APPENDIX 9

Air Quality Impact Assessment

Mangoola Coal Continued Operations Project

Mangoola Coal

Air Quality Impact Assessment

Final | Revision 1

18 June 2019

Umwelt 4004

Mangoola Coal Continued Operations Project

Project No:	IA157300
Document Title:	Air Quality Impact Assessment
Document No.:	Final
Revision:	Revision 1
Date:	18 June 2019
Client Name:	Mangoola Coal
Client No:	Umwelt 4004
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File Name:	J:\IE\Projects\04_Eastern\IA157300\Deliverables\01_AQIA\IA157300_Jacobs_AQIA_Final_1.docx

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Document history and status

Revision	Date	Description	By	Review	Approved
D1R0	24/08/18	Draft report	SL	MD	MV
D2R0	26/10/18	Draft report, following client review	SL	-	MV
Final draft	21/01/19	Final draft	SL	-	MV
Final draft	17/04/19	Final draft	SL	-	MV
Final	1/05/19	Final	SL	-	PH
Final 1	18/06/19	Final 1	SL	-	PH

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Executive Summary

Mangoola Coal Mine is an open cut coal mine located approximately 20 kilometres (km) west of Muswellbrook and 10 km north of Denman in the Upper Hunter Valley of NSW. Mangoola has operated the Mangoola Coal Mine in accordance with Project Approval (PA) 06_0014 since mining commenced at the site in September 2010.

This report provides an assessment of the air quality impacts of the Mangoola Coal Continued Operations (MCCO) Project which involves the continuation of mining at Mangoola Coal Mine into a new mining area to the immediate north of the existing operations. The purpose of this air quality impact assessment is to form part of an Environmental Impact Statement (EIS) being prepared by Umwelt to accompany an application for development consent under Division 4.1 and 4.7 of Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) for the MCCO Project. The assessment has been undertaken in accordance with the *Secretary's Environmental Assessment Requirements* (SEARs) and the EPA's "Approved Methods for the Modelling and Assessment of Air Pollutants in NSW" (EPA 2016). The 2016 version of the EPA's "Approved Methods" introduces revised, more stringent criteria for particulate matter concentrations, compared to the criteria used to assess the existing and approved operations at Mangoola Coal Mine. This Air Quality Impact Assessment has been peer reviewed by Dr Nigel Holmes.

The potential air quality issues for the MCCO Project were identified as:

- Dust from the general mining activities;
- Fume from blasting; and
- Emissions of substances from machinery exhausts.

A detailed review of the existing environment was carried out. The following conclusions were made in relation to the existing air quality and meteorological conditions:

- Wind patterns in the vicinity of Mangoola Coal Mine are similar to other parts of the Hunter Valley, with the prevailing winds being from either the northwest or southeast.
- There are seasonal variations in particulate matter concentrations, with PM_{10} levels higher in spring and $PM_{2.5}$ levels higher in winter.
- Air quality conditions can be regarded as good, with annual average PM_{10} concentrations well below the relevant criteria. Some monitoring sites have experienced at least one day per year above the relevant 24-hour average criterion. This is not uncommon for most locations in NSW, including in rural and urban areas. None of these events were identified as being caused by activities at the existing Mangoola Coal Mine as they are typically related to regional influences.
- Annual average $PM_{2.5}$ concentrations have been variable, with some locations measuring concentrations above the recently introduced assessment criterion. Wood smoke from domestic heating was identified by the CSIRO (on behalf of the Office of Environment and Heritage) as a key factor for $PM_{2.5}$ concentrations in the Muswellbrook area, especially in winter.
- TSP, dust deposition and NO_2 levels are below their relevant assessment criteria.

The computer-based dispersion model known as CALPUFF was used to predict the potential air quality impacts of the MCCO Project, including cumulative impacts. The dispersion modelling accounted for meteorological conditions, land use and terrain information and used dust emission estimates to predict the off-site air quality impacts. The performance of the model was reviewed by comparing predictions to measured results for a representative year. It was found that, with the adopted approach for modelling and assessment, the model predictions were typically within 20 per cent of measured results, well within the factor-of-two accuracy that has been recognised for these types of models.

The main conclusions of the assessment were as follows:

- Maximum 24-hour average PM_{10} concentrations can meet the EPA 50 µg/m^3 cumulative criterion at all but one sensitive receptor location (property 83) in all assessment years. This property is subject to voluntary acquisition under the existing approved operations and is within the predicted noise voluntary acquisition zone for the MCCO Project. Further investigation showed that the MCCO Project would not be the primary cause of an exceedance. Nevertheless it is anticipated that 24-hour average PM_{10} concentrations will continue to be variable from day-to-day, due to existing conditions and sources, and that operations will need to be managed in a way which minimises the contribution to off-site PM_{10} levels, as is done under the existing approved operation. The predicted 24-hour and annual average PM_{10} impacts at property 83 do not trigger the air quality related voluntary mitigation or acquisition criteria in the Voluntary Land Acquisition and Mitigation Policy.

- As for PM_{10}, concentrations of $PM_{2.5}$ will continue to be variable from day-to-day. There are typically a few days each year when $PM_{2.5}$ concentrations exceed the recently introduced EPA cumulative assessment criterion, with wood smoke being a key factor, especially in the Muswellbrook region. This trend is expected to continue with or without the MCCO Project, based on model predictions showing that the MCCO Project's contribution to $PM_{2.5}$ concentrations would be relatively low. The modelling did indicate that the Project will contribute to, but will not be the primary cause of, an exceedance of the 24-hour average criterion at the location most likely to be influenced by emissions from the MCCO Project, being property 83 which is the closest property to the west of the existing Mangoola Coal Mine. The predicted 24-hour and annual average $PM_{2.5}$ impacts at property 83 do not trigger the air quality related voluntary mitigation or acquisition criteria in the Voluntary Land Acquisition and Mitigation Policy.
- There are no privately owned sensitive locations which are predicted to experience exceedances of the EPA's annual average PM_{10}, $PM_{2.5}$, TSP or dust deposition criteria at any stage of the MCCO Project.
- Post blast fume emissions are not expected to result in any adverse air quality impacts, based on model predictions which show compliance with EPA air quality criteria and with consideration of blast management practices that are currently employed by Mangoola Coal.
- Emissions from diesel exhausts associated with off-road vehicles and equipment are not expected to result in any adverse air quality impacts, based on model predictions which show compliance with EPA air quality criteria.
- The MCCO Project is predicted to comply with the air quality criteria specified in the Voluntary Land Acquisition and Mitigation Policy at all private sensitive receptor locations.

Important note about your report

The sole purpose of this report and the associated services performed by Jacobs is to quantify the potential air quality impacts of the Mangoola Coal Continued Operations Project in accordance with the scope of services set out in the contract between Jacobs and the Client. That scope of services, as described in this report, was developed with the Client.

In preparing this report, Jacobs has relied upon, and presumed accurate, any information (or confirmation of the absence thereof) provided by the Client and/or from other sources. Except as otherwise stated in the report, Jacobs has not attempted to verify the accuracy or completeness of any such information. If the information is subsequently determined to be false, inaccurate or incomplete then it is possible that our observations and conclusions as expressed in this report may change.

Jacobs derived the data in this report from information sourced from the Client (if any) and/or available in the public domain at the time or times outlined in this report. The passage of time, manifestation of latent conditions or impacts of future events may require further examination of the project and subsequent data analysis, and re-evaluation of the data, findings, observations and conclusions expressed in this report. Jacobs has prepared this report in accordance with the usual care and thoroughness of the consulting profession, for the sole purpose described above and by reference to applicable standards, guidelines, procedures and practices at the date of issue of this report. For the reasons outlined above, however, no other warranty or guarantee, whether expressed or implied, is made as to the data, observations and findings expressed in this report, to the extent permitted by law.

This report should be read in full and no excerpts are to be taken as representative of the findings. No responsibility is accepted by Jacobs for use of any part of this report in any other context.

This report has been prepared on behalf of, and for the exclusive use of, Jacobs's Client, and is subject to, and issued in accordance with, the provisions of the contract between Jacobs and the Client. Jacobs accepts no liability or responsibility whatsoever for, or in respect of, any use of, or reliance upon, this report by any third party.

1. Introduction

Jacobs Group (Australia) Pty Ltd (Jacobs) has been engaged by Umwelt (Australia) Pty Limited (Umwelt) on behalf of Mangoola Coal Operations Pty Limited (Mangoola) to complete an air quality impact assessment for the Mangoola Coal Continued Operations Project (MCCO Project). The MCCO Project involves the continuation of mining at Mangoola Coal Mine into a new mining area to the immediate north of the existing operations. The purpose of the assessment is to form part of an Environmental Impact Statement (EIS) being prepared by Umwelt to accompany an application for development consent under Division 4.1 and 4.7 of Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) for the MCCO Project. **Figure 1** shows the regional location of Mangoola Coal Mine.

The air quality impact assessment has been carried out in accordance with relevant guidelines published by the Environment Protection Authority (EPA), namely, the "Approved Methods for the Modelling and Assessment of Air Pollutants in NSW" (EPA 2016). The 2016 version of the EPA's "Approved Methods" introduced revised, more stringent criteria for particulate matter concentrations, compared to the criteria used to assess the existing approved operation.

The main objectives of this assessment were to:

- Identify potential air quality issues;
- Quantify existing and potential air quality impacts; and
- Identify suitable air quality management measures, as appropriate, to minimise impacts.

The Secretary's Environmental Assessment Requirements (SEARs) for the MCCO Project were issued by the Department of Planning and Environment (DPE) on 15 February 2019 (replacing a previous version of the SEARs issued on 22 August 2017) and identify the specific requirements to be addressed by the EIS for the MCCO Project. This assessment has been prepared in accordance with the SEARs, as well as relevant governmental assessment requirements, guidelines and policies. **Table 1** lists the matters relevant to this assessment and where they are addressed in this report.

Table 1 Relevant matters raised in SEARs

Requirement	Section addressed
Air quality – including: - a detailed assessment of potential construction and operational air quality impacts, in accordance with the *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW 2016*, and with a particular focus on particulate matter emissions ($PM_{2.5}$ and PM_{10}) emissions, and having regard to the *Voluntary Land Acquisition and* *Mitigation Policy 2018;* and - an assessment of the likely greenhouse gas emissions of the development	This report, in particular: - **Section 3** (identification of issues) - **Section 6** (estimated emissions) - **Section 9** (assessment of impacts) - **Section 10** (mitigation, monitoring and management) Greenhouse gas emissions have been assessed in a separate study for the EIS.

The assessment was based on the use of an air dispersion model, CALPUFF, to predict concentrations of substances emitted to air due to the proposed mining activities. Model predictions have been compared with air quality criteria referred to by the EPA in order to assess the effect that the MCCO Project may have on the existing air quality environment.

In summary, the report provides information on the following:

- Proposed mining activities (**Section 2**);
- Potential air quality issues (**Section 3**);

- Relevant air quality criteria (**Section 4**);
- Existing meteorological and air quality conditions (**Section 5**);
- Emissions to air from proposed mining activities (**Section 6**);
- Methods used to predict air quality impacts (**Section 7**);
- Expected air quality impacts, as determined by a comparison of model results with air quality assessment criteria (**Section 9**); and
- Management measures to be implemented, and monitoring of potential impacts (**Section 10**).

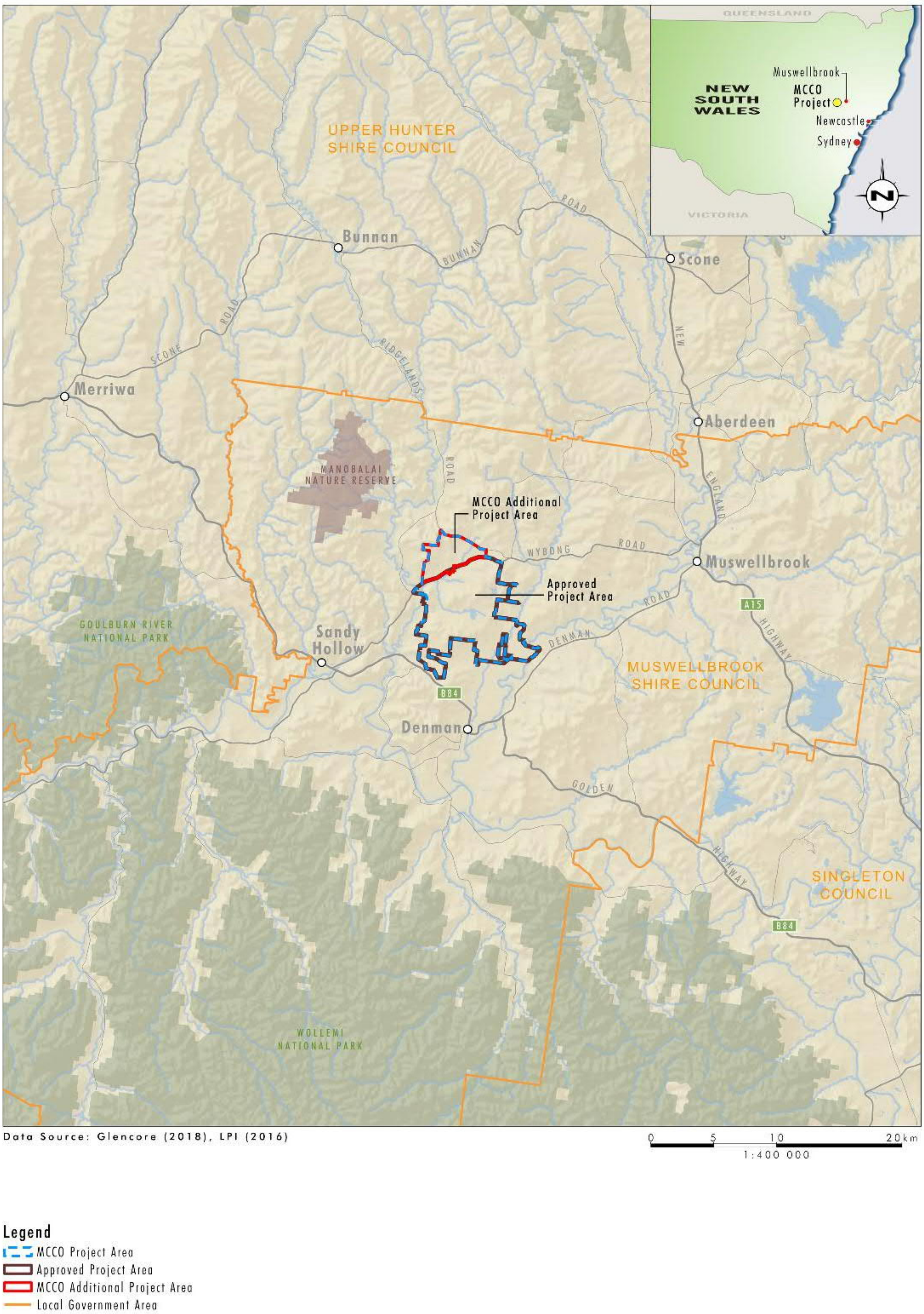


Figure 1 Regional locality plan

2. Project Description

Mangoola Coal Mine is an existing open cut coal mine located approximately 20 kilometres (km) west of Muswellbrook and 10 km north of Denman in the Upper Hunter Valley of NSW (refer **Figure 1**). Mangoola has operated the Mangoola Coal Mine in accordance with Project Approval (PA) 06_0014 since mining commenced at the site in September 2010.

The MCCO Project will allow for the continuation of mining at Mangoola Coal Mine into a new mining area to the immediate north of the existing operations. The MCCO Project will extend the life of the existing operation providing for ongoing employment opportunities for the Mangoola workforce. The MCCO Project Area includes the existing approved Project Area for Mangoola Coal Mine and the MCCO Additional Project Area as shown on **Figure 1**.

The MCCO Project generally comprises:

- open cut mining peaking at up to the same rate as that currently approved (13.5 Million tonnes per annum (Mtpa) of run of mine (ROM) coal) using truck and excavator mining methods;
- continued operations within the existing Mangoola Coal Mine;
- mining operations in a new mining area located north of the existing Mangoola Coal Mine, Wybong Road, south of Ridgelands Road and east of the 500 kV Electricity Transmission Line (ETL);
- construction of a haul road overpass over Big Flat Creek and Wybong Road to provide access from the existing mine to the proposed Additional Mining Area;
- establishment of an out-of-pit overburden emplacement area;
- distribution of overburden between the proposed Additional Mining Area and the existing mine in order to optimise the final landform design of the integrated operation;
- realignment of a portion of Wybong Post Office Road;
- the use of all existing or approved infrastructure and equipment for the Mangoola Coal Mine with some minor additions to the existing mobile equipment fleet;
- construction of a water management system to manage sediment laden water runoff, divert clean water catchment, provide flood protection from Big Flat Creek and provide for reticulation of mine water. The water management system will be connected to that of the existing mine;
- continued ability to discharge excess water in accordance with the Hunter River Salinity Trading Scheme (HRSTS)
- establishment of a final landform in line with current design standards at Mangoola Coal Mine including use of natural landform design principles consistent with the existing site;
- rehabilitation of the proposed Additional Mining Area using the same revegetation techniques as at the existing mine;
- a likely construction workforce of approximately 145 persons. No change to the existing approved operational workforce; and
- continued use of the mine access for the existing operational mine and access to/from Wybong Road, Wybong Post Office Road and Ridgelands Road to the MCCO Additional Project Area for construction, emergency services, ongoing operational environmental monitoring and property maintenance.

Figure 2 illustrates the key features of the MCCO Project and **Figure 3** shows the location of nearest sensitive receptors.

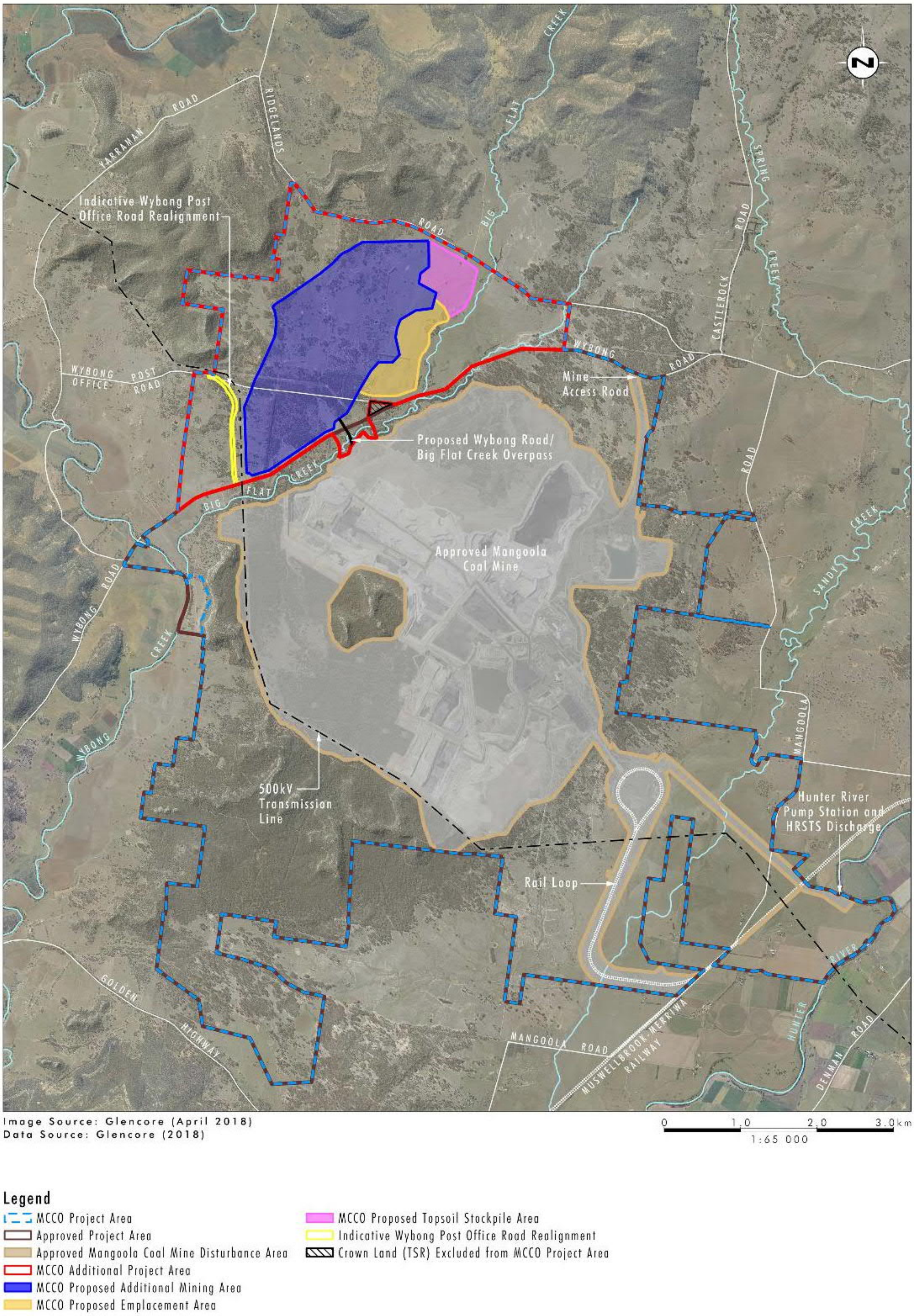


Figure 2 Conceptual Mangoola Coal Continued Operations Project

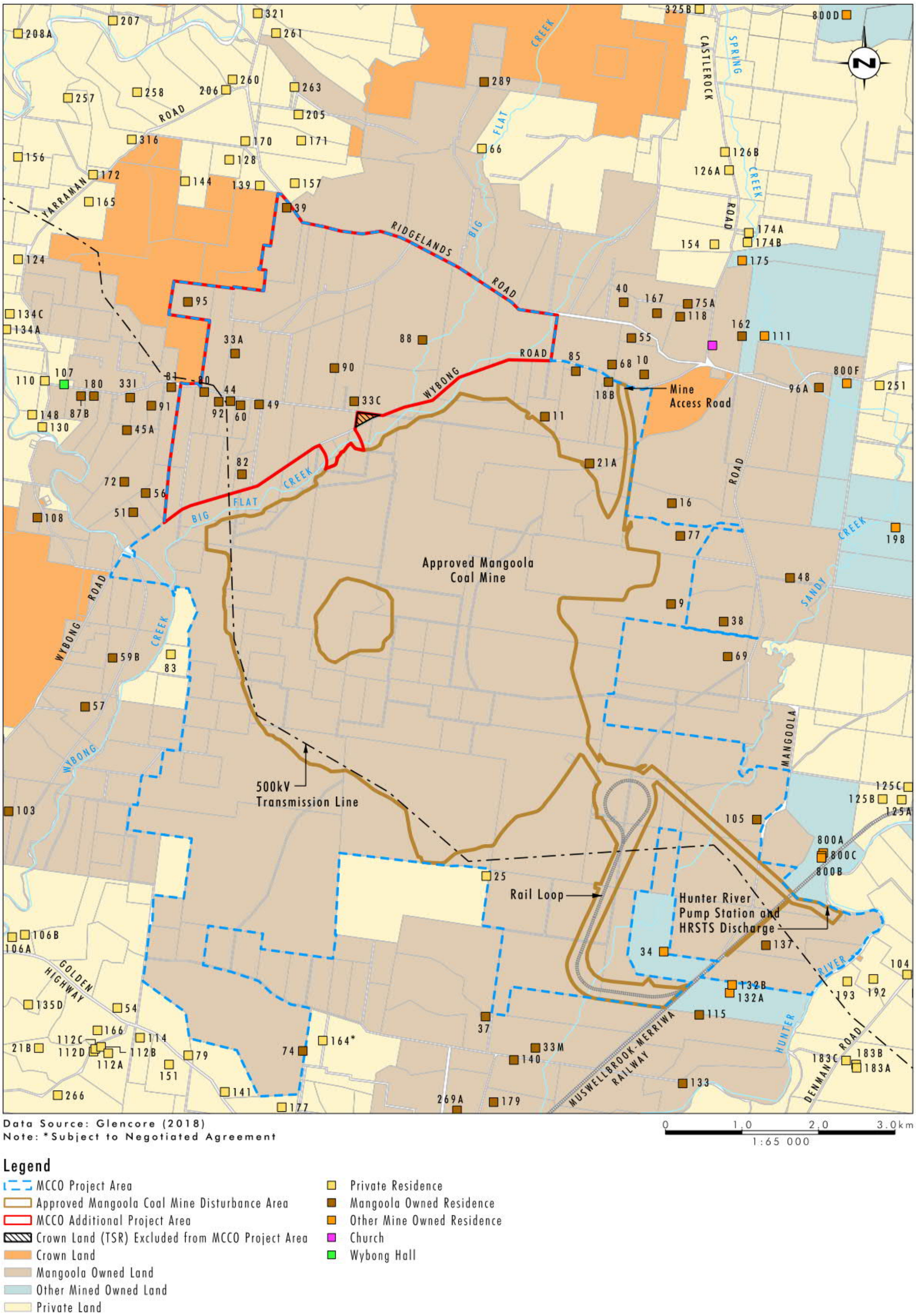


Figure 3 Location of nearest sensitive receptors and identification labels

3. Air Quality Issues

Air quality issues can arise when emissions from an industry or activity lead to deterioration in the ambient air quality. Potential air quality issues have been identified from a review of the MCCO Project and associated activities. This identification process has considered the types of emissions to air and proximity of these emission sources to sensitive receptors.

Emissions to air will occur from a variety of activities including material handling, material transport, processing, wind erosion, blasting and potentially, from the spontaneous combustion of coal. These emissions would mainly comprise of particulate matter in the form of total suspended particulates (TSP), particulate matter with equivalent aerodynamic diameter of 10 microns or less (PM_{10}) and particulate matter with equivalent aerodynamic diameter of 2.5 microns or less ($PM_{2.5}$). There would also be relatively minor emissions from machinery exhausts such as carbon monoxide (CO), oxides of nitrogen (NO_x) and particulate matter, and to a lesser extent sulphur dioxide (SO_2), hydrogen sulphide (H_2S) and potentially odour and other substances from the spontaneous combustion of coal. However, spontaneous combustion of coal has historically not been an issue at Mangoola Coal Mine and is not anticipated to be an issue for the MCCO Project as the same coal seams are proposed to be mined.

In summary, the potential air quality issues associated with the existing and proposed mining activities have been identified as:

- Dust (that is, particulate matter in the form of TSP, deposited dust, PM_{10} or $PM_{2.5}$) from the general mining activities;
- Fume (that is, NO_x emissions) from blasting;
- Emissions of substances from machinery exhausts, that is, diesel exhaust emissions.

The issues identified above are the focus of this assessment.

4. Air Quality Criteria

Typically, air quality is quantified by the concentrations of air pollutants in the ambient air. Air pollution occurs when the concentration (or some other measure of intensity) of substances known to cause health, nuisance and/or environmental effects, exceeds a certain level. With regard to human health and nuisance effects, the air pollutants most relevant to the MCCO Project are particulate matter emissions from blasting, excavation works and material handling, transport and processing activities (see **Section 3**).

There are various classifications of particulate matter and the EPA has developed assessment criteria for:

- TSP, to protect against nuisance amenity impacts;
- PM_{10}, to protect against health impacts;
- $PM_{2.5}$, to protect against health impacts; and
- Deposited dust, to protect against nuisance amenity impacts.

Most of the EPA criteria are drawn from national standards for air quality set by the National Environmental Protection Council of Australia (NEPC) as part of the National Environment Protection Measures (NEPM). To measure compliance with ambient air quality criteria, the Office of Environment and Heritage (OEH) has established a network of monitoring stations across the State and up-to-date records are published on the OEH website.

Air quality impacts from the MCCO Project have been determined by the level of compliance with the air quality criteria set by the EPA as part of its "Approved Methods for the Modelling and Assessment of Air Pollutants in NSW" (EPA 2016). These criteria are outlined in **Table 2** and apply to existing and potentially sensitive receptors such as residences, schools and hospitals. It should be noted that the assessment to support the existing approved operation was based on an earlier version of the "Approved Methods" (see DEC 2005). The 2016 version introduced a revised, more stringent criterion for PM_{10} as well as new criteria for 24-hour and annual average $PM_{2.5}$. In addition, the impact assessment criteria for the existing approved operation, as prescribed in the current Project Approval for Mangoola Coal Mine PA 06_0014, are numerically identical to the criteria in the 2005 version of the Approved Methods. The impact assessment criteria from PA 06_0014 are included in **Table 2** for comparison.

Table 2 EPA air quality assessment criteria

Substance	Averaging time	Impact assessment criteria from PA 06_0014	EPA criterion	Source
Particulate matter (PM_{10})	24-hour	50 µg/m^3	50 µg/m^3	EPA (2016) / DoE (2016)
	Annual	30 µg/m^3	25 µg/m^3	EPA (2016) / DoE (2016)
Particulate matter ($PM_{2.5}$)	24-hour	Nil	25 µg/m^3	EPA (2016) / DoE (2016)
	Annual	Nil	8 µg/m^3	EPA (2016) / DoE (2016)
Particulate matter (TSP)	Annual	90 µg/m^3	90 µg/m^3	EPA (2016) / NHMRC (1996)
Deposited dust	Annual (maximum increase)	2 g/m^2/month	2 g/m^2/month	EPA (2016) / NERDDC (1998)
	Annual (maximum total)	4 g/m^2/month	4 g/m^2/month	EPA (2016) / NERDDC (1998)
Nitrogen dioxide (NO_2)	1-hour	Nil	246 µg/m^3	EPA (2016) / NEPC (1998)
	Annual	Nil	62 µg/m^3	EPA (2016) / NEPC (1998)

The EPA air quality assessment criteria relate to the total concentration of air pollutant in the air (that is, cumulative) and not just the contribution from project-specific sources. Therefore, some consideration of background levels needs to be made when using these criteria to assess the potential impacts. Further discussion of background levels in the study area is provided in **Section 5**.

In situations where background levels are elevated, the proponent must "demonstrate that no additional exceedances of the impact assessment criteria will occur as a result of the proposed activity and that best management practices will be implemented to minimise emissions of air pollutants as far as is practical" (EPA 2016). In PA 06_0014 the determination of impact, for the purposes of land acquisition, was based on either incremental or total concentrations, depending on the substance and averaging time.

In December 2015 the Australian Government announced a National Clean Air Agreement (Agreement). This Agreement aims to reduce air pollution and improve air quality via the following main actions:

- The introduction of emission standards for new non-road spark ignition engines and equipment.
- Measures to reduce air pollution from wood heaters.
- Strengthened ambient air quality reporting standards for particle pollution.

The strengthening of ambient air quality reporting standards for particle pollution is relevant to the MCCO Project. Specifically, and at the time, the following was agreed:

> *"Taking into account the latest scientific evidence of health impacts, Ministers agreed to strengthen national ambient air quality reporting standards for airborne fine particles. Ministers agreed to adopt reporting standards for annual average and 24-hour $PM_{2.5}$ particles of 8 µg/m^3 and 25 µg/m^3 respectively, aiming to move to 7 µg/m^3 and 20 µg/m^3 respectively by 2025. Ministers also agreed to establish an annual average standard for PM_{10} particles of 25 µg/m^3. Victoria and the Australian Capital Territory will set, and South Australia will consider setting, a more stringent annual average PM_{10} standard of 20 µg/m^3 in the state, while ensuring nationally consistent monitoring and reporting against the agreed National Environment Protection Measure standards. The decision was also taken to review PM_{10} standards in 2018. The review will be co-led by the NSW and Victorian governments, in discussion with other jurisdictions."*

On 25 February 2016 an amendment to the NEPM entered into force and introduced the new national air quality standards for PM_{10} and $PM_{2.5}$, as noted above. The EPA subsequently revised its PM_{10} and $PM_{2.5}$ assessment criteria as part of an update to the "Approved Methods for the Modelling and Assessment of Air Pollutants NSW" (EPA 2016). These revised criteria are reflected in **Table 2**. There is currently no State legislation regarding the aim to move to more stringent $PM_{2.5}$ criteria by 2025. Accordingly, the MCCO Project is assessed against the current criteria detailed in the Approved Methods (2016) as these criteria would be applied by the consent authority in accordance with the provisions of Clause 12AB of the *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007* (Mining SEPP) (2018 amendment).

The NSW Voluntary Land Acquisition and Mitigation Policy (VLAMP) (2018) includes the NSW Government's policy for voluntary mitigation and land acquisition to address dust (particulate matter) impacts from state significant mining, petroleum and extractive industry developments. The current VLAMP (2018) brings the air quality criteria in line with the NEPM standards and EPA criteria.

From this Policy, voluntary mitigation rights may apply where, even with best practice management, the development contributes to exceedances of the criteria in **Table 3** at any residence or workplace.

Table 3 Mitigation criteria for particulate matter from the VLAMP

Substance	Averaging time	Mitigation criterion	Impact type
Particulate matter ($PM_{2.5}$)	Annual	8 µg/m^3*	Human health
	24-hour	25 µg/m^3**	Human health
Particulate matter (PM_{10})	Annual	25 µg/m^3*	Human health
	24-hour	50 µg/m^3**	Human health
Particulate matter (TSP)	Annual	90 µg/m^3*	Amenity
Deposited dust	Annual	2 g/m^2/month**	Amenity
	Annual	4 g/m^2/month*	Amenity

** Cumulative impact (i.e. increase in concentrations 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 acquisition rights may apply where, even with best practice management, the development contributes to exceedances of the criteria in **Table 4** at any residence or workplace on privately owned land, or on more than 25% of any privately-owned land where there is an existing dwelling or where a dwelling could be built under existing planning controls.

Table 4 Acquisition criteria for particulate matter from the VLAMP

Substance	Averaging time	Acquisition criterion	Impact type
Particulate matter ($PM_{2.5}$)	Annual	8 µg/m^3*	Human health
	24-hour	25 µg/m^3**	Human health
Particulate matter (PM_{10})	Annual	25 µg/m^3*	Human health
	24-hour	50 µg/m^3**	Human health
Particulate matter (TSP)	Annual	90 µg/m^3*	Amenity
Deposited dust	Annual	2 g/m^2/month**	Amenity
	Annual	4 g/m^2/month*	Amenity

** Cumulative impact (i.e. increase in concentrations 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 5 allowable exceedances of the criteria over the life of the development.*

The particulate matter levels for comparison with the criteria in **Table 3** and **Table 4** must be calculated in accordance with the EPA's "Approved Methods for the Modelling and Assessment of Air Pollutants in NSW" (EPA 2016).

5. Existing Environment

This section provides a description of the environmental characteristics in the area, focussing on a review of the local meteorological and ambient air quality conditions. The review considers data collected from existing meteorological and air quality monitoring networks over a minimum five year period, the locations of which are shown in **Figure 4**. One of the objectives for reviewing these data was to develop an understanding of existing air quality issues as well as the meteorological conditions which typically influence the local air quality conditions.

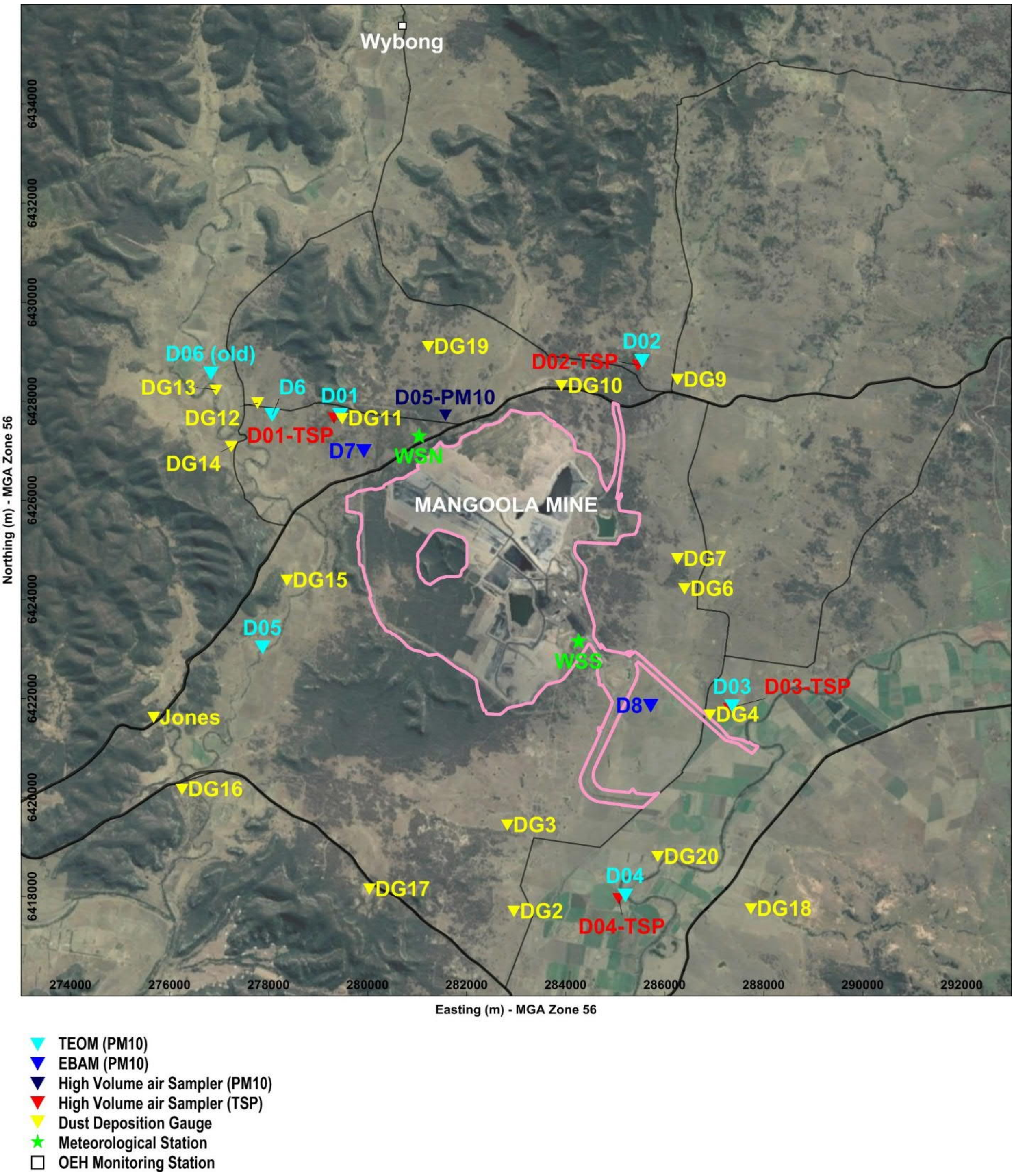


Figure 4 Location of air quality and meteorological monitoring sites

5.1 Meteorological Conditions

Meteorological conditions are important for determining the direction and rate at which emissions from a source will disperse. The key meteorological requirements of air dispersion models are, typically, hourly records of wind speed, wind direction, temperature, and atmospheric stability. For air quality assessments, a minimum one year of hourly data is usually required, which means that almost all possible meteorological conditions, including seasonal variations, are considered in the model simulations.

Three meteorological stations have been identified in a 20 km by 20 km domain around the Mangoola Coal Mine. These stations, shown in **Figure 4**, are referred to as:

- Weather Station North (WSN), operated by Mangoola;
- Weather Station South (WSS), operated by the Mangoola; and
- Wybong, operated by the OEH.

WSN is located on the northern side of Wybong Road, on clear open land. WSS is located within the existing disturbance area and adjacent to the product coal stockpiles. Based on a site inspection, measurements of wind conditions at WSS will be affected by the presence of nearby trees so data from this station have not been considered further.

Meteorological data from five recent years (2012 to 2016 inclusive) have been analysed in order to identify a representative year for the modelling. These years were selected on the basis that they were the most recent complete five years available when the assessment commenced. Hourly records of temperature, wind speed and wind direction were obtained, among other parameters. The procedure for identifying a representative meteorological year involved selecting a meteorological monitoring station and comparing wind patterns for the 2012 to 2016 calendar years. Data from WSN have been chosen for identifying a representative year.

Figure 5 shows the annual wind patterns for 2012, 2013, 2014, 2015 and 2016. It can be seen from these wind-roses that the most common winds in the area are from the east-southeast, southeast, and west-northwest. This pattern of winds is common for many parts of the Hunter Valley and reflects the northwest-southeast alignment of the valley.

It is also clear from **Figure 5** that wind patterns were similar in all of the 2012 to 2016 years. This suggests that wind patterns do not vary significantly from year to year, and potentially the data from any of the years presented could be used as a representative year for modelling purposes.

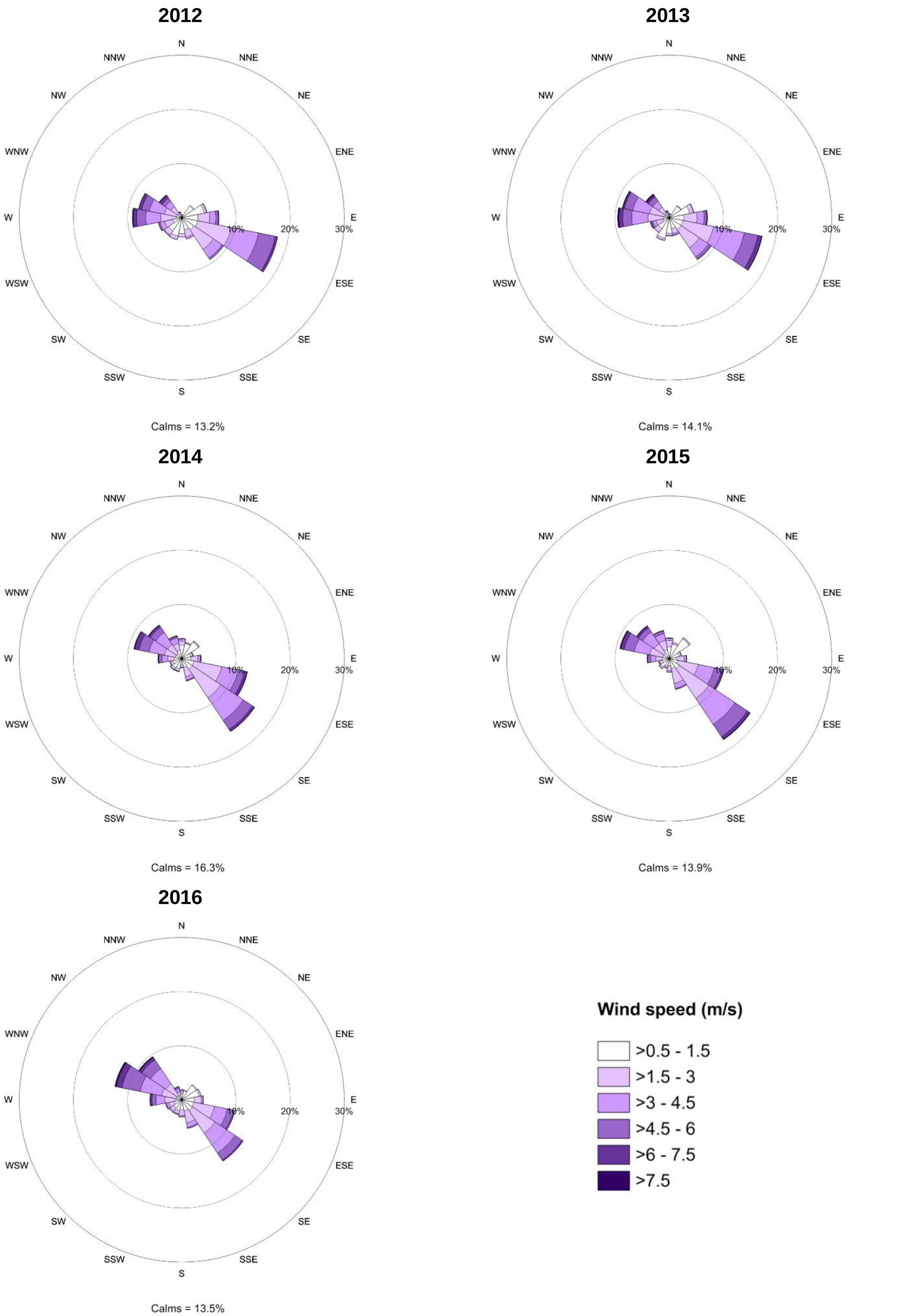


Figure 5 Annual wind-roses for data collected at WSN meteorological station

Figure 6 shows the wind speed data from the WSN meteorological station, as well as rainfall data from Muswellbrook. In terms of wind conditions, the average and maximum wind speeds exhibited similar ranges across all five years. Maximum wind speeds reached around 12 m/s (as an hourly average) and these winds typically occurred in spring.

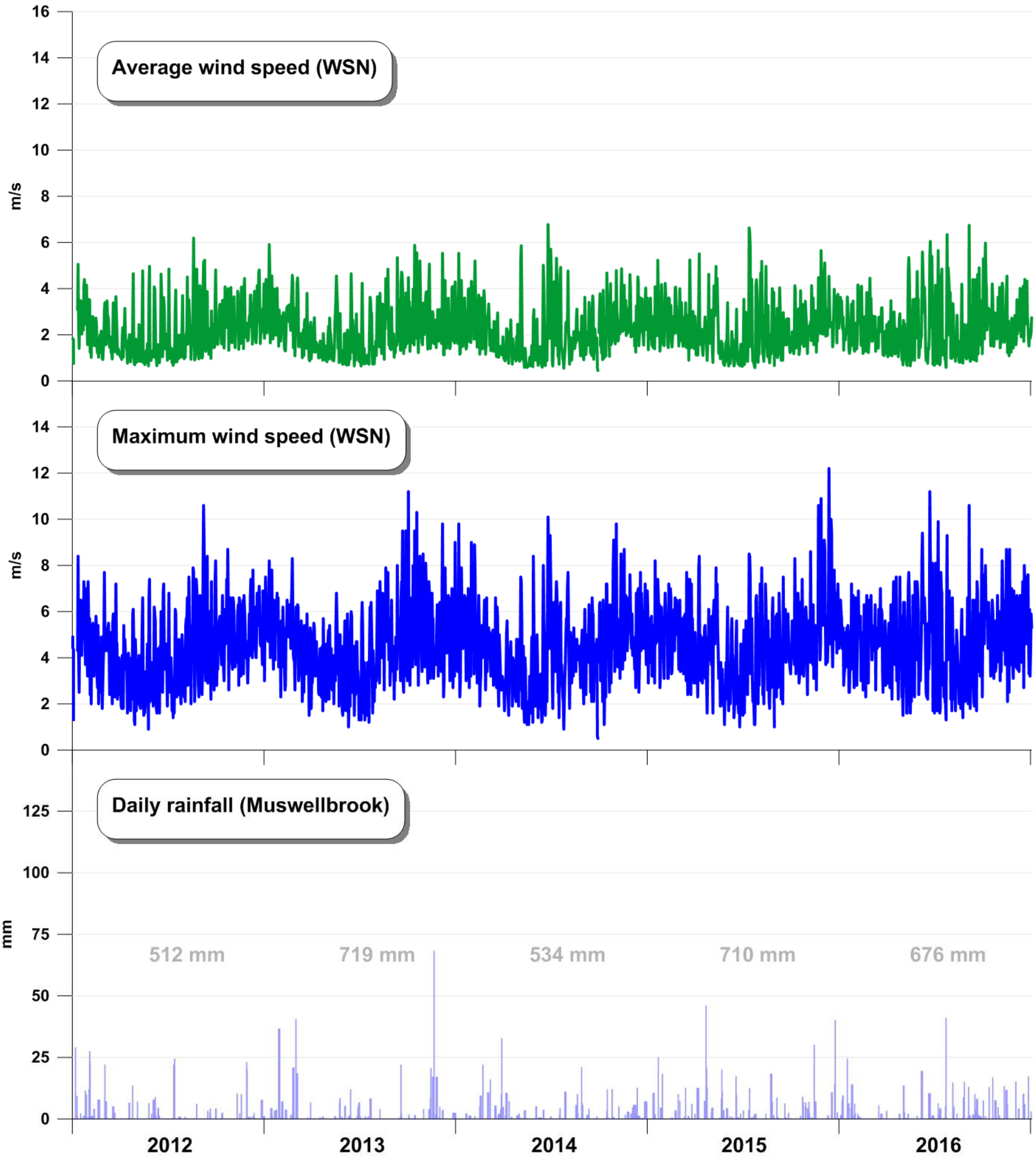


Figure 6 Wind speed and rainfall for data collected between 2012 and 2016

As can be seen from **Figure 6**, rainfall can occur at any time of the year and with varying intensity. Statistically, the annual rainfall (for 2012 to 2016) has ranged from 512 mm in 2012 to 719 mm in 2013. These annual values can be compared to the longer-term record which is as follows:

- Muswellbrook (St Heliers) (Bureau of Meteorology) 1992 to 2018 = 638 mm

Rainfall data for 2017 and 2018 were also reviewed after the air quality assessment had commenced. At the time of writing the Bureau of Meteorology had not completed their quality controls checks on the 2017 and 2018 data however the preliminary data indicated much lower rainfall than the long term average; 390 mm in 2017 and 388 mm in 2018. This suggests that 2017 and 2018 were not typical meteorological years, in terms of rainfall.

Finally, the annual data statistics for the 2012 to 2016 years have been examined to assist with identifying a representative meteorological year. **Table 5** shows the statistics.

Table 5 Annual statistics from meteorological data collected between 2012 and 2016

Location	Statistic	2012	2013	2014	2015	2016
WSN	Percent complete (%)	98	98	98	98	99
WSN	Mean wind speed (m/s)	2.2	2.3	2.2	2.3	2.3
WSN	99^{th} percentile wind speed (m/s)	6.7	7.3	7.0	7.0	7.0
WSN	Percentage of calms (%)	13	14	16	14	14
WSN	Percentage of winds >6 m/s (%)	2.8	3.3	3.0	2.7	3.1
Muswellbrook	Rainfall (mm)	512	719	534	710	676
Singleton	Rainfall (mm)	565	772	650	899	728

Over these five years, the mean annual wind speed has ranged from 2.2 to 2.3 m/s, and the percentage of calms has ranged from 13 to 16 per cent. None of these years appear to be significantly different to the other years and again, data from any of the years may be considered as representative for the purposes of modelling.

For this assessment the 2014 calendar year has been selected as the meteorological modelling year, based on:

- High data capture rate which meets the EPA's requirement for a 90% complete dataset
- Similar wind patterns to other years
- Rainfall being slightly below the long-term average, and the preference was for a slightly drier than average year
- Air quality conditions which showed similarities to other years and not adversely influenced by bushfire activity (as will be seen in **Section 5.2**)
- Consistency with other recent air quality impact assessments (see for example, Jacobs [2016] and Jacobs [2018])

Methods used for incorporating the 2014 data into the meteorological modelling (CALMET) and air dispersion modelling (CALPUFF) are discussed in detail in **Section 7**. Annual and seasonal wind-roses from the WSN and Wybong stations used in the modelling are provided in **Appendix B**.

5.2 Air Quality Conditions

The EPA air quality criteria refer to levels of substances which generally include the project of interest and existing sources, not just the contribution from local mining activities. To fully assess impacts against all the relevant air quality criteria (see **Section 4**) it is necessary to have information or estimates of the existing air quality conditions. This section provides a description of the existing air quality.

Air quality in the vicinity of the Mangoola Coal Mine is monitored by Mangoola and by the OEH. This monitoring includes the measurement of:

- Particulate matter (as PM_{10});
- Particulate matter (as $PM_{2.5}$);
- Particulate matter (as TSP); and
- Dust deposition.

Concentrations of NO_2 have not been measured in the vicinity of the Mangoola Coal Mine, however the OEH measures this substance at other locations as part of its Upper Hunter Air Quality Monitoring Network. **Sections 5.2.1** to **5.2.5** describe the existing air quality conditions, based on a review of monitoring results for the substances listed above, as well as for NO_2.

It should be noted that the measurement data represent the contributions from all sources that have at some stage been upwind of each monitor. In the case of particulate matter (as PM_{10}) for example, the background concentration may contain emissions from many sources such as from mining activities, construction works, bushfires and ‘burning off’, agricultural activities, industry, vehicles, roads, wind-blown dust from nearby and remote areas, fragments of pollens, moulds, and so on.

5.2.1 Particulate Matter (as PM_{10})

Figure 4 shows the location of monitors surrounding Mangoola Coal Mine which are used to measure PM_{10} concentrations. The concentrations are measured by a variety of instruments including Tapered Element Oscillating Microbalance (TEOM), high volume air sampler (HVAS) and eSamplers.

Figure 7 shows the measured 24-hour average PM_{10} concentrations from each TEOM monitoring site for data collected between 2012 and 2016; the most recent five years available at the time of commencing this assessment. The EPA’s air quality assessment criteria for PM_{10} (50 µg/m^3) has also been shown on these graphs. It can be seen from **Figure 7** that all monitors, except D05, recorded at least one day above the 50 µg/m^3 criterion in the 2012 to 2016 period. All of these days have been investigated by Mangoola Coal as part of annual reporting. None of these events were identified as being caused by activities at the existing Mangoola Coal Mine. There is a seasonal variation in the air quality conditions, with most exceedances of the 50 µg/m^3 criterion occurring in the warmer months.

The patterns in **Figure 7** indicate that PM_{10} concentrations at the Wybong monitoring site may be slightly higher than PM_{10} concentrations in the vicinity of Mangoola Coal Mine, with similar seasonal trends. The location of the Wybong monitor is near the St Marks Church and vehicle activity to and from the church on the unpaved gravel road and parking area may explain the slightly higher measured PM_{10} concentrations.

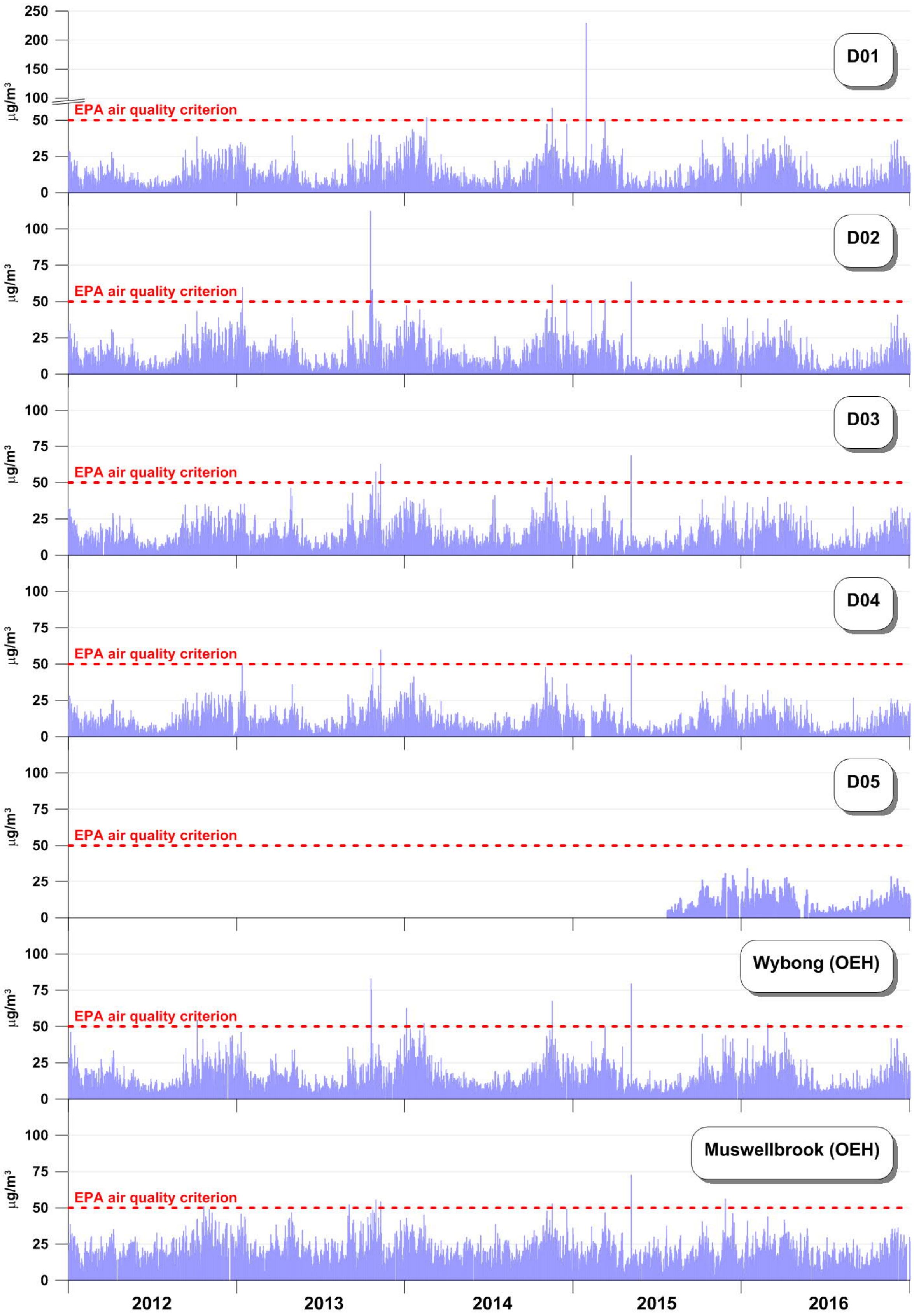


Figure 7 Measured 24-hour average PM_{10} concentrations

Table 6 summarises the measured PM_{10} concentration data for each monitor, for 24-hour and annual average periods, and for comparison with the respective EPA criteria. As noted above, most monitors have measured at least one day per year above the 50 µg/m^3 criterion in this five year period. Annual average PM_{10} concentrations have not exceeded the 30 µg/m^3 criterion (applicable during 2012 to 2016) at any monitor. Data from the OEH's monitoring site at Muswellbrook have also been presented in **Table 6** for comparison. Data for 2017 and 2018 were also included once available because, as noted in **Section 5.1**, the rainfall in 2017 and 2018 was around 40 per cent lower than the long term average.

