER JOHN BROWN
238	290893	6426165	MARK ROBERT PEEL
238	290771	6426234	MARK ROBERT PEEL

Receiver ID	Easting	Northing	Landowner
239	290650	6425665	PETER RAYMOND ELLIS
240	291001	6426005	PETER STUART JOHN MURRAY
242	290978	6426456	NEVILLE JOHN ELLIS, RUTH YVONNE ELLIS
243	289104	6426843	GRAEME TIMOTHY MCNEILL
252	291265	6428277	BRADLEY ATHOL STRACHAN, TRACEY ELIZABETH STRACHAN
254	290362	6428029	ADRIAN RONALD FLETCHER, FIONA FLETCHER
257	289022	6427911	REGINALD BRUCE PARKINSON
259	288368	6427932	FRANCIS NOEL GOOGE, WENDY LEE GOOGE
264	292319	6429013	JONATHAN BUCHANAN MOORE
265	308305	6421623	RONALD DAVID WIEKENS, MAARTJE MARIJKE WIEKENS
287	307345	6421749	WILD GROUP PTY LIMITED
288	291386	6428704	JONATHAN BUCHANAN MOORE
289	291276	6429621	BRUCE LEONARD BATES, MARY LLEWELLYN BATES
290	299896	6429203	PHILIP NORMAN SIMPSON
291	300004	6429277	MARIA SORMAZ, NIKOLA SORMAZ
292	300331	6429494	BIANCA ELLEN WHITEHEAD, WAYNE BARRY WHITEHEAD
293	300571	6429446	MARY HELEN RAY
294	301019	6429169	ANDREW KENT BIRCH
295	300958	6429302	CAROL MAY KELMAN, LEONARD GEORGE KELMAN
296	300797	6429363	GWEN ELIZABETH PITMAN
297	300343	6429725	COWTIME INVESTMENTS PTY LIMITED
298	299830	6430444	ALAN JOHN PETER STANLEY MATHER
299	299716	6430474	JOHN STEPHEN GIBSON
300	299569	6430451	BRENDAN DOUGLAS BARRY
301	299654	6430631	CHRISTINE ANNE HAYES, JOHN MAXWELL HAYES
302	299721	6430733	DOUGLAS LLOYD MOORE, PAMELA ANN MOORE
303	299655	6430781	CARL MOORE, JENNIFER MAY MOORE
304	289455	6428817	JOHN MICHAEL LONERGAN, SANDRA THERESE LONERGAN, LINDA ANNE PARKES, PATRICIA MARY HOWARD, JOHN EDWARD LONERGAN
305	300328	6428693	ELIZABETH ANNE LAWMAN, ROBERT ALAN LAWMAN
306	286411	6430732	ROBERT GEOFFREY GOWING
307	286335	6430403	DARREN GAVIN PEACE
308	286649	6429789	SCOTT HEYWOOD JENNAR
309	286664	6429919	SCOTT HEYWOOD JENNAR
310	289094	6428237	JASON LEE SMITH, KERRIE LEA BALMER
311	300536	6429474	LAWRENCE GREGORY WICKS
312	304802	6425787	GRAHAM KEITH BRIDGE, JENNIFER MARGARET BRIDGE
313	300416	6428684	BRAD LAWMAN
314	286450	6420099	MARK ANTHONY & SONYA ANN GREENTREE AND GRANT KINGSLEY & MAYBERY SUSAN GREENTREE
337	310331	6420362	WAYNE DAVID SMITH
383	306609	6422064	KEVIN CROSS, KAREN IRENE CROSS
384	306736	6422603	JUDITH ANNE FISHER, CHRISTOPHER IAN DENNIS
385	305857	6423073	MITCHELL JOHN WARD, SHARI LEIGH WARD
386	307051	6423083	BRIAN TERENCE DAVIS, JUDITH ELIZABETH DAVIS
387	307233	6423085	BRADLEY JAMES KING
388	305647	6423320	ELLEN JOZINA WALLMAN, MARK JAMES WALLMAN
389	306923	6423536	TRAVIS RAVA ZOLNIKOV, KAREN SUZANNE ZOLNIKOV
391	305991	6424365	BARBARA JOY HOPMANS, WALTER JOHN HOPMANS
392	302472	6424541	REBECCA JANE GUMB
394	302354	6424568	DANIEL BRIAN KELLY, NATALIE LOUISE KELLY
395	302052	6424598	MARION MARGARET BROTHERTON
396	302397	6424608	MARK SHANE MCCREERY, MICHELLE SOPHIA MCCREERY
397	302531	6424650	DAYARNE REBECCA SMITH, MATHEW LINCON SMITH
398	302025	6424651	CHRISTOPHER JAMES KENNEDY, DEBRA KENNEDY

Receiver ID	Easting	Northing	Landowner
399	302462	6424656	KATHERINE ANN VANDENBERG, STEPHEN JOHN VANDENBERG
400	302355	6424673	BRADLEY JOHN WESTGATE, KELLY WESTGATE
401	302383	6424705	BARRY KEITH MOFFITT
402	302484	6424709	JEREMY RICHARD PAINE
403	302192	6424717	CAMERON JOHN BENKOVIC, NICHOLA LEA BENKOVIC
404	302521	6424737	JOANNE GOLDTHORPE, NATHAN ALLEN BRIND
405	302417	6424741	ANDREW BRIAN HINES, REBECCA LEE HINES
406	302568	6424766	TROY ENZO MUSSIO, TUMAY ANNITRA MUSSIO
407	302486	6424813	ANTHONY GRAHAM MARGETTS
408	302263	6424828	BRETT ANDREW MICHAEL, SHANNON JADE MICHAEL
409	302519	6424851	HAYLEY ERIN MCCAUGHEY, PHILLIP WILLIAM MCCAUGHEY
410	302257	6424870	DAMIAN JOHN CHICK
411	302119	6424874	HUGH SNEDDON, JULIE ANN SNEDDON
412	302337	6424876	LORNA MAREE COX, SHANE MALCOLM COX
413	302547	6424889	IAN WILLIAM GOUGH, LISA MAREE GOUGH
414	302372	6424891	SAMUEL DAVID DOYLE
415	302645	6424900	PATRICK JOHN HOGAN
416	302403	6424900	JULIE MAREE DELFORCE, SHANE MATHEW DELFORCE
417	302470	6424926	AMY-LOUISE FLEMING, ROBERT MATTHEW FLEMING
418	302178	6424926	PHILIP KEITH BERNARD, SUE ELLEN BERNARD
419	302590	6424933	LINDSEY BEAU ARCHIBALD, TONYA TEREAZA MCQUILTY
420	302030	6424936	DANIELLE JANE JACKSON, PETER ANTHONY JACKSON
422	302247	6424958	DAVID LENICE MOFFITT, KERRY ACKERS MOFFITT
423	302774	6424959	PATRICK JOHN HOGAN
424	302083	6424979	AIMIE LOUISE NICHOLS, CHRISTOPHER JOHN NICHOLS
425	302369	6424984	DOMINIC WALTER PIKE
426	302696	6424991	BELINDA LEANNE ROUSELL, MATTHEW CHRISTOPHER ROUSELL
427	302634	6425013	KARLIE ANN NORMAN, SCOTT EDMOND NORMAN
428	302052	6425018	JESSICA ALMOND, JOHNATHON WILLIAM ASHFORD
429	302294	6425038	CAMERON GEORGE AYRES, KRYSTAL ANN AYRES
430	302745	6425048	HERBERT BRUCE BAXTER, JULIE ALETA BAXTER
431	302551	6425050	BENJAMIN THOMAS CARTER, STACEY JAYNE CARTER
432	302701	6425064	KIEREN WADE O'BRIEN, STACEY ELIZABETH O'BRIEN
433	302012	6425065	JULIANNE HERBERT, MARK GREGORY HERBERT
434	302476	6425079	CHRISTOPHER JAMES CRANDELL, NATASHA ANN MARIE WHITE
435	302624	6425097	DONNA ANNE LLOYD, GRANT BERNARD LLOYD
436	302149	6425106	CLINTON WAYNE MOBBERLEY
437	302584	6425116	DARRAN EDWARD ELLIOTT, LISA MAREE ELLIOTT
438	301952	6425119	DAVID COLIN GEORGE SHIBBLE, MARSHA SALLY SHIBBLE
439	302189	6425134	BRETT ROBERT MILLER, CHELSEA LOUISE RICHENS
440	302010	6425153	MITCHELL BENNET KELLY, TAMMY MARIE KELLY
441	302059	6425178	MATTHEW GARY CLARK, MELINDA LEE MONTEFIORE
442	302113	6425191	JAYE FOOT, KRISTAL ANNE FOOT
443	302295	6425237	MATHEW DAVID STAFA, MELISSA JAYNE STAFA
444	302223	6425281	HAMISH WILLIAM HARTLEY WING
445	302104	6425342	CATHERINE MICHELLE MAREE EDWARDS, GREGORY JOHN EDWARDS
446	302045	6425416	CHERYL ANN HILLERY
447	302067	6425492	CAROL LEA HUGHES, CHRIS MAURICE KNOWLES
448	301796	6425584	ALI MOURAD, FATIMA ISSA
449	301705	6425635	BRADLEY JOHN SWANN, NAOMI LISA SWANN
450	301666	6425777	JOSEPH GEORGE MADIKIAN, MARGARET ALICE MADIKIAN
451	301665	6425796	JAMIE FIBBENS, NICOLE JANE FIBBENS
452	301660	6425834	KR TIMPSON & ASSOCIATES PTY LIMITED
453	301658	6425861	DENNIS HOWARD BURTON, DORIS JOAN BURTON
454	301351	6426087	JOAN IRENE HOBBS

Receiver ID	Easting	Northing	Landowner
455	301354	6426149	FRANCIE JEAN GAGELER
456	301397	6426182	RAYMOND ARTHUR CHILLINGWORTH, THERESA KIM CHILLINGWORTH
457	301284	6426186	JOSHUA STEPHEN DANIEL
458	301345	6426193	GARY TREVOR JOHNSON, NOELINE VERA MORTON
459	301401	6426205	KATHRYN BARBARA KILLEN, WAYNE JOHN KILLEN
460	301355	6426221	JODIE ELIZABETH AYRE, MICHAEL ALLAN BUNT
461	301402	6426229	DANIEL LEIGH O'CONNOR
462	301338	6426238	BRUCE PATRICK HONEYSETT, CHRISTINE JANE HONEYSETT
463	301294	6426239	Unknown owner
464	301260	6426262	DALE ROBERT SIMPSON, KATRINA MICHELLE SIMPSON
465	301226	6426267	NATALIE ANNE LANESBURY, STEVEN RONALD LANESBURY
466	286641	6413978	Unknown owner
467	286143	6414130	WONARUA SUPER PTY LTD, MARCUS HUMPHREY WOLFGANG, MARCUS HUMPHREY WOLFGANG
470	286682	6417667	Unknown owner
471	286716	6417722	Unknown owner
473	285189	6417802	DUNBIER PASTORAL PTY LIMITED
476	284677	6416760	JANE MAREA THRIFT
477	284476	6416436	BRIAN ROBERT PARKER, DEBRA ANN PARKER
480	283536	6415202	DEXTER WILLIAM BURKILL
481	285288	6415547	VICTORIA ELIZABETH SOWTER, CHRISTOPHER JAMES SOWTER
482	285375	6415475	ELIZABETH MARIE ROBINSON, MARK EDWARD WILSON
485	282978	6415475	Unknown owner
111a	296124	6408219	CALOGO BLOODSTOCK AG
111b	296159	6408251	CALOGO BLOODSTOCK AG
111c	296197	6408291	CALOGO BLOODSTOCK AG
111d	296167	6407835	CALOGO BLOODSTOCK AG
112a	295508	6407554	CALOGO BLOODSTOCK AG
112b	295517	6407450	CALOGO BLOODSTOCK AG
112c	295599	6407384	CALOGO BLOODSTOCK AG
112d	295727	6407254	CALOGO BLOODSTOCK AG
112e	295863	6407149	CALOGO BLOODSTOCK AG
112f	297732	6407244	CALOGO BLOODSTOCK AG
113a	292092	6407335	GODOLPHIN AUSTRALIA PTY LIMITED
113b	292457	6407903	GODOLPHIN AUSTRALIA PTY LIMITED
113c	292485	6407928	GODOLPHIN AUSTRALIA PTY LIMITED
113d	292518	6407959	GODOLPHIN AUSTRALIA PTY LIMITED
113e	292433	6407832	GODOLPHIN AUSTRALIA PTY LIMITED
117a	290304	6406976	HYNKEN PTY LIMITED
121a	289532	6408902	JEFFREY NEVILLE WOLFGANG, JENNIFER ELIZABETH WOLFGANG
179a	288066	6419050	MARGARET BURGMANN, PHILIP RICHARD BURGMANN
179b	288071	6419004	MARGARET BURGMANN, PHILIP RICHARD BURGMANN
179c	287933	6419095	MARGARET BURGMANN, PHILIP RICHARD BURGMANN
213a	288744	6422670	S.R. & J. W. LAWSON (LINDISFARNE) PTY. LIMITED
213b	288563	6422550	S.R. & J. W. LAWSON (LINDISFARNE) PTY. LIMITED
213c	288663	6422488	S.R. & J. W. LAWSON (LINDISFARNE) PTY. LIMITED
218a	289391	6423191	JOHN DAVID MICHAEL MARKHAM
218b	289359	6423042	JOHN DAVID MICHAEL MARKHAM
218c	289154	6422757	JOHN DAVID MICHAEL MARKHAM
233a	289458	6424902	KATHLEEN FRANCIS MERRICK, RAYMOND MORRIS MERRICK
233b	289574	6424547	KATHLEEN FRANCIS MERRICK, RAYMOND MORRIS MERRICK
242a	290581	6426753	NEVILLE JOHN ELLIS, RUTH YVONNE ELLIS
242b	291000	6426444	NEVILLE JOHN ELLIS, RUTH YVONNE ELLIS
306a	286350	6430974	ROBERT GEOFFREY GOWING

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314a	286413	6419986	MARK ANTHONY & SONYA ANN GREENTREE AND GRANT KINGSLEY & MAYBERY SUSAN GREENTREE
386a	307163	6423084	BRIAN TERENCE DAVIS, JUDITH ELIZABETH DAVIS
457a	301296	6426220	JOSHUA STEPHEN DANIEL
463a	301296	6426254	Unknown owner
463b	301300	6426267	Unknown owner
477a	284597	6416229	BRIAN ROBERT PARKER, DEBRA ANN PARKER
485a	283234	6415566	Unknown owner
IR.1	301927	6425612	MADISON JAYNE FORD, MARK DAVID THORLEY
IR.10	302339	6425219	KRISTON ROBERT BAKER, NICOLE RENEE BAKER
IR.100	302323	6424962	ANGUS ALEXANDER NAPIER, ANITA MARIJKE NAPIER
IR.109	302280	6424779	AIDAN THOMAS PONT
IR.11	302424	6425186	JULIE ANN DANIEL, LLOYD GEORGE DANIEL
IR.111	302252	6424668	KRISTEN JOY SEYMOUR, TIMOTHY FRANCIS SEYMOUR
IR.116	302454	6424770	KRISTEN LEIGH CLAPHAM, STEPHEN MURRAY BRYAN CLAPHAM
IR.12	302462	6425165	ROBERT JOHN CULLEN, SUSAN MAY CULLEN
IR.122	302675	6424944	LUKE DOMINIC SANDELL-HAY, TAHNEE ELISE O'HALLORAN
IR.125	302622	6424866	AMANDA LOUISE CRAIG, BRADY BORG
IR.126	302597	6424811	LINDSEY FRANCIS SMITH, SAVANNAH MACY MELICHAR
IR.13	302546	6425133	HEATHER CLARE MCBRIDE, LINDSAY CECIL MCBRIDE
IR.14	302513	6425065	ANGELA LOUISE DAWSON, CAMERON JAMES DAWSON
IR.145	302106	6424640	FAYE WEBBER, IAN RAYMOND WEBBER
IR.148	302083	6424684	FIONA HELEN MCGUINNES
IR.15	302434	6425098	JESSICA MARIE HINSCHEN, MATTHEW ROSS HINSCHEN
IR.156	301978	6424861	FAYE WEBBER, IAN RAYMOND WEBBER
IR.158	301978	6424968	CINDY LEE HUGO, GLENN ANTHONY HUGO
IR.16	302395	6425116	NEIL THOMAS POLLARD, SUZANNE MAREE POLLARD
IR.160	301892	6424930	CARLA MAE DUNN, LIAM JOHN DUNN
IR.161	301910	6425004	FAYE WEBBER, IAN RAYMOND WEBBER
IR.17	302355	6425129	ALISON LEANNE BRADSTREET, DAVID BRENDAN BRADSTREET
IR.18	302311	6425140	ANDREW JAMES WRIGHT, HOLLIE ANN WRIGHT
IR.19	302237	6425178	CATHERINE ELIZABETH MAY, SCOTT THOMAS NOONAN
IR.2	301980	6425569	KEVIN JOHN NILON
IR.20	302166	6425235	BENJAMIN SCOTT WALSH, RENAE JANE WALSH
IR.21	302125	6425300	STANISLAV STRIJAKOV
IR.22	302009	6425441	BAZIL JOHN WILCHER, RACHEL-ANN WILCHER
IR.23	301961	6425468	CATHY LEANNE LANGFORD, PETER JOHN LANGFORD
IR.24	301906	6425486	BRUCE DAVID WEBBER
IR.28	302381	6425202	JENNY-LOU HINSCHEN, KELVIN JOHN HINSCHEN
IR.29	302505	6425149	LAUREN ANGELA MCINTOSH, SHANE JOHN MCINTOSH
IR.3	302013	6425533	BRETT JAMES OSBORN
IR.36	302589	6425031	BIJESH JOHN, JAYA BIJESH
IR.4	302111	6425464	ISSAM HAMWI, JULIANNE MAREE GILL
IR.5	302139	6425427	KAROLYN ELIZABETH MCGEACHIE, SCOTT DAVID MCGEACHIE
IR.6	302159	6425390	BRONWEN CARRALL SMITH, DANIEL HEATH SMITH
IR.7	302175	6425354	SCOTT ANTHONY FULLOON, TARA DANIELLE FULLOON
IR.8	302197	6425321	KARLENE HOLLAND
IR.9	302256	6425255	TIMOTHY JOHN VANDERWERF, TONI LEIGH VANDERWERF
IR.90	302102	6425088	KANE DAVID DENNIS
IR.137	302381	6424441	MATTHEW PETER LEVEN
IR.136	302339	6424485	HERBERT BRUCE BAXTER & JULIE ALETA BAXTER
IR.139	302173	6424488	DAHLIA BINTE HAMZAH
IR.141	302110	6424503	SCOTT DOUGLAS PARKER
IR.135	302289	6424542	CHRISTOPHER CHARLES GEORGE & RACHAEL ANN GEORGE
IR.140	302180	6424543	MARK SHANE MCCREERY & MICHELLE SOPHIA MCCREERY
IR.142	302086	6424549	DANIEL STEPHEN DENNIS & ASHLEY JEAN JONES

Receiver ID	Easting	Northing	Landowner
IR.143	302165	6424590	JAMES MARK BARNETT
IR.112	302286	6424617	CHAD CLEEVELY
IR.144	302163	6424642	FAYE WEBBER, IAN RAYMOND WEBBER
IR.149	302126	6424721	FAYE WEBBER, IAN RAYMOND WEBBER
IR.110	302271	6424725	RYAN PETER LANGFORD
IR.151	302185	6424793	FAYE WEBBER, IAN RAYMOND WEBBER
IR.155	302020	6424832	MICHAEL JOSEPH STUART MURDOCH
IR.154	302071	6424903	DANIEL LEWIS KILKOLLY
IR.159	301930	6424905	FAYE WEBBER, IAN RAYMOND WEBBER
IR.102	302419	6424975	MELANIE JEAN O'NIONS, STEPHEN JOHN O'NIONS
IR.93	302191	6425002	FAYE WEBBER, IAN RAYMOND WEBBER
IR.162	301861	6425024	ALEXANDRIA HELEN STEVENSON & BRODIE MICHAEL RONALD SMITH
IR.98	302238	6425024	FAYE WEBBER, IAN RAYMOND WEBBER
IR.163	301810	6425042	MORGAN NEIL WEBBER
IR.165	301737	6425063	MARK JOHN MCCANN & MEGAN LOUISE MCCANN
IR.166	301699	6425080	KEYREN MICHAEL FORBES & LEAH MAREE HARDY
IR.32	302663	6425084	MICHAEL LAURENCE BURKE, SARAH-JAYNE LOUISE BURKE
IR.83	301884	6425085	CRAIG JOHN WALLIS
IR.167	301661	6425104	KALLAN JOHN WATSON
IR.82	301831	6425121	JOSH MICHAEL WHYBURN & LUCY MARGARET PRUDDEN
IR.168	301628	6425141	DWAYNE RAYMOND O'BRIEN & JESSICA MYRA O'BRIEN
IR.72	301751	6425141	SHASHI KANTH SINGH THAKUR & SANYOGITA SINGH
IR.71	301701	6425176	JOSEY LEE MANSFIELD & SAPNA SIDHU
IR.81	301864	6425179	SHIRLEY LAI
IR.80	301901	6425208	DARYL GAVIDIA & SUSAN ROSSMERY CARRASCO ATAUPILLCO
IR.70	301668	6425211	NARINDER SINGH
IR.73	301801	6425226	JOSHYMON JOSEPH & JISHA THOMAS
IR.79	301936	6425237	DIANA PAULA ORTANEZ COLLO & JANE REINA SANTOS BERMEJO
IR.74	301840	6425256	JESSY JAMES & SIBI ENCHENATTU CHACKOCHAN
IR.69	301638	6425258	ANTHONY WILLIAM POWER & KATHERINE ASHLEY BAXTER
IR.171	301558	6425259	CHRISTOPHER IAN RODNEY SCRIVEN & BRIANA JADE SCRIVEN
IR.78	301997	6425271	MARIE ANTHONETTE SANTOS BERMEJO
IR.75	301872	6425290	AKHIL KATHURIA
IR.68	301602	6425318	KIERON TROY GALLETLY
IR.172	301523	6425322	DAVID JOHN FRIEND & NATALIE JAYNE FRIEND
IR.77	301975	6425332	MCDONALD JONES COMMUNITIES PTY LTD
IR.76	301908	6425334	MCDONALD JONES COMMUNITIES PTY LTD
IR.67	301639	6425349	GURDEEP KUMAR
IR.66	301678	6425378	DAMEN ANTHONY NIXON & JORDAN PATRICIA PAGETT
IR.58	301549	6425396	DEBABRATA DAS & RASHMI REKHA DAS
IR.65	301739	6425398	MARILYN AGUILELLA
IR.64	301808	6425413	SHIVANDHANA NARAYAN
IR.59	301608	6425419	DAVID GATT & CATHERINE ANNE GALEA
IR.174	301414	6425441	IAN RAYMOND WEBBER & CATHERINE LOUISE WEBBER
IR.57	301570	6425458	RICHARD THOMAS PATRICK HILTON
IR.60	301664	6425460	ALEXANDER JOEL LENNON & SILVANA LENNON
IR.63	301774	6425471	MOHSIN ZAMAN
IR.175	301373	6425478	IAN RAYMOND WEBBER & CATHERINE LOUISE WEBBER
IR.56	301470	6425479	IAN RAYMOND WEBBER & CATHERINE LOUISE WEBBER
IR.61	301694	6425491	GOLAM SARWAR & AMRIN SARWAR
IR.55	301503	6425505	IAN RAYMOND WEBBER & CATHERINE LOUISE WEBBER
IR.62	301729	6425505	KENDALL JADE STEELE & KIERAN WILLIAM STEELE
IR.176	301339	6425508	IAN RAYMOND WEBBER & CATHERINE LOUISE WEBBER
IR.54	301533	6425530	IAN RAYMOND WEBBER & CATHERINE LOUISE WEBBER
IR.177	301316	6425542	IAN RAYMOND WEBBER & CATHERINE LOUISE WEBBER

Receiver ID	Easting	Northing	Landowner
IR.46	301397	6425547	IAN RAYMOND WEBBER & CATHERINE LOUISE WEBBER
IR.53	301571	6425552	IAN RAYMOND WEBBER & CATHERINE LOUISE WEBBER
IR.47	301444	6425577	IAN RAYMOND WEBBER & CATHERINE LOUISE WEBBER
IR.178	301295	6425580	IAN RAYMOND WEBBER & CATHERINE LOUISE WEBBER
IR.52	301606	6425582	IAN RAYMOND WEBBER & CATHERINE LOUISE WEBBER
IR.48	301488	6425609	IAN RAYMOND WEBBER & CATHERINE LOUISE WEBBER
IR.44	301359	6425622	IAN RAYMOND WEBBER & CATHERINE LOUISE WEBBER
IR.51	301580	6425624	IAN RAYMOND WEBBER & CATHERINE LOUISE WEBBER
IR.179	301290	6425628	IAN RAYMOND WEBBER & CATHERINE LOUISE WEBBER
IR.45	301410	6425651	IAN RAYMOND WEBBER & CATHERINE LOUISE WEBBER
IR.50	301543	6425659	IAN RAYMOND WEBBER & CATHERINE LOUISE WEBBER
IR.49	301498	6425661	IAN RAYMOND WEBBER & CATHERINE LOUISE WEBBER
IR.180	301299	6425688	IAN RAYMOND WEBBER & CATHERINE LOUISE WEBBER
IR.43	301363	6425690	IAN RAYMOND WEBBER & CATHERINE LOUISE WEBBER
79	304920	6423905	MUSWELLBROOK SHIRE COUNCIL
79	305178	6423954	MUSWELLBROOK SHIRE COUNCIL
421	302136	6424953	NSW TRUSTEE AND GUARDIAN
268	311493	6418846	THE STATE OF NEW SOUTH WALES
Mine-owned			
8	299158	6425523	HUNTER VALLEY ENERGY COAL PTY LTD
11	299510	6426190	
196	289651	6421421	
197	289889	6421303	
204	291487	6421947	
205	291514	6421737	
206	291746	6422106	
206	291623	6422136	
207	291885	6422033	
208	292201	6422345	
209	292323	6421880	
210	292667	6422647	
211	292981	6421913	
241	291300	6426071	
358	298473	6426130	
359	298436	6426200	
360	298394	6426282	
361	291555	6421395	
361a	291644	6421571	
362	293826	6422113	
363	293238	6422606	
364	295705	6423948	
365	296635	6424344	
366	290218	6424814	
367	290262	6424901	
368	298999	6424940	
369	299120	6424980	
370	299061	6424990	
372	290815	6419814	
361b	291298	6420470	
374	290316	6422361	
381	295689	6413017	
381a	295883	6413125	
381b	295680	6413189	
381c	295752	6413191	
358a	298479	6426108	
393	295976	6424189	

Receiver ID	Easting	Northing	Landowner
203a	291433	6421730	
49b	299688	6425014	
49b	299776	6425226	
49b	299751	6425111	
371	292922	6419062	
373	292757	6421175	
373a	292638	6421335	
Other mine-owned			
446	309980	6420342	AGL MACQUARIE PTY LTD
390	305481	6423913	ANOTERO PTY LIMITED, COAL & ALLIED OPERATIONS PTY LTD
31	299048	6427365	
250	291456	6427229	
340	299880	6430325	
341	299975	6429059	
342	300556	6429466	
343	300494	6429495	
345	299172	6427657	
346	298781	6428443	
347	299583	6428764	
348	299927	6429227	MACH ENERGY AUSTRALIA PTY LTD
349	299940	6429238	
350	299956	6429248	
351	299971	6429258	
352	300115	6429782	
353	299929	6430146	
354	299794	6430383	
355	299850	6430393	
356	299528	6429084	
357	299422	6428720	
333	286950	6420596	
333a	286886	6420607	
334	286763	6422241	
335	287201	6425412	
336	287586	6427892	
337	286574	6428572	
336a	287514	6427944	MANGOOLA COAL OPERATIONS PTY LIMITED
338	286387	6424379	
339	286336	6424834	
473	285796	6418801	
474	285781	6419553	
444	284973	6418296	
90	304129	6422562	
379	303998	6422187	
380	305129	6422061	
382	305767	6421009	
451	292808	6410941	
452	297477	6407717	
453	299404	6408034	MAXWELL VENTURES (MANAGEMENT) PTY LTD
454	300411	6406844	
452a	297358	6407729	
454a	300400	6407255	
454b	300192	6406996	
454c	300289	6406665	
315	292869	6423439	MITSUI BENGALLA INVESTMENT PTY LTD, NEW HOPE BENGALLA PTY LTD, TAIPOWER BENGALLA PTY LIMITED, WESFARMERS BENGALLA LIMITED
315a	292827	6423488	
316	297852	6427740	

Receiver ID	Easting	Northing	Landowner
317	300478	6428153	
318	298360	6428431	
319	293016	6423529	
320	292327	6423978	
320a	292261	6423979	
320b	292255	6424068	
320c	292244	6424131	
321	291603	6425848	
322	298372	6426397	
323	298379	6426499	
324	298455	6426572	
325	298331	6426590	
326	298487	6426609	
327	298532	6426702	
328	298638	6426785	
329	297627	6426970	
330	298761	6427330	
316a	297792	6427735	
331	298689	6426768	
332	292183	6423976	
332a	292219	6423991	
235	288584	6426061	MUSWELLBROOK COAL COMPANY LIMITED
236	288755	6426284	
376	287607	6421748	
376a	287634	6421808	
377	287897	6427953	
378	286866	6428574	
376b	287617	6421769	
375	286578	6429561	
468	285798	6415276	SPUR HILL AGRICULTURAL PTY LIMITED
468a	286206	6415298	
468b	286230	6415369	
469	285738	6415988	
472	287163	6418220	UPPER HUNTER RESOURCES PTY LIMITED

Appendix B

Selection of Modelling Year

A statistical analysis of eight contiguous years of meteorological data from the Scone Airport Automatic Weather Station (AWS) is presented in **Table B-1**. The standard deviation of the twelve years was analysed against the long-term measured wind speed, temperature and relative humidity spanning a 14 to 19-year period recorded at the station.

The analysis indicates that 2020 is the closest to the long-term average for wind speed and relative humidity. The closest year to the long-term average for temperature is 2021.

This analysis suggests 2020 could be considered as the most representative of the long-term measured wind speed, and relative humidity, and 2021 as the most representative of the long-term measured temperature. However, due to the severe bushfire season that occurred across 2019 and 2020 and the major flooding across NSW in 2021, neither 2020 nor 2021 are considered to be representative of long-term measured meteorological parameters.

Considering this, the next years found to be representative of the long-term measured wind speed is 2016, of the long-term measured temperature is 2022 and of the of the long-term measured relative humidity is 2015 (refer to **Table B-1**).

Table B-1: Statistical analysis results of standard deviation from long-term meteorological data at Scone Airport AWS

Year	Wind speed	Temperature	Relative humidity
2015	0.32	0.97	3.76
2016	0.30	1.16	6.35
2017	0.33	1.30	7.70
2018	0.34	1.22	9.37
2019	0.38	1.65	10.84
2020	0.23	0.85	3.24
2021	0.28	0.65	3.49
2022	0.33	0.78	6.46

A score weighting analysis was performed to consider the deviation from the average for each of the last eight years of meteorological and dust monitoring data from Muswellbrook DPE monitoring station in **Table B-2**. The Muswellbrook monitoring station is located approximately 5.5km northwest of the MAC site and therefore the meteorological data is considered to be more representative of the surrounding area of the MAC. The values shaded in light-blue indicate the lowest deviation and in orange the highest deviation.

The score value is based on the weighting of the different parameters as considered most relevant for the purposes of air dispersion modelling and assessment. The score for 2015 is lowest indicating it is most representative. The meteorological year is generally selected only by considering representative meteorological data. In this case 2015 is also the most representative year, even when dust levels are considered.

Based on the analysis presented in **Table B-2**, the 2015 calendar year was chosen to be most suitable for use in dispersion modelling.

Table B-2: Score weighting analysis of modelling year selection from meteorological data at Muswellbrook

	WS	WD	Temp.	R.H.	PM_{10}	$PM_{2.5}$	Score with dust	Score
Weighting	2	4	1	1	1	1		
2015	0.27	0.14	0.19	0.55	0.85	0.98	3.68	1.85
2016	0.32	0.31	0.15	0.40	0.86	0.95	4.24	2.43
2017	0.39	0.24	0.27	0.58	0.97	1.06	4.61	2.58
2018	0.52	0.37	0.23	0.60	1.22	1.06	5.62	3.35
2019	0.48	0.34	0.33	0.87	1.54	1.38	6.45	3.54
2020	0.33	0.22	0.21	0.54	1.01	1.05	4.35	2.29
2021	0.50	0.19	0.28	0.52	0.81	0.82	4.19	2.55
2022	0.67	0.21	0.39	0.66	0.74	0.70	4.67	3.22

WS = wind speed, WD = wind direction, Temp. = temperature, R.H. = relative humidity

Figure B-1 presents a graphical analysis of monthly meteorological conditions at the Scone Airport AWS from 2015 to 2022. The monthly conditions for a range of meteorological parameters are expressed as the maximum, minimum and 25th and 75th percentiles. The 2015 data are presented as the orange line for comparison with the range of the data set shown in the blue colours.

The 2015 data trend relatively well with the monthly average of the dataset values for temperature and overall show little inter-annual variation for temperature. The relative humidity during 2015 shows typically above-average levels for most of the year. The wind speed indicates levels above the monthly average in the first half of the year and typically below in the second half.

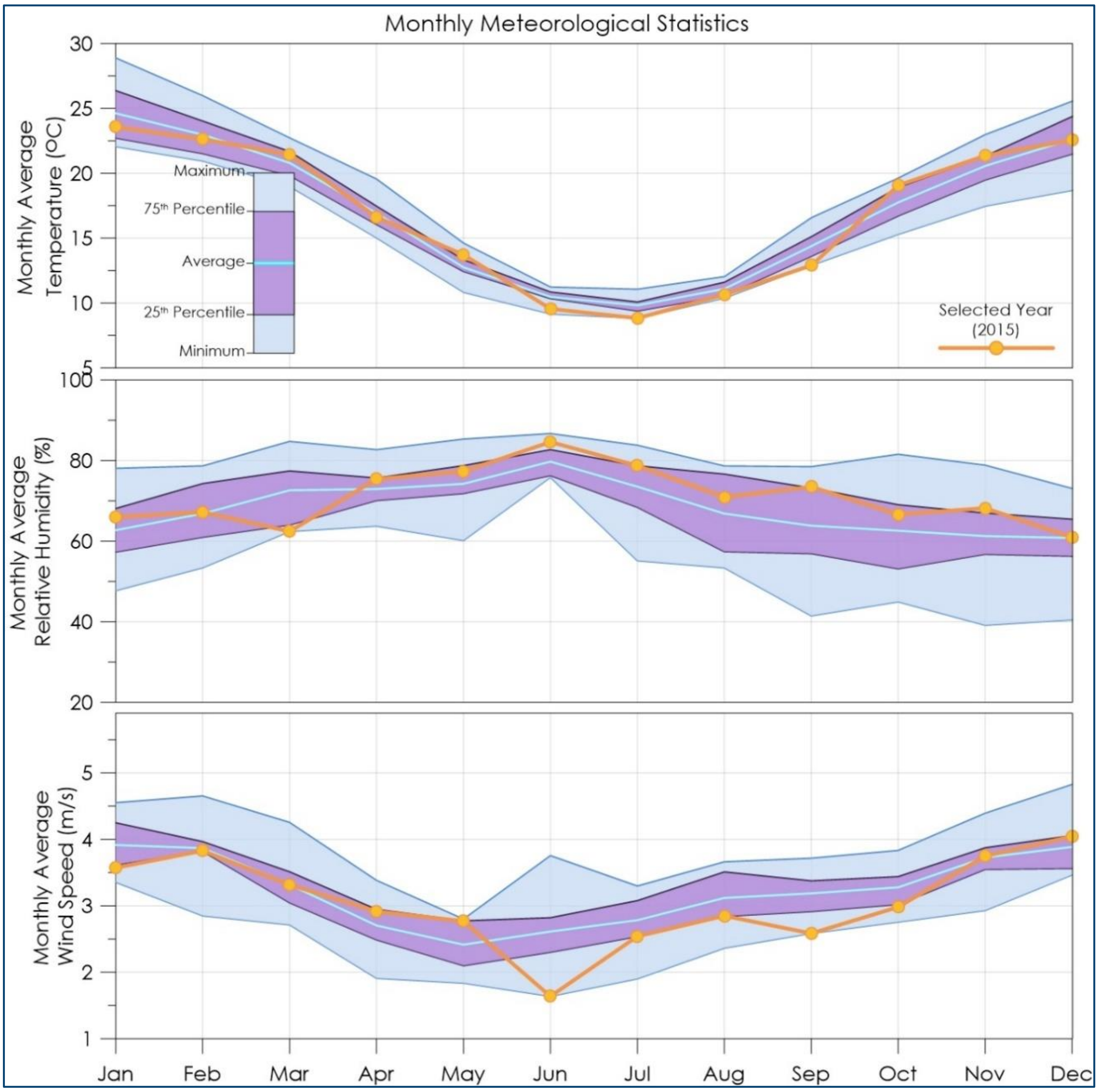

Figure B-1: Graphical analysis of meteorological conditions at Scone Airport AWS

A frequency distribution of the meteorological parameters from Scone Airport AWS is shown in **Figure B-2**. The graphs indicate that 2015 trends very close to the mean value for wind direction and relative humidity. A frequency distribution of the meteorological parameters from Muswellbrook DPE monitoring station is shown in **Figure B-3** for comparison and indicate that 2015 trends very close to the mean values for all meteorological parameters.

Further detailed analysis of the distribution of the meteorological parameters is shown in **Figure B-4**. The graphs on the left-hand side show the frequency distribution for each year and the graphs on the right-hand side show the deviation from the mean value for each of the years.

For wind speed, each year shows a similar deviation from the mean. The wind direction in 2016 shows noticeable deviation in frequency of winds from the south and from the north-west in 2016. Temperature in 2015 indicates a higher frequency of values approximately at 20 degrees Celsius and during 2017 for temperatures approximately ranging from 10 to 20 degrees Celsius. For relative humidity, 2015 and 2017 values at approximately 30% show noticeable deviation.

Overall this analysis indicates that 2015 is generally representative of the long-term average and does not indicate any significant variation of the last 8 years of data.

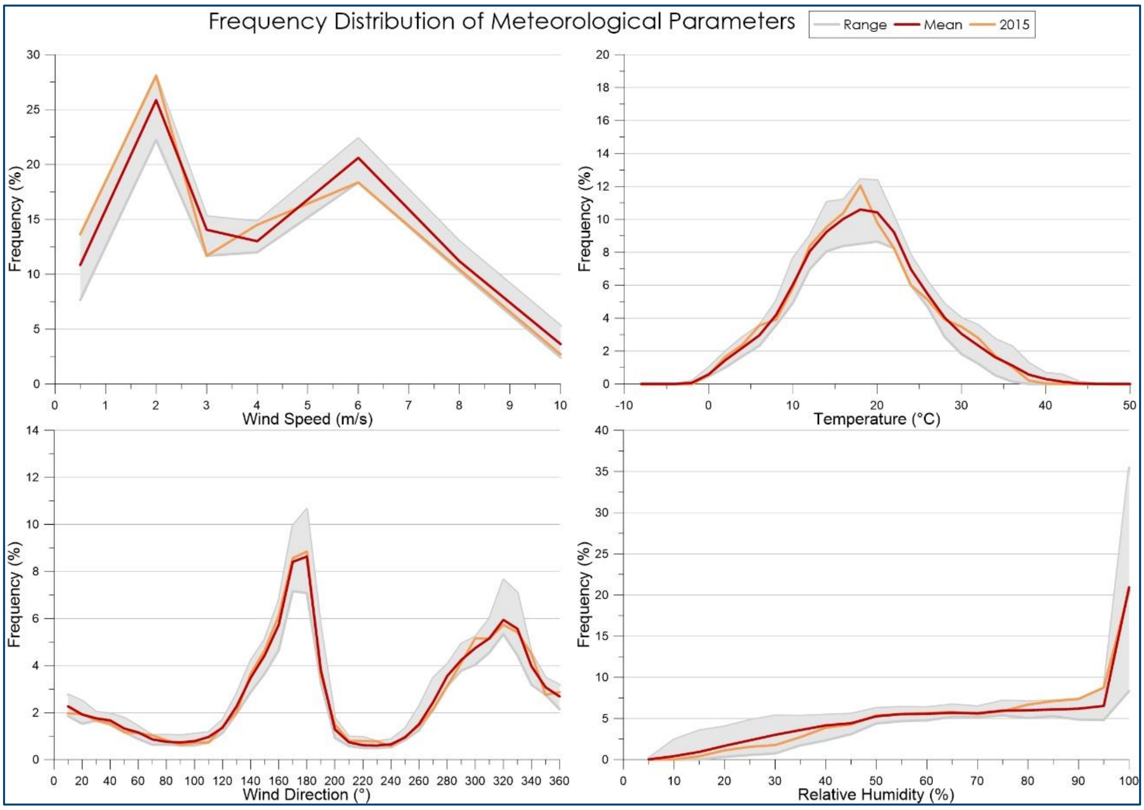

Figure B-2: Frequency distribution of meteorological parameters for Scone Airport AWS (2015 – 2022)

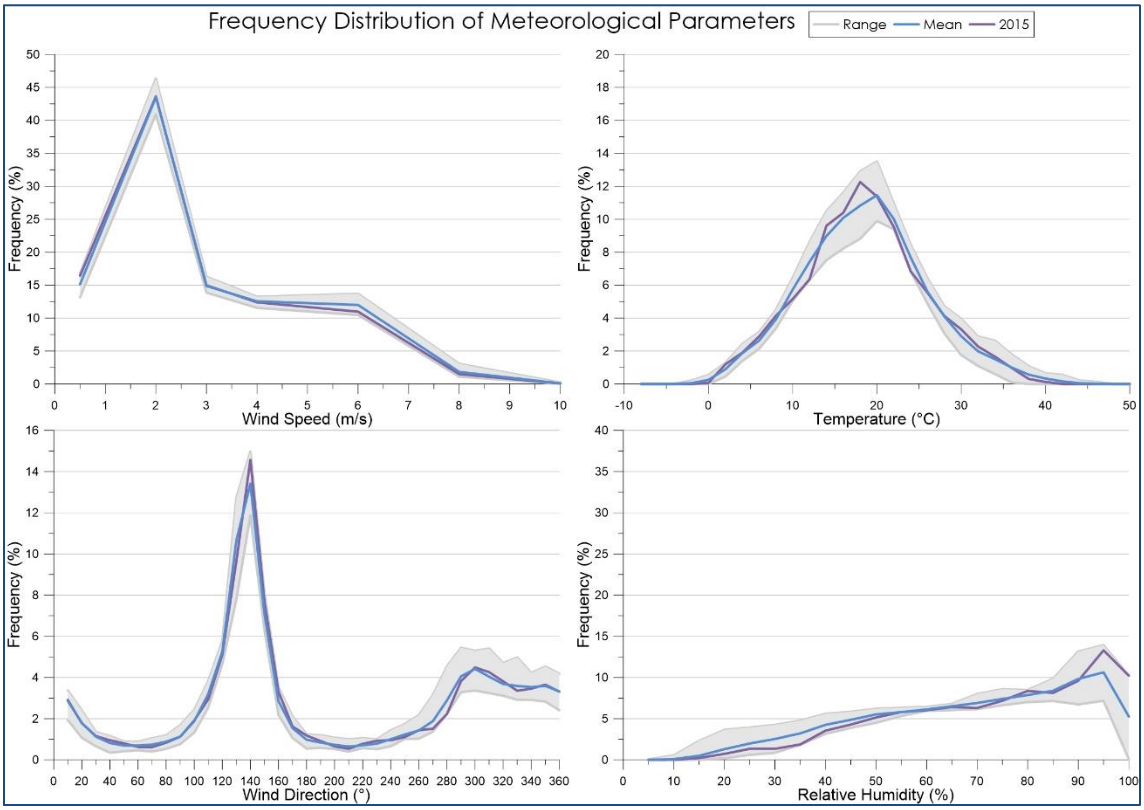

Figure B-3: Frequency distribution of meteorological parameters for Scone Airport AWS (2015 – 2022)

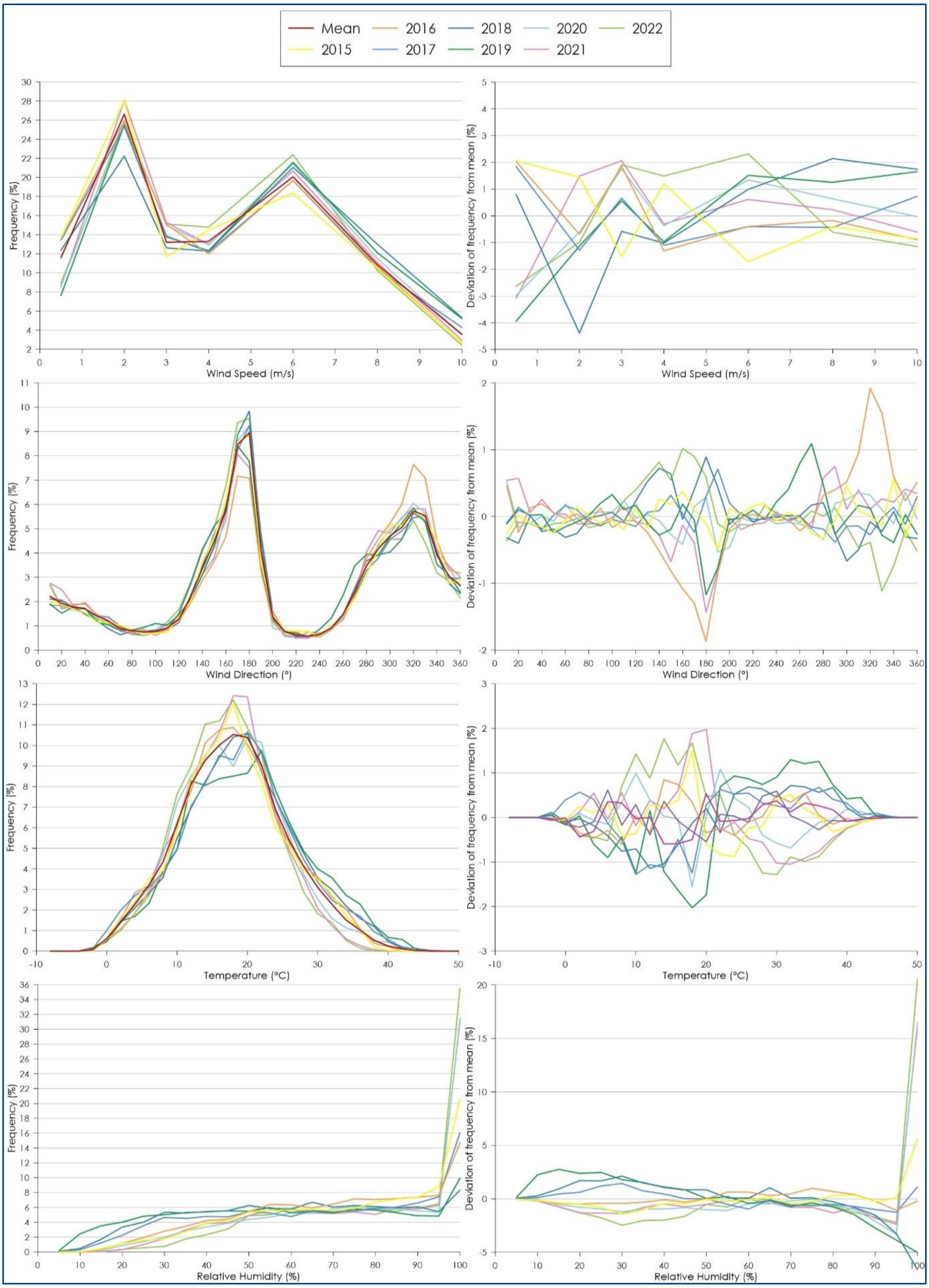

Figure B-4: Frequency distribution of meteorological parameters and standard deviation from mean (2013 – 2022)

Annual rainfall over the last seven-year period at the Scone Airport AWS with the long-term average is shown in **Figure B-5**. Annual rainfall during 2014, 2017, 2018 and 2019 was below the long-term average of 620.7 millimetres (mm) with the 2013, 2015, 2016, 2020, 2021 and 2022 above the long-term average.

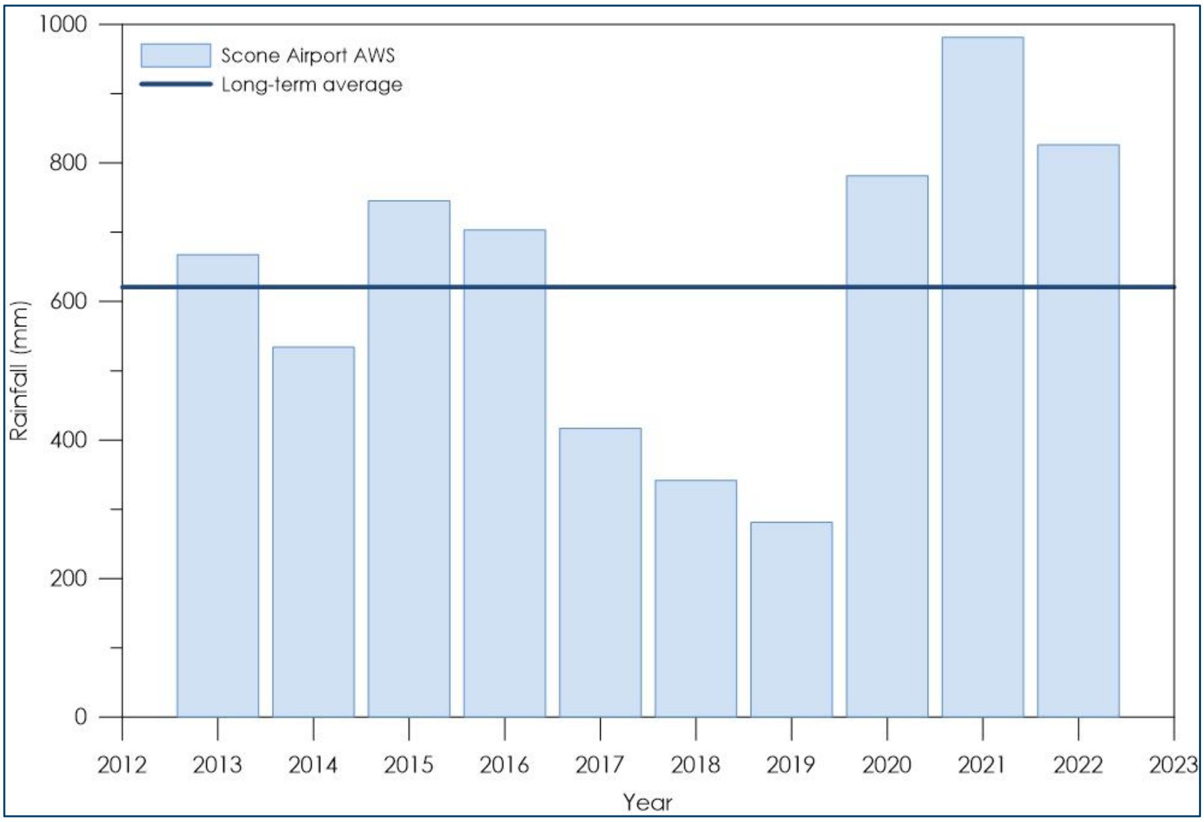

Figure B-5: Annual rainfall – Scone Airport AWS

Background dust levels can reduce due to rainfall. **Figure B-6** shows the monthly average PM_{10} concentrations with monthly rainfall levels in Muswellbrook. However, this does not mean there will be a relationship between high rainfall and low dust levels over the long-term, as can be seen in **Figure B-7**. The figure presents annual average PM_{10} and $PM_{2.5}$ levels from the Muswellbrook and Muswellbrook NW DPE monitors compared with the annual rainfall for the 2013 to 2022 period from the Muswellbrook (Lindisfarne) BoM station. It can be seen from the graphs in **Figure B-7** that there is no clear correlation between annual dust levels and annual rainfall over the last seven years of data in this location.

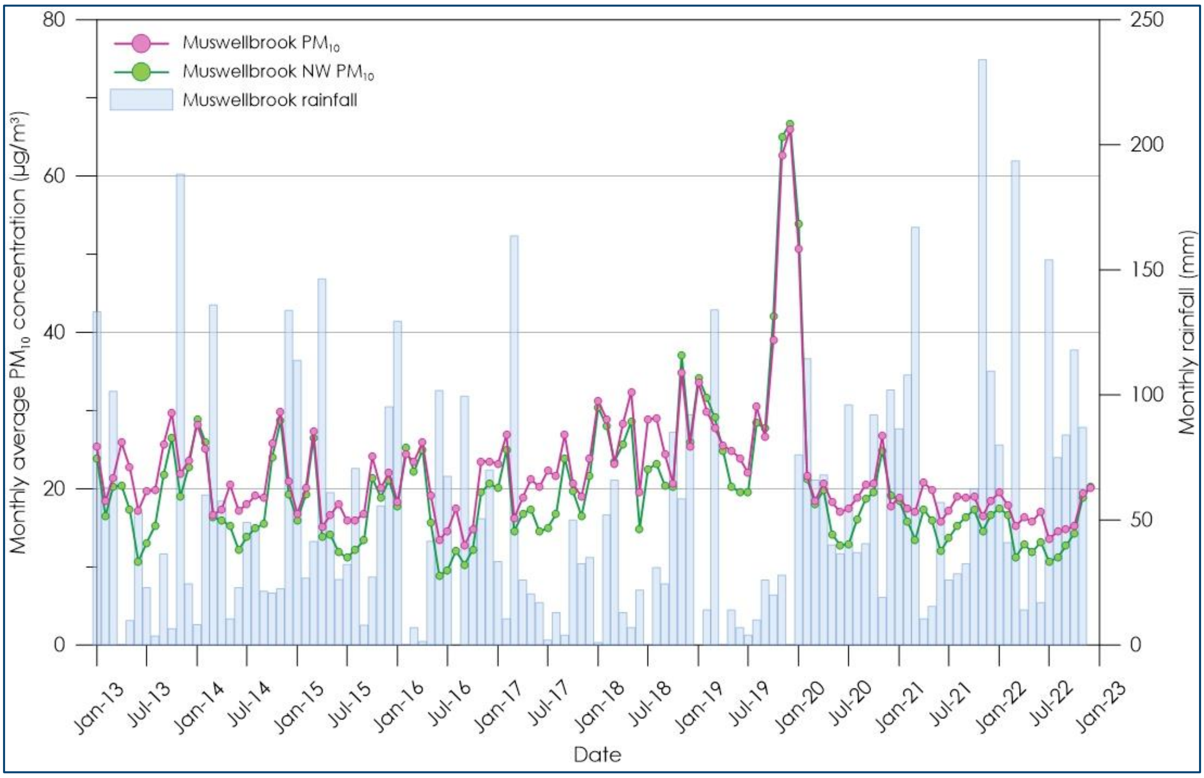

Figure B-6: Monthly average PM_{10} levels at Muswellbrook and Muswellbrook NW (NSW DPE) vs monthly rainfall for Muswellbrook (Lindisfarne BoM)

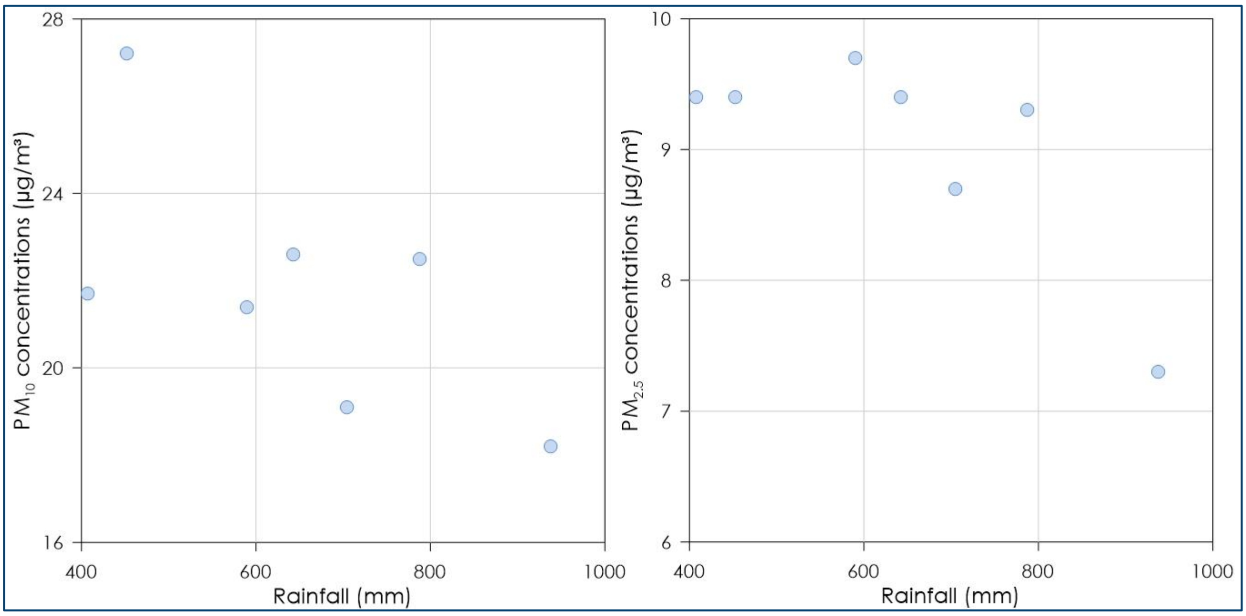

Figure B-7: Correlation of annual average PM_{10} and $PM_{2.5}$ concentrations with rainfall

Appendix C

Emission Calculation

Emission Calculation

The mining schedule and mine plan designs provided by the Proponent have been combined with emissions factor equations that relate to the quantity of dust emitted from particular activities based on intensity, the prevailing meteorological conditions, and composition of the material being handled.