The data from **Table 6** indicate good air quality conditions in the vicinity of Mangoola Coal Mine, with respect to PM_{10}. This conclusion is based on annual average PM_{10} concentrations which, for 2012 to 2016, have ranged between 10 and 15 µg/m^3 and typically less than half the current assessment criterion (25 µg/m^3). The air quality conditions in 2018 were quite clearly higher than in previous years with conditions likely to have been influenced by an extended dry period from 2017 to 2018 resulting in more regional events, classified as "extraordinary" under PA 06_0014. For example, dust storms on 22 and 23 November 2018.

Table 6 Summary of measured PM_{10} concentrations

Year	D01	D02	D03	D04	D05	Wybong (OEH)	Muswellbrook (OEH)	Criterion
Maximum 24-hour average in µg/m^3								
2012	39	43	35	31	N/A	54	51	50
2013	40	112	63	60	N/A	83	56	
2014	58	62	53	48	N/A	68	53	
2015	230	64	69	56	31	80	73	
2016	40	41	40	32	34	52	44	
2017	51	50	50	84	38	64	57	
2018	N/A	132	155	178	170	180	186	
Number of days above 24-hour average criteria								
2012	0	0	0	0	N/A	1	1	-
2013	0	5	2	2	N/A	2	3	
2014	2	2	1	0	N/A	3	1	
2015	2	2	1	1	0	1	2	
2016	0	0	0	0	0	1	0	
2017	2	0	0	1	0	3	2	
2018	N/A	4	5	3	5	9	13	
Annual average in µg/m^3								
2012	12	13	14	11	N/A	15	22	30 (now 25)
2013	13	15	15	12	N/A	16	23	
2014	14	14	15	12	N/A	17	21	
2015	12	11	12	10	11	15	19	
2016	12	12	14	10	10	15	19	
2017	12	13	15	13	9	17	22	
2018	N/A	17	20	18	16	22	27	

PM_{10}concentrations in the vicinity of Mangoola Coal Mine have also been lower than those measured at Muswellbrook. There are occasional exceedances of the 24-hour average PM_{10} criterion, 50 µg/m^3, however this not uncommon for most parts of NSW, including rural and urban areas and as noted, none of these events have been identified as being caused by activities at the existing Mangoola Coal Mine.

The results for the 2014 calendar year appear to be typical of, or slightly higher than, the longer-term conditions experienced at each monitoring site which supports the earlier suggestion (**Section 5.1**) of 2014 being a typical or representative year.

The potential conditions which led to elevated PM_{10} concentrations at D01, D02, D03 and D04 for 2014 have been analysed by the preparation of the following graphs:

- Hourly PM_{10} concentrations by time of day and wind speed (**Figure 8**).
- Hourly PM_{10} concentrations by wind direction and wind speed (**Figure 9**).

The information from **Figure 8** shows that, for these monitoring sites in 2014, the highest short-term (1-hour average) PM_{10} concentrations could be at any time of day. However, on average, the PM_{10} concentrations are typically highest in the morning (around 9 am) and evening (around 8 pm). This pattern may be explained by poorer dispersion conditions in the morning and evening whereby any dust emissions disperse more slowly and allow higher concentrations to exist for extended periods of time. Also, the higher average concentrations in the morning and evening may be associated with increased anthropogenic (human) activity at these times, for example the use of wood heaters.

Figure 9 shows the measured hourly average PM_{10} concentrations by wind direction and wind speed, from 2014 data. It can be seen from these figures that, at D01, some of the highest hourly average PM_{10} concentrations were associated with stronger winds from the southeast. Based on the location of D01 it would not be unreasonable to infer that these measured concentrations were influenced to some degree by emissions from Mangoola Coal Mine. However, at all sites (with the exception of D03) the very highest concentration coincided with a wind from the northwest which is not in the direction of Mangoola Coal Mine.

The dust monitoring program for Mangoola Coal Mine will capture the effects that dust emissions from other existing mining operations have on air quality in the study area. Based on **Figure 9** the data do not appear to show very strong signals from the directions of other mining operations such as Mt Arthur mine and Bengalla mine. Mount Pleasant mine was not operating in 2014. This suggests that, while there is likely to be some contributions, other mining operations have little influence on air quality in the areas of interest around Mangoola Coal Mine and, as noted from **Table 6**, PM_{10} concentrations in the vicinity of Mangoola Coal Mine have historically been lower than those measured in the Muswellbrook area. Additional discussion of potential cumulative impacts with other operations is provided in **Section 5.4**.

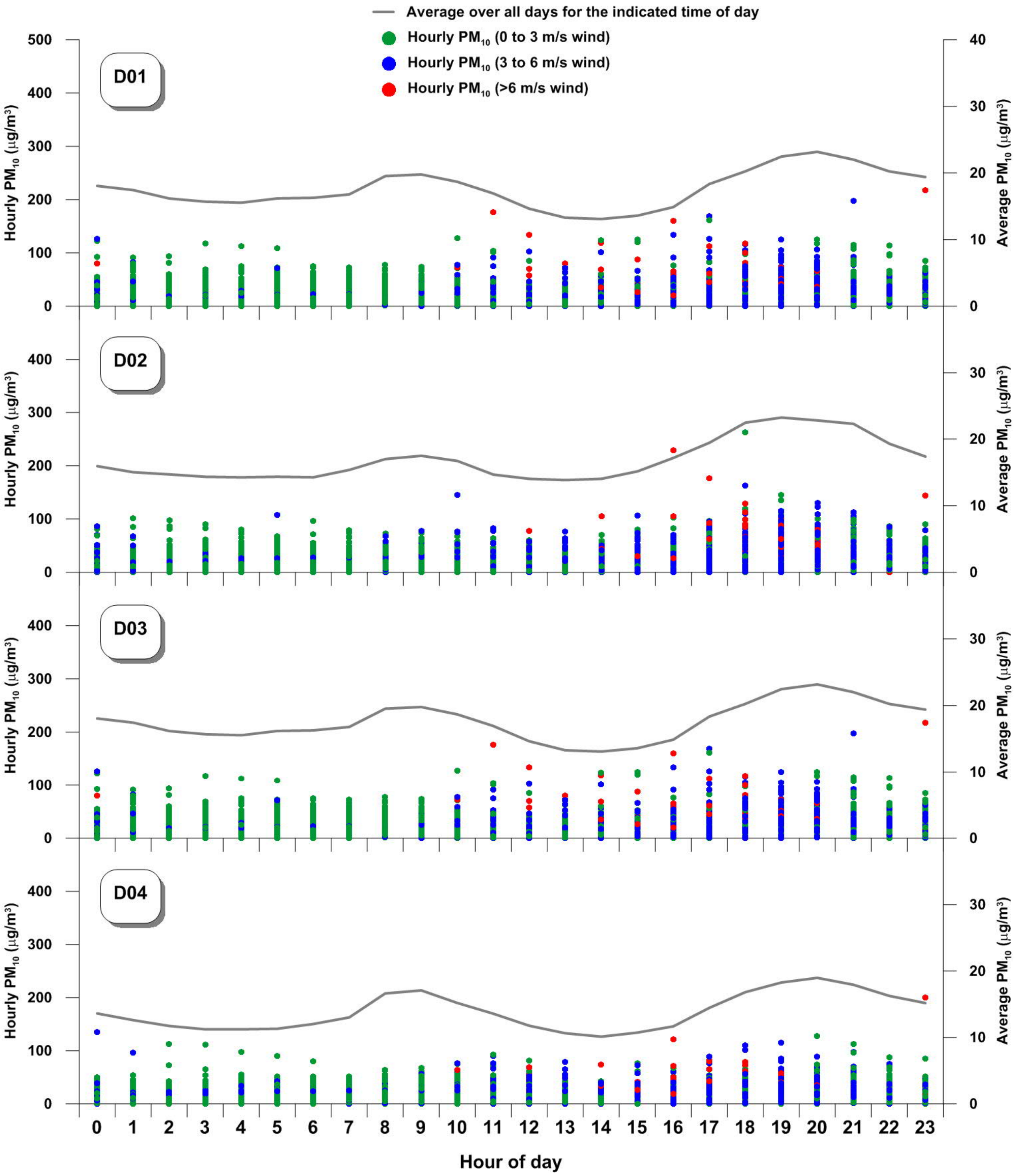


Figure 8 Measured PM_{10} concentrations by time of day and wind speed (2014 data)

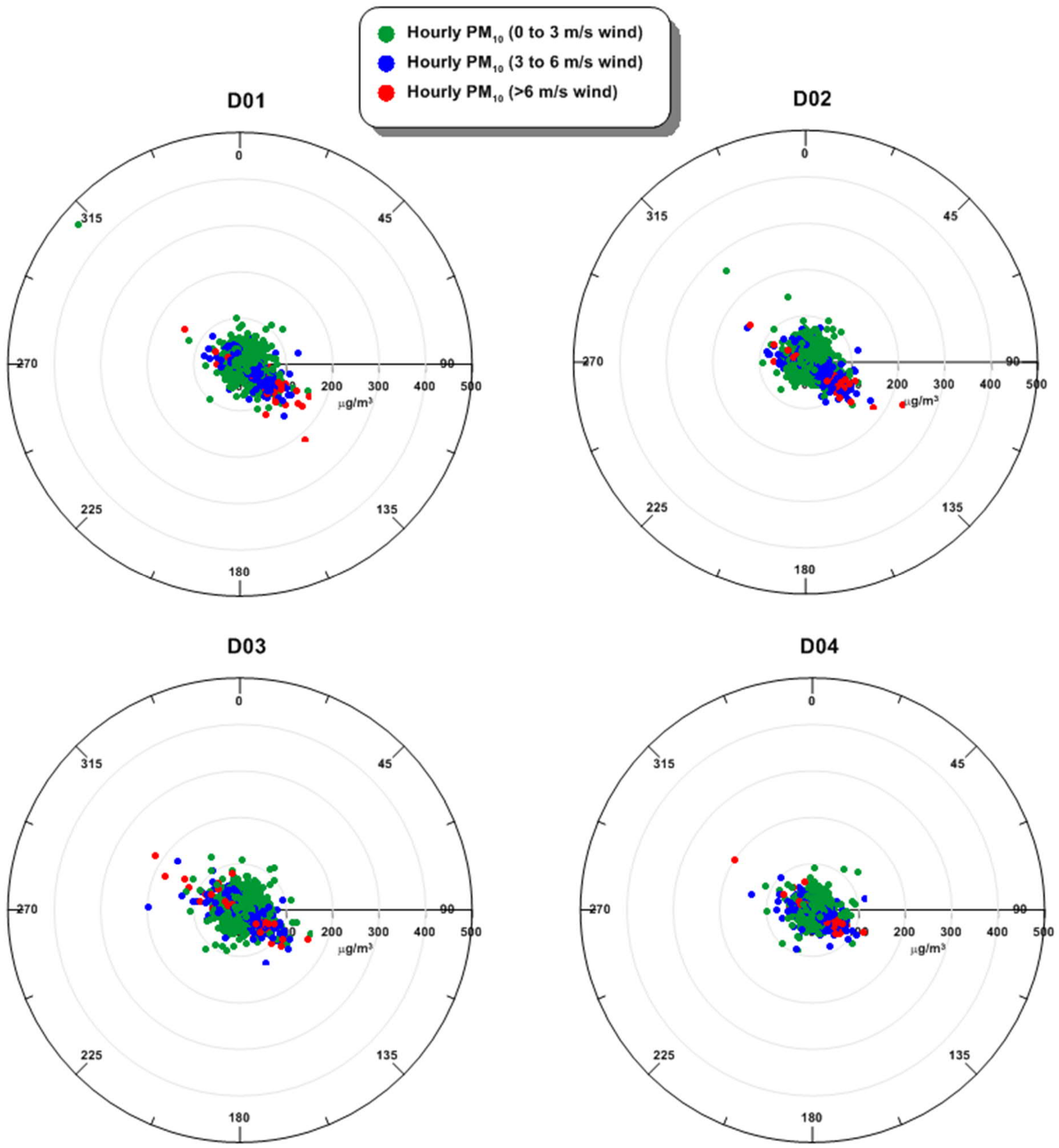


Figure 9 Measured PM_{10} concentrations by wind direction and wind speed (2014 data)

5.2.2 Particulate Matter (as $PM_{2.5}$)

Mangoola monitors $PM_{2.5}$ concentrations at two locations, D01 and D04, and the OEH has a $PM_{2.5}$ monitoring site at Muswellbrook. These stations use Beta Attenuation Monitors (BAM) for the measurement of $PM_{2.5}$.

Figure 10 shows the measured 24-hour average $PM_{2.5}$ concentrations from each of the three monitoring sites for data collected between 2012 and 2016. The EPA's current air quality assessment criteria for $PM_{2.5}$ (25 µg/m^3) has also been shown, but it should be noted that this criterion came into effect from 20 January 2017 onwards and was therefore not applicable to the data being collected between 2012 and 2016.

$PM_{2.5}$ concentrations have been below the EPA criterion for the majority of the time. There have however been days when the $PM_{2.5}$ concentration exceeded 25 µg/m^3 at all three monitors. A seasonal variation is also evident, especially at Muswellbrook, with the higher concentrations tending to occur in winter. There appeared to be abnormally high $PM_{2.5}$ results from D04 between November 2012 and February 2013. These high results were not evident in the data from either D01 or from Muswellbrook. The monitoring contractor confirmed that some units had experienced water related issues due to extreme weather at the time and that updated settings and calibration tasks had resolved the issues. The data for this period were therefore not representative of actual conditions.

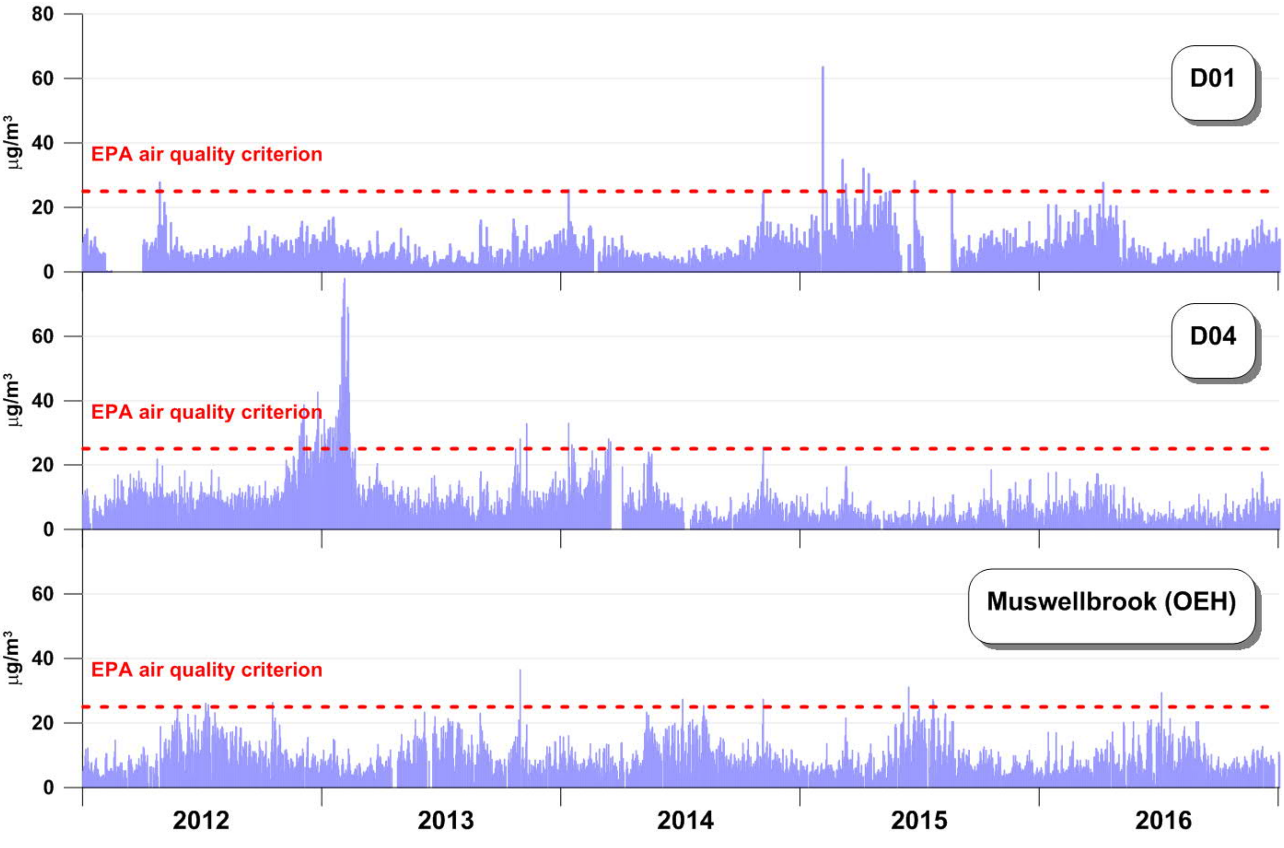


Figure 10 Measured 24-hour average $PM_{2.5}$ concentrations

Table 7 summarises the measured $PM_{2.5}$ results for data collected between 2012 and 2018. It can be seen from these data that the highest 24-hour average $PM_{2.5}$ concentrations have exceeded 25 µg/m^3 on at least one occasion in the past seven years but, for 2012 to 2016, the 25 µg/m^3 criterion was referred to as an advisory reporting goal and not an EPA air quality impact assessment criterion. Therefore no investigation was required.

Annual averages exceeded 8 µg/m^3 at D01 in 2015, at D04 in 2012, 2013, 2014 and 2017, and at Muswellbrook for all years between 2012 and 2018. Again, the 8 µg/m^3 level only came into effect as an assessment criterion from 20 January 2017, prior to which it was referred to as an advisory reporting goal.

It is also useful to compare the Hunter Valley data with information from other locations. At Cape Grimm, a site in rural Tasmania that is used as a global “baseline” reference for unpolluted air entering Australia, the mean $PM_{2.5}$ concentration was 5.6 µg/m^3 for data collected between 1998 and 2008 (ANSTO 2008). The results from D01 have ranged between 11% lower to 61% higher than the Cape Grimm records and, on average, 16% higher. Most of Cape Grimm’s particulate matter mass is from sea salt.

The Upper Hunter Fine Particle Characterisation Study (OEH, 2013b) investigated the factors which contributed to elevated $PM_{2.5}$ concentrations in the Hunter Valley. This study identified a clear seasonal trend with higher $PM_{2.5}$ concentrations occurring in the cooler months, and predominantly due to wood smoke from domestic heating. Specifically, in Muswellbrook, wood smoke accounted for an average of approximately 30% of the total $PM_{2.5}$, peaking at around 62% in winter.

Table 7 Summary of measured $PM_{2.5}$ concentrations

Year	D01	D04	Muswellbrook (OEH)	Criterion
Maximum 24-hour average in µg/m^3				
2012	28	43*	26	25 (came into effect as an assessment criterion from 20 Jan 2017 onwards)
2013	17	78*	37	
2014	26	33	27	
2015	64	20	31	
2016	28	18	29	
2017	20	43	31	
2018	N/A	30	27	
Number of days above 24-hour average criteria				
2012	1	15	3	-
2013	0	36	1	
2014	1	6	3	
2015	7	0	3	
2016	1	0	1	
2017	0	8	2	
2018	N/A	4	2	
Annual average in µg/m^3				
2012	6.2	11.4*	10.1	8 (came into effect as an assessment criterion from 20 Jan 2017 onwards)
2013	5.0	12.6*	9.4	
2014	5.7	8.7	9.7	
2015	9.0	4.8	8.7	
2016	6.6	5.4	8.4	
2017	5.9	8.1	9.4	
2018	N/A	7.2	9.4	

** Influenced by erroneous readings from November 2012 and February 2013*

5.2.3 Particulate Matter (as TSP)

TSP concentrations have been measured at four locations by high volume air sampler (HVAS). **Figure 4** shows the location of the monitoring sites and **Table 8** shows the annual average concentrations from data collected in the past seven years, for comparison with the EPA’s 90 µg/m^3 criterion. None of the monitoring sites have recorded TSP concentrations above 90 µg/m^3.

Table 8 Summary of measured TSP concentrations

Year	D01	D02	D03	D04	Criterion
Annual average in µg/m³					
2012	33	42	38	29	90
2013	34	44	44	37	
2014	44	47	50	39	
2015	41	41	40	34	
2016	36	35	42	35	
2017	39	43	42	38	
2018	N/A	61	60	50	

5.2.4 Deposited Dust

Table 9 shows the annual average deposited dust levels for each gauge from data collected in the past seven years, for locations representative of private properties. **Figure 4** shows the location of the monitoring sites. The results in **Table 9** can be compared with the EPA's 4 g/m²/month criterion. Contaminated monthly samples were excluded from the calculation of these annual averages as these do not reflect actual dust fallout levels.

Table 9 Summary of measured deposited dust levels

Year	DG01	DG02	DG03	DG04	DG09	DG12	DG13	DG14	DG15	DG16	DG17	DG18	Criterion
Annual average expressed as g/m²/month													
2012	2.9	3.4	1.0	2.5	2.5	2.2	1.8	2.4	1.1	1.2	4.0	2.0	4
2013	1.6	3.0	1.2	2.3	2.4	1.2	1.5	3.1	1.6	1.5	2.5	1.4	
2014	1.5	2.3	1.2	1.9	1.9	1.3	0.9	1.3	1.1	1.1	1.1	1.9	
2015	1.3	1.3	0.8	1.7	1.6	0.9	0.9	1.0	0.9	1.0	0.9	1.4	
2016	1.2	2.0	0.9	1.8	1.3	1.4	0.9	1.4	1.0	0.9	0.7	1.6	
2017	1.7	3.0	1.2	2.1	1.4	1.6	1.6	2.7	1.9	1.2	1.2	1.9	
2018	2.0	1.8	1.2	1.7	1.5	1.8	1.9	2.8	2.2	2.3	1.2	2.7	

It can be seen from **Table 9** that no locations experienced deposition levels above the EPA's 4 g/m²/month criterion, from data collected between 2012 and 2018.

5.2.5 Nitrogen Dioxide (NO_2)

Table 10 provides a summary of the measured NO_2 concentrations from Muswellbrook (the closest known air quality monitoring site which records this substance). These data show that the maximum NO_2 concentrations have been well below the EPA's 1-hour average criterion of 246 µg/m³. Annual averages have also been well below the EPA's annual average criterion of 62 µg/m³.

Table 10 Summary of measured NO_2 concentrations

Year	Muswellbrook (OEH)	Criterion
Maximum 1-hour average in µg/m^3		
2012	90	246
2013	86	
2014	80	
2015	86	
2016	86	
2017	92	
2018	96	
Annual average in µg/m^3		
2012	21	62
2013	18	
2014	21	
2015	18	
2016	18	
2017	21	
2018	21	

5.3 Summary of the Existing Environment

The following conclusions have been made from the review of local meteorological and ambient air quality monitoring data:

- Wind patterns in the vicinity of Mangoola Coal Mine are similar to other parts of the Hunter Valley, with the prevailing winds being from either the northwest or southeast.
- There are seasonal variations in particulate matter concentrations, with PM_{10} levels higher in spring and $PM_{2.5}$ levels higher in winter.
- In terms of PM_{10}, air quality conditions can be regarded as good, with annual average concentrations well below the revised assessment criterion of 25 µg/m^3. Most monitoring sites in the vicinity of Mangoola Coal Mine have experienced at least one day above the EPA's 50 µg/m^3 criterion in the past seven years. This is not uncommon for most locations in NSW, including in rural and urban areas. None of these events have been identified as being caused by activities at the existing Mangoola Coal Mine.
- In terms of $PM_{2.5}$, annual averages have been variable. Results were below the recently introduced assessment criterion (8 µg/m^3) at one (D01) of the three locations for most years. Results from another location (D04) were affected by abnormal measurements, and results from Muswellbrook were above 8 µg/m^3 in all years between 2012 and 2016. A study by the OEH (2013b) found that wood smoke from domestic heating was one of the main factors that influenced $PM_{2.5}$ concentrations in the Muswellbrook area, especially in winter.
- TSP, dust deposition and NO_2 levels are below their relevant EPA criteria.
- Conditions in 2014 were representative of the longer-term air quality and meteorological conditions.

5.4 Assumed Background Levels

One of the objectives for reviewing the air quality monitoring data was to determine appropriate background levels to be added to model predictions for the assessment of potential cumulative impacts, that is, mining contribution plus non-mining contribution. For this objective, the approach was to make use of data collected from all real-time air quality monitors in the vicinity of Mangoola Coal Mine and, at the same time, minimise the potential for adding model predictions to measurements which may already contain contributions from those sources being modelled (i.e. to avoid double counting).

The adopted approach involved developing an hourly variable background dataset that was added to the model predictions. This dataset (for PM_{10}) was created by using the minimum measured non-zero 24-hour average concentration from D01, D02, D03 and D04 for each day in the 2014 calendar year. A key assumption to this approach was that the minimum value from these sites reflected a location that was not being influenced by emissions from the sources / operation to be modelled. The statistics of the resultant dataset (included in **Table 11**) indicate that this approach, and its inherent assumption, produce estimated background levels which are similar to actual measurements in the region. **Figure 11** shows a graphical representation of the assumed background PM_{10} and $PM_{2.5}$ concentrations that were used in this assessment and added to the model predictions of concentrations due to the MCCO Project. As can be seen from **Figure 11** these background concentrations have been inferred from the measurement data.

The estimated background levels that apply at sensitive receptors are shown below in **Table 11**. These levels (or approach adopted) have been added to model predictions to determine the potential cumulative impacts.

Table 11 Assumed non-modelled background levels that apply at sensitive receptors

Substance	Averaging time	Assumed background level that applies at sensitive receptors	Notes
Particulate matter (PM_{10})	24-hour and annual	Variable by hour of day	The adopted approach involved developing an hourly variable background dataset that was added to the model predictions. This dataset was created by using the minimum measured non-zero 24-hour average concentration from D01, D02, D03 and D04 for each day in the 2014 calendar year. Statistics from the resultant dataset are as follows: - Maximum 24-hour average = 41 µg/m^3 - Annual average = 11 µg/m^3 The data derived above have been added to the predicted contributions of the MCCO Project for the assessment of potential cumulative impacts, in accordance with EPA guidelines.
Particulate matter ($PM_{2.5}$)	24-hour and annual	Variable by hour of day	The adopted approach involved developing an hourly variable background dataset that was added to the model predictions. This dataset was created by using the minimum measured non-zero 24-hour average concentration from D01 and D04 for each day in the 2014 calendar year. Statistics from the resultant dataset are as follows: - Maximum 24-hour average = 26 µg/m^3 (note, this level already exceeds the relevant EPA criterion so the assessment aimed to determine whether the MCCO Project would lead to additional exceedances) - Annual average = 5.2 µg/m^3 The data derived above have been added to the predicted contributions of the MCCO Project for the assessment of potential cumulative impacts, in accordance with EPA guidelines.
Particulate matter (TSP)	Annual	50 µg/m^3	Highest annual average concentration measured from D01, D02, D03 and D04 in 2014. Taking the highest annual average is a conservative approach.

Substance	Averaging time	Assumed background level that applies at sensitive receptors	Notes
Deposited dust	Annual	2.3 g/m^2/month	Highest annual average deposition level from DG01, DG02, DG03, DG04, DG09, DG12, DG13, DG14, DG15, DG16, DG17 and DG18 in 2014. Taking the highest annual average is a conservative approach.
Nitrogen dioxide (NO_2)	1-hour	80 $\mu g/m^3$	Maximum 1-hour average from Muswellbrook in 2014. Taking the maximum 1-hour average is a conservative approach.
	Annual	21 $\mu g/m^3$	Annual average from Muswellbrook in 2014.

As noted in **Section 5.2** the dust monitoring program for Mangoola Coal Mine will capture the effects that dust emissions from other existing mining operations have on air quality in the study area. It was also shown that, while there are likely to be some contributions, other mining operations have little influence on air quality in the areas of interest around Mangoola Coal Mine.

The monitoring program does not however captured the effects of dust emissions from expected changes in future activities from other mining operations and these change have been reviewed. In particular, the nearest mining operations to Mangoola Coal Mine are as follows:

- Bengalla Mine; an existing operation that is located approximately 12 km to the east of Mangoola Coal Mine. In 2015, Bengalla Mine was approved operate at a rate of up to 15 Mtpa of ROM coal through to 2039.
- Mount Pleasant Mine; an approved and now existing operation that is located approximately 15 km to the east-southeast of Mangoola Coal Mine which commenced earthworks and mining activities in 2017. Mount Pleasant Mine is approved to extract up to 10.5 Mtpa of ROM coal through to 2026.
- Mt Arthur Coal Mine; an existing operation that is located approximately 15 km to the east-southeast of the Mangoola Coal Mine. BHP has approval to extract up to 32 Mtpa ROM coal from the open cut operations through to 2026.

Air quality impacts due to operations at Bengalla Mine were most recently assessed by Todoroski Air Sciences (2013). The assessment used computer-based air dispersion modelling to predict the contribution of dust emissions from Bengalla Mine activities to the local air quality environment. The modelling showed that annual average PM_{10} and TSP concentrations would reduce to less than 1 to 2 $\mu g/m^3$ by the time emissions reached the receptors in this current assessment for Mangoola Coal Mine. Annual average dust deposition due to Bengalla Mine was predicted to have reduced to an estimated 0.1 g/m^2/month.

The most recent study of potential air quality impacts of Mount Pleasant Mine was carried out by Todoroski Air Sciences (2017) as part of the approved Mount Pleasant Project Mine Optimisation Modification. This study showed that there would be almost no transport of emission from the mine towards the area around Mangoola Coal Mine. This was due to the prevailing winds which are typically from the northwest in winter and from the southeast in summer. Under these winds, the cumulative impacts of the Mangoola Coal Mine and the Mount Pleasant Mine are expected to be minimal.

For Mt Arthur Coal Mine, the air quality impacts were most recently assessed by PAEHolmes (2013) as part of the approved Mt Arthur Extension of Mining Modification. The predicted contributions of Mt Arthur Coal Mine (as modified) to the receptors in the vicinity of Mangoola Coal Mine were in the order of 4 $\mu g/m^3$, 4 $\mu g/m^3$ and 0.1 g/m^2/month for annual average PM_{10}, annual average TSP and annual average dust deposition respectively. In addition it was demonstrated that, in the vicinity of Mangoola Coal Mine, the modification would result in very similar or lower impacts to the then approved operation.

From the information reviewed above, the potential future approved changes in operations at Mount Pleasant Mine, Bengalla Mine and Mt Arthur Mine will not be significant enough to affect the conclusions of this assessment. Any relevant dust emissions from these existing mining operations are captured by the monitoring program undertaken for Mangoola Coal Mine and these data have been included as background levels.

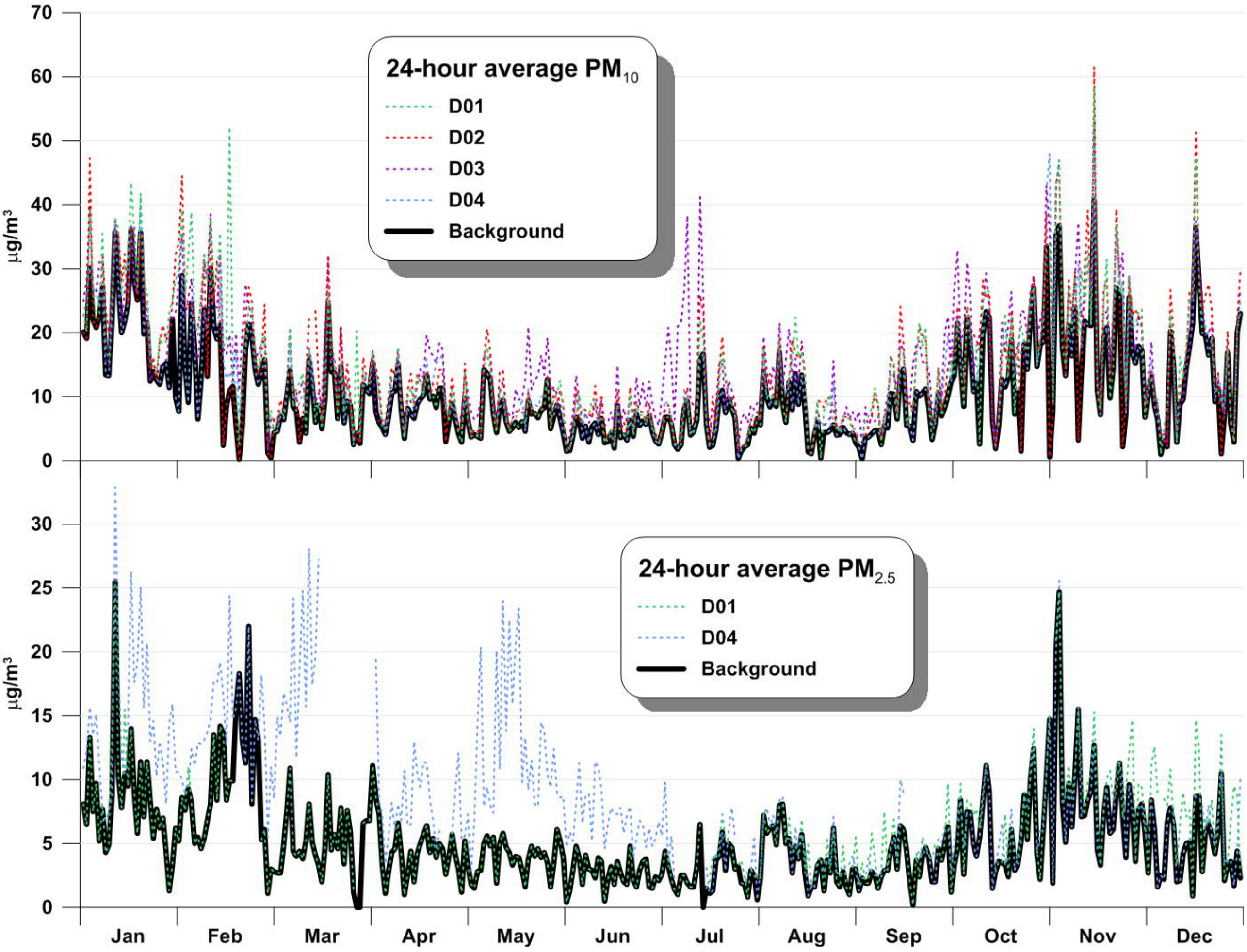


Figure 11 Assumed background PM_{10} and $PM_{2.5}$ concentrations as inferred from the measurement data

6. Emissions to Air

The most significant emission to air from the MCCO Project will be dust (particulate matter) due to material handling, material transport, processing, wind erosion, and blasting. Estimates of these emissions are required by the dispersion model. Total dust emissions have been estimated by analysing the material handling schedule, equipment listing and mine plans and identifying the location and intensity of dust generating activities. Operations have been combined with emissions factors developed both locally and by the US EPA.

The emission factors used for this assessment have been drawn largely from the following sources:

- *Emission Estimation Technique Manual for Mining* (NPI, 2012); and
- AP 42 (US EPA, 1985 and updates).

Dust emission inventories have been developed for each of the modelled scenarios, namely:

- Existing conditions. Monitoring and operational data from 2014 were used, in combination with the intensity and scheduling of operations approved and occurring at that time, for model performance evaluations.
- Project Years 1, 3, 5 and 8. These years have been selected as they represent proposed future conditions, and assuming maximum production.

The “existing” scenario has been developed to evaluate the performance of the model. In this case the model predictions were compared to monitored results to determine the level of confidence that can be assumed for the future scenarios. The assessment focusses primarily on the performance of the model for predicting PM_{10} concentrations. This approach was driven by the outcome of the existing air quality review (see **Section 5.2**) which showed that PM_{10} is one of the key air quality issues due to a higher number of historical exceedances of the EPA air quality criteria than other substances. It was not possible to evaluate the performance of the model for predicting $PM_{2.5}$ or NO_2 as there are insufficient $PM_{2.5}$ or NO_x monitors in the model domain to allow for a comparison between measured and predicted levels.

The four future scenarios have been selected to represent various stages in the life of the mine, including at maximum production and for times when operations are close to sensitive receptors. There are no specific guidelines or procedures which define an adequate level of information to demonstrate that selected scenarios are representative of worst-case impacts. The selection of Project Year 1, Project Year 3, Project Year 5 and Project Year 8 was therefore based on a review of material handling quantities, haul distances, and location of activities for each year in the proposed mine life and selecting four years for assessment.

Table 12, **Table 13** and **Table 14** show the estimated annual TSP, PM_{10} and $PM_{2.5}$ emissions, respectively, due to the MCCO Project. Estimates for 2014 were based on production and material handling quantities contained in the 2014 Annual Environmental Management Report (AEMR) produced by Mangoola Coal (2015). Estimates for future years were based on estimated production quantities for the MCCO Project, provided by Mangoola Coal, based on indicative mine production schedules.

It should be noted that the main intent of the inventories is to capture the most significant emission sources that may affect off-site air quality. Not every source will be captured. However, the contribution of emissions from sources not identified will be captured in the air quality monitoring data and these data have been added to the predicted project contributions. **Appendix C** provides details of the dust emission calculations, including assumptions, emission controls and allocation of emissions to modelled locations.

Table 12 Estimated TSP emissions due to the MCCO Project

Activity*	Annual TSP emissions (kg/y)				
	Existing Conditions	Project Year 1	Project Year 3	Project Year 5	Project Year 8
Stripping topsoil (dozers)	837	1,389	374	1,451	0
Drilling overburden (North Pit)	6,964	1,804	7,010	7,700	7,663
Drilling overburden (South Pit)	2,321	9,471	3,721	685	0
Blasting overburden (North Pit)	51,745	11,676	45,641	49,887	49,887
Blasting overburden (South Pit)	17,248	61,563	23,882	4,246	0
Excavators loading overburden to trucks (North Pit)	69,402	17,997	69,993	76,750	76,539
Excavators loading overburden to trucks (South Pit)	23,134	94,498	37,130	6,833	0
Hauling overburden from North Pit to north dump	517,869	0	329,836	270,720	599,017
Hauling overburden from North Pit to south dump	0	228,298	592,104	977,900	0
Hauling overburden from South Pit to south dump	112,205	846,161	346,325	33,142	0
Unloading overburden to north dump	69,402	0	42,098	34,552	76,454
Unloading overburden to south dump	23,134	112,495	64,972	49,108	0
Dozers shaping overburden (North dump)	329,853	0	177,759	185,324	246,931
Dozers shaping overburden (South dump)	109,951	382,986	215,174	157,529	0
Dozers working on overburden for rehabilitation	13,054	13,315	47,428	78,408	2,132
Drilling coal (North Pit)	0	0	0	0	0
Drilling coal (South Pit)	0	0	0	0	0
Blasting coal (North Pit)	0	0	0	0	0
Blasting coal (South Pit)	0	0	0	0	0
Dozers working on coal (North Pit)	72,143	0	68,235	46,678	49,706
Dozers working on coal (South Pit)	24,048	99,054	60,161	22,566	0
Loading ROM coal to trucks (North Pit)	318,381	0	306,021	211,432	222,074
Loading ROM coal to trucks (South Pit)	106,127	386,485	187,968	70,504	0
Hauling ROM coal from North Pit to hopper / ROM pad	154,567	0	317,625	219,449	237,930
Hauling ROM coal from South Pit to hopper / ROM pad	31,979	226,450	110,134	83,800	0
Unloading ROM coal to ROM hopper / pad (from all pits)	34,800	31,683	40,496	23,112	18,205
ROM coal rehandle to hopper	34,800	31,683	40,496	23,112	18,205
Transferring ROM coal by conveyor to CHPP	475	433	553	316	249
Handling coal at CHPP	2,376	2,164	2,765	1,578	1,243
Dozers on ROM coal stockpiles	0	0	0	0	0
Dozers on product coal stockpiles	49,765	54,266	52,803	41,884	54,204
Conveyer to product stockpiles	295	254	327	186	151
Loading product coal to trains	3,718	3,203	4,123	2,345	1,905
Wind erosion from active pits	259,947	233,016	195,348	93,732	113,880
Wind erosion from active dumps	157,892	301,019	297,840	191,844	57,816
Wind erosion from inactive or partially rehabed dumps	30,660	41,698	53,348	85,848	134,291
Wind erosion from ROM coal stockpiles	3,373	3,373	3,373	3,373	3,373
Wind erosion from product coal stockpile	3,942	3,942	3,942	3,942	3,942
Grading roads	18,464	32,117	32,204	23,178	19,658
Total	**2,654,871**	**3,232,490**	**3,781,208**	**3,083,114**	**1,995,455**

** "North Pit" represents "Main Pit West" for the Existing Conditions scenario.*

Table 13 Estimated PM_{10} emissions due to the MCCO Project

Activity*	Annual PM_{10} emissions (kg/y)				
	Existing Conditions	Project Year 1	Project Year 3	Project Year 5	Project Year 8
Stripping topsoil (dozers)	204	338	91	353	0
Drilling overburden (North Pit)	3,621	938	3,645	4,004	3,985
Drilling overburden (South Pit)	1,207	4,925	1,935	356	0
Blasting overburden (North Pit)	26,907	6,071	23,734	25,941	25,941
Blasting overburden (South Pit)	8,969	32,013	12,419	2,208	0
Excavators loading overburden to trucks (North Pit)	32,825	8,512	33,105	36,301	36,201
Excavators loading overburden to trucks (South Pit)	10,942	44,695	17,561	3,232	0
Hauling overburden from North Pit to north dump	153,035	0	97,469	80,000	177,015
Hauling overburden from North Pit to south dump	0	67,464	174,972	288,977	0
Hauling overburden from South Pit to south dump	33,158	250,048	102,342	9,794	0
Unloading overburden to north dump	32,825	0	19,911	16,342	36,161
Unloading overburden to south dump	10,942	53,207	30,730	23,227	0
Dozers shaping overburden (North dump)	80,301	0	43,275	45,116	60,114
Dozers shaping overburden (South dump)	26,767	93,236	52,383	38,350	0
Dozers working on overburden for rehabilitation	3,178	3,241	11,546	19,088	519
Drilling coal (North Pit)	0	0	0	0	0
Drilling coal (South Pit)	0	0	0	0	0
Blasting coal (North Pit)	0	0	0	0	0
Blasting coal (South Pit)	0	0	0	0	0
Dozers working on coal (North Pit)	22,997	0	21,752	14,880	15,845
Dozers working on coal (South Pit)	7,666	31,576	19,178	7,193	0
Loading ROM coal to trucks (North Pit)	48,958	0	47,058	32,512	34,149
Loading ROM coal to trucks (South Pit)	16,319	59,431	28,904	10,842	0
Hauling ROM coal from North Pit to hopper / ROM pad	45,676	0	93,861	64,849	70,310
Hauling ROM coal from South Pit to hopper / ROM pad	9,450	66,918	32,546	24,764	0
Unloading ROM coal to ROM hopper / pad (from all pits)	14,616	13,307	17,008	9,707	7,646
ROM coal rehandle to hopper	14,616	13,307	17,008	9,707	7,646
Transferring ROM coal by conveyor to CHPP	225	205	262	149	118
Handling coal at CHPP	1,124	1,023	1,308	746	588
Dozers on ROM coal stockpiles	0	0	0	0	0
Dozers on product coal stockpiles	14,341	15,638	15,216	12,070	15,620
Conveyer to product stockpiles	140	120	155	88	71
Loading product coal to trains	1,580	1,361	1,752	996	810
Wind erosion from active pits	129,974	116,508	97,674	46,866	56,940
Wind erosion from active dumps	78,946	150,510	148,920	95,922	28,908
Wind erosion from inactive or partially rehabed dumps	15,330	20,849	26,674	42,924	67,145
Wind erosion from ROM coal stockpiles	1,686	1,686	1,686	1,686	1,686
Wind erosion from product coal stockpile	1,971	1,971	1,971	1,971	1,971
Grading roads	6,528	11,355	11,386	8,195	6,950
Total	**857,023**	**1,070,453**	**1,209,436**	**979,358**	**656,339**

** "North Pit" represents "Main Pit West" for the Existing Conditions scenario.*

Table 14 Estimated $PM_{2.5}$ emissions due to the MCCO Project

Activity*	Annual $PM_{2.5}$ emissions (kg/y)				
	Existing Conditions	Project Year 1	Project Year 3	Project Year 5	Project Year 8
Stripping topsoil (dozers)	88	146	39	152	0
Drilling overburden (North Pit)	209	54	210	231	230
Drilling overburden (South Pit)	70	284	112	21	0
Blasting overburden (North Pit)	1,552	350	1,369	1,497	1,497
Blasting overburden (South Pit)	517	1,847	716	127	0
Excavators loading overburden to trucks (North Pit)	4,971	1,289	5,013	5,497	5,482
Excavators loading overburden to trucks (South Pit)	1,657	6,768	2,659	489	0
Hauling overburden from North Pit to north dump	15,536	0	9,895	8,122	17,971
Hauling overburden from North Pit to south dump	0	6,849	17,763	29,337	0
Hauling overburden from South Pit to south dump	3,366	25,385	10,390	994	0
Unloading overburden to north dump	4,971	0	3,015	2,475	5,476
Unloading overburden to south dump	1,657	8,057	4,653	3,517	0
Dozers shaping overburden (North dump)	34,635	0	18,665	19,459	25,928
Dozers shaping overburden (South dump)	11,545	40,214	22,593	16,541	0
Dozers working on overburden for rehabilitation	1,371	1,398	4,980	8,233	224
Drilling coal (North Pit)	0	0	0	0	0
Drilling coal (South Pit)	0	0	0	0	0
Blasting coal (North Pit)	0	0	0	0	0
Blasting coal (South Pit)	0	0	0	0	0
Dozers working on coal (North Pit)	1,587	0	1,501	1,027	1,094
Dozers working on coal (South Pit)	529	2,179	1,324	496	0
Loading ROM coal to trucks (North Pit)	6,049	0	5,814	4,017	4,219
Loading ROM coal to trucks (South Pit)	2,016	7,343	3,571	1,340	0
Hauling ROM coal from North Pit to hopper / ROM pad	4,637	0	9,529	6,583	7,138
Hauling ROM coal from South Pit to hopper / ROM pad	959	6,793	3,304	2,514	0
Unloading ROM coal to ROM hopper / pad (from all pits)	661	602	769	439	346
ROM coal rehandle to hopper	661	602	769	439	346
Transferring ROM coal by conveyor to CHPP	34	31	40	23	18
Handling coal at CHPP	34	31	40	23	18
Dozers on ROM coal stockpiles	0	0	0	0	0
Dozers on product coal stockpiles	1,095	1,194	1,162	921	1,192
Conveyer to product stockpiles	21	18	23	13	11
Loading product coal to trains	186	160	206	117	95
Wind erosion from active pits	19,496	17,476	14,651	7,030	8,541
Wind erosion from active dumps	11,842	22,576	22,338	14,388	4,336
Wind erosion from inactive or partially rehabed dumps	2,300	3,127	4,001	6,439	10,072
Wind erosion from ROM coal stockpiles	253	253	253	253	253
Wind erosion from product coal stockpile	296	296	296	296	296
Grading roads	202	352	353	254	215
Total	**135,003**	**155,675**	**172,018**	**143,304**	**94,996**

** "North Pit" represents "Main Pit West" for the Existing Conditions scenario.*

Finally, there will be operational controls in place at Mangoola Coal Mine which will also have a direct effect on emissions to air. Specifically, Mangoola is committed to the continued implementation of operational controls during adverse weather conditions in order to minimise impacts. The operational controls will result in reduced levels of activity at Mangoola Coal Mine relative to the capacity considered as part of the current air quality modelling. In practice these operational controls, which will vary on a daily basis, will lead to lower emissions to air than for unconstrained activities. Consequently the estimated emissions in **Table 12**, **Table 13** and **Table 14** should represent conservative estimates, as these further detailed operational controls are not included, and it follows that the predicted impacts of the MCCO Project will also be conservative. That is, the predicted impacts are likely to over-state actual impacts to some extent.

7. Approach to Assessment

7.1 Overview

This assessment has followed the EPA's "Approved Methods of the Modelling and Assessment of Air Pollutants in New South Wales" (EPA, 2016), which specifies how assessments based on the use of air dispersion models should be undertaken. The "Approved Methods" include guidelines for the preparation of meteorological data, reporting requirements and air quality assessment criteria to assess the significance of dispersion model predictions.

The CALPUFF computer-based air dispersion model has been used to predict ground-level concentrations and deposition levels due to the identified emission sources, and the model predictions have been compared with relevant air quality criteria. The choice of model has considered the expected transport distances for the emissions, as well as the potential for temporally and spatially varying flow fields due to influences of the locally complex terrain, non-uniform land use, and potential for stagnation conditions characterised by calm or very low wind speeds with variable wind directions.

The CALPUFF model, through the CALMET meteorological pre-processor, simulates complex meteorological patterns that exist in a particular region. The effects of local topography and changes in land surface characteristics are accounted for by this model. The model comprises meteorological modelling as well as dispersion modelling, both of which are described below.

This Air Quality Impact Assessment has been subject to independent peer review, by Dr Nigel Holmes, in order to test all assumptions. Review comments have been addressed in this assessment and the peer review has been included as **Appendix D**. In summary, the peer review concluded that this assessment "provides a comprehensive investigation as to the likely air quality effects of the proposed MCCO Project and can be relied upon by approval agencies and regulators to assess the proposal".

7.2 Meteorological Modelling

The air dispersion model used for this assessment, CALPUFF, requires information on the meteorological conditions in the modelled region. This information is typically generated by the meteorological pre-processor, CALMET, using surface observation data from local weather stations and upper air data from radio-sondes or numerical models, such as the CSIRO's prognostic model known as TAPM (The Air Pollution Model). CALMET also requires information on the local land-use and terrain. The result of a CALMET simulation is a year-long, three-dimensional output of meteorological conditions that can be used as input to the CALPUFF air dispersion model.

There are no known meteorological stations in the Upper Hunter region that collect suitable upper air data for CALMET. The closest station with suitable data is operated by the Bureau of Meteorology at Williamtown, approximately 100 km to the east-southeast of Mangoola Coal Mine. The necessary upper air data were therefore generated by TAPM, using influence from the surface observations at the WSN meteorological station. CALMET was then set up with two surface observations stations (WSN and Wybong) and one upper air station (based on TAPM output for the WSN meteorological station). The meteorological modelling followed the guidance of TRC (2011) and adopted the "observations" mode. A "hybrid" mode was also tested but found to produce unrealistic wind-fields because of too much weighting towards the prognostic data.

Key model settings for TAPM are shown below in **Table 15**.

Table 15 Model settings and inputs for TAPM

Parameter	Value(s)
Model version	4.0.5
Number of grids (spacing)	4 (30 km, 10 km, 3 km, 1 km)
Number of grids point	35 x 35 x 25
Year(s) of analysis	2014, with one "spin-up" day.
Centre of analysis	Mangoola Coal Mine (32º18' S, 150º42' E)
Terrain data source	Shuttle Research Topography Mission (SRTM)
Land use data source	Default
Meteorological data assimilation	WSN meteorological station. Radius of influence = 15 km. Number of vertical levels for assimilation = 4

Table 16 lists the model settings and input data for CALMET. This information has been provided so that the user can reproduce the results if required.

Table 16 Model settings and inputs for CALMET

Parameter	Value(s)
Model version	6.334
Terrain data source(s)	SRTM and Project Digital Elevation Model (DEM)
Land-use data source(s)	Digitized from aerial imagery
Meteorological grid domain	20 km x 20 km
Meteorological grid resolution	0.2 km
Meteorological grid dimensions	100 x 100 x 9
Meteorological grid origin	273000 mE, 6416000 mN. MGA Zone 56
Surface meteorological stations	WSN (Observations of wind speed and wind direction. TAPM for ceiling height, cloud cover, temperature, relative humidity and air pressure) Wybong (Observations of wind speed, wind direction, temperature and relative humidity)
Upper air meteorological stations	Upper air data file for the location of WSN met station derived by TAPM Biased towards surface observations (-1, -0.8, -0.6, -0.4, -0.2, 0, 0, 0, 0)
Simulation length	8760 hours (1 Jan 2014 to 31 Dec 2014)
R1, R2	0.5, 1
RMAX1, RMAX2	5, 20
TERRAD	5

Terrain information was extracted from the NASA Shuttle Research Topography Mission database which has global coverage at approximately 30 metre resolution (in addition to the MCCO Project Digital Elevation Model). Higher resolution topographical data are not necessary in order to develop wind fields that reflect the influence of terrain and effects that are important for dispersion of emissions from the MCCO Project to the sensitive receptor areas.

Land use data were extracted from aerial imagery. **Figure 12** shows the model grid, land-use and terrain information, as used by CALMET. It is noted that the extent of some land-uses will change over time, such as mining areas, however the model sensitivity has been tested and changes from grassland to barren land (i.e. mining areas) were found to have very little influence on the dispersion modelling results.

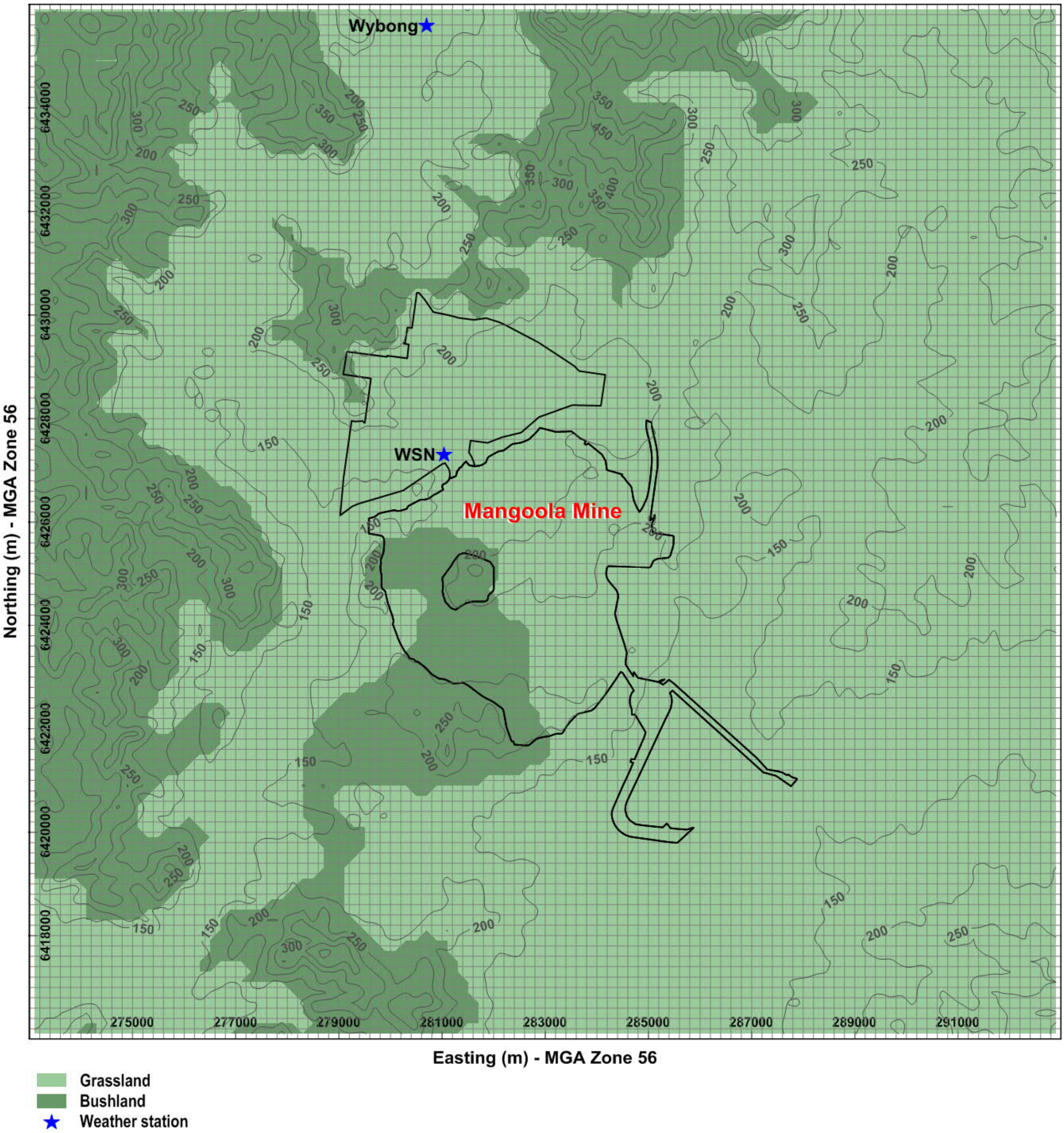


Figure 12 Model grid, land-use and terrain information

Figure 13 shows a snapshot of winds at 10 metres above ground-level as simulated by the CALMET model under stable conditions. This plot shows the effect of the topography on local winds (for this particular hour), and highlights the non-uniform wind patterns in the area, which further supports the use of a non-steady-state model such as CALPUFF.