Emission factors and associated controls have been sourced from the US EPA AP42 Emission Factors (**US EPA, 1995 and Updates**), the National Pollutant Inventory document *Emission Estimation Technique Manual for Mining, Version 3.1* (**NPI, 2012**) and the NSW EPA document, *NSW Coal Mining Benchmarking Study: International Best Practice Measures to Prevent and/or Minimise Emissions of Particulate Matter from Coal Mining*, prepared by Katestone Environmental (**Katestone Environmental, 2010**).

The emission factor equations used for each dust generating activity are outlined in **Table C-1** below. Detailed emission inventories for each scenario are presented in **Table C-2** to **Table C-7**.

Control factors include the following:

- Hauling on unpaved surfaces – 85% control for watering of trafficked areas. Note the control factor is only applied to the mechanically generated emissions and not the contributions from the diesel exhaust emissions
- Drilling overburden material – 70% control for use of dust suppression.
- Unloading ROM to dump hopper – 85% control for use of enclosure.
- Grading roads – 75% for keeping routes moist
- Unloading product coal – 70% for enclosure.
- Unloading bypass coal – 50% for boom tip water sprays.
- Product stockpiles – 50% for watering of exposed stockpiles.
- Clearing – 50% for watering of exposed surfaces and surface crusting.
- Wind erosion of stabilised areas – 30% for watering of exposed surfaces and surface crusting.

Potential air emissions associated with locomotives idling at the rail loop have been included in the emissions inventory. Emission estimates assume locomotives idling continuously with emission based on Class 81 locomotive emission rates (**Parsons Brinckerhoff, 2012**).

Air emissions associated with the operation of the diesel-powered equipment have been estimated based on the number of equipment, power rating, hours of operation and emission factors sourced from the NSW EPA document *NSW Coal Mining Benchmarking Study Best-practice measures for reducing non-road diesel exhaust emissions* (**NSW EPA, 2014**). Emission factors are based on Tier 4 equipment. A detailed emission inventory for diesel emissions is presented in **Table C-3**.

Table C-1: Emission factor equations

Activity	Emission factor equation		
	TSP	PM_{10}	$PM_{2.5}$
Drilling (overburden)	$EF = 0.59\ kg/hole$	$0.52\ \times TSP$	$0.03\ \times TSP$
Blasting (overburden)	$EF = 0.00022\ \times A^{1.5}\ kg/blast$	$0.52\ \times TSP$	$0.03\ \times TSP$
Loading / emplacing overburden & loading product coal to stockpile	$EF = 0.74\ \times 0.0016\ \times \left(\frac{U}{2.2}^{1.3} / \frac{M}{2}^{1.4}\right)\ kg/tonne$	$EF = 0.35\ \times 0.0016\ \times \left(\frac{U}{2.2}^{1.3} / \frac{M}{2}^{1.4}\right)\ kg/tonne$	$EF = 0.053\ \times 0.0016\ \times \left(\frac{U}{2.2}^{1.3} / \frac{M}{2}^{1.4}\right)\ kg/tonne$
Hauling on unsealed surfaces	$EF = \left(\frac{0.4536}{1.6093}\right) \times 4.9\ \times (s/12)^{0.7} \times (1.1023\ \times M/3)^{0.45}\ kg/VKT$	$EF = \left(\frac{0.4536}{1.6093}\right) \times 1.5 \times (s/12)^{0.9} \times (1.1023\ \times M/3)^{0.45}\ kg/VKT$	$EF = \left(\frac{0.4536}{1.6093}\right) \times 0.15\ \times (s/12)^{0.9} \times (1.1023\ \times M/3)^{0.45}\ kg/VKT$
Dozers on overburden	$EF = 2.6\ \times \frac{s^{1.2}}{M^{1.3}}\ kg/hour$	$EF = 0.45\ \times \frac{s^{1.5}}{M^{1.4}} \times 0.75\ kg/hour$	$EF = 0.45\ \times \frac{s^{1.5}}{M^{1.4}} \times 0.105\ kg/hour$
Dozers on coal	$EF = 35.6\ \times \frac{s^{1.2}}{M^{1.4}}\ kg/hour$	$EF = 8.44\ \times \frac{s^{1.5}}{M^{1.4}} \times 0.75\ kg/hour$	$EF = 8.44\ \times \frac{s^{1.5}}{M^{1.4}} \times 0.022\ kg/hour$
Loading / emplacing coal	$EF = \frac{0.58}{M^{1.2}}\ kg/tonne$	$EF = \frac{0.0596}{M^{0.9}} \times 0.75\ kg/tonne$	$EF = \frac{0.0596}{M^{0.9}} \times 0.019\ kg/tonne$
Wind erosion on exposed areas	$EF = 850\ kg/ha/year$	$0.5\ \times TSP$	$0.075\ \times TSP$
Wind erosion on stockpiles	$EF = 1.9\ \times \left(\frac{s}{1.5}\right) \times 365\ \times \left(\frac{365 - p}{235}\right) \times \left(\frac{f}{15}\right) kg/ha/year$	$0.5\ \times TSP$	$0.075\ \times TSP$
Grading roads	$EF = 0.0034\ \times\ sp^{2.5}\ kg/VKT$	$EF = 0.0056\ \times\ sp^{2.0}\ \times 0.6\ kg/VKT$	$EF = 0.0056\ \times\ sp^{2.0}\ \times 0.031\ kg/VKT$

EF = emission factor, A = area of blast (m^2), U = wind speed (m/s), M = moisture content (%), s = silt content (%)[6], VKT = vehicle kilometres travelled (km), p = number of days per year when rainfall is greater than 0.25mm (days), f = percentage of time that wind speed is greater than 5.4m/s (%), sp = speed of grader (km/h).

Emissions for the underground operations were sourced from the Mod1 Air Quality Impact Assessment (**PAE Holmes, 2013**).

6 Silt content is based upon site-specific sampling for the Australian Coal Industry's Research Program (ACARP) study conducted at the MAC.

Table C-2: Emission inventory

Activity	TSP emission	PM10 emission	PM25 emission	Intensity	Units	EF - TSP	EF - PM10	EF - PM25	Units	Var. 1	Units	Var. 2	Units	Var. 3 - TSP	Var. 3 - PM10	Var. 3 - PM25	Units	Var. 4	Units	Var. 5	Units	Var. 6	Units
Topsoil - Stripping topsoil	4,698	2,349	352	162,000	t/yr	0.029	0.0145	0.00218	kg/t														
Topsoil - Loading topsoil to trucks	45	21	3	162,000	t/yr	0.00028	0.00013	0.00002	kg/t	1.069	Ave. (wind speed/2.2)^1.3 in m/s	5.9	M.C. in %										
Topsoil - Hauling topsoil to emplacement area	2,097	487	49	162,000	t/yr	0.086	0.020	0.002	kg/t	319	t/load	5.7	km/return trip	4.9	1.1	0.1	kg/VKT	3.0	% silt cont	388	t	85	% Control
Topsoil - Emplacing topsoil at emplacement area	45	21	3	162,000	t/yr	0.00028	0.00013	0.00002	kg/t	1.069	Ave. (wind speed/2.2)^1.3 in m/s	5.9	M.C. in %										
OB - Drilling - CA	16,272	8,461	488	91,930	holes/yr	0.59	0.31	0.02	kg/hole													70	% Control
OB - Drilling - RX	16,743	8,706	502	94,592	holes/yr	0.59	0.31	0.02	kg/hole													70	% Control
OB - Drilling - WM	11,220	5,834	337	63,390	holes/yr	0.59	0.31	0.02	kg/hole													70	% Control
OB - Blasting - CA	141,817	73,745	4,254	58	blasts/yr	2460	1279.0	73.8	kg/blast	50,000	Area of blast in square metres												
OB - Blasting - RX	145,924	75,881	4,378	59	blasts/yr	2460	1279.0	73.8	kg/blast	50,000	Area of blast in square metres												
OB - Blasting - WM	97,789	50,850	2,934	40	blasts/yr	2460	1279.0	73.8	kg/blast	50,000	Area of blast in square metres												
OB - Sh/Ex/FELs loading - Haul 1	17	8	1	30,176	t/yr	0.00058	0.00027	0.00004	kg/t	1.069	Ave. (wind speed/2.2)^1.3 in m/s	3.5	M.C. in %										
OB - Sh/Ex/FELs loading - Haul 2	34,057	16,108	2,439	58,901,313	t/yr	0.00058	0.00027	0.00004	kg/t	1.069	Ave. (wind speed/2.2)^1.3 in m/s	3.5	M.C. in %										
OB - Sh/Ex/FELs loading - Haul 3	17,813	8,425	1,276	30,807,625	t/yr	0.00058	0.00027	0.00004	kg/t	1.069	Ave. (wind speed/2.2)^1.3 in m/s	3.5	M.C. in %										
OB - Sh/Ex/FELs loading - Haul 4	32,375	15,313	2,319	55,993,355	t/yr	0.00058	0.00027	0.00004	kg/t	1.069	Ave. (wind speed/2.2)^1.3 in m/s	3.5	M.C. in %										
OB - Sh/Ex/FELs loading - Haul 5	715	338	51	1,236,151	t/yr	0.00058	0.00027	0.00004	kg/t	1.069	Ave. (wind speed/2.2)^1.3 in m/s	3.5	M.C. in %										
OB - Sh/Ex/FELs loading - Haul 6	35,461	16,772	2,540	61,330,624	t/yr	0.00058	0.00027	0.00004	kg/t	1.069	Ave. (wind speed/2.2)^1.3 in m/s	3.5	M.C. in %										
OB - Sh/Ex/FELs loading - Haul 7	4,218	1,995	302	7,295,765	t/yr	0.00058	0.00027	0.00004	kg/t	1.069	Ave. (wind speed/2.2)^1.3 in m/s	3.5	M.C. in %										
OB - Sh/Ex/FELs loading - Haul 8	9,658	4,568	692	16,704,454	t/yr	0.00058	0.00027	0.00004	kg/t	1.069	Ave. (wind speed/2.2)^1.3 in m/s	3.5	M.C. in %										
OB - Hauling to emplacement area - Haul 1	403	94	9	30,176	t/yr	0.089	0.021	0.002	kg/t	350	t/load	6.2	km/return trip	5.0	1.2	0.1	kg/VKT	3.0	S.C. in %	417	t	85	% Control
OB - Hauling to emplacement area - Haul 2	533,761	123,831	12,383	58,901,313	t/yr	0.060	0.014	0.001	kg/t	325	t/load	4.0	km/return trip	4.9	1.1	0.1	kg/VKT	3.0	S.C. in %	394	t	85	% Control
OB - Hauling to emplacement area - Haul 3	438,346	101,695	10,170	30,807,625	t/yr	0.095	0.022	0.002	kg/t	350	t/load	6.6	km/return trip	5.0	1.2	0.1	kg/VKT	3.0	S.C. in %	417	t	85	% Control
OB - Hauling to emplacement area - Haul 4	387,455	89,889	8,989	55,993,355	t/yr	0.046	0.011	0.001	kg/t	349	t/load	3.2	km/return trip	5.0	1.2	0.1	kg/VKT	3.0	S.C. in %	415	t	85	% Control
OB - Hauling to emplacement area - Haul 5	20,786	4,822	482	1,236,151	t/yr	0.112	0.026	0.003	kg/t	350	t/load	7.8	km/return trip	5.0	1.2	0.1	kg/VKT	3.0	S.C. in %	417	t	85	% Control
OB - Hauling to emplacement area - Haul 6	794,773	184,385	18,439	61,330,624	t/yr	0.086	0.020	0.002	kg/t	282	t/load	5.2	km/return trip	4.7	1.1	0.1	kg/VKT	3.0	S.C. in %	354	t	85	% Control
OB - Hauling to emplacement area - Haul 7	65,066	15,095	1,510	7,295,765	t/yr	0.059	0.014	0.001	kg/t	261	t/load	3.4	km/return trip	4.6	1.1	0.1	kg/VKT	3.0	S.C. in %	335	t	85	% Control
OB - Hauling to emplacement area - Haul 8	361,414	83,847	8,385	16,704,454	t/yr	0.144	0.033	0.003	kg/t	287	t/load	8.8	km/return trip	4.7	1.1	0.1	kg/VKT	3.0	S.C. in %	359	t	85	% Control
OB - Emplacing at dump - Haul 1	17	8	1	30,176	t/yr	0.00058	0.00027	0.00004	kg/t	1.069	Ave. (wind speed/2.2)^1.3 in m/s	3.5	M.C. in %										
OB - Emplacing at dump - Haul 2	34,057	16,108	2,439	58,901,313	t/yr	0.00058	0.00027	0.00004	kg/t	1.069	Ave. (wind speed/2.2)^1.3 in m/s	3.5	M.C. in %										
OB - Emplacing at dump - Haul 3	17,813	8,425	1,276	30,807,625	t/yr	0.00058	0.00027	0.00004	kg/t	1.069	Ave. (wind speed/2.2)^1.3 in m/s	3.5	M.C. in %										
OB - Emplacing at dump - Haul 4	32,375	15,313	2,319	55,993,355	t/yr	0.00058	0.00027	0.00004	kg/t	1.069	Ave. (wind speed/2.2)^1.3 in m/s	3.5	M.C. in %										
OB - Emplacing at dump - Haul 5	715	338	51	1,236,151	t/yr	0.00058	0.00027	0.00004	kg/t	1.069	Ave. (wind speed/2.2)^1.3 in m/s	3.5	M.C. in %										
OB - Emplacing at dump - Haul 6	35,461	16,772	2,540	61,330,624	t/yr	0.00058	0.00027	0.00004	kg/t	1.069	Ave. (wind speed/2.2)^1.3 in m/s	3.5	M.C. in %										
OB - Emplacing at dump - Haul 7	4,218	1,995	302	7,295,765	t/yr	0.00058	0.00027	0.00004	kg/t	1.069	Ave. (wind speed/2.2)^1.3 in m/s	3.5	M.C. in %										
OB - Emplacing at dump - Haul 8	9,658	4,568	692	16,704,454	t/yr	0.00058	0.00027	0.00004	kg/t	1.069	Ave. (wind speed/2.2)^1.3 in m/s	3.5	M.C. in %										
OB - Sh/Ex/FELs loading - Crusher (4x)	333	158	24	576,207	t/yr	0.00058	0.00027	0.00004	kg/t	1.069	Ave. (wind speed/2.2)^1.3 in m/s	3.5	M.C. in %										
OB - Crushing rock (4x)	1,556	691	128	576,207	t/yr	0.00270	0.00120	0.00022	kg/t														
OB - Unloading from Crusher (4x)	333	158	24	576,207	t/yr	0.00058	0.00027	0.00004	kg/t	1.069	Ave. (wind speed/2.2)^1.3 in m/s	3.5	M.C. in %										
OB - Rehandle material (4x)	333	158	24	576,207	t/yr	0.00058	0.00027	0.00004	kg/t	1.069	Ave. (wind speed/2.2)^1.3 in m/s	3.5	M.C. in %										
OB - Dozers on O/B - CA	125,706	28,724	13,199	15,548	hrs/yr	8.1	1.8	0.8	kg/h	10	S.C. in %	3.5	M.C. in %										
OB - Dozers on O/B - RX	129,347	29,556	13,581	15,998	hrs/yr	8.1	1.8	0.8	kg/h	10	S.C. in %	3.5	M.C. in %										
OB - Dozers on O/B - WM	86,680	19,807	9,101	10,721	hrs/yr	8.1	1.8	0.8	kg/h	10	S.C. in %	3.5	M.C. in %										
OB - Dozers on O/B - Dump 1	47,598	10,876	4,998	5,887	hrs/yr	8.1	1.8	0.8	kg/h	10	S.C. in %	3.5	M.C. in %										
OB - Dozers on O/B - Dump 2	86,510	19,768	9,084	10,700	hrs/yr	8.1	1.8	0.8	kg/h	10	S.C. in %	3.5	M.C. in %										
OB - Dozers on O/B - Dump 3	96,713	22,099	10,155	11,962	hrs/yr	8.1	1.8	0.8	kg/h	10	S.C. in %	3.5	M.C. in %										
OB - Dozers on O/B - Dump 4	102,275	23,370	10,739	12,650	hrs/yr	8.1	1.8	0.8	kg/h	10	S.C. in %	3.5	M.C. in %										
OB - Dozers on O/B - Dump 5	25,808	5,897	2,710	3,192	hrs/yr	8.1	1.8	0.8	kg/h	10	S.C. in %	3.5	M.C. in %										
CL - Dozers ripping - CA	150,420	35,208	3,309	9,143	hrs/yr	16.5	3.9	0.4	kg/h	5	S.C. in %	8	M.C. in %										
CL - Dozers ripping - RX	264,203	61,841	5,812	16,060	hrs/yr	16.5	3.9	0.4	kg/h	5	S.C. in %	8	M.C. in %										
CL - Dozers ripping - WM	143,995	33,704	3,168	8,753	hrs/yr	16.5	3.9	0.4	kg/h	5	S.C. in %	8	M.C. in %										
CL - Loading ROM coal to trucks - CA	320,140	46,041	6,083	6,692,990	t/yr	0.048	0.007	0.001	kg/t	8	M.C. in %												
CL - Loading ROM coal to trucks - RX	562,306	80,868	10,684	11,755,807	t/yr	0.048	0.007	0.001	kg/t	8	M.C. in %												
CL - Loading ROM coal to trucks - WM	306,466	44,075	5,823	6,407,105	t/yr	0.048	0.007	0.001	kg/t	8	M.C. in %												
CL - Hauling ROM coal to dump hopper - CA	458,826	106,446	10,645	6,692,990	t/yr	0.457	0.106	0.011	kg/t	158	t/load	18.2	km/return trip	4.0	0.9	0.1	kg/VKT	3.0	S.C. in %	245	t	85	% Control
CL - Hauling ROM coal to dump hopper - RX	513,649	119,165	11,917	11,755,807	t/yr	0.291	0.068	0.007	kg/t	158	t/load	11.6	km/return trip	4.0	0.9	0.1	kg/VKT	3.0	S.C. in %	245	t	85	% Control
CL - Hauling ROM coal to dump hopper - WM	439,227	101,900	10,190	6,407,105	t/yr	0.457	0.106	0.011	kg/t	158	t/load	18.2	km/return trip	4.0	0.9	0.1	kg/VKT	3.0	S.C. in %	245	t	85	% Control
CL - Unloading all ROM coal to raw coal stockpile	178,337	25,648	3,388	24,855,902	t/yr	0.048	0.007	0.001	kg/t	8	M.C. in %											85	% Control
Transporting Rejects	262,993	61,014	6,101	4,363,827	t/yr	0.402	0.093	0.009	kg/t	158	t/load	16.0	km/return trip	4.0	0.9	0.1	kg/VKT	3.0	S.C. in %	245	t	85	% Control
Grading roads	49,237	17,203	1,526	320,000	km	0.62	0.22	0.02	kg/VKT	8	speed of graders in km/h											75	% Control
WE - Clearing	36,061	18,030	2,705	9	ha	8014	4007	601	kg/ha/yr	15	S.C. in %	66	number of rain days (>0.25mm)					13.6	% of time wind speed >5.4m/s			50	% Control
WE - Pit	499,112	249,556	37,433	587	ha	850	425	64	kg/ha/yr														
WE - Dump	1,326,694	663,347	99,502	1,561	ha	850	425	64	kg/ha/yr														
WE - Stabilised areas	642,939	321,469	48,220	1,081	ha	850	425	64	kg/ha/yr													30	% Control
WE - ROM stockpile (eastern)	40,068	20,034	3,005	15	ha	2,671	1,336	200	kg/ha/yr	5	S.C. in %	66	number of rain days (>0.25mm)					13.6	% of time wind speed >5.4m/s				
WE - Product stockpile (eastern)	9,616	4,808	721	9	ha	2,137	1,068	160	kg/ha/yr	4	S.C. in %	66	number of rain days (>0.25mm)					13.6	% of time wind speed >5.4m/s			50	% Control
WE - Product stockpile (western)	5,342	2,671	401	5	ha	2,137	1,068	160	kg/ha/yr	4	S.C. in %	66	number of rain days (>0.25mm)					13.6	% of time wind speed >5.4m/s			50	% Control
CL - Reclaimer unloading ROM coal to ROM bin in the CHPP	594,456	85,492	11,295	24,855,902	t/yr	0.048	0.007	0.001	kg/t	8	M.C. in %											50	% Control
CL - Crushing ROM coal	14,914	6,711	1,119	24,855,902	t/yr	0.0006	0.00027	0.00005	kg/t														
CL - Screening ROM coal	27,341	9,197	621	24,855,902	t/yr	0.0011	0.00037	0.00003	kg/t														
CL - Screening product coal	19,160	6,445	435	17,418,264	t/yr	0.0011	0.00037	0.00003	kg/t														
CL - Unloading product coal to stockpile (western)	248	117	18	6,220,809	t/yr	0.00013	0.00006	0.00001	kg/t	1.069	Ave. (wind speed/2.2)^1.3 in m/s	10	M.C. in %									70	% Control
CL - Unloading bypass product coal stockpile (western)	73	35	5	1,097,790	t/yr	0.00013	0.00006	0.00001	kg/t	1.069	Ave. (wind speed/2.2)^1.3 in m/s	10	M.C. in %									50	% Control
CL - Unloading product coal to stockpile (eastern)	447	211	32	11,197,455	t/yr	0.00013	0.00006	0.00001	kg/t	1.069	Ave. (wind speed/2.2)^1.3 in m/s	10	M.C. in %									70	% Control
CL - Unloading bypass product coal stockpile (eastern)	131	62	9	1,976,022	t/yr	0.00013	0.00006	0.00001	kg/t	1.069	Ave. (wind speed/2.2)^1.3 in m/s	10	M.C. in %									50	% Control
CL - Loading coal to trains	2,725	1,289	195	20,492,075	t/yr	0.00013	0.00006	0.00001	kg/t	1.069	Ave. (wind speed/2.2)^1.3 in m/s	10	M.C. in %										
Diesel mining equipment	52,566	52,566	50,989																				
Locomotive idling	515	515	499																				
CL - Dozers on ROM	82,256	19,253	1,810	5,000	hrs/yr	16.5	3.9	0.4	kg/h	5	S.C. in %	8	M.C. in %										
CL - Dozers on bypass product stockpile (western)	82,256	19,253	1,810	5,000	hrs/yr	16.5	3.9	0.4	kg/h	5	S.C. in %	8	M.C. in %										
CL - Dozers on product stockpile (eastern)	47,086	10,080	1,036	5,000	hrs/yr	9.42	2.02	0.21	kg/h	4	S.C. in %	10	M.C. in %										
Underground ROM/crushing stockpile area	360,000	1,891,892	286,486	4,000,000	t/yr	0.09	0.47	0.07	kg/t														
Underground CHPP area	360,000	1,891,892	286,486	4,000,000	t/yr	0.09	0.47	0.07	kg/t														
Total emissions (kg/yr)	**11,864,280**	**7,126,369**	**1,080,152**																				

Note: ha = hectares, SC=silt content, kg/h = kilograms/hour, WS = wind speed, MC = moisture content.

Table C-3: Emission inventory – Diesel emissions

Equipment type	Equipment number	Power (hp)	Tier 4f	Load Factor	Hours of Operation	PM2.5 emissions (kg/yr)
Shovel	1	4,002	0.025	0.45	12,256	2,311
Excavator	2	3,350	0.025	0.45	31,199	4,924
Excavator	7	1,875	0.025	0.45	9,957	880
Excavator	3	3,650	0.025	0.32	156,268	19,110
Haul truck	25	2,100	0.025	0.32	210,399	14,804
Haul truck	12	850	0.025	0.48	75,000	3,205
Dozer	15	599	0.025	0.48	45,000	1,356
Dozer	9	814	0.025	0.48	15,000	613
Dozer	3	290	0.007	0.46	25,000	349
Grader	5	290	0.007	0.46	15,000	209
Grader	3	944	0.025	0.32	45,000	1,422
Water truck	9	469	0.007	0.32	30,000	472
Lube truck	6	801	0.025	0.52	35,000	1,100
Drill	7	469	0.007	0.32	15,000	236

The range of best practice control measures applied for the Modification are summarised in **Table C-9.**

Table C-9: Summary of best practice control measures

Control measure		Control level applied to the Modification	Available control range	Comment
Drilling	Dust suppression	70%	3% - 99%	Drill rigs are fitted with dust aprons and utilise either water injection or dust collectors.
Blasting	No blasting during unfavourable weather conditions	Not quantified	Not quantified	Modification applies a range of blast management systems including predictive blast management system to assist with blasting
Hauling on unpaved surfaces	Watering of trafficked areas	85%*	30% - 90%	Roads are constructed to achieve a compact, stable, and durable surface, using material will a low silt/ fines content. Surface is regularly maintained and controlled with watering.
Unloading ROM to hopper at CHPP	Enclosure	85%	50% - 90%	Three-sided enclosure remove turbulence induced from dumping and influence from crosswinds.
Unloading product coal	Enclosure	70%	50% - 90%	Three-sided enclosure remove turbulence induced from dumping and influence from crosswinds.
Unloading bypass coal	Boom-tip water sprays	50%	25 - 75%	Watering binds loose material preventing dust when subject to winds.
Grading roads	Keeping routes moist, grader speed reduction	75%	10 - 75%	Surface is regularly maintained and controlled with watering. Reducing travel speeds influences dust lift-off.
Clearing	Watering of exposed surface and surface crusting	50%	30% - 80%	Watering binds loose material preventing dust lift-off when subject to winds. Natural surface crusting occurs when surface is watered and inactive for extended period.
Stabilisation area	Inactivity and surface crusting/ stabilisation	30%	30% - 80%	Natural surface crusting occurs when surface is watered and inactive for extended period.
Product stockpiles	Watering stockpile surface	50%	30% - 80%	Watering binds loose material preventing dust lift-off when subject to winds.