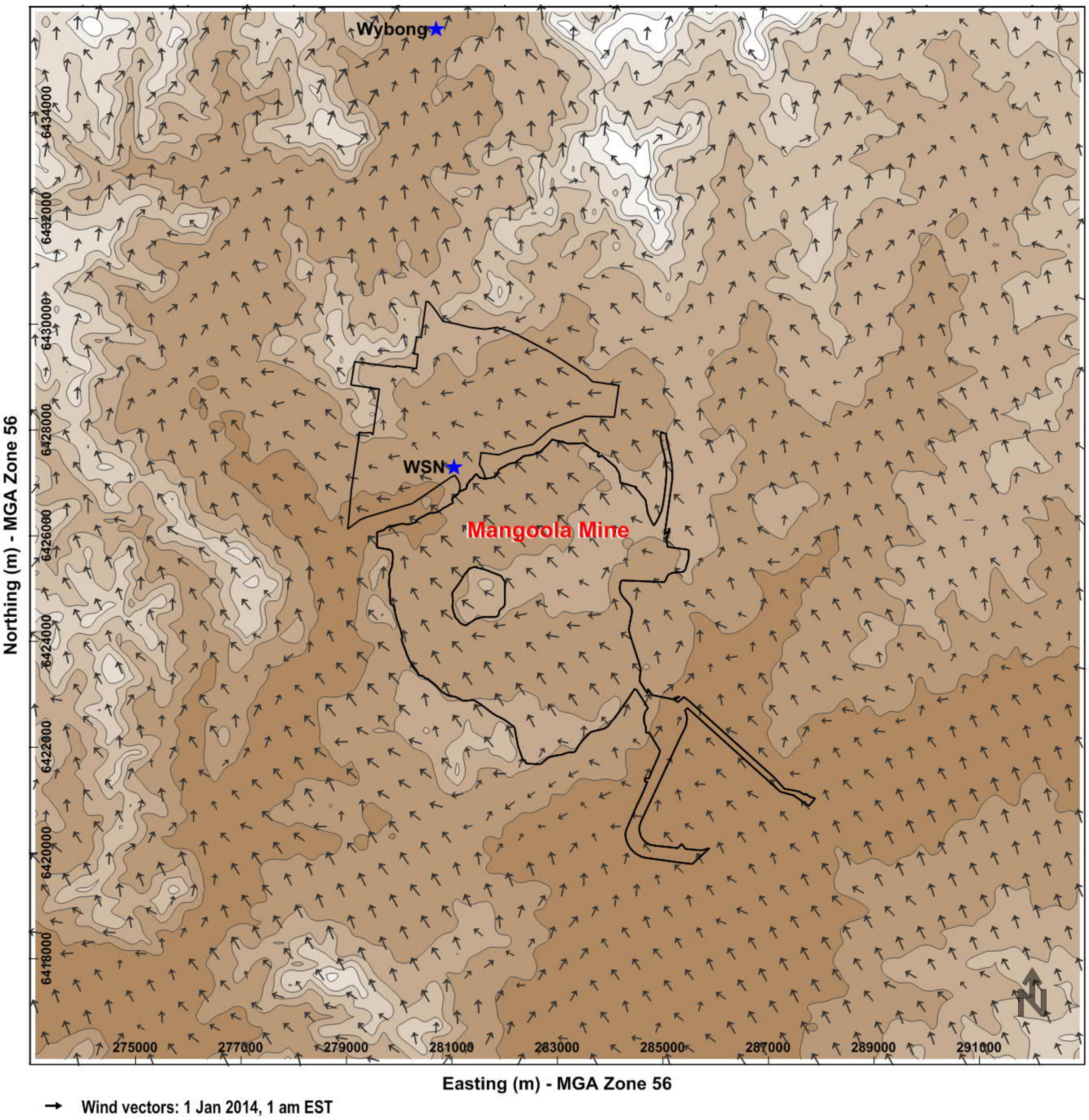


Figure 13 Example of CALMET simulated ground-level wind flows

7.3 Dispersion Modelling

Ground-level concentration and deposition levels due to the emission sources have been predicted using the air dispersion model known as CALPUFF (Version 6.42). CALPUFF is a Lagrangian dispersion model that simulates the dispersion of pollutants within a turbulent atmosphere by representing emissions as a series of puffs emitted sequentially. Provided the rate at which the puffs are emitted is sufficiently rapid, the puffs overlap and the serial release is representative of a continuous release.

The CALPUFF model differs from traditional Gaussian plume models (such as AUSPLUME and ISCST3) in that it can model spatially varying wind and turbulence fields that are important in complex terrain, long-range transport and near calm conditions. It is the preferred model of the United States Environmental Protection Agency for the long-range transport of pollutants and for complex terrain (TRC 2007). CALPUFF has the ability to model the effect of emissions entrained into the thermal internal boundary layer that forms over land, both through fumigation and plume trapping. CALPUFF is an air dispersion model which has been approved by the EPA for these types of assessments (EPA 2016).

The modelling was performed using the emission estimates from **Section 6** and using the meteorological information provided by the CALMET model, described in **Section 7.2**. Predictions were made at 776 discrete receptors (including sensitive receptors and monitoring locations) to allow for contouring of results. The locations of the model receptors are shown in **Appendix E**.

Mining operations were represented by a series of volume sources located according to the location of activities for each modelled scenario. **Figure 14** and **Figure 15** show the location of the modelled sources for 2014 and future years respectively, where the emissions from the dust generating activities summarised in **Table 12** to **Table 14** were assigned to one or more of these source locations (refer to **Appendix C** for details of the allocations).

Dust emissions for all modelled mine-related sources have been considered to fit in one of three categories, as follows:

- Wind insensitive sources, where emissions are relatively insensitive to wind speed (for example, dozers).
- Wind sensitive sources, where emissions vary with the hourly wind speed, raised to the power of 1.3, a generic relationship published by the US EPA (1987). This relationship has been applied to sources such as loading and unloading of waste to/from trucks and results in increased emissions with increased wind speed.
- Wind sensitive sources, where emissions also vary with the hourly wind speed, but raised to the power of 3, a generic relationship published by Skidmore (1998). This relationship has been applied to sources including wind erosion from stockpiles, overburden dumps or active pits, and results in increased emissions with increased wind speed.

Emissions from each volume source were developed on an hourly time step, taking into account the level of activity at that location and, in some cases, the hourly wind speed. This approach ensured that light winds corresponded with lower dust generation and higher winds, with higher dust generation.

Blasting activities and associated emissions were assumed to take place only during daylight hours (9 am to 5 pm for the purposes of the modelling) while all other activities have been modelled for 24 hours per day.

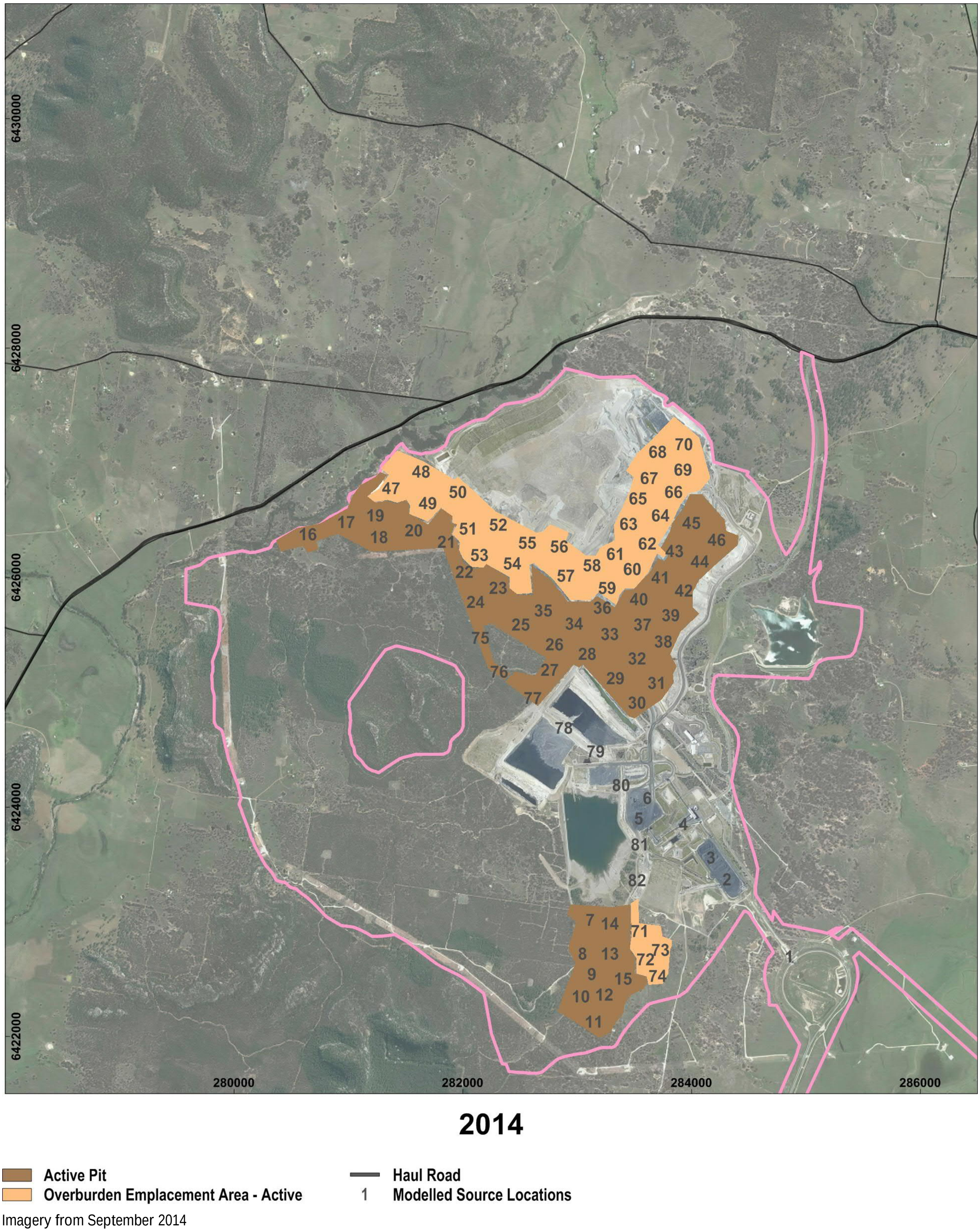


Figure 14 Location of modelled sources for Mangoola Coal Mine in 2014 (Existing Conditions)

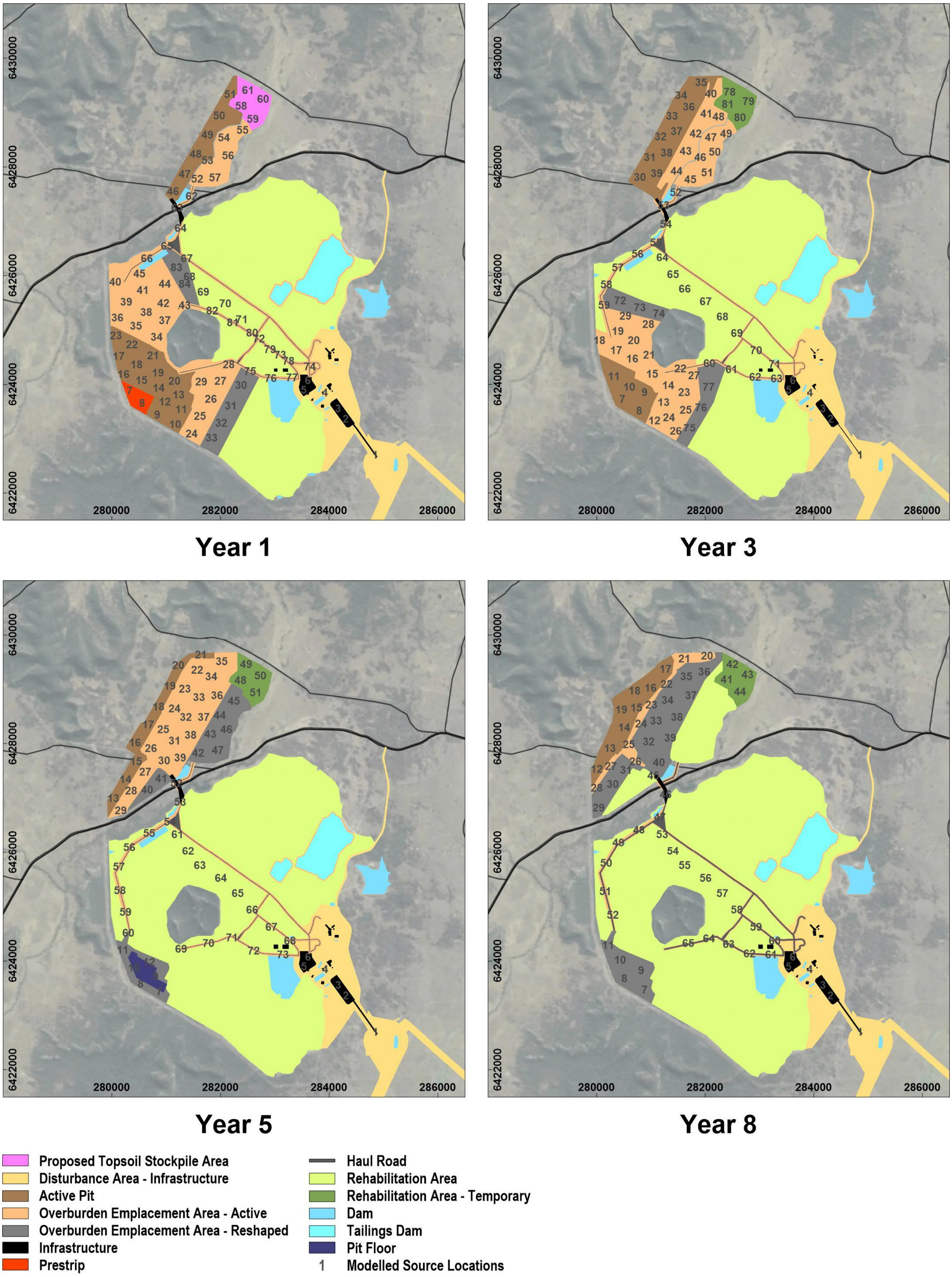


Figure 15 Location of modelled sources for the MCCO Project in Years 1, 3, 5 and 8

Pit retention (that is, retention of dust particles within the open pits) has been included in the model simulations. The pit retention calculation determines the fraction of dust emitted in the pit that may escape the pit. The "escaped fraction" is a function of the gravitational settling velocity of the particles and the wind speed and is shown by the following relationship (US EPA, 1995).

Equation 1:

$$\varepsilon = \frac{1}{\left(1 + \frac{v_g}{(\alpha U_r)}\right)}$$

where:

ε = escaped fraction for the particle size category
V_g = gravitational settling velocity (m/s)
U_r = approach wind speed at 10 m (m/s)
α = proportionality constant in the relationship between flux from the pit and the product of U_r and concentration in the pit (0.029)

To model the effect of pit retention, the emissions from mining sources within the open pits have been reduced, as per the calculation above. This approach means that much of the coarser dust would remain trapped in the pits. Typically, five per cent of the PM_{10} emissions are trapped in the pit using this calculation.

The effect of rainfall for suppressing dust from exposed areas has also been simulated. For each hour of rainfall above 0.254 mm (i.e. 0.1 inch) a 50% control on emissions has been applied to wind erosion from active pits and active dumps.

Key model settings and inputs for CALPUFF are provided in **Table 17**.

Table 17 Model settings and inputs for CALPUFF

Parameter	Value(s)
Model version	6.42
Computational grid domain	100 x 100
Chemical transformation	None
Dry deposition	Yes
Wind speed profile	ISC rural
Puff element	Puff
Dispersion option	Turbulence from micrometeorology
Time step	3600 seconds (1 hour)
Terrain adjustment	Partial plume path
Number of volume sources	See Appendix C. Height = 5m, SY = 20 m, SZ = 10 m
Number of discrete receptors	776. See Appendix E.

Finally, the model predictions at identified sensitive receptors were then compared with the EPA air quality criteria, previously discussed in **Section 4**. Contour plots have also been created to show the spatial distribution of model predictions. The results for each substance and averaging time were presented as a series of figures showing:

- Model predictions for future operational scenarios, as Project only contributions.
- Model predictions for future operational scenarios, due to the MCCO Project and other sources.

8. Model Performance

The performance of the model for predicting air quality conditions has been evaluated. This involved comparing predictions with measurements for a recent year (2014), using information on meteorological and operating conditions at the time, in order to establish the likely confidence in the model predictions for future operations.

The model performance has been evaluated for:

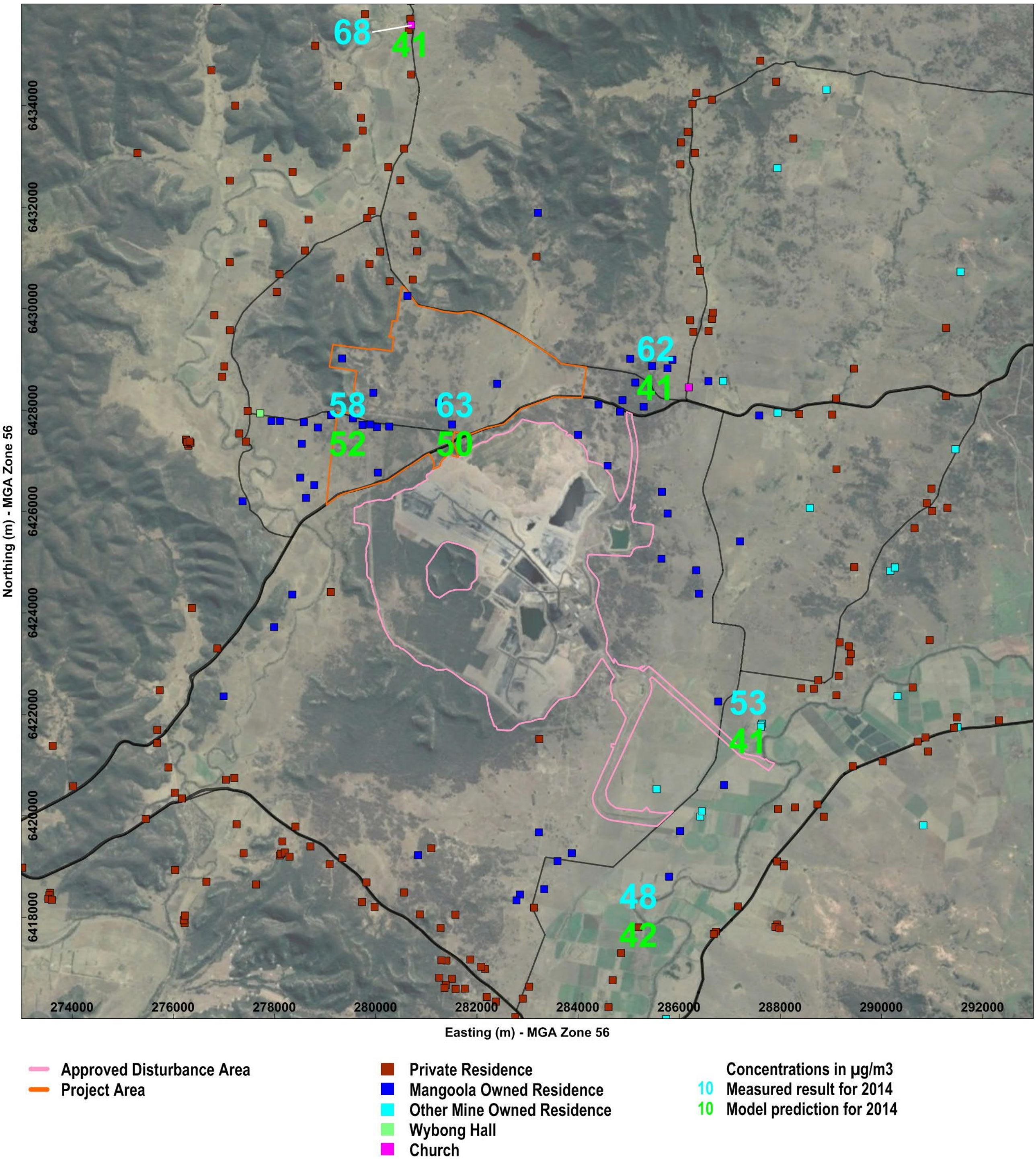
- Maximum 24-hour average PM_{10} concentrations;
- Annual average PM_{10} concentrations;
- Annual average TSP concentrations; and
- Annual average dust deposition.

Model performance was not evaluated for $PM_{2.5}$ as there are insufficient $PM_{2.5}$ monitors in the model domain (only two) to allow for a comparison between measured and predicted levels.

Figure 16 shows the model performance for predicting maximum 24-hour average PM_{10} concentrations, based on conditions in 2014. As noted above, this comparison is useful for determining the confidence in the model predictions for future operations. It should be noted that only one data point is shown for each location (that is, the highest value) and more detailed comparisons between measured and predicted results for all percentiles is provided in **Appendix F.**

Figure 16 shows that the model predictions for 24-hour averages are in the order of 10 to 40 per cent lower that the measured result, depending on the location. However, from **Section 5.2.1**, the very highest concentrations are not in the direction of Mangoola Coal mine or other mining operations in the Muswellbrook region so it would be quite difficult for the model to make predictions of maximum concentrations due to other, unidentified sources or events. The correlation does improve when comparing results for those statistics lower than the maximum. As an example, for the fifth highest results, the model predictions range from 17 per cent lower to four per cent higher than the measured results. All of these results highlight the difficultly in predicting short-term (24-hour average) concentrations and the highly variable nature of daily PM_{10} concentrations but they are however well within a factor of two for all percentiles. **Appendix F** provides this detail.

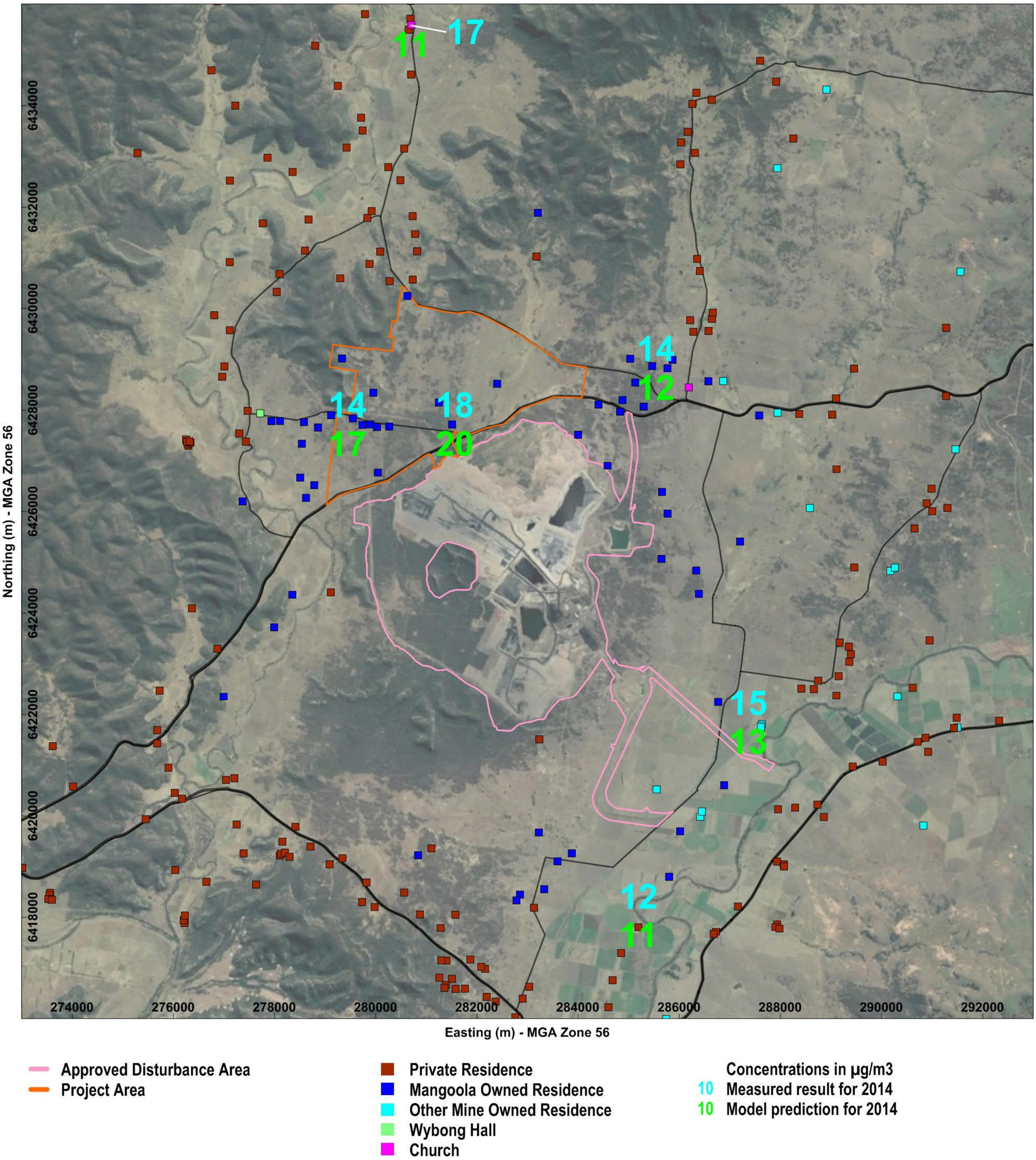
The performance of the model for predicting annual averages has also been reviewed by comparing predictions to measured results for the representative year. These comparisons have shown that, with the adopted approach for modelling and assessment, the model predictions for annual averages are typically higher than the measured results. In addition the predictions are generally within 20 per cent of measured results; well within the factor-of-two accuracy that has been recognised for these types of models (US EPA 2005). For 24-hour averages, the model predictions generally show between agreement for less extreme statistics (for example, the 5^{th} highest). As noted above, this outcome reflects the difficultly of any model to predict the highest results for a short 24 hour average periods, however, overall the model performance has been considered adequate for the assessment of potential future 24 hour average predictions.



EPA criterion is 50 µg/m³.

Figure 16 Model performance for predicting maximum 24-hour average PM_{10} concentrations

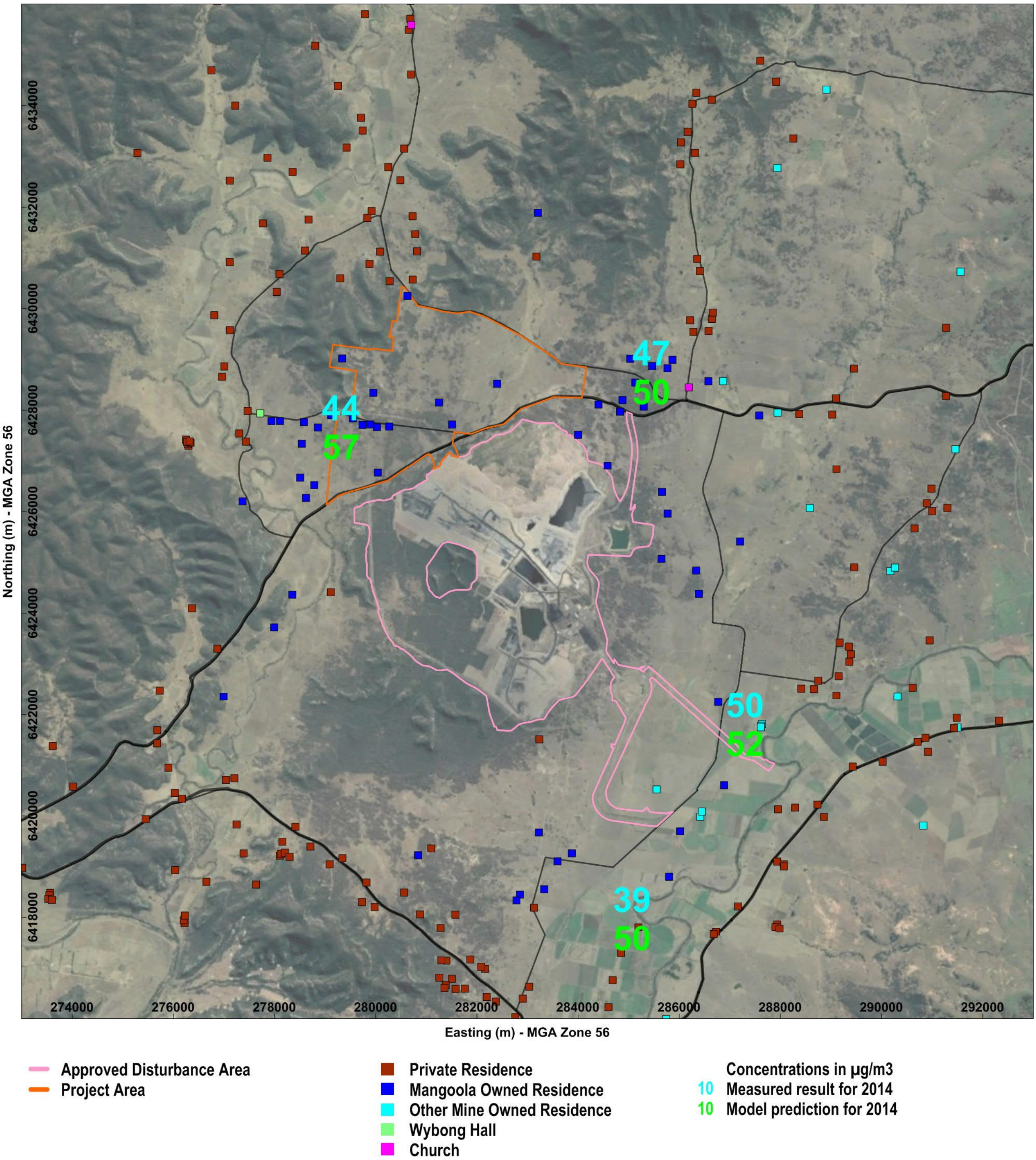
Figure 17 shows the measured and predicted annual average PM_{10} concentrations for 2014. These results show that, for locations around Mangoola Coal Mine, the model predictions range from 16 per cent lower to 20 per cent higher than measured results. In absolute numbers, the range is from 2 µg/m^3 lower to 3 µg/m^3 higher. These differences have been regarded as demonstrating good model performance, as the differences consume only a small fraction of the criterion against which they are assessed, namely 25 µg/m^3. Similar performance may therefore be expected for the predictions of future conditions.



EPA criterion is 25 µg/m^3.

Figure 17 Model performance for predicting annual average PM_{10} concentrations

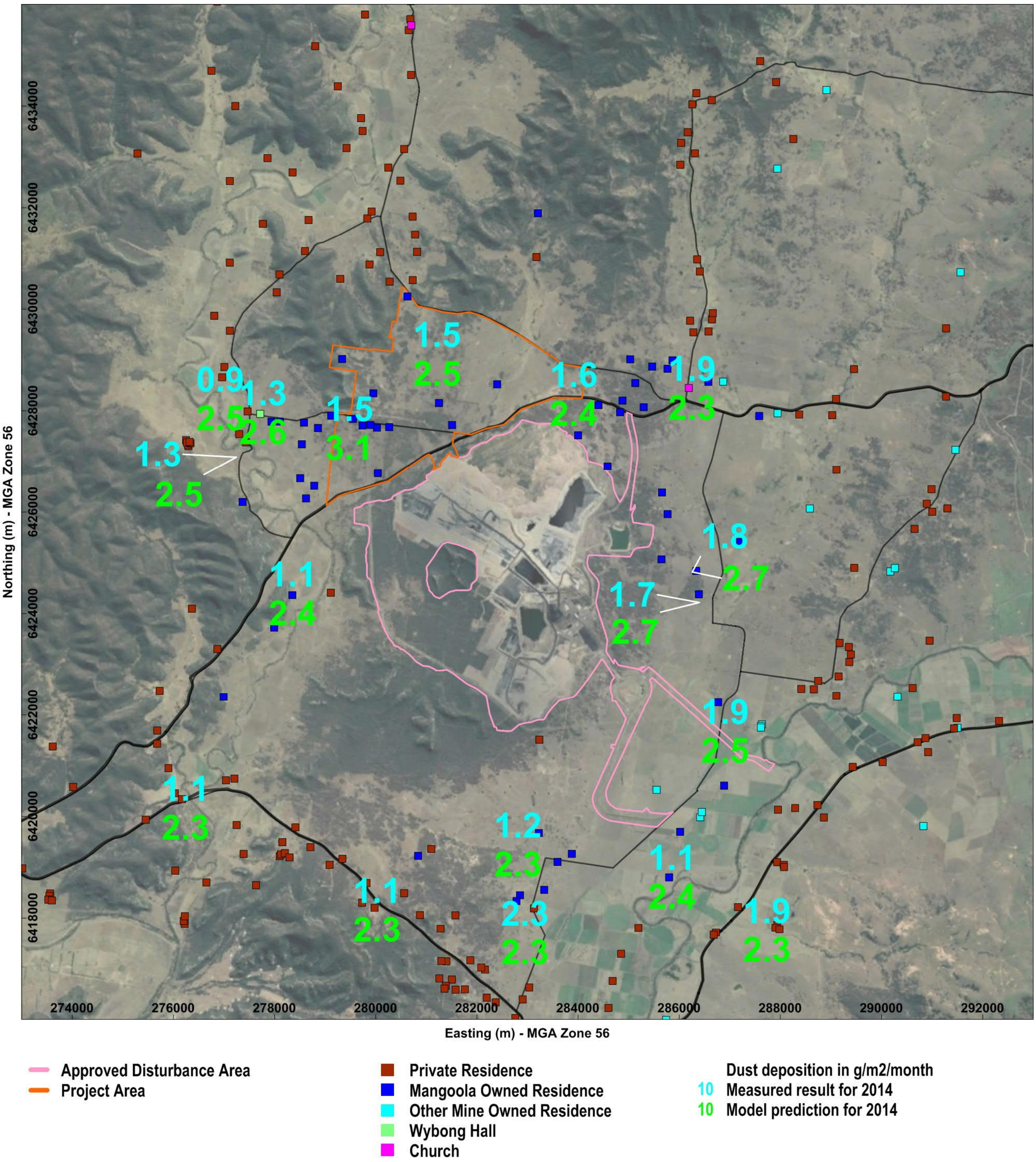
Figure 18 shows the annual average TSP concentrations for existing conditions (2014). This figure shows that the model predictions for this statistic are between four and 29 per cent higher than the measured results, depending on the location. Some over-prediction may therefore be inferred when assessing the results for the MCCO Project.



EPA criterion is 90 µg/m^3.

Figure 18 Model performance for predicting annual average TSP concentrations

Figure 19 shows the annual average dust deposition levels for existing conditions (2014). The model predictions are higher than the measured results at all locations. This suggests that model predictions for the MCCO Project are conservative.



EPA criterion is 4 g/m²/month.

Figure 19 Model performance for predicting annual average deposited dust

9. Assessment of Impacts

This section provides an assessment of the key air quality issues associated with the MCCO Project, primarily based on model predictions and comparisons to air quality criteria. One objective of this study was to predict the extent of air quality impacts due to the MCCO Project, and to identify potential changes in air quality over existing levels, recognising that the Mangoola Coal Mine currently exists and the MCCO Project represents the progression of mining into a new area.

The complete list of tabulated results is provided in **Appendix G**. Contour plots have also been prepared and are discussed below. Additional information on the model performance is provided in **Appendix F**.

9.1 Particulate Matter (as PM_{10})

Figure 20 and **Figure 21** show the predicted maximum 24-hour average PM_{10} concentrations for the MCCO Project only and cumulative scenarios respectively. **Figure 20** shows that the contribution of the MCCO Project will not exceed the EPA's 50 µg/m^3 cumulative criterion at any private properties. As per **Table 3** and **Table 4**, the 24-hour average concentration of 50 µg/m^3 for PM_{10} is applied as an incremental criterion in VLAMP (2018), for the purposes of determining land acquisition and / or mitigation.

Figure 21 shows that the maximum 24-hour average PM_{10} concentrations can meet 50 µg/m^3 at all but one sensitive receptor location (property 83) in all assessment years. Additional investigation of the predictions at property 83 have been carried out and **Figure 22** shows the predicted 24-hour average PM_{10} concentrations over the course of a year, including the background and Project contributions. It can be seen from this figure that there are only one or two days of predicted exceedances of the cumulative criteria each year and that on these days when the concentration is predicted to exceed 50 µg/m^3, the background level is in the order of 30 µg/m^3 or more; a result which suggests that the MCCO Project would not be the primary cause of an exceedance. In addition, it should be noted that property 83 is subject to voluntary acquisition under the existing approved operation and is within the predicted noise voluntary acquisition zone for the MCCO Project. The predicted particulate matter impacts at property 83 do not trigger the voluntary mitigation or acquisition criteria in the Voluntary Land Acquisition and Mitigation Policy.

There are two additional factors to consider where assessing these results. Firstly, the comparisons between model predictions and measured results for the existing (2014) operations highlighted a potential for under-prediction of the very highest concentrations, most likely because of events or other unknown sources to the northwest. Secondly, the monitoring data did show that there were between 0 and 2 days above 50 µg/m^3 at locations around Mangoola Coal Mine in 2014. With this information it can be anticipated that 24-hour average PM_{10} concentrations will continue to be variable from day-to-day, due to existing conditions and sources, and that operations will need to be managed in a way which minimises the contribution to off-site PM_{10} levels, as is done under the existing approved operation.

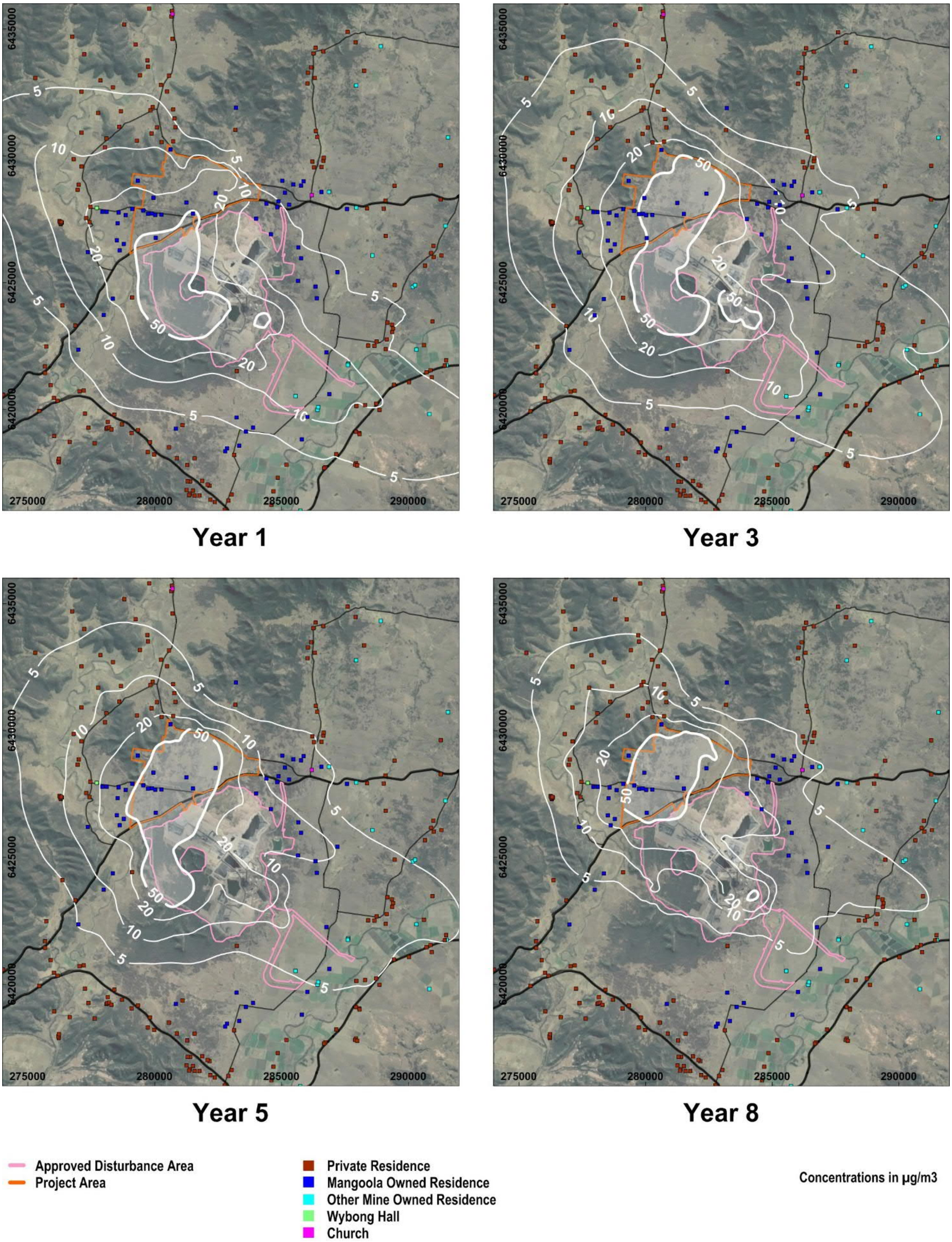


Figure 20 Predicted maximum 24-hour average PM_{10} concentrations due to the MCCO Project only

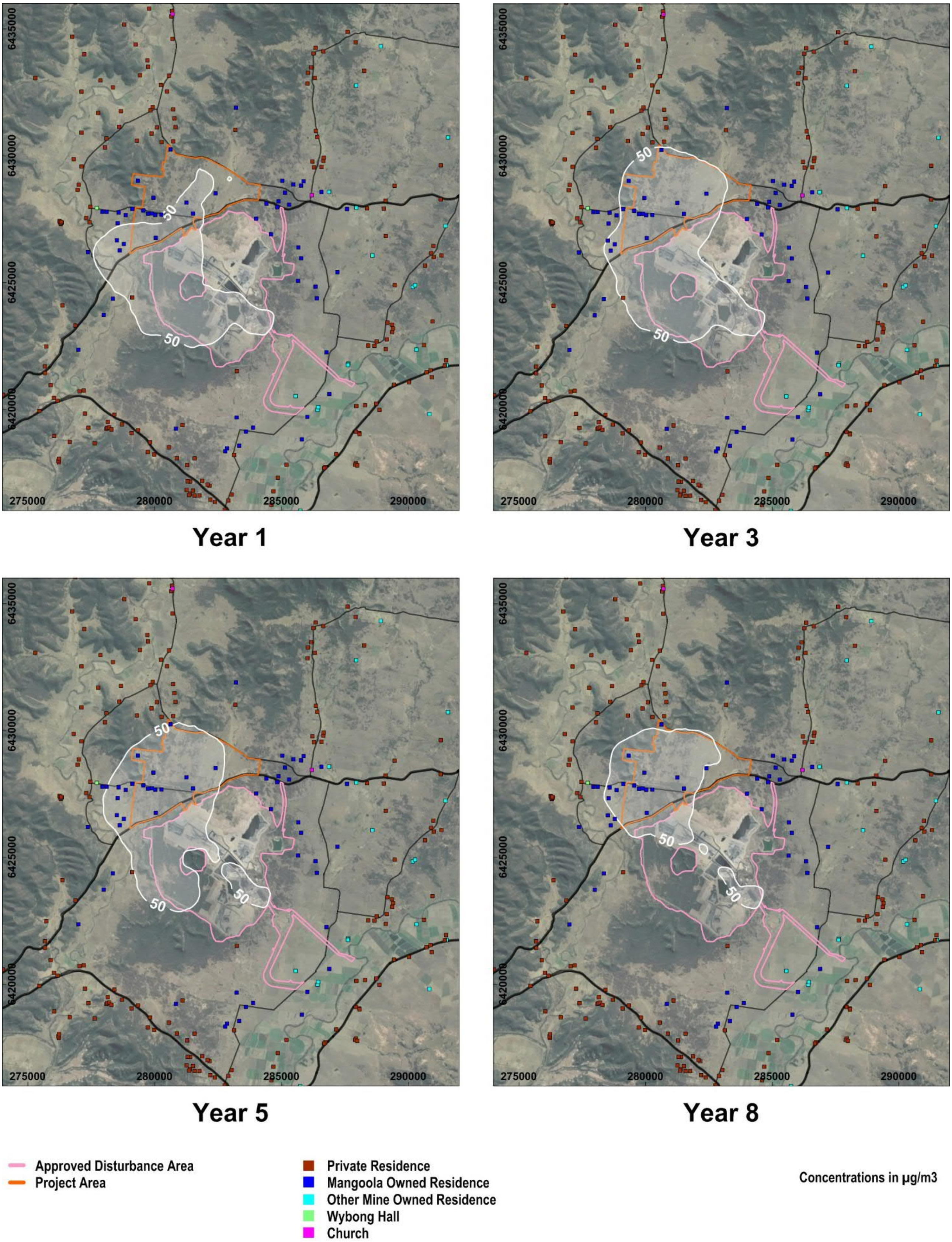


Figure 21 Predicted maximum 24-hour average PM_{10} concentrations due all sources (cumulative)

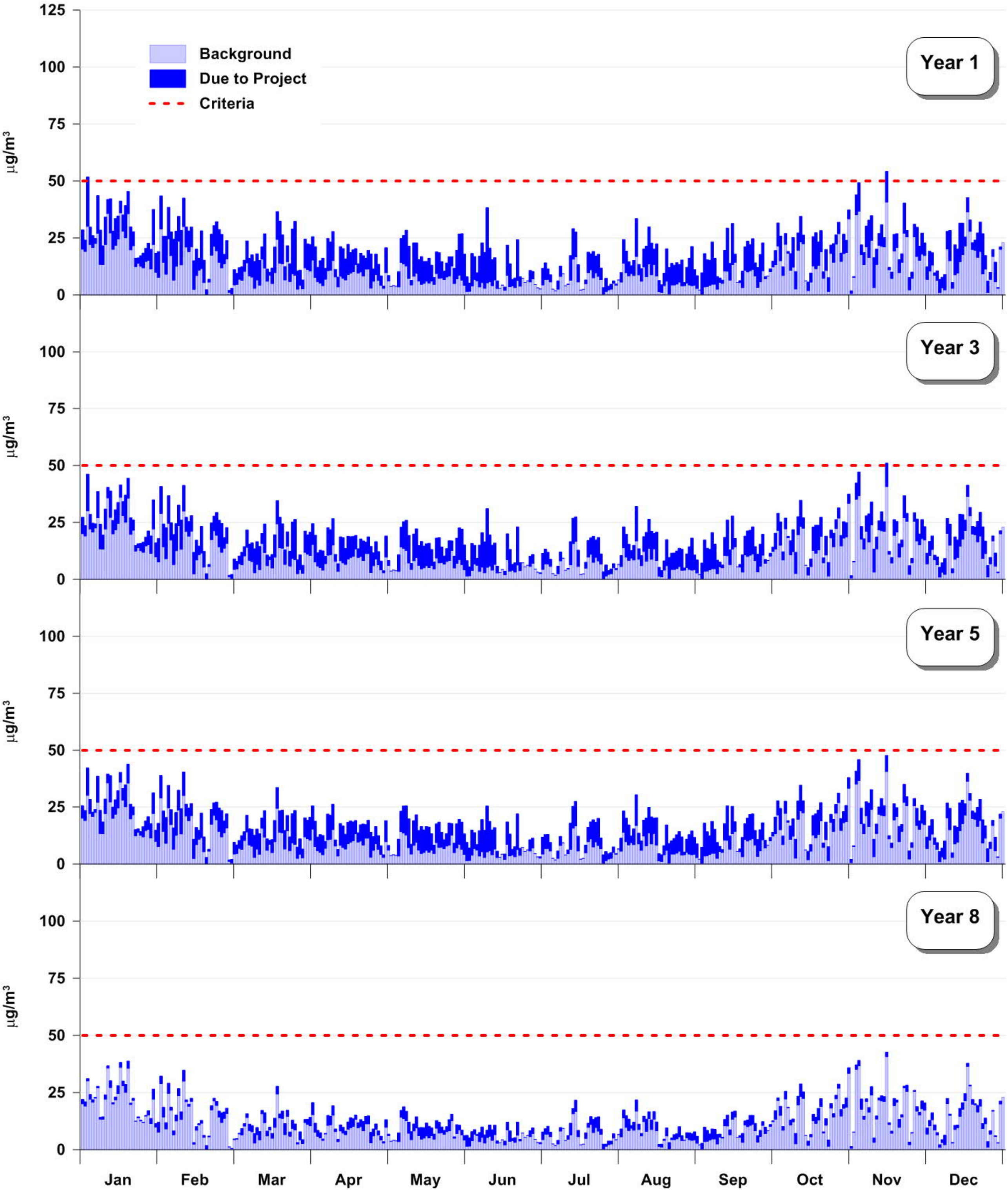


Figure 22 Predicted 24-hour average PM_{10} concentrations at property 83

Figure 23 shows the predicted annual average PM_{10} concentrations due to the MCCO Project only and **Figure 24** shows the predicted cumulative concentrations. The EPA air quality assessment criterion for annual average PM_{10} is 25 µg/m^3. From **Figure 24** it can be seen that annual average PM_{10} concentrations are predicted to comply with the 25 µg/m^3 criterion at all private sensitive receptors. It has therefore been concluded that the MCCO Project will not cause adverse air quality impacts with respect to annual average PM_{10}.

As noted from **Section 5.2**, the air quality monitoring data showed that annual average PM_{10} concentrations have not exceeded 25 µg/m^3 in the past five years. This outcome is expected to be maintained if the MCCO Project proceeds.

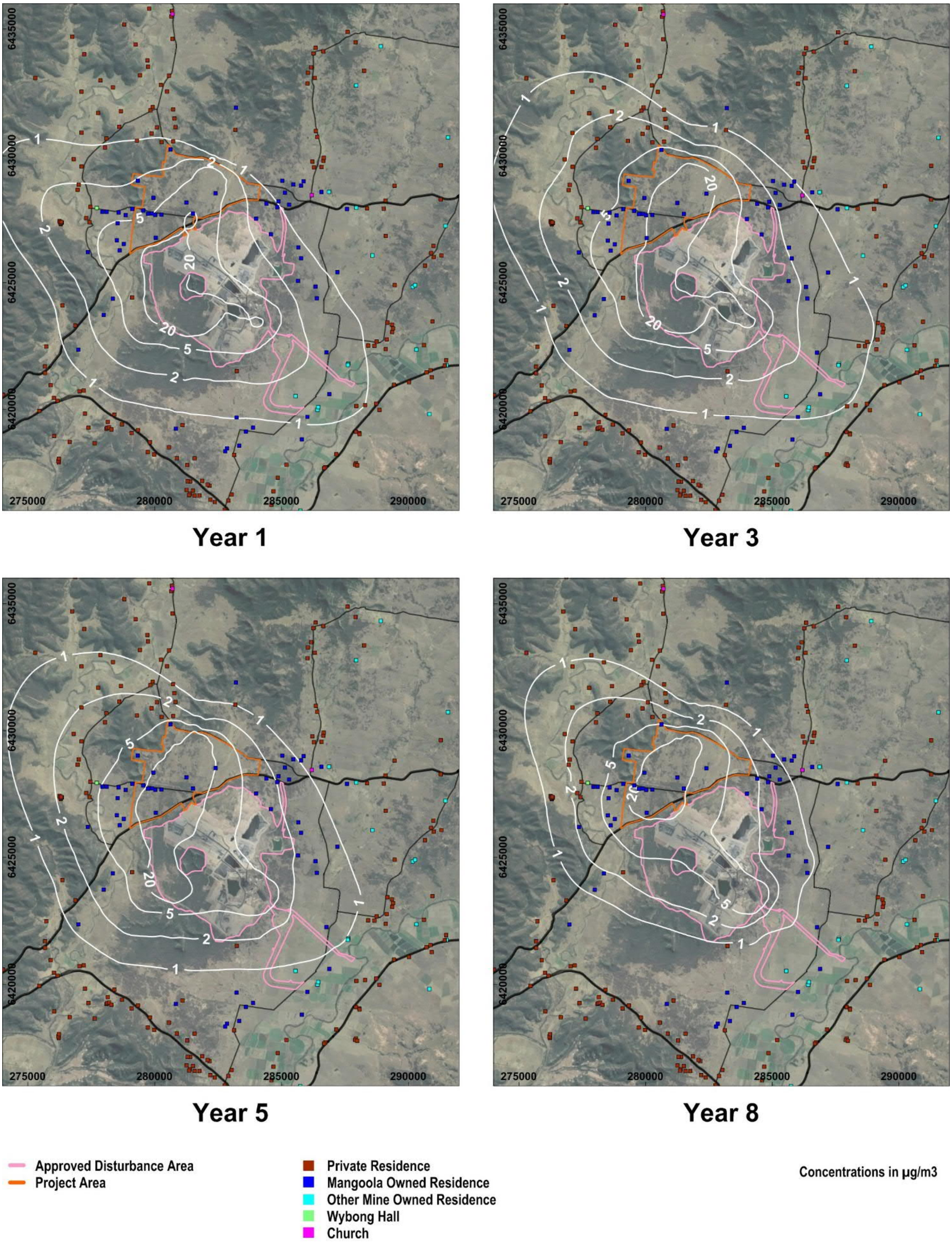


Figure 23 Predicted annual average PM_{10} concentrations due to the MCCO Project only

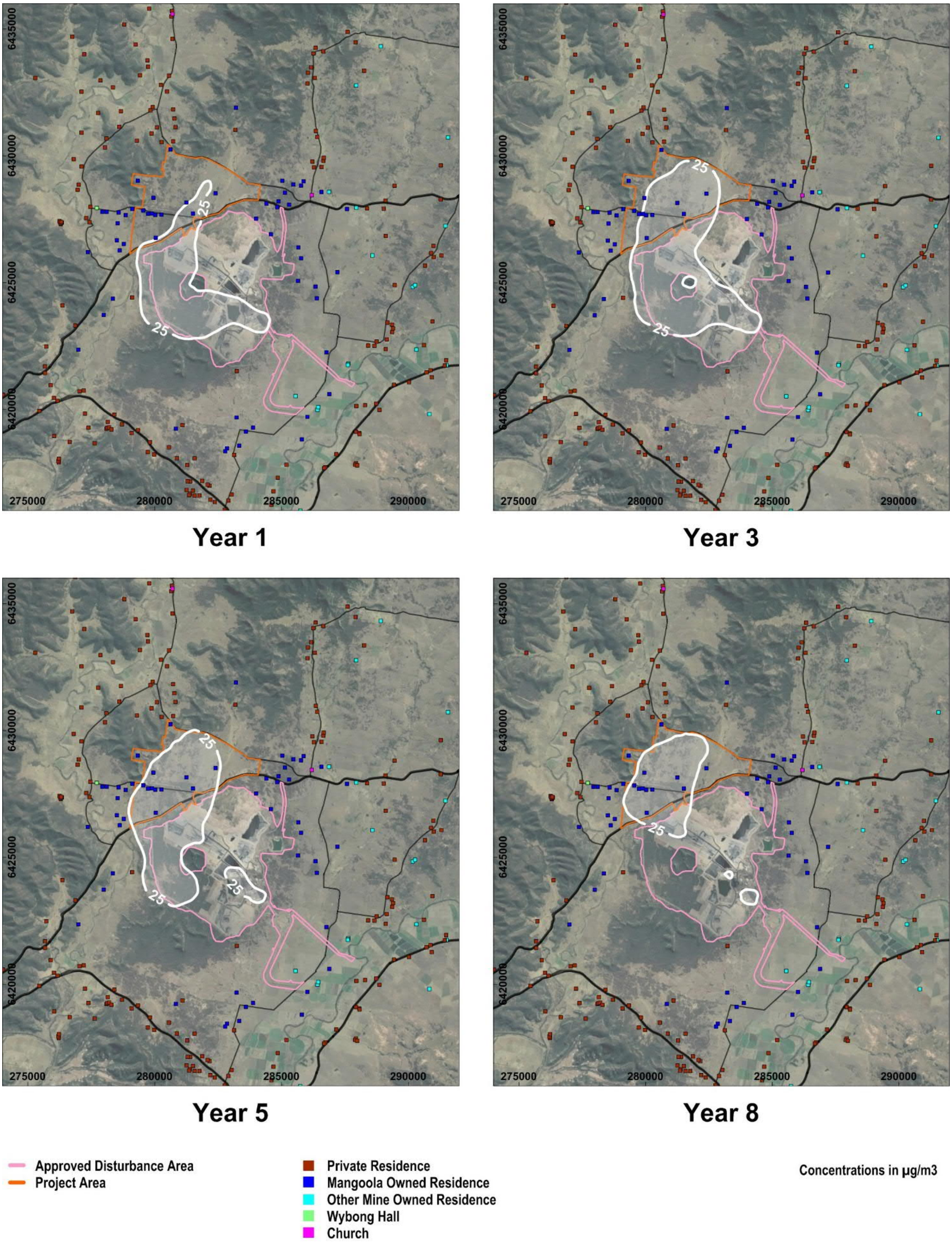


Figure 24 Predicted annual average PM_{10} concentrations due to all sources (cumulative)

9.2 Particulate Matter (as $PM_{2.5}$)

The results for $PM_{2.5}$ are shown in **Figure 25** to **Figure 29**, including the MCCO Project only and cumulative scenarios, for maximum 24-hour and annual averages. **Appendix G** provides all $PM_{2.5}$ model results for each receptor in tabular form.

Figure 25 shows that the contribution of the MCCO Project will not exceed EPA's 25 µg/m^3 cumulative criterion at any private properties. As per **Table 3** and **Table 4**, the 24-hour average concentration of 25 µg/m^3 for $PM_{2.5}$ is applied as an incremental criterion in VLAMP (2018), for the purposes of determining land acquisition and / or mitigation. The contribution of the MCCO Project to maximum 24-hour average $PM_{2.5}$ concentrations is predicted to be in the order of up to 5 µg/m^3 at the nearest private sensitive receptors. Compliance with the VLAMP (for 24-hour average PM_{10}) is therefore demonstrated at all private sensitive receptors.

Figure 26 shows the predicted maximum 24-hour average $PM_{2.5}$ concentrations due to all sources (that is, cumulative for the purposes of assessing against EPA criteria). This figure does not clearly show whether the MCCO Project is the cause of an exceedance since the maximum 24-hour average $PM_{2.5}$ concentration in the derived background dataset (for the purposes of the cumulative predictions) is already above the criterion, at 26 µg/m^3. Therefore, some additional investigation of the MCCO Project contribution and likely cause of potential exceedances has been carried out.

Figure 27 shows the predicted 24-hour average $PM_{2.5}$ concentrations at property 83, the potentially most impacted location, including the background and Project contributions. It can be seen from this figure that, according to the modelling, there would be up to two days each year when the 24-hour average $PM_{2.5}$ concentration exceeded 25 µg/m^3 at property 83. On these days when the concentration is predicted to exceed 25 µg/m^3, the background level is already in the order of 25 µg/m^3; a result which suggests that the MCCO Project would not be the primary cause of an exceedance. Again, it should be noted that property 83 is subject to voluntary acquisition under the existing approved operation and is within the predicted noise voluntary acquisition zone for the MCCO Project. Therefore, and as for PM_{10}, these results suggest that the MCCO Project will contribute to, but will not be the primary cause of, an exceedance of the 24-hour average criterion. The predicted impacts at property 83 do not trigger the voluntary mitigation or acquisition criteria in the Voluntary Land Acquisition and Mitigation Policy.

Figure 28 and **Figure 29** show the predicted annual average $PM_{2.5}$ concentrations due to the MCCO Project only and all sources scenarios respectively. The model results show that there are no private sensitive locations which are predicted to experience exceedances of the annual average $PM_{2.5}$ criterion (8 µg/m^3) at any stage of the MCCO Project. In addition these results demonstrate compliance with the VLAMP (2018) criteria for annual average $PM_{2.5}$.

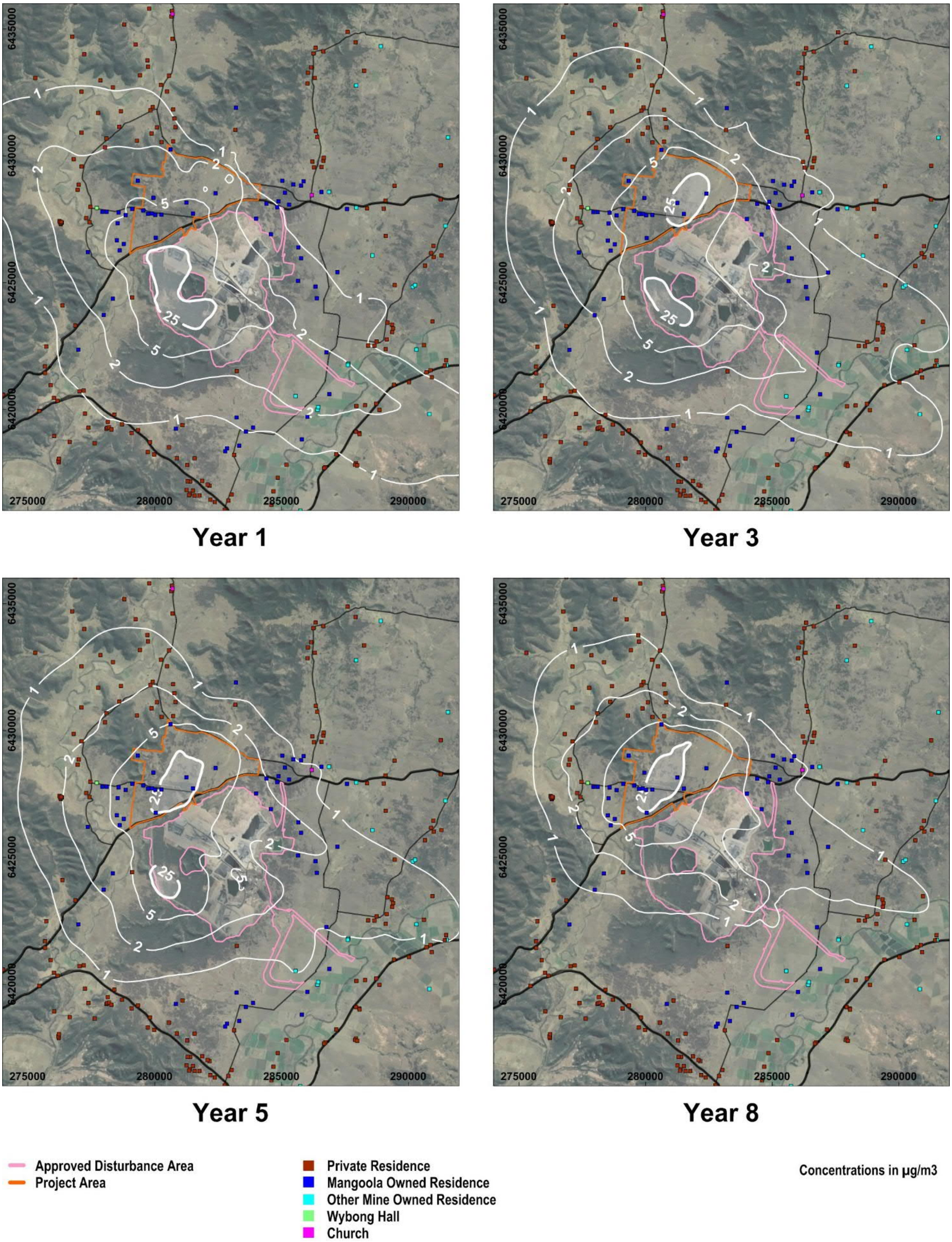


Figure 25 Predicted maximum 24-hour average $PM_{2.5}$ concentrations due to the MCCO Project only

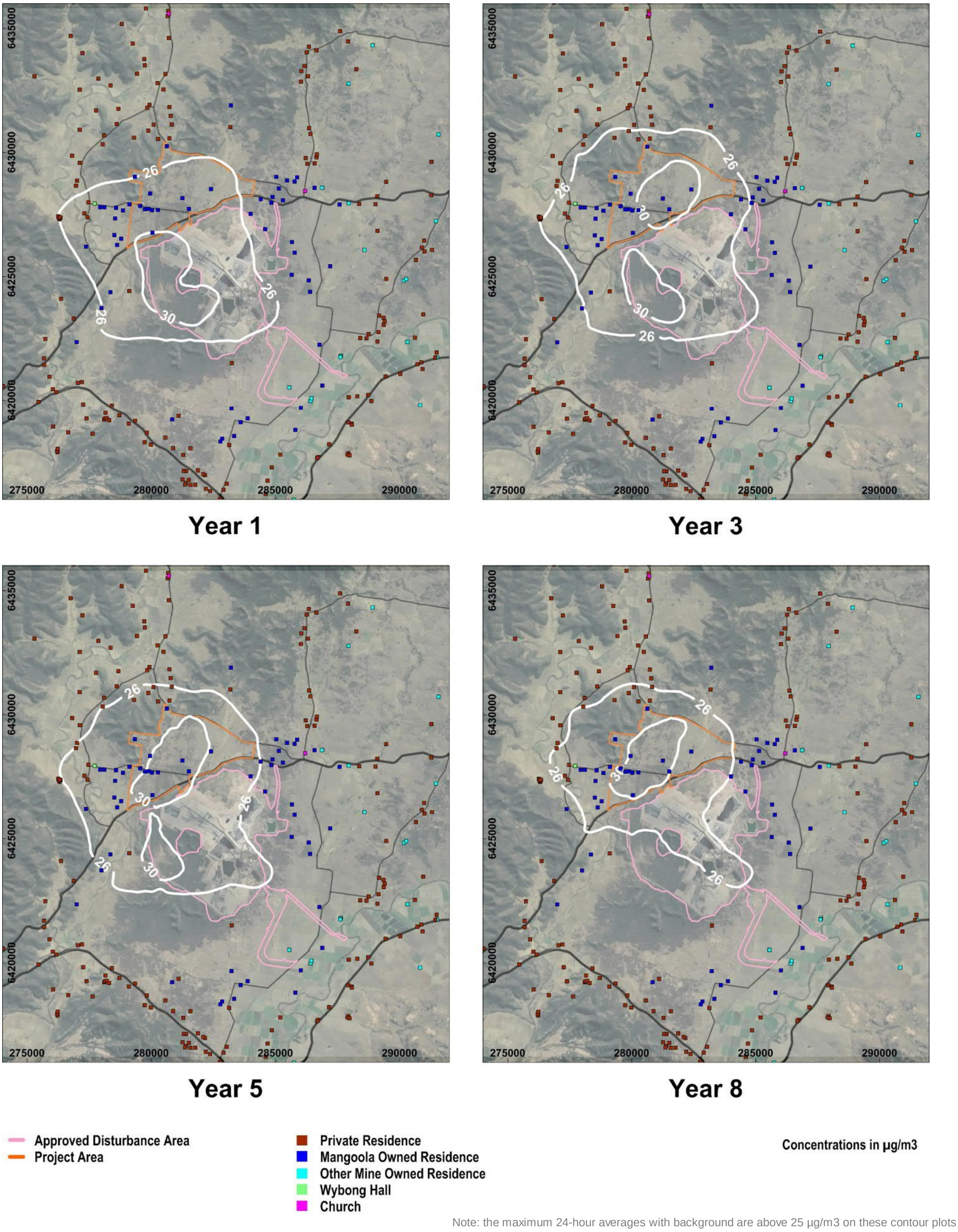


Figure 26 Predicted maximum 24-hour average $PM_{2.5}$ concentrations due to all sources (cumulative)

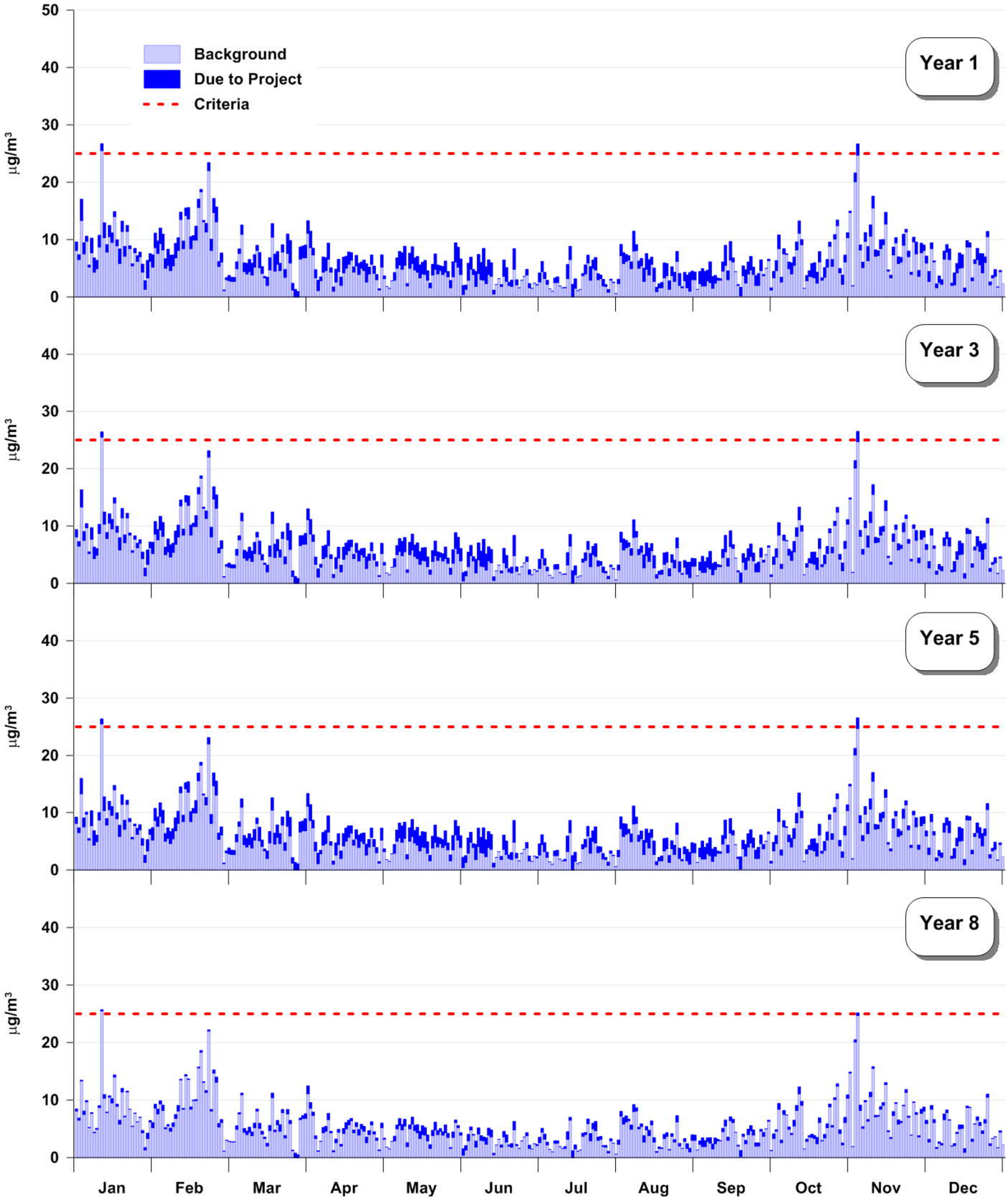


Figure 27 Predicted 24-hour average $PM_{2.5}$ concentrations at property 83

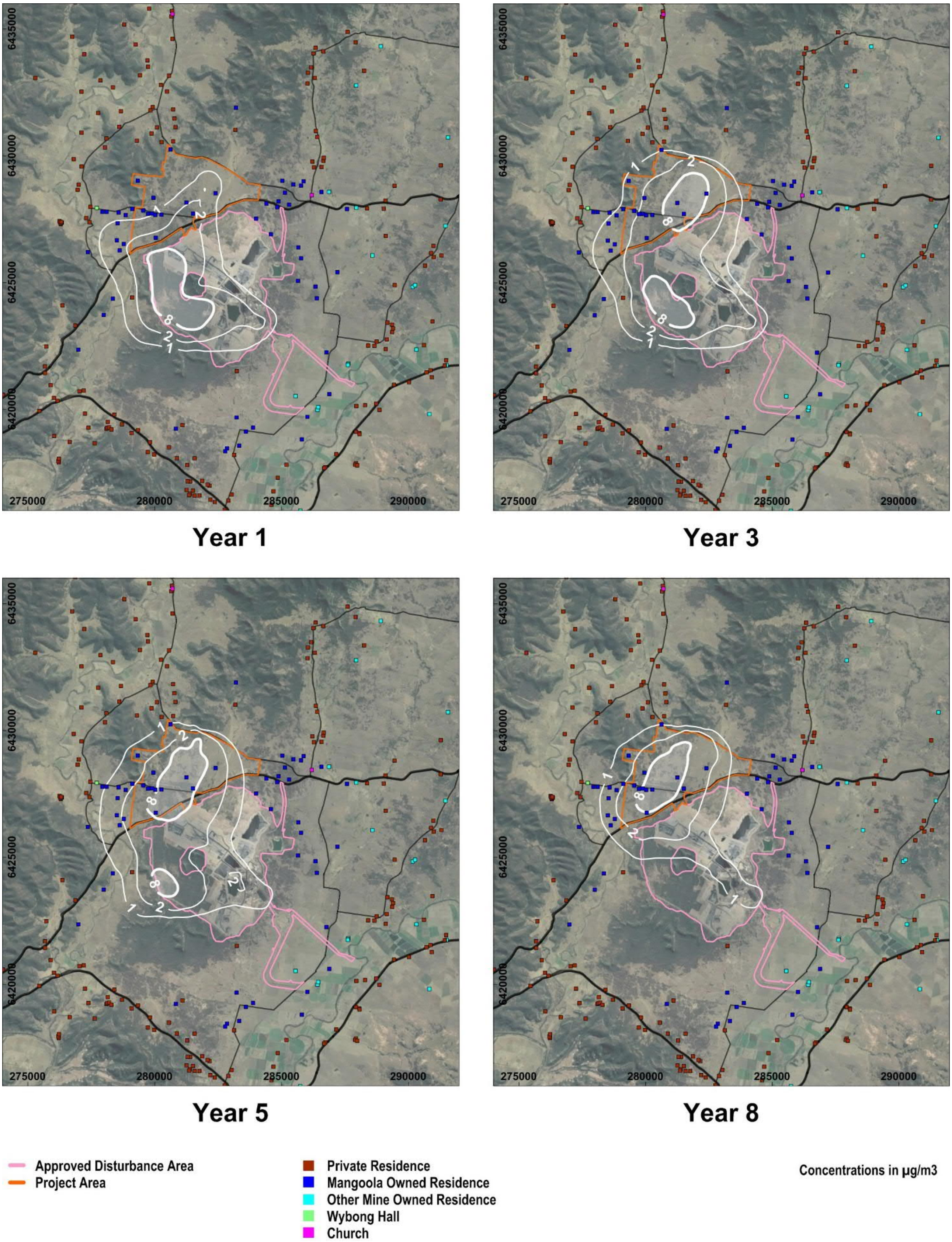


Figure 28 Predicted annual average $PM_{2.5}$ concentrations due to the MCCO Project only

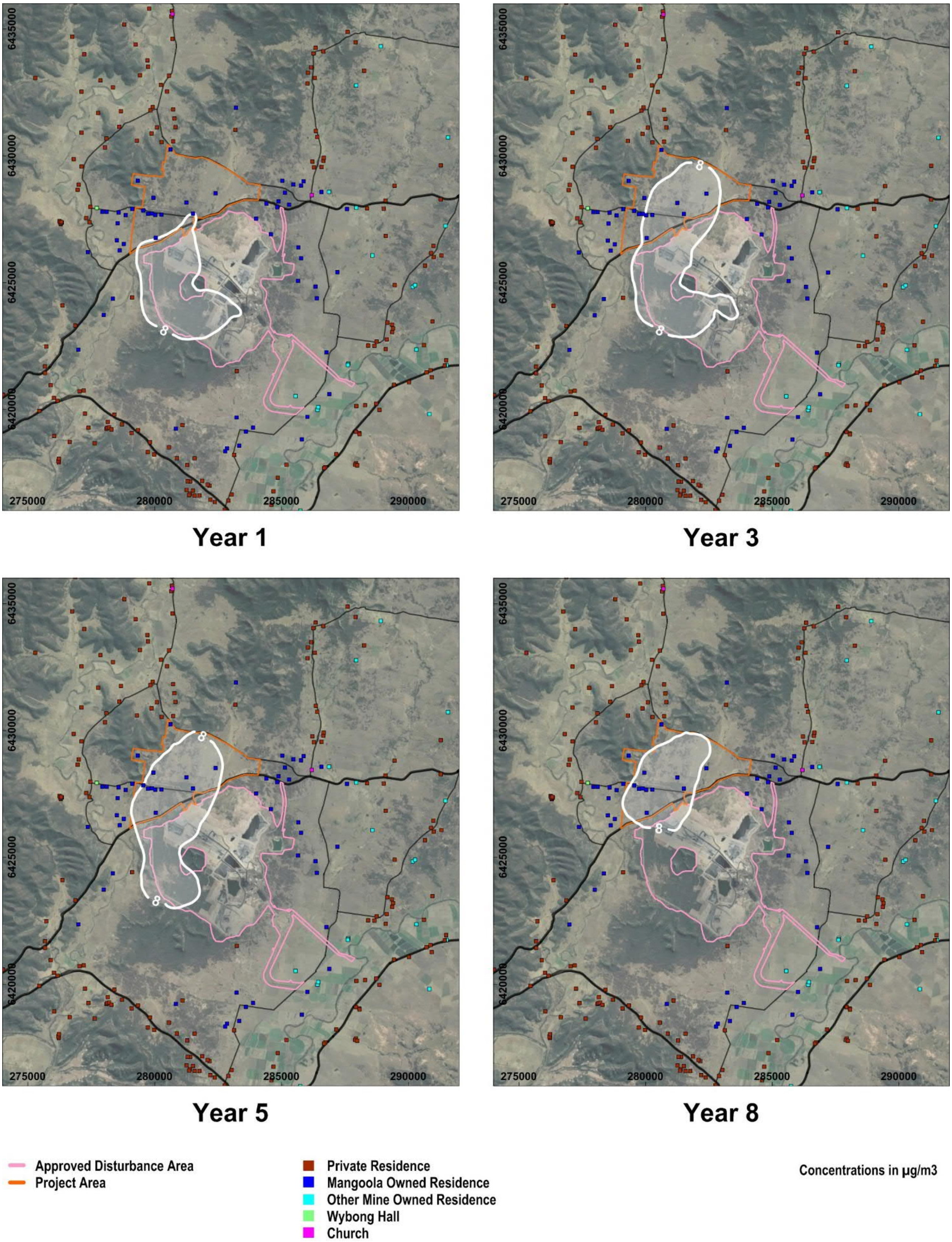


Figure 29 Predicted annual average $PM_{2.5}$ concentrations due to all sources (cumulative)

9.3 Particulate Matter (as TSP)

Figure 30 and **Figure 31** show the predicted annual average TSP concentrations in future years for the MCCO Project only and cumulative scenarios respectively. There are no private dust sensitive locations which are predicted to experience exceedances of the annual average TSP criterion (90 µg/m^3) at any stage of the MCCO Project.

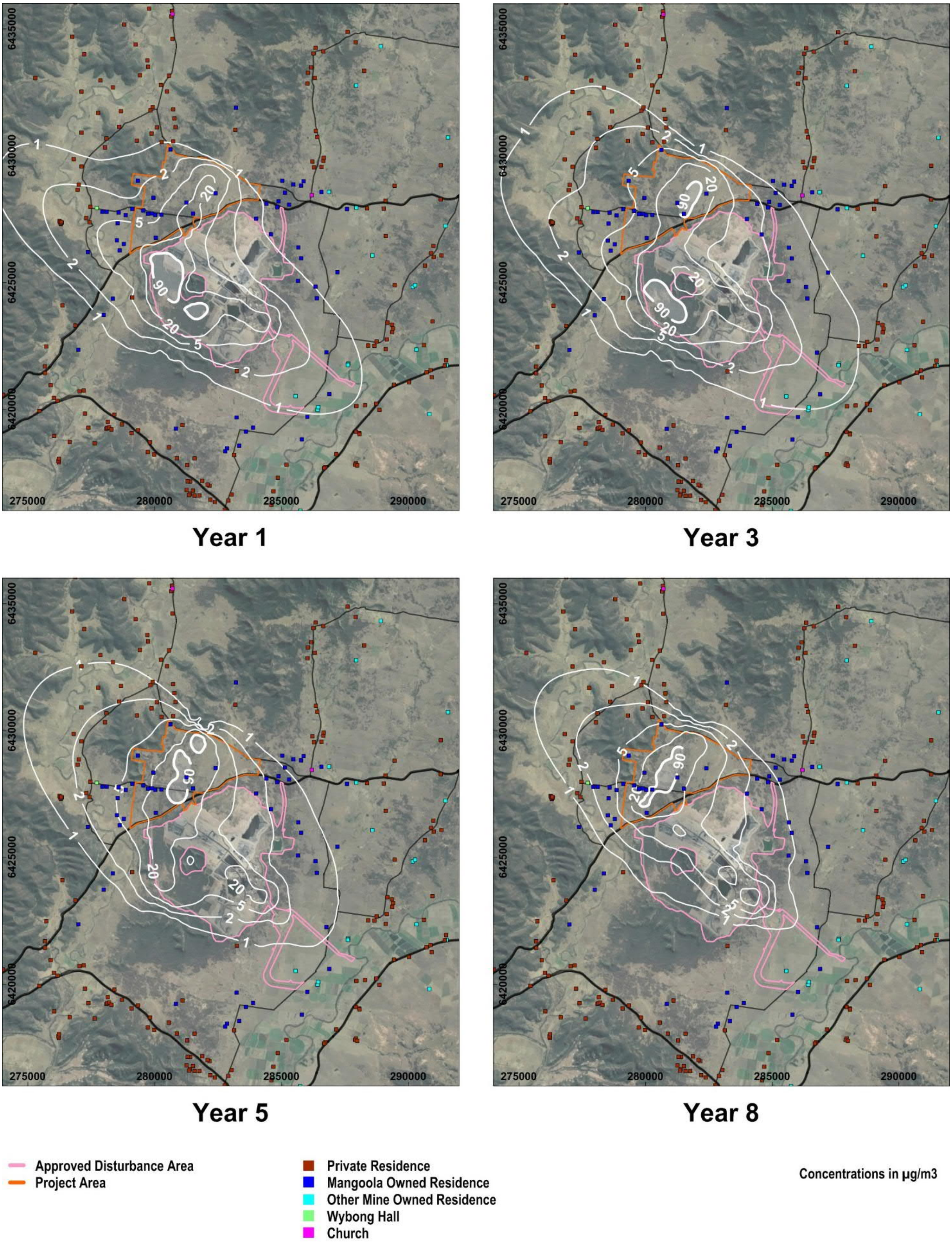


Figure 30 Predicted annual average TSP concentrations due to the MCCO Project only

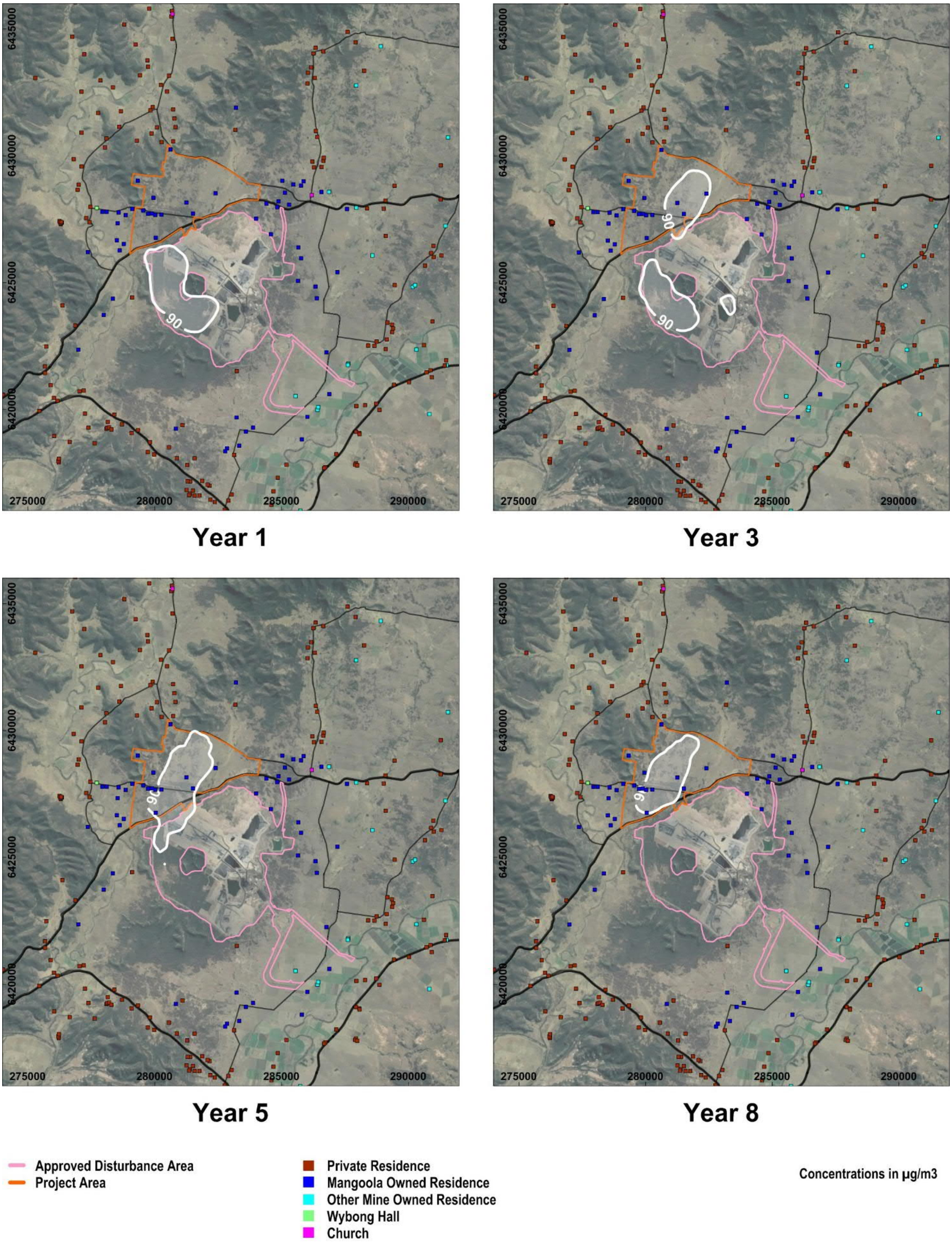


Figure 31 Predicted annual average TSP concentrations due to all sources (cumulative)

9.4 Deposited Dust

Figure 32 and **Figure 33** show the predicted annual average dust deposition levels in future years for the MCCO Project only and cumulative scenarios respectively. There are no private dust sensitive locations which are predicted to experience exceedances of the annual average dust deposition criteria at any stage of the MCCO Project.

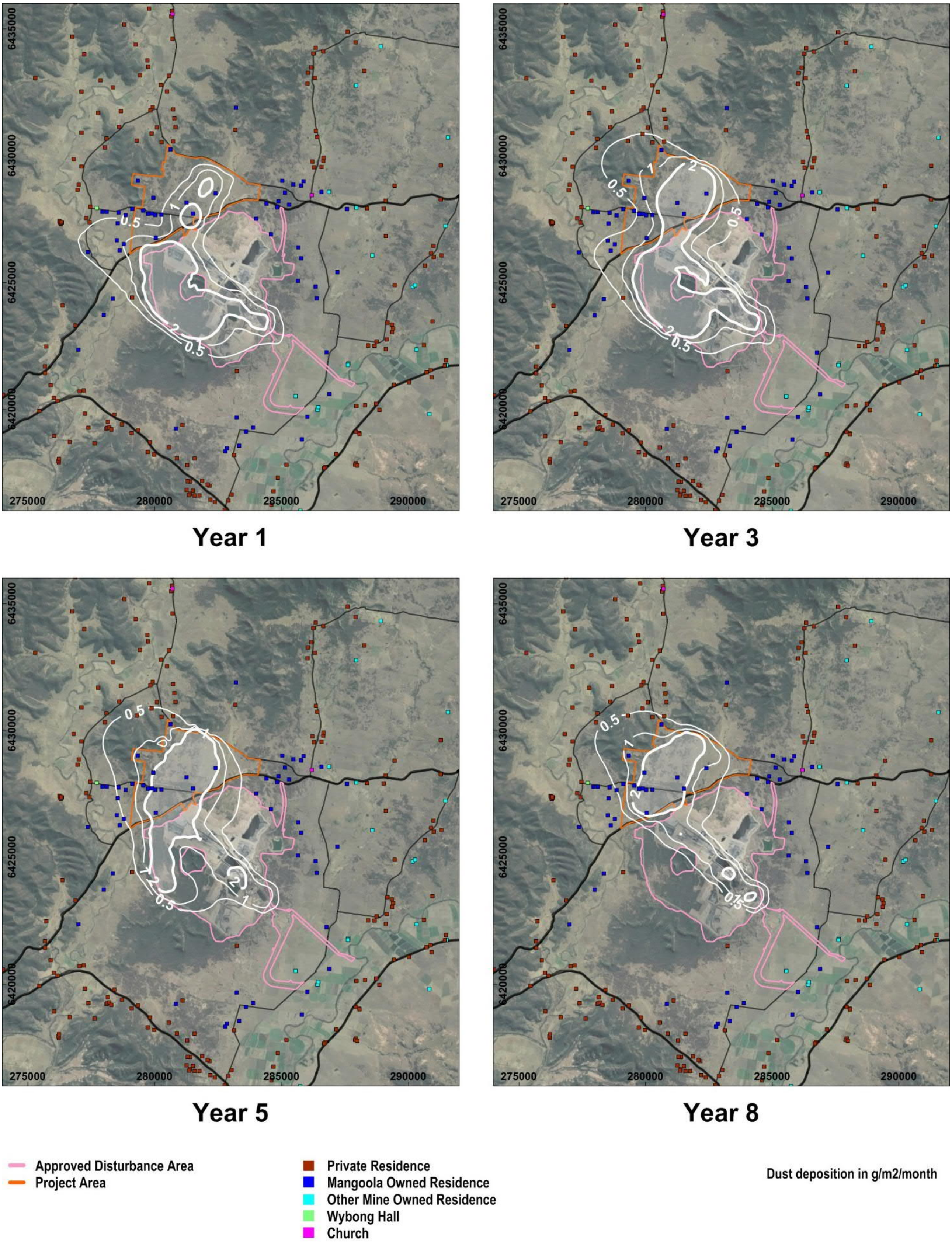


Figure 32 Predicted annual average deposited dust levels due to the MCCO Project only

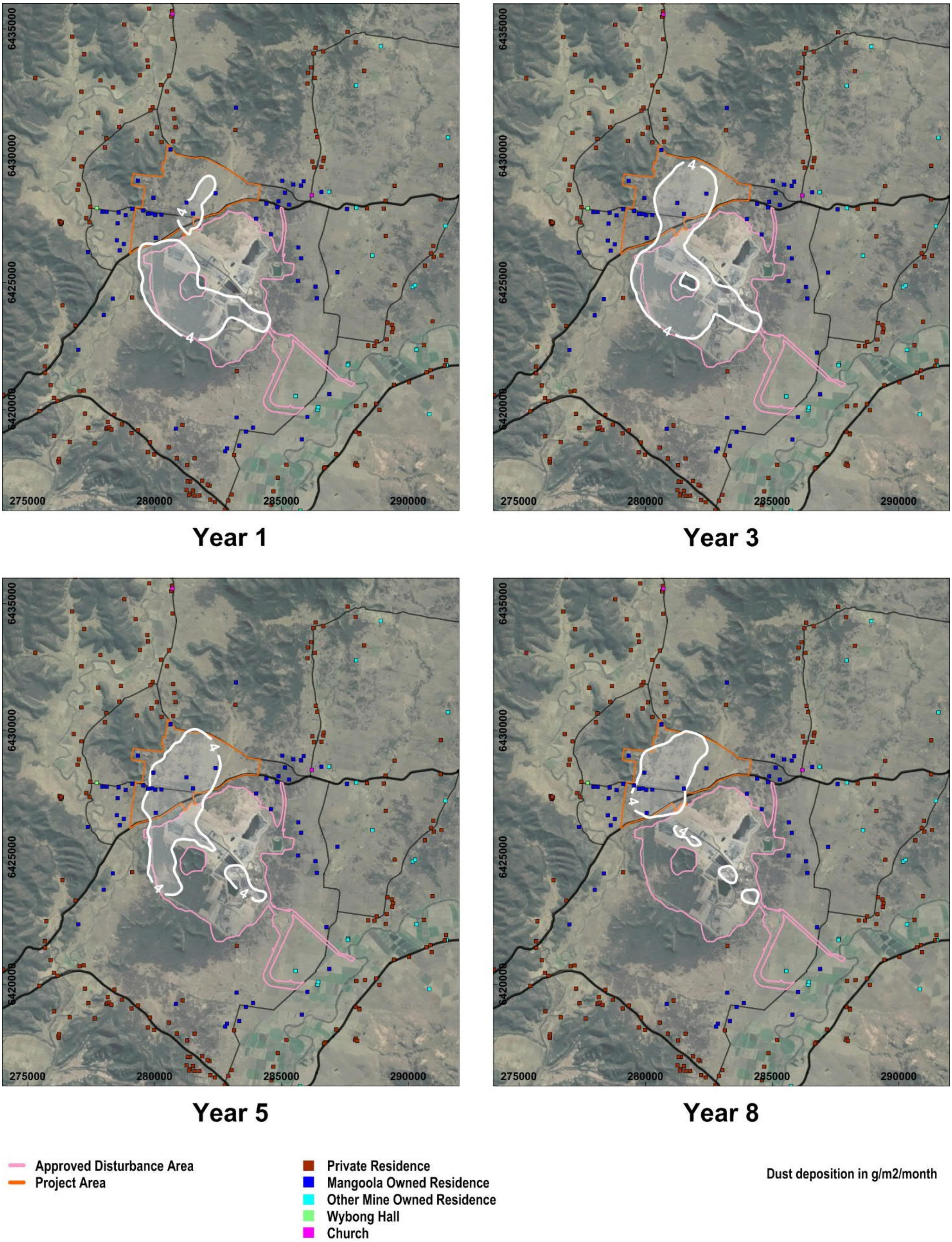


Figure 33 Predicted annual average deposited dust levels due to all sources (cumulative)

9.5 Post-Blast Fume (NO_2)

Blasting activities have the potential to result in fume and particulate matter emissions. Particulate matter emissions from blasting are included in the dispersion modelling results presented in **Sections 9.1** to **9.4**. Post-blast fume can be produced in non-ideal explosive conditions of the ammonium nitrate/fuel oil (ANFO) and is visible as an orange / brown plume.

Post-blast fumes comprise of oxides of nitrogen (NO_x) including nitric oxide (NO) and nitrogen dioxide (NO_2). In general, at the point of emission, NO will comprise the greatest proportion of the total NO_x emission. Typically, this is 90% by volume of the NO_x. The remaining 10% will comprise mostly NO_2. It is the NO_2 which has been linked to adverse health effects.

Ultimately however, much of the NO emitted into the atmosphere is oxidised to NO_2. The rate at which this oxidisation takes place depends on prevailing atmospheric conditions including temperature, humidity and the presence of other substances in the atmosphere such as ozone. It can vary from a few minutes to many hours. The rate of conversion is important because from the point of emission to the point of maximum ground-level concentration there will be an interval of time during which some oxidation will take place. If the dispersion is sufficient to have diluted the plume to the point where the concentration is very low, then the level of oxidation is unimportant. However, if the oxidation is rapid and the dispersion is slow then high concentrations of NO_2 can occur.

In NO_x monitoring data near significant emission sources (for example, power stations and motorways) the percentage of NO_2 in the NO_x is (as a rule) inversely proportional to the total NO_x concentration, and when NO_x concentrations are high, the percentage of NO_2 in the NO_x is typically of the order of 20%. This is demonstrated by **Figure 34** which shows that, for high NO_x concentrations, the NO_2 to NO_x ratio reduces to less than 20%.

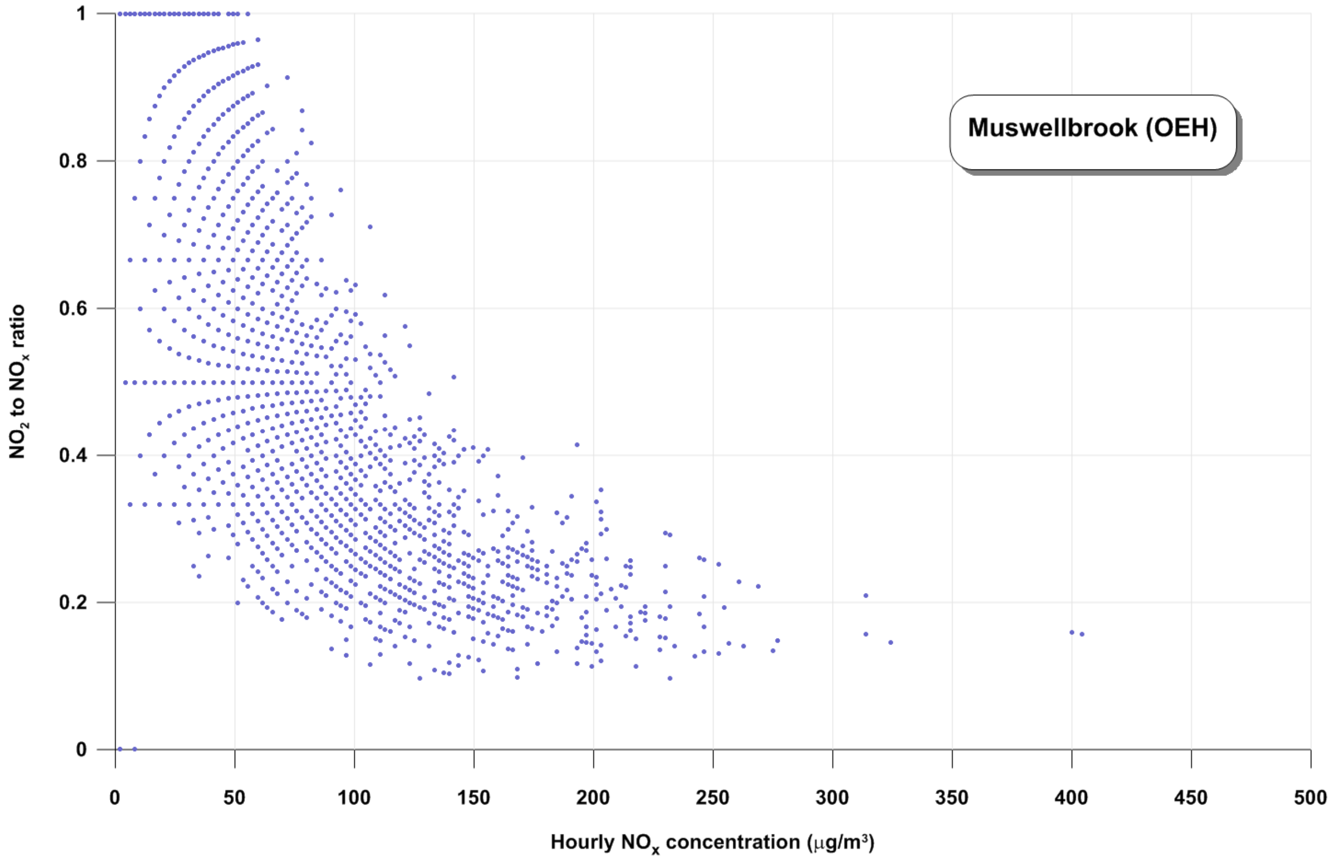


Figure 34 Measured NO_2 to NO_x ratios from hourly average data collected at Muswellbrook by the OEH in 2014

For assessment of post-blast fume the applicable EPA air quality criterion for NO_2 is 246 µg/m^3 as a 1-hour average.

The CALPUFF dispersion model has been used to quantify potential NO_2 concentrations due to blasting. The methodology was as follows:

- Blasts modelled as single volume sources in two locations of the MCCO Project. That is, in the North Pit or South Pit.
- Release heights of 20 m, effective plume heights of 40 m, initial horizontal spread (sigma y) of 25 m and initial vertical spread (sigma z) of 10 m. These are conservative estimates based on the data presented by Attalla *et al*. (2008). No plume rise due to buoyancy was modelled, which is again a conservative assumption.
- Emissions assumed to occur every hour between 9 am and 5 pm. However, it has been assumed that blasting would not occur if a temperature inversion was present, as identified in pre-blast meteorological assessments. In the meteorological dataset, temperature inversions may be present in the afternoon, from around 4 pm onwards, for approximately 1% of the time during daytime (9 am to 5 pm) hours. In 2017 most blasts (around 60%) occurred between 12 and 1 pm.
- Blasting could be on any day of the week (a conservative assumption as, in accordance with current Project Approval, blasting cannot occur on Sundays or public holidays unless written approval is obtained from the EPA).
- NO_x emissions based on data presented in the Queensland *Guidance Note for the management of oxides in open cut blasting* (DEEDI, 2011). It was conservatively assumed that the initial NO_2 concentration in the plume would be 17 ppm (34.9 mg/m^3) based on the Rating 3 Fume Category in the Queensland Guidance Note.
- The initial NO_2 concentration in the plume was converted to a total NO_x emission rate based on a detailed measurement program of NO_x in blast plumes in the Hunter Valley made by Attalla *et al*. (2008) which found that the NO:NO_2 ratio was typically 27:1, giving a NO_x:NO_2 ratio of approximately 18.6 g NO_x/g NO_2.
- Emission release time of 5 minutes.
- Calculated emission of 866 g/s of NO_x per blast.
- 20% of the NO_x is NO_2 at the points of maximum 1-hour average concentrations and at sensitive receptors.

Figure 35 shows the predicted maximum 1-hour average NO_2 concentrations due to post-blast fume, based on the methodology outlined above. These results show that, under worst-case meteorological conditions with a rated 3 fume, blasting every day between 9 am and 5 pm and maximum background NO_2 concentrations from Muswellbrook, the maximum 1-hour average NO_2 concentrations will not exceed EPA's criterion of 246 µg/m^3 at any off-site sensitive receptor location. While worst-case assumptions have been made with respect to time-of-day, fume rating and background levels, the modelling has been based on a blast positioned broadly in the middle of the proposed disturbance footprint. It is acknowledged that moving the blast location, for example further to the north, would lead to a corresponding shift in the contours, potentially extending to sensitive receptor locations. However, this potential will be managed through the design process for each individual blast which will be designed to comply with relevant criteria. The potential for post-blast fume impacts will be identified prior to all blasts, taking into account the specific parameters of each blast, to avoid worst-case conditions and to minimise fume emissions from blasting, in accordance with contemporary conditions of approval.

Mangoola has developed a pre-blasting procedure which covers fume management. A site-specific blast management plan will be implemented during operations, including key fume management actions, such as defining the potential risk zone based upon weather patterns and obtaining permissions to fire based on an assessment of real-time weather conditions. In addition to general fume management practices, Mangoola continues to work closely with its explosive suppliers to minimise the potential for post-blast fume.

Based on the dispersion modelling (with predominantly worst-case assumptions) and proposed implementation of site-specific pre-blast procedures it has therefore been concluded that the MCCO Project will not lead to any adverse air quality impacts with respect to post blast fume.

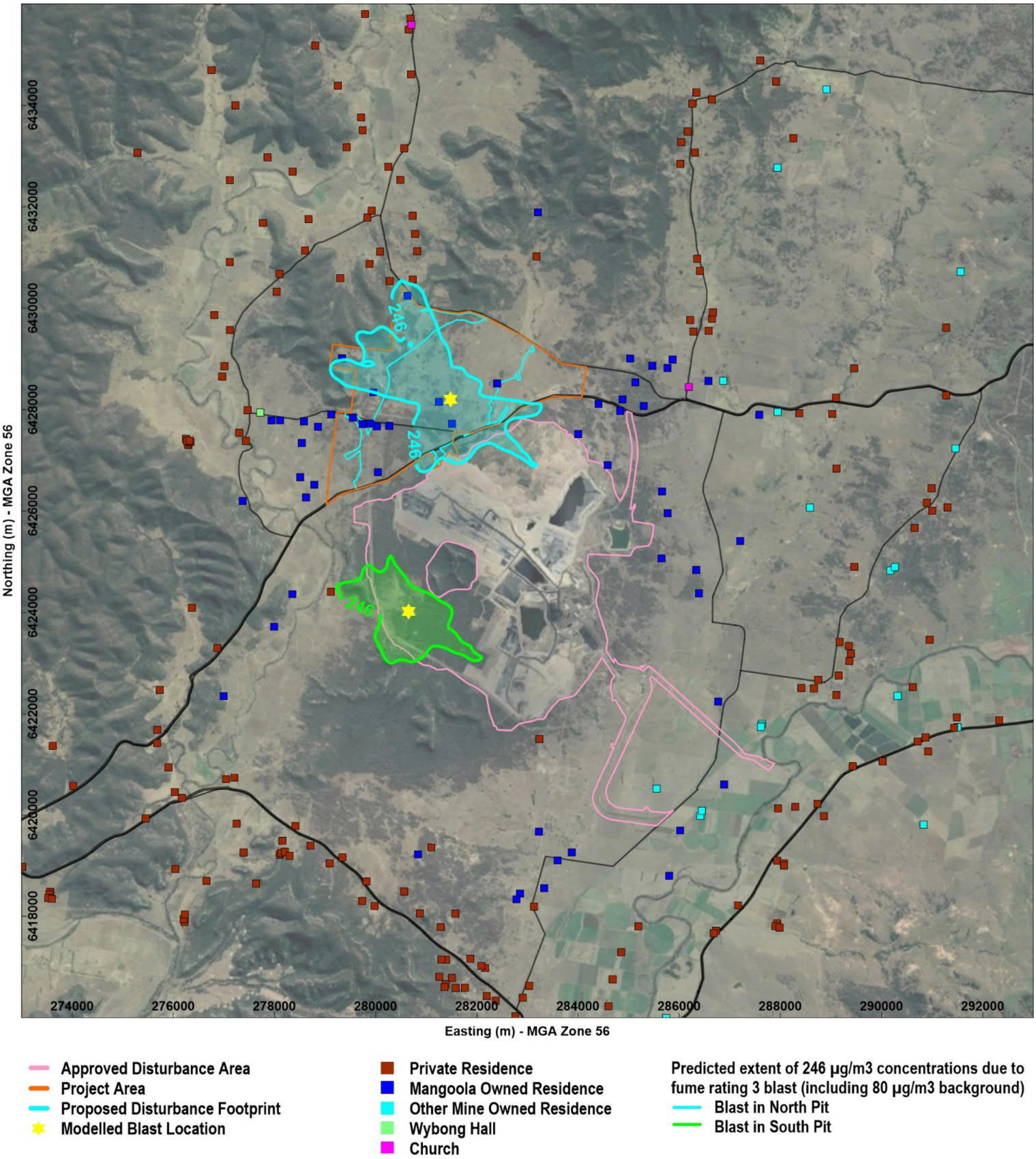


Figure 35 Predicted maximum 1-hour average NO_2 concentrations due to blasting

9.6 Diesel Exhaust Emissions

Emissions from diesel exhausts associated with off-road vehicles and equipment at mine sites are often deemed a lower air quality impact risk than dust emissions from the material handling activities. This is because of the relatively few emission sources involved, for example when compared to a busy motorway, and the large distances between the sources and sensitive receptors. Nevertheless, a review of the potential impacts has been carried out.

The most significant emissions from diesel exhausts are products of combustion including carbon monoxide (CO), oxides of nitrogen (NO_x) and particulate matter (PM_{10} and including $PM_{2.5}$). It is the NO_x, or more specifically NO_2, and PM_{10} (including $PM_{2.5}$) which have been reviewed in this section.

9.6.1 Particulate Matter (as PM_{10} and $PM_{2.5}$)

The emission factors, presented in **Section 6** and **Appendix C**, represent the contribution from both wheel generated particulates and the exhaust particulates. These emission factors, including with control factors, are based on measured emissions which include diesel particulates in the form of both PM_{10} and $PM_{2.5}$. The emission factors are also likely to include more diesel exhaust particulate than from a modern truck as the factors were developed on the basis of emissions from trucks measured in the 1980's (that is, older trucks). Todoroski Air Sciences has also reported (TAS 2016) that several studies, reported to the EPA, confirmed that a control factor of 85% can be maintained, representing all components of the truck haulage emission.

Based on the information collated above, the potential impacts of diesel exhaust emissions (as PM_{10} and $PM_{2.5}$) are represented in the preceding results, in **Sections 9.1** to **9.4**.

Table 18 provides the explicit estimates of PM_{10} and $PM_{2.5}$ emissions due only to diesel plant and equipment exhausts. Emission factors for "Industrial off-road vehicles and equipment" from the EPA's 2008 Air Emissions Inventory (EPA 2012) were used for the calculations. These factors relate to diesel exhaust and evaporative emissions.

Table 18 Estimate of PM_{10} and $PM_{2.5}$ emissions from diesel engines

Total fuel used (litres) (based on maximum annual fuel usage between 2015 and 2017) (L/y)	Emission factors (kg/kL)		Emissions (kg/y)	
	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
36,156,000	2.84	2.75	102,683	99,603

Mangoola has considered the practicalities of exhaust after-treatment technologies for in service non-road diesel engines. Consideration has been given to the emission reductions, capital costs, maintenance costs and operational costs. The proposed mitigation measures to manage diesel combustion emissions aim to address the equipment maintenance and engine replacement strategies from the *NSW Coal Mining Benchmarking Study: Best practice measures for reducing non-road diesel exhaust emissions"* (EPA 2014).

The emission control measures proposed by Mangoola include:

- Servicing all machinery in accordance with maintenance contracts and adopting original equipment manufacturer recommendations for maintenance.
- Targeting the maintenance to ensure, as far as reasonably practical, equipment remains fit for purpose over its whole life cycle.
- Defining failure modes, effects and criticality which helps to minimise potential equipment failure.

9.6.2 Nitrogen Dioxide (NO_2)

Emissions of NO_x from diesel exhausts have been estimated using fuel consumption data, provided by Mangoola, and an emission factor from the EPA's Air Emissions Inventory for 2008 (EPA 2012). **Table 19** shows the calculations.

Table 19 Estimated NO_X emissions from diesel exhausts

Item	Value
Total fuel used (litres) (based on maximum annual fuel usage between 2015 and 2017)	36,156,000
Diesel exhaust emission factor (kg/kL)	40.77
Diesel exhaust emissions – all equipment (kg/y)	1,474,080

The NO_x emission estimate from **Table 19** has been modelled using the same source locations as Year 3 (a potential worst case year) to provide an indication of the off-site NO_2 concentrations due to diesel exhaust emissions. The predicted maximum 1-hour average NO_2 concentrations are shown in **Figure 36**, which assumes that 20% of the NO_x is NO_2 at the locations of maximum ground-level concentrations.

At the nearest sensitive receptors, the predicted maximum 1-hour average NO_2 concentrations are in the order of 50 µg/m^3. With the addition of maximum background levels (80 µg/m^3 from **Table 10**) the results demonstrate compliance with the EPA's 246 µg/m^3 criterion. The 166 µg/m^3 contour represents the EPA criterion assuming a background level of 74 µg/m^3.

Figure 37 shows the predicted annual average NO_2 concentrations. These predictions assume that 70% of the NO_x is NO_2 based on the annual average NO_x to NO_2 percentage in the data collected from Muswellbrook in 2014. At nearest sensitive receptors the predicted average NO_2 concentrations are in the order of 10 µg/m^3 or less. With the addition of conservative background levels (21 µg/m^3 from **Table 10**) the results show compliance with the EPA's 62 µg/m^3 criterion. The 41 µg/m^3 contour in **Figure 37** represents the EPA criterion assuming a background level of 21 µg/m^3.

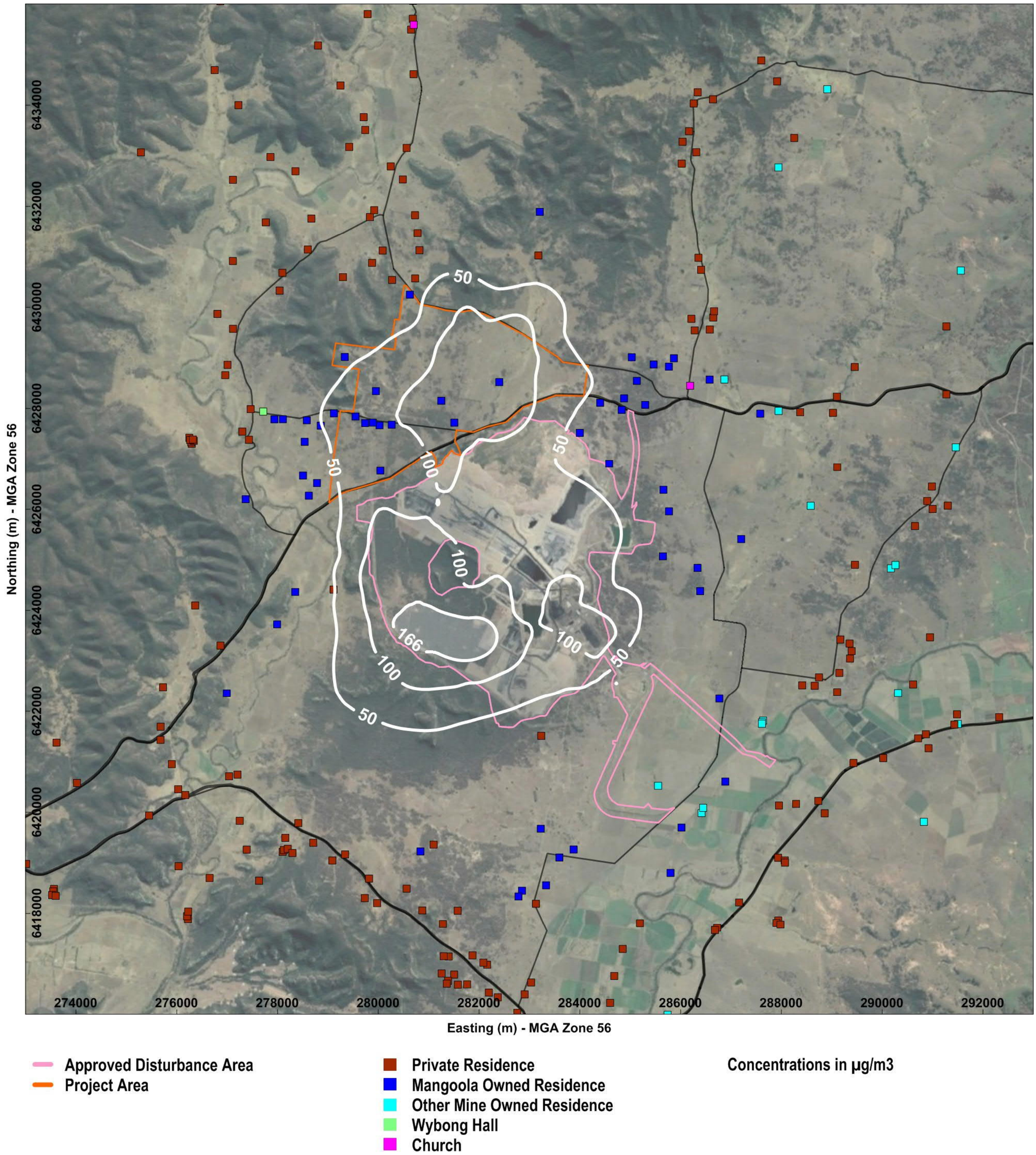


Figure 36 Predicted maximum 1-hour average NO_2 concentrations due to diesel exhausts

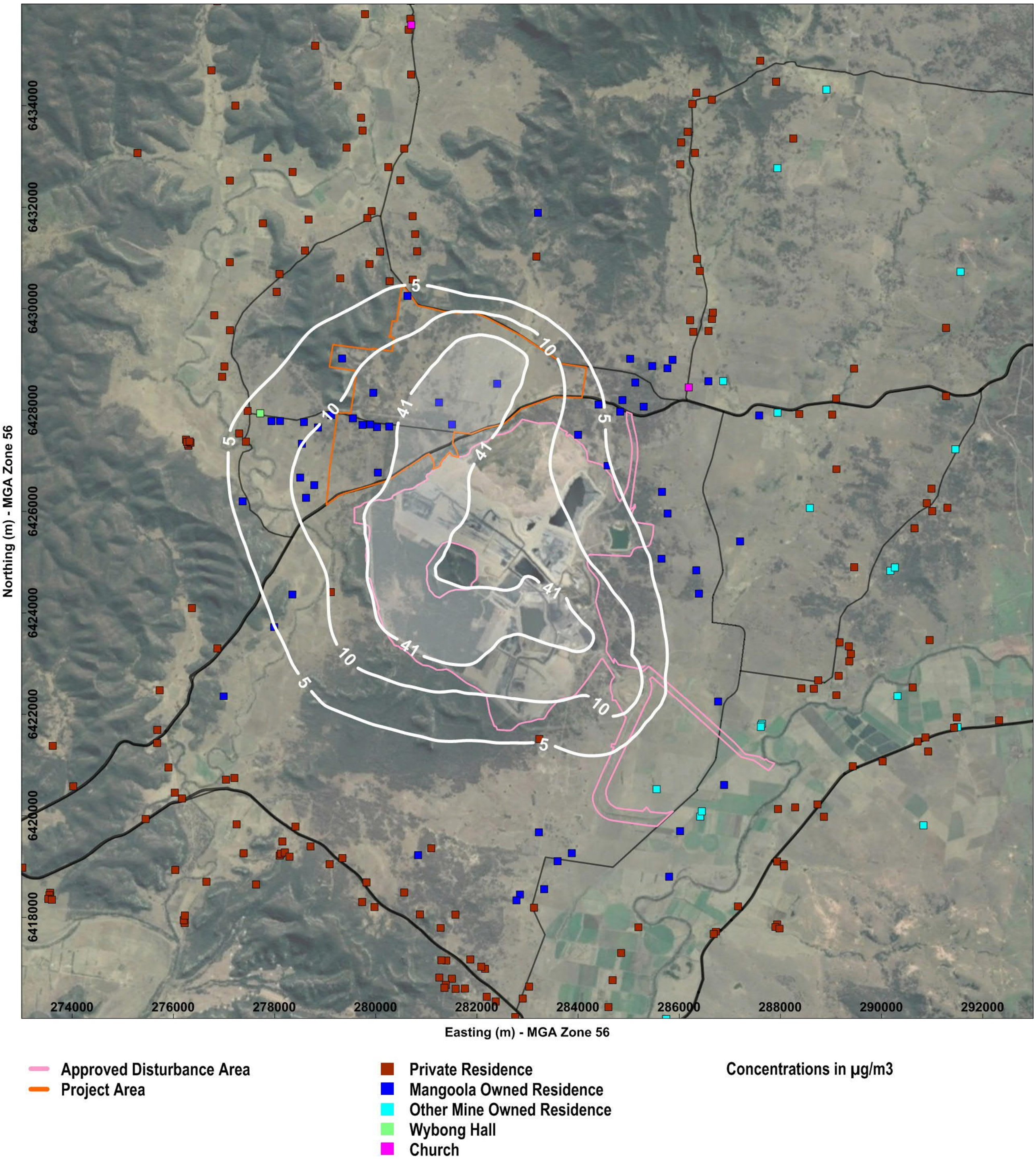


Figure 37 Predicted annual average NO_2 concentrations due to diesel exhausts

9.7 Construction

Dust emissions from construction works have the potential to cause nuisance impacts if not properly managed. In practice, it is not possible to realistically quantify impacts using dispersion modelling. To do so would require knowledge of weather conditions for the period in which work will be taking place in each location on the site.