** 85% is considered to be appropriate and is within the haul road control effectiveness monitoring conducted as part of BHP (2014), which found an average 91% control.*

Appendix D

Modelling Predictions

Table D-1: Modelling predictions

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)
	Modification impact						Total impact			
	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									
	25	-	50	-	-	2	8	25	90	4
Privately-owned receptors										
6	3.5	0.4	22.2	2.1	3.9	0.1	6.2	10.4	51.5	2.6
10	3.7	0.3	23.1	1.6	3.1	0.1	6.1	11.4	51.0	2.6
12	2.9	0.2	18.3	1.0	1.7	0.0	6.6	12.0	46.2	2.5
12	2.9	0.2	18.2	1.0	1.8	0.0	6.6	11.9	46.3	2.5
14	2.9	0.2	17.7	1.0	1.8	0.0	6.8	12.3	47.8	2.5
15	2.8	0.2	17.7	1.0	1.8	0.0	6.7	12.3	47.7	2.5
16	2.8	0.2	17.7	1.0	1.8	0.0	6.7	12.3	47.6	2.5
17	2.8	0.2	17.6	1.0	1.7	0.0	6.7	12.4	47.4	2.5
18	2.8	0.2	17.6	1.0	1.8	0.0	6.7	12.3	47.5	2.5
19	2.8	0.2	17.7	1.0	1.8	0.0	6.7	12.2	47.5	2.5
19	2.8	0.2	17.6	1.0	1.8	0.0	6.7	12.2	47.4	2.5
20	2.8	0.2	17.7	1.0	1.8	0.0	6.7	12.1	47.6	2.5
21	2.8	0.2	17.7	1.0	1.9	0.0	6.7	11.9	47.6	2.5
22	2.8	0.2	17.7	1.0	1.9	0.0	6.7	11.9	47.6	2.5
23	2.8	0.2	17.7	1.1	1.9	0.0	6.7	11.8	47.6	2.5
24	2.9	0.2	17.8	1.0	1.9	0.0	6.7	12.0	47.8	2.5
25	2.9	0.2	17.8	1.0	1.9	0.0	6.8	12.0	47.8	2.5
26	2.8	0.2	17.7	1.0	1.8	0.0	6.7	12.1	47.7	2.5
27	2.8	0.2	17.7	1.0	1.8	0.0	6.7	12.3	47.7	2.5
27	2.9	0.2	17.7	1.0	1.8	0.0	6.8	12.3	47.8	2.5
28	3.1	0.2	19.0	1.1	2.0	0.0	6.0	12.4	49.1	2.6
29	3.0	0.2	18.5	1.1	1.9	0.0	5.9	12.3	48.7	2.5
30	2.8	0.2	17.6	1.0	1.7	0.0	6.7	12.4	47.7	2.5
32	2.8	0.2	17.6	1.0	1.7	0.0	6.7	12.5	47.5	2.5
33	2.9	0.2	17.9	0.9	1.5	0.0	6.7	13.2	46.7	2.5
34	3.1	0.1	18.6	0.7	1.3	0.0	6.5	14.9	45.2	2.5
36	2.9	0.1	17.3	0.5	0.8	0.0	5.5	16.8	43.8	2.4
36	2.9	0.1	17.1	0.4	0.8	0.0	5.5	16.8	43.7	2.4
37	3.1	0.1	18.7	0.8	1.4	0.0	6.6	15.1	46.0	2.5
38	3.0	0.2	19.2	1.0	1.9	0.0	5.7	11.5	46.2	2.5
40	3.1	0.2	19.5	1.0	1.9	0.0	5.7	11.4	46.2	2.5
41	3.0	0.2	19.4	1.1	2.0	0.0	5.7	11.1	46.6	2.5
42	3.0	0.2	19.4	1.1	2.0	0.0	5.7	11.1	46.7	2.5
43	3.0	0.2	19.5	1.1	2.1	0.0	5.8	11.0	46.8	2.5
56	2.0	0.1	13.1	0.8	1.2	0.0	6.7	17.3	46.1	2.5
57	1.9	0.1	12.5	0.7	1.2	0.0	6.7	17.4	45.8	2.5
58	1.9	0.1	12.3	0.7	1.2	0.0	6.6	17.2	45.6	2.5
59	1.8	0.1	11.6	0.7	1.2	0.0	6.6	17.1	45.0	2.5
60	1.8	0.1	11.3	0.7	1.2	0.0	6.6	16.7	44.8	2.4
61	1.7	0.1	11.0	0.7	1.2	0.0	6.5	16.8	44.7	2.4
62	1.7	0.1	10.6	0.7	1.1	0.0	6.5	16.6	44.3	2.4
66	0.9	0.1	4.0	0.4	0.6	0.0	5.0	9.6	38.2	2.3
66	0.8	0.1	3.9	0.4	0.6	0.0	5.0	9.4	38.1	2.3
68	0.7	0.1	3.7	0.3	0.6	0.0	4.9	8.9	37.5	2.3
69	0.7	0.1	3.6	0.3	0.6	0.0	4.9	9.2	37.8	2.3
70	0.7	0.1	3.8	0.4	0.6	0.0	5.0	9.2	37.9	2.3
71	0.7	0.1	4.1	0.4	0.6	0.0	5.0	9.3	38.0	2.3
72	0.7	0.1	4.2	0.4	0.7	0.0	4.9	9.2	37.9	2.3
73	0.7	0.1	4.2	0.4	0.7	0.0	3.7	9.1	37.8	2.3
75	0.8	0.1	4.3	0.4	0.7	0.0	3.8	9.2	38.0	2.3

Receptor ID	PM2.5 (µg/m³)		PM10 (µg/m³)		TSP (µg/m³)	DD (g/m²/mth)	PM2.5 (µg/m³)	PM10 (µg/m³)	TSP (µg/m³)	DD (g/m²/mth)
	Modification impact						Total impact			
	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									
	25	-	50	-	-	2	8	25	90	4
76	0.8	0.1	4.7	0.4	0.8	0.0	3.8	9.2	38.0	2.3
77	0.9	0.1	5.2	0.5	0.8	0.0	3.8	9.5	38.4	2.3
77	0.9	0.1	5.0	0.5	0.8	0.0	3.8	9.2	38.0	2.3
78	1.0	0.1	5.1	0.6	0.9	0.0	5.1	9.9	39.1	2.3
79	1.0	0.1	6.0	0.5	0.9	0.0	3.8	9.4	38.4	2.3
79	1.0	0.1	6.0	0.5	0.8	0.0	3.7	9.2	38.0	2.3
82	1.4	0.1	8.4	0.6	1.1	0.0	3.8	9.3	38.4	2.3
83	1.3	0.1	7.4	0.6	1.0	0.0	3.8	9.2	38.2	2.3
85	1.5	0.1	8.7	0.7	1.2	0.0	3.8	9.3	38.4	2.3
86	1.9	0.1	12.1	0.9	1.6	0.0	3.8	9.5	38.6	2.3
87	2.0	0.2	12.5	0.9	1.7	0.0	3.8	9.6	39.2	2.3
88	1.7	0.1	10.4	0.8	1.4	0.0	3.8	9.4	39.0	2.3
89	2.0	0.2	12.0	0.9	1.7	0.1	3.9	9.7	40.0	2.4
91	2.5	0.2	15.3	1.2	2.2	0.1	4.1	10.7	42.4	2.4
92	2.3	0.2	14.3	1.1	2.0	0.1	4.0	10.1	40.9	2.4
93	2.2	0.2	13.8	1.0	1.9	0.1	3.9	9.7	39.7	2.4
94	2.5	0.2	15.4	1.2	2.2	0.1	3.5	9.9	39.9	2.4
95	2.1	0.2	13.2	1.0	1.8	0.0	3.4	9.7	38.8	2.3
96	2.0	0.2	12.5	0.9	1.7	0.0	3.4	9.7	38.6	2.3
97	2.0	0.2	12.4	1.0	2.0	0.0	3.4	9.9	38.9	2.3
98	2.0	0.2	12.9	1.1	2.0	0.0	3.4	10.0	38.9	2.3
99	2.1	0.2	13.7	1.1	2.1	0.0	3.4	10.2	38.9	2.3
99	2.2	0.2	14.0	1.1	2.1	0.1	3.4	10.2	39.0	2.3
100	2.2	0.2	14.0	1.1	2.2	0.1	3.4	10.4	39.1	2.3
101	2.3	0.2	14.4	1.3	2.4	0.1	3.5	10.6	39.6	2.3
102	2.4	0.2	15.0	1.4	2.6	0.1	3.5	10.7	40.0	2.3
111	0.5	0.1	2.3	0.3	0.5	0.0	3.0	15.0	35.1	2.2
111	0.6	0.1	2.6	0.3	0.5	0.0	3.1	14.9	35.2	2.2
111	0.6	0.1	2.6	0.3	0.5	0.0	3.1	14.9	35.2	2.2
111	0.6	0.1	2.6	0.3	0.6	0.0	3.1	14.8	35.2	2.2
112	0.5	0.0	2.0	0.2	0.4	0.0	3.0	15.4	34.9	2.2
112	0.5	0.1	2.2	0.3	0.5	0.0	3.0	15.0	35.0	2.2
112	0.5	0.0	2.0	0.2	0.4	0.0	3.0	15.4	34.9	2.2
112	0.5	0.0	2.1	0.2	0.4	0.0	3.0	15.4	34.9	2.2
112	0.5	0.0	2.1	0.2	0.4	0.0	3.0	15.4	35.0	2.2
112	0.5	0.1	2.2	0.2	0.4	0.0	3.0	15.3	35.0	2.2
113	0.6	0.0	2.3	0.2	0.3	0.0	3.0	16.3	34.7	2.2
113	0.7	0.0	2.5	0.2	0.3	0.0	3.0	16.0	34.8	2.2
113	0.7	0.0	2.5	0.2	0.4	0.0	3.0	16.0	34.8	2.2
113	0.7	0.0	2.6	0.2	0.4	0.0	3.0	16.0	34.8	2.2
113	0.7	0.0	2.6	0.2	0.4	0.0	3.0	16.0	34.8	2.2
116	0.7	0.0	2.6	0.2	0.4	0.0	3.0	16.3	34.9	2.2
117	0.6	0.0	2.1	0.1	0.3	0.0	3.0	16.7	34.6	2.2
117	0.6	0.0	2.1	0.1	0.3	0.0	3.0	16.7	34.6	2.2
118	0.6	0.0	2.1	0.1	0.3	0.0	3.0	16.7	34.6	2.2
121	0.7	0.0	2.4	0.2	0.3	0.0	3.0	16.5	34.8	2.2
121	0.7	0.0	2.4	0.2	0.3	0.0	3.0	16.6	34.8	2.2
122	0.7	0.0	2.3	0.2	0.3	0.0	3.0	16.6	34.9	2.2
125	0.6	0.0	2.1	0.2	0.3	0.0	3.0	16.6	34.8	2.2
138	0.7	0.1	2.8	0.3	0.5	0.0	3.1	16.1	35.3	2.2
139	0.7	0.1	2.8	0.3	0.5	0.0	3.1	16.1	35.2	2.2
157	0.6	0.1	2.7	0.3	0.5	0.0	3.1	12.7	35.4	2.2

Receptor ID	PM2.5 (µg/m³)		PM10 (µg/m³)		TSP (µg/m³)	DD (g/m²/mth)	PM2.5 (µg/m³)	PM10 (µg/m³)	TSP (µg/m³)	DD (g/m²/mth)
	Modification impact						Total impact			
	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									
	25	-	50	-	-	2	8	25	90	4
163	0.6	0.1	2.8	0.3	0.6	0.0	3.2	13.2	35.8	2.2
178	1.1	0.1	5.2	0.6	1.1	0.0	3.3	9.9	36.9	2.2
179	1.4	0.1	6.3	0.7	1.4	0.0	3.3	8.9	37.5	2.2
182	1.7	0.2	8.1	1.1	2.1	0.0	3.5	8.9	38.8	2.3
186	2.4	0.4	11.7	1.9	3.8	0.1	3.7	9.3	41.1	2.3
187	3.0	0.5	15.2	2.6	5.2	0.1	3.9	10.2	43.6	2.4
189	1.5	0.2	7.2	0.9	1.8	0.0	3.4	8.3	38.1	2.3
190	1.6	0.2	7.6	1.0	1.9	0.0	3.5	8.6	38.5	2.3
191	1.7	0.2	8.2	1.1	2.1	0.0	3.5	8.6	38.7	2.3
195	2.1	0.3	10.1	1.6	3.1	0.1	3.6	8.9	40.0	2.3
198	2.9	0.5	14.8	2.7	5.4	0.1	3.9	10.1	43.3	2.4
200	3.8	0.8	20.3	4.4	9.4	0.2	4.2	12.6	47.8	2.5
200	3.7	0.7	19.4	4.1	8.7	0.2	4.2	12.3	46.9	2.5
201	3.0	0.5	15.6	2.9	5.9	0.1	4.0	10.4	44.0	2.4
213	2.3	0.4	13.4	2.2	4.6	0.1	3.7	9.3	41.8	2.3
216	2.6	0.5	14.8	2.5	5.2	0.1	3.8	9.8	42.4	2.3
226	6.2	1.6	37.7	9.0	21.1	0.5	5.4	20.2	62.2	2.8
231	3.4	0.7	21.0	4.2	9.2	0.2	4.4	13.4	48.4	2.5
232	3.4	0.8	21.3	4.4	9.5	0.2	4.4	13.6	48.7	2.5
238	6.4	1.2	38.7	7.2	15.7	0.3	6.0	21.2	62.5	2.7
238	6.3	1.2	38.1	7.0	15.3	0.3	5.9	20.6	61.5	2.7
239	7.1	1.3	41.7	7.7	17.4	0.4	5.8	21.0	62.1	2.7
240	6.6	1.3	39.9	7.4	16.4	0.3	6.1	21.9	63.6	2.7
242	6.8	1.2	41.7	6.8	14.8	0.3	6.1	21.3	62.8	2.7
243	5.1	0.9	30.1	5.2	11.3	0.3	4.6	13.8	50.7	2.6
252	5.9	0.6	35.3	3.8	7.5	0.2	5.9	18.8	58.7	2.8
254	5.8	0.7	34.2	4.2	8.6	0.3	4.9	14.5	51.6	2.6
257	4.0	0.7	24.2	4.0	8.2	0.2	4.2	12.1	47.1	2.5
259	3.9	0.6	23.5	3.7	7.7	0.2	4.2	12.1	46.5	2.4
264	5.1	0.5	29.9	3.2	6.1	0.1	8.0	29.9	84.9	3.4
265	1.5	0.1	9.4	0.7	1.3	0.0	3.2	10.3	37.0	2.3
287	1.6	0.1	10.1	0.8	1.5	0.0	3.3	10.1	37.7	2.3
288	5.2	0.6	30.9	3.4	6.7	0.2	6.0	19.1	60.0	2.9
289	4.3	0.4	25.6	2.7	5.1	0.1	5.8	18.9	62.6	3.0
290	2.6	0.1	15.6	0.4	0.7	0.0	5.5	16.8	44.1	2.5
291	2.6	0.1	15.4	0.4	0.7	0.0	5.5	17.0	43.7	2.5
292	2.4	0.1	14.5	0.3	0.6	0.0	5.4	17.6	42.5	2.4
293	2.4	0.1	14.1	0.3	0.5	0.0	5.3	17.5	41.6	2.4
294	2.1	0.1	12.6	0.3	0.5	0.0	6.1	17.4	40.8	2.4
295	2.2	0.1	12.8	0.3	0.5	0.0	6.1	17.2	40.7	2.4
296	2.3	0.1	13.5	0.3	0.5	0.0	5.2	17.3	40.9	2.4
297	2.3	0.1	14.0	0.3	0.5	0.0	5.4	17.2	42.5	2.4
298	2.3	0.1	13.9	0.3	0.5	0.0	5.6	15.0	44.7	2.5
299	2.3	0.1	14.0	0.3	0.6	0.0	5.7	14.8	45.4	2.5
300	2.4	0.1	14.1	0.3	0.6	0.0	4.6	14.8	46.7	2.6
301	2.3	0.1	13.7	0.3	0.5	0.0	4.5	14.4	45.8	2.6
302	2.3	0.1	13.5	0.3	0.5	0.0	4.4	14.2	45.3	2.5
303	2.2	0.1	13.4	0.3	0.5	0.0	4.5	14.1	45.8	2.6
304	4.7	0.6	28.8	3.2	6.6	0.2	4.2	11.9	46.6	2.5
305	2.8	0.1	16.3	0.4	0.7	0.0	6.3	17.1	42.3	2.4
306	2.4	0.3	14.9	1.8	3.5	0.1	3.7	11.6	41.3	2.3
306a	2.4	0.3	14.5	1.7	3.3	0.1	3.7	11.6	41.1	2.3

Receptor ID	PM2.5 (µg/m³)		PM10 (µg/m³)		TSP (µg/m³)	DD (g/m²/mth)	PM2.5 (µg/m³)	PM10 (µg/m³)	TSP (µg/m³)	DD (g/m²/mth)
	Modification impact						Total impact			
	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									
	25	-	50	-	-	2	8	25	90	4
307	2.5	0.3	15.2	1.9	3.7	0.1	3.8	11.6	41.5	2.3
308	2.7	0.4	16.3	2.2	4.3	0.1	3.8	11.5	42.1	2.4
309	2.7	0.4	16.1	2.1	4.2	0.1	3.8	11.5	41.9	2.4
310	3.9	0.6	24.1	3.7	7.6	0.2	4.2	11.9	46.6	2.5
311	2.4	0.1	14.1	0.3	0.5	0.0	5.3	17.5	41.7	2.4
312	1.0	0.1	4.6	0.3	0.6	0.0	5.0	9.4	38.0	2.3
313	2.7	0.1	15.9	0.4	0.7	0.0	6.2	17.2	42.0	2.4
314	1.5	0.1	6.4	0.7	1.4	0.0	3.3	8.0	37.4	2.2
314a	1.5	0.1	6.3	0.7	1.3	0.0	3.3	8.1	37.4	2.2
383	1.5	0.1	9.9	0.9	1.6	0.0	3.3	9.8	38.1	2.3
384	1.4	0.1	8.6	0.7	1.2	0.0	3.3	9.5	37.7	2.3
385	1.5	0.1	9.2	0.6	1.1	0.0	3.7	9.2	37.9	2.3
386	1.2	0.1	7.7	0.5	1.0	0.0	3.3	9.1	37.2	2.3
386a	1.2	0.1	7.3	0.5	1.0	0.0	3.2	9.1	37.2	2.3
387	1.2	0.1	7.1	0.5	0.9	0.0	3.2	9.1	37.1	2.3
388	1.4	0.1	8.1	0.6	1.0	0.0	3.7	9.2	37.9	2.3
389	1.3	0.1	7.8	0.5	0.9	0.0	3.3	8.9	37.2	2.3
391	1.0	0.1	5.6	0.4	0.7	0.0	3.7	8.6	37.3	2.3
392	1.3	0.1	7.3	0.7	1.2	0.0	6.2	11.7	41.6	2.4
394	1.4	0.1	7.4	0.7	1.2	0.0	6.2	11.8	41.7	2.4
395	1.3	0.1	7.3	0.7	1.2	0.0	6.2	11.5	41.5	2.4
396	1.3	0.1	7.4	0.7	1.2	0.0	6.2	11.9	41.7	2.4
397	1.3	0.1	7.2	0.7	1.2	0.0	6.2	12.0	41.6	2.4
398	1.4	0.1	7.4	0.7	1.2	0.0	6.2	11.7	41.6	2.4
399	1.3	0.1	7.3	0.7	1.2	0.0	6.2	12.0	41.7	2.4
400	1.3	0.1	7.4	0.7	1.2	0.0	6.2	12.0	41.8	2.4
401	1.3	0.1	7.3	0.7	1.2	0.0	6.2	12.1	41.8	2.4
402	1.3	0.1	7.2	0.7	1.2	0.0	6.2	12.1	41.7	2.4
403	1.3	0.1	7.3	0.7	1.2	0.0	6.2	12.0	41.8	2.4
404	1.3	0.1	7.1	0.7	1.2	0.0	6.2	12.2	41.6	2.4
405	1.3	0.1	7.2	0.7	1.2	0.0	6.2	12.2	41.8	2.4
406	1.3	0.1	7.0	0.7	1.2	0.0	6.2	12.2	41.6	2.4
407	1.3	0.1	7.1	0.7	1.2	0.0	6.2	12.4	41.7	2.4
408	1.3	0.1	7.3	0.7	1.2	0.0	6.2	12.4	41.9	2.4
409	1.3	0.1	7.0	0.7	1.2	0.0	6.2	12.5	41.7	2.4
410	1.3	0.1	7.3	0.7	1.2	0.0	6.2	12.6	42.0	2.4
411	1.3	0.1	7.3	0.7	1.2	0.0	6.2	12.5	42.0	2.4
412	1.3	0.1	7.2	0.7	1.2	0.0	6.2	12.6	41.9	2.4
413	1.3	0.1	6.9	0.7	1.2	0.0	6.2	12.5	41.7	2.4
414	1.3	0.1	7.2	0.7	1.2	0.0	6.2	12.6	41.9	2.4
415	1.2	0.1	6.8	0.7	1.1	0.0	6.2	12.5	41.6	2.4
416	1.3	0.1	7.1	0.7	1.2	0.0	6.2	12.7	41.9	2.4
417	1.3	0.1	7.0	0.7	1.2	0.0	6.2	12.7	41.8	2.4
418	1.3	0.1	7.3	0.7	1.2	0.0	6.3	12.7	42.1	2.4
419	1.3	0.1	6.8	0.7	1.1	0.0	6.2	12.6	41.6	2.4
420	1.4	0.1	7.4	0.7	1.2	0.0	6.3	12.8	42.2	2.4
421	1.3	0.1	7.3	0.7	1.2	0.0	6.3	12.8	42.2	2.4
422	1.3	0.1	7.2	0.7	1.2	0.0	6.3	12.8	42.1	2.4
423	1.2	0.1	6.5	0.7	1.1	0.0	6.2	12.5	41.4	2.4
424	1.4	0.1	7.4	0.7	1.2	0.0	6.3	13.0	42.3	2.4
425	1.3	0.1	7.1	0.7	1.2	0.0	6.3	12.9	42.0	2.4
426	1.2	0.1	6.6	0.7	1.1	0.0	6.2	12.6	41.5	2.4

Receptor ID	PM2.5 (µg/m³)		PM10 (µg/m³)		TSP (µg/m³)	DD (g/m²/mth)	PM2.5 (µg/m³)	PM10 (µg/m³)	TSP (µg/m³)	DD (g/m²/mth)
	Modification impact						Total impact			
	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									
	25	-	50	-	-	2	8	25	90	4
427	1.2	0.1	6.6	0.7	1.1	0.0	6.2	12.7	41.6	2.4
428	1.4	0.1	7.5	0.7	1.2	0.0	6.3	13.1	42.5	2.4
429	1.3	0.1	7.1	0.7	1.2	0.0	6.3	13.1	42.2	2.4
430	1.2	0.1	6.4	0.7	1.1	0.0	6.2	12.6	41.4	2.4
431	1.2	0.1	6.7	0.7	1.1	0.0	6.2	12.9	41.7	2.4
432	1.2	0.1	6.4	0.7	1.1	0.0	6.2	12.7	41.5	2.4
433	1.4	0.1	7.5	0.7	1.2	0.0	6.3	13.3	42.6	2.4
434	1.3	0.1	6.8	0.7	1.1	0.0	6.3	13.0	41.9	2.4
435	1.2	0.1	6.5	0.7	1.1	0.0	6.2	12.9	41.6	2.4
436	1.3	0.1	7.3	0.7	1.2	0.0	6.3	13.4	42.5	2.4
437	1.2	0.1	6.6	0.7	1.1	0.0	6.2	13.0	41.7	2.4
438	1.4	0.1	7.4	0.7	1.2	0.0	6.3	13.5	42.7	2.4
439	1.3	0.1	7.2	0.7	1.2	0.0	6.3	13.5	42.5	2.4
440	1.4	0.1	7.5	0.7	1.2	0.0	6.3	13.7	42.8	2.4
441	1.4	0.1	7.4	0.7	1.2	0.0	6.4	13.8	42.9	2.4
442	1.3	0.1	7.3	0.7	1.2	0.0	6.3	13.7	42.7	2.4
443	1.3	0.1	6.8	0.7	1.1	0.0	6.3	13.6	42.2	2.4
444	1.3	0.1	6.9	0.7	1.1	0.0	6.3	13.8	42.4	2.4
445	1.3	0.1	7.1	0.7	1.1	0.0	6.4	14.2	42.8	2.4
446	1.3	0.1	7.1	0.7	1.2	0.0	6.4	14.6	43.1	2.4
447	1.3	0.1	6.9	0.7	1.1	0.0	6.4	14.7	43.0	2.4
448	1.3	0.1	8.4	0.7	1.1	0.0	6.4	15.0	43.2	2.4
449	1.4	0.1	8.9	0.7	1.1	0.0	6.4	15.1	43.2	2.4
450	1.4	0.1	9.2	0.7	1.1	0.0	6.4	15.6	43.2	2.4
451	1.4	0.1	9.2	0.7	1.1	0.0	6.4	15.6	43.2	2.4
452	1.5	0.1	9.2	0.7	1.1	0.0	6.4	15.7	43.2	2.4
453	1.5	0.1	9.2	0.7	1.1	0.0	6.4	15.8	43.1	2.4
454	1.6	0.1	10.4	0.7	1.1	0.0	6.5	16.5	44.1	2.4
455	1.6	0.1	10.4	0.7	1.1	0.0	6.5	16.6	44.0	2.4
456	1.6	0.1	10.2	0.6	1.1	0.0	6.5	16.7	43.8	2.4
457	1.7	0.1	10.6	0.7	1.1	0.0	6.5	16.8	44.2	2.4
458	1.6	0.1	10.4	0.7	1.1	0.0	6.5	16.7	43.9	2.4
459	1.6	0.1	10.2	0.6	1.1	0.0	6.5	16.7	43.7	2.4
457a	1.6	0.1	10.5	0.7	1.1	0.0	6.5	16.8	44.1	2.4
460	1.6	0.1	10.3	0.6	1.1	0.0	6.5	16.8	43.8	2.4
461	1.6	0.1	10.1	0.6	1.0	0.0	6.4	16.7	43.6	2.4
462	1.6	0.1	10.4	0.6	1.1	0.0	6.5	16.8	43.9	2.4
463	1.6	0.1	10.5	0.7	1.1	0.0	6.5	16.9	44.1	2.4
463a	1.6	0.1	10.5	0.7	1.1	0.0	6.5	16.9	44.0	2.4
464	1.7	0.1	10.6	0.7	1.1	0.0	6.5	17.0	44.2	2.4
465	1.7	0.1	10.8	0.7	1.1	0.0	6.5	17.0	44.3	2.4
463b	1.6	0.1	10.5	0.6	1.1	0.0	6.5	16.9	44.0	2.4
466	0.6	0.1	2.8	0.3	0.6	0.0	3.1	12.8	35.6	2.2
467	0.6	0.1	2.8	0.3	0.6	0.0	3.1	12.5	35.5	2.2
470	1.1	0.1	4.8	0.5	0.9	0.0	3.2	9.8	36.5	2.2
471	1.1	0.1	4.8	0.5	0.9	0.0	3.2	9.8	36.5	2.2
179a	1.4	0.1	6.4	0.7	1.4	0.0	3.3	9.0	37.5	2.2
179b	1.4	0.1	6.3	0.7	1.4	0.0	3.3	9.0	37.5	2.2
179c	1.4	0.1	6.3	0.7	1.4	0.0	3.3	8.9	37.4	2.2
213a	2.4	0.5	13.8	2.6	5.4	0.1	3.8	10.0	42.9	2.4
213b	2.3	0.4	13.7	2.4	4.8	0.1	3.8	9.5	42.1	2.3
213c	2.4	0.4	13.9	2.4	4.8	0.1	3.8	9.5	42.0	2.3

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)
	Modification impact						Total impact			
	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									
	25	-	50	-	-	2	8	25	90	4
218a	3.2	0.7	19.9	4.1	8.9	0.2	4.4	13.2	47.9	2.4
218b	2.9	0.7	18.2	3.8	8.1	0.2	4.3	12.6	46.9	2.4
218c	2.5	0.6	14.7	3.1	6.5	0.1	4.0	11.3	44.6	2.4
233a	6.4	1.2	38.6	7.2	16.5	0.5	5.1	16.9	56.8	2.7
233b	5.9	1.2	35.8	7.1	16.3	0.4	5.1	17.1	56.8	2.7
242a	5.9	1.1	36.3	6.2	13.3	0.3	5.7	19.1	59.1	2.7
242b	6.9	1.2	42.0	6.9	14.9	0.3	6.1	21.4	63.0	2.7
IR.1	1.3	0.1	7.7	0.7	1.1	0.0	6.4	15.1	43.0	2.4
IR.10	1.2	0.1	6.8	0.7	1.1	0.0	6.3	13.5	42.1	2.4
IR.11	1.2	0.1	6.7	0.7	1.1	0.0	6.3	13.3	42.0	2.4
IR.12	1.2	0.1	6.7	0.7	1.1	0.0	6.3	13.2	41.9	2.4
IR.13	1.2	0.1	6.6	0.7	1.1	0.0	6.2	13.1	41.8	2.4
IR.14	1.2	0.1	6.8	0.7	1.1	0.0	6.2	13.0	41.8	2.4
IR.15	1.3	0.1	6.9	0.7	1.1	0.0	6.3	13.1	42.0	2.4
IR.16	1.3	0.1	6.9	0.7	1.1	0.0	6.3	13.2	42.0	2.4
IR.17	1.3	0.1	6.9	0.7	1.1	0.0	6.3	13.3	42.1	2.4
IR.18	1.3	0.1	7.0	0.7	1.1	0.0	6.3	13.4	42.2	2.4
IR.19	1.3	0.1	7.1	0.7	1.1	0.0	6.3	13.5	42.4	2.4
IR.2	1.3	0.1	7.3	0.7	1.1	0.0	6.4	15.0	43.0	2.4
IR.20	1.3	0.1	7.1	0.7	1.2	0.0	6.3	13.8	42.6	2.4
IR.21	1.3	0.1	7.1	0.7	1.2	0.0	6.3	14.1	42.7	2.4
IR.22	1.3	0.1	7.1	0.7	1.2	0.0	6.4	14.7	43.2	2.4
IR.23	1.3	0.1	7.4	0.7	1.2	0.0	6.4	14.8	43.2	2.4
IR.24	1.3	0.1	7.7	0.7	1.2	0.0	6.4	14.8	43.2	2.4
IR.3	1.3	0.1	7.1	0.7	1.1	0.0	6.4	14.9	43.0	2.4
IR.4	1.3	0.1	6.9	0.7	1.1	0.0	6.4	14.5	42.8	2.4
IR.5	1.3	0.1	6.9	0.7	1.1	0.0	6.3	14.4	42.7	2.4
IR.6	1.3	0.1	6.9	0.7	1.1	0.0	6.3	14.2	42.6	2.4
IR.7	1.3	0.1	6.9	0.7	1.1	0.0	6.3	14.1	42.5	2.4
IR.8	1.3	0.1	6.9	0.7	1.1	0.0	6.3	13.9	42.5	2.4
IR.9	1.3	0.1	6.9	0.7	1.1	0.0	6.3	13.7	42.3	2.4
IR.100	1.3	0.1	7.2	0.7	1.2	0.0	6.3	12.8	42.0	2.4
IR.109	1.3	0.1	7.3	0.7	1.2	0.0	6.2	12.3	41.9	2.4
IR.111	1.3	0.1	7.4	0.7	1.2	0.0	6.2	11.9	41.7	2.4
IR.116	1.3	0.1	7.2	0.7	1.2	0.0	6.2	12.3	41.7	2.4
IR.122	1.2	0.1	6.7	0.7	1.1	0.0	6.2	12.5	41.5	2.4
IR.125	1.3	0.1	6.9	0.7	1.1	0.0	6.2	12.4	41.6	2.4
IR.126	1.3	0.1	7.0	0.7	1.2	0.0	6.2	12.3	41.6	2.4
IR.145	1.3	0.1	7.3	0.7	1.2	0.0	6.2	11.7	41.6	2.4
IR.148	1.3	0.1	7.3	0.7	1.2	0.0	6.2	11.8	41.7	2.4
IR.156	1.3	0.1	7.3	0.7	1.2	0.0	6.2	12.3	41.9	2.4
IR.158	1.4	0.1	7.4	0.7	1.2	0.0	6.3	12.8	42.3	2.4
IR.160	1.3	0.1	7.3	0.7	1.2	0.0	6.2	12.5	42.1	2.4
IR.161	1.4	0.1	7.4	0.7	1.2	0.0	6.3	12.9	42.3	2.4
IR.28	1.2	0.1	6.7	0.7	1.1	0.0	6.3	13.4	42.0	2.4
IR.29	1.2	0.1	6.7	0.7	1.1	0.0	6.3	13.2	41.8	2.4
IR.36	1.2	0.1	6.7	0.7	1.1	0.0	6.2	12.8	41.7	2.4
IR.90	1.4	0.1	7.4	0.7	1.2	0.0	6.3	13.4	42.6	2.4
IR.137	1.4	0.1	7.4	0.7	1.3	0.0	6.2	11.5	41.5	2.4
IR.136	1.4	0.1	7.5	0.7	1.3	0.0	6.2	11.6	41.6	2.4
IR.139	1.4	0.1	7.5	0.7	1.3	0.0	6.2	11.4	41.6	2.4
IR.141	1.4	0.1	7.5	0.7	1.3	0.0	6.2	11.4	41.5	2.4

Receptor ID	PM2.5 (µg/m³)		PM10 (µg/m³)		TSP (µg/m³)	DD (g/m²/mth)	PM2.5 (µg/m³)	PM10 (µg/m³)	TSP (µg/m³)	DD (g/m²/mth)
	Modification impact						Total impact			
	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									
	25	-	50	-	-	2	8	25	90	4
IR.135	1.4	0.1	7.4	0.7	1.2	0.0	6.2	11.6	41.6	2.4
IR.140	1.3	0.1	7.4	0.7	1.2	0.0	6.2	11.5	41.5	2.4
IR.142	1.3	0.1	7.4	0.7	1.2	0.0	6.2	11.4	41.5	2.4
IR.143	1.3	0.1	7.4	0.7	1.2	0.0	6.2	11.6	41.6	2.4
IR.112	1.3	0.1	7.4	0.7	1.2	0.0	6.2	11.8	41.7	2.4
IR.144	1.3	0.1	7.3	0.7	1.2	0.0	6.2	11.8	41.7	2.4
IR.149	1.3	0.1	7.3	0.7	1.2	0.0	6.2	12.0	41.8	2.4
IR.110	1.3	0.1	7.3	0.7	1.2	0.0	6.2	12.1	41.8	2.4
IR.151	1.3	0.1	7.3	0.7	1.2	0.0	6.2	12.3	41.9	2.4
IR.155	1.3	0.1	7.3	0.7	1.2	0.0	6.2	12.3	41.9	2.4
IR.154	1.3	0.1	7.3	0.7	1.2	0.0	6.3	12.6	42.1	2.4
IR.159	1.3	0.1	7.3	0.7	1.2	0.0	6.2	12.5	42.1	2.4
IR.102	1.3	0.1	7.0	0.7	1.2	0.0	6.3	12.8	41.9	2.4
IR.93	1.3	0.1	7.3	0.7	1.2	0.0	6.3	13.0	42.3	2.4
IR.162	1.4	0.1	7.4	0.7	1.2	0.0	6.3	12.9	42.3	2.4
IR.98	1.3	0.1	7.2	0.7	1.2	0.0	6.3	13.1	42.2	2.4
IR.163	1.3	0.1	7.7	0.7	1.2	0.0	6.3	12.8	42.3	2.4
IR.165	1.3	0.1	8.2	0.7	1.2	0.0	6.3	12.8	42.3	2.4
IR.166	1.4	0.1	8.4	0.7	1.2	0.0	6.3	12.8	42.3	2.4
IR.32	1.2	0.1	6.5	0.7	1.1	0.0	6.2	12.8	41.5	2.4
IR.83	1.4	0.1	7.4	0.7	1.2	0.0	6.3	13.2	42.5	2.4
IR.167	1.4	0.1	8.7	0.7	1.2	0.0	6.3	12.9	42.4	2.4
IR.82	1.4	0.1	7.7	0.7	1.2	0.0	6.3	13.2	42.5	2.4
IR.168	1.4	0.1	9.0	0.7	1.2	0.0	6.3	13.0	42.4	2.4
IR.72	1.3	0.1	8.2	0.7	1.2	0.0	6.3	13.1	42.4	2.4
IR.71	1.4	0.1	8.5	0.7	1.2	0.0	6.3	13.2	42.5	2.4
IR.81	1.4	0.1	7.6	0.7	1.2	0.0	6.3	13.6	42.7	2.4
IR.80	1.4	0.1	7.4	0.7	1.2	0.0	6.3	13.8	42.9	2.4
IR.70	1.4	0.1	8.8	0.7	1.2	0.0	6.3	13.4	42.6	2.4
IR.73	1.3	0.1	8.0	0.7	1.2	0.0	6.3	13.7	42.8	2.4
IR.79	1.4	0.1	7.4	0.7	1.2	0.0	6.4	13.9	42.9	2.4
IR.74	1.4	0.1	7.8	0.7	1.2	0.0	6.3	13.9	42.9	2.4
IR.69	1.4	0.1	9.0	0.7	1.2	0.0	6.3	13.5	42.6	2.4
IR.171	1.5	0.1	9.4	0.7	1.2	0.0	6.3	13.4	42.5	2.4
IR.78	1.4	0.1	7.4	0.7	1.2	0.0	6.4	14.1	43.0	2.4
IR.75	1.4	0.1	7.7	0.7	1.2	0.0	6.4	14.1	43.0	2.4
IR.68	1.5	0.1	9.3	0.7	1.2	0.0	6.3	13.7	42.7	2.4
IR.172	1.5	0.1	9.6	0.7	1.2	0.0	6.3	13.5	42.5	2.4
IR.77	1.3	0.1	7.3	0.7	1.2	0.0	6.4	14.3	43.1	2.4
IR.76	1.3	0.1	7.6	0.7	1.2	0.0	6.4	14.3	43.1	2.4
IR.67	1.4	0.1	9.1	0.7	1.2	0.0	6.3	13.9	42.8	2.4
IR.66	1.4	0.1	8.9	0.7	1.2	0.0	6.3	14.2	42.9	2.4
IR.58	1.5	0.1	9.6	0.7	1.2	0.0	6.3	13.9	42.7	2.4
IR.65	1.4	0.1	8.6	0.7	1.2	0.0	6.4	14.4	43.1	2.4
IR.64	1.3	0.1	8.2	0.7	1.2	0.0	6.4	14.5	43.2	2.4
IR.59	1.5	0.1	9.3	0.7	1.2	0.0	6.3	14.2	42.9	2.4
IR.174	1.6	0.1	10.1	0.7	1.2	0.0	6.3	13.6	42.5	2.4
IR.57	1.5	0.1	9.5	0.7	1.2	0.0	6.3	14.3	42.8	2.4
IR.60	1.4	0.1	9.1	0.7	1.2	0.0	6.4	14.5	43.1	2.4
IR.63	1.3	0.1	8.5	0.7	1.2	0.0	6.4	14.7	43.2	2.4
IR.175	1.6	0.1	10.3	0.7	1.2	0.0	6.3	13.7	42.6	2.4
IR.56	1.5	0.1	9.9	0.7	1.2	0.0	6.3	13.9	42.6	2.4

Receptor ID	PM2.5 (µg/m³)		PM10 (µg/m³)		TSP (µg/m³)	DD (g/m²/mth)	PM2.5 (µg/m³)	PM10 (µg/m³)	TSP (µg/m³)	DD (g/m²/mth)
	Modification impact						Total impact			
	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									
	25	-	50	-	-	2	8	25	90	4
IR.61	1.4	0.1	8.9	0.7	1.2	0.0	6.4	14.7	43.1	2.4
IR.55	1.5	0.1	9.8	0.7	1.2	0.0	6.3	14.2	42.7	2.4
IR.62	1.4	0.1	8.8	0.7	1.2	0.0	6.4	14.7	43.2	2.4
IR.176	1.6	0.1	10.4	0.7	1.2	0.0	6.3	13.8	42.7	2.4
IR.54	1.5	0.1	9.7	0.7	1.2	0.0	6.3	14.5	42.9	2.4
IR.177	1.6	0.1	10.5	0.7	1.2	0.0	6.3	13.9	42.8	2.4
IR.46	1.6	0.1	10.2	0.7	1.2	0.0	6.3	14.1	42.8	2.4
IR.53	1.5	0.1	9.5	0.7	1.2	0.0	6.3	14.7	43.0	2.4
IR.47	1.6	0.1	10.0	0.7	1.2	0.0	6.3	14.4	42.8	2.4
IR.178	1.6	0.1	10.6	0.7	1.2	0.0	6.3	14.1	43.0	2.4
IR.52	1.5	0.1	9.4	0.7	1.2	0.0	6.4	14.9	43.1	2.4
IR.48	1.5	0.1	9.9	0.7	1.2	0.0	6.3	14.7	43.0	2.4
IR.44	1.6	0.1	10.4	0.7	1.2	0.0	6.3	14.4	43.0	2.4
IR.51	1.5	0.1	9.5	0.7	1.2	0.0	6.4	15.0	43.1	2.4
IR.179	1.7	0.1	10.6	0.7	1.2	0.0	6.3	14.3	43.1	2.4
IR.45	1.6	0.1	10.2	0.7	1.2	0.0	6.4	14.7	43.1	2.4
IR.50	1.5	0.1	9.7	0.7	1.2	0.0	6.4	15.1	43.2	2.4
IR.49	1.5	0.1	9.9	0.7	1.2	0.0	6.4	15.0	43.1	2.4
IR.180	1.6	0.1	10.6	0.7	1.2	0.0	6.4	14.7	43.3	2.4
IR.43	1.6	0.1	10.4	0.7	1.2	0.0	6.4	14.8	43.2	2.4
Mine-owned receptors										
8	3.2	0.3	20.1	1.7	3.1	0.1	6.0	10.0	49.7	2.6
11	2.9	0.2	18.3	1.1	1.9	0.0	5.7	11.4	46.6	2.5
31	2.8	0.1	17.3	0.8	1.5	0.0	5.9	13.8	47.9	2.5
90	2.0	0.2	11.9	1.0	1.7	0.1	4.0	10.0	40.7	2.4
196	2.2	0.4	11.3	2.0	3.9	0.1	3.7	9.3	41.0	2.3
197	2.3	0.4	11.7	2.0	3.9	0.1	3.7	9.4	41.2	2.3
204	4.0	0.8	22.2	4.4	9.2	0.2	4.3	11.9	48.4	2.5
205	3.8	0.7	20.2	4.0	8.2	0.2	4.3	11.4	47.4	2.5
206	4.6	0.9	25.3	5.4	11.7	0.3	4.6	13.0	51.5	2.6
206	4.5	0.9	24.7	5.2	11.2	0.3	4.5	12.9	50.9	2.6
207	4.6	1.0	25.7	5.5	11.9	0.3	4.6	12.9	51.8	2.6
208	5.6	1.4	30.9	8.1	18.7	0.5	5.2	15.9	60.0	2.8
209	5.5	1.1	29.9	6.2	13.5	0.4	4.8	13.2	54.1	2.6
210	10.5	2.6	61.3	14.8	36.3	1.1	6.6	23.1	80.0	3.4
211	8.4	1.7	45.8	10.0	22.8	0.7	5.6	16.8	64.9	3.0
235	5.6	0.9	34.3	5.5	12.3	0.4	4.4	13.1	50.4	2.6
236	5.6	0.9	34.0	5.5	12.1	0.4	4.4	13.2	50.4	2.6
241	7.3	1.3	44.8	7.5	16.5	0.3	6.4	23.5	66.3	2.7
250	7.4	0.9	43.4	5.3	10.9	0.2	6.3	21.4	62.6	2.7
315	14.7	3.4	84.8	19.1	47.3	1.2	8.0	31.7	97.9	3.6
315a	14.4	3.3	83.3	18.5	45.9	1.1	7.9	31.4	96.6	3.5
316	3.7	0.2	22.6	1.3	2.4	0.0	7.4	24.3	73.3	2.9
317	2.7	0.1	15.7	0.4	0.8	0.0	6.3	17.5	42.4	2.4
318	3.1	0.1	18.2	0.8	1.4	0.0	5.1	14.8	52.5	2.6
319	13.8	3.3	79.4	18.7	45.9	1.1	8.3	33.2	100.3	3.5
320	12.3	2.5	71.2	14.4	34.7	0.8	7.9	32.3	89.9	3.2
320a	12.3	2.5	71.4	14.4	34.6	0.8	7.8	32.1	89.0	3.2
320b	11.9	2.4	68.8	13.8	33.1	0.7	7.8	32.0	88.2	3.2
320c	11.5	2.3	66.7	13.4	32.0	0.7	7.8	31.9	87.6	3.1
321	8.0	1.4	48.8	8.1	17.7	0.4	6.9	26.0	70.6	2.7
322	3.8	0.3	23.7	1.6	3.0	0.1	6.2	12.1	52.1	2.6

Receptor ID	PM2.5 (µg/m³)		PM10 (µg/m³)		TSP (µg/m³)	DD (g/m²/mth)	PM2.5 (µg/m³)	PM10 (µg/m³)	TSP (µg/m³)	DD (g/m²/mth)
	Modification impact						Total impact			
	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									
	25	-	50	-	-	2	8	25	90	4
323	3.8	0.3	23.6	1.5	2.9	0.0	6.2	12.2	51.9	2.6
324	3.7	0.2	23.1	1.4	2.6	0.0	6.2	12.2	51.3	2.6
325	3.8	0.3	23.8	1.5	2.8	0.0	6.2	12.4	52.0	2.6
326	3.6	0.2	22.7	1.4	2.6	0.0	6.2	12.2	51.0	2.6
327	3.5	0.2	22.0	1.3	2.4	0.0	6.1	12.3	50.6	2.6
328	3.3	0.2	20.7	1.2	2.2	0.0	6.1	12.3	49.9	2.6
329	3.8	0.3	23.0	1.9	3.6	0.1	7.7	19.1	65.0	2.8
330	3.0	0.2	18.4	0.9	1.7	0.0	6.0	13.5	49.4	2.6
316a	3.6	0.2	22.1	1.3	2.4	0.0	7.5	24.9	74.7	2.9
331	3.2	0.2	20.2	1.2	2.1	0.0	6.0	12.3	49.7	2.6
332	12.3	2.5	71.2	14.3	34.4	0.8	7.8	31.7	88.0	3.2
332a	12.3	2.5	71.1	14.2	34.2	0.8	7.8	31.9	88.4	3.2
333	1.6	0.2	7.1	0.9	1.7	0.0	3.4	7.8	37.9	2.3
333a	1.6	0.2	7.1	0.9	1.7	0.0	3.4	7.7	37.9	2.3
334	1.7	0.3	10.0	1.4	2.7	0.1	3.5	7.3	39.4	2.3
335	3.2	0.7	19.5	3.8	8.4	0.2	4.0	10.5	45.8	2.4
336	3.9	0.6	23.9	3.5	7.3	0.2	4.1	11.6	45.3	2.4
337	3.6	0.5	21.7	2.9	6.0	0.1	4.0	11.8	43.9	2.4
336a	3.9	0.6	23.7	3.5	7.2	0.2	4.1	11.6	45.2	2.4
338	2.2	0.4	13.8	2.4	5.0	0.1	3.8	8.7	42.7	2.4
339	2.5	0.5	15.5	2.7	5.7	0.1	4.0	9.5	44.0	2.4
340	2.3	0.1	14.0	0.3	0.6	0.0	5.6	15.3	44.4	2.5
341	2.7	0.1	15.9	0.4	0.7	0.0	5.5	16.9	43.7	2.5
342	2.4	0.1	14.1	0.3	0.5	0.0	5.3	17.5	41.6	2.4
343	2.4	0.1	14.2	0.3	0.6	0.0	5.3	17.5	41.9	2.4
344	2.2	0.1	13.1	0.3	0.5	0.0	5.5	14.0	44.0	2.5
345	2.9	0.1	17.3	0.7	1.3	0.0	5.8	14.6	47.4	2.5
346	2.9	0.1	17.4	0.7	1.2	0.0	6.1	14.9	49.7	2.6
347	2.8	0.1	16.4	0.5	0.8	0.0	5.7	16.2	45.5	2.5
348	2.6	0.1	15.5	0.4	0.7	0.0	5.5	16.8	44.0	2.5
349	2.6	0.1	15.5	0.4	0.7	0.0	5.5	16.9	44.0	2.5
350	2.6	0.1	15.5	0.4	0.7	0.0	5.5	16.9	43.9	2.5
351	2.6	0.1	15.4	0.4	0.7	0.0	5.5	16.9	43.9	2.5
352	2.4	0.1	14.2	0.3	0.6	0.0	5.5	16.7	43.3	2.5
353	2.3	0.1	14.0	0.3	0.6	0.0	5.5	15.7	44.1	2.5
354	2.3	0.1	14.0	0.3	0.6	0.0	5.6	15.1	44.9	2.5
355	2.3	0.1	13.9	0.3	0.5	0.0	5.6	15.1	44.6	2.5
356	2.7	0.1	15.9	0.5	0.8	0.0	5.7	16.1	45.8	2.5
357	2.7	0.1	16.3	0.5	0.9	0.0	5.7	15.8	46.0	2.5
358	3.8	0.3	23.6	1.8	3.3	0.1	6.2	11.6	51.9	2.6
359	3.8	0.3	23.6	1.7	3.3	0.1	6.2	11.8	52.0	2.6
360	3.8	0.3	23.7	1.7	3.2	0.1	6.2	12.0	52.1	2.6
361	3.6	0.6	19.1	3.4	7.0	0.2	4.2	10.9	46.1	2.4
361a	3.9	0.7	20.7	3.9	8.0	0.2	4.3	11.4	47.5	2.4
362	22.2	6.1	117.7	34.6	89.0	2.6	10.2	41.7	133.7	5.0
363	15.5	4.1	89.0	23.8	60.5	1.8	8.3	32.0	106.4	4.1
364	8.8	1.9	50.7	10.5	21.8	0.7	7.6	28.0	89.6	3.4
365	5.3	1.3	32.6	7.9	15.6	0.4	6.8	21.1	74.7	3.1
366	7.6	1.5	46.3	8.7	20.2	0.4	5.6	20.4	62.4	2.7
367	7.8	1.5	47.4	8.7	20.2	0.4	5.7	20.6	62.6	2.7
368	3.9	0.5	24.6	2.8	5.2	0.1	6.3	10.9	53.4	2.6
369	3.8	0.4	24.3	2.6	4.8	0.1	6.3	10.8	52.9	2.6

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)
	Modification impact						Total impact			
	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									
	25	-	50	-	-	2	8	25	90	4
370	3.9	0.4	24.4	2.6	4.9	0.1	6.3	10.8	53.0	2.6
371	2.5	0.5	12.5	2.5	4.6	0.1	4.0	10.2	43.3	2.3
372	2.1	0.3	10.3	1.6	3.0	0.1	3.8	9.8	41.0	2.3
361b	2.7	0.4	13.8	2.3	4.3	0.1	4.0	10.1	43.0	2.3
373	5.3	0.9	28.2	5.2	10.9	0.3	4.6	11.7	50.9	2.5
373a	5.4	1.0	28.8	5.3	11.2	0.3	4.6	12.0	51.4	2.5
374	3.5	0.6	18.6	3.6	7.6	0.2	4.1	11.6	45.6	2.4
375	2.9	0.4	17.1	2.3	4.6	0.1	3.8	11.6	42.3	2.4
376	1.9	0.3	10.4	1.4	2.7	0.1	3.5	7.8	39.5	2.3
376a	2.0	0.3	10.7	1.4	2.8	0.1	3.6	7.9	39.6	2.3
377	3.8	0.6	23.2	3.6	7.4	0.2	4.1	11.8	45.7	2.4
378	3.5	0.5	21.2	3.0	6.0	0.1	4.0	11.7	43.9	2.4
376b	2.0	0.3	10.5	1.4	2.8	0.1	3.5	7.8	39.5	2.3
379	2.5	0.2	15.0	1.2	2.2	0.1	4.1	10.9	42.9	2.4
380	2.3	0.2	14.1	1.0	1.9	0.1	3.4	9.7	39.3	2.3
381	1.6	0.2	7.6	1.0	1.7	0.0	3.3	12.2	37.5	2.2
381a	1.7	0.2	8.4	1.0	1.8	0.0	3.3	12.2	37.9	2.3
381b	1.7	0.2	8.1	1.0	1.8	0.0	3.3	12.1	37.7	2.3
381c	1.7	0.2	8.4	1.0	1.8	0.0	3.4	12.2	37.9	2.3
382	2.5	0.3	15.6	1.5	2.9	0.1	3.5	10.9	40.6	2.4
390	1.1	0.1	6.3	0.5	0.8	0.0	3.7	9.0	37.7	2.3
358a	3.8	0.3	23.6	1.8	3.4	0.1	6.2	11.6	51.9	2.6
393	7.6	1.6	43.5	9.3	18.7	0.6	7.4	27.4	87.4	3.3
468	0.8	0.1	3.3	0.3	0.6	0.0	3.1	11.1	35.6	2.2
468a	0.8	0.1	3.4	0.3	0.6	0.0	3.1	11.2	35.8	2.2
468b	0.8	0.1	3.4	0.3	0.7	0.0	3.1	11.2	35.8	2.2
469	0.8	0.1	3.7	0.4	0.7	0.0	3.1	10.4	35.7	2.2
472	1.2	0.1	5.3	0.6	1.1	0.0	3.2	9.5	36.8	2.2
473	1.2	0.1	5.0	0.5	1.0	0.0	3.2	9.1	36.6	2.2
474	1.4	0.1	5.8	0.6	1.1	0.0	3.3	8.4	36.9	2.2
203a	3.7	0.7	19.5	3.8	7.9	0.2	4.2	11.3	47.0	2.4
49b	3.4	0.3	21.9	2.0	3.6	0.1	6.2	10.8	51.3	2.6
49b	3.3	0.3	21.4	1.7	2.9	0.0	6.1	10.7	49.9	2.5
49b	3.3	0.3	21.7	1.8	3.2	0.1	6.2	10.8	50.8	2.5

Note: DD = dust deposition.