Air quality impacts during construction would largely result from dust generated during earthworks and other engineering activities associated with the site construction works. Specifically, these works will primarily include the Wybong Post Office Road realignment, construction of the haul road overpass over Big Flat Creek and Wybong Road, and construction of water management infrastructure and realignment of electricity transmission lines. The total amount of dust generated would depend on the quantities of material handled, silt and moisture content of the soil, the types of operations being carried out, exposed areas, frequency of water spraying and speed of machinery. The detailed approach to construction will depend on decisions that will be made by Mangoola in conjunction with the contractor(s) and changes to the construction methods and sequences that are expected to take place during the construction phase.

Material handling quantities in the construction phase will be much lower than the material handling quantities in the operations phase. Consequently, the air quality impacts during construction will be lower than during operations. However, as for the operations phase, it is important that exposed areas be stabilised as quickly as possible and that appropriate dust suppression methods be used to keep dust impacts to a minimum. Dust management will require the use of water carts, the defining of trafficked areas, the imposition of site vehicle speed limits and constraints on work under extreme unfavourable weather conditions, such as dry wind conditions. Monitoring would also continue to be carried out during the construction phase to assess compliance with EPA criteria.

10. Management and Monitoring

Table 20 summarises the standard emission management measures, currently implemented as part of the existing Air Quality Management Plan, that will continue to be adopted as part of the MCCO Project.

Table 20 Emission management measures

Activity	Emission management measures	Assumed emission control (%) (NPI 2012, Donnelly et el 2011)	Measures identified from Donnelly et al (2011)	Consistent with best practice
Stripping topsoil by scraper	Watering of haul routes Restricting vehicle speeds	50	Control measures for this activity are not specifically identified but can be inferred from the bulldozer information below.	Y
Drilling overburden	Water injection and application of water to drill cuttings upon removal Dust curtains Ceasing operations when visible dust is generated	70	*"Best practice control measures include air extraction to a bag filter. No mines were found to use this practice."*	N (bag filters are not best practice in NSW)
Blasting overburden	Pre-blast checks including review of meteorological conditions	0	*"Best practice control measures include delaying shot to avoid unfavourable weather conditions and minimising the area blasted"*	Y
Hauling overburden and coal on unsealed roads	Watering of haul routes Gravel compaction and maintenance of haul routes Restricting vehicle speeds Clearly marked haul routes Fleet optimisation to reduce vehicle kilometres travelled Prompt clean-up of any material spillage	85	*"Control measures include watering, grading, well-defined haul routes, speed limits to 40 km/h and/or the use of suppressants."*	Y
Loading and unloading of overburden	Minimisation of fall distances during unloading and loading Planning of dump locations based on weather conditions Ceasing operations during adverse dust conditions	0	*"Current practices adopted to control emissions from loading and dumping overburden were found to be water application, minimisation of drop heights and suspension or modification of activities during adverse weather conditions. Best practice control measures were identified as minimising drop heights and / or the application of water".*	Y
Unloading coal to ROM hopper	Water sprays and partial enclosure	70	*"Best practice control measures for minimising emissions from the ROM hopper is enclosure with air extraction to a fabric filter or other control device. No mines in the GMR adopt this approach."*	N (additional control devices are not best practice in NSW)
Coal processing	Enclosure	70	Control measures for this process are not specifically identified.	N/A

Activity	Emission management measures	Assumed emission control (%) (NPI 2012, Donnelly et el 2011)	Measures identified from Donnelly et al (2011)	Consistent with best practice
Dozers or loaders on ROM and product coal stockpiles	Watering of travel routes Minimisation during dusty conditions Reduced travel speed during dusty conditions	50	*"Best practice control measures include minimising the travel speed and distance travelled by bulldozers and the application of water to keep travel routes moist"*	Y
Conveyors to stockpiles	Covered / enclosure Belt cleaning	70	*"The use of wind shielding on conveyor sides, water sprays at conveyor transfers, enclosure of transfer points, and, soft-loading chutes."*	Y (except for water sprays and soft-loading chutes)
Wind erosion from partially rehabilitated dumps	Partial rehabilitation / stabilisation	30	*"Control measures include watering exposed areas, minimising areas of disturbance, progressive rehabilitation and use of suppressants"*	Y
Wind erosion from ROM and product coal stockpiles	Water sprays, triggered by wind conditions Minimisation of FEL drop heights when loading	50	*"Control measures include watering exposed areas, minimising areas of disturbance, progressive rehabilitation and use of suppressants"*	Y
Grading roads	Watering of haul routes Restricting vehicle speeds Clearly marked routes	50	Control measures for this activity are not specifically identified. This activity forms part of the control measures for haul roads.	N/A
Machinery exhausts and plant and equipment	Servicing all machinery in accordance with maintenance contracts and adopting original equipment manufacturer recommendations for maintenance. Targeting the maintenance to ensure, as far as reasonably practical, equipment remains fit for purpose over its whole life cycle. Defining failure modes, effects and criticality.	0	Control measures for this activity are not specifically identified.	N/A

In addition to the measures listed above Mangoola is committed to effectively managing the air quality impacts associated with the MCCO Project and will implement a range of dust management measures for the key dust generating activities. These measures are currently implemented as part of the existing Air Quality Management Plan for the Mangoola Coal Mine and will continue to be implemented as part of the MCCO Project.

The key measures that will continue to be implemented and that have been incorporated into the modelling of the dust impacts of the MCCO Project include:

- minimising the area of disturbed land at any one time, in line with the approved Mining Operations Plan
- development of a mine plan that provides for timely progressive rehabilitation

- adopting controls for haul road dust emissions
- review of meteorological conditions prior to blasting
- consideration of meteorological conditions in planning the loading and unloading of overburden
- applying water and using dust curtains when drilling overburden
- minimising fall distance during loading and unloading of overburden
- utilising water sprays and water carts on ROM coal stockpile area
- maintaining the existing covered conveyors and belt cleaning
- maintaining and servicing machinery, exhaust systems and plant equipment in accordance with contemporary maintenance practices
- using dust cameras to monitor dust
- enact the TARP process and to investigate dust levels when the TARP process is enacted to identify likely sources of dust from any complaints or potential compliance issues
- using temporary rehabilitation and stabilisation measures on disturbed land.

In addition to the measures listed above Mangoola implements both proactive and reactive dust control strategies informed by real-time dust and meteorological monitoring systems. Reactive air quality management will assess the need to modify the activities in response to the following triggers:

- visual conditions, such as excessive visible dust
- meteorological conditions, such as dry, strong wind conditions
- ambient air quality conditions (that is, elevated short-term PM_{10} concentrations).

Proactive air quality management will involve the discussion and planning of activities in advance of potentially adverse conditions. Specifically, the pro-active air quality management approach will include:

- implementation of a system to provide environmental personnel with a daily forecast of expected dust conditions in the vicinity of the operation
- discussion of the dust forecast at daily operational meetings
- modifying the planned mining activities, as appropriate, to minimise or avoid the potential dust impacts.

The dust management measures proposed for the MCCO Project have been compared to the measures outlined in the "NSW Coal Benchmarking Study: International Best Practice Measures to Prevent and/or Minimise Emissions of Particulate Matter from Coal Mining" (Donnelly et al, 2011). This comparison, as per **Table 20**, shows that the proposed measures are consistent with best practice dust mitigation measures. In some instances Donnelly et al (2011) identified control measures that were not common practice, or reasonable and/or feasible to apply at any mine in NSW. For example, air extraction to bag filters for drilling operations.

Mangoola will review and update the existing Air Quality Management Plan for the MCCO Project. The Air Quality Management Plan will be revised to detail the implementation of monitoring and management controls to manage air quality impacts associated with the MCCO Project to maintain compliance with air quality criterion as required.

A review of the existing air quality monitoring locations will be undertaken prior to the commencement of the MCCO Project to make sure that the monitoring network provides adequate coverage of the MCCO Project Area. Any changes to the monitoring network will also be included in the revised Air Quality Management Plan.

Table 21 provides details of the proposed air quality emission control measures, as requested by the SEARs.

Table 21 MCCO Project approach to air quality emission control measures

Requested SEARs information	Approach for the MCCO Project
Explicit linkage of proposed emission controls to the site specific best practice determination assessment	As per **Table 20**
Timeframe for implementation of all identified emission controls	From commencement of the MCCO Project construction
Key performance indicators for emission controls	Compliance with Development Consent criteria
Monitoring methods (location, frequency, duration)	The monitoring methods will be as per the current approved operations. Should the MCCO Project be approved, the monitoring locations will be reviewed as part of the revised Air Quality Management Plan and will reflect the expected areas of potential impact. The revised monitoring network will be developed to allow for evaluation of compliance at private landowners in accordance with conditions of consent.
Response mechanisms	Response mechanisms will be outlined the Dust Trigger Action Response Plan (TARP) and revised Air Quality Management Plan.
Responsibilities for demonstrating and reporting achievement of KPIs	Responsibilities will be outlined the Dust Trigger Action Response Plan (TARP) and revised Air Quality Management Plan.
Record keeping and complaints response register	Details of records keeping and complaints response register are outlined in the currently approved Air Quality Management Plan. These will be reviewed and confirmed prior to the commencement of the MCCO Project.
Compliance reporting	Compliance reporting information is outlined in the currently approved Air Quality Management Plan. These will be reviewed and confirmed prior to the commencement of the MCCO Project.

11. Conclusions

This report has assessed the potential air quality impacts of the Mangoola Coal Continued Operations Project. In summary the assessment involved identifying the key air quality issues, characterising the existing air quality and meteorological environment, quantifying Project emissions and using an air dispersion model to predict the impact of Project emissions on local air quality.

The potential air quality issues were identified as:

- Dust (that is, particulate matter in the form of TSP, PM_{10} or $PM_{2.5}$) from the general mining activities;
- Fume (that is, NO_x emissions) from blasting; and
- Emissions of substances from machinery exhausts, that is, diesel emissions.

A detailed review of the existing environment was carried out. The following conclusions were made in relation to the existing air quality and meteorological conditions:

- Wind patterns in the vicinity of Mangoola Coal Mine are similar to other parts of the Hunter Valley, with the prevailing winds being from either the northwest or southeast.
- There are seasonal variations in particulate matter concentrations, with PM_{10} levels higher in spring and $PM_{2.5}$ levels higher in winter.
- Air quality conditions can be regarded as good, with annual average PM_{10} concentrations well below the revised assessment criterion of 25 µg/m^3. Most monitoring sites in the vicinity of Mangoola Coal Mine have experienced at least one day above the EPA's 50 µg/m^3 criterion in the past five years. This is not uncommon for most locations in NSW, including in rural and urban areas. None of these events have been identified as being caused by activities at the existing Mangoola Coal Mine
- Annual average $PM_{2.5}$ concentrations have been variable, with some locations measuring concentrations above the recently introduced assessment criterion (8 µg/m^3). Data from one of the monitoring sites appeared to be affected by abnormal measurements. A study by the OEH (2013b) found that wood smoke from domestic heating was one of the main factors that influenced $PM_{2.5}$ concentrations in the Muswellbrook area, especially in winter.
- TSP, dust deposition and NO_2 levels are below their relevant EPA criteria.

The computer-based dispersion model known as CALPUFF was used to predict the potential air quality impacts of the MCCO Project, including cumulative impacts. The dispersion modelling accounted for meteorological conditions, land use and terrain information and used dust emission estimates to predict the off-site air quality impacts. The performance of the model was reviewed by comparing predictions to measured results for a representative year. It was found that, with the adopted approach for modelling and assessment, the model predictions for average concentrations were typically within 20 per cent of measured results. This result is well within the factor-of-two accuracy that has been recognised for these types of models (US EPA, 2005).

The main conclusions of the assessment were as follows:

- Maximum 24-hour average PM_{10} concentrations can meet the EPA 50 µg/m^3 criterion at all but one sensitive receptor location (property 83) in all assessment years. This property is subject to acquisition under the existing approved operations and is within the predicted noise voluntary acquisition zone for the MCCO Project. Further investigation showed that the MCCO Project would not be the primary cause of an exceedance. Nevertheless it is anticipated that 24-hour average PM_{10} concentrations will continue to be variable from day-to-day, due to existing conditions and sources, and that operations will need to be managed in a way which minimises the contribution to off-site PM_{10} levels, as is done under the existing approved operation. The predicted 24-hour and annual average PM_{10} impacts at property 83 do not trigger the air quality related voluntary mitigation or acquisition criteria in the Voluntary Land Acquisition and Mitigation Policy.
- As for PM_{10}, concentrations of $PM_{2.5}$ will continue to be variable from day-to-day. There are typically a few days each year when $PM_{2.5}$ concentrations exceed the recently introduced assessment criterion of 25 µg/m^3 which, as noted above, is influenced by wood smoke in the Muswellbrook region. This trend is

expected to continue with or without the MCCO Project. The modelling did however indicate that the MCCO Project will contribute to, but will not be the primary cause of, an exceedance of the 24-hour average criterion at the location most likely to be influenced by emissions from the proposed operation, being property 83 which is the closest private residence to the west of the existing Mangoola Coal Mine. The predicted 24-hour and annual average $PM_{2.5}$ impacts do not trigger the air quality related voluntary mitigation or acquisition criteria in the Voluntary Land Acquisition and Mitigation Policy.

- There are no private sensitive locations which are predicted to experience exceedances of the annual average PM_{10}, $PM_{2.5}$, TSP or dust deposition criteria at any stage of the MCCO Project.
- Post blast fume emissions are not expected to result in any adverse air quality impacts, based on model predictions which show compliance with air quality criteria and with consideration of blast management practices that are currently employed by Mangoola Coal.
- Emissions from diesel exhausts associated with off-road vehicles and equipment are not expected to result in any adverse air quality impacts, based on model predictions which show compliance with air quality criteria.
- The MCCO Project is predicted to comply with the VLAMP (2018) criteria, used for the purposes of determining land acquisition and / or mitigation, at all private sensitive receptor locations.

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Appendix A. EPA Assessment Requirements

4 Air Issues

4.1 Air quality

The EIS should include an air quality impact assessment (AQIA) in accordance with the Approved Methods for the Modelling and Assessment of Air Pollutants in NSW, including, as a minimum the following components:

<u>Assessment Objective</u>

1. Demonstrate the proposed project will incorporate and apply best management practice emission controls; and
2. Demonstrate that the project will not cause violation of the project adopted air quality impact assessment criteria at any residential dwelling or other sensitive receptor.

<u>Assessment Criteria</u>

- Define applicable assessment criteria for the proposed development referencing the Approved Methods for the Modelling and Assessment of Air Pollutants in NSW, including appendices and updates
- Demonstrate the proposal's ability to comply with the relevant regulatory framework, specifically the *Protection of the Environment Operations* (POEO) *Act* (1997) and the POEO (Clean Air) Regulation (2010).

<u>Existing Environment</u>

- Provide a detailed description of the existing environment within the assessment domain, including:
    - geophysical form and land-uses;
    - location of all sensitive receptors;
    - existing air quality; and
    - local and regional prevailing meteorology.
- Justify all data used in the assessment, specifically including analysis of inter-annual trends (preferably five consecutive years of data), availability of monitoring data, and local topographical features.
- Meteorological modelling must be verified against monitored data. Verification should involve comparative analysis of wind speed, wind direction and temperature, at a minimum.
- A review of all existing, recently approved and planned developments likely to contribute to cumulative air quality impacts must be completed.

<u>Emissions Inventory</u>

- Provide a detailed description of the project and identify the key stages with regards to the potential for air emissions and impacts on the surrounding environment.
- Identify all sources of air emissions, including mechanically generated, combustion and transport related emissions likely to be associated with the proposed development.
- Estimate emissions of TSP, PM10, PM2.5, NOx, (tonnes per year), at a minimum, for all identified sources during each key development stage. The emissions inventory should:
    - utilise USEPA (1995) (and updates) emission estimation techniques, direct measurement or other method approved in writing by EPA;
    - calculate uncontrolled emissions (with no particulate matter controls in place); and
    - calculate controlled emissions (with proposed particulate matter controls in place).

- The emissions inventory must be explicitly coupled with the project description.
- Provide a detailed summary and justification of all parameters adopted within all emission estimation calculations, including site specific measurements, proponent recommended values or published literature.
- Document, including quantification and justification, all air quality emission control techniques/practices proposed for implementation during the project. As a minimum, consideration must be given to source control techniques, emission control through mine planning and reactive/predictive management techniques.
- Blasting emission estimation should provide specific details on likely activities, including the frequency of blasts, area per blast, amount and type of explosives used and blasting hours.

Best Practice Determination

- Based on the TSP, PM10 and PM2.5 emissions inventories calculated for the proposed development, undertake a site-specific best practice determination, in accordance with the document Coal Mine Particulate Matter Control Best Practice – Site specific determination guideline.
- Demonstrate that the proposed control techniques/practices are consistent with best management practice.

Dispersion Modelling and Interpretation of Results

- Atmospheric dispersion modelling should be undertaken in accordance with the Approved Methods for the Modelling and Assessment of Air Pollutants in NSW, including appendices and updates.
- Modelling must implement fit for purpose modelling techniques that:
  - have regard for the most up to date and scientifically accepted dispersion modelling techniques;
  - contextualise all assumptions based on current scientific understanding and available data; and
  - include a thorough validation of adopted methods and model performance.
- Use an appropriate atmospheric dispersion model to predict, at a minimum, incremental ground level concentrations/levels of the following:
  - 24-hour and annual average PM10 concentrations;
  - 24-hour and annual average PM2.5 concentrations; and
  - 1-hour and annual average NO2 concentrations. NO2 concentrations should be assessed using a well justified approach for the transformation of NOx to NO2.
- Ground level concentrations of pollutants should be presented for surrounding privately-owned properties, mine-owned properties and other sensitive receptors (as applicable).
- Undertake a cumulative assessment of predicted impacts. The contribution of all identified existing and recently approved developments should be accounted for in the cumulative assessment.
- Cumulative 24-hour PM10 and PM2.5 concentrations must be assessed in accordance with the Approved Methods for the Modelling and Assessment of Air Pollutants in NSW, including appendices and updates, and/or a suitably justified probabilistic methodology.
- Cumulative annual average PM10, PM2.5, and NO2 should be assessed using a sufficiently justified background concentration(s);
- Results of dispersion modelling should be presented as follows:

  - isopleth plots showing the geographic extent of maximum pollutant concentrations (incremental and cumulative);
  - tables presenting the maximum predicted pollutant concentrations (increment and cumulative) and the frequency of any predicted exceedances at each surrounding privately-owned properties, mine-owned properties and other sensitive receptors (as applicable); and
  - time series and frequency distribution plots of pollutant concentrations at each private receptor location at which an exceedance is predicted to occur. Where no exceedances are predicted, the analysis must be performed for the most impacted off site sensitive receptor.

Air Quality Emission Control Measures

- Provide a detailed discussion of all proposed air quality emission control measures, including details of a reactive/predictive management system. The information provided must include:
  - explicit linkage of proposed emission controls to the site specific best practice determination assessment
  - timeframe for implementation of all identified emission controls;
  - key performance indicators for emission controls;
  - monitoring methods (location, frequency, duration);
  - response mechanisms;
  - responsibilities for demonstrating and reporting achievement of KPIs;
  - record keeping and complaints response register; and
  - compliance reporting.

Appendix B. Wind-roses for all meteorological stations

Figure B1 Annual and seasonal wind-roses for WSN 2014

Figure B2 Annual and seasonal wind-roses for Wybong 2014

Figure B3 demonstrates that the data used by the model accurately reflects the measurement data, based on the similarities to **Figure B1**.

Figure B3 Annual and seasonal wind-roses for WSN 2014 as determined by CALMET

Appendix C. Emissions Calculations

Mangoola Coal Mine 2014

	Annual emissions (kg/y)						TSP		PM10		PM2.5		Variables							
Activity	TSP	PM10	PM2.5	Control (%)	Intensity	Units	Factor	Units	Factor	Units	Factor	Units	Area (m2)	(ws/2.2)^1.3	Moisture (%)	kg/VKT	t/truck	km/trip	Silt (%)	Speed (km/h)
Stripping topsoil (dozers)	837	204	88	50	100	h/y	16.7	kg/h	4.07415	kg/h	1.757	kg/h	-	-	2	-	-	-	10	-
Drilling overburden (North Pit)	6964	3621	209	70	39343	holes/y	0.59	kg/hole	0.31	kg/hole	0.018	kg/hole	-	-	-	-	-	-	-	-
Drilling overburden (South Pit)	2321	1207	70	70	13114	holes/y	0.59	kg/hole	0.31	kg/hole	0.018	kg/hole	-	-	-	-	-	-	-	-
Blasting overburden (North Pit)	51745	26907	1552	0	98	blasts/y	530.7	kg/blast	276.0	kg/blast	15.9	kg/blast	17987	-	-	-	-	-	-	-
Blasting overburden (South Pit)	17248	8969	517	0	33	blasts/y	530.7	kg/blast	276.0	kg/blast	15.9	kg/blast	17987	-	-	-	-	-	-	-
Excavators loading overburden to trucks (North Pit)	69402	32825	4971	0	53388598	t/y	0.00130	kg/t	0.00061	kg/t	0.0001	kg/t	-	1.10	2	-	-	-	-	-
Excavators loading overburden to trucks (South Pit)	23134	10942	1657	0	17796199	t/y	0.00130	kg/t	0.00061	kg/t	0.0001	kg/t	-	1.10	2	-	-	-	-	-
Hauling overburden from North Pit to north dump	517869	153035	15536	85	53388598	t/y	0.06467	kg/t	0.01911	kg/t	0.002	kg/t	-	-	-	4	240	4	-	-
Hauling overburden from North Pit to south dump	0	0	0	85	0	t/y	0.03233	kg/t	0.00955	kg/t	0.001	kg/t	-	-	-	4	240	2	-	-
Hauling overburden from South Pit to south dump	112205	33158	3366	85	17796199	t/y	0.04203	kg/t	0.01242	kg/t	0.001	kg/t	-	-	-	4	240	2.6	-	-
Unloading overburden to north dump	69402	32825	4971	0	53388598	t/y	0.00130	kg/t	0.00061	kg/t	0.0001	kg/t	-	1.10	2	-	-	-	-	-
Unloading overburden to south dump	23134	10942	1657	0	17796199	t/y	0.00130	kg/t	0.00061	kg/t	0.0001	kg/t	-	1.10	2	-	-	-	-	-
Dozers shaping overburden (North dump)	329853	80301	34635	0	19710	h/y	16.7	kg/h	4.07415	kg/h	1.757	kg/h	-	-	2	-	-	-	10	-
Dozers shaping overburden (South dump)	109951	26767	11545	0	6570	h/y	16.7	kg/h	4.07415	kg/h	1.757	kg/h	-	-	2	-	-	-	10	-
Dozers working on overburden for rehabilitation	13054	3178	1371	0	780	h/y	16.7	kg/h	4.07415	kg/h	1.757	kg/h	-	-	2	-	-	-	10	-
Drilling coal (North Pit)	0	0	0	70	0	holes/y	0.59	kg/hole	0.31	kg/hole	0.018	kg/hole	-	-	-	-	-	-	-	-
Drilling coal (South Pit)	0	0	0	70	0	holes/y	0.59	kg/hole	0.31	kg/hole	0.018	kg/hole	-	-	-	-	-	-	-	-
Blasting coal (North Pit)	0	0	0	0	0	blasts/y	220.0	kg/blast	114.4	kg/blast	6.6	kg/blast	10000	-	-	-	-	-	-	-
Blasting coal (South Pit)	0	0	0	0	0	blasts/y	220.0	kg/blast	114.4	kg/blast	6.6	kg/blast	10000	-	-	-	-	-	-	-
Dozers working on coal (North Pit)	72143	22997	1587	0	4928	h/y	14.6	kg/h	4.7	kg/h	0.322	kg/h	-	-	10	-	-	-	7	-
Dozers working on coal (South Pit)	24048	7666	529	0	1643	h/y	14.6	kg/h	4.7	kg/h	0.322	kg/h	-	-	10	-	-	-	7	-
Loading ROM coal to trucks (North Pit)	318381	48958	6049	0	8700000	t/y	0.03660	kg/t	0.00563	kg/t	0.001	kg/t	-	-	10	-	-	-	-	-
Loading ROM coal to trucks (South Pit)	106127	16319	2016	0	2900000	t/y	0.03660	kg/t	0.00563	kg/t	0.001	kg/t	-	-	10	-	-	-	-	-
Hauling ROM coal from North Pit to hopper / ROM pad	154567	45676	4637	85	8700000	t/y	0.11844	kg/t	0.035	kg/t	0.004	kg/t	-	-	-	4	190	5.8	-	-
Hauling ROM coal from South Pit to hopper / ROM pad	31979	9450	959	85	2900000	t/y	0.07352	kg/t	0.02172	kg/t	0.002	kg/t	-	-	-	4	190	3.6	-	-
Unloading ROM coal to ROM hopper / pad (from all pits)	34800	14616	661	70	11600000	t/y	0.01	kg/t	0.0042	kg/t	0.000	kg/t	-	-	-	-	-	-	-	-
ROM coal rehandle to hopper	34800	14616	661	0	3480000	t/y	0.01	kg/t	0.0042	kg/t	0.000	kg/t	-	-	-	-	-	-	-	-
Transferring ROM coal by conveyor to CHPP	475	225	34	70	11600000	t/y	0.00014	kg/t	0.00006	kg/t	0.0000	kg/t	-	1.10	10	-	-	-	-	-
Handling coal at CHPP	2376	1124	34	70	11600000	t/y	0.00068	kg/t	0.00032	kg/t	0.0000	kg/t	-	1.10	10	-	-	-	-	-
Dozers on ROM coal stockpiles	0	0	0	50	0	h/y	14.6	kg/h	4.7	kg/h	0.322	kg/h	-	-	10	-	-	-	7	-
Dozers on product coal stockpiles	49765	14341	1095	50	13140	h/y	7.6	kg/h	2.2	kg/h	0.167	kg/h	-	-	12	-	-	-	5	-
Conveyer to product stockpiles	295	140	21	70	9295132	t/y	0.00011	kg/t	0.00005	kg/t	0.0000	kg/t	-	1.10	12	-	-	-	-	-
Loading product coal to trains	3718	1580	186	0	9295132	t/y	0.00040	kg/t	0.00017	kg/t	0.0000	kg/t	-	-	-	-	-	-	-	-
Wind erosion from active pits	259947	129974	19496	0	297	ha	876.0	kg/ha/y	438.0	kg/ha/y	65.7	kg/ha/y	-	-	-	-	-	-	-	-
Wind erosion from active dumps	157892	78946	11842	0	180	ha	876.0	kg/ha/y	438.0	kg/ha/y	65.7	kg/ha/y	-	-	-	-	-	-	-	-
Wind erosion from inactive or partially rehabed dumps	30660	15330	2300	30	50	ha	876.0	kg/ha/y	438.0	kg/ha/y	65.7	kg/ha/y	-	-	-	-	-	-	-	-
Wind erosion from ROM coal stockpiles	3373	1686	253	50	8	ha	876.0	kg/ha/y	438.0	kg/ha/y	65.7	kg/ha/y	-	-	-	-	-	-	-	-
Wind erosion from product coal stockpile	3942	1971	296	50	9	ha	876.0	kg/ha/y	438.0	kg/ha/y	65.7	kg/ha/y	-	-	-	-	-	-	-	-
Grading roads	18464	6528	202	50	60000	km/y	0.61547	kg/VKT	0.2176	kg/VKT	0.007	kg/VKT	-	-	-	-	-	-	-	8
	2654871	857023	135003																	

Notes: based on data from Mangoola (2015)

MCCO Year 1

	Annual emissions (kg/y)						TSP		PM10		PM2.5		Variables								
Activity	TSP	PM10	PM2.5	Control (%)	Intensity	Units	Factor	Units	Factor	Units	Factor	Units	Area (m2)	(ws/2.2)^1.3	Moisture (%)	Drop distance (m)	kg/VKT	t/truck	km/trip	Silt (%)	Speed (km/h)
Stripping topsoil (dozers)	1389	338	146	50	166	h/y	16.7	kg/h	4.07415	kg/h	1.757	kg/h	-	-	2	-	-	-	-	10	-
Drilling overburden (North Pit)	1804	938	54	70	10191	holes/y	0.59	kg/hole	0.31	kg/hole	0.018	kg/hole	-	-	-	-	-	-	-	-	-
Drilling overburden (South Pit)	9471	4925	284	70	53510	holes/y	0.59	kg/hole	0.31	kg/hole	0.018	kg/hole	-	-	-	-	-	-	-	-	-
Blasting overburden (North Pit)	11676	6071	350	0	22	blasts/y	530.7	kg/blast	276.0	kg/blast	15.9	kg/blast	17987	-	-	-	-	-	-	-	-
Blasting overburden (South Pit)	61563	32013	1847	0	116	blasts/y	530.7	kg/blast	276.0	kg/blast	15.9	kg/blast	17987	-	-	-	-	-	-	-	-
Excavators loading overburden to trucks (North Pit)	17997	8512	1289	0	13844618	t/y	0.00130	kg/t	0.00061	kg/t	0.0001	kg/t	-	1.10	2	-	-	-	-	-	-
Excavators loading overburden to trucks (South Pit)	94498	44695	6768	0	72694232	t/y	0.00130	kg/t	0.00061	kg/t	0.0001	kg/t	-	1.10	2	-	-	-	-	-	-
Hauling overburden from North Pit to north dump	0	0	0	85	0	t/y	0.06790	kg/t	0.02007	kg/t	0.002	kg/t	-	-	-	-	4	240	4.2	-	-
Hauling overburden from North Pit to south dump	228298	67464	6849	85	13844619	t/y	0.10993	kg/t	0.03249	kg/t	0.003	kg/t	-	-	-	-	4	240	6.8	-	-
Hauling overburden from South Pit to south dump	846161	250048	25385	85	72694233	t/y	0.07760	kg/t	0.02293	kg/t	0.002	kg/t	-	-	-	-	4	240	4.8	-	-
Unloading overburden to north dump	0	0	0	0	0	t/y	0.00130	kg/t	0.00061	kg/t	0.0001	kg/t	-	1.10	2	-	-	-	-	-	-
Unloading overburden to south dump	112495	53207	8057	0	86538851	t/y	0.00130	kg/t	0.00061	kg/t	0.0001	kg/t	-	1.10	2	-	-	-	-	-	-
Dozers shaping overburden (North dump)	0	0	0	0	0	h/y	16.7	kg/h	4.07415	kg/h	1.757	kg/h	-	-	2	-	-	-	-	10	-
Dozers shaping overburden (South dump)	382986	93236	40214	0	22885	h/y	16.7	kg/h	4.07415	kg/h	1.757	kg/h	-	-	2	-	-	-	-	10	-
Dozers working on overburden for rehabilitation	13315	3241	1398	0	796	h/y	16.7	kg/h	4.07415	kg/h	1.757	kg/h	-	-	2	-	-	-	-	10	-
Drilling coal (North Pit)	0	0	0	70	0	holes/y	0.59	kg/hole	0.31	kg/hole	0.018	kg/hole	-	-	-	-	-	-	-	-	-
Drilling coal (South Pit)	0	0	0	70	0	holes/y	0.59	kg/hole	0.31	kg/hole	0.018	kg/hole	-	-	-	-	-	-	-	-	-
Blasting coal (North Pit)	0	0	0	0	0	blasts/y	220.0	kg/blast	114.4	kg/blast	6.6	kg/blast	10000	-	-	-	-	-	-	-	-
Blasting coal (South Pit)	0	0	0	0	0	blasts/y	220.0	kg/blast	114.4	kg/blast	6.6	kg/blast	10000	-	-	-	-	-	-	-	-
Dozers working on coal (North Pit)	0	0	0	0	0	h/y	14.6	kg/h	4.7	kg/h	0.322	kg/h	-	-	10	-	-	-	-	7	-
Dozers working on coal (South Pit)	99054	31576	2179	0	6766	h/y	14.6	kg/h	4.7	kg/h	0.322	kg/h	-	-	10	-	-	-	-	7	-
Loading ROM coal to trucks (North Pit)	0	0	0	0	0	t/y	0.03660	kg/t	0.00563	kg/t	0.001	kg/t	-	-	10	-	-	-	-	-	-
Loading ROM coal to trucks (South Pit)	386485	59431	7343	0	10560988	t/y	0.03660	kg/t	0.00563	kg/t	0.001	kg/t	-	-	10	-	-	-	-	-	-
Hauling ROM coal from North Pit to hopper / ROM pad	0	0	0	85	0	t/y	0.24914	kg/t	0.07362	kg/t	0.007	kg/t	-	-	-	-	4	190	12.2	-	-
Hauling ROM coal from South Pit to hopper / ROM pad	226450	66918	6793	85	10560988	t/y	0.14295	kg/t	0.04224	kg/t	0.004	kg/t	-	-	-	-	4	190	7	-	-
Unloading ROM coal to ROM hopper / pad (from all pits)	31683	13307	602	70	10560988	t/y	0.01	kg/t	0.0042	kg/t	0.000	kg/t	-	-	-	-	-	-	-	-	-
ROM coal rehandle to hopper	31683	13307	602	0	3168296	t/y	0.01	kg/t	0.0042	kg/t	0.000	kg/t	-	-	-	-	-	-	-	-	-
Transferring ROM coal by conveyor to CHPP	433	205	31	70	10560988	t/y	0.00014	kg/t	0.00006	kg/t	0.0000	kg/t	-	1.10	10	-	-	-	-	-	-
Handling coal at CHPP	2164	1023	31	70	10560988	t/y	0.00068	kg/t	0.00032	kg/t	0.0000	kg/t	-	1.10	10	-	-	-	-	-	-
Dozers on ROM coal stockpiles	0	0	0	50	0	h/y	14.6	kg/h	4.7	kg/h	0.322	kg/h	-	-	10	-	-	-	-	7	-
Dozers on product coal stockpiles	54266	15638	1194	50	14328	h/y	7.6	kg/h	2.2	kg/h	0.167	kg/h	-	-	12	-	-	-	-	5	-
Conveyer to product stockpiles	254	120	18	70	8008087	t/y	0.00011	kg/t	0.00005	kg/t	0.0000	kg/t	-	1.10	12	-	-	-	-	-	-
Loading product coal to trains	3203	1361	160	0	8008087	t/y	0.00040	kg/t	0.00017	kg/t	0.0000	kg/t	-	-	-	-	-	-	-	-	-
Wind erosion from active pits	233016	116508	17476	0	266	ha	876.0	kg/ha/y	438.0	kg/ha/y	65.7	kg/ha/y	-	-	-	-	-	-	-	-	-
Wind erosion from active dumps	301019	150510	22576	0	344	ha	876.0	kg/ha/y	438.0	kg/ha/y	65.7	kg/ha/y	-	-	-	-	-	-	-	-	-
Wind erosion from inactive or partially rehabed dumps	41698	20849	3127	30	68	ha	876.0	kg/ha/y	438.0	kg/ha/y	65.7	kg/ha/y	-	-	-	-	-	-	-	-	-
Wind erosion from ROM coal stockpiles	3373	1686	253	50	8	ha	876.0	kg/ha/y	438.0	kg/ha/y	65.7	kg/ha/y	-	-	-	-	-	-	-	-	-
Wind erosion from product coal stockpile	3942	1971	296	50	9	ha	876.0	kg/ha/y	438.0	kg/ha/y	65.7	kg/ha/y	-	-	-	-	-	-	-	-	-
Grading roads	32117	11355	352	50	104368	km/y	0.61547	kg/VKT	0.2176	kg/VKT	0.007	kg/VKT	-	-	-	-	-	-	-	-	8
	3232490	1070453	155675																		

Notes: production data supplied by Mangoola

MCCO Year 3

Activity	Annual emissions (kg/y) TSP	PM10	PM2.5	Control (%)	Intensity	Units	TSP Factor	Units	PM10 Factor	Units	PM2.5 Factor	Units	Variables: Area (m2)	(ws/2.2)^1.3	Moisture (%)	Drop distance (m)	kg/VKT	t/truck	km/trip	Silt (%)	Speed (km/h)
Stripping topsoil (dozers)	374	91	39	50	45	h/y	16.7	kg/h	4.07415	kg/h	1.757	kg/h	-	-	2	-	-	-	-	10	-
Drilling overburden (North Pit)	7010	3645	210	70	39604	holes/y	0.59	kg/hole	0.31	kg/hole	0.018	kg/hole	-	-	-	-	-	-	-	-	-
Drilling overburden (South Pit)	3721	1935	112	70	21025	holes/y	0.59	kg/hole	0.31	kg/hole	0.018	kg/hole	-	-	-	-	-	-	-	-	-
Blasting overburden (North Pit)	45641	23734	1369	0	86	blasts/y	530.7	kg/blast	276.0	kg/blast	15.9	kg/blast	17987	-	-	-	-	-	-	-	-
Blasting overburden (South Pit)	23882	12419	716	0	45	blasts/y	530.7	kg/blast	276.0	kg/blast	15.9	kg/blast	17987	-	-	-	-	-	-	-	-
Excavators loading overburden to trucks (North Pit)	69993	33105	5013	0	53843658	t/y	0.00130	kg/t	0.00061	kg/t	0.0001	kg/t	-	1.10	2	-	-	-	-	-	-
Excavators loading overburden to trucks (South Pit)	37130	17561	2659	0	28562851	t/y	0.00130	kg/t	0.00061	kg/t	0.0001	kg/t	-	1.10	2	-	-	-	-	-	-
Hauling overburden from North Pit to north dump	329836	97469	9895	85	32384446	t/y	0.06790	kg/t	0.02007	kg/t	0.002	kg/t	-	-	-	-	4	240	4.2	-	-
Hauling overburden from North Pit to south dump	592104	174972	17763	85	21418111	t/y	0.18430	kg/t	0.05446	kg/t	0.006	kg/t	-	-	-	-	4	240	11.4	-	-
Hauling overburden from South Pit to south dump	346325	102342	10390	85	28562851	t/y	0.08083	kg/t	0.02389	kg/t	0.002	kg/t	-	-	-	-	4	240	5.0	-	-
Unloading overburden to north dump	42098	19911	3015	0	32384446	t/y	0.00130	kg/t	0.00061	kg/t	0.0001	kg/t	-	1.10	2	-	-	-	-	-	-
Unloading overburden to south dump	64972	30730	4653	0	49980963	t/y	0.00130	kg/t	0.00061	kg/t	0.0001	kg/t	-	1.10	2	-	-	-	-	-	-
Dozers shaping overburden (North dump)	177759	43275	18665	0	10622	h/y	16.7	kg/h	4.07415	kg/h	1.757	kg/h	-	-	2	-	-	-	-	10	-
Dozers shaping overburden (South dump)	215174	52383	22593	0	12857	h/y	16.7	kg/h	4.07415	kg/h	1.757	kg/h	-	-	2	-	-	-	-	10	-
Dozers working on overburden for rehabilitation	47428	11546	4980	0	2834	h/y	16.7	kg/h	4.07415	kg/h	1.757	kg/h	-	-	2	-	-	-	-	10	-
Drilling coal (North Pit)	0	0	0	70	0	holes/y	0.59	kg/hole	0.31	kg/hole	0.018	kg/hole	-	-	-	-	-	-	-	-	-
Drilling coal (South Pit)	0	0	0	70	0	holes/y	0.59	kg/hole	0.31	kg/hole	0.018	kg/hole	-	-	-	-	-	-	-	-	-
Blasting coal (North Pit)	0	0	0	0	0	blasts/y	220.0	kg/blast	114.4	kg/blast	6.6	kg/blast	10000	-	-	-	-	-	-	-	-
Blasting coal (South Pit)	0	0	0	0	0	blasts/y	220.0	kg/blast	114.4	kg/blast	6.6	kg/blast	10000	-	-	-	-	-	-	-	-
Dozers working on coal (North Pit)	68235	21752	1501	0	4661	h/y	14.6	kg/h	4.7	kg/h	0.322	kg/h	-	-	10	-	-	-	-	7	-
Dozers working on coal (South Pit)	60161	19178	1324	0	4109	h/y	14.6	kg/h	4.7	kg/h	0.322	kg/h	-	-	10	-	-	-	-	7	-
Loading ROM coal to trucks (North Pit)	306021	47058	5814	0	8362253	t/y	0.03660	kg/t	0.00563	kg/t	0.001	kg/t	-	-	10	-	-	-	-	-	-
Loading ROM coal to trucks (South Pit)	187968	28904	3571	0	5136361	t/y	0.03660	kg/t	0.00563	kg/t	0.001	kg/t	-	-	10	-	-	-	-	-	-
Hauling ROM coal from North Pit to hopper / ROM pad	317625	93861	9529	85	8362253	t/y	0.25322	kg/t	0.07483	kg/t	0.008	kg/t	-	-	-	-	4	190	12.4	-	-
Hauling ROM coal from South Pit to hopper / ROM pad	110134	32546	3304	85	5136361	t/y	0.14295	kg/t	0.04224	kg/t	0.004	kg/t	-	-	-	-	4	190	7	-	-
Unloading ROM coal to ROM hopper / pad (from all pits)	40496	17008	769	70	13498614	t/y	0.01	kg/t	0.0042	kg/t	0.000	kg/t	-	-	-	-	-	-	-	-	-
ROM coal rehandle to hopper	40496	17008	769	0	4049584	t/y	0.01	kg/t	0.0042	kg/t	0.000	kg/t	-	-	-	-	-	-	-	-	-
Transferring ROM coal by conveyor to CHPP	553	262	40	70	13498614	t/y	0.00014	kg/t	0.00006	kg/t	0.0000	kg/t	-	1.10	10	-	-	-	-	-	-
Handling coal at CHPP	2765	1308	40	70	13498614	t/y	0.00068	kg/t	0.00032	kg/t	0.0000	kg/t	-	1.10	10	-	-	-	-	-	-
Dozers on ROM coal stockpiles	0	0	0	50	0	h/y	14.6	kg/h	4.7	kg/h	0.322	kg/h	-	-	10	-	-	-	-	7	-
Dozers on product coal stockpiles	52803	15216	1162	50	13942	h/y	7.6	kg/h	2.2	kg/h	0.167	kg/h	-	-	12	-	-	-	-	5	-
Conveyer to product stockpiles	327	155	23	70	10308383	t/y	0.00011	kg/t	0.00005	kg/t	0.0000	kg/t	-	1.10	12	-	-	-	-	-	-
Loading product coal to trains	4123	1752	206	0	10308383	t/y	0.00040	kg/t	0.00017	kg/t	0.0000	kg/t	-	-	-	-	-	-	-	-	-
Wind erosion from active pits	195348	97674	14651	0	223	ha	876.0	kg/ha/y	438.0	kg/ha/y	65.7	kg/ha/y	-	-	-	-	-	-	-	-	-
Wind erosion from active dumps	297840	148920	22338	0	340	ha	876.0	kg/ha/y	438.0	kg/ha/y	65.7	kg/ha/y	-	-	-	-	-	-	-	-	-
Wind erosion from inactive or partially rehabed dumps	53348	26674	4001	30	87	ha	876.0	kg/ha/y	438.0	kg/ha/y	65.7	kg/ha/y	-	-	-	-	-	-	-	-	-
Wind erosion from ROM coal stockpiles	3373	1686	253	50	8	ha	876.0	kg/ha/y	438.0	kg/ha/y	65.7	kg/ha/y	-	-	-	-	-	-	-	-	-
Wind erosion from product coal stockpile	3942	1971	296	50	9	ha	876.0	kg/ha/y	438.0	kg/ha/y	65.7	kg/ha/y	-	-	-	-	-	-	-	-	-
Grading roads	32204	11386	353	50	104648	km/y	0.61547	kg/VKT	0.2176	kg/VKT	0.007	kg/VKT	-	-	-	-	-	-	-	-	8
	3781208	1209436	172018																		

Notes: production data supplied by Mangoola

MCCO Year 5

	Annual emissions (kg/y)						TSP		PM10		PM2.5		Variables								
Activity	TSP	PM10	PM2.5	Control (%)	Intensity	Units	Factor	Units	Factor	Units	Factor	Units	Area (m2)	(ws/2.2)^1.3	Moisture (%)	Drop distance (m)	kg/VKT	t/truck	km/trip	Silt (%)	Speed (km/h)
Stripping topsoil (dozers)	1451	353	152	50	173	h/y	16.7	kg/h	4.07415	kg/h	1.757	kg/h	-	-	2	-	-	-	-	10	-
Drilling overburden (North Pit)	7700	4004	231	70	43504	holes/y	0.59	kg/hole	0.31	kg/hole	0.018	kg/hole	-	-	-	-	-	-	-	-	-
Drilling overburden (South Pit)	685	356	21	70	3869	holes/y	0.59	kg/hole	0.31	kg/hole	0.018	kg/hole	-	-	-	-	-	-	-	-	-
Blasting overburden (North Pit)	49887	25941	1497	0	94	blasts/y	530.7	kg/blast	276.0	kg/blast	15.9	kg/blast	17987	-	-	-	-	-	-	-	-
Blasting overburden (South Pit)	4246	2208	127	0	8	blasts/y	530.7	kg/blast	276.0	kg/blast	15.9	kg/blast	17987	-	-	-	-	-	-	-	-
Excavators loading overburden to trucks (North Pit)	76750	36301	5497	0	59041511	t/y	0.00130	kg/t	0.00061	kg/t	0.0001	kg/t	-	1.10	2	-	-	-	-	-	-
Excavators loading overburden to trucks (South Pit)	6833	3232	489	0	5256521	t/y	0.00130	kg/t	0.00061	kg/t	0.0001	kg/t	-	1.10	2	-	-	-	-	-	-
Hauling overburden from North Pit to north dump	270720	80000	8122	85	26580223	t/y	0.06790	kg/t	0.02007	kg/t	0.002	kg/t	-	-	-	-	4	240	4.2	-	-
Hauling overburden from North Pit to south dump	977900	288977	29337	85	32520775	t/y	0.20047	kg/t	0.05924	kg/t	0.006	kg/t	-	-	-	-	4	240	12.4	-	-
Hauling overburden from South Pit to south dump	33142	9794	994	85	5256521	t/y	0.04203	kg/t	0.01242	kg/t	0.001	kg/t	-	-	-	-	4	240	2.6	-	-
Unloading overburden to north dump	34552	16342	2475	0	26580223	t/y	0.00130	kg/t	0.00061	kg/t	0.0001	kg/t	-	1.10	2	-	-	-	-	-	-
Unloading overburden to south dump	49108	23227	3517	0	37777296	t/y	0.00130	kg/t	0.00061	kg/t	0.0001	kg/t	-	1.10	2	-	-	-	-	-	-
Dozers shaping overburden (North dump)	185324	45116	19459	0	11074	h/y	16.7	kg/h	4.07415	kg/h	1.757	kg/h	-	-	2	-	-	-	-	10	-
Dozers shaping overburden (South dump)	157529	38350	16541	0	9413	h/y	16.7	kg/h	4.07415	kg/h	1.757	kg/h	-	-	2	-	-	-	-	10	-
Dozers working on overburden for rehabilitation	78408	19088	8233	0	4685	h/y	16.7	kg/h	4.07415	kg/h	1.757	kg/h	-	-	2	-	-	-	-	10	-
Drilling coal (North Pit)	0	0	0	70	0	holes/y	0.59	kg/hole	0.31	kg/hole	0.018	kg/hole	-	-	-	-	-	-	-	-	-
Drilling coal (South Pit)	0	0	0	70	0	holes/y	0.59	kg/hole	0.31	kg/hole	0.018	kg/hole	-	-	-	-	-	-	-	-	-
Blasting coal (North Pit)	0	0	0	0	0	blasts/y	220.0	kg/blast	114.4	kg/blast	6.6	kg/blast	10000	-	-	-	-	-	-	-	-
Blasting coal (South Pit)	0	0	0	0	0	blasts/y	220.0	kg/blast	114.4	kg/blast	6.6	kg/blast	10000	-	-	-	-	-	-	-	-
Dozers working on coal (North Pit)	46678	14880	1027	0	3188	h/y	14.6	kg/h	4.7	kg/h	0.322	kg/h	-	-	10	-	-	-	-	7	-
Dozers working on coal (South Pit)	22566	7193	496	0	1541	h/y	14.6	kg/h	4.7	kg/h	0.322	kg/h	-	-	10	-	-	-	-	7	-
Loading ROM coal to trucks (North Pit)	211432	32512	4017	0	5777535	t/y	0.03660	kg/t	0.00563	kg/t	0.001	kg/t	-	-	10	-	-	-	-	-	-
Loading ROM coal to trucks (South Pit)	70504	10842	1340	0	1926582	t/y	0.03660	kg/t	0.00563	kg/t	0.001	kg/t	-	-	10	-	-	-	-	-	-
Hauling ROM coal from North Pit to hopper / ROM pad	219449	64849	6583	85	5777535	t/y	0.25322	kg/t	0.07483	kg/t	0.008	kg/t	-	-	-	-	4	190	12.4	-	-
Hauling ROM coal from South Pit to hopper / ROM pad	83800	24764	2514	85	1926582	t/y	0.28998	kg/t	0.08569	kg/t	0.009	kg/t	-	-	-	-	4	190	14.2	-	-
Unloading ROM coal to ROM hopper / pad (from all pits)	23112	9707	439	70	7704117	t/y	0.01	kg/t	0.0042	kg/t	0.000	kg/t	-	-	-	-	-	-	-	-	-
ROM coal rehandle to hopper	23112	9707	439	0	2311235	t/y	0.01	kg/t	0.0042	kg/t	0.000	kg/t	-	-	-	-	-	-	-	-	-
Transferring ROM coal by conveyor to CHPP	316	149	23	70	7704117	t/y	0.00014	kg/t	0.00006	kg/t	0.0000	kg/t	-	1.10	10	-	-	-	-	-	-
Handling coal at CHPP	1578	746	23	70	7704117	t/y	0.00068	kg/t	0.00032	kg/t	0.0000	kg/t	-	1.10	10	-	-	-	-	-	-
Dozers on ROM coal stockpiles	0	0	0	50	0	h/y	14.6	kg/h	4.7	kg/h	0.322	kg/h	-	-	10	-	-	-	-	7	-
Dozers on product coal stockpiles	41884	12070	921	50	11059	h/y	7.6	kg/h	2.2	kg/h	0.167	kg/h	-	-	12	-	-	-	-	5	-
Conveyer to product stockpiles	186	88	13	70	5861649	t/y	0.00011	kg/t	0.00005	kg/t	0.0000	kg/t	-	1.10	12	-	-	-	-	-	-
Loading product coal to trains	2345	996	117	0	5861649	t/y	0.00040	kg/t	0.00017	kg/t	0.0000	kg/t	-	-	-	-	-	-	-	-	-
Wind erosion from active pits	93732	46866	7030	0	107	ha	876.0	kg/ha/y	438.0	kg/ha/y	65.7	kg/ha/y	-	-	-	-	-	-	-	-	-
Wind erosion from active dumps	191844	95922	14388	0	219	ha	876.0	kg/ha/y	438.0	kg/ha/y	65.7	kg/ha/y	-	-	-	-	-	-	-	-	-
Wind erosion from inactive or partially rehabed dumps	85848	42924	6439	30	140	ha	876.0	kg/ha/y	438.0	kg/ha/y	65.7	kg/ha/y	-	-	-	-	-	-	-	-	-
Wind erosion from ROM coal stockpiles	3373	1686	253	50	8	ha	876.0	kg/ha/y	438.0	kg/ha/y	65.7	kg/ha/y	-	-	-	-	-	-	-	-	-
Wind erosion from product coal stockpile	3942	1971	296	50	9	ha	876.0	kg/ha/y	438.0	kg/ha/y	65.7	kg/ha/y	-	-	-	-	-	-	-	-	-
Grading roads	23178	8195	254	50	75320	km/y	0.61547	kg/VKT	0.2176	kg/VKT	0.007	kg/VKT	-	-	-	-	-	-	-	-	8
	3083114	979358	143304																		