Appendix E

Isopleth Diagrams

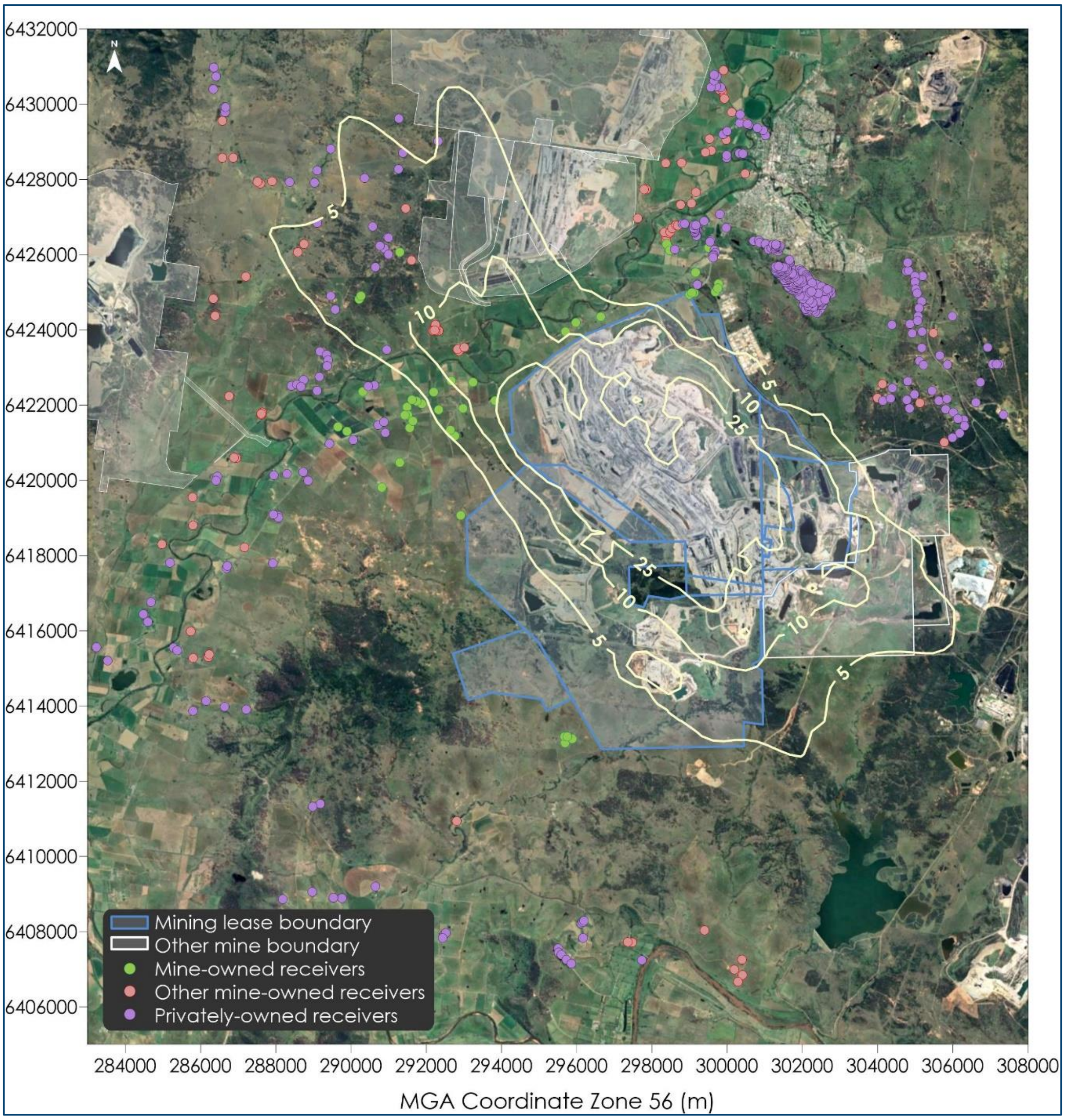

Figure E-1: Predicted maximum 24-hour average $PM_{2.5}$ concentrations due to emissions from the Modification (µg/m³)

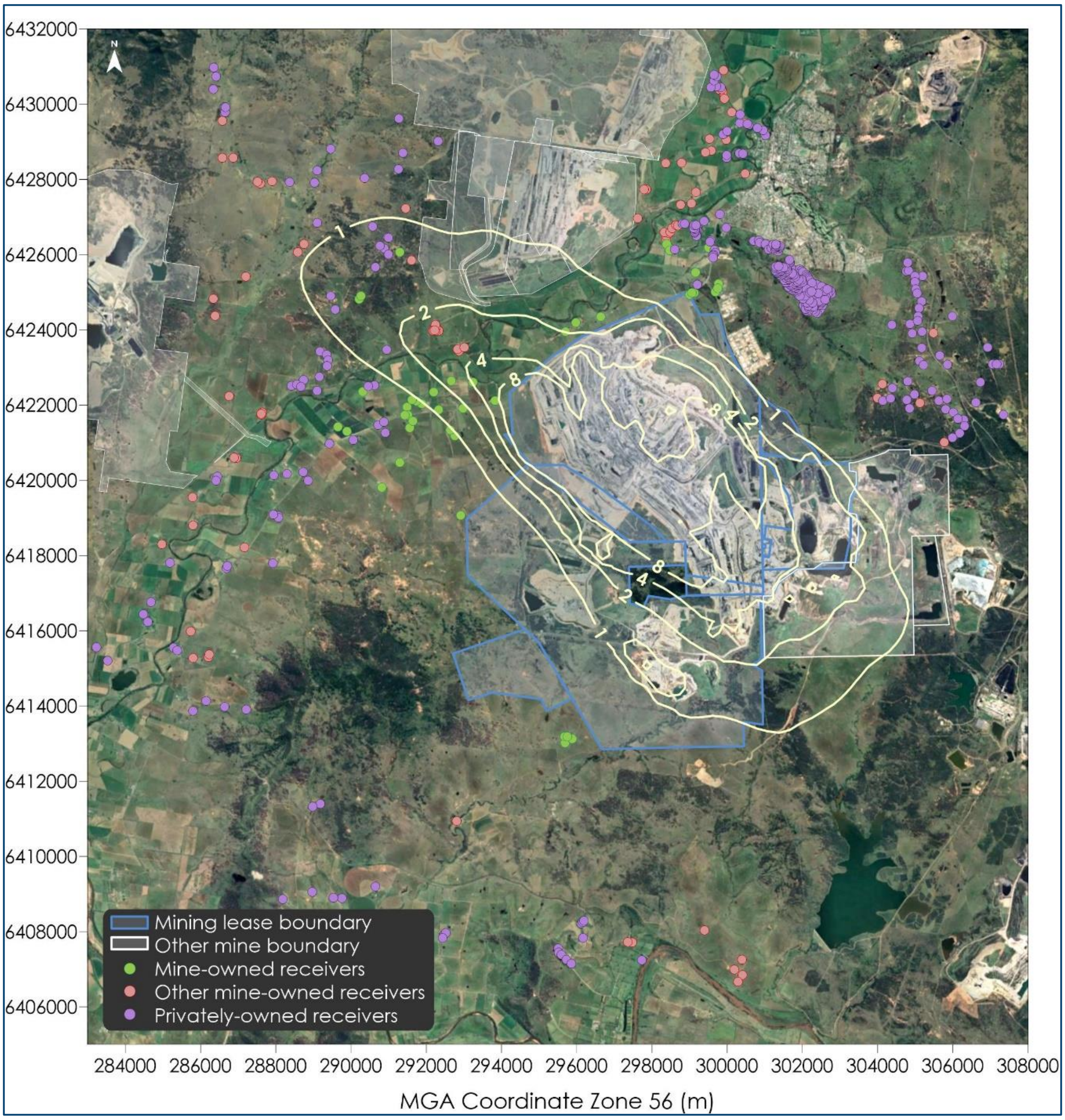

Figure E-2: Predicted annual average $PM_{2.5}$ concentrations due to emissions from the Modification (µg/m³)

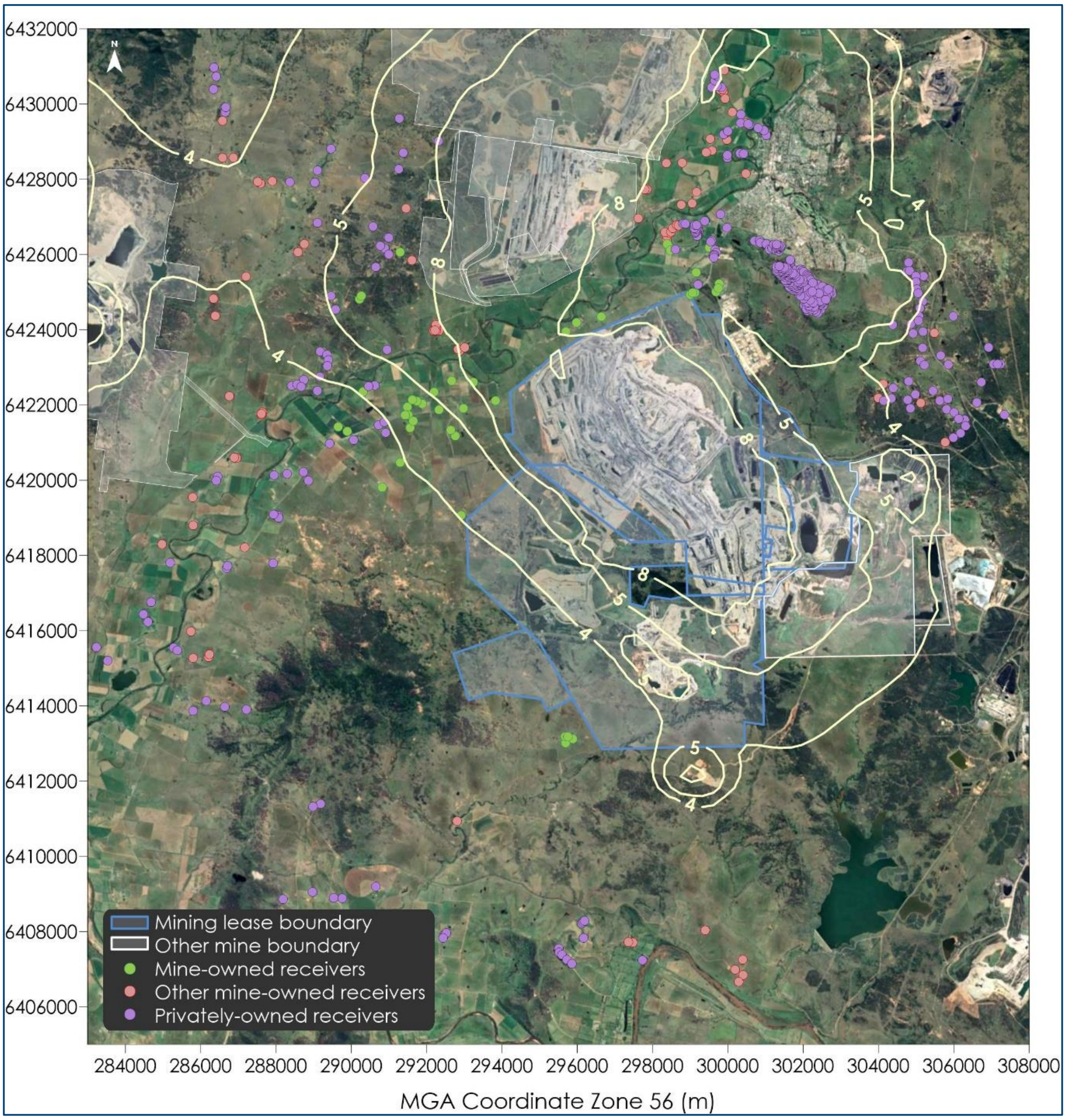

Figure E-3: Predicted annual average $PM_{2.5}$ concentrations due to emissions from the Modification and other sources (µg/m³)

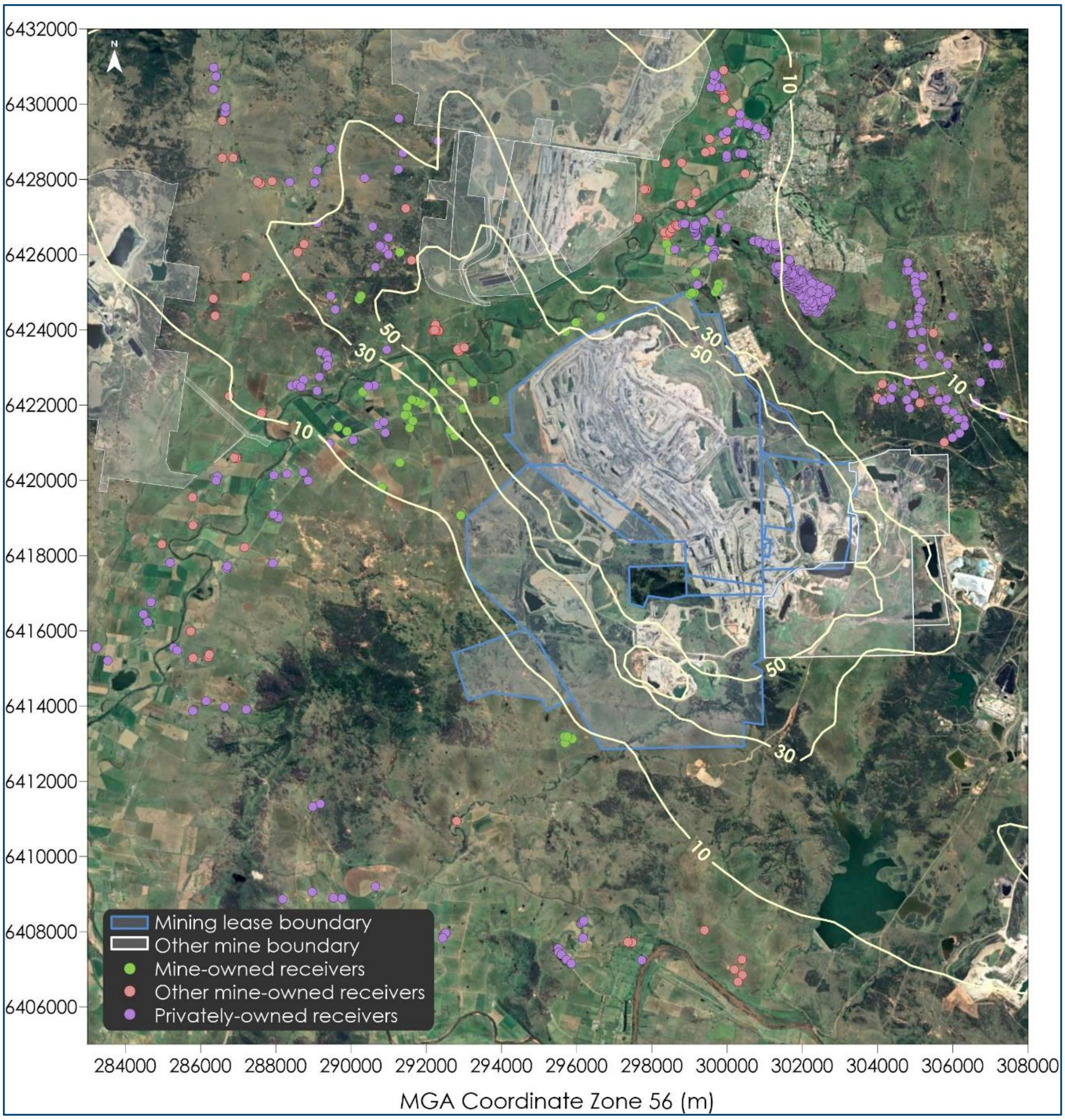

Figure E-4: Predicted maximum 24-hour average PM_{10} concentrations due to emissions from the Modification (µg/m³)

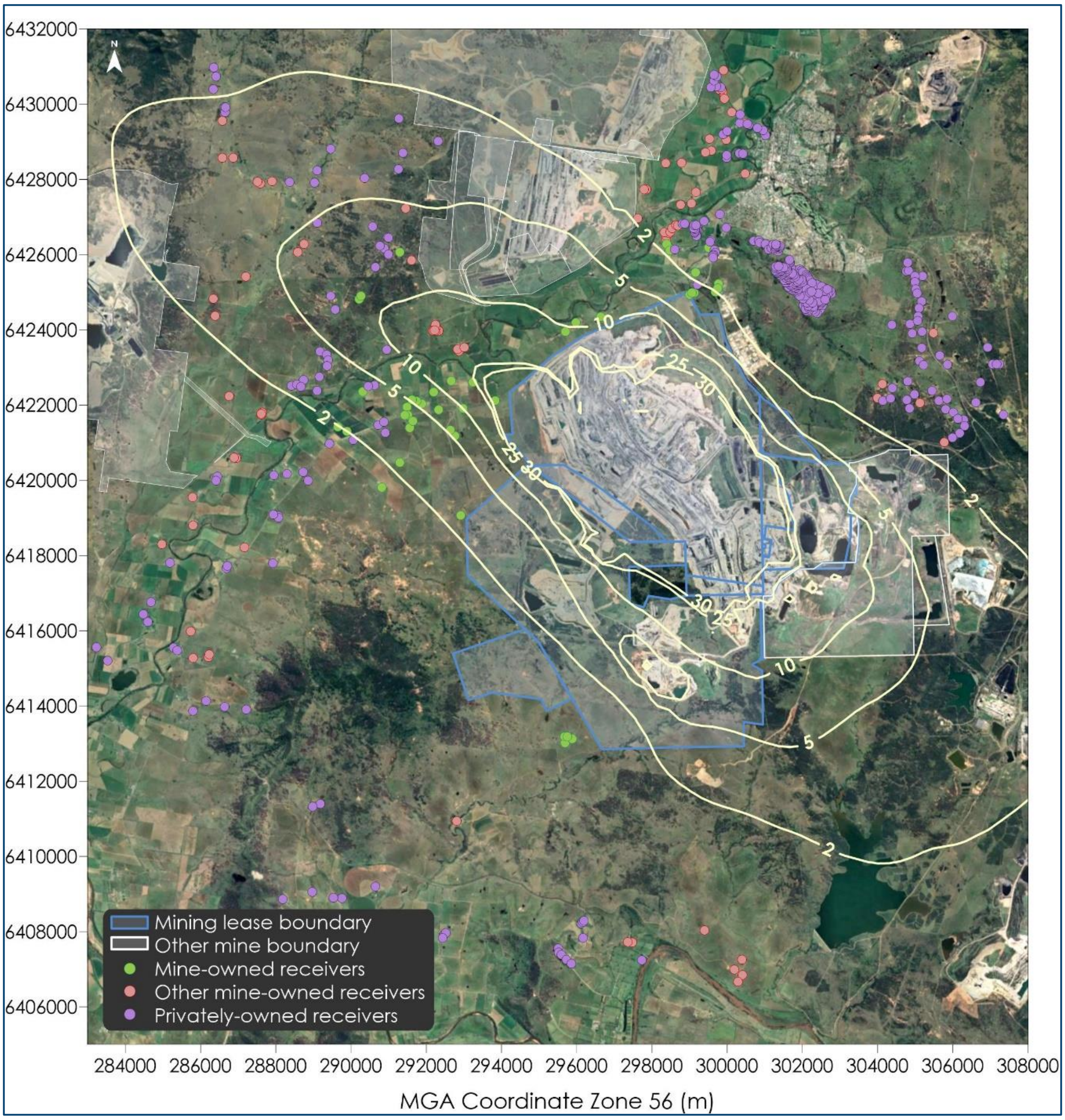

Figure E-5: Predicted annual average PM_{10} concentrations due to emissions from the Modification (µg/m³)

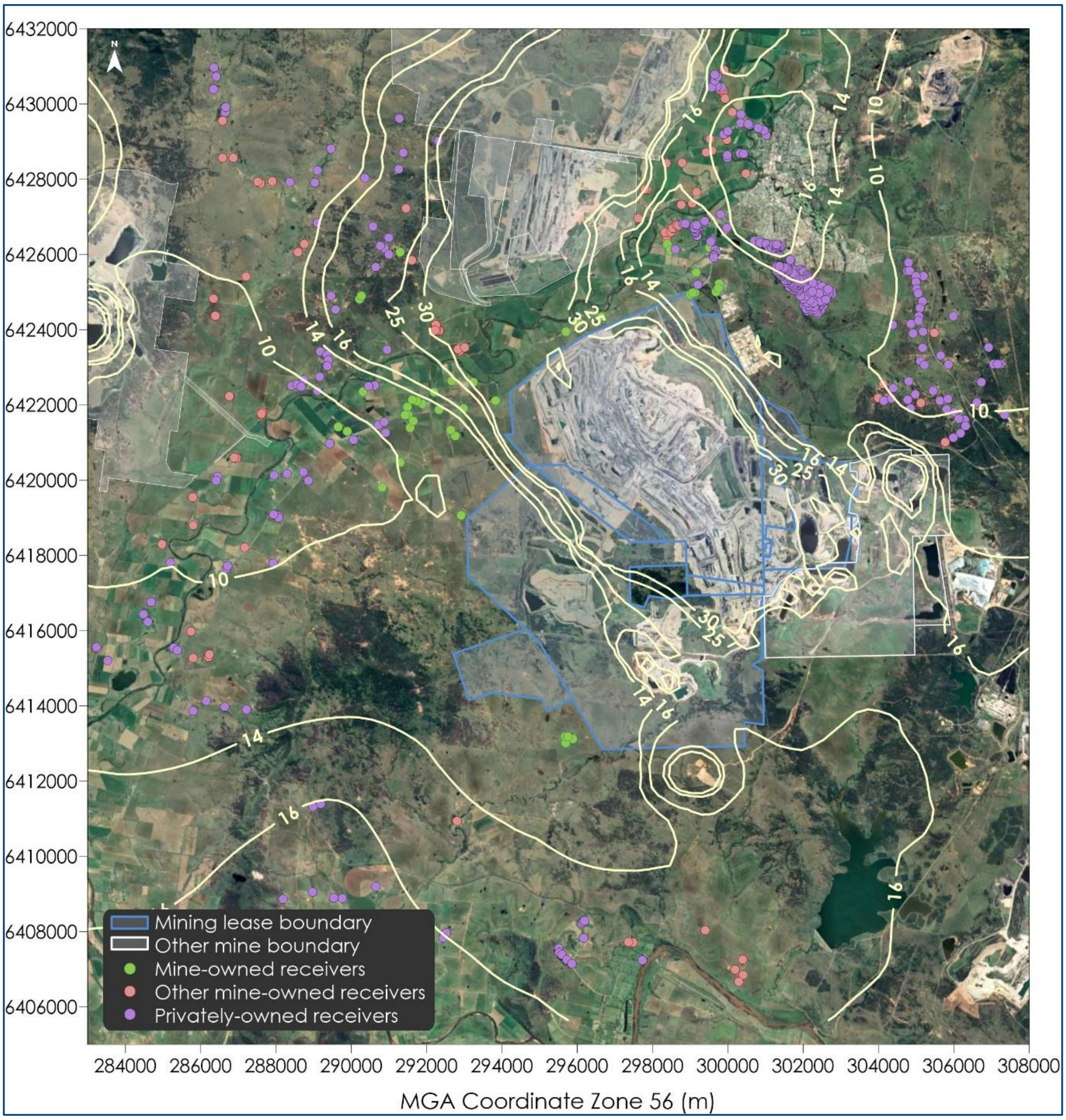

Figure E-6: Predicted annual average PM_{10} concentrations due to emissions from the Modification and other sources (µg/m³)

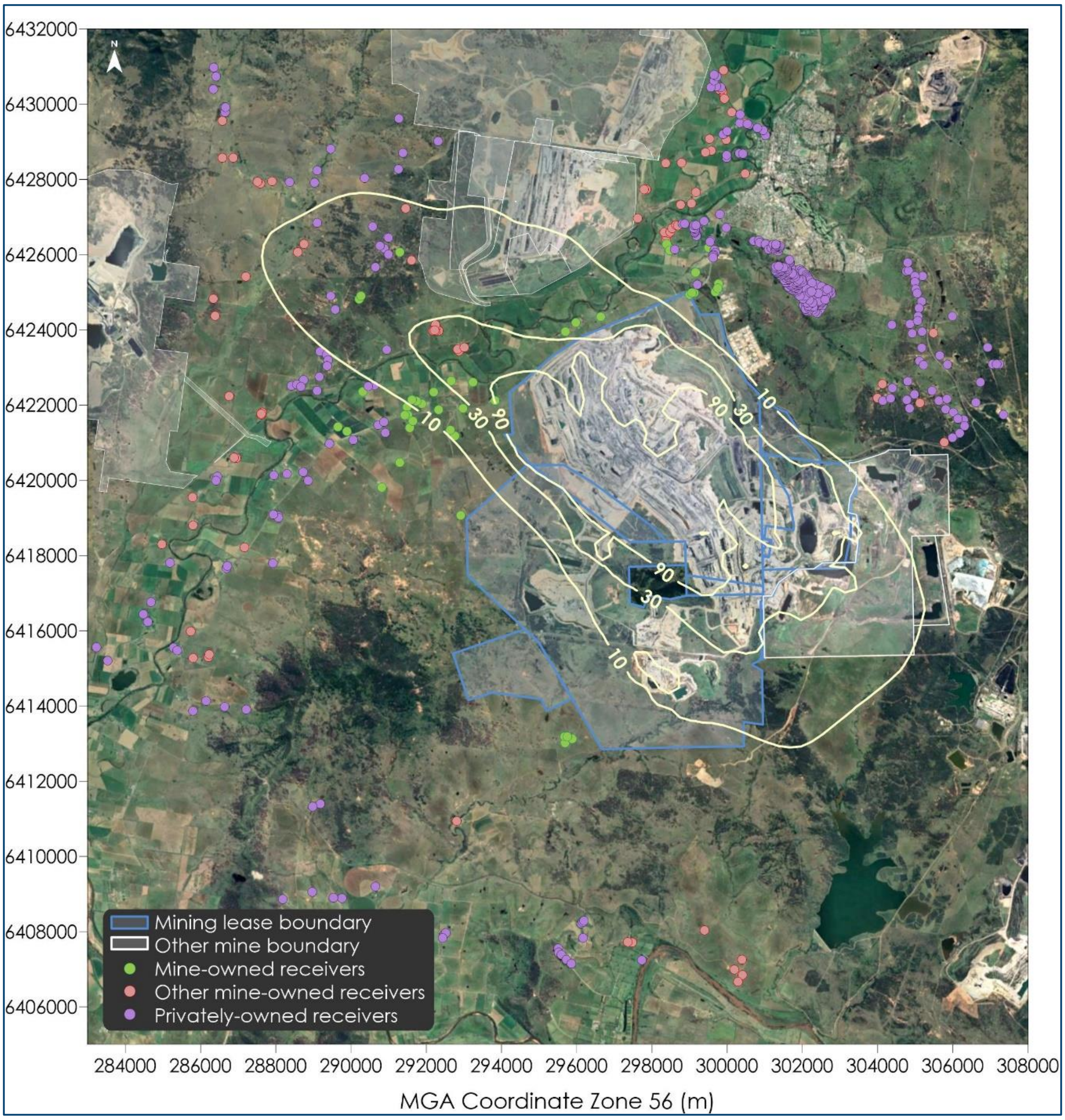

Figure E-7: Predicted annual average TSP concentrations due to emissions from the Modification (μg/m³)

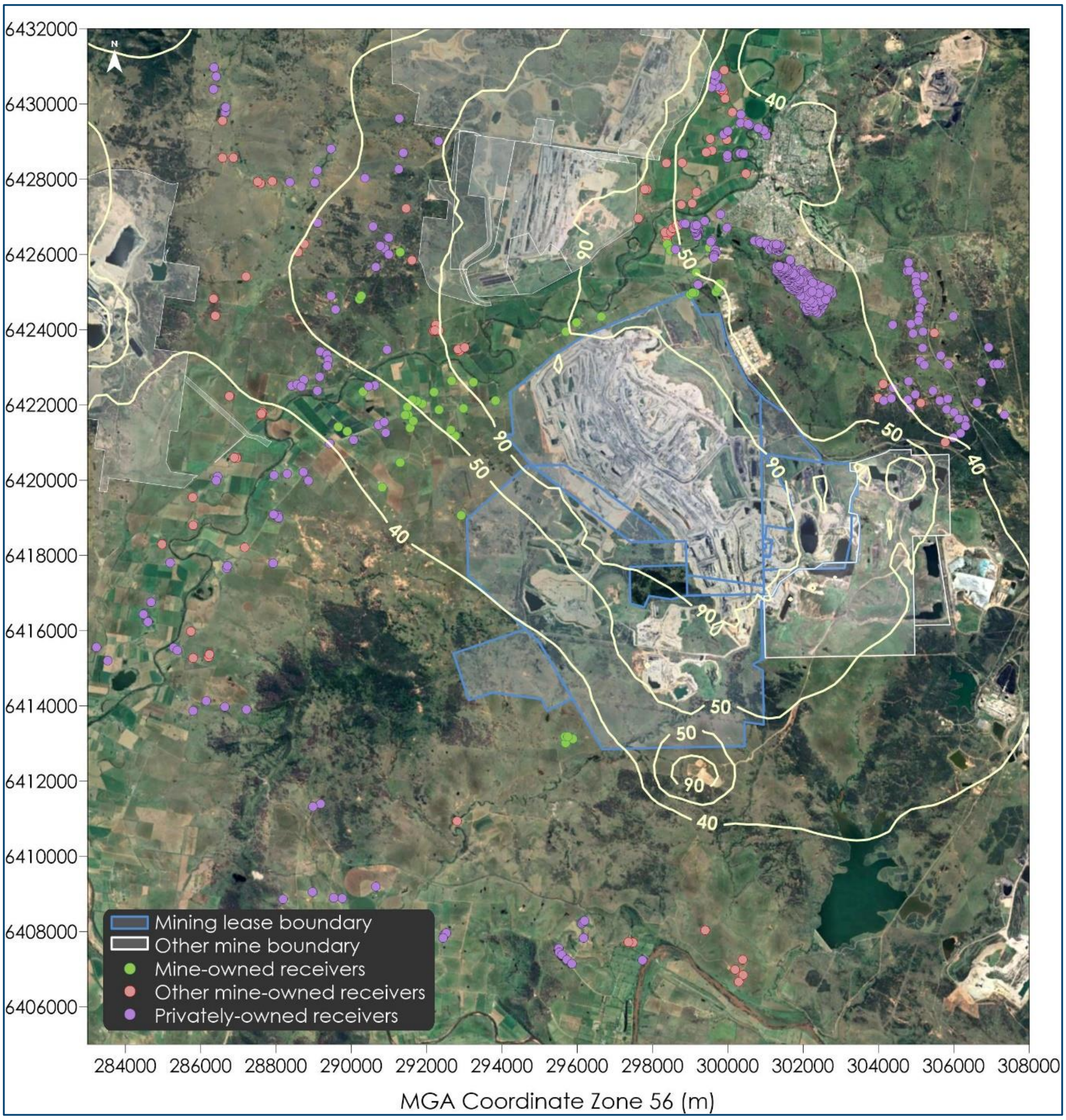

Figure E-8: Predicted annual average TSP concentrations due to emissions from the Modification and other sources (µg/m³)

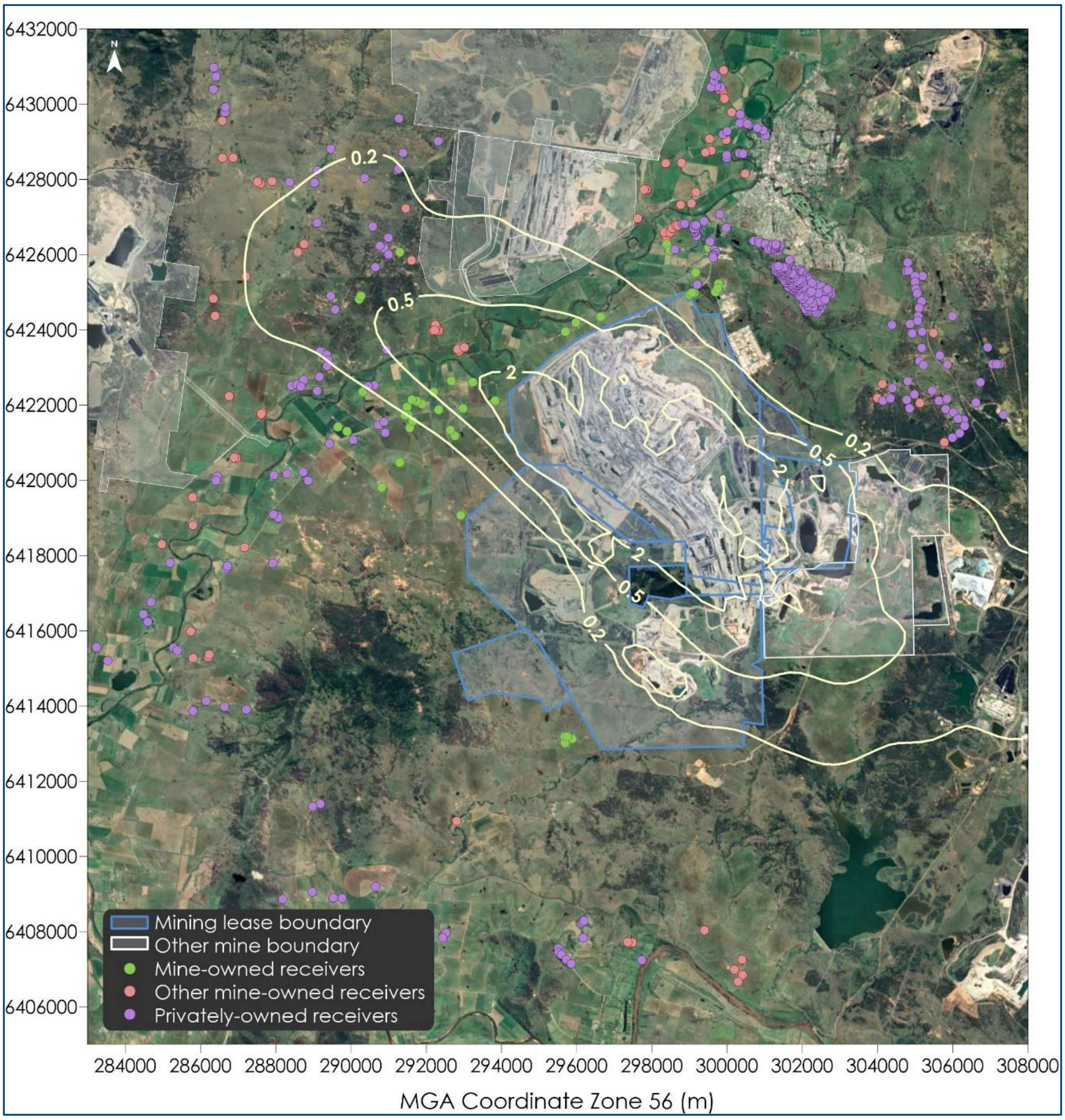

Figure E-9: Predicted annual average dust deposition levels due to emissions from the Modification (g/m²/month)

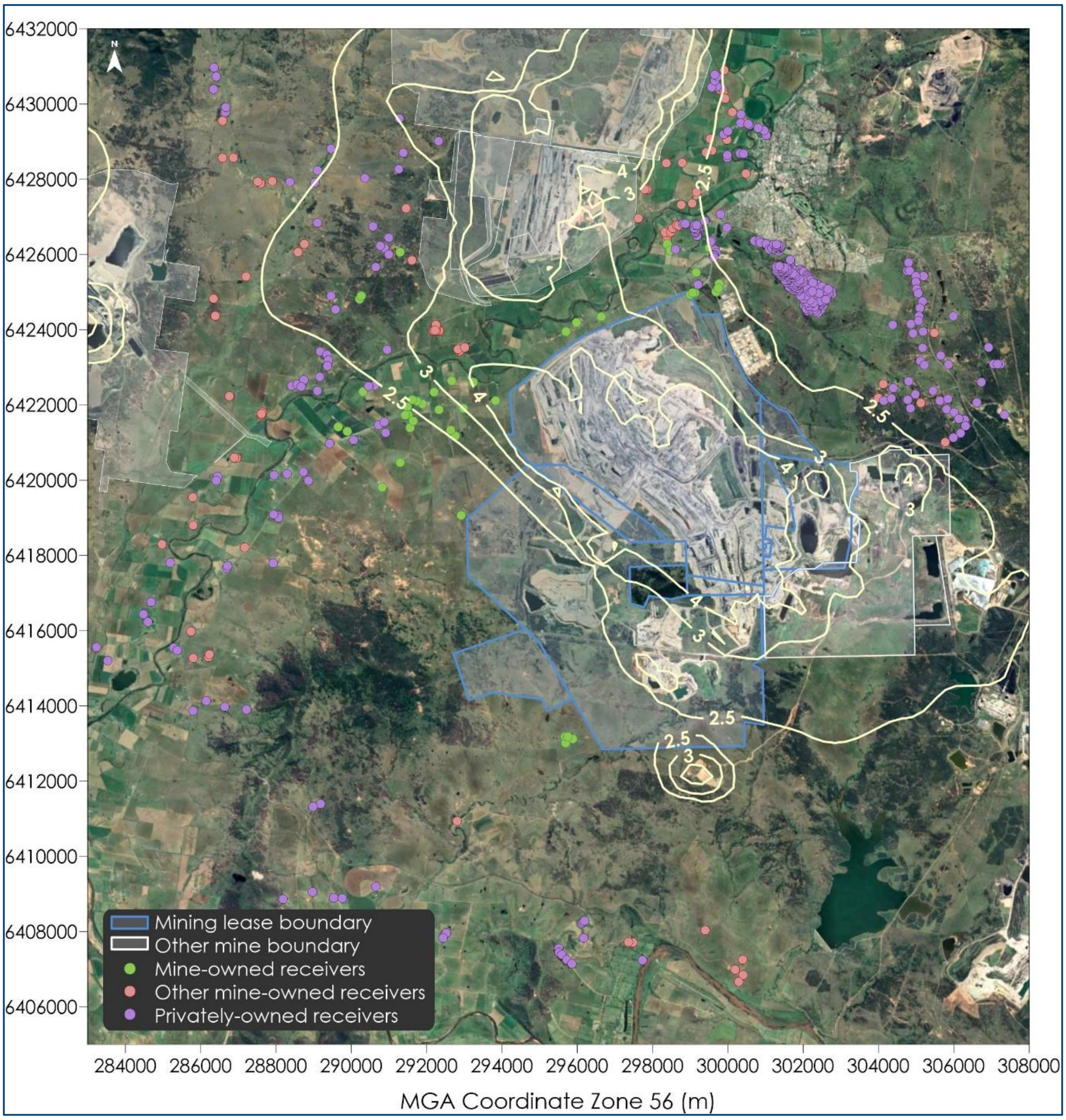

Figure E-10: Predicted annual average dust deposition levels due to emissions from the Modification and other sources (g/m²/month)

Appendix F

Further Detail Regarding 24-hour $PM_{2.5}$ Analysis

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

The analysis below provides a cumulative 24-hour $PM_{2.5}$ impact assessment in accordance with the NSW EPA Approved Methods; refer to the worked example on Page 50 to 51 of the Approved Methods.

The background level is the ambient level at the relevant TEOM monitoring station.

The predicted increment is the predicted level to occur at the receptor due to the Modification and the approved MAC.

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

Table F-1 to **Table F-24** assesses the selected receptors and shows the predicted maximum cumulative levels at the selected receptors. 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 Modification and approved MAC.

Any value above the 24-hour average $PM_{2.5}$ criterion of 25µg/m³ is in **bold red**.

Table F-1: Receptor location 6

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
10/03/2015	22.0	0.2	22.2	24/09/2015	1.8	1.3	3.1
12/03/2015	13.9	-0.4	13.5	25/09/2015	1.7	1.2	2.9
9/03/2015	13.3	-0.1	13.2	20/04/2015	0.2	1.0	1.2
11/03/2015	11.6	0.1	11.7	21/04/2015	0.1	1.0	1.1
12/12/2015	11.4	-0.7	10.7	18/09/2015	3.4	0.7	4.1
22/07/2015	10.5	-1.0	9.5	6/09/2015	4.4	0.7	5.1
15/12/2015	10.5	-0.1	10.4	22/10/2015	1.1	0.5	1.6
17/04/2015	10.2	0.0	10.2	20/01/2015	1.6	0.5	2.1
4/03/2015	9.2	-0.1	9.1	1/04/2015	0.1	0.5	0.6
29/03/2015	9.2	0.1	9.3	3/04/2015	3.2	0.5	3.7

Table F-2: Receptor location 10

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
10/03/2015	22.0	0.2	22.2	20/04/2015	0.2	1.1	1.3
12/03/2015	13.9	-0.1	13.8	28/01/2015	1.5	1.0	2.5
9/03/2015	13.3	0.0	13.3	25/09/2015	1.7	0.8	2.5
11/03/2015	11.6	0.0	11.6	24/09/2015	1.8	0.6	2.4
12/12/2015	11.4	-0.3	11.1	18/09/2015	3.4	0.5	3.9
22/07/2015	10.5	-0.8	9.7	3/02/2015	4.0	0.4	4.4
15/12/2015	10.5	-0.1	10.4	23/09/2015	1.8	0.4	2.2
17/04/2015	10.2	0.0	10.2	23/10/2015	2.0	0.4	2.4
4/03/2015	9.2	0.0	9.2	17/09/2015	4.9	0.3	5.2
29/03/2015	9.2	0.1	9.3	18/07/2015	3.8	0.3	4.1

Table F-3: Receptor location 91

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
10/03/2015	22.0	0.0	22.0	13/05/2015	2.2	1.4	3.6
12/03/2015	13.9	-0.1	13.8	30/01/2015	2.0	0.6	2.6
9/03/2015	13.3	0.0	13.3	31/01/2015	5.6	0.6	6.2
11/03/2015	11.6	0.0	11.6	1/06/2015	1.6	0.4	2.0
12/12/2015	11.4	0.4	11.8	12/12/2015	11.4	0.4	11.8
22/07/2015	10.5	-0.1	10.4	24/08/2015	2.7	0.4	3.1
15/12/2015	10.5	0.0	10.5	21/04/2015	0.1	0.4	0.5
17/04/2015	10.2	0.0	10.2	16/04/2015	4.8	0.4	5.2
4/03/2015	9.2	0.0	9.2	25/01/2015	2.5	0.4	2.9
29/03/2015	9.2	0.0	9.2	21/10/2015	4.4	0.3	4.7

Table F-4: Receptor location 94

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
10/03/2015	22.0	0.0	22.0	13/05/2015	2.2	1.5	3.7
12/03/2015	13.9	0.0	13.9	30/01/2015	2.0	0.6	2.6
9/03/2015	13.3	0.0	13.3	31/01/2015	5.6	0.5	6.1
11/03/2015	11.6	0.0	11.6	1/06/2015	1.6	0.5	2.1
12/12/2015	11.4	0.4	11.8	26/03/2015	4.6	0.5	5.1
22/07/2015	10.5	-0.1	10.4	23/11/2015	4.6	0.4	5.0
15/12/2015	10.5	0.0	10.5	12/12/2015	11.4	0.4	11.8
17/04/2015	10.2	0.0	10.2	25/01/2015	2.5	0.4	2.9
4/03/2015	9.2	0.0	9.2	21/05/2015	1.2	0.3	1.5
29/03/2015	9.2	0.0	9.2	6/11/2015	2.2	0.3	2.5

Table F-5: Receptor location 102

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
10/03/2015	22.0	0.0	22.0	26/03/2015	4.6	1.2	5.8
12/03/2015	13.9	0.0	13.9	13/05/2015	2.2	1.0	3.2
9/03/2015	13.3	0.0	13.3	22/04/2015	0.2	1.0	1.2
11/03/2015	11.6	0.0	11.6	1/06/2015	1.6	0.8	2.4
12/12/2015	11.4	0.4	11.8	4/08/2015	0.1	0.7	0.8
22/07/2015	10.5	-0.1	10.4	6/08/2015	1.6	0.6	2.2
15/12/2015	10.5	0.0	10.5	11/08/2015	2.2	0.6	2.8
17/04/2015	10.2	0.0	10.2	4/07/2015	4.6	0.6	5.2
4/03/2015	9.2	0.0	9.2	6/11/2015	2.2	0.5	2.7
29/03/2015	9.2	0.0	9.2	25/01/2015	2.5	0.4	2.9

Table F-6: Receptor location 111c

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
10/03/2015	**25.2**	0.0	**25.2**				
9/03/2015	20.6	0.0	20.6	5/10/2015	9.7	0.1	9.8
11/03/2015	19.0	0.0	19.0	29/09/2015	7.4	0.1	7.5
15/12/2015	19.0	0.0	19.0	19/11/2015	6.7	0.1	6.8
12/03/2015	17.1	0.0	17.1	23/07/2015	7.4	0.1	7.5
9/02/2015	14.4	0.0	14.4	11/10/2015	8.7	0.1	8.8
8/03/2015	13.9	0.0	13.9	24/03/2015	5.6	0.1	5.7
4/03/2015	13.8	0.0	13.8	14/09/2015	10.4	0.1	10.5
5/03/2015	12.7	0.0	12.7	28/05/2015	4.5	0.1	4.6
17/10/2015	12.5	0.0	12.5	21/09/2015	5.8	0.1	5.9
20/08/2015	12.4	0.0	12.4	25/05/2015	5.7	0.1	5.8

Table F-7: Receptor location 112f

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
10/03/2015	**25.2**	0.0	**25.2**				
9/03/2015	20.6	0.0	20.6	6/10/2015	12.0	0.2	12.2
11/03/2015	19.0	0.0	19.0	11/10/2015	8.7	0.1	8.8
15/12/2015	19.0	0.0	19.0	1/11/2015	9.2	0.1	9.3
12/03/2015	17.1	0.0	17.1	1/12/2015	11.2	0.1	11.3
9/02/2015	14.4	0.0	14.4	9/12/2015	7.5	0.1	7.6
8/03/2015	13.9	0.1	14.0	19/11/2015	6.7	0.1	6.8
4/03/2015	13.8	0.0	13.8	23/07/2015	7.4	0.1	7.5
5/03/2015	12.7	0.0	12.7	28/05/2015	4.5	0.1	4.6
17/10/2015	12.5	0.0	12.5	23/06/2015	4.8	0.1	4.9
20/08/2015	12.4	0.0	12.4	29/09/2015	7.4	0.1	7.5

Table F-8: Receptor location 113d

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
10/03/2015	**25.2**	0.0	**25.2**				
9/03/2015	20.6	0.0	20.6	5/10/2015	9.7	0.1	9.8
11/03/2015	19.0	0.0	19.0	15/02/2015	5.0	0.1	5.1
15/12/2015	19.0	0.0	19.0	14/09/2015	10.4	0.1	10.5
12/03/2015	17.1	0.0	17.1	23/01/2015	4.0	0.1	4.1
9/02/2015	14.4	0.0	14.4	17/11/2015	4.8	0.1	4.9
8/03/2015	13.9	0.0	13.9	29/09/2015	7.4	0.1	7.5
4/03/2015	13.8	0.0	13.8	20/10/2015	8.9	0.1	9.0
5/03/2015	12.7	0.0	12.7	28/09/2015	6.6	0.1	6.7
17/10/2015	12.5	0.0	12.5	10/10/2015	9.3	0.0	9.3
20/08/2015	12.4	0.0	12.4	16/10/2015	10.4	0.0	10.4

Table F-9: Receptor location 116

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
10/03/2015	**25.2**	0.0	**25.2**				
9/03/2015	20.6	0.0	20.6	15/02/2015	5.0	0.2	5.2
11/03/2015	19.0	0.0	19.0	23/01/2015	4.0	0.1	4.1
15/12/2015	19.0	0.0	19.0	5/10/2015	9.7	0.1	9.8
12/03/2015	17.1	0.0	17.1	17/11/2015	4.8	0.1	4.9
9/02/2015	14.4	0.0	14.4	14/09/2015	10.4	0.1	10.5
8/03/2015	13.9	0.0	13.9	9/01/2015	7.6	0.1	7.7
4/03/2015	13.8	0.0	13.8	28/09/2015	6.6	0.1	6.7
5/03/2015	12.7	0.0	12.7	2/09/2015	5.0	0.1	5.1
17/10/2015	12.5	0.0	12.5	4/01/2015	5.6	0.1	5.7
20/08/2015	12.4	0.0	12.4	10/10/2015	9.3	0.1	9.4

Table F-10: Receptor location 138

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
10/03/2015	25.2	0.0	25.2				
9/03/2015	20.6	0.0	20.6	23/01/2015	4.0	0.1	4.1
11/03/2015	19.0	0.0	19.0	9/01/2015	7.6	0.1	7.7
15/12/2015	19.0	0.0	19.0	14/09/2015	10.4	0.1	10.5
12/03/2015	17.1	0.0	17.1	11/01/2015	2.0	0.1	2.1
9/02/2015	14.4	0.0	14.4	28/09/2015	6.6	0.1	6.7
8/03/2015	13.9	0.0	13.9	10/10/2015	9.3	0.1	9.4
4/03/2015	13.8	0.0	13.8	10/01/2015	8.5	0.1	8.6
5/03/2015	12.7	0.0	12.7	17/11/2015	4.8	0.1	4.9
17/10/2015	12.5	0.0	12.5	4/01/2015	5.6	0.1	5.7
20/08/2015	12.4	0.0	12.4	3/01/2015	8.6	0.1	8.7

Table F-11: Receptor location 163

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
10/03/2015	25.2	0.0	25.2				
9/03/2015	20.6	0.0	20.6	9/10/2015	7.4	0.1	7.5
11/03/2015	19.0	0.1	19.1	23/01/2015	4.0	0.1	4.1
15/12/2015	19.0	0.1	19.1	17/04/2015	12.0	0.1	12.1
12/03/2015	17.1	0.0	17.1	10/01/2015	8.5	0.1	8.6
9/02/2015	14.4	0.0	14.4	10/10/2015	9.3	0.1	9.4
8/03/2015	13.9	0.0	13.9	11/01/2015	2.0	0.1	2.1
4/03/2015	13.8	0.0	13.8	3/01/2015	8.6	0.1	8.7
5/03/2015	12.7	0.0	12.7	28/09/2015	6.6	0.1	6.7
17/10/2015	12.5	0.0	12.5	18/12/2015	7.0	0.1	7.1
20/08/2015	12.4	0.0	12.4	8/12/2015	7.2	0.1	7.3

Table F-12: Receptor location 178

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
10/03/2015	22.3	0.1	22.4	17/04/2015	11.4	0.2	11.6
9/03/2015	15.7	0.0	15.7	26/02/2015	4.3	0.2	4.5
11/03/2015	14.8	0.1	14.9	16/06/2015	4.2	0.2	4.4
12/03/2015	14.1	0.0	14.1	10/01/2015	7.1	0.2	7.3
15/12/2015	13.6	0.1	13.7	2/01/2015	1.8	0.2	2.0
9/02/2015	12.6	0.0	12.6	18/12/2015	6.6	0.2	6.8
21/11/2015	12.6	0.0	12.6	23/01/2015	4.3	0.2	4.5
20/08/2015	12.4	0.1	12.5	19/10/2015	8.1	0.2	8.3
24/11/2015	11.9	0.0	11.9	29/06/2015	6.2	0.2	6.4
26/11/2015	11.7	0.0	11.7	9/10/2015	9.0	0.2	9.2

Table F-13: Receptor location 182

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
10/03/2015	22.3	0.3	22.6	16/06/2015	4.2	0.5	4.7
9/03/2015	15.7	0.1	15.8	10/01/2015	7.1	0.5	7.6
11/03/2015	14.8	0.2	15.0	17/04/2015	11.4	0.4	11.8
12/03/2015	14.1	0.0	14.1	3/01/2015	7.2	0.4	7.6
15/12/2015	13.6	0.2	13.8	5/12/2015	5.6	0.4	6.0
9/02/2015	12.6	0.3	12.9	19/10/2015	8.1	0.3	8.4
21/11/2015	12.6	0.1	12.7	6/12/2015	7.0	0.3	7.3
20/08/2015	12.4	0.1	12.5	31/10/2015	4.8	0.3	5.1
24/11/2015	11.9	0.1	12.0	10/03/2015	22.3	0.3	22.6
26/11/2015	11.7	0.0	11.7	2/01/2015	1.8	0.3	2.1

Table F-14: Receptor location 186

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
10/03/2015	22.3	0.6	22.9	10/01/2015	7.1	1.1	8.2
9/03/2015	15.7	0.3	16.0	3/01/2015	7.2	1.0	8.2
11/03/2015	14.8	0.4	15.2	16/06/2015	4.2	0.9	5.1
12/03/2015	14.1	0.1	14.2	6/12/2015	7.0	0.8	7.8
15/12/2015	13.6	0.3	13.9	18/12/2015	6.6	0.7	7.3
9/02/2015	12.6	0.6	13.2	9/10/2015	9.0	0.7	9.7
21/11/2015	12.6	0.3	12.9	5/12/2015	5.6	0.7	6.3
20/08/2015	12.4	0.2	12.6	3/12/2015	6.2	0.7	6.9
24/11/2015	11.9	0.2	12.1	19/10/2015	8.1	0.7	8.8
26/11/2015	11.7	0.0	11.7	24/12/2015	4.3	0.7	5.0

Table F-15: Receptor location 187

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
10/03/2015	22.3	0.8	23.1	10/01/2015	7.1	1.5	8.6
9/03/2015	15.7	0.5	16.2	3/01/2015	7.2	1.3	8.5
11/03/2015	14.8	0.4	15.2	16/06/2015	4.2	1.2	5.4
12/03/2015	14.1	0.1	14.2	18/12/2015	6.6	1.2	7.8
15/12/2015	13.6	0.4	14.0	24/12/2015	4.3	1.1	5.4
9/02/2015	12.6	0.8	13.4	9/10/2015	9.0	1.1	10.1
21/11/2015	12.6	0.4	13.0	3/12/2015	6.2	1.0	7.2
20/08/2015	12.4	0.3	12.7	19/10/2015	8.1	1.0	9.1
24/11/2015	11.9	0.3	12.2	6/12/2015	7.0	0.9	7.9
26/11/2015	11.7	0.0	11.7	5/12/2015	5.6	0.9	6.5

Table F-16: Receptor location 200

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
10/03/2015	22.3	2.3	24.6	10/03/2015	22.3	2.3	24.6
9/03/2015	15.7	0.8	16.5	3/12/2015	6.2	2.2	8.4
11/03/2015	14.8	0.9	15.7	9/02/2015	12.6	2.1	14.7
12/03/2015	14.1	0.2	14.3	18/12/2015	6.6	2.0	8.6
15/12/2015	13.6	0.7	14.3	9/10/2015	9.0	1.9	10.9
9/02/2015	12.6	2.1	14.7	27/11/2015	7.6	1.9	9.5
21/11/2015	12.6	1.0	13.6	6/02/2015	4.3	1.9	6.2
20/08/2015	12.4	0.2	12.6	28/12/2015	4.6	1.8	6.4
24/11/2015	11.9	0.7	12.6	24/02/2015	4.6	1.8	6.4
26/11/2015	11.7	0.0	11.7	21/03/2015	3.2	1.8	5.0

Table F-17: Receptor location 226

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
10/03/2015	22.3	3.7	**26.0**				
9/03/2015	15.7	0.5	16.2	25/12/2015	3.8	5.0	8.8
11/03/2015	14.8	1.8	16.6	2/03/2015	4.3	4.9	9.2
12/03/2015	14.1	0.8	14.9	8/10/2015	5.6	4.7	10.3
15/12/2015	13.6	1.0	14.6	6/01/2015	3.2	4.6	7.8
9/02/2015	12.6	3.9	16.5	21/03/2015	3.2	4.4	7.6
21/11/2015	12.6	3.3	15.9	26/01/2015	4.7	4.3	9.0
20/08/2015	12.4	0.1	12.5	24/02/2015	4.6	4.1	8.7
24/11/2015	11.9	3.7	15.6	13/10/2015	9.6	4.0	13.6
26/11/2015	11.7	0.2	11.9	22/11/2015	6.3	4.0	10.3
17/04/2015	11.4	3.5	14.9	11/11/2015	6.0	3.9	9.9

Table F-18: Receptor location 239

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
10/03/2015	22.3	0.4	22.7	2/05/2015	1.6	5.5	7.1
9/03/2015	15.7	0.0	15.7	19/01/2015	4.6	5.1	9.7
11/03/2015	14.8	0.2	15.0	16/05/2015	4.1	4.7	8.8
12/03/2015	14.1	0.3	14.4	28/10/2015	3.9	4.3	8.2
15/12/2015	13.6	0.8	14.4	27/01/2015	1.4	3.9	5.3
9/02/2015	12.6	-0.2	12.4	21/02/2015	1.4	3.9	5.3
21/11/2015	12.6	0.3	12.9	8/11/2015	5.3	3.8	9.1
20/08/2015	12.4	0.0	12.4	12/01/2015	0.0	3.7	3.7
24/11/2015	11.9	-0.8	11.1	26/06/2015	4.1	3.2	7.3
26/11/2015	11.7	0.3	12.0	15/11/2015	5.1	3.0	8.1

Table F-19: Receptor location 240

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
10/03/2015	22.3	-0.3	22.0	4/04/2015	0.1	4.3	4.4
9/03/2015	15.7	-0.3	15.4	15/11/2015	5.1	4.1	9.2
11/03/2015	14.8	0.2	15.0	2/05/2015	1.6	4.1	5.7
12/03/2015	14.1	-0.2	13.9	12/01/2015	0.0	3.9	3.9
15/12/2015	13.6	0.7	14.3	11/06/2015	3.7	3.9	7.6
9/02/2015	12.6	-0.4	12.2	27/01/2015	1.4	3.3	4.7
21/11/2015	12.6	-0.5	12.1	2/02/2015	3.1	3.3	6.4
20/08/2015	12.4	0.0	12.4	19/01/2015	4.6	3.0	7.6
24/11/2015	11.9	-1.3	10.6	26/06/2015	4.1	2.9	7.0
26/11/2015	11.7	0.1	11.8	16/05/2015	4.1	2.8	6.9

Table F-20: Receptor location 482

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
10/03/2015	25.2	0.0	25.2				
9/03/2015	20.6	0.0	20.6	9/10/2015	7.4	0.2	7.6
11/03/2015	19.0	0.1	19.1	23/01/2015	4.0	0.1	4.1
15/12/2015	19.0	0.1	19.1	17/04/2015	12.0	0.1	12.1
12/03/2015	17.1	0.0	17.1	10/01/2015	8.5	0.1	8.6
9/02/2015	14.4	0.0	14.4	28/09/2015	6.6	0.1	6.7
8/03/2015	13.9	0.0	13.9	29/06/2015	5.9	0.1	6.0
4/03/2015	13.8	0.0	13.8	10/10/2015	9.3	0.1	9.4
5/03/2015	12.7	0.0	12.7	24/05/2015	5.0	0.1	5.1
17/10/2015	12.5	0.0	12.5	26/12/2015	4.0	0.1	4.1
20/08/2015	12.4	0.0	12.4	22/06/2015	3.2	0.1	3.3

Table F-21: Receptor location 179b

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
10/03/2015	22.3	0.2	22.5	16/06/2015	4.2	0.3	4.5
9/03/2015	15.7	0.0	15.7	17/04/2015	11.4	0.3	11.7
11/03/2015	14.8	0.1	14.9	10/01/2015	7.1	0.3	7.4
12/03/2015	14.1	0.0	14.1	19/10/2015	8.1	0.2	8.3
15/12/2015	13.6	0.1	13.7	29/06/2015	6.2	0.2	6.4
9/02/2015	12.6	0.1	12.7	2/01/2015	1.8	0.2	2.0
21/11/2015	12.6	0.0	12.6	31/10/2015	4.8	0.2	5.0
20/08/2015	12.4	0.1	12.5	18/12/2015	6.6	0.2	6.8
24/11/2015	11.9	0.0	11.9	9/10/2015	9.0	0.2	9.2
26/11/2015	11.7	0.0	11.7	26/02/2015	4.3	0.2	4.5

Table F-22: Receptor location IR.141

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
10/03/2015	22.0	0.0	22.0	21/04/2015	0.1	0.7	0.8
12/03/2015	13.9	-0.2	13.7	22/10/2015	1.1	0.1	1.2
9/03/2015	13.3	0.0	13.3	14/09/2015	6.3	0.1	6.4
11/03/2015	11.6	0.0	11.6	24/09/2015	1.8	0.1	1.9
12/12/2015	11.4	-0.1	11.3	21/10/2015	4.4	0.1	4.5
22/07/2015	10.5	-0.2	10.3	3/07/2015	5.3	0.1	5.4
15/12/2015	10.5	0.0	10.5	20/01/2015	1.6	0.0	1.6
17/04/2015	10.2	0.0	10.2	3/05/2015	1.2	0.0	1.2
4/03/2015	9.2	0.0	9.2	6/04/2015	0.8	0.0	0.8
29/03/2015	9.2	0.0	9.2	10/12/2015	4.2	0.0	4.2

Table F-23: Receptor location IR.165

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
10/03/2015	22.0	0.0	22.0	21/04/2015	0.1	0.9	1.0
12/03/2015	13.9	-0.2	13.7	22/10/2015	1.1	0.1	1.2
9/03/2015	13.3	0.0	13.3	24/09/2015	1.8	0.1	1.9
11/03/2015	11.6	0.0	11.6	3/05/2015	1.2	0.1	1.3
12/12/2015	11.4	-0.3	11.1	14/09/2015	6.3	0.1	6.4
22/07/2015	10.5	-0.2	10.3	20/01/2015	1.6	0.0	1.6
15/12/2015	10.5	0.0	10.5	20/04/2015	0.2	0.0	0.2
17/04/2015	10.2	0.0	10.2	5/01/2015	4.9	0.0	4.9
4/03/2015	9.2	0.0	9.2	10/12/2015	4.2	0.0	4.2
29/03/2015	9.2	0.0	9.2	19/12/2015	6.2	0.0	6.2

Table F-24: Receptor location IR.178

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
10/03/2015	22.0	0.0	22.0	21/04/2015	0.1	1.1	1.2
12/03/2015	13.9	-0.2	13.7	22/10/2015	1.1	0.3	1.4
9/03/2015	13.3	0.0	13.3	3/05/2015	1.2	0.1	1.3
11/03/2015	11.6	0.0	11.6	24/09/2015	1.8	0.1	1.9
12/12/2015	11.4	-0.5	10.9	14/09/2015	6.3	0.1	6.4
22/07/2015	10.5	-0.3	10.2	20/04/2015	0.2	0.1	0.3
15/12/2015	10.5	0.0	10.5	20/01/2015	1.6	0.1	1.7
17/04/2015	10.2	0.0	10.2	5/01/2015	4.9	0.0	4.9
4/03/2015	9.2	0.0	9.2	10/12/2015	4.2	0.0	4.2
29/03/2015	9.2	0.0	9.2	25/09/2015	1.7	0.0	1.7

Appendix G

Further Detail Regarding 24-hour PM_{10} Analysis

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

The analysis below provides a cumulative 24-hour PM_{10} impact assessment in accordance with the NSW EPA Approved Methods; refer to the worked example on Page 50 to 51 of the Approved Methods.