Notes: production data supplied by Mangoola

MCCO Year 8

	Annual emissions (kg/y)						TSP		PM10		PM2.5		Variables								
Activity	TSP	PM10	PM2.5	Control (%)	Intensity	Units	Factor	Units	Factor	Units	Factor	Units	Area (m2)	(ws/2.2)^1.3	Moisture (%)	Drop distance (m)	kg/VKT	t/truck	km/trip	Silt (%)	Speed (km/h)
Stripping topsoil (dozers)	0	0	0	50	0	h/y	16.7	kg/h	4.07415	kg/h	1.757	kg/h	-	-	2	-	-	-	-	10	-
Drilling overburden (North Pit)	7663	3985	230	70	43292	holes/y	0.59	kg/hole	0.31	kg/hole	0.018	kg/hole	-	-	-	-	-	-	-	-	-
Drilling overburden (South Pit)	0	0	0	70	0	holes/y	0.59	kg/hole	0.31	kg/hole	0.018	kg/hole	-	-	-	-	-	-	-	-	-
Blasting overburden (North Pit)	49887	25941	1497	0	94	blasts/y	530.7	kg/blast	276.0	kg/blast	15.9	kg/blast	17987	-	-	-	-	-	-	-	-
Blasting overburden (South Pit)	0	0	0	0	0	blasts/y	530.7	kg/blast	276.0	kg/blast	15.9	kg/blast	17987	-	-	-	-	-	-	-	-
Excavators loading overburden to trucks (North Pit)	76539	36201	5482	0	58879167	t/y	0.00130	kg/t	0.00061	kg/t	0.0001	kg/t	-	1.10	2	-	-	-	-	-	-
Excavators loading overburden to trucks (South Pit)	0	0	0	0	0	t/y	0.00130	kg/t	0.00061	kg/t	0.0001	kg/t	-	1.10	2	-	-	-	-	-	-
Hauling overburden from North Pit to north dump	599017	177015	17971	85	58813678	t/y	0.06790	kg/t	0.02007	kg/t	0.002	kg/t	-	-	-	-	4	240	4.2	-	-
Hauling overburden from North Pit to south dump	0	0	0	85	0	t/y	0.20693	kg/t	0.06115	kg/t	0.006	kg/t	-	-	-	-	4	240	12.8	-	-
Hauling overburden from South Pit to south dump	0	0	0	85	0	t/y	0.04527	kg/t	0.01338	kg/t	0.001	kg/t	-	-	-	-	4	240	2.8	-	-
Unloading overburden to north dump	76454	36161	5476	0	58813678	t/y	0.00130	kg/t	0.00061	kg/t	0.0001	kg/t	-	1.10	2	-	-	-	-	-	-
Unloading overburden to south dump	0	0	0	0	0	t/y	0.00130	kg/t	0.00061	kg/t	0.0001	kg/t	-	1.10	2	-	-	-	-	-	-
Dozers shaping overburden (North dump)	246931	60114	25928	0	14755	h/y	16.7	kg/h	4.07415	kg/h	1.757	kg/h	-	-	2	-	-	-	-	10	-
Dozers shaping overburden (South dump)	0	0	0	0	0	h/y	16.7	kg/h	4.07415	kg/h	1.757	kg/h	-	-	2	-	-	-	-	10	-
Dozers working on overburden for rehabilitation	2132	519	224	0	127	h/y	16.7	kg/h	4.07415	kg/h	1.757	kg/h	-	-	2	-	-	-	-	10	-
Drilling coal (North Pit)	0	0	0	70	0	holes/y	0.59	kg/hole	0.31	kg/hole	0.018	kg/hole	-	-	-	-	-	-	-	-	-
Drilling coal (South Pit)	0	0	0	70	0	holes/y	0.59	kg/hole	0.31	kg/hole	0.018	kg/hole	-	-	-	-	-	-	-	-	-
Blasting coal (North Pit)	0	0	0	0	0	blasts/y	220.0	kg/blast	114.4	kg/blast	6.6	kg/blast	10000	-	-	-	-	-	-	-	-
Blasting coal (South Pit)	0	0	0	0	0	blasts/y	220.0	kg/blast	114.4	kg/blast	6.6	kg/blast	10000	-	-	-	-	-	-	-	-
Dozers working on coal (North Pit)	49706	15845	1094	0	3395	h/y	14.6	kg/h	4.7	kg/h	0.322	kg/h	-	-	10	-	-	-	-	7	-
Dozers working on coal (South Pit)	0	0	0	0	0	h/y	14.6	kg/h	4.7	kg/h	0.322	kg/h	-	-	10	-	-	-	-	7	-
Loading ROM coal to trucks (North Pit)	222074	34149	4219	0	6068337	t/y	0.03660	kg/t	0.00563	kg/t	0.001	kg/t	-	-	10	-	-	-	-	-	-
Loading ROM coal to trucks (South Pit)	0	0	0	0	0	t/y	0.03660	kg/t	0.00563	kg/t	0.001	kg/t	-	-	10	-	-	-	-	-	-
Hauling ROM coal from North Pit to hopper / ROM pad	237930	70310	7138	85	6068337	t/y	0.26139	kg/t	0.07724	kg/t	0.008	kg/t	-	-	-	-	4	190	12.8	-	-
Hauling ROM coal from South Pit to hopper / ROM pad	0	0	0	85	0	t/y	0.29406	kg/t	0.0869	kg/t	0.009	kg/t	-	-	-	-	4	190	14.4	-	-
Unloading ROM coal to ROM hopper / pad (from all pits)	18205	7646	346	70	6068337	t/y	0.01	kg/t	0.0042	kg/t	0.000	kg/t	-	-	-	-	-	-	-	-	-
ROM coal rehandle to hopper	18205	7646	346	0	1820501	t/y	0.01	kg/t	0.0042	kg/t	0.000	kg/t	-	-	-	-	-	-	-	-	-
Transferring ROM coal by conveyor to CHPP	249	118	18	70	6068337	t/y	0.00014	kg/t	0.00006	kg/t	0.0000	kg/t	-	1.10	10	-	-	-	-	-	-
Handling coal at CHPP	1243	588	18	70	6068337	t/y	0.00068	kg/t	0.00032	kg/t	0.0000	kg/t	-	1.10	10	-	-	-	-	-	-
Dozers on ROM coal stockpiles	0	0	0	50	0	h/y	14.6	kg/h	4.7	kg/h	0.322	kg/h	-	-	10	-	-	-	-	7	-
Dozers on product coal stockpiles	54204	15620	1192	50	14312	h/y	7.6	kg/h	2.2	kg/h	0.167	kg/h	-	-	12	-	-	-	-	5	-
Conveyer to product stockpiles	151	71	11	70	4761988	t/y	0.00011	kg/t	0.00005	kg/t	0.0000	kg/t	-	1.10	12	-	-	-	-	-	-
Loading product coal to trains	1905	810	95	0	4761988	t/y	0.00040	kg/t	0.00017	kg/t	0.0000	kg/t	-	-	-	-	-	-	-	-	-
Wind erosion from active pits	113880	56940	8541	0	130	ha	876.0	kg/ha/y	438.0	kg/ha/y	65.7	kg/ha/y	-	-	-	-	-	-	-	-	-
Wind erosion from active dumps	57816	28908	4336	0	66	ha	876.0	kg/ha/y	438.0	kg/ha/y	65.7	kg/ha/y	-	-	-	-	-	-	-	-	-
Wind erosion from inactive or partially rehabed dumps	134291	67145	10072	30	219	ha	876.0	kg/ha/y	438.0	kg/ha/y	65.7	kg/ha/y	-	-	-	-	-	-	-	-	-
Wind erosion from ROM coal stockpiles	3373	1686	253	50	8	ha	876.0	kg/ha/y	438.0	kg/ha/y	65.7	kg/ha/y	-	-	-	-	-	-	-	-	-
Wind erosion from product coal stockpile	3942	1971	296	50	9	ha	876.0	kg/ha/y	438.0	kg/ha/y	65.7	kg/ha/y	-	-	-	-	-	-	-	-	-
Grading roads	19658	6950	215	50	63880	km/y	0.61547	kg/VKT	0.2176	kg/VKT	0.007	kg/VKT	-	-	-	-	-	-	-	-	8
	1995455	656339	94996																		

Notes: production data supplied by Mangoola

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 --------------------------------      13-Jul-2018 11:52
  DUST EMISSION CALCULATIONS XL1
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 Number of dust sources : 82
 Number of activities   : 39

  -----ACTIVITY SUMMARY-----
 ACTIVITY NAME : Stripping topsoil (dozers)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 837 kg/y TSP  204 kg/y PM10  88 kg/y PM2.5
 FROM SOURCES  : 10
7 8 9 10 11 16 17 18 19 20
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Drilling overburden (North Pit)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 6964 kg/y TSP  3621 kg/y PM10  209 kg/y PM2.5
 FROM SOURCES  : 31
16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37
38 39 40 41 42 43 44 45 46
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Drilling overburden (South Pit)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 2321 kg/y TSP  1207 kg/y PM10  70 kg/y PM2.5
 FROM SOURCES  : 9
7 8 9 10 11 12 13 14 15
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Blasting overburden (North Pit)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 51745 kg/y TSP  26907 kg/y PM10  1552 kg/y PM2.5
 FROM SOURCES  : 31
16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37
38 39 40 41 42 43 44 45 46
 HOURS OF DAY  :
0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0

 ACTIVITY NAME : Blasting overburden (South Pit)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 17248 kg/y TSP  8969 kg/y PM10  517 kg/y PM2.5
 FROM SOURCES  : 9
7 8 9 10 11 12 13 14 15
 HOURS OF DAY  :
0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0

 ACTIVITY NAME : Excavators loading overburden to trucks (North
Pit)
 ACTIVITY TYPE : Wind sensitive
 DUST EMISSION : 69402 kg/y TSP  32825 kg/y PM10  4971 kg/y PM2.5
 FROM SOURCES  : 31
16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37
38 39 40 41 42 43 44 45 46
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Excavators loading overburden to trucks (South
Pit)
 ACTIVITY TYPE : Wind sensitive
 DUST EMISSION : 23134 kg/y TSP  10942 kg/y PM10  1657 kg/y PM2.5
 FROM SOURCES  : 9
7 8 9 10 11 12 13 14 15
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Hauling overburden from North Pit to north dump
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 517869 kg/y TSP  153035 kg/y PM10  15536 kg/y
PM2.5
 FROM SOURCES  : 55
16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37
38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59
60 61 62 63 64 65 66 67 68 69 70
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Hauling overburden from North Pit to south dump
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 0 kg/y TSP  0 kg/y PM10  0 kg/y PM2.5
 FROM SOURCES  : 1
1
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Hauling overburden from South Pit to south dump
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 112205 kg/y TSP  33158 kg/y PM10  3366 kg/y PM2.5
 FROM SOURCES  : 13
7 8 9 10 11 12 13 14 15 71 72 73 74
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Unloading overburden to north dump
 ACTIVITY TYPE : Wind sensitive
 DUST EMISSION : 69402 kg/y TSP  32825 kg/y PM10  4971 kg/y PM2.5
 FROM SOURCES  : 24
47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68
69 70
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Unloading overburden to south dump
 ACTIVITY TYPE : Wind sensitive
 DUST EMISSION : 23134 kg/y TSP  10942 kg/y PM10  1657 kg/y PM2.5
 FROM SOURCES  : 4
71 72 73 74
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Dozers shaping overburden (North dump)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 329853 kg/y TSP  80301 kg/y PM10  34635 kg/y PM2.5
 FROM SOURCES  : 24
47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68
69 70
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Dozers shaping overburden (South dump)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 109951 kg/y TSP  26767 kg/y PM10  11545 kg/y PM2.5
 FROM SOURCES  : 4
71 72 73 74
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Dozers working on overburden for rehabilitation
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 13054 kg/y TSP  3178 kg/y PM10  1371 kg/y PM2.5
 FROM SOURCES  : 11
48 50 52 55 56 58 61 63 65 67 68
 HOURS OF DAY  :
0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 0 0 0 0 0 0

 ACTIVITY NAME : Drilling coal (North Pit)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 0 kg/y TSP  0 kg/y PM10  0 kg/y PM2.5
 FROM SOURCES  : 31
16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37
38 39 40 41 42 43 44 45 46
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Drilling coal (South Pit)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 0 kg/y TSP  0 kg/y PM10  0 kg/y PM2.5
 FROM SOURCES  : 9
7 8 9 10 11 12 13 14 15
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Blasting coal (North Pit)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 0 kg/y TSP  0 kg/y PM10  0 kg/y PM2.5
 FROM SOURCES  : 31
16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37
38 39 40 41 42 43 44 45 46
 HOURS OF DAY  :
0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0

 ACTIVITY NAME : Blasting coal (South Pit)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 0 kg/y TSP  0 kg/y PM10  0 kg/y PM2.5
 FROM SOURCES  : 9
7 8 9 10 11 12 13 14 15
 HOURS OF DAY  :
0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0

 ACTIVITY NAME : Dozers working on coal (North Pit)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 72143 kg/y TSP  22997 kg/y PM10  1587 kg/y PM2.5
 FROM SOURCES  : 31
16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37
38 39 40 41 42 43 44 45 46
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Dozers working on coal (South Pit)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 24048 kg/y TSP  7666 kg/y PM10  529 kg/y PM2.5
 FROM SOURCES  : 9
7 8 9 10 11 12 13 14 15
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Loading ROM coal to trucks (North Pit)
 ACTIVITY TYPE : Wind sensitive
 DUST EMISSION : 318381 kg/y TSP  48958 kg/y PM10  6049 kg/y PM2.5
 FROM SOURCES  : 31
16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37
38 39 40 41 42 43 44 45 46
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Loading ROM coal to trucks (South Pit)
 ACTIVITY TYPE : Wind sensitive
 DUST EMISSION : 106127 kg/y TSP  16319 kg/y PM10  2016 kg/y PM2.5
 FROM SOURCES  : 9
7 8 9 10 11 12 13 14 15
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Hauling ROM coal from North Pit to hopper / ROM
pad
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 154567 kg/y TSP  45676 kg/y PM10  4637 kg/y PM2.5
 FROM SOURCES  : 39
5 6 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
37 38 39 40 41 42 43 44 45 46 75 76 77 78 79 80
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Hauling ROM coal from South Pit to hopper / ROM
pad
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 31979 kg/y TSP  9450 kg/y PM10  959 kg/y PM2.5
 FROM SOURCES  : 13
5 6 7 8 9 10 11 12 13 14 15 81 82
 HOURS OF DAY  :
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1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Unloading ROM coal to ROM hopper / pad (from all
pits)
 ACTIVITY TYPE : Wind sensitive
 DUST EMISSION : 34800 kg/y TSP  14616 kg/y PM10  661 kg/y PM2.5
 FROM SOURCES  : 2
5 6
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : ROM coal rehandle to hopper
 ACTIVITY TYPE : Wind sensitive
 DUST EMISSION : 34800 kg/y TSP  14616 kg/y PM10  661 kg/y PM2.5
 FROM SOURCES  : 2
5 6
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Transferring ROM coal by conveyor to CHPP
 ACTIVITY TYPE : Wind sensitive
 DUST EMISSION : 475 kg/y TSP  225 kg/y PM10  34 kg/y PM2.5
 FROM SOURCES  : 1
4
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Handling coal at CHPP
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 2376 kg/y TSP  1124 kg/y PM10  34 kg/y PM2.5
 FROM SOURCES  : 1
4
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Dozers on ROM coal stockpiles
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 0 kg/y TSP  0 kg/y PM10  0 kg/y PM2.5
 FROM SOURCES  : 2
5 6
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Dozers on product coal stockpiles
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 49765 kg/y TSP  14341 kg/y PM10  1095 kg/y PM2.5
 FROM SOURCES  : 2
2 3
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Conveyer to product stockpiles
 ACTIVITY TYPE : Wind sensitive
 DUST EMISSION : 295 kg/y TSP  140 kg/y PM10  21 kg/y PM2.5
 FROM SOURCES  : 2
2 3
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Loading product coal to trains
 ACTIVITY TYPE : Wind sensitive
 DUST EMISSION : 3718 kg/y TSP  1580 kg/y PM10  186 kg/y PM2.5
 FROM SOURCES  : 1
1
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Wind erosion from active pits
 ACTIVITY TYPE : Wind erosion
 DUST EMISSION : 259947 kg/y TSP  129974 kg/y PM10  19496 kg/y
PM2.5
 FROM SOURCES  : 39
7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29
30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Wind erosion from active dumps
 ACTIVITY TYPE : Wind erosion
 DUST EMISSION : 157892 kg/y TSP  78946 kg/y PM10  11842 kg/y PM2.5
 FROM SOURCES  : 29
46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67
68 69 70 71 72 73 74
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Wind erosion from inactive or partially rehabed
dumps
 ACTIVITY TYPE : Wind erosion
 DUST EMISSION : 30660 kg/y TSP  15330 kg/y PM10  2300 kg/y PM2.5
 FROM SOURCES  : 29
46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67
68 69 70 71 72 73 74
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Wind erosion from ROM coal stockpiles
 ACTIVITY TYPE : Wind erosion
 DUST EMISSION : 3373 kg/y TSP  1686 kg/y PM10  253 kg/y PM2.5
 FROM SOURCES  : 2
5 6
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Wind erosion from product coal stockpile
 ACTIVITY TYPE : Wind erosion
 DUST EMISSION : 3942 kg/y TSP  1971 kg/y PM10  296 kg/y PM2.5
 FROM SOURCES  : 2
2 3
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Grading roads
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 18464 kg/y TSP  6528 kg/y PM10  202 kg/y PM2.5
 FROM SOURCES  : 76
7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29
30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51
52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73
74 75 76 77 78 79 80 81 82
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 Pit retention sources:
28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46
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MCCO Year 1

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 --------------------------------      24-Oct-2018 11:41
  DUST EMISSION CALCULATIONS XL1
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 Output emissions file  :
C:\Users\slakmaker\Projects\IA157300_Mangoola\calpuff\2022\Mangoola
\emiss.vol
 Meteorological file    : NA
 Number of dust sources : 84
 Number of activities   : 39

  -----ACTIVITY SUMMARY-----
 ACTIVITY NAME : Stripping topsoil (dozers)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 1389 kg/y TSP  338 kg/y PM10  146 kg/y PM2.5
 FROM SOURCES  : 10
7 8 9 10 46 47 48 49 50 51
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Drilling overburden (North Pit)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 1804 kg/y TSP  938 kg/y PM10  54 kg/y PM2.5
 FROM SOURCES  : 9
46 47 48 49 50 51 52 53 54
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Drilling overburden (South Pit)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 9471 kg/y TSP  4925 kg/y PM10  284 kg/y PM2.5
 FROM SOURCES  : 14
7 8 9 10 11 12 13 14 15 16 17 18 19 20
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Blasting overburden (North Pit)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 11676 kg/y TSP  6071 kg/y PM10  350 kg/y PM2.5
 FROM SOURCES  : 9
46 47 48 49 50 51 52 53 54
 HOURS OF DAY  :
0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0

 ACTIVITY NAME : Blasting overburden (South Pit)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 61563 kg/y TSP  32013 kg/y PM10  1847 kg/y PM2.5
 FROM SOURCES  : 14
7 8 9 10 11 12 13 14 15 16 17 18 19 20
 HOURS OF DAY  :
0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0

 ACTIVITY NAME : Excavators loading overburden to trucks (North
Pit)
 ACTIVITY TYPE : Wind sensitive
 DUST EMISSION : 17997 kg/y TSP  8512 kg/y PM10  1289 kg/y PM2.5
 FROM SOURCES  : 9
46 47 48 49 50 51 52 53 54
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Excavators loading overburden to trucks (South
Pit)
 ACTIVITY TYPE : Wind sensitive
 DUST EMISSION : 94498 kg/y TSP  44695 kg/y PM10  6768 kg/y PM2.5
 FROM SOURCES  : 14
7 8 9 10 11 12 13 14 15 16 17 18 19 20
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Hauling overburden from North Pit to north dump
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 0 kg/y TSP  0 kg/y PM10  0 kg/y PM2.5
 FROM SOURCES  : 12
46 47 48 49 50 51 52 53 54 55 56 57
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Hauling overburden from North Pit to south dump
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 228298 kg/y TSP  67464 kg/y PM10  6849 kg/y PM2.5
 FROM SOURCES  : 16
40 41 42 44 45 46 47 48 49 50 51 62 63 64 65 66
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Hauling overburden from South Pit to south dump
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 846161 kg/y TSP  250048 kg/y PM10  25385 kg/y
PM2.5
 FROM SOURCES  : 31
7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 29 34
35 36 37 38 39 40 41 42
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Unloading overburden to north dump
 ACTIVITY TYPE : Wind sensitive
 DUST EMISSION : 0 kg/y TSP  0 kg/y PM10  0 kg/y PM2.5
 FROM SOURCES  : 6
52 53 54 55 56 57
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Unloading overburden to south dump
 ACTIVITY TYPE : Wind sensitive
 DUST EMISSION : 112495 kg/y TSP  53207 kg/y PM10  8057 kg/y PM2.5
 FROM SOURCES  : 16
24 25 26 27 29 34 35 36 37 38 39 40 41 42 44 45
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Dozers shaping overburden (North dump)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 0 kg/y TSP  0 kg/y PM10  0 kg/y PM2.5
 FROM SOURCES  : 6
52 53 54 55 56 57
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Dozers shaping overburden (South dump)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 382986 kg/y TSP  93236 kg/y PM10  40214 kg/y PM2.5
 FROM SOURCES  : 18
24 25 26 27 28 29 34 35 36 37 38 39 40 41 42 43 44 45
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Dozers working on overburden for rehabilitation
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 13315 kg/y TSP  3241 kg/y PM10  1398 kg/y PM2.5
 FROM SOURCES  : 6
30 31 32 33 83 84
 HOURS OF DAY  :
0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 0 0 0 0 0 0

 ACTIVITY NAME : Drilling coal (North Pit)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 0 kg/y TSP  0 kg/y PM10  0 kg/y PM2.5
 FROM SOURCES  : 9
46 47 48 49 50 51 52 53 54
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Drilling coal (South Pit)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 0 kg/y TSP  0 kg/y PM10  0 kg/y PM2.5
 FROM SOURCES  : 14
7 8 9 10 11 12 13 14 15 16 17 18 19 20
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Blasting coal (North Pit)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 0 kg/y TSP  0 kg/y PM10  0 kg/y PM2.5
 FROM SOURCES  : 9
46 47 48 49 50 51 52 53 54
 HOURS OF DAY  :
0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0

 ACTIVITY NAME : Blasting coal (South Pit)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 0 kg/y TSP  0 kg/y PM10  0 kg/y PM2.5
 FROM SOURCES  : 14
7 8 9 10 11 12 13 14 15 16 17 18 19 20
 HOURS OF DAY  :
0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0

 ACTIVITY NAME : Dozers working on coal (North Pit)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 0 kg/y TSP  0 kg/y PM10  0 kg/y PM2.5
 FROM SOURCES  : 9
46 47 48 49 50 51 52 53 54
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Dozers working on coal (South Pit)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 99054 kg/y TSP  31576 kg/y PM10  2179 kg/y PM2.5
 FROM SOURCES  : 14
7 8 9 10 11 12 13 14 15 16 17 18 19 20
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Loading ROM coal to trucks (North Pit)
 ACTIVITY TYPE : Wind sensitive
 DUST EMISSION : 0 kg/y TSP  0 kg/y PM10  0 kg/y PM2.5
 FROM SOURCES  : 9
46 47 48 49 50 51 52 53 54
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Loading ROM coal to trucks (South Pit)
 ACTIVITY TYPE : Wind sensitive
 DUST EMISSION : 386485 kg/y TSP  59431 kg/y PM10  7343 kg/y PM2.5
 FROM SOURCES  : 14
7 8 9 10 11 12 13 14 15 16 17 18 19 20
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Hauling ROM coal from North Pit to hopper / ROM
pad
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 0 kg/y TSP  0 kg/y PM10  0 kg/y PM2.5
 FROM SOURCES  : 23
5 6 46 47 48 49 50 51 52 53 54 62 63 64 65 67 68 69 70 71 72 73 74
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Hauling ROM coal from South Pit to hopper / ROM
pad
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 226450 kg/y TSP  66918 kg/y PM10  6793 kg/y PM2.5
 FROM SOURCES  : 21
5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 28 29 75 76 77
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Unloading ROM coal to ROM hopper / pad (from all
pits)
 ACTIVITY TYPE : Wind sensitive
 DUST EMISSION : 31683 kg/y TSP  13307 kg/y PM10  602 kg/y PM2.5
 FROM SOURCES  : 2
```

5 6
 HOURS OF DAY :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : ROM coal rehandle to hopper
 ACTIVITY TYPE : Wind sensitive
 DUST EMISSION : 31683 kg/y TSP 13307 kg/y PM10 602 kg/y PM2.5
 FROM SOURCES : 2
5 6
 HOURS OF DAY :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Transferring ROM coal by conveyor to CHPP
 ACTIVITY TYPE : Wind sensitive
 DUST EMISSION : 433 kg/y TSP 205 kg/y PM10 31 kg/y PM2.5
 FROM SOURCES : 1
4
 HOURS OF DAY :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Handling coal at CHPP
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 2164 kg/y TSP 1023 kg/y PM10 31 kg/y PM2.5
 FROM SOURCES : 1
4
 HOURS OF DAY :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Dozers on ROM coal stockpiles
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 0 kg/y TSP 0 kg/y PM10 0 kg/y PM2.5
 FROM SOURCES : 2
5 6
 HOURS OF DAY :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Dozers on product coal stockpiles
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 54266 kg/y TSP 15638 kg/y PM10 1194 kg/y PM2.5
 FROM SOURCES : 2
2 3
 HOURS OF DAY :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Conveyer to product stockpiles
 ACTIVITY TYPE : Wind sensitive
 DUST EMISSION : 254 kg/y TSP 120 kg/y PM10 18 kg/y PM2.5
 FROM SOURCES : 2
2 3
 HOURS OF DAY :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Loading product coal to trains
 ACTIVITY TYPE : Wind sensitive
 DUST EMISSION : 3203 kg/y TSP 1361 kg/y PM10 160 kg/y PM2.5
 FROM SOURCES : 1
1
 HOURS OF DAY :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Wind erosion from active pits
 ACTIVITY TYPE : Wind erosion
 DUST EMISSION : 233016 kg/y TSP 116508 kg/y PM10 17476 kg/y PM2.5
 FROM SOURCES : 23
7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 46 47 48 49 50 51
 HOURS OF DAY :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Wind erosion from active dumps
 ACTIVITY TYPE : Wind erosion
 DUST EMISSION : 301019 kg/y TSP 150510 kg/y PM10 22576 kg/y PM2.5
 FROM SOURCES : 29
24 25 26 27 28 29 34 35 36 37 38 39 40 41 42 43 44 45 52 53 54 55 56 57 58 59 60 61 66
 HOURS OF DAY :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Wind erosion from inactive or partially rehabed dumps
 ACTIVITY TYPE : Wind erosion
 DUST EMISSION : 41698 kg/y TSP 20849 kg/y PM10 3127 kg/y PM2.5
 FROM SOURCES : 6
30 31 32 33 83 84
 HOURS OF DAY :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Wind erosion from ROM coal stockpiles
 ACTIVITY TYPE : Wind erosion
 DUST EMISSION : 3373 kg/y TSP 1686 kg/y PM10 253 kg/y PM2.5
 FROM SOURCES : 2
5 6
 HOURS OF DAY :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Wind erosion from product coal stockpile
 ACTIVITY TYPE : Wind erosion
 DUST EMISSION : 3942 kg/y TSP 1971 kg/y PM10 296 kg/y PM2.5
 FROM SOURCES : 2
2 3
 HOURS OF DAY :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Grading roads
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 32117 kg/y TSP 11355 kg/y PM10 352 kg/y PM2.5
 FROM SOURCES : 78
7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84
 HOURS OF DAY :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 Pit retention sources:
7 8 9 10 11 12 13 14 15 16 17 18 19 20

MCCO Year 3

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 -------------------------------      24-Oct-2018 11:51
  DUST EMISSION CALCULATIONS XL1
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 Output emissions file  :
C:\Users\slakmaker\Projects\IA157300_Mangoola\calpuff\2024\Mangoola
\emiss.vol
 Meteorological file    : NA
 Number of dust sources : 81
 Number of activities   : 39

  -----ACTIVITY SUMMARY-----
 ACTIVITY NAME : Stripping topsoil (dozers)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 374 kg/y TSP  91 kg/y PM10  39 kg/y PM2.5
 FROM SOURCES  : 10
7 8 9 10 11 30 31 32 33 34
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Drilling overburden (North Pit)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 7010 kg/y TSP  3645 kg/y PM10  210 kg/y PM2.5
 FROM SOURCES  : 10
30 31 32 33 34 35 36 37 38 39
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Drilling overburden (South Pit)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 3721 kg/y TSP  1935 kg/y PM10  112 kg/y PM2.5
 FROM SOURCES  : 5
7 8 9 10 11
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Blasting overburden (North Pit)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 45641 kg/y TSP  23734 kg/y PM10  1369 kg/y PM2.5
 FROM SOURCES  : 10
30 31 32 33 34 35 36 37 38 39
 HOURS OF DAY  :
0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0

 ACTIVITY NAME : Blasting overburden (South Pit)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 23882 kg/y TSP  12419 kg/y PM10  716 kg/y PM2.5
 FROM SOURCES  : 5
7 8 9 10 11
 HOURS OF DAY  :
0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0

 ACTIVITY NAME : Excavators loading overburden to trucks (North
Pit)
 ACTIVITY TYPE : Wind sensitive
 DUST EMISSION : 69993 kg/y TSP  33105 kg/y PM10  5013 kg/y PM2.5
 FROM SOURCES  : 10
30 31 32 33 34 35 36 37 38 39
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Excavators loading overburden to trucks (South
Pit)
 ACTIVITY TYPE : Wind sensitive
 DUST EMISSION : 37130 kg/y TSP  17561 kg/y PM10  2659 kg/y PM2.5
 FROM SOURCES  : 5
7 8 9 10 11
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Hauling overburden from North Pit to north dump
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 329836 kg/y TSP  97469 kg/y PM10  9895 kg/y PM2.5
 FROM SOURCES  : 19
30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Hauling overburden from North Pit to south dump
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 592104 kg/y TSP  174972 kg/y PM10  17763 kg/y
PM2.5
 FROM SOURCES  : 25
15 16 17 18 19 20 21 30 31 32 33 34 35 36 37 38 39 53 54 55 56 57
58 59 60
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Hauling overburden from South Pit to south dump
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 346325 kg/y TSP  102342 kg/y PM10  10390 kg/y
PM2.5
 FROM SOURCES  : 20
7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Unloading overburden to north dump
 ACTIVITY TYPE : Wind sensitive
 DUST EMISSION : 42098 kg/y TSP  19911 kg/y PM10  3015 kg/y PM2.5
 FROM SOURCES  : 9
40 41 42 43 44 45 46 47 48
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Unloading overburden to south dump
 ACTIVITY TYPE : Wind sensitive
 DUST EMISSION : 64972 kg/y TSP  30730 kg/y PM10  4653 kg/y PM2.5
 FROM SOURCES  : 15
12 13 14 15 16 17 18 19 20 21 22 23 24 25 26
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Dozers shaping overburden (North dump)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 177759 kg/y TSP  43275 kg/y PM10  18665 kg/y PM2.5
 FROM SOURCES  : 9
40 41 42 43 44 45 46 47 48
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Dozers shaping overburden (South dump)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 215174 kg/y TSP  52383 kg/y PM10  22593 kg/y PM2.5
 FROM SOURCES  : 15
12 13 14 15 16 17 18 19 20 21 22 23 24 25 26
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Dozers working on overburden for rehabilitation
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 47428 kg/y TSP  11546 kg/y PM10  4980 kg/y PM2.5
 FROM SOURCES  : 6
72 73 74 75 76 77
 HOURS OF DAY  :
0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 0 0 0 0 0 0

 ACTIVITY NAME : Drilling coal (North Pit)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 0 kg/y TSP  0 kg/y PM10  0 kg/y PM2.5
 FROM SOURCES  : 10
30 31 32 33 34 35 36 37 38 39
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Drilling coal (South Pit)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 0 kg/y TSP  0 kg/y PM10  0 kg/y PM2.5
 FROM SOURCES  : 5
7 8 9 10 11
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Blasting coal (North Pit)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 0 kg/y TSP  0 kg/y PM10  0 kg/y PM2.5
 FROM SOURCES  : 10
30 31 32 33 34 35 36 37 38 39
 HOURS OF DAY  :
0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0

 ACTIVITY NAME : Blasting coal (South Pit)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 0 kg/y TSP  0 kg/y PM10  0 kg/y PM2.5
 FROM SOURCES  : 5
7 8 9 10 11
 HOURS OF DAY  :
0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0

 ACTIVITY NAME : Dozers working on coal (North Pit)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 68235 kg/y TSP  21752 kg/y PM10  1501 kg/y PM2.5
 FROM SOURCES  : 10
30 31 32 33 34 35 36 37 38 39
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Dozers working on coal (South Pit)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 60161 kg/y TSP  19178 kg/y PM10  1324 kg/y PM2.5
 FROM SOURCES  : 5
7 8 9 10 11
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Loading ROM coal to trucks (North Pit)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 306021 kg/y TSP  47058 kg/y PM10  5814 kg/y PM2.5
 FROM SOURCES  : 10
30 31 32 33 34 35 36 37 38 39
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Loading ROM coal to trucks (South Pit)
 ACTIVITY TYPE : Wind sensitive
 DUST EMISSION : 187968 kg/y TSP  28904 kg/y PM10  3571 kg/y PM2.5
 FROM SOURCES  : 5
7 8 9 10 11
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Hauling ROM coal from North Pit to hopper / ROM
pad
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 317625 kg/y TSP  93861 kg/y PM10  9529 kg/y PM2.5
 FROM SOURCES  : 24
5 6 30 31 32 33 34 35 36 37 38 39 52 53 54 55 64 65 66 67 68 69 70
71
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Hauling ROM coal from South Pit to hopper / ROM
pad
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 110134 kg/y TSP  32546 kg/y PM10  3304 kg/y PM2.5
 FROM SOURCES  : 13
5 6 7 8 9 10 11 15 22 60 61 62 63
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Unloading ROM coal to ROM hopper / pad (from all
pits)
 ACTIVITY TYPE : Wind sensitive
```

DUST EMISSION : 40496 kg/y TSP 17008 kg/y PM10 769 kg/y PM2.5
FROM SOURCES : 2
5 6
HOURS OF DAY :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

ACTIVITY NAME : ROM coal rehandle to hopper
ACTIVITY TYPE : Wind sensitive
DUST EMISSION : 40496 kg/y TSP 17008 kg/y PM10 769 kg/y PM2.5
FROM SOURCES : 2
5 6
HOURS OF DAY :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

ACTIVITY NAME : Transferring ROM coal by conveyor to CHPP
ACTIVITY TYPE : Wind sensitive
DUST EMISSION : 553 kg/y TSP 262 kg/y PM10 40 kg/y PM2.5
FROM SOURCES : 1
4
HOURS OF DAY :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

ACTIVITY NAME : Handling coal at CHPP
ACTIVITY TYPE : Wind insensitive
DUST EMISSION : 2765 kg/y TSP 1308 kg/y PM10 40 kg/y PM2.5
FROM SOURCES : 1
4
HOURS OF DAY :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

ACTIVITY NAME : Dozers on ROM coal stockpiles
ACTIVITY TYPE : Wind insensitive
DUST EMISSION : 0 kg/y TSP 0 kg/y PM10 0 kg/y PM2.5
FROM SOURCES : 2
5 6
HOURS OF DAY :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

ACTIVITY NAME : Dozers on product coal stockpiles
ACTIVITY TYPE : Wind insensitive
DUST EMISSION : 52803 kg/y TSP 15216 kg/y PM10 1162 kg/y PM2.5
FROM SOURCES : 2
2 3
HOURS OF DAY :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

ACTIVITY NAME : Conveyer to product stockpiles
ACTIVITY TYPE : Wind sensitive
DUST EMISSION : 327 kg/y TSP 155 kg/y PM10 23 kg/y PM2.5
FROM SOURCES : 2
2 3
HOURS OF DAY :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

ACTIVITY NAME : Loading product coal to trains
ACTIVITY TYPE : Wind sensitive
DUST EMISSION : 4123 kg/y TSP 1752 kg/y PM10 206 kg/y PM2.5
FROM SOURCES : 1
1
HOURS OF DAY :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

ACTIVITY NAME : Wind erosion from active pits
ACTIVITY TYPE : Wind erosion
DUST EMISSION : 195348 kg/y TSP 97674 kg/y PM10 14651 kg/y PM2.5
FROM SOURCES : 15
7 8 9 10 11 30 31 32 33 34 35 36 37 38 39
HOURS OF DAY :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

ACTIVITY NAME : Wind erosion from active dumps
ACTIVITY TYPE : Wind erosion
DUST EMISSION : 297840 kg/y TSP 148920 kg/y PM10 22338 kg/y
PM2.5
FROM SOURCES : 31
12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 40 41 42 43
44 45 46 47 48 49 50 51 52
HOURS OF DAY :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

ACTIVITY NAME : Wind erosion from inactive or partially rehabed
dumps
ACTIVITY TYPE : Wind erosion
DUST EMISSION : 53348 kg/y TSP 26674 kg/y PM10 4001 kg/y PM2.5
FROM SOURCES : 10
72 73 74 75 76 77 78 79 80 81
HOURS OF DAY :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

ACTIVITY NAME : Wind erosion from ROM coal stockpiles
ACTIVITY TYPE : Wind erosion
DUST EMISSION : 3373 kg/y TSP 1686 kg/y PM10 253 kg/y PM2.5
FROM SOURCES : 2
5 6
HOURS OF DAY :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

ACTIVITY NAME : Wind erosion from product coal stockpile
ACTIVITY TYPE : Wind erosion
DUST EMISSION : 3942 kg/y TSP 1971 kg/y PM10 296 kg/y PM2.5
FROM SOURCES : 2
2 3
HOURS OF DAY :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

ACTIVITY NAME : Grading roads
ACTIVITY TYPE : Wind insensitive
DUST EMISSION : 32204 kg/y TSP 11386 kg/y PM10 353 kg/y PM2.5
FROM SOURCES : 75
7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29
30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51
52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73
74 75 76 77 78 79 80 81
HOURS OF DAY :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

Pit retention sources:
7 8 9 10 11 30 31 32 33 34 35 36 37 38 39

MCCO Year 5

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 -------------------------------      24-Oct-2018 11:50
  DUST EMISSION CALCULATIONS XL1
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 Output emissions file  :
C:\Users\slakmaker\Projects\IA157300_Mangoola\calpuff\2026\Mangoola
\emiss.vol
 Meteorological file    : NA
 Number of dust sources : 73
 Number of activities   : 39

  -----ACTIVITY SUMMARY-----
 ACTIVITY NAME : Stripping topsoil (dozers)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 1451 kg/y TSP  353 kg/y PM10  152 kg/y PM2.5
 FROM SOURCES  : 14
7 8 9 10 11 12 13 14 15 16 17 18 19 20
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Drilling overburden (North Pit)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 7700 kg/y TSP  4004 kg/y PM10  231 kg/y PM2.5
 FROM SOURCES  : 9
13 14 15 16 17 18 19 20 21
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Drilling overburden (South Pit)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 685 kg/y TSP  356 kg/y PM10  21 kg/y PM2.5
 FROM SOURCES  : 6
7 8 9 10 11 12
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Blasting overburden (North Pit)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 49887 kg/y TSP  25941 kg/y PM10  1497 kg/y PM2.5
 FROM SOURCES  : 9
13 14 15 16 17 18 19 20 21
 HOURS OF DAY  :
0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0

 ACTIVITY NAME : Blasting overburden (South Pit)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 4246 kg/y TSP  2208 kg/y PM10  127 kg/y PM2.5
 FROM SOURCES  : 6
7 8 9 10 11 12
 HOURS OF DAY  :
0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0

 ACTIVITY NAME : Excavators loading overburden to trucks (North
Pit)
 ACTIVITY TYPE : Wind sensitive
 DUST EMISSION : 76750 kg/y TSP  36301 kg/y PM10  5497 kg/y PM2.5
 FROM SOURCES  : 9
13 14 15 16 17 18 19 20 21
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Excavators loading overburden to trucks (South
Pit)
 ACTIVITY TYPE : Wind sensitive
 DUST EMISSION : 6833 kg/y TSP  3232 kg/y PM10  489 kg/y PM2.5
 FROM SOURCES  : 6
7 8 9 10 11 12
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Hauling overburden from North Pit to north dump
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 270720 kg/y TSP  80000 kg/y PM10  8122 kg/y PM2.5
 FROM SOURCES  : 27
13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34
35 36 37 38 39
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Hauling overburden from North Pit to south dump
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 977900 kg/y TSP  288977 kg/y PM10  29337 kg/y
PM2.5
 FROM SOURCES  : 26
7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 26 30 52 53 54 55 56 57
58 59 60
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Hauling overburden from South Pit to south dump
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 33142 kg/y TSP  9794 kg/y PM10  994 kg/y PM2.5
 FROM SOURCES  : 6
7 8 9 10 11 12
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Unloading overburden to north dump
 ACTIVITY TYPE : Wind sensitive
 DUST EMISSION : 34552 kg/y TSP  16342 kg/y PM10  2475 kg/y PM2.5
 FROM SOURCES  : 18
22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Unloading overburden to south dump
 ACTIVITY TYPE : Wind sensitive
 DUST EMISSION : 49108 kg/y TSP  23227 kg/y PM10  3517 kg/y PM2.5
 FROM SOURCES  : 6
7 8 9 10 11 12
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Dozers shaping overburden (North dump)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 185324 kg/y TSP  45116 kg/y PM10  19459 kg/y PM2.5
 FROM SOURCES  : 18
22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Dozers shaping overburden (South dump)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 157529 kg/y TSP  38350 kg/y PM10  16541 kg/y PM2.5
 FROM SOURCES  : 6
7 8 9 10 11 12
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Dozers working on overburden for rehabilitation
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 78408 kg/y TSP  19088 kg/y PM10  8233 kg/y PM2.5
 FROM SOURCES  : 8
40 41 42 43 44 45 46 47
 HOURS OF DAY  :
0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 0 0 0 0 0 0

 ACTIVITY NAME : Drilling coal (North Pit)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 0 kg/y TSP  0 kg/y PM10  0 kg/y PM2.5
 FROM SOURCES  : 9
13 14 15 16 17 18 19 20 21
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Drilling coal (South Pit)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 0 kg/y TSP  0 kg/y PM10  0 kg/y PM2.5
 FROM SOURCES  : 6
7 8 9 10 11 12
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Blasting coal (North Pit)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 0 kg/y TSP  0 kg/y PM10  0 kg/y PM2.5
 FROM SOURCES  : 9
13 14 15 16 17 18 19 20 21
 HOURS OF DAY  :
0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0

 ACTIVITY NAME : Blasting coal (South Pit)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 0 kg/y TSP  0 kg/y PM10  0 kg/y PM2.5
 FROM SOURCES  : 6
7 8 9 10 11 12
 HOURS OF DAY  :
0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0

 ACTIVITY NAME : Dozers working on coal (North Pit)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 46678 kg/y TSP  14880 kg/y PM10  1027 kg/y PM2.5
 FROM SOURCES  : 9
13 14 15 16 17 18 19 20 21
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Dozers working on coal (South Pit)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 22566 kg/y TSP  7193 kg/y PM10  496 kg/y PM2.5
 FROM SOURCES  : 6
7 8 9 10 11 12
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Loading ROM coal to trucks (North Pit)
 ACTIVITY TYPE : Wind sensitive
 DUST EMISSION : 211432 kg/y TSP  32512 kg/y PM10  4017 kg/y PM2.5
 FROM SOURCES  : 9
13 14 15 16 17 18 19 20 21
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Loading ROM coal to trucks (South Pit)
 ACTIVITY TYPE : Wind sensitive
 DUST EMISSION : 70504 kg/y TSP  10842 kg/y PM10  1340 kg/y PM2.5
 FROM SOURCES  : 6
7 8 9 10 11 12
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Hauling ROM coal from North Pit to hopper / ROM
pad
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 219449 kg/y TSP  64849 kg/y PM10  6583 kg/y PM2.5
 FROM SOURCES  : 23
5 6 13 14 15 16 17 18 19 20 21 30 52 53 54 61 62 63 64 65 66 67 68
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Hauling ROM coal from South Pit to hopper / ROM
pad
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 83800 kg/y TSP  24764 kg/y PM10  2514 kg/y PM2.5
 FROM SOURCES  : 13
5 6 7 8 9 10 11 12 69 70 71 72 73
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Unloading ROM coal to ROM hopper / pad (from all
pits)
 ACTIVITY TYPE : Wind sensitive
 DUST EMISSION : 23112 kg/y TSP  9707 kg/y PM10  439 kg/y PM2.5
```

FROM SOURCES : 2 7 8 9 10 11 12 13 14 15 16 17 18 19 20
5 6
HOURS OF DAY :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

ACTIVITY NAME : ROM coal rehandle to hopper
ACTIVITY TYPE : Wind sensitive
DUST EMISSION : 23112 kg/y TSP 9707 kg/y PM10 439 kg/y PM2.5
FROM SOURCES : 2
5 6
HOURS OF DAY :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

ACTIVITY NAME : Transferring ROM coal by conveyor to CHPP
ACTIVITY TYPE : Wind sensitive
DUST EMISSION : 316 kg/y TSP 149 kg/y PM10 23 kg/y PM2.5
FROM SOURCES : 1
4
HOURS OF DAY :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

ACTIVITY NAME : Handling coal at CHPP
ACTIVITY TYPE : Wind insensitive
DUST EMISSION : 1578 kg/y TSP 746 kg/y PM10 23 kg/y PM2.5
FROM SOURCES : 1
4
HOURS OF DAY :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

ACTIVITY NAME : Dozers on ROM coal stockpiles
ACTIVITY TYPE : Wind insensitive
DUST EMISSION : 0 kg/y TSP 0 kg/y PM10 0 kg/y PM2.5
FROM SOURCES : 2
5 6
HOURS OF DAY :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

ACTIVITY NAME : Dozers on product coal stockpiles
ACTIVITY TYPE : Wind insensitive
DUST EMISSION : 41884 kg/y TSP 12070 kg/y PM10 921 kg/y PM2.5
FROM SOURCES : 2
2 3
HOURS OF DAY :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

ACTIVITY NAME : Conveyer to product stockpiles
ACTIVITY TYPE : Wind sensitive
DUST EMISSION : 186 kg/y TSP 88 kg/y PM10 13 kg/y PM2.5
FROM SOURCES : 2
2 3
HOURS OF DAY :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

ACTIVITY NAME : Loading product coal to trains
ACTIVITY TYPE : Wind sensitive
DUST EMISSION : 2345 kg/y TSP 996 kg/y PM10 117 kg/y PM2.5
FROM SOURCES : 1
1
HOURS OF DAY :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

ACTIVITY NAME : Wind erosion from active pits
ACTIVITY TYPE : Wind erosion
DUST EMISSION : 93732 kg/y TSP 46866 kg/y PM10 7030 kg/y PM2.5
FROM SOURCES : 15
7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
HOURS OF DAY :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

ACTIVITY NAME : Wind erosion from active dumps
ACTIVITY TYPE : Wind erosion
DUST EMISSION : 191844 kg/y TSP 95922 kg/y PM10 14388 kg/y PM2.5
FROM SOURCES : 18
22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39
HOURS OF DAY :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

ACTIVITY NAME : Wind erosion from inactive or partially rehabed
dumps
ACTIVITY TYPE : Wind erosion
DUST EMISSION : 85848 kg/y TSP 42924 kg/y PM10 6439 kg/y PM2.5
FROM SOURCES : 8
40 41 42 43 44 45 46 47
HOURS OF DAY :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

ACTIVITY NAME : Wind erosion from ROM coal stockpiles
ACTIVITY TYPE : Wind erosion
DUST EMISSION : 3373 kg/y TSP 1686 kg/y PM10 253 kg/y PM2.5
FROM SOURCES : 2
5 6
HOURS OF DAY :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

ACTIVITY NAME : Wind erosion from product coal stockpile
ACTIVITY TYPE : Wind erosion
DUST EMISSION : 3942 kg/y TSP 1971 kg/y PM10 296 kg/y PM2.5
FROM SOURCES : 2
2 3
HOURS OF DAY :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

ACTIVITY NAME : Grading roads
ACTIVITY TYPE : Wind insensitive
DUST EMISSION : 23178 kg/y TSP 8195 kg/y PM10 254 kg/y PM2.5
FROM SOURCES : 67
7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29
30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51
52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73
HOURS OF DAY :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

Pit retention sources:

MCCO Year 8

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 -------------------------------      24-Oct-2018 11:40
  DUST EMISSION CALCULATIONS XL1
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 Output emissions file  :
C:\Users\slakmaker\Projects\IA157300_Mangoola\calpuff\2029\Mangoola
\emiss.vol
 Meteorological file    : NA
 Number of dust sources : 65
 Number of activities   : 39

  -----ACTIVITY SUMMARY-----
 ACTIVITY NAME : Stripping topsoil (dozers)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 0 kg/y TSP  0 kg/y PM10  0 kg/y PM2.5
 FROM SOURCES  : 12
7 8 9 10 12 13 14 15 16 17 18 19
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Drilling overburden (North Pit)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 7663 kg/y TSP  3985 kg/y PM10  230 kg/y PM2.5
 FROM SOURCES  : 8
12 13 14 15 16 17 18 19
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Drilling overburden (South Pit)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 0 kg/y TSP  0 kg/y PM10  0 kg/y PM2.5
 FROM SOURCES  : 4
7 8 9 10
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Blasting overburden (North Pit)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 49887 kg/y TSP  25941 kg/y PM10  1497 kg/y PM2.5
 FROM SOURCES  : 8
12 13 14 15 16 17 18 19
 HOURS OF DAY  :
0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0

 ACTIVITY NAME : Blasting overburden (South Pit)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 0 kg/y TSP  0 kg/y PM10  0 kg/y PM2.5
 FROM SOURCES  : 4
7 8 9 10
 HOURS OF DAY  :
0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0

 ACTIVITY NAME : Excavators loading overburden to trucks (North
Pit)
 ACTIVITY TYPE : Wind sensitive
 DUST EMISSION : 76539 kg/y TSP  36201 kg/y PM10  5482 kg/y PM2.5
 FROM SOURCES  : 8
12 13 14 15 16 17 18 19
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Excavators loading overburden to trucks (South
Pit)
 ACTIVITY TYPE : Wind sensitive
 DUST EMISSION : 0 kg/y TSP  0 kg/y PM10  0 kg/y PM2.5
 FROM SOURCES  : 4
7 8 9 10
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Hauling overburden from North Pit to north dump
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 599017 kg/y TSP  177015 kg/y PM10  17971 kg/y
PM2.5
 FROM SOURCES  : 17
12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Hauling overburden from North Pit to south dump
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 0 kg/y TSP  0 kg/y PM10  0 kg/y PM2.5
 FROM SOURCES  : 23
7 8 9 10 11 12 13 14 15 16 17 18 19 25 26 45 46 47 48 49 50 51 52
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Hauling overburden from South Pit to south dump
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 0 kg/y TSP  0 kg/y PM10  0 kg/y PM2.5
 FROM SOURCES  : 4
7 8 9 10
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Unloading overburden to north dump
 ACTIVITY TYPE : Wind sensitive
 DUST EMISSION : 76454 kg/y TSP  36161 kg/y PM10  5476 kg/y PM2.5
 FROM SOURCES  : 9
20 21 22 23 24 25 26 27 28
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Unloading overburden to south dump
 ACTIVITY TYPE : Wind sensitive
 DUST EMISSION : 0 kg/y TSP  0 kg/y PM10  0 kg/y PM2.5
 FROM SOURCES  : 4
7 8 9 10
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Dozers shaping overburden (North dump)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 246931 kg/y TSP  60114 kg/y PM10  25928 kg/y PM2.5
 FROM SOURCES  : 9
20 21 22 23 24 25 26 27 28
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Dozers shaping overburden (South dump)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 0 kg/y TSP  0 kg/y PM10  0 kg/y PM2.5
 FROM SOURCES  : 4
7 8 9 10
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Dozers working on overburden for rehabilitation
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 2132 kg/y TSP  519 kg/y PM10  224 kg/y PM2.5
 FROM SOURCES  : 12
29 30 31 32 33 34 35 36 37 38 39 40
 HOURS OF DAY  :
0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 0 0 0 0 0 0

 ACTIVITY NAME : Drilling coal (North Pit)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 0 kg/y TSP  0 kg/y PM10  0 kg/y PM2.5
 FROM SOURCES  : 8
12 13 14 15 16 17 18 19
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Drilling coal (South Pit)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 0 kg/y TSP  0 kg/y PM10  0 kg/y PM2.5
 FROM SOURCES  : 4
7 8 9 10
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Blasting coal (North Pit)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 0 kg/y TSP  0 kg/y PM10  0 kg/y PM2.5
 FROM SOURCES  : 8
12 13 14 15 16 17 18 19
 HOURS OF DAY  :
0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0

 ACTIVITY NAME : Blasting coal (South Pit)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 0 kg/y TSP  0 kg/y PM10  0 kg/y PM2.5
 FROM SOURCES  : 4
7 8 9 10
 HOURS OF DAY  :
0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0

 ACTIVITY NAME : Dozers working on coal (North Pit)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 49706 kg/y TSP  15845 kg/y PM10  1094 kg/y PM2.5
 FROM SOURCES  : 8
12 13 14 15 16 17 18 19
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Dozers working on coal (South Pit)
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 0 kg/y TSP  0 kg/y PM10  0 kg/y PM2.5
 FROM SOURCES  : 4
7 8 9 10
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Loading ROM coal to trucks (North Pit)
 ACTIVITY TYPE : Wind sensitive
 DUST EMISSION : 222074 kg/y TSP  34149 kg/y PM10  4219 kg/y PM2.5
 FROM SOURCES  : 8
12 13 14 15 16 17 18 19
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Loading ROM coal to trucks (South Pit)
 ACTIVITY TYPE : Wind sensitive
 DUST EMISSION : 0 kg/y TSP  0 kg/y PM10  0 kg/y PM2.5
 FROM SOURCES  : 4
7 8 9 10
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Hauling ROM coal from North Pit to hopper / ROM
pad
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 237930 kg/y TSP  70310 kg/y PM10  7138 kg/y PM2.5
 FROM SOURCES  : 23
5 6 12 13 14 15 16 17 18 19 25 26 45 46 47 53 54 55 56 57 58 59 60
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Hauling ROM coal from South Pit to hopper / ROM
pad
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 0 kg/y TSP  0 kg/y PM10  0 kg/y PM2.5
 FROM SOURCES  : 11
5 6 7 8 9 10 61 62 63 64 65
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Unloading ROM coal to ROM hopper / pad (from all
pits)
 ACTIVITY TYPE : Wind sensitive
 DUST EMISSION : 18205 kg/y TSP  7646 kg/y PM10  346 kg/y PM2.5
 FROM SOURCES  : 2
5 6
```

```
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : ROM coal rehandle to hopper
 ACTIVITY TYPE : Wind sensitive
 DUST EMISSION : 18205 kg/y TSP  7646 kg/y PM10  346 kg/y PM2.5
 FROM SOURCES  : 2
5 6
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Transferring ROM coal by conveyor to CHPP
 ACTIVITY TYPE : Wind sensitive
 DUST EMISSION : 249 kg/y TSP  118 kg/y PM10  18 kg/y PM2.5
 FROM SOURCES  : 1
4
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Handling coal at CHPP
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 1243 kg/y TSP  588 kg/y PM10  18 kg/y PM2.5
 FROM SOURCES  : 1
4
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Dozers on ROM coal stockpiles
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 0 kg/y TSP  0 kg/y PM10  0 kg/y PM2.5
 FROM SOURCES  : 2
5 6
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Dozers on product coal stockpiles
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 54204 kg/y TSP  15620 kg/y PM10  1192 kg/y PM2.5
 FROM SOURCES  : 2
2 3
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Conveyer to product stockpiles
 ACTIVITY TYPE : Wind sensitive
 DUST EMISSION : 151 kg/y TSP  71 kg/y PM10  11 kg/y PM2.5
 FROM SOURCES  : 2
2 3
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Loading product coal to trains
 ACTIVITY TYPE : Wind sensitive
 DUST EMISSION : 1905 kg/y TSP  810 kg/y PM10  95 kg/y PM2.5
 FROM SOURCES  : 1
1
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Wind erosion from active pits
 ACTIVITY TYPE : Wind erosion
 DUST EMISSION : 113880 kg/y TSP  56940 kg/y PM10  8541 kg/y PM2.5
 FROM SOURCES  : 12
7 8 9 10 12 13 14 15 16 17 18 19
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Wind erosion from active dumps
 ACTIVITY TYPE : Wind erosion
 DUST EMISSION : 57816 kg/y TSP  28908 kg/y PM10  4336 kg/y PM2.5
 FROM SOURCES  : 13
7 8 9 10 20 21 22 23 24 25 26 27 28
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Wind erosion from inactive or partially rehabed
dumps
 ACTIVITY TYPE : Wind erosion
 DUST EMISSION : 134291 kg/y TSP  67145 kg/y PM10  10072 kg/y PM2.5
 FROM SOURCES  : 16
29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Wind erosion from ROM coal stockpiles
 ACTIVITY TYPE : Wind erosion
 DUST EMISSION : 3373 kg/y TSP  1686 kg/y PM10  253 kg/y PM2.5
 FROM SOURCES  : 2
5 6
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Wind erosion from product coal stockpile
 ACTIVITY TYPE : Wind erosion
 DUST EMISSION : 3942 kg/y TSP  1971 kg/y PM10  296 kg/y PM2.5
 FROM SOURCES  : 2
2 3
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Grading roads
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 19658 kg/y TSP  6950 kg/y PM10  215 kg/y PM2.5
 FROM SOURCES  : 59
7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29
30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51
52 53 54 55 56 57 58 59 60 61 62 63 64 65
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 Pit retention sources:
7 8 9 10 12 13 14 15 16 17 18 19
```

Appendix D. Peer Review Outcomes

Nigel Holmes

44/1-11 Bridge End
Wollstonecraft
NSW 2065
+61 (0)412-619-718

30 April 2019

Umwelt (Australia) Pty Limited
75 York Street
Teralba, NSW 2284
Phone: (02) 4950 5322

Attention:
Daniel Sullivan - Principal Environmental Consultant

Dear Daniel,

Peer Review of Air Quality Assessment of Mangoola Coal Continued Operations (MCCO) Prepared by Jacobs

Introduction

At your request I have undertaken a peer review of the air quality assessment undertaken by Jacobs Group (Australia) Pty Ltd (Jacobs) for the for the Mangoola Coal Continued Operations Project (MCCO Project). This letter describes the issues covered in the review and my conclusions.

Approach to review

My review was undertaken in stages as the assessment work was done. It focussed on the proposed assessment methodology; including the issues proposed to be covered by the assessment, the model proposed to be used, the meteorological data, the emission factors, dust emissions inventories, methods of handing background particulate matter concentrations and the air quality assessment criteria selected.

These aspects were reviewed with a view to assessing whether the assessment was technically sound (i.e., whether the assessment used appropriate models and applied the models in an appropriate way). Finally, I have reviewed the work with a view to assessing whether it complied with NSW regulatory requirements and whether it dealt with the issues referred to in the Secretary's Environmental Assessment Requirements (SEARs).

Findings

My conclusions are summarised below.

- The use of the CALPUFF/CALMET models, as used in the assessment, are the best models available for this purpose.
- The assessment criteria are appropriate and consistent with the NSW EPA's *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (2016) (Approved Methods) and the NSW *Voluntary Land Acquisition and Mitigation Policy* (VLAMP, 2018).
- The existing environment, including landforms, land uses, identification of sensitive receptors, description of existing air quality and local meteorology have been appropriately described and appropriately incorporated into the modelling.

- The meteorological data and the way they have been used is appropriate, and the report demonstrates that the CALMET predictions are consistent with the observed meteorological conditions.
- The way in which the modelling has been undertaken is consistent with the *NSW EPA's Approved Methods*.
- The identification of the main non-project contributors to particulate matter emissions in the area is correct and the manner in which non-project emissions of particulate matter have been accounted for (i.e., the method of accounting for background particulate matter) is sound.
- The emissions inventories for particulate matter and nitrogen dioxide have been developed using appropriate emission factors and cover representative stages in the life of the mine.
- The emission controls proposed and the efficiency of the controls are realistic and represent current best practice for NSW mines.
- The dispersion modelling has been undertaken in accordance with the *NSW EPA's Approved Methods* and the work includes a validation study. The results have been presented in a clear way that allows assessing agencies to appreciate the effects of the project on air quality and the potential impacts on nearby residences.
- The report provides a discussion of proposed air quality emission controls.

Closure

In my opinion the air quality study provides a comprehensive investigation as to the likely air quality effects of the proposed MCCO Project and can be relied upon by approval agencies and regulators to assess the proposal.

Yours sincerely
Nigel Holmes

N.E. Holmes.