The background level is the ambient level at the relevant TEOM monitoring station.

The predicted increment is the predicted level to occur at the receptor due to the Modification and the approved MAC.

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

Table G-1 to **Table G-24** assesses the selected receptors and shows the predicted maximum cumulative levels at the selected receptors. 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 Modification and approved MAC.

Any value above the 24-hour average PM_{10} criterion of 50µg/m³ is in **bold red**.

Table G-1: Receptor location 6

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
11/12/2015	**108.6**	-2.1	**106.5**				
12/12/2015	**76.1**	-5.8	**70.3**				
6/05/2015	**71.1**	0.0	**71.1**				
29/03/2015	**67.2**	0.5	**67.7**				
15/12/2015	**66.3**	-0.8	**65.5**				
14/02/2015	**62.2**	-3.2	**59.0**				
11/09/2015	**59.3**	-3.6	**55.7**				
5/10/2015	**58.9**	-0.1	**58.8**				
26/11/2015	**57.9**	-1.5	**56.4**				
10/03/2015	**57.7**	1.4	**59.1**				
7/10/2015	**54.1**	0.0	**54.1**				
9/02/2015	47.0	0.3	47.3	25/09/2015	10.1	8.1	18.2
2/12/2015	46.6	-0.1	46.5	24/09/2015	26.5	8.0	34.5
6/10/2015	45.9	0.0	45.9	20/04/2015	1.9	6.1	8.0
8/12/2015	45.0	1.2	46.2	21/04/2015	0.8	5.1	5.9
14/12/2015	43.8	0.1	43.9	18/09/2015	12.2	4.6	16.8
1/12/2015	43.4	0.0	43.4	6/09/2015	10.3	4.3	14.6
7/12/2015	42.5	0.1	42.6	3/04/2015	23.7	2.8	26.5
21/12/2015	42.4	0.1	42.5	20/01/2015	8.7	2.8	11.5
11/03/2015	39.8	-0.1	39.7	1/04/2015	19.7	2.7	22.4
20/03/2015	39.7	-0.7	39.0	22/10/2015	3.9	2.7	6.6

Table G-2: Receptor location 10

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
11/12/2015	**108.6**	-1.5	**107.1**				
12/12/2015	**76.1**	-2.2	**73.9**				
6/05/2015	**71.1**	0.0	**71.1**				
29/03/2015	**67.2**	0.3	**67.5**				
15/12/2015	**66.3**	-0.7	**65.6**				
14/02/2015	**62.2**	-7.0	**55.2**				
11/09/2015	**59.3**	-4.5	**54.8**				
5/10/2015	**58.9**	0.0	**58.9**				
26/11/2015	**57.9**	-0.3	**57.6**				
10/03/2015	**57.7**	1.0	**58.7**				
7/10/2015	**54.1**	0.0	**54.1**				
9/02/2015	47.0	0.0	47.0	20/04/2015	1.9	6.6	8.5
2/12/2015	46.6	-0.1	46.5	28/01/2015	6.3	6.6	12.9
6/10/2015	45.9	0.0	45.9	25/09/2015	10.1	5.0	15.1
8/12/2015	45.0	0.2	45.2	24/09/2015	26.5	3.8	30.3
14/12/2015	43.8	-0.8	43.0	18/09/2015	12.2	3.1	15.3
1/12/2015	43.4	-0.1	43.3	3/02/2015	18.4	2.5	20.9
7/12/2015	42.5	0.1	42.6	23/10/2015	12.0	2.5	14.5
21/12/2015	42.4	0.1	42.5	23/09/2015	17.4	2.4	19.8
11/03/2015	39.8	-0.6	39.2	17/09/2015	23.9	1.8	25.7
20/03/2015	39.7	0.1	39.8	10/12/2015	22.7	1.7	24.4

Table G-3: Receptor location 91

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
23/07/2015	**136.4**	-1.3	**135.1**				
6/05/2015	**59.1**	-3.6	**55.5**				
10/03/2015	47.8	0.0	47.8	13/05/2015	9.0	7.8	16.8
15/12/2015	47.3	0.0	47.3	30/01/2015	14.7	3.3	18.0
26/11/2015	42.0	-0.7	41.3	31/01/2015	20.9	2.8	23.7
12/12/2015	36.3	2.3	38.6	12/12/2015	36.3	2.3	38.6
9/02/2015	36.0	0.0	36.0	21/04/2015	0.0	2.1	2.1
7/03/2015	36.0	0.4	36.4	1/06/2015	7.1	2.1	9.2
11/03/2015	36.0	0.0	36.0	16/04/2015	15.1	1.9	17.0
17/03/2015	34.6	-0.1	34.5	21/10/2015	17.9	1.8	19.6
7/10/2015	33.8	0.0	33.8	25/01/2015	15.0	1.4	16.4
17/04/2015	33.7	0.0	33.7	22/09/2015	11.2	1.4	12.6

Table G-4: Receptor location 94

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
23/07/2015	**136.4**	-1.0	**135.4**				
6/05/2015	**59.1**	-3.5	**55.6**				
10/03/2015	47.8	0.0	47.8	13/05/2015	9.0	8.8	17.8
15/12/2015	47.3	0.0	47.3	30/01/2015	14.7	3.1	17.8
26/11/2015	42.0	0.0	42.0	1/06/2015	7.1	2.9	10.0
12/12/2015	36.3	2.3	38.6	31/01/2015	20.9	2.8	23.7
9/02/2015	36.0	0.0	36.0	12/12/2015	36.3	2.3	38.6
7/03/2015	36.0	0.7	36.7	26/03/2015	17.3	1.9	19.2
11/03/2015	36.0	0.0	36.0	23/11/2015	22.4	1.8	24.2
17/03/2015	34.6	-0.1	34.5	21/04/2015	0.0	1.7	1.7
7/10/2015	33.8	0.0	33.8	25/01/2015	15.0	1.6	16.6
17/04/2015	33.7	0.0	33.7	4/10/2015	17.9	1.6	19.5

Table G-5: Receptor location 102

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
23/07/2015	**136.4**	-0.9	**135.5**				
6/05/2015	**59.1**	-3.2	**55.9**				
10/03/2015	47.8	0.0	47.8	26/03/2015	17.3	6.4	23.7
15/12/2015	47.3	0.0	47.3	13/05/2015	9.0	5.3	14.3
26/11/2015	42.0	0.1	42.1	22/04/2015	3.0	5.3	8.3
12/12/2015	36.3	2.1	38.4	1/06/2015	7.1	4.4	11.5
9/02/2015	36.0	0.0	36.0	4/08/2015	9.2	3.6	12.7
7/03/2015	36.0	0.4	36.4	6/08/2015	4.8	3.3	8.2
11/03/2015	36.0	0.0	36.0	11/08/2015	12.4	3.2	15.6
17/03/2015	34.6	-0.1	34.5	4/07/2015	12.0	3.1	15.1
7/10/2015	33.8	0.0	33.8	6/11/2015	8.4	2.5	10.9
17/04/2015	33.7	0.0	33.7	12/12/2015	36.3	2.1	38.4

Table G-6: Receptor location 111c

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
6/05/2015	38.5	0.0	38.5	19/11/2015	20.4	0.4	20.8
15/12/2015	37.9	-0.1	37.8	21/09/2015	12.5	0.3	12.8
26/11/2015	36.7	0.0	36.7	5/10/2015	27.3	0.3	27.6
17/10/2015	30.2	0.0	30.2	11/10/2015	12.6	0.2	12.8
1/12/2015	29.6	0.0	29.6	10/12/2015	19.1	0.2	19.3
4/10/2015	29.0	0.0	29.0	23/08/2015	9.0	0.2	9.2
7/10/2015	29.0	0.0	29.0	29/09/2015	20.1	0.2	20.3
14/12/2015	27.5	0.0	27.5	12/10/2015	18.5	0.2	18.7
5/10/2015	27.3	0.3	27.6	28/05/2015	6.6	0.1	6.7
24/11/2015	27.3	0.0	27.3	8/03/2015	11.2	0.1	11.4

Table G-7: Receptor location 112f

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
6/05/2015	38.5	0.0	38.5	6/10/2015	27.2	0.6	27.8
15/12/2015	37.9	-0.1	37.8	1/12/2015	29.6	0.5	30.1
26/11/2015	36.7	0.1	36.8	9/12/2015	15.4	0.5	15.9
17/10/2015	30.2	0.1	30.3	1/11/2015	14.5	0.5	15.0
1/12/2015	29.6	0.5	30.1	19/11/2015	20.4	0.4	20.8
4/10/2015	29.0	0.0	29.0	11/10/2015	12.6	0.4	13.0
7/10/2015	29.0	0.0	29.0	13/11/2015	7.5	0.3	7.8
14/12/2015	27.5	0.0	27.5	21/09/2015	12.5	0.3	12.8
5/10/2015	27.3	0.1	27.4	28/05/2015	6.6	0.2	6.8
24/11/2015	27.3	0.0	27.3	20/12/2015	18.3	0.2	18.5

Table G-8: Receptor location 113d

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
6/05/2015	38.5	0.0	38.5	15/02/2015	6.3	0.3	6.6
15/12/2015	37.9	-0.1	37.8	5/10/2015	27.3	0.2	27.5
26/11/2015	36.7	0.0	36.7	20/10/2015	20.6	0.2	20.8
17/10/2015	30.2	0.0	30.2	4/01/2015	14.0	0.1	14.1
1/12/2015	29.6	0.0	29.6	11/01/2015	4.7	0.1	4.8
4/10/2015	29.0	0.0	29.0	23/08/2015	9.0	0.1	9.1
7/10/2015	29.0	0.0	29.0	20/12/2015	18.3	0.1	18.4
14/12/2015	27.5	0.1	27.6	14/12/2015	27.5	0.1	27.6
5/10/2015	27.3	0.2	27.5	30/11/2015	19.7	0.1	19.8
24/11/2015	27.3	0.0	27.3	28/09/2015	14.5	0.1	14.6

Table G-9: Receptor location 116

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
6/05/2015	38.5	0.0	38.5	15/02/2015	6.3	0.6	6.9
15/12/2015	37.9	0.0	37.9	9/01/2015	23.6	0.3	23.9
26/11/2015	36.7	0.0	36.7	11/01/2015	4.7	0.2	4.9
17/10/2015	30.2	0.0	30.2	20/12/2015	18.3	0.2	18.5
1/12/2015	29.6	0.0	29.6	23/01/2015	12.0	0.2	12.2
4/10/2015	29.0	0.0	29.0	4/01/2015	14.0	0.2	14.2
7/10/2015	29.0	0.0	29.0	28/09/2015	14.5	0.2	14.7
14/12/2015	27.5	0.1	27.6	14/12/2015	27.5	0.1	27.6
5/10/2015	27.3	0.1	27.4	23/08/2015	9.0	0.1	9.1
24/11/2015	27.3	0.0	27.3	17/11/2015	11.4	0.1	11.5

Table G-10: Receptor location 138

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
6/05/2015	38.5	0.0	38.5	11/01/2015	4.7	0.4	5.1
15/12/2015	37.9	0.0	37.9	20/12/2015	18.3	0.3	18.6
26/11/2015	36.7	0.0	36.7	9/01/2015	23.6	0.3	23.9
17/10/2015	30.2	0.0	30.2	23/01/2015	12.0	0.2	12.2
1/12/2015	29.6	-0.1	29.5	8/12/2015	18.6	0.2	18.8
4/10/2015	29.0	0.0	29.0	14/12/2015	27.5	0.2	27.7
7/10/2015	29.0	0.0	29.0	18/12/2015	15.8	0.2	16.0
14/12/2015	27.5	0.2	27.7	4/01/2015	14.0	0.2	14.2
5/10/2015	27.3	-0.1	27.2	8/03/2015	11.2	0.2	11.4
24/11/2015	27.3	0.0	27.3	28/09/2015	14.5	0.2	14.7

Table G-11: Receptor location 163

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
6/05/2015	38.5	0.0	38.5	17/04/2015	24.4	0.5	24.9
15/12/2015	37.9	0.1	38.0	11/01/2015	4.7	0.4	5.1
26/11/2015	36.7	0.0	36.7	5/11/2015	4.9	0.4	5.3
17/10/2015	30.2	0.0	30.2	8/12/2015	18.6	0.3	18.9
1/12/2015	29.6	0.0	29.6	18/12/2015	15.8	0.3	16.1
4/10/2015	29.0	0.0	29.0	20/12/2015	18.3	0.3	18.6
7/10/2015	29.0	0.0	29.0	11/03/2015	11.2	0.3	11.5
14/12/2015	27.5	0.2	27.7	28/02/2015	13.5	0.3	13.8
5/10/2015	27.3	-0.3	27.0	26/12/2015	7.6	0.2	7.8
24/11/2015	27.3	0.0	27.3	10/01/2015	17.2	0.2	17.4

Table G-12: Receptor location 178

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
7/10/2015	44.6	0.0	44.6	26/02/2015	15.8	1.2	17.0
10/03/2015	40.8	0.5	41.3	17/04/2015	12.6	1.1	13.7
7/03/2015	40.4	-0.1	40.3	18/12/2015	18.5	0.8	19.3
26/11/2015	40.3	0.0	40.3	5/11/2015	4.5	0.7	5.2
15/12/2015	37.4	0.3	37.7	10/01/2015	20.7	0.7	21.4
21/11/2015	35.6	0.0	35.6	26/12/2015	9.5	0.6	10.1
12/12/2015	33.8	0.1	33.8	11/01/2015	3.9	0.6	4.5
5/10/2015	32.4	-0.3	32.1	19/12/2015	26.0	0.6	26.6
24/11/2015	32.3	0.1	32.4	11/03/2015	26.7	0.5	27.2
9/02/2015	32.2	0.1	32.3	8/12/2015	26.7	0.5	27.2

Table G-13: Receptor location 182

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
7/10/2015	44.6	1.2	45.8	17/04/2015	12.6	2.0	14.6
10/03/2015	40.8	1.5	42.3	3/01/2015	21.4	1.9	23.3
7/03/2015	40.4	0.2	40.6	5/12/2015	18.5	1.9	20.4
26/11/2015	40.3	0.0	40.3	10/01/2015	20.7	1.7	22.4
15/12/2015	37.4	0.6	38.0	3/12/2015	24.6	1.7	26.3
21/11/2015	35.6	0.9	36.5	6/12/2015	25.6	1.7	27.4
12/12/2015	33.8	0.3	34.1	16/06/2015	7.4	1.6	9.0
5/10/2015	32.4	-0.4	32.1	21/01/2015	14.8	1.6	16.4
24/11/2015	32.3	0.5	32.8	9/02/2015	32.2	1.5	33.7
9/02/2015	32.2	1.5	33.7	10/03/2015	40.8	1.5	42.3

Table G-14: Receptor location 186

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
7/10/2015	44.6	1.5	46.1	3/01/2015	21.4	4.9	26.3
10/03/2015	40.8	3.2	44.0	10/01/2015	20.7	4.8	25.5
7/03/2015	40.4	0.9	41.3	3/12/2015	24.6	4.6	29.2
26/11/2015	40.3	0.2	40.5	24/12/2015	10.6	4.3	15.0
15/12/2015	37.4	1.2	38.6	6/12/2015	25.6	4.1	29.7
21/11/2015	35.6	1.9	37.5	18/12/2015	18.5	3.9	22.4
12/12/2015	33.8	1.1	34.9	5/12/2015	18.5	3.7	22.3
5/10/2015	32.4	-0.5	31.9	21/03/2015	17.4	3.3	20.7
24/11/2015	32.3	1.1	33.4	9/10/2015	27.7	3.3	31.0
9/02/2015	32.2	3.0	35.2	10/03/2015	40.8	3.2	44.0

Table G-15: Receptor location 187

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
7/10/2015	44.6	2.6	47.2	24/12/2015	10.6	7.0	17.6
10/03/2015	40.8	4.5	45.3	10/01/2015	20.7	6.7	27.4
7/03/2015	40.4	1.2	41.6	18/12/2015	18.5	6.5	25.0
26/11/2015	40.3	0.1	40.4	3/12/2015	24.6	6.3	30.9
15/12/2015	37.4	1.9	39.4	3/01/2015	21.4	6.2	27.6
21/11/2015	35.6	2.5	38.1	9/10/2015	27.7	5.2	32.9
12/12/2015	33.8	1.7	35.5	21/03/2015	17.4	5.1	22.5
5/10/2015	32.4	-0.7	31.7	16/06/2015	7.4	4.8	12.2
24/11/2015	32.3	1.6	33.9	6/12/2015	25.6	4.7	30.3
9/02/2015	32.2	4.3	36.5	27/02/2015	12.2	4.6	16.8

Table G-16: Receptor location 200

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
7/10/2015	44.6	8.5	**53.1**				
10/03/2015	40.8	11.6	**52.4**	3/12/2015	24.6	13.7	38.3
7/03/2015	40.4	5.1	45.5	9/02/2015	32.2	12.1	44.3
26/11/2015	40.3	0.3	40.6	27/11/2015	22.8	11.9	34.7
15/12/2015	37.4	3.8	41.2	10/03/2015	40.8	11.6	**52.4**
21/11/2015	35.6	5.9	41.5	21/03/2015	17.4	11.2	28.6
12/12/2015	33.8	2.3	36.0	28/12/2015	10.7	10.9	21.6
5/10/2015	32.4	-0.6	31.8	27/12/2015	5.6	10.9	16.5
24/11/2015	32.3	4.4	36.7	6/02/2015	16.8	10.8	27.6
9/02/2015	32.2	12.1	44.3	24/02/2015	14.5	10.7	25.2
2/10/2015	32.0	4.9	36.8	24/12/2015	10.6	10.6	21.2
9/03/2015	30.2	4.3	34.5	18/12/2015	18.5	10.5	29.0

Table G-17: Receptor location 226

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
6/05/2015	**63.1**	0.0	**63.1**				
9/10/2015	**56.0**	0.1	**56.1**				
10/03/2015	47.3	17.3	**64.6**				
9/02/2015	42.6	22.3	**64.9**	2/03/2015	22.5	29.2	**51.7**
7/03/2015	41.2	3.4	44.6	8/10/2015	23.8	28.8	**52.6**
15/12/2015	40.6	4.8	45.4	25/12/2015	10.4	28.5	38.9
21/11/2015	39.9	19.8	**59.7**	21/03/2015	15.0	26.5	41.5
26/11/2015	38.6	1.0	39.6	26/01/2015	14.1	26.1	40.2
7/10/2015	36.9	23.0	**59.9**	22/11/2015	21.0	24.3	45.3
12/12/2015	35.6	4.3	39.9	6/01/2015	16.8	24.2	41.0
19/03/2015	34.5	-1.0	33.5	24/02/2015	17.3	23.8	41.1
7/12/2015	33.8	12.2	46.0	7/10/2015	36.9	23.0	**59.9**
24/11/2015	33.1	21.0	**54.1**	13/10/2015	22.8	22.9	45.7
14/04/2015	33.0	11.9	44.9	23/02/2015	12.5	22.8	35.3
9/03/2015	32.8	1.8	34.6	9/02/2015	42.6	22.3	**64.9**
17/03/2015	32.1	8.5	40.6	8/11/2015	11.5	21.9	33.4
19/12/2015	31.1	9.9	41.0	11/11/2015	19.4	21.8	41.2

Table G-18: Receptor location 239

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
6/05/2015	**63.1**	0.0	**63.1**				
9/10/2015	**56.0**	-2.3	**53.7**				
10/03/2015	47.3	0.8	48.1	2/05/2015	6.6	32.9	39.5
9/02/2015	42.6	-3.4	39.2	19/01/2015	14.0	29.6	43.6
7/03/2015	41.2	-1.5	39.7	16/05/2015	10.9	26.3	37.2
15/12/2015	40.6	4.0	44.6	27/01/2015	5.1	23.0	28.1
21/11/2015	39.9	0.1	40.0	28/10/2015	18.6	22.7	41.3
26/11/2015	38.6	1.4	40.0	21/02/2015	7.4	22.0	29.4
7/10/2015	36.9	-5.2	31.7	12/01/2015	2.1	22.0	24.1
12/12/2015	35.6	10.4	46.0	8/11/2015	11.5	21.7	33.2
19/03/2015	34.5	-0.8	33.7	15/11/2015	10.0	17.1	27.1
7/12/2015	33.8	14.3	48.1	22/03/2015	14.2	17.1	31.3

Table G-19: Receptor location 240

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
6/05/2015	**63.1**	0.0	**63.1**				
9/10/2015	**56.0**	-3.3	**52.7**				
10/03/2015	47.3	-3.4	43.9	4/04/2015	1.1	23.6	24.7
9/02/2015	42.6	-4.7	37.9	15/11/2015	10.0	23.1	33.1
7/03/2015	41.2	-3.7	37.5	2/05/2015	6.6	22.7	29.3
15/12/2015	40.6	3.0	43.6	12/01/2015	2.1	22.3	24.4
21/11/2015	39.9	-4.6	35.3	11/06/2015	9.3	20.5	29.8
26/11/2015	38.6	0.6	39.2	2/02/2015	12.0	18.6	30.6
7/10/2015	36.9	-4.0	32.9	27/01/2015	5.1	18.4	23.5
12/12/2015	35.6	9.3	44.9	10/06/2015	10.8	16.0	26.8
19/03/2015	34.5	-0.8	33.7	19/01/2015	14.0	15.9	29.9
7/12/2015	33.8	3.8	37.6	8/11/2015	11.5	14.3	25.8

Table G-20: Receptor location 482

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
6/05/2015	38.5	0.0	38.5	17/04/2015	24.4	0.5	24.9
15/12/2015	37.9	0.1	38.0	9/10/2015	22.1	0.4	22.5
26/11/2015	36.7	0.0	36.7	26/02/2015	18.0	0.4	18.4
17/10/2015	30.2	0.0	30.2	26/12/2015	7.6	0.4	8.0
1/12/2015	29.6	0.0	29.6	18/12/2015	15.8	0.3	16.1
4/10/2015	29.0	0.0	29.0	1/04/2015	10.6	0.3	10.9
7/10/2015	29.0	0.0	29.0	5/11/2015	4.9	0.3	5.2
14/12/2015	27.5	0.1	27.6	11/03/2015	11.2	0.3	11.5
5/10/2015	27.3	-0.2	27.1	11/01/2015	4.7	0.3	5.0
24/11/2015	27.3	0.0	27.3	28/02/2015	13.5	0.3	13.8

Table G-21: Receptor location 179b

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
7/10/2015	44.6	0.1	44.8	17/04/2015	12.6	1.4	14.0
10/03/2015	40.8	0.9	41.7	18/12/2015	18.5	1.0	19.5
7/03/2015	40.4	0.1	40.5	21/01/2015	14.8	1.0	15.8
26/11/2015	40.3	0.0	40.3	3/12/2015	24.6	1.0	25.6
15/12/2015	37.4	0.4	37.8	10/01/2015	20.7	1.0	21.7
21/11/2015	35.6	0.2	35.8	19/12/2015	26.0	1.0	27.0
12/12/2015	33.8	0.1	33.9	26/12/2015	9.5	0.9	10.4
5/10/2015	32.4	-0.3	32.1	10/03/2015	40.8	0.9	41.7
24/11/2015	32.3	0.1	32.4	16/06/2015	7.4	0.9	8.3
9/02/2015	32.2	0.5	32.7	19/10/2015	25.2	0.8	26.0

Table G-23: Receptor location IR.141

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
6/05/2015	**76.7**	-0.1	**76.6**				
10/03/2015	**51.9**	0.0	**51.9**				
26/11/2015	48.3	0.0	48.3	21/04/2015	3.0	3.8	6.8
12/12/2015	45.7	-1.2	44.5	22/10/2015	6.8	0.4	7.2
15/12/2015	40.5	-0.1	40.4	24/09/2015	17.1	0.3	17.4
7/10/2015	40.1	0.0	40.1	20/01/2015	12.0	0.3	12.3
9/02/2015	39.6	0.0	39.6	14/09/2015	20.9	0.2	21.1
11/03/2015	38.5	-0.2	38.3	3/05/2015	6.8	0.2	7.0
11/12/2015	37.6	-0.5	37.1	5/01/2015	24.5	0.2	24.7
19/03/2015	37.2	-1.1	36.1	20/04/2015	5.7	0.2	5.9
7/03/2015	36.1	-1.2	34.9	10/12/2015	19.4	0.1	19.5
4/03/2015	35.9	-0.2	35.7	23/09/2015	19.4	0.1	19.5

Table G-23: Receptor location IR.165

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
6/05/2015	**76.7**	0.0	**76.7**				
10/03/2015	**51.9**	0.0	**51.9**				
26/11/2015	48.3	0.1	48.4	21/04/2015	3.0	5.1	8.1
12/12/2015	45.7	-2.1	43.6	22/10/2015	6.8	0.8	7.6
15/12/2015	40.5	-0.1	40.4	3/05/2015	6.8	0.4	7.2
7/10/2015	40.1	0.0	40.1	24/09/2015	17.1	0.4	17.5
9/02/2015	39.6	0.0	39.6	14/09/2015	20.9	0.3	21.2
11/03/2015	38.5	-0.2	38.3	20/01/2015	12.0	0.3	12.3
11/12/2015	37.6	-0.5	37.1	20/04/2015	5.7	0.2	5.9
19/03/2015	37.2	-1.2	36.0	5/01/2015	24.5	0.2	24.7
7/03/2015	36.1	-1.2	34.9	10/12/2015	19.4	0.2	19.5
4/03/2015	35.9	-0.3	35.6	25/09/2015	15.0	0.1	15.1

Table G-24: Receptor location IR.178

Ranked by Highest to Lowest Background Concentration				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
6/05/2015	**76.7**	0.0	**76.7**				
10/03/2015	**51.9**	0.0	**51.9**				
26/11/2015	48.3	0.1	48.4	21/04/2015	3.0	6.4	9.4
12/12/2015	45.7	-4.1	41.6	22/10/2015	6.8	1.5	8.3
15/12/2015	40.5	-0.2	40.4	3/05/2015	6.8	0.5	7.3
7/10/2015	40.1	0.0	40.1	24/09/2015	17.1	0.4	17.5
9/02/2015	39.6	0.0	39.6	20/01/2015	12.0	0.3	12.3
11/03/2015	38.5	-0.3	38.2	20/04/2015	5.7	0.3	6.0
11/12/2015	37.6	-0.6	37.0	14/09/2015	20.9	0.3	21.2
19/03/2015	37.2	-1.2	36.0	25/09/2015	15.0	0.2	15.2
7/03/2015	36.1	-1.3	34.8	5/01/2015	24.5	0.2	24.7
4/03/2015	35.9	-0.4	35.5	10/12/2015	19.4	0.2	19.5