Nigel Holmes PhD
Atmospheric Physicist

Appendix E. Model Receptors

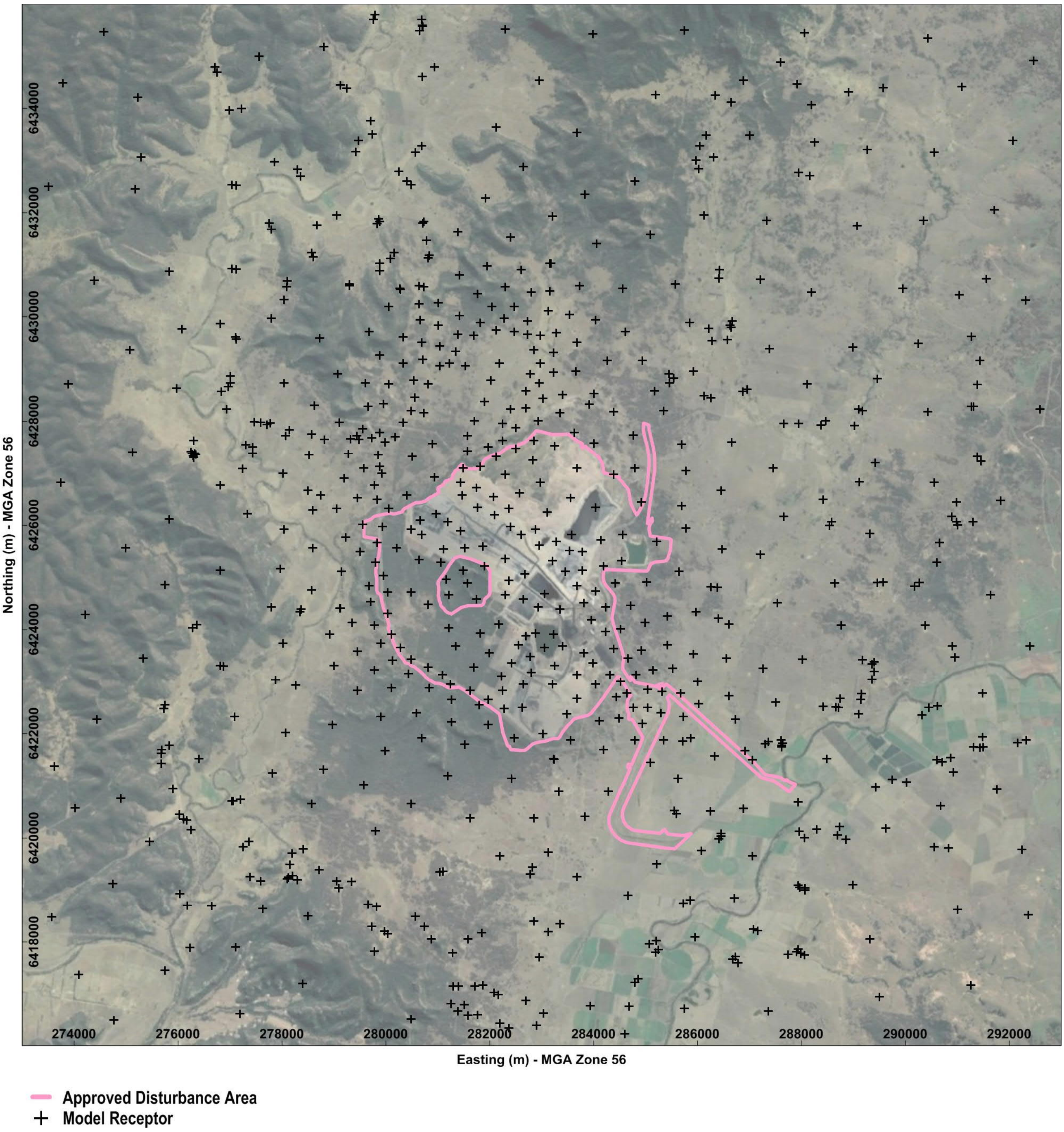

Figure E1 Location of model receptors

Appendix F. Additional Model Performance Evaluations

This section provides information on the performance of the model for predicting measured PM_{10} concentrations. The performance evaluation has been carried out by predicting PM_{10} concentrations for the 2014 calendar year (based on mining and activities rates in 2014) and comparing these results to measurement data.

Figure F1 shows quantile-quantile plots of measured and predicted 24-hour average PM_{10} concentrations at D01, D02, D03 and D04. These plots show the measured data and predictions paired by highest to lowest, and not matched in time. Dispersion models often encounter difficulties when trying to reproduce monitoring results for a single point, especially for the extreme statistics such as the maximum 24-hour average. The most significant factor is the limitation of using computers to model large, complex systems (this would be the case even if all the physics were perfectly correct). The quantile-quantile plots **Figure F1** do however show that the model predictions are well within a factor of two for all percentiles.

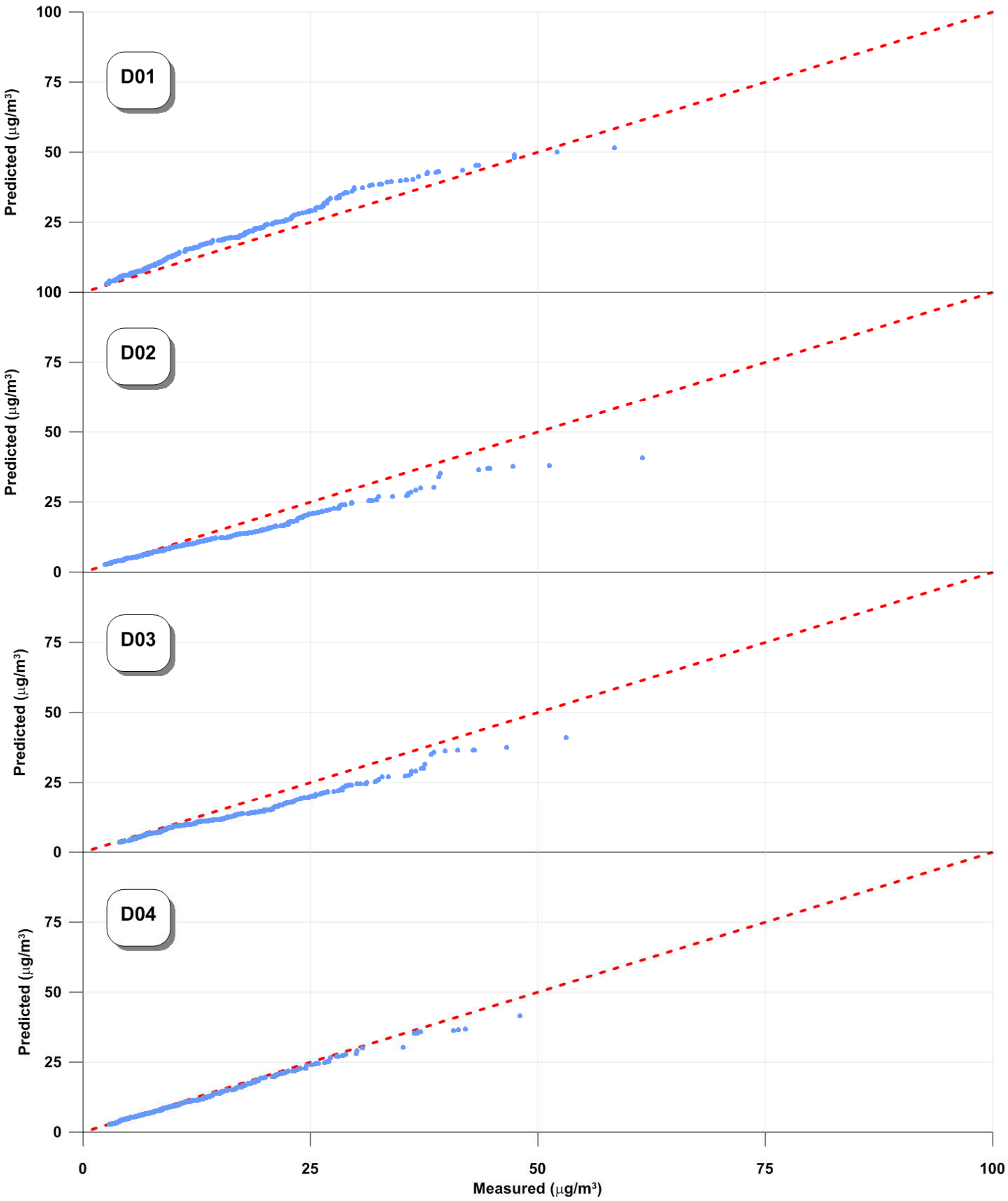

Figure F1 Quantile-quantile plots of measured and predicted 24-hour average PM_{10} concentrations

Appendix G. Tabulated Model Results

Model predictions at properties

ID	Type	Project in isolation				Cumulative					Criteria
		2022	2024	2026	2029	2014	2022	2024	2026	2029	
Maximum 24-hour average PM10 (ug/m3)											
19	Residence	2	2	1	1	41	41	41	41	41	50
21B	Residence	3	3	2	1	41	41	41	41	41	50
25	Residence	13	9	6	3	43	43	43	42	41	50
54	Residence	4	4	3	1	41	41	41	41	41	50
66	Residence	2	5	4	4	41	41	41	41	41	50
79	Residence	4	3	3	1	41	41	41	41	41	50
83	Residence	33	26	20	6	43	54	51	48	43	50
104	Residence	10	7	5	3	41	41	41	41	41	50
106A	Residence	4	3	3	1	41	41	41	41	41	50
106B	Residence	4	4	3	1	41	41	41	41	41	50
107	Residence	21	15	18	13	44	47	46	47	45	50
109A	Residence	12	9	9	6	43	46	46	45	43	50
109B	Residence	12	10	10	6	43	46	46	45	43	50
109C	Residence	12	10	10	6	43	46	46	45	43	50
109D	Residence	12	10	10	6	43	46	46	45	43	50
109E	Residence	12	9	9	6	43	46	46	45	43	50
109F	Residence	12	10	10	6	43	46	46	45	43	50
110	Residence	20	14	17	12	44	47	46	46	45	50
112A	Residence	3	3	2	1	41	41	41	41	41	50
112B	Residence	3	3	3	1	41	41	41	41	41	50
112C	Residence	3	3	2	1	41	41	41	41	41	50
112D	Residence	3	3	2	1	41	41	41	41	41	50
114	Residence	4	3	3	1	41	41	41	41	41	50
124	Residence	11	9	11	9	45	43	44	46	45	50
125A	Residence	5	7	6	5	41	41	41	41	41	50
125B	Residence	6	7	6	5	41	41	41	41	41	50
125C	Residence	6	7	6	5	41	41	41	41	41	50
126A	Residence	1	3	3	3	41	41	41	41	41	50
128	Residence	8	14	15	14	42	42	46	45	44	50
130	Residence	21	13	15	11	44	47	47	46	44	50
134D	Residence	11	8	10	7	45	43	44	45	45	50
134A	Residence	18	11	13	11	44	45	45	46	45	50
134C	Residence	17	11	12	11	45	45	45	46	45	50
135D	Residence	3	3	2	1	41	41	41	41	41	50
135A	Residence	1	1	1	1	41	41	41	41	41	50
139	Residence	9	20	22	22	42	43	48	46	45	50
141	Residence	3	3	2	1	41	41	41	41	41	50
144	Residence	8	14	14	13	43	42	47	46	45	50
147	Residence	2	2	2	1	41	41	41	41	41	50
148	Residence	20	14	16	11	43	47	47	46	44	50
151	Residence	3	3	2	1	41	41	41	41	41	50
154	Residence	2	6	5	5	41	41	41	41	41	50
156	Residence	7	8	8	8	43	42	44	45	44	50
157	Residence	7	19	19	19	41	43	46	44	44	50
164	Residence	4	4	3	1	41	41	41	41	41	50
165	Residence	10	12	11	12	44	42	45	46	46	50
166	Residence	4	3	3	1	41	41	41	41	41	50
170	Residence	7	14	14	13	41	42	44	43	43	50
171	Residence	5	14	12	11	41	41	42	42	42	50
172	Residence	9	11	12	12	43	42	45	45	45	50
174B	Residence	2	5	5	4	41	41	41	41	41	50
174A	Residence	2	5	5	4	41	41	41	41	41	50
175	Residence	2	5	5	4	41	41	41	41	41	50
176	Residence	6	5	5	3	42	44	43	43	41	50
177	Residence	3	3	2	1	41	41	41	41	41	50
178	Residence	3	2	2	1	41	41	41	41	41	50
182B	Residence	6	6	8	6	41	41	41	41	41	50
182A	Residence	5	6	8	6	41	41	41	41	41	50
183C	Residence	9	7	4	3	41	41	41	41	41	50
183B	Residence	9	7	4	3	41	41	41	41	41	50
183A	Residence	9	7	4	3	41	41	41	41	41	50
184A	Residence	4	3	2	1	42	41	41	41	41	50
184B	Residence	3	3	2	1	42	41	41	41	41	50
185	Residence	5	3	3	2	41	41	41	41	41	50
187	Residence	5	3	3	2	41	41	41	41	41	50
190	Residence	4	7	6	5	41	41	41	41	41	50
191	Residence	10	7	5	3	41	41	41	41	41	50
192	Residence	10	7	5	4	41	41	41	41	41	50
193	Residence	10	7	5	3	41	41	41	41	41	50
195	Residence	3	3	3	2	41	41	41	41	41	50
200	Residence	3	3	2	1	41	42	42	41	41	50

ID	Type	Project in isolation				Cumulative					Criteria
		2022	2024	2026	2029	2014	2022	2024	2026	2029	
201A	Residence	5	4	3	2	41	41	41	41	41	50
201B	Residence	5	4	3	2	41	41	41	41	41	50
201C	Residence	5	4	3	2	41	41	41	41	41	50
205	Residence	5	12	11	10	41	41	42	41	41	50
206	Residence	6	12	11	10	41	42	43	42	42	50
207	Residence	5	7	8	6	42	42	43	43	43	50
208A	Residence	5	6	7	7	42	42	44	43	43	50
209	Residence	7	6	5	3	42	44	43	43	41	50
210	Residence	2	2	2	1	41	41	41	41	41	50
211	Residence	2	2	1	1	41	41	41	41	41	50
213	Residence	2	2	1	1	41	41	41	41	41	50
216A	Residence	2	2	1	1	41	41	41	41	41	50
217A	Residence	2	2	1	1	41	41	41	41	41	50
218	Residence	2	2	1	1	41	41	41	41	41	50
227	Residence	8	6	5	4	41	41	41	41	41	50
228	Residence	7	5	5	4	41	41	41	41	41	50
230A	Residence	5	5	5	3	41	41	41	41	41	50
230B	Residence	5	5	4	3	41	41	41	41	41	50
231	Residence	4	5	5	3	41	41	41	41	41	50
238	Residence	4	5	6	5	41	41	41	41	41	50
240	Residence	5	6	5	4	41	41	41	41	41	50
241A	Residence	5	6	6	4	41	41	41	41	41	50
241B	Residence	5	6	7	5	41	41	41	41	41	50
241C	Residence	5	6	7	5	41	41	41	41	41	50
242	Residence	4	7	6	5	41	41	41	41	41	50
243	Residence	3	3	3	2	41	41	41	41	41	50
245	Residence	3	3	3	2	41	41	41	41	41	50
246	Residence	2	4	3	3	41	41	41	41	41	50
248	Residence	2	4	3	3	41	41	41	41	41	50
249	Residence	2	5	4	4	41	41	41	41	41	50
250	Residence	3	4	4	3	41	41	41	41	41	50
251	Residence	3	5	4	4	41	41	41	41	41	50
253	Residence	3	2	2	1	41	41	41	41	41	50
254	Residence	3	2	2	1	41	41	41	41	41	50
255	Residence	3	3	3	1	41	41	41	41	41	50
256A	Residence	3	3	3	2	41	42	42	41	41	50
257B	Residence	6	9	9	10	42	42	44	44	44	50
258	Residence	6	10	9	9	42	42	45	44	44	50
260	Residence	6	11	11	10	41	41	43	42	42	50
261	Residence	4	8	8	7	41	41	41	41	41	50
263	Residence	4	10	9	8	41	41	41	41	41	50
264	Residence	3	2	2	1	41	41	41	41	41	50
265A	Residence	3	2	2	1	41	41	41	41	41	50
266	Residence	2	2	2	1	41	41	41	41	41	50
270A	Residence	2	2	1	1	41	41	41	41	41	50
275	Residence	2	4	4	3	41	41	41	41	41	50
283	Residence	2	2	1	1	41	41	41	41	41	50
284A	Residence	2	2	1	1	41	41	41	41	41	50
285	Residence	3	3	2	1	41	41	41	41	41	50
286	Residence	3	3	2	1	41	41	41	41	41	50
287	Residence	3	2	2	1	41	41	41	41	41	50
288A	Residence	2	2	1	1	41	41	41	41	41	50
290	Residence	3	3	2	1	41	41	41	41	41	50
291A	Residence	2	2	1	1	41	41	41	41	41	50
292A	Residence	2	2	1	1	41	41	41	41	41	50
293A	Residence	2	2	1	1	41	41	41	41	41	50
294	Residence	3	2	1	1	42	41	41	41	41	50
295	Residence	3	3	3	2	41	41	41	41	41	50
296	Residence	5	7	6	6	42	42	43	43	43	50
298	Residence	3	6	6	5	41	41	41	41	41	50
299	Residence	4	8	8	6	41	41	42	42	41	50
301	Residence	2	4	3	2	41	41	41	41	41	50
302	Residence	1	2	2	1	41	41	41	41	41	50
303	Residence	1	2	2	1	41	41	41	41	41	50
304	Residence	3	6	6	5	41	41	41	41	41	50
307	Residence	3	5	5	4	42	41	43	42	42	50
308	Residence	3	4	4	3	41	41	42	42	42	50
309	Residence	4	3	3	2	41	41	41	41	41	50
313	Residence	4	4	5	4	42	42	43	43	43	50
316	Residence	7	12	12	13	42	42	45	45	45	50
319	Residence	4	7	6	5	41	41	41	41	41	50
321	Residence	4	8	8	7	41	41	41	41	41	50
324	Residence	3	5	5	4	41	41	41	41	41	50
325A	Residence	1	1	1	1	41	41	41	41	41	50
325B	Residence	1	1	1	1	41	41	41	41	41	50

ID	Type	Project in isolation				Cumulative					Criteria
		2022	2024	2026	2029	2014	2022	2024	2026	2029	
326	Residence	1	1	1	1	41	41	41	41	41	50
328B	Residence	1	1	1	1	41	41	41	41	41	50
328A	Residence	1	1	1	1	41	41	41	41	41	50
329	Residence	1	1	1	1	41	41	41	41	41	50
338	Residence	1	2	2	2	41	41	41	41	41	50
34	Residence	14	10	5	3	42	41	41	41	41	50
132A	Residence	12	9	5	4	41	41	41	41	41	50
132B	Residence	13	9	5	4	41	41	41	41	41	50
194	Residence	8	6	4	3	41	41	41	41	41	50
237	Residence	4	5	6	4	41	41	41	41	41	50
233	Residence	3	4	5	4	41	41	41	41	41	50
600A	Residence	4	6	4	4	41	41	41	41	41	50
600B	Residence	4	6	5	4	41	41	41	41	41	50
710	Residence	2	2	2	2	41	41	41	41	41	50
717	Residence	2	4	3	3	41	41	41	41	41	50
718	Residence	3	3	3	2	41	41	41	41	41	50
719A	Residence	1	1	1	1	41	41	41	41	41	50
720A	Residence	1	1	1	1	41	41	41	41	41	50
721A	Residence	1	1	1	1	41	41	41	41	41	50
727A	Residence	1	1	1	1	41	41	41	41	41	50
732A	Residence	3	5	5	4	41	41	41	41	41	50
732B	Residence	3	4	5	4	41	41	41	41	41	50
741	Residence	3	3	3	1	41	41	41	41	41	50
742B	Residence	1	1	1	0	41	41	41	41	41	50
749A	Residence	2	2	2	1	41	41	41	41	41	50
758A	Residence	1	1	1	1	41	41	41	41	41	50
760A	Residence	2	4	4	3	41	41	41	41	41	50
761A	Residence	2	6	5	4	41	41	41	41	41	50
768A	Residence	2	2	1	1	41	41	41	41	41	50
770	Residence	3	3	2	1	41	41	41	41	41	50
771	Residence	1	2	2	2	41	41	41	41	41	50
189	Residence	5	4	3	2	41	41	41	41	41	50
111	Residence	2	7	5	5	41	41	41	41	41	50
800D	Residence	1	1	1	1	41	41	41	41	41	50
198	Residence	4	5	4	4	41	41	41	41	41	50
800A	Residence	10	8	6	5	41	41	41	41	41	50
800B	Residence	11	8	6	5	41	41	41	41	41	50
800C	Residence	11	8	6	5	41	41	41	41	41	50
800F	Residence	3	5	5	4	41	41	41	41	41	50
800E	Residence	1	1	1	1	41	41	41	41	41	50
247	Residence	1	2	2	1	41	41	41	41	41	50
202	Residence	3	3	2	2	41	41	41	41	41	50
DG2	Dust gauge	3	3	2	1	41	41	41	41	41	50
DG3	Dust gauge	5	4	3	2	41	42	42	42	41	50
DG4	Dust gauge	13	10	6	5	41	41	41	41	41	50
DG6	Dust gauge	7	8	8	6	41	41	41	41	41	50
DG7	Dust gauge	6	9	10	8	41	41	41	41	41	50
DG9	Dust gauge	3	8	6	6	41	41	41	41	41	50
DG10	Dust gauge	9	17	12	12	41	41	41	41	41	50
DG11	Dust gauge	35	41	63	69	53	45	58	84	86	50
DG12	Dust gauge	22	16	19	14	44	46	46	47	46	50
DG13	Dust gauge	17	11	12	9	43	46	46	45	44	50
DG14	Dust gauge	18	13	14	10	44	48	47	46	43	50
DG15	Dust gauge	23	18	15	6	43	49	48	45	42	50
DG16	Dust gauge	3	2	2	1	41	41	41	41	41	50
DG17	Dust gauge	2	2	2	1	41	41	41	41	41	50
DG18	Dust gauge	5	4	3	2	41	41	41	41	41	50
DG19	Dust gauge	13	101	108	179	43	48	105	117	190	50
DG20	Dust gauge	6	4	3	2	41	41	41	41	41	50
Jones	Dust gauge	3	3	3	1	41	41	41	41	41	50
D7	Esampler	47	45	195	160	61	61	70	208	166	50
D8	Esampler	14	10	8	5	42	41	41	41	41	50
D05-PM10	HVAS PM10	56	170	130	68	50	65	179	137	75	50
D01-TSP	HVAS TSP	34	37	55	57	52	45	55	78	76	50
D02-TSP	HVAS TSP	3	9	6	7	41	41	41	41	41	50
D03-TSP	HVAS TSP	12	9	7	5	41	41	41	41	41	50
D04-TSP	HVAS TSP	4	3	2	1	42	41	41	41	41	50
Wybong	OEH	1	2	2	1	41	41	41	41	41	50
D01	TEOM PM10	34	41	60	64	52	44	58	80	80	50
D02	TEOM PM10	3	8	6	7	41	41	41	41	41	50
D03	TEOM PM10	11	9	7	5	41	41	41	41	41	50
D04	TEOM PM10	4	3	2	2	42	41	41	41	41	50
D05	TEOM PM10	9	8	7	3	42	43	42	42	41	50
D06 (old)	TEOM PM10	17	11	12	10	44	45	45	45	44	50
D6	TEOM PM10	24	18	23	16	44	47	47	49	46	50

ID	Type	Project in isolation				Cumulative					Criteria
		2022	2024	2026	2029	2014	2022	2024	2026	2029	
-											
Days above PM10 criterion (days)											
19	Residence	0	0	0	0	0	0	0	0	0	-
21B	Residence	0	0	0	0	0	0	0	0	0	-
25	Residence	0	0	0	0	0	0	0	0	0	-
54	Residence	0	0	0	0	0	0	0	0	0	-
66	Residence	0	0	0	0	0	0	0	0	0	-
79	Residence	0	0	0	0	0	0	0	0	0	-
83	Residence	0	0	0	0	0	2	1	0	0	-
104	Residence	0	0	0	0	0	0	0	0	0	-
106A	Residence	0	0	0	0	0	0	0	0	0	-
106B	Residence	0	0	0	0	0	0	0	0	0	-
107	Residence	0	0	0	0	0	0	0	0	0	-
109A	Residence	0	0	0	0	0	0	0	0	0	-
109B	Residence	0	0	0	0	0	0	0	0	0	-
109C	Residence	0	0	0	0	0	0	0	0	0	-
109D	Residence	0	0	0	0	0	0	0	0	0	-
109E	Residence	0	0	0	0	0	0	0	0	0	-
109F	Residence	0	0	0	0	0	0	0	0	0	-
110	Residence	0	0	0	0	0	0	0	0	0	-
112A	Residence	0	0	0	0	0	0	0	0	0	-
112B	Residence	0	0	0	0	0	0	0	0	0	-
112C	Residence	0	0	0	0	0	0	0	0	0	-
112D	Residence	0	0	0	0	0	0	0	0	0	-
114	Residence	0	0	0	0	0	0	0	0	0	-
124	Residence	0	0	0	0	0	0	0	0	0	-
125A	Residence	0	0	0	0	0	0	0	0	0	-
125B	Residence	0	0	0	0	0	0	0	0	0	-
125C	Residence	0	0	0	0	0	0	0	0	0	-
126A	Residence	0	0	0	0	0	0	0	0	0	-
128	Residence	0	0	0	0	0	0	0	0	0	-
130	Residence	0	0	0	0	0	0	0	0	0	-
134D	Residence	0	0	0	0	0	0	0	0	0	-
134A	Residence	0	0	0	0	0	0	0	0	0	-
134C	Residence	0	0	0	0	0	0	0	0	0	-
135D	Residence	0	0	0	0	0	0	0	0	0	-
135A	Residence	0	0	0	0	0	0	0	0	0	-
139	Residence	0	0	0	0	0	0	0	0	0	-
141	Residence	0	0	0	0	0	0	0	0	0	-
144	Residence	0	0	0	0	0	0	0	0	0	-
147	Residence	0	0	0	0	0	0	0	0	0	-
148	Residence	0	0	0	0	0	0	0	0	0	-
151	Residence	0	0	0	0	0	0	0	0	0	-
154	Residence	0	0	0	0	0	0	0	0	0	-
156	Residence	0	0	0	0	0	0	0	0	0	-
157	Residence	0	0	0	0	0	0	0	0	0	-
164	Residence	0	0	0	0	0	0	0	0	0	-
165	Residence	0	0	0	0	0	0	0	0	0	-
166	Residence	0	0	0	0	0	0	0	0	0	-
170	Residence	0	0	0	0	0	0	0	0	0	-
171	Residence	0	0	0	0	0	0	0	0	0	-
172	Residence	0	0	0	0	0	0	0	0	0	-
174B	Residence	0	0	0	0	0	0	0	0	0	-
174A	Residence	0	0	0	0	0	0	0	0	0	-
175	Residence	0	0	0	0	0	0	0	0	0	-
176	Residence	0	0	0	0	0	0	0	0	0	-
177	Residence	0	0	0	0	0	0	0	0	0	-
178	Residence	0	0	0	0	0	0	0	0	0	-
182B	Residence	0	0	0	0	0	0	0	0	0	-
182A	Residence	0	0	0	0	0	0	0	0	0	-
183C	Residence	0	0	0	0	0	0	0	0	0	-
183B	Residence	0	0	0	0	0	0	0	0	0	-
183A	Residence	0	0	0	0	0	0	0	0	0	-
184A	Residence	0	0	0	0	0	0	0	0	0	-
184B	Residence	0	0	0	0	0	0	0	0	0	-
185	Residence	0	0	0	0	0	0	0	0	0	-
187	Residence	0	0	0	0	0	0	0	0	0	-
190	Residence	0	0	0	0	0	0	0	0	0	-
191	Residence	0	0	0	0	0	0	0	0	0	-
192	Residence	0	0	0	0	0	0	0	0	0	-
193	Residence	0	0	0	0	0	0	0	0	0	-
195	Residence	0	0	0	0	0	0	0	0	0	-
200	Residence	0	0	0	0	0	0	0	0	0	-
201A	Residence	0	0	0	0	0	0	0	0	0	-
201B	Residence	0	0	0	0	0	0	0	0	0	-

ID	Type	Project in isolation				Cumulative					Criteria
		2022	2024	2026	2029	2014	2022	2024	2026	2029	
201C	Residence	0	0	0	0	0	0	0	0	0	-
205	Residence	0	0	0	0	0	0	0	0	0	-
206	Residence	0	0	0	0	0	0	0	0	0	-
207	Residence	0	0	0	0	0	0	0	0	0	-
208A	Residence	0	0	0	0	0	0	0	0	0	-
209	Residence	0	0	0	0	0	0	0	0	0	-
210	Residence	0	0	0	0	0	0	0	0	0	-
211	Residence	0	0	0	0	0	0	0	0	0	-
213	Residence	0	0	0	0	0	0	0	0	0	-
216A	Residence	0	0	0	0	0	0	0	0	0	-
217A	Residence	0	0	0	0	0	0	0	0	0	-
218	Residence	0	0	0	0	0	0	0	0	0	-
227	Residence	0	0	0	0	0	0	0	0	0	-
228	Residence	0	0	0	0	0	0	0	0	0	-
230A	Residence	0	0	0	0	0	0	0	0	0	-
230B	Residence	0	0	0	0	0	0	0	0	0	-
231	Residence	0	0	0	0	0	0	0	0	0	-
238	Residence	0	0	0	0	0	0	0	0	0	-
240	Residence	0	0	0	0	0	0	0	0	0	-
241A	Residence	0	0	0	0	0	0	0	0	0	-
241B	Residence	0	0	0	0	0	0	0	0	0	-
241C	Residence	0	0	0	0	0	0	0	0	0	-
242	Residence	0	0	0	0	0	0	0	0	0	-
243	Residence	0	0	0	0	0	0	0	0	0	-
245	Residence	0	0	0	0	0	0	0	0	0	-
246	Residence	0	0	0	0	0	0	0	0	0	-
248	Residence	0	0	0	0	0	0	0	0	0	-
249	Residence	0	0	0	0	0	0	0	0	0	-
250	Residence	0	0	0	0	0	0	0	0	0	-
251	Residence	0	0	0	0	0	0	0	0	0	-
253	Residence	0	0	0	0	0	0	0	0	0	-
254	Residence	0	0	0	0	0	0	0	0	0	-
255	Residence	0	0	0	0	0	0	0	0	0	-
256A	Residence	0	0	0	0	0	0	0	0	0	-
257B	Residence	0	0	0	0	0	0	0	0	0	-
258	Residence	0	0	0	0	0	0	0	0	0	-
260	Residence	0	0	0	0	0	0	0	0	0	-
261	Residence	0	0	0	0	0	0	0	0	0	-
263	Residence	0	0	0	0	0	0	0	0	0	-
264	Residence	0	0	0	0	0	0	0	0	0	-
265A	Residence	0	0	0	0	0	0	0	0	0	-
266	Residence	0	0	0	0	0	0	0	0	0	-
270A	Residence	0	0	0	0	0	0	0	0	0	-
275	Residence	0	0	0	0	0	0	0	0	0	-
283	Residence	0	0	0	0	0	0	0	0	0	-
284A	Residence	0	0	0	0	0	0	0	0	0	-
285	Residence	0	0	0	0	0	0	0	0	0	-
286	Residence	0	0	0	0	0	0	0	0	0	-
287	Residence	0	0	0	0	0	0	0	0	0	-
288A	Residence	0	0	0	0	0	0	0	0	0	-
290	Residence	0	0	0	0	0	0	0	0	0	-
291A	Residence	0	0	0	0	0	0	0	0	0	-
292A	Residence	0	0	0	0	0	0	0	0	0	-
293A	Residence	0	0	0	0	0	0	0	0	0	-
294	Residence	0	0	0	0	0	0	0	0	0	-
295	Residence	0	0	0	0	0	0	0	0	0	-
296	Residence	0	0	0	0	0	0	0	0	0	-
298	Residence	0	0	0	0	0	0	0	0	0	-
299	Residence	0	0	0	0	0	0	0	0	0	-
301	Residence	0	0	0	0	0	0	0	0	0	-
302	Residence	0	0	0	0	0	0	0	0	0	-
303	Residence	0	0	0	0	0	0	0	0	0	-
304	Residence	0	0	0	0	0	0	0	0	0	-
307	Residence	0	0	0	0	0	0	0	0	0	-
308	Residence	0	0	0	0	0	0	0	0	0	-
309	Residence	0	0	0	0	0	0	0	0	0	-
313	Residence	0	0	0	0	0	0	0	0	0	-
316	Residence	0	0	0	0	0	0	0	0	0	-
319	Residence	0	0	0	0	0	0	0	0	0	-
321	Residence	0	0	0	0	0	0	0	0	0	-
324	Residence	0	0	0	0	0	0	0	0	0	-
325A	Residence	0	0	0	0	0	0	0	0	0	-
325B	Residence	0	0	0	0	0	0	0	0	0	-
326	Residence	0	0	0	0	0	0	0	0	0	-
328B	Residence	0	0	0	0	0	0	0	0	0	-

ID	Type	Project in isolation				Cumulative					Criteria
		2022	2024	2026	2029	2014	2022	2024	2026	2029	
328A	Residence	0	0	0	0	0	0	0	0	0	-
329	Residence	0	0	0	0	0	0	0	0	0	-
338	Residence	0	0	0	0	0	0	0	0	0	-
34	Residence	0	0	0	0	0	0	0	0	0	-
132A	Residence	0	0	0	0	0	0	0	0	0	-
132B	Residence	0	0	0	0	0	0	0	0	0	-
194	Residence	0	0	0	0	0	0	0	0	0	-
237	Residence	0	0	0	0	0	0	0	0	0	-
233	Residence	0	0	0	0	0	0	0	0	0	-
600A	Residence	0	0	0	0	0	0	0	0	0	-
600B	Residence	0	0	0	0	0	0	0	0	0	-
710	Residence	0	0	0	0	0	0	0	0	0	-
717	Residence	0	0	0	0	0	0	0	0	0	-
718	Residence	0	0	0	0	0	0	0	0	0	-
719A	Residence	0	0	0	0	0	0	0	0	0	-
720A	Residence	0	0	0	0	0	0	0	0	0	-
721A	Residence	0	0	0	0	0	0	0	0	0	-
727A	Residence	0	0	0	0	0	0	0	0	0	-
732A	Residence	0	0	0	0	0	0	0	0	0	-
732B	Residence	0	0	0	0	0	0	0	0	0	-
741	Residence	0	0	0	0	0	0	0	0	0	-
742B	Residence	0	0	0	0	0	0	0	0	0	-
749A	Residence	0	0	0	0	0	0	0	0	0	-
758A	Residence	0	0	0	0	0	0	0	0	0	-
760A	Residence	0	0	0	0	0	0	0	0	0	-
761A	Residence	0	0	0	0	0	0	0	0	0	-
768A	Residence	0	0	0	0	0	0	0	0	0	-
770	Residence	0	0	0	0	0	0	0	0	0	-
771	Residence	0	0	0	0	0	0	0	0	0	-
189	Residence	0	0	0	0	0	0	0	0	0	-
111	Residence	0	0	0	0	0	0	0	0	0	-
800D	Residence	0	0	0	0	0	0	0	0	0	-
198	Residence	0	0	0	0	0	0	0	0	0	-
800A	Residence	0	0	0	0	0	0	0	0	0	-
800B	Residence	0	0	0	0	0	0	0	0	0	-
800C	Residence	0	0	0	0	0	0	0	0	0	-
800F	Residence	0	0	0	0	0	0	0	0	0	-
800E	Residence	0	0	0	0	0	0	0	0	0	-
247	Residence	0	0	0	0	0	0	0	0	0	-
202	Residence	0	0	0	0	0	0	0	0	0	-
DG2	Dust gauge	0	0	0	0	0	0	0	0	0	-
DG3	Dust gauge	0	0	0	0	0	0	0	0	0	-
DG4	Dust gauge	0	0	0	0	0	0	0	0	0	-
DG6	Dust gauge	0	0	0	0	0	0	0	0	0	-
DG7	Dust gauge	0	0	0	0	0	0	0	0	0	-
DG9	Dust gauge	0	0	0	0	0	0	0	0	0	-
DG10	Dust gauge	0	0	0	0	0	0	0	0	0	-
DG11	Dust gauge	0	0	4	5	3	0	3	21	33	-
DG12	Dust gauge	0	0	0	0	0	0	0	0	0	-
DG13	Dust gauge	0	0	0	0	0	0	0	0	0	-
DG14	Dust gauge	0	0	0	0	0	0	0	0	0	-
DG15	Dust gauge	0	0	0	0	0	0	0	0	0	-
DG16	Dust gauge	0	0	0	0	0	0	0	0	0	-
DG17	Dust gauge	0	0	0	0	0	0	0	0	0	-
DG18	Dust gauge	0	0	0	0	0	0	0	0	0	-
DG19	Dust gauge	0	54	175	303	0	0	129	249	317	-
DG20	Dust gauge	0	0	0	0	0	0	0	0	0	-
Jones	Dust gauge	0	0	0	0	0	0	0	0	0	-
D7	Esampler	0	0	285	186	4	4	15	299	225	-
D8	Esampler	0	0	0	0	0	0	0	0	0	-
D05-PM10	HVAS PM10	5	257	128	9	1	20	288	169	32	-
D01-TSP	HVAS TSP	0	0	1	1	1	0	2	13	13	-
D02-TSP	HVAS TSP	0	0	0	0	0	0	0	0	0	-
D03-TSP	HVAS TSP	0	0	0	0	0	0	0	0	0	-
D04-TSP	HVAS TSP	0	0	0	0	0	0	0	0	0	-
Wybong	OEH	0	0	0	0	0	0	0	0	0	-
D01	TEOM PM10	0	0	1	3	2	0	2	16	22	-
D02	TEOM PM10	0	0	0	0	0	0	0	0	0	-
D03	TEOM PM10	0	0	0	0	0	0	0	0	0	-
D04	TEOM PM10	0	0	0	0	0	0	0	0	0	-
D05	TEOM PM10	0	0	0	0	0	0	0	0	0	-
D06 (old)	TEOM PM10	0	0	0	0	0	0	0	0	0	-
D6	TEOM PM10	0	0	0	0	0	0	0	0	0	-
-											
Annual average PM10 (ug/m3)											

ID	Type	Project in isolation				Cumulative					Criteria
		2022	2024	2026	2029	2014	2022	2024	2026	2029	
19	Residence	0.4	0.4	0.3	0	11	11	11	11	11	25
21B	Residence	0.5	0.5	0.4	0	11	11	11	11	11	25
25	Residence	2.6	2.4	1.7	1	14	13	13	12	12	25
54	Residence	0.7	0.7	0.6	0	11	11	11	11	11	25
66	Residence	0.4	1.0	1.0	1	11	11	12	12	12	25
79	Residence	0.7	0.6	0.5	0	11	11	11	11	11	25
83	Residence	8.0	6.9	6.5	2	13	19	18	17	13	25
104	Residence	0.9	0.9	0.6	0	12	12	12	11	11	25
106A	Residence	0.8	0.7	0.6	0	11	11	11	11	11	25
106B	Residence	0.8	0.8	0.7	0	11	12	11	11	11	25
107	Residence	3.4	3.5	4.4	3	13	14	14	15	14	25
109A	Residence	2.7	2.4	2.1	1	12	13	13	13	12	25
109B	Residence	2.7	2.5	2.2	1	12	13	13	13	12	25
109C	Residence	2.7	2.5	2.2	1	12	13	13	13	12	25
109D	Residence	2.8	2.5	2.2	1	12	13	13	13	12	25
109E	Residence	2.7	2.4	2.2	1	12	13	13	13	12	25
109F	Residence	2.7	2.5	2.2	1	12	13	13	13	12	25
110	Residence	3.2	3.3	4.0	3	13	14	14	15	13	25
112A	Residence	0.6	0.6	0.5	0	11	11	11	11	11	25
112B	Residence	0.6	0.6	0.5	0	11	11	11	11	11	25
112C	Residence	0.6	0.6	0.5	0	11	11	11	11	11	25
112D	Residence	0.6	0.6	0.5	0	11	11	11	11	11	25
114	Residence	0.7	0.7	0.5	0	11	11	11	11	11	25
124	Residence	1.4	2.2	2.7	2	12	12	13	13	13	25
125A	Residence	0.9	1.1	0.8	1	12	12	12	12	11	25
125B	Residence	0.9	1.1	0.9	1	12	12	12	12	11	25
125C	Residence	0.9	1.0	0.8	1	12	12	12	12	11	25
126A	Residence	0.2	0.4	0.4	0	11	11	11	11	11	25
128	Residence	0.9	3.0	2.9	3	12	12	14	14	13	25
130	Residence	4.0	3.7	4.1	2	13	15	14	15	13	25
134D	Residence	1.3	1.9	2.3	2	12	12	13	13	13	25
134A	Residence	2.3	2.5	3.0	2	13	13	13	14	13	25
134C	Residence	2.0	2.4	3.0	2	13	13	13	14	13	25
135D	Residence	0.6	0.6	0.5	0	11	11	11	11	11	25
135A	Residence	0.3	0.3	0.2	0	11	11	11	11	11	25
139	Residence	1.1	4.0	4.2	4	12	12	15	15	14	25
141	Residence	0.6	0.6	0.5	0	11	11	11	11	11	25
144	Residence	1.0	3.1	3.0	3	12	12	14	14	14	25
147	Residence	0.5	0.5	0.4	0	11	11	11	11	11	25
148	Residence	3.7	3.5	3.9	2	13	14	14	15	13	25
151	Residence	0.6	0.6	0.5	0	11	11	11	11	11	25
154	Residence	0.3	0.7	0.6	0	11	11	11	11	11	25
156	Residence	0.8	2.0	2.0	2	12	12	13	13	13	25
157	Residence	1.0	3.6	3.7	3	12	12	14	14	14	25
164	Residence	0.8	0.8	0.6	0	12	12	12	11	11	25
165	Residence	1.0	2.8	2.8	3	12	12	13	14	13	25
166	Residence	0.7	0.6	0.5	0	11	11	11	11	11	25
170	Residence	0.8	2.4	2.4	2	11	11	13	13	13	25
171	Residence	0.6	1.7	1.8	2	11	11	12	12	12	25
172	Residence	0.9	2.5	2.5	2	12	12	13	13	13	25
174B	Residence	0.3	0.6	0.5	0	11	11	11	11	11	25
174A	Residence	0.3	0.5	0.5	0	11	11	11	11	11	25
175	Residence	0.3	0.6	0.6	0	11	11	11	11	11	25
176	Residence	1.4	1.4	1.4	1	11	12	12	12	11	25
177	Residence	0.6	0.6	0.4	0	11	11	11	11	11	25
178	Residence	0.5	0.5	0.4	0	11	11	11	11	11	25
182B	Residence	0.8	1.0	0.8	1	12	11	12	11	11	25
182A	Residence	0.7	0.9	0.8	1	12	11	12	11	11	25
183C	Residence	0.9	0.8	0.6	0	12	12	11	11	11	25
183B	Residence	0.8	0.8	0.5	0	12	12	11	11	11	25
183A	Residence	0.8	0.8	0.5	0	12	12	11	11	11	25
184A	Residence	0.5	0.5	0.4	0	11	11	11	11	11	25
184B	Residence	0.5	0.5	0.3	0	11	11	11	11	11	25
185	Residence	0.5	0.5	0.4	0	11	11	11	11	11	25
187	Residence	0.5	0.5	0.4	0	11	11	11	11	11	25
190	Residence	0.5	0.8	0.6	0	12	11	11	11	11	25
191	Residence	0.9	0.8	0.6	0	12	12	12	11	11	25
192	Residence	1.0	1.0	0.7	0	12	12	12	11	11	25
193	Residence	1.0	1.0	0.7	0	12	12	12	11	11	25
195	Residence	0.3	0.4	0.4	0	11	11	11	11	11	25
200	Residence	0.6	0.6	0.4	0	11	11	11	11	11	25
201A	Residence	0.6	0.6	0.4	0	11	11	11	11	11	25
201B	Residence	0.6	0.5	0.4	0	11	11	11	11	11	25
201C	Residence	0.6	0.5	0.4	0	11	11	11	11	11	25
205	Residence	0.5	1.3	1.3	1	11	11	12	12	12	25

ID	Type	Project in isolation				Cumulative					Criteria
		2022	2024	2026	2029	2014	2022	2024	2026	2029	
206	Residence	0.5	1.6	1.5	1	11	11	12	12	12	25
207	Residence	0.5	1.3	1.2	1	11	11	12	12	12	25
208A	Residence	0.5	1.3	1.2	1	11	11	12	12	12	25
209	Residence	1.2	1.3	1.2	1	11	12	12	12	11	25
210	Residence	0.3	0.4	0.3	0	11	11	11	11	11	25
211	Residence	0.4	0.4	0.3	0	11	11	11	11	11	25
213	Residence	0.3	0.3	0.3	0	11	11	11	11	11	25
216A	Residence	0.3	0.3	0.2	0	11	11	11	11	11	25
217A	Residence	0.3	0.3	0.2	0	11	11	11	11	11	25
218	Residence	0.3	0.3	0.2	0	11	11	11	11	11	25
227	Residence	0.8	0.8	0.6	0	12	11	12	11	11	25
228	Residence	0.7	0.8	0.6	0	12	11	11	11	11	25
230A	Residence	0.6	0.7	0.5	0	12	11	11	11	11	25
230B	Residence	0.6	0.6	0.5	0	11	11	11	11	11	25
231	Residence	0.5	0.7	0.5	0	11	11	11	11	11	25
238	Residence	0.5	0.7	0.6	0	12	11	11	11	11	25
240	Residence	0.8	0.9	0.8	1	12	11	12	11	11	25
241A	Residence	0.8	1.0	0.8	1	12	11	12	11	11	25
241B	Residence	0.7	0.9	0.8	1	12	11	12	11	11	25
241C	Residence	0.7	0.9	0.8	1	12	11	12	11	11	25
242	Residence	0.5	0.6	0.5	0	11	11	11	11	11	25
243	Residence	0.4	0.5	0.4	0	11	11	11	11	11	25
245	Residence	0.3	0.4	0.4	0	11	11	11	11	11	25
246	Residence	0.2	0.3	0.2	0	11	11	11	11	11	25
248	Residence	0.2	0.4	0.3	0	11	11	11	11	11	25
249	Residence	0.3	0.5	0.4	0	11	11	11	11	11	25
250	Residence	0.3	0.5	0.4	0	11	11	11	11	11	25
251	Residence	0.3	0.6	0.5	0	11	11	11	11	11	25
253	Residence	0.5	0.5	0.4	0	11	11	11	11	11	25
254	Residence	0.5	0.5	0.5	0	11	11	11	11	11	25
255	Residence	0.6	0.6	0.6	0	11	11	11	11	11	25
256A	Residence	0.7	0.7	0.7	0	11	11	11	11	11	25
257B	Residence	0.6	1.7	1.6	2	12	11	12	12	12	25
258	Residence	0.7	1.9	1.8	2	11	11	13	12	12	25
260	Residence	0.5	1.4	1.4	1	11	11	12	12	12	25
261	Residence	0.3	0.7	0.7	1	11	11	11	11	11	25
263	Residence	0.4	1.0	1.0	1	11	11	12	12	12	25
264	Residence	0.5	0.5	0.4	0	11	11	11	11	11	25
265A	Residence	0.5	0.5	0.5	0	11	11	11	11	11	25
266	Residence	0.4	0.4	0.4	0	11	11	11	11	11	25
270A	Residence	0.3	0.3	0.2	0	11	11	11	11	11	25
275	Residence	0.3	0.4	0.4	0	11	11	11	11	11	25
283	Residence	0.4	0.4	0.3	0	11	11	11	11	11	25
284A	Residence	0.3	0.3	0.3	0	11	11	11	11	11	25
285	Residence	0.4	0.4	0.3	0	11	11	11	11	11	25
286	Residence	0.4	0.4	0.3	0	11	11	11	11	11	25
287	Residence	0.4	0.4	0.3	0	11	11	11	11	11	25
288A	Residence	0.3	0.3	0.2	0	11	11	11	11	11	25
290	Residence	0.5	0.5	0.4	0	11	11	11	11	11	25
291A	Residence	0.3	0.3	0.2	0	11	11	11	11	11	25
292A	Residence	0.3	0.3	0.2	0	11	11	11	11	11	25
293A	Residence	0.3	0.3	0.3	0	11	11	11	11	11	25
294	Residence	0.4	0.4	0.3	0	11	11	11	11	11	25
295	Residence	0.3	0.4	0.3	0	11	11	11	11	11	25
296	Residence	0.4	1.2	1.0	1	11	11	12	12	12	25
298	Residence	0.2	0.5	0.5	0	11	11	11	11	11	25
299	Residence	0.3	0.8	0.7	1	11	11	11	11	11	25
301	Residence	0.1	0.3	0.3	0	11	11	11	11	11	25
302	Residence	0.1	0.2	0.2	0	11	11	11	11	11	25
303	Residence	0.1	0.2	0.2	0	11	11	11	11	11	25
304	Residence	0.2	0.5	0.5	0	11	11	11	11	11	25
307	Residence	0.3	0.8	0.7	1	11	11	11	11	11	25
308	Residence	0.2	0.6	0.5	0	11	11	11	11	11	25
309	Residence	0.4	0.6	0.5	0	11	11	11	11	11	25
313	Residence	0.4	0.9	0.8	1	11	11	12	12	11	25
316	Residence	0.8	2.4	2.3	2	12	12	13	13	13	25
319	Residence	0.2	0.6	0.6	0	11	11	11	11	11	25
321	Residence	0.3	0.7	0.7	1	11	11	11	11	11	25
324	Residence	0.2	0.4	0.4	0	11	11	11	11	11	25
325A	Residence	0.1	0.2	0.2	0	11	11	11	11	11	25
325B	Residence	0.1	0.2	0.2	0	11	11	11	11	11	25
326	Residence	0.1	0.2	0.2	0	11	11	11	11	11	25
328B	Residence	0.1	0.1	0.1	0	11	11	11	11	11	25
328A	Residence	0.1	0.1	0.1	0	11	11	11	11	11	25
329	Residence	0.1	0.1	0.1	0	11	11	11	11	11	25

ID	Type	Project in isolation				Cumulative					Criteria
		2022	2024	2026	2029	2014	2022	2024	2026	2029	
338	Residence	0.1	0.2	0.2	0	11	11	11	11	11	25
34	Residence	1.5	1.4	0.9	0	12	12	12	12	11	25
132A	Residence	1.2	1.1	0.8	0	12	12	12	11	11	25
132B	Residence	1.3	1.2	0.8	0	12	12	12	11	11	25
194	Residence	0.6	0.6	0.5	0	11	11	11	11	11	25
237	Residence	0.6	0.7	0.6	0	12	11	11	11	11	25
233	Residence	0.5	0.6	0.5	0	11	11	11	11	11	25
600A	Residence	0.4	0.6	0.5	0	11	11	11	11	11	25
600B	Residence	0.5	0.7	0.5	0	11	11	11	11	11	25
710	Residence	0.1	0.2	0.2	0	11	11	11	11	11	25
717	Residence	0.2	0.3	0.2	0	11	11	11	11	11	25
718	Residence	0.3	0.4	0.3	0	11	11	11	11	11	25
719A	Residence	0.1	0.1	0.1	0	11	11	11	11	11	25
720A	Residence	0.1	0.1	0.1	0	11	11	11	11	11	25
721A	Residence	0.1	0.1	0.1	0	11	11	11	11	11	25
727A	Residence	0.3	0.3	0.3	0	11	11	11	11	11	25
732A	Residence	0.5	0.6	0.5	0	11	11	11	11	11	25
732B	Residence	0.5	0.6	0.5	0	11	11	11	11	11	25
741	Residence	0.6	0.6	0.5	0	11	11	11	11	11	25
742B	Residence	0.2	0.2	0.2	0	11	11	11	11	11	25
749A	Residence	0.4	0.4	0.4	0	11	11	11	11	11	25
758A	Residence	0.1	0.2	0.2	0	11	11	11	11	11	25
760A	Residence	0.1	0.3	0.3	0	11	11	11	11	11	25
761A	Residence	0.3	0.7	0.6	1	11	11	11	11	11	25
768A	Residence	0.3	0.3	0.3	0	11	11	11	11	11	25
770	Residence	0.6	0.6	0.5	0	11	11	11	11	11	25
771	Residence	0.1	0.2	0.2	0	11	11	11	11	11	25
189	Residence	0.7	0.6	0.4	0	11	11	11	11	11	25
111	Residence	0.4	0.8	0.7	1	11	11	12	11	11	25
800D	Residence	0.1	0.2	0.2	0	11	11	11	11	11	25
198	Residence	0.5	0.8	0.7	0	11	11	11	11	11	25
800A	Residence	1.2	1.3	1.0	1	12	12	12	12	11	25
800B	Residence	1.3	1.3	1.0	1	12	12	12	12	11	25
800C	Residence	1.3	1.3	1.0	1	12	12	12	12	11	25
800F	Residence	0.4	0.7	0.6	0	11	11	11	11	11	25
800E	Residence	0.1	0.1	0.1	0	11	11	11	11	11	25
247	Residence	0.1	0.1	0.1	0	11	11	11	11	11	25
202	Residence	0.2	0.3	0.3	0	11	11	11	11	11	25
DG2	Dust gauge	0.5	0.5	0.4	0	11	11	11	11	11	25
DG3	Dust gauge	0.9	0.9	0.7	0	12	12	12	11	11	25
DG4	Dust gauge	1.5	1.5	1.1	1	12	12	12	12	11	25
DG6	Dust gauge	1.4	1.8	1.5	1	14	12	13	12	12	25
DG7	Dust gauge	1.4	2.0	1.6	1	14	12	13	12	12	25
DG9	Dust gauge	0.5	1.0	0.9	1	12	11	12	12	11	25
DG10	Dust gauge	1.6	4.4	3.3	3	13	12	15	14	14	25
DG11	Dust gauge	4.4	9.7	18.0	20	17	15	20	29	31	25
DG12	Dust gauge	3.3	3.5	4.6	3	13	14	14	15	14	25
DG13	Dust gauge	2.7	2.6	2.9	2	12	13	13	14	13	25
DG14	Dust gauge	3.9	3.6	3.6	2	12	15	14	14	13	25
DG15	Dust gauge	4.4	4.2	4.2	2	12	15	15	15	13	25
DG16	Dust gauge	0.5	0.5	0.4	0	11	11	11	11	11	25
DG17	Dust gauge	0.5	0.5	0.4	0	11	11	11	11	11	25
DG18	Dust gauge	0.6	0.5	0.4	0	11	11	11	11	11	25
DG19	Dust gauge	3.4	31.1	49.4	94	13	14	42	60	105	25
DG20	Dust gauge	0.8	0.8	0.5	0	12	11	11	11	11	25
Jones	Dust gauge	0.6	0.6	0.6	0	11	11	11	11	11	25
D7	Esampler	9.7	17.7	90.3	54	19	20	28	101	65	25
D8	Esampler	2.1	2.0	1.4	1	13	13	13	12	12	25
D05-PM10	HVAS PM10	20.9	76.8	40.3	21	20	32	87	51	32	25
D01-TSP	HVAS TSP	4.3	8.4	14.9	15	17	15	19	26	26	25
D02-TSP	HVAS TSP	0.6	1.3	1.1	1	12	11	12	12	12	25
D03-TSP	HVAS TSP	1.4	1.5	1.1	1	13	12	12	12	11	25
D04-TSP	HVAS TSP	0.6	0.6	0.4	0	11	11	11	11	11	25
Wybong	OEH	0.1	0.2	0.2	0	11	11	11	11	11	25
D01	TEOM PM10	4.2	9.0	16.2	18	17	15	20	27	29	25
D02	TEOM PM10	0.6	1.2	1.1	1	12	11	12	12	12	25
D03	TEOM PM10	1.4	1.4	1.1	1	13	12	12	12	11	25
D04	TEOM PM10	0.6	0.6	0.4	0	11	11	11	11	11	25
D05	TEOM PM10	2.3	2.1	2.0	1	11	13	13	13	11	25
D06 (old)	TEOM PM10	2.4	2.4	2.9	2	13	13	13	14	13	25
D6	TEOM PM10	3.9	4.2	5.6	4	14	15	15	16	15	25
-											
Maximum 24-hour average PM2.5 (ug/m3)											
19	Residence	0	0	0	0	26	26	26	26	26	25
21B	Residence	1	1	1	0	26	26	26	26	26	25

ID	Type	Project in isolation				Cumulative					Criteria
		2022	2024	2026	2029	2014	2022	2024	2026	2029	
25	Residence	2	2	1	1	26	26	26	26	26	25
54	Residence	1	1	1	0	26	26	26	26	26	25
66	Residence	1	1	1	1	26	26	26	26	26	25
79	Residence	1	1	1	0	26	26	26	26	26	25
83	Residence	6	5	4	2	26	27	26	27	26	25
104	Residence	2	2	1	1	26	26	26	26	26	25
106A	Residence	1	1	1	0	26	26	26	26	26	25
106B	Residence	1	1	1	0	26	26	26	26	26	25
107	Residence	4	3	4	3	26	26	26	27	26	25
109A	Residence	2	2	2	1	26	26	26	26	26	25
109B	Residence	2	2	2	1	26	26	26	26	26	25
109C	Residence	2	2	2	1	26	26	26	26	26	25
109D	Residence	2	2	2	1	26	26	26	26	26	25
109E	Residence	2	2	2	1	26	26	26	26	26	25
109F	Residence	2	2	2	1	26	26	26	26	26	25
110	Residence	4	3	3	3	26	26	26	26	26	25
112A	Residence	1	1	1	0	26	26	26	26	26	25
112B	Residence	1	1	1	0	26	26	26	26	26	25
112C	Residence	1	1	1	0	26	26	26	26	26	25
112D	Residence	1	1	1	0	26	26	26	26	26	25
114	Residence	1	1	1	0	26	26	26	26	26	25
124	Residence	2	2	2	2	26	26	26	26	26	25
125A	Residence	1	1	1	1	26	26	26	26	26	25
125B	Residence	1	1	1	1	26	26	26	26	26	25
125C	Residence	1	1	1	1	26	26	26	26	26	25
126A	Residence	0	1	1	1	26	26	26	26	26	25
128	Residence	2	2	3	3	26	26	26	26	26	25
130	Residence	4	3	3	2	26	26	26	26	26	25
134D	Residence	2	1	2	1	26	26	26	26	26	25
134A	Residence	3	2	3	2	26	26	26	26	26	25
134C	Residence	3	2	2	2	26	26	26	26	26	25
135D	Residence	1	1	1	0	26	26	26	26	26	25
135A	Residence	0	0	0	0	26	26	26	26	26	25
139	Residence	2	3	4	4	26	26	26	26	26	25
141	Residence	1	1	1	0	26	26	26	26	26	25
144	Residence	2	2	2	3	26	26	26	26	26	25
147	Residence	1	1	1	0	26	26	26	26	26	25
148	Residence	4	3	3	2	26	26	26	26	26	25
151	Residence	1	1	1	0	26	26	26	26	26	25
154	Residence	0	1	1	1	26	26	26	26	26	25
156	Residence	2	1	2	2	26	26	26	26	26	25
157	Residence	1	3	3	3	26	26	26	26	26	25
164	Residence	1	1	1	0	26	26	26	26	26	25
165	Residence	2	2	2	2	26	26	26	26	26	25
166	Residence	1	1	1	0	26	26	26	26	26	25
170	Residence	1	2	2	2	26	26	26	26	26	25
171	Residence	1	2	2	2	26	26	26	26	26	25
172	Residence	2	2	2	2	26	26	26	26	26	25
174B	Residence	0	1	1	1	26	26	26	26	26	25
174A	Residence	0	1	1	1	26	26	26	26	26	25
175	Residence	0	1	1	1	26	26	26	26	26	25
176	Residence	1	1	1	1	26	26	26	26	26	25
177	Residence	1	1	1	0	26	26	26	26	26	25
178	Residence	1	1	0	0	26	26	26	26	26	25
182B	Residence	1	1	1	1	26	26	26	26	26	25
182A	Residence	1	1	1	1	26	26	26	26	26	25
183C	Residence	2	1	1	0	26	26	26	26	26	25
183B	Residence	2	1	1	0	26	26	26	26	26	25
183A	Residence	2	1	1	0	26	26	26	26	26	25
184A	Residence	1	1	0	0	26	26	26	26	26	25
184B	Residence	1	1	0	0	26	26	26	26	26	25
185	Residence	1	1	0	0	26	26	26	26	26	25
187	Residence	1	1	0	0	26	26	26	26	26	25
190	Residence	1	1	1	1	26	26	26	26	26	25
191	Residence	2	1	1	1	26	26	26	26	26	25
192	Residence	2	2	1	1	26	26	26	26	26	25
193	Residence	2	2	1	0	26	26	26	26	26	25
195	Residence	0	1	0	0	26	26	26	26	26	25
200	Residence	1	1	0	0	26	26	26	26	26	25
201A	Residence	1	1	1	0	26	26	26	26	26	25
201B	Residence	1	1	1	0	26	26	26	26	26	25
201C	Residence	1	1	1	0	26	26	26	26	26	25
205	Residence	1	2	2	2	26	26	26	26	26	25
206	Residence	1	2	2	2	26	26	26	26	26	25
207	Residence	1	1	1	1	26	26	26	26	26	25

ID	Type	Project in isolation				Cumulative					Criteria
		2022	2024	2026	2029	2014	2022	2024	2026	2029	
208A	Residence	1	1	1	1	26	26	26	26	26	25
209	Residence	1	1	1	1	26	26	26	26	26	25
210	Residence	1	1	0	0	26	26	26	26	26	25
211	Residence	1	1	0	0	26	26	26	26	26	25
213	Residence	0	0	0	0	26	26	26	26	26	25
216A	Residence	0	0	0	0	26	26	26	26	26	25
217A	Residence	0	0	0	0	26	26	26	26	26	25
218	Residence	0	0	0	0	26	26	26	26	26	25
227	Residence	2	1	1	1	26	26	26	26	26	25
228	Residence	1	1	1	1	26	26	26	26	26	25
230A	Residence	1	1	1	1	26	26	26	26	26	25
230B	Residence	1	1	1	1	26	26	26	26	26	25
231	Residence	1	1	1	1	26	26	26	26	26	25
238	Residence	1	1	1	1	26	26	26	26	26	25
240	Residence	1	1	1	1	26	26	26	26	26	25
241A	Residence	1	1	1	1	26	26	26	26	26	25
241B	Residence	1	1	1	1	26	26	26	26	26	25
241C	Residence	1	1	1	1	26	26	26	26	26	25
242	Residence	1	1	1	1	26	26	26	26	26	25
243	Residence	1	1	0	0	26	26	26	26	26	25
245	Residence	0	1	0	0	26	26	26	26	26	25
246	Residence	0	1	1	1	26	26	26	26	26	25
248	Residence	0	1	1	1	26	26	26	26	26	25
249	Residence	0	1	1	1	26	26	26	26	26	25
250	Residence	1	1	1	1	26	26	26	26	26	25
251	Residence	1	1	1	1	26	26	26	26	26	25
253	Residence	1	1	1	0	26	26	26	26	26	25
254	Residence	1	1	1	0	26	26	26	26	26	25
255	Residence	1	1	1	0	26	26	26	26	26	25
256A	Residence	1	1	1	0	26	26	26	26	26	25
257B	Residence	1	1	2	2	26	26	26	26	26	25
258	Residence	1	2	2	2	26	26	26	26	26	25
260	Residence	1	2	2	2	26	26	26	26	26	25
261	Residence	1	1	1	1	26	26	26	26	26	25
263	Residence	1	2	2	2	26	26	26	26	26	25
264	Residence	1	1	0	0	26	26	26	26	26	25
265A	Residence	1	1	1	0	26	26	26	26	26	25
266	Residence	1	1	1	0	26	26	26	26	26	25
270A	Residence	0	0	0	0	26	26	26	26	26	25
275	Residence	1	1	1	1	26	26	26	26	26	25
283	Residence	0	0	0	0	26	26	26	26	26	25
284A	Residence	0	0	0	0	26	26	26	26	26	25
285	Residence	1	1	0	0	26	26	26	26	26	25
286	Residence	1	1	0	0	26	26	26	26	26	25
287	Residence	1	0	0	0	26	26	26	26	26	25
288A	Residence	0	0	0	0	26	26	26	26	26	25
290	Residence	1	1	0	0	26	26	26	26	26	25
291A	Residence	0	0	0	0	26	26	26	26	26	25
292A	Residence	0	0	0	0	26	26	26	26	26	25
293A	Residence	0	0	0	0	26	26	26	26	26	25
294	Residence	1	0	0	0	26	26	26	26	26	25
295	Residence	0	1	0	0	26	26	26	26	26	25
296	Residence	1	1	1	1	26	26	26	26	26	25
298	Residence	1	1	1	1	26	26	26	26	26	25
299	Residence	1	1	1	1	26	26	26	26	26	25
301	Residence	0	1	1	0	26	26	26	26	26	25
302	Residence	0	0	0	0	26	26	26	26	26	25
303	Residence	0	0	0	0	26	26	26	26	26	25
304	Residence	1	1	1	1	26	26	26	26	26	25
307	Residence	1	1	1	1	26	26	26	26	26	25
308	Residence	1	1	1	1	26	26	26	26	26	25
309	Residence	1	1	1	0	26	26	26	26	26	25
313	Residence	1	1	1	1	26	26	26	26	26	25
316	Residence	1	2	2	2	26	26	26	26	26	25
319	Residence	1	1	1	1	26	26	26	26	26	25
321	Residence	1	1	1	1	26	26	26	26	26	25
324	Residence	1	1	1	1	26	26	26	26	26	25
325A	Residence	0	0	0	0	26	26	26	26	26	25
325B	Residence	0	0	0	0	26	26	26	26	26	25
326	Residence	0	0	0	0	26	26	26	26	26	25
328B	Residence	0	0	0	0	26	26	26	26	26	25
328A	Residence	0	0	0	0	26	26	26	26	26	25
329	Residence	0	0	0	0	26	26	26	26	26	25
338	Residence	0	0	0	0	26	26	26	26	26	25
34	Residence	3	2	1	1	26	26	26	26	26	25

ID	Type	Project in isolation				Cumulative					Criteria
		2022	2024	2026	2029	2014	2022	2024	2026	2029	
132A	Residence	2	2	1	1	26	26	26	26	26	25
132B	Residence	2	2	1	1	26	26	26	26	26	25
194	Residence	2	1	1	1	26	26	26	26	26	25
237	Residence	1	1	1	1	26	26	26	26	26	25
233	Residence	1	1	1	1	26	26	26	26	26	25
600A	Residence	1	1	1	1	26	26	26	26	26	25
600B	Residence	1	1	1	1	26	26	26	26	26	25
710	Residence	0	0	0	0	26	26	26	26	26	25
717	Residence	0	1	1	1	26	26	26	26	26	25
718	Residence	0	1	0	0	26	26	26	26	26	25
719A	Residence	0	0	0	0	26	26	26	26	26	25
720A	Residence	0	0	0	0	26	26	26	26	26	25
721A	Residence	0	0	0	0	26	26	26	26	26	25
727A	Residence	0	0	0	0	26	26	26	26	26	25
732A	Residence	1	1	1	1	26	26	26	26	26	25
732B	Residence	1	1	1	1	26	26	26	26	26	25
741	Residence	1	1	1	0	26	26	26	26	26	25
742B	Residence	0	0	0	0	26	26	26	26	26	25
749A	Residence	1	1	1	0	26	26	26	26	26	25
758A	Residence	0	0	0	0	26	26	26	26	26	25
760A	Residence	0	1	1	1	26	26	26	26	26	25
761A	Residence	0	1	1	1	26	26	26	26	26	25
768A	Residence	0	0	0	0	26	26	26	26	26	25
770	Residence	1	1	1	0	26	26	26	26	26	25
771	Residence	0	0	0	0	26	26	26	26	26	25
189	Residence	1	1	1	0	26	26	26	26	26	25
111	Residence	0	1	1	1	26	26	26	26	26	25
800D	Residence	0	0	0	0	26	26	26	26	26	25
198	Residence	1	1	1	1	26	26	26	26	26	25
800A	Residence	2	1	1	1	26	26	26	26	26	25
800B	Residence	2	1	1	1	26	26	26	26	26	25
800C	Residence	2	1	1	1	26	26	26	26	26	25
800F	Residence	0	1	1	1	26	26	26	26	26	25
800E	Residence	0	0	0	0	26	26	26	26	26	25
247	Residence	0	0	0	0	26	26	26	26	26	25
202	Residence	0	1	0	0	26	26	26	26	26	25
DG2	Dust gauge	1	1	0	0	26	26	26	26	26	25
DG3	Dust gauge	1	1	1	0	26	26	26	26	26	25
DG4	Dust gauge	3	2	1	1	26	26	26	26	26	25
DG6	Dust gauge	1	2	1	1	26	26	26	26	26	25
DG7	Dust gauge	1	2	2	1	26	26	26	26	26	25
DG9	Dust gauge	1	1	1	1	26	26	26	26	26	25
DG10	Dust gauge	2	3	3	2	27	26	26	26	26	25
DG11	Dust gauge	7	8	11	14	27	27	27	29	30	25
DG12	Dust gauge	4	3	4	3	26	26	26	27	26	25
DG13	Dust gauge	3	2	2	2	26	26	26	26	26	25
DG14	Dust gauge	3	3	3	2	26	26	26	26	26	25
DG15	Dust gauge	4	3	3	2	26	26	26	26	26	25
DG16	Dust gauge	1	1	1	0	26	26	26	26	26	25
DG17	Dust gauge	1	1	0	0	26	26	26	26	26	25
DG18	Dust gauge	1	1	0	0	26	26	26	26	26	25
DG19	Dust gauge	2	14	19	38	27	26	32	35	49	25
DG20	Dust gauge	1	1	1	0	26	26	26	26	26	25
Jones	Dust gauge	1	1	1	0	26	26	26	26	26	25
D7	Esampler	10	8	30	37	28	29	28	44	41	25
D8	Esampler	3	2	1	1	26	26	26	26	26	25
D05-PM10	HVAS PM10	9	40	27	15	29	28	46	33	29	25
D01-TSP	HVAS TSP	7	7	10	12	27	27	27	28	29	25
D02-TSP	HVAS TSP	1	1	1	1	26	26	26	26	26	25
D03-TSP	HVAS TSP	2	1	1	1	26	26	26	26	26	25
D04-TSP	HVAS TSP	1	1	0	0	26	26	26	26	26	25
Wybong	OEH	0	0	0	0	26	26	26	26	26	25
D01	TEOM PM10	7	8	11	12	27	27	27	29	29	25
D02	TEOM PM10	1	1	1	1	26	26	26	26	26	25
D03	TEOM PM10	2	1	1	1	26	26	26	26	26	25
D04	TEOM PM10	1	1	0	0	26	26	26	26	26	25
D05	TEOM PM10	2	2	2	1	26	26	26	26	26	25
D06 (old)	TEOM PM10	3	2	2	2	26	26	26	26	26	25
D6	TEOM PM10	5	4	4	4	26	26	26	27	27	25
-											
Annual average PM2.5 (ug/m3)											
19	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
21B	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
25	Residence	0.5	0.5	0.3	0	6	6	6	6	5	8
54	Residence	0.2	0.2	0.2	0	5	5	5	5	5	8

ID	Type	Project in isolation				Cumulative					Criteria
		2022	2024	2026	2029	2014	2022	2024	2026	2029	
66	Residence	0.1	0.2	0.2	0	5	5	5	5	5	8
79	Residence	0.2	0.2	0.1	0	5	5	5	5	5	8
83	Residence	1.5	1.3	1.4	1	6	7	7	7	6	8
104	Residence	0.2	0.2	0.1	0	5	5	5	5	5	8
106A	Residence	0.2	0.2	0.2	0	5	5	5	5	5	8
106B	Residence	0.2	0.2	0.2	0	5	5	5	5	5	8
107	Residence	0.7	0.6	0.8	1	6	6	6	6	6	8
109A	Residence	0.5	0.5	0.4	0	5	6	6	6	5	8
109B	Residence	0.5	0.5	0.4	0	5	6	6	6	5	8
109C	Residence	0.5	0.5	0.4	0	5	6	6	6	5	8
109D	Residence	0.5	0.5	0.5	0	5	6	6	6	5	8
109E	Residence	0.5	0.5	0.4	0	5	6	6	6	5	8
109F	Residence	0.5	0.5	0.5	0	5	6	6	6	5	8
110	Residence	0.7	0.6	0.7	1	6	6	6	6	6	8
112A	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
112B	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
112C	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
112D	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
114	Residence	0.2	0.2	0.1	0	5	5	5	5	5	8
124	Residence	0.3	0.4	0.5	0	6	5	6	6	6	8
125A	Residence	0.2	0.2	0.2	0	5	5	5	5	5	8
125B	Residence	0.2	0.2	0.2	0	6	5	5	5	5	8
125C	Residence	0.2	0.2	0.2	0	6	5	5	5	5	8
126A	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
128	Residence	0.2	0.5	0.5	1	5	5	6	6	6	8
130	Residence	0.8	0.7	0.8	1	6	6	6	6	6	8
134D	Residence	0.3	0.4	0.4	0	6	5	6	6	6	8
134A	Residence	0.5	0.5	0.6	0	6	6	6	6	6	8
134C	Residence	0.4	0.4	0.5	0	6	6	6	6	6	8
135D	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
135A	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
139	Residence	0.2	0.7	0.8	1	5	5	6	6	6	8
141	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
144	Residence	0.2	0.6	0.6	1	5	5	6	6	6	8
147	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
148	Residence	0.7	0.7	0.7	1	6	6	6	6	6	8
151	Residence	0.2	0.2	0.1	0	5	5	5	5	5	8
154	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
156	Residence	0.2	0.4	0.4	0	5	5	6	6	6	8
157	Residence	0.2	0.6	0.7	1	5	5	6	6	6	8
164	Residence	0.2	0.2	0.2	0	5	5	5	5	5	8
165	Residence	0.2	0.5	0.5	1	6	5	6	6	6	8
166	Residence	0.2	0.2	0.1	0	5	5	5	5	5	8
170	Residence	0.2	0.4	0.5	0	5	5	6	6	6	8
171	Residence	0.1	0.3	0.3	0	5	5	6	6	6	8
172	Residence	0.2	0.5	0.5	0	6	5	6	6	6	8
174B	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
174A	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
175	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
176	Residence	0.3	0.3	0.3	0	5	6	6	6	5	8
177	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
178	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
182B	Residence	0.1	0.2	0.2	0	5	5	5	5	5	8
182A	Residence	0.1	0.2	0.1	0	5	5	5	5	5	8
183C	Residence	0.2	0.2	0.1	0	5	5	5	5	5	8
183B	Residence	0.2	0.2	0.1	0	5	5	5	5	5	8
183A	Residence	0.2	0.2	0.1	0	5	5	5	5	5	8
184A	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
184B	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
185	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
187	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
190	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
191	Residence	0.2	0.2	0.1	0	5	5	5	5	5	8
192	Residence	0.2	0.2	0.1	0	5	5	5	5	5	8
193	Residence	0.2	0.2	0.1	0	5	5	5	5	5	8
195	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
200	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
201A	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
201B	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
201C	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
205	Residence	0.1	0.3	0.3	0	5	5	5	5	5	8
206	Residence	0.1	0.3	0.3	0	5	5	5	5	5	8
207	Residence	0.1	0.2	0.2	0	5	5	5	5	5	8
208A	Residence	0.1	0.2	0.2	0	5	5	5	5	5	8
209	Residence	0.3	0.3	0.3	0	5	5	5	5	5	8

ID	Type	Project in isolation				Cumulative					Criteria
		2022	2024	2026	2029	2014	2022	2024	2026	2029	
210	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
211	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
213	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
216A	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
217A	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
218	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
227	Residence	0.2	0.2	0.1	0	5	5	5	5	5	8
228	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
230A	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
230B	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
231	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
238	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
240	Residence	0.2	0.2	0.1	0	5	5	5	5	5	8
241A	Residence	0.2	0.2	0.2	0	5	5	5	5	5	8
241B	Residence	0.1	0.2	0.1	0	5	5	5	5	5	8
241C	Residence	0.1	0.2	0.1	0	5	5	5	5	5	8
242	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
243	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
245	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
246	Residence	0.0	0.1	0.1	0	5	5	5	5	5	8
248	Residence	0.0	0.1	0.1	0	5	5	5	5	5	8
249	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
250	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
251	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
253	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
254	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
255	Residence	0.1	0.2	0.2	0	5	5	5	5	5	8
256A	Residence	0.2	0.2	0.2	0	5	5	5	5	5	8
257B	Residence	0.1	0.3	0.3	0	5	5	6	6	6	8
258	Residence	0.1	0.4	0.3	0	5	5	6	6	6	8
260	Residence	0.1	0.3	0.3	0	5	5	5	5	5	8
261	Residence	0.1	0.2	0.2	0	5	5	5	5	5	8
263	Residence	0.1	0.2	0.2	0	5	5	5	5	5	8
264	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
265A	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
266	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
270A	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
275	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
283	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
284A	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
285	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
286	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
287	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
288A	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
290	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
291A	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
292A	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
293A	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
294	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
295	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
296	Residence	0.1	0.2	0.2	0	5	5	5	5	5	8
298	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
299	Residence	0.1	0.2	0.2	0	5	5	5	5	5	8
301	Residence	0.0	0.1	0.1	0	5	5	5	5	5	8
302	Residence	0.0	0.0	0.0	0	5	5	5	5	5	8
303	Residence	0.0	0.0	0.0	0	5	5	5	5	5	8
304	Residence	0.0	0.1	0.1	0	5	5	5	5	5	8
307	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
308	Residence	0.0	0.1	0.1	0	5	5	5	5	5	8
309	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
313	Residence	0.1	0.2	0.2	0	5	5	5	5	5	8
316	Residence	0.2	0.4	0.4	0	5	5	6	6	6	8
319	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
321	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
324	Residence	0.0	0.1	0.1	0	5	5	5	5	5	8
325A	Residence	0.0	0.1	0.0	0	5	5	5	5	5	8
325B	Residence	0.0	0.1	0.1	0	5	5	5	5	5	8
326	Residence	0.0	0.0	0.0	0	5	5	5	5	5	8
328B	Residence	0.0	0.0	0.0	0	5	5	5	5	5	8
328A	Residence	0.0	0.0	0.0	0	5	5	5	5	5	8
329	Residence	0.0	0.0	0.0	0	5	5	5	5	5	8
338	Residence	0.0	0.0	0.0	0	5	5	5	5	5	8
34	Residence	0.3	0.3	0.2	0	6	5	5	5	5	8
132A	Residence	0.2	0.2	0.2	0	5	5	5	5	5	8
132B	Residence	0.2	0.2	0.2	0	5	5	5	5	5	8

ID	Type	Project in isolation				Cumulative					Criteria
		2022	2024	2026	2029	2014	2022	2024	2026	2029	
194	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
237	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
233	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
600A	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
600B	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
710	Residence	0.0	0.0	0.0	0	5	5	5	5	5	8
717	Residence	0.0	0.1	0.0	0	5	5	5	5	5	8
718	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
719A	Residence	0.0	0.0	0.0	0	5	5	5	5	5	8
720A	Residence	0.0	0.0	0.0	0	5	5	5	5	5	8
721A	Residence	0.0	0.0	0.0	0	5	5	5	5	5	8
727A	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
732A	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
732B	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
741	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
742B	Residence	0.0	0.0	0.0	0	5	5	5	5	5	8
749A	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
758A	Residence	0.0	0.0	0.0	0	5	5	5	5	5	8
760A	Residence	0.0	0.1	0.1	0	5	5	5	5	5	8
761A	Residence	0.1	0.2	0.1	0	5	5	5	5	5	8
768A	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
770	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
771	Residence	0.0	0.0	0.0	0	5	5	5	5	5	8
189	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
111	Residence	0.1	0.2	0.2	0	5	5	5	5	5	8
800D	Residence	0.0	0.0	0.0	0	5	5	5	5	5	8
198	Residence	0.1	0.2	0.1	0	5	5	5	5	5	8
800A	Residence	0.2	0.2	0.2	0	6	5	5	5	5	8
800B	Residence	0.2	0.2	0.2	0	6	5	5	5	5	8
800C	Residence	0.2	0.2	0.2	0	6	5	5	5	5	8
800F	Residence	0.1	0.1	0.1	0	5	5	5	5	5	8
800E	Residence	0.0	0.0	0.0	0	5	5	5	5	5	8
247	Residence	0.0	0.0	0.0	0	5	5	5	5	5	8
202	Residence	0.0	0.1	0.1	0	5	5	5	5	5	8
DG2	Dust gauge	0.1	0.1	0.1	0	5	5	5	5	5	8
DG3	Dust gauge	0.2	0.2	0.2	0	5	5	5	5	5	8
DG4	Dust gauge	0.3	0.3	0.2	0	6	5	5	5	5	8
DG6	Dust gauge	0.3	0.3	0.3	0	6	5	6	5	5	8
DG7	Dust gauge	0.3	0.4	0.3	0	6	5	6	6	5	8
DG9	Dust gauge	0.1	0.2	0.2	0	5	5	5	5	5	8
DG10	Dust gauge	0.3	0.9	0.7	1	6	6	6	6	6	8
DG11	Dust gauge	0.9	1.7	3.1	4	7	6	7	8	9	8
DG12	Dust gauge	0.7	0.7	0.8	1	6	6	6	6	6	8
DG13	Dust gauge	0.5	0.5	0.5	0	6	6	6	6	6	8
DG14	Dust gauge	0.8	0.7	0.7	0	6	6	6	6	6	8
DG15	Dust gauge	0.9	0.8	0.9	0	6	6	6	6	6	8
DG16	Dust gauge	0.1	0.1	0.1	0	5	5	5	5	5	8
DG17	Dust gauge	0.1	0.1	0.1	0	5	5	5	5	5	8
DG18	Dust gauge	0.1	0.1	0.1	0	5	5	5	5	5	8
DG19	Dust gauge	0.6	4.9	8.3	19	6	6	10	13	24	8
DG20	Dust gauge	0.2	0.2	0.1	0	5	5	5	5	5	8
Jones	Dust gauge	0.1	0.1	0.2	0	5	5	5	5	5	8
D7	Esampler	1.9	3.0	13.5	12	7	7	8	19	17	8
D8	Esampler	0.4	0.4	0.3	0	6	6	6	5	5	8
D05-PM10	HVAS PM10	2.8	16.4	8.6	4	7	8	22	14	10	8
D01-TSP	HVAS TSP	0.9	1.5	2.6	3	6	6	7	8	8	8
D02-TSP	HVAS TSP	0.1	0.3	0.3	0	6	5	5	5	5	8
D03-TSP	HVAS TSP	0.3	0.3	0.2	0	6	5	5	5	5	8
D04-TSP	HVAS TSP	0.1	0.1	0.1	0	5	5	5	5	5	8
Wybong	OEH	0.0	0.0	0.0	0	5	5	5	5	5	8
D01	TEOM PM10	0.8	1.6	2.8	3	6	6	7	8	9	8
D02	TEOM PM10	0.1	0.3	0.2	0	6	5	5	5	5	8
D03	TEOM PM10	0.3	0.3	0.2	0	6	5	5	5	5	8
D04	TEOM PM10	0.1	0.1	0.1	0	5	5	5	5	5	8
D05	TEOM PM10	0.5	0.5	0.5	0	5	6	6	6	5	8
D06 (old)	TEOM PM10	0.5	0.5	0.5	0	6	6	6	6	6	8
D6	TEOM PM10	0.8	0.8	1.0	1	6	6	6	6	6	8
-											
Annual average TSP (ug/m3)											
19	Residence	0.1	0.1	0.1	0	50	50	50	50	50	90
21B	Residence	0.1	0.1	0.1	0	50	50	50	50	50	90
25	Residence	1.8	1.7	0.8	0	53	52	52	51	50	90
54	Residence	0.2	0.2	0.1	0	50	50	50	50	50	90
66	Residence	0.2	0.4	0.4	0	50	50	50	50	50	90
79	Residence	0.2	0.2	0.1	0	50	50	50	50	50	90

ID	Type	Project in isolation				Cumulative					Criteria
		2022	2024	2026	2029	2014	2022	2024	2026	2029	
83	Residence	5.4	4.8	3.0	1	51	55	55	53	51	90
104	Residence	0.8	0.8	0.5	0	51	51	51	51	50	90
106A	Residence	0.2	0.2	0.1	0	50	50	50	50	50	90
106B	Residence	0.2	0.3	0.1	0	50	50	50	50	50	90
107	Residence	3.5	2.6	2.9	2	52	53	53	53	52	90
109A	Residence	2.6	2.0	1.3	1	51	53	52	51	51	90
109B	Residence	2.6	2.1	1.3	1	51	53	52	51	51	90
109C	Residence	2.6	2.1	1.3	1	51	53	52	51	51	90
109D	Residence	2.7	2.1	1.3	1	51	53	52	51	51	90
109E	Residence	2.6	2.1	1.3	1	51	53	52	51	51	90
109F	Residence	2.7	2.1	1.3	1	51	53	52	51	51	90
110	Residence	3.4	2.5	2.6	2	52	53	52	53	52	90
112A	Residence	0.2	0.2	0.1	0	50	50	50	50	50	90
112B	Residence	0.2	0.2	0.1	0	50	50	50	50	50	90
112C	Residence	0.2	0.2	0.1	0	50	50	50	50	50	90
112D	Residence	0.2	0.2	0.1	0	50	50	50	50	50	90
114	Residence	0.2	0.2	0.1	0	50	50	50	50	50	90
124	Residence	1.2	1.7	2.2	2	52	51	52	52	52	90
125A	Residence	0.8	0.9	0.7	0	51	51	51	51	50	90
125B	Residence	0.8	1.0	0.7	1	51	51	51	51	51	90
125C	Residence	0.8	0.9	0.7	0	51	51	51	51	51	90
126A	Residence	0.1	0.2	0.2	0	50	50	50	50	50	90
128	Residence	0.7	2.5	2.7	2	51	51	53	53	52	90
130	Residence	4.2	3.0	2.5	1	52	54	53	53	51	90
134D	Residence	1.1	1.5	1.9	2	52	51	52	52	52	90
134A	Residence	2.2	1.9	2.1	1	52	52	52	52	51	90
134C	Residence	2.0	1.8	2.2	2	52	52	52	52	52	90
135D	Residence	0.2	0.2	0.1	0	50	50	50	50	50	90
135A	Residence	0.1	0.1	0.0	0	50	50	50	50	50	90
139	Residence	1.0	3.7	4.2	4	51	51	54	54	54	90
141	Residence	0.2	0.2	0.1	0	50	50	50	50	50	90
144	Residence	0.8	2.6	2.7	3	51	51	53	53	53	90
147	Residence	0.1	0.1	0.1	0	50	50	50	50	50	90
148	Residence	3.9	2.8	2.4	1	52	54	53	52	51	90
151	Residence	0.2	0.2	0.1	0	50	50	50	50	50	90
154	Residence	0.1	0.3	0.3	0	50	50	50	50	50	90
156	Residence	0.7	1.6	1.7	2	51	51	52	52	52	90
157	Residence	0.9	3.1	3.6	3	51	51	53	54	53	90
164	Residence	0.3	0.3	0.1	0	50	50	50	50	50	90
165	Residence	0.8	2.2	2.4	2	51	51	52	52	52	90
166	Residence	0.2	0.2	0.1	0	50	50	50	50	50	90
170	Residence	0.6	2.0	2.1	2	50	51	52	52	52	90
171	Residence	0.4	1.1	1.3	1	50	50	51	51	51	90
172	Residence	0.7	2.0	2.2	2	51	51	52	52	52	90
174B	Residence	0.1	0.3	0.3	0	50	50	50	50	50	90
174A	Residence	0.1	0.3	0.3	0	50	50	50	50	50	90
175	Residence	0.2	0.3	0.3	0	50	50	50	50	50	90
176	Residence	0.5	0.5	0.3	0	50	51	51	50	50	90
177	Residence	0.2	0.2	0.1	0	50	50	50	50	50	90
178	Residence	0.1	0.2	0.1	0	50	50	50	50	50	90
182B	Residence	0.6	0.8	0.7	0	51	51	51	51	50	90
182A	Residence	0.6	0.8	0.6	0	51	51	51	51	50	90
183C	Residence	0.7	0.7	0.4	0	51	51	51	50	50	90
183B	Residence	0.7	0.7	0.4	0	51	51	51	50	50	90
183A	Residence	0.7	0.7	0.4	0	51	51	51	50	50	90
184A	Residence	0.4	0.4	0.2	0	50	50	50	50	50	90
184B	Residence	0.3	0.3	0.2	0	50	50	50	50	50	90
185	Residence	0.4	0.4	0.2	0	50	50	50	50	50	90
187	Residence	0.4	0.4	0.2	0	50	50	50	50	50	90
190	Residence	0.4	0.6	0.5	0	51	50	51	51	50	90
191	Residence	0.8	0.8	0.5	0	51	51	51	50	50	90
192	Residence	0.9	0.9	0.6	0	51	51	51	51	50	90
193	Residence	1.0	0.9	0.6	0	51	51	51	51	50	90
195	Residence	0.2	0.4	0.3	0	50	50	50	50	50	90
200	Residence	0.3	0.3	0.2	0	50	50	50	50	50	90
201A	Residence	0.5	0.4	0.3	0	51	50	50	50	50	90
201B	Residence	0.4	0.4	0.3	0	51	50	50	50	50	90
201C	Residence	0.4	0.4	0.2	0	51	50	50	50	50	90
205	Residence	0.3	0.7	0.8	1	50	50	51	51	51	90
206	Residence	0.4	1.2	1.2	1	50	50	51	51	51	90
207	Residence	0.3	1.0	1.0	1	50	50	51	51	51	90
208A	Residence	0.4	1.0	1.0	1	51	50	51	51	51	90
209	Residence	0.6	0.5	0.3	0	50	51	51	50	50	90
210	Residence	0.1	0.1	0.1	0	50	50	50	50	50	90
211	Residence	0.1	0.1	0.1	0	50	50	50	50	50	90

ID	Type	Project in isolation				Cumulative					Criteria
		2022	2024	2026	2029	2014	2022	2024	2026	2029	
213	Residence	0.1	0.1	0.1	0	50	50	50	50	50	90
216A	Residence	0.1	0.1	0.1	0	50	50	50	50	50	90
217A	Residence	0.1	0.1	0.1	0	50	50	50	50	50	90
218	Residence	0.2	0.2	0.1	0	50	50	50	50	50	90
227	Residence	0.7	0.8	0.5	0	51	51	51	51	50	90
228	Residence	0.6	0.7	0.5	0	51	51	51	50	50	90
230A	Residence	0.5	0.6	0.5	0	51	51	51	50	50	90
230B	Residence	0.5	0.6	0.4	0	51	50	51	50	50	90
231	Residence	0.5	0.6	0.4	0	51	50	51	50	50	90
238	Residence	0.5	0.6	0.5	0	51	50	51	50	50	90
240	Residence	0.7	0.9	0.6	0	51	51	51	51	50	90
241A	Residence	0.7	0.9	0.7	0	51	51	51	51	50	90
241B	Residence	0.6	0.8	0.6	0	51	51	51	51	50	90
241C	Residence	0.6	0.8	0.6	0	51	51	51	51	50	90
242	Residence	0.4	0.6	0.4	0	51	50	51	50	50	90
243	Residence	0.3	0.4	0.4	0	50	50	50	50	50	90
245	Residence	0.2	0.4	0.3	0	50	50	50	50	50	90
246	Residence	0.1	0.2	0.2	0	50	50	50	50	50	90
248	Residence	0.1	0.2	0.2	0	50	50	50	50	50	90
249	Residence	0.2	0.3	0.3	0	50	50	50	50	50	90
250	Residence	0.2	0.4	0.3	0	50	50	50	50	50	90
251	Residence	0.2	0.4	0.4	0	50	50	50	50	50	90
253	Residence	0.1	0.1	0.1	0	50	50	50	50	50	90
254	Residence	0.2	0.2	0.1	0	50	50	50	50	50	90
255	Residence	0.2	0.2	0.1	0	50	50	50	50	50	90
256A	Residence	0.3	0.3	0.1	0	50	50	50	50	50	90
257B	Residence	0.5	1.4	1.4	1	51	50	51	51	51	90
258	Residence	0.5	1.6	1.6	1	51	51	52	52	51	90
260	Residence	0.4	1.1	1.1	1	50	50	51	51	51	90
261	Residence	0.1	0.4	0.4	0	50	50	50	50	50	90
263	Residence	0.2	0.5	0.6	1	50	50	51	51	51	90
264	Residence	0.1	0.2	0.1	0	50	50	50	50	50	90
265A	Residence	0.2	0.2	0.1	0	50	50	50	50	50	90
266	Residence	0.1	0.1	0.1	0	50	50	50	50	50	90
270A	Residence	0.1	0.1	0.1	0	50	50	50	50	50	90
275	Residence	0.3	0.4	0.3	0	50	50	50	50	50	90
283	Residence	0.1	0.1	0.1	0	50	50	50	50	50	90
284A	Residence	0.1	0.1	0.1	0	50	50	50	50	50	90
285	Residence	0.1	0.1	0.1	0	50	50	50	50	50	90
286	Residence	0.1	0.1	0.1	0	50	50	50	50	50	90
287	Residence	0.1	0.1	0.1	0	50	50	50	50	50	90
288A	Residence	0.1	0.1	0.1	0	50	50	50	50	50	90
290	Residence	0.2	0.2	0.1	0	50	50	50	50	50	90
291A	Residence	0.1	0.1	0.1	0	50	50	50	50	50	90
292A	Residence	0.1	0.1	0.1	0	50	50	50	50	50	90
293A	Residence	0.1	0.1	0.1	0	50	50	50	50	50	90
294	Residence	0.2	0.2	0.1	0	50	50	50	50	50	90
295	Residence	0.2	0.3	0.3	0	50	50	50	50	50	90
296	Residence	0.3	0.9	0.9	1	50	50	51	51	51	90
298	Residence	0.1	0.2	0.2	0	50	50	50	50	50	90
299	Residence	0.2	0.5	0.5	0	50	50	51	51	50	90
301	Residence	0.1	0.1	0.1	0	50	50	50	50	50	90
302	Residence	0.0	0.1	0.1	0	50	50	50	50	50	90
303	Residence	0.0	0.1	0.1	0	50	50	50	50	50	90
304	Residence	0.1	0.3	0.3	0	50	50	50	50	50	90
307	Residence	0.2	0.6	0.5	0	50	50	51	51	50	90
308	Residence	0.2	0.4	0.4	0	50	50	50	50	50	90
309	Residence	0.3	0.5	0.4	0	50	50	50	50	50	90
313	Residence	0.3	0.7	0.7	1	50	50	51	51	51	90
316	Residence	0.6	1.9	1.9	2	51	51	52	52	52	90
319	Residence	0.1	0.3	0.4	0	50	50	50	50	50	90
321	Residence	0.1	0.4	0.4	0	50	50	50	50	50	90
324	Residence	0.1	0.3	0.3	0	50	50	50	50	50	90
325A	Residence	0.0	0.1	0.1	0	50	50	50	50	50	90
325B	Residence	0.0	0.1	0.1	0	50	50	50	50	50	90
326	Residence	0.0	0.1	0.1	0	50	50	50	50	50	90
328B	Residence	0.0	0.0	0.0	0	50	50	50	50	50	90
328A	Residence	0.0	0.0	0.0	0	50	50	50	50	50	90
329	Residence	0.0	0.0	0.0	0	50	50	50	50	50	90
338	Residence	0.0	0.1	0.1	0	50	50	50	50	50	90
34	Residence	1.3	1.2	0.6	0	52	51	51	51	50	90
132A	Residence	1.1	1.0	0.5	0	51	51	51	51	50	90
132B	Residence	1.1	1.0	0.6	0	51	51	51	51	50	90
194	Residence	0.5	0.5	0.4	0	51	51	51	50	50	90
237	Residence	0.5	0.7	0.5	0	51	51	51	51	50	90

ID	Type	Project in isolation				Cumulative					Criteria
		2022	2024	2026	2029	2014	2022	2024	2026	2029	
233	Residence	0.4	0.5	0.4	0	51	50	51	50	50	90
600A	Residence	0.4	0.5	0.4	0	51	50	51	50	50	90
600B	Residence	0.4	0.6	0.5	0	51	50	51	50	50	90
710	Residence	0.1	0.1	0.1	0	50	50	50	50	50	90
717	Residence	0.1	0.2	0.2	0	50	50	50	50	50	90
718	Residence	0.2	0.3	0.3	0	50	50	50	50	50	90
719A	Residence	0.0	0.0	0.0	0	50	50	50	50	50	90
720A	Residence	0.0	0.0	0.0	0	50	50	50	50	50	90
721A	Residence	0.0	0.0	0.0	0	50	50	50	50	50	90
727A	Residence	0.1	0.1	0.1	0	50	50	50	50	50	90
732A	Residence	0.4	0.5	0.4	0	51	50	51	50	50	90
732B	Residence	0.4	0.5	0.4	0	51	50	51	50	50	90
741	Residence	0.2	0.2	0.1	0	50	50	50	50	50	90
742B	Residence	0.0	0.0	0.0	0	50	50	50	50	50	90
749A	Residence	0.1	0.1	0.1	0	50	50	50	50	50	90
758A	Residence	0.0	0.1	0.1	0	50	50	50	50	50	90
760A	Residence	0.1	0.2	0.2	0	50	50	50	50	50	90
761A	Residence	0.2	0.4	0.4	0	50	50	50	50	50	90
768A	Residence	0.1	0.1	0.1	0	50	50	50	50	50	90
770	Residence	0.2	0.2	0.1	0	50	50	50	50	50	90
771	Residence	0.0	0.1	0.1	0	50	50	50	50	50	90
189	Residence	0.5	0.5	0.3	0	51	51	50	50	50	90
111	Residence	0.2	0.5	0.5	0	50	50	51	50	50	90
800D	Residence	0.0	0.1	0.1	0	50	50	50	50	50	90
198	Residence	0.4	0.6	0.6	0	51	50	51	51	50	90
800A	Residence	1.2	1.2	0.8	1	52	51	51	51	51	90
800B	Residence	1.2	1.2	0.8	1	52	51	51	51	51	90
800C	Residence	1.2	1.2	0.8	1	52	51	51	51	51	90
800F	Residence	0.2	0.5	0.4	0	50	50	50	50	50	90
800E	Residence	0.0	0.0	0.0	0	50	50	50	50	50	90
247	Residence	0.0	0.1	0.1	0	50	50	50	50	50	90
202	Residence	0.1	0.2	0.2	0	50	50	50	50	50	90
DG2	Dust gauge	0.2	0.2	0.1	0	50	50	50	50	50	90
DG3	Dust gauge	0.5	0.5	0.3	0	50	50	50	50	50	90
DG4	Dust gauge	1.5	1.5	0.9	1	52	51	51	51	51	90
DG6	Dust gauge	1.1	1.5	1.3	1	53	51	52	51	51	90
DG7	Dust gauge	1.0	1.5	1.3	1	53	51	52	51	51	90
DG9	Dust gauge	0.3	0.7	0.6	1	50	50	51	51	51	90
DG10	Dust gauge	1.3	3.2	2.6	2	51	51	53	53	52	90
DG11	Dust gauge	3.4	4.9	12.1	16	57	53	55	62	66	90
DG12	Dust gauge	3.4	2.6	3.0	2	53	53	53	53	52	90
DG13	Dust gauge	2.8	2.1	2.0	1	52	53	52	52	51	90
DG14	Dust gauge	3.9	3.0	2.1	1	51	54	53	52	51	90
DG15	Dust gauge	2.6	2.3	1.5	1	51	53	52	51	51	90
DG16	Dust gauge	0.2	0.2	0.1	0	50	50	50	50	50	90
DG17	Dust gauge	0.1	0.1	0.1	0	50	50	50	50	50	90
DG18	Dust gauge	0.4	0.4	0.2	0	50	50	50	50	50	90
DG19	Dust gauge	3.6	26.0	52.4	189	52	54	76	102	239	90
DG20	Dust gauge	0.6	0.6	0.3	0	51	51	51	50	50	90
Jones	Dust gauge	0.2	0.2	0.1	0	50	50	50	50	50	90
D7	Esampler	8.2	8.8	72.7	82	61	58	59	123	132	90
D8	Esampler	2.1	2.1	1.2	1	53	52	52	51	51	90
D05-PM10	HVAS PM10	30.5	110.7	45.6	17	59	81	161	96	67	90
D01-TSP	HVAS TSP	3.4	4.4	9.9	11	57	53	54	60	61	90
D02-TSP	HVAS TSP	0.3	0.8	0.7	1	50	50	51	51	51	90
D03-TSP	HVAS TSP	1.3	1.4	0.9	1	52	51	51	51	51	90
D04-TSP	HVAS TSP	0.4	0.4	0.2	0	50	50	50	50	50	90
Wybong	OEH	0.0	0.1	0.1	0	50	50	50	50	50	90
D01	TEOM PM10	3.2	4.7	11.1	14	57	53	55	61	64	90
D02	TEOM PM10	0.3	0.7	0.7	1	50	50	51	51	51	90
D03	TEOM PM10	1.3	1.4	0.9	1	52	51	51	51	51	90
D04	TEOM PM10	0.4	0.4	0.2	0	50	50	50	50	50	90
D05	TEOM PM10	0.9	0.9	0.5	0	50	51	51	50	50	90
D06 (old)	TEOM PM10	2.4	1.9	2.0	1	52	52	52	52	51	90
D6	TEOM PM10	4.0	3.0	3.6	2	53	54	53	54	52	90
-											
Annual average dust deposition (g/m2/month)											
19	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
21B	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
25	Residence	0.3	0.2	0.1	0.0	2.6	2.6	2.5	2.4	2.3	4
54	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
66	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
79	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
83	Residence	0.7	0.6	0.4	0.1	2.4	3.0	2.9	2.7	2.4	4
104	Residence	0.1	0.1	0.1	0.0	2.4	2.4	2.4	2.4	2.3	4

ID	Type	Project in isolation				Cumulative					Criteria
		2022	2024	2026	2029	2014	2022	2024	2026	2029	
106A	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
106B	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
107	Residence	0.4	0.3	0.3	0.2	2.6	2.7	2.6	2.6	2.5	4
109A	Residence	0.4	0.3	0.2	0.1	2.4	2.7	2.6	2.5	2.4	4
109B	Residence	0.4	0.3	0.2	0.1	2.4	2.7	2.6	2.5	2.4	4
109C	Residence	0.4	0.3	0.2	0.1	2.4	2.7	2.6	2.5	2.4	4
109D	Residence	0.4	0.3	0.2	0.1	2.4	2.7	2.6	2.5	2.4	4
109E	Residence	0.4	0.3	0.2	0.1	2.4	2.7	2.6	2.5	2.4	4
109F	Residence	0.4	0.3	0.2	0.1	2.4	2.7	2.6	2.5	2.4	4
110	Residence	0.4	0.3	0.3	0.2	2.6	2.7	2.6	2.6	2.5	4
112A	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
112B	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
112C	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
112D	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
114	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
124	Residence	0.2	0.2	0.3	0.3	2.6	2.5	2.5	2.6	2.6	4
125A	Residence	0.1	0.1	0.1	0.1	2.5	2.4	2.4	2.4	2.4	4
125B	Residence	0.1	0.1	0.1	0.1	2.5	2.4	2.4	2.4	2.4	4
125C	Residence	0.1	0.1	0.1	0.1	2.5	2.4	2.4	2.4	2.4	4
126A	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
128	Residence	0.1	0.5	0.5	0.4	2.4	2.4	2.8	2.8	2.7	4
130	Residence	0.5	0.3	0.2	0.1	2.5	2.8	2.6	2.5	2.4	4
134D	Residence	0.1	0.2	0.2	0.2	2.5	2.4	2.5	2.5	2.5	4
134A	Residence	0.3	0.2	0.3	0.2	2.5	2.6	2.5	2.6	2.5	4
134C	Residence	0.2	0.2	0.3	0.2	2.6	2.5	2.5	2.6	2.5	4
135D	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
135A	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
139	Residence	0.2	0.7	0.8	0.7	2.4	2.5	3.0	3.1	3.0	4
141	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
144	Residence	0.2	0.5	0.5	0.5	2.5	2.5	2.8	2.8	2.8	4
147	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
148	Residence	0.4	0.3	0.2	0.1	2.5	2.7	2.6	2.5	2.4	4
151	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
154	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
156	Residence	0.1	0.2	0.2	0.2	2.4	2.4	2.5	2.5	2.5	4
157	Residence	0.2	0.5	0.6	0.5	2.4	2.5	2.8	2.9	2.8	4
164	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
165	Residence	0.1	0.4	0.4	0.4	2.5	2.4	2.7	2.7	2.7	4
166	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
170	Residence	0.1	0.3	0.3	0.3	2.4	2.4	2.6	2.6	2.6	4
171	Residence	0.1	0.2	0.2	0.2	2.3	2.4	2.5	2.5	2.5	4
172	Residence	0.1	0.4	0.4	0.4	2.5	2.4	2.7	2.7	2.7	4
174B	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
174A	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
175	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
176	Residence	0.1	0.1	0.0	0.0	2.3	2.4	2.4	2.3	2.3	4
177	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
178	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
182B	Residence	0.1	0.1	0.1	0.1	2.5	2.4	2.4	2.4	2.4	4
182A	Residence	0.1	0.1	0.1	0.1	2.4	2.4	2.4	2.4	2.4	4
183C	Residence	0.1	0.1	0.0	0.0	2.4	2.4	2.4	2.3	2.3	4
183B	Residence	0.1	0.1	0.0	0.0	2.4	2.4	2.4	2.3	2.3	4
183A	Residence	0.1	0.1	0.0	0.0	2.4	2.4	2.4	2.3	2.3	4
184A	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
184B	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
185	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
187	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
190	Residence	0.1	0.1	0.1	0.1	2.4	2.4	2.4	2.4	2.4	4
191	Residence	0.1	0.1	0.1	0.0	2.4	2.4	2.4	2.4	2.3	4
192	Residence	0.1	0.1	0.1	0.0	2.4	2.4	2.4	2.4	2.3	4
193	Residence	0.1	0.1	0.1	0.0	2.4	2.4	2.4	2.4	2.3	4
195	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
200	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
201A	Residence	0.0	0.0	0.0	0.0	2.4	2.3	2.3	2.3	2.3	4
201B	Residence	0.0	0.0	0.0	0.0	2.4	2.3	2.3	2.3	2.3	4
201C	Residence	0.0	0.0	0.0	0.0	2.4	2.3	2.3	2.3	2.3	4
205	Residence	0.0	0.1	0.1	0.1	2.3	2.3	2.4	2.4	2.4	4
206	Residence	0.0	0.1	0.1	0.1	2.3	2.3	2.4	2.4	2.4	4
207	Residence	0.0	0.1	0.1	0.1	2.3	2.3	2.4	2.4	2.4	4
208A	Residence	0.0	0.1	0.1	0.1	2.4	2.3	2.4	2.4	2.4	4
209	Residence	0.1	0.1	0.0	0.0	2.3	2.4	2.4	2.3	2.3	4
210	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
211	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
213	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
216A	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4

ID	Type	Project in isolation				Cumulative					Criteria
		2022	2024	2026	2029	2014	2022	2024	2026	2029	
217A	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
218	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
227	Residence	0.1	0.1	0.1	0.0	2.4	2.4	2.4	2.4	2.3	4
228	Residence	0.1	0.1	0.1	0.0	2.4	2.4	2.4	2.4	2.3	4
230A	Residence	0.1	0.1	0.1	0.0	2.4	2.4	2.4	2.4	2.3	4
230B	Residence	0.1	0.1	0.0	0.0	2.4	2.4	2.4	2.3	2.3	4
231	Residence	0.1	0.1	0.1	0.0	2.4	2.4	2.4	2.4	2.3	4
238	Residence	0.1	0.1	0.1	0.0	2.4	2.4	2.4	2.4	2.3	4
240	Residence	0.1	0.1	0.1	0.1	2.5	2.4	2.4	2.4	2.4	4
241A	Residence	0.1	0.1	0.1	0.1	2.5	2.4	2.4	2.4	2.4	4
241B	Residence	0.1	0.1	0.1	0.1	2.5	2.4	2.4	2.4	2.4	4
241C	Residence	0.1	0.1	0.1	0.1	2.4	2.4	2.4	2.4	2.4	4
242	Residence	0.1	0.1	0.1	0.0	2.4	2.4	2.4	2.4	2.3	4
243	Residence	0.0	0.1	0.0	0.0	2.4	2.3	2.4	2.3	2.3	4
245	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
246	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
248	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
249	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
250	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
251	Residence	0.0	0.1	0.1	0.0	2.3	2.3	2.4	2.4	2.3	4
253	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
254	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
255	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
256A	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
257B	Residence	0.1	0.2	0.2	0.2	2.4	2.4	2.5	2.5	2.5	4
258	Residence	0.1	0.2	0.2	0.2	2.4	2.4	2.5	2.5	2.5	4
260	Residence	0.0	0.1	0.1	0.1	2.3	2.3	2.4	2.4	2.4	4
261	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
263	Residence	0.0	0.1	0.1	0.1	2.3	2.3	2.4	2.4	2.4	4
264	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
265A	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
266	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
270A	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
275	Residence	0.0	0.0	0.0	0.0	2.4	2.3	2.3	2.3	2.3	4
283	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
284A	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
285	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
286	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
287	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
288A	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
290	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
291A	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
292A	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
293A	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
294	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
295	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
296	Residence	0.0	0.1	0.1	0.1	2.3	2.3	2.4	2.4	2.4	4
298	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
299	Residence	0.0	0.1	0.1	0.0	2.3	2.3	2.4	2.4	2.3	4
301	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
302	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
303	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
304	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
307	Residence	0.0	0.1	0.1	0.1	2.3	2.3	2.4	2.4	2.4	4
308	Residence	0.0	0.1	0.1	0.0	2.3	2.3	2.4	2.4	2.3	4
309	Residence	0.0	0.1	0.1	0.0	2.3	2.3	2.4	2.4	2.3	4
313	Residence	0.1	0.1	0.1	0.1	2.4	2.4	2.4	2.4	2.4	4
316	Residence	0.1	0.3	0.3	0.3	2.4	2.4	2.6	2.6	2.6	4
319	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
321	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
324	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
325A	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
325B	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
326	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
328B	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
328A	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
329	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
338	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
34	Residence	0.1	0.1	0.1	0.0	2.5	2.4	2.4	2.4	2.3	4
132A	Residence	0.1	0.1	0.1	0.0	2.4	2.4	2.4	2.4	2.3	4
132B	Residence	0.1	0.1	0.1	0.0	2.5	2.4	2.4	2.4	2.3	4
194	Residence	0.1	0.1	0.0	0.0	2.4	2.4	2.4	2.3	2.3	4
237	Residence	0.1	0.1	0.1	0.0	2.4	2.4	2.4	2.4	2.3	4
233	Residence	0.1	0.1	0.0	0.0	2.4	2.4	2.4	2.3	2.3	4
600A	Residence	0.0	0.1	0.1	0.0	2.4	2.3	2.4	2.4	2.3	4

ID	Type	Project in isolation				Cumulative					Criteria
		2022	2024	2026	2029	2014	2022	2024	2026	2029	
600B	Residence	0.0	0.1	0.1	0.0	2.4	2.3	2.4	2.4	2.3	4
710	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
717	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
718	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
719A	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
720A	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
721A	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
727A	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
732A	Residence	0.1	0.1	0.0	0.0	2.4	2.4	2.4	2.3	2.3	4
732B	Residence	0.1	0.1	0.0	0.0	2.4	2.4	2.4	2.3	2.3	4
741	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
742B	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
749A	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
758A	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
760A	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
761A	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
768A	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
770	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
771	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
189	Residence	0.1	0.0	0.0	0.0	2.4	2.4	2.3	2.3	2.3	4
111	Residence	0.0	0.1	0.1	0.1	2.3	2.3	2.4	2.4	2.4	4
800D	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
198	Residence	0.0	0.1	0.1	0.1	2.4	2.3	2.4	2.4	2.4	4
800A	Residence	0.1	0.1	0.1	0.1	2.5	2.4	2.4	2.4	2.4	4
800B	Residence	0.1	0.1	0.1	0.1	2.5	2.4	2.4	2.4	2.4	4
800C	Residence	0.1	0.2	0.1	0.1	2.5	2.4	2.5	2.4	2.4	4
800F	Residence	0.0	0.1	0.1	0.0	2.3	2.3	2.4	2.4	2.3	4
800E	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
247	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
202	Residence	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
DG2	Dust gauge	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
DG3	Dust gauge	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
DG4	Dust gauge	0.2	0.2	0.1	0.1	2.5	2.5	2.5	2.4	2.4	4
DG6	Dust gauge	0.1	0.2	0.2	0.1	2.7	2.4	2.5	2.5	2.4	4
DG7	Dust gauge	0.1	0.2	0.2	0.1	2.7	2.4	2.5	2.5	2.4	4
DG9	Dust gauge	0.0	0.1	0.1	0.1	2.3	2.3	2.4	2.4	2.4	4
DG10	Dust gauge	0.2	0.4	0.3	0.3	2.4	2.5	2.7	2.6	2.6	4
DG11	Dust gauge	0.3	0.5	1.2	1.5	3.1	2.6	2.8	3.5	3.8	4
DG12	Dust gauge	0.4	0.3	0.3	0.2	2.6	2.7	2.6	2.6	2.5	4
DG13	Dust gauge	0.3	0.2	0.2	0.1	2.5	2.6	2.5	2.5	2.4	4
DG14	Dust gauge	0.5	0.4	0.2	0.1	2.5	2.8	2.7	2.5	2.4	4
DG15	Dust gauge	0.3	0.3	0.2	0.0	2.4	2.6	2.6	2.5	2.3	4
DG16	Dust gauge	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
DG17	Dust gauge	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
DG18	Dust gauge	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
DG19	Dust gauge	0.4	3.0	5.1	16.7	2.5	2.7	5.3	7.4	19.0	4
DG20	Dust gauge	0.1	0.1	0.0	0.0	2.4	2.4	2.4	2.3	2.3	4
Jones	Dust gauge	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
D7	Esampler	0.7	0.7	6.7	5.7	3.4	3.0	3.0	9.0	8.0	4
D8	Esampler	0.3	0.2	0.1	0.1	2.6	2.6	2.5	2.4	2.4	4
D05-PM10	HVAS PM10	3.1	8.6	4.0	1.7	3.2	5.4	10.9	6.3	4.0	4
D01-TSP	HVAS TSP	0.3	0.4	1.0	1.1	3.0	2.6	2.7	3.3	3.4	4
D02-TSP	HVAS TSP	0.0	0.1	0.1	0.1	2.3	2.3	2.4	2.4	2.4	4
D03-TSP	HVAS TSP	0.2	0.2	0.1	0.1	2.5	2.5	2.5	2.4	2.4	4
D04-TSP	HVAS TSP	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
Wybong	OEH	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
D01	TEOM PM10	0.3	0.4	1.2	1.4	3.1	2.6	2.7	3.5	3.7	4
D02	TEOM PM10	0.0	0.1	0.1	0.1	2.3	2.3	2.4	2.4	2.4	4
D03	TEOM PM10	0.2	0.2	0.1	0.1	2.5	2.5	2.5	2.4	2.4	4
D04	TEOM PM10	0.0	0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.3	4
D05	TEOM PM10	0.1	0.1	0.0	0.0	2.3	2.4	2.4	2.3	2.3	4
D06 (old)	TEOM PM10	0.3	0.2	0.2	0.1	2.5	2.6	2.5	2.5	2.4	4
D6	TEOM PM10	0.4	0.3	0.4	0.2	2.7	2.7	2.6	2.7	2.5	4
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