



# Air Quality and Greenhouse Gas Management Plan

**Document Number:** MGOOC-1779562647-4392

**Status:** Draft

**Version:** 13

**Effective:** TBC

**Review:** TBC

**Owner:** Environment and Community Manager

## Table of Contents

<b>1</b>	<b>Commitment and Policy</b>	<b>4</b>
1.1	Background	4
1.2	Purpose	4
1.3	Scope	4
1.4	Objectives	4
1.5	Requirements of the Air Quality and Greenhouse Gas Management Plan	5
1.5.1	Statutory Requirements	5
1.5.2	GCAA Requirements	6
1.6	Consultation	7
1.6.1	Consultation with Internal (Mount Owen) Stakeholders	7
1.6.2	Consultation with External Stakeholders	7
<b>2</b>	<b>Planning</b>	
2.1	Environment Baseline	8
2.2	Potential Impacts	13
2.2.1	Dust	13
2.2.2	Fume	13
2.2.3	Odour	14
2.2.4	Greenhouse Gas	14
2.3	Air Quality Criteria	15
<b>3</b>	<b>Implementation</b>	<b>18</b>
3.1	Dust Management	18
3.1.1	Mine Planning	18
3.1.2	Unsealed Roads	18
3.1.3	Exposed Areas	19
3.1.4	Coal Handling and Stockpiles	20
3.1.5	Topsoil Management	20
3.1.6	Drill and Blast Operations	20
3.1.7	Material Extraction and Handling	21
3.1.8	Dozer Operations	21
3.1.9	Scraper Operations	21
3.1.10	Material Crushing and Screening	21
3.1.11	Rail Loading Operations	21
3.2	Fume Management	22
3.3	Odour Management	22
3.4	Greenhouse Gas Management	23
3.4.1	Managing Excess Greenhouse Gas Emissions	23
3.5	Emissions	23
3.6	Strategies Overview	25
3.6.1	Proactive Management Strategies	26
3.6.2	Reactive Management Strategies	27
3.7	Air Quality Information	29
3.8	Rain Water Tank Inspection and Cleaning	29
3.9	Best Practice Measures	29

<b>4</b>	<b>Measurement and Evaluation</b>	<b>30</b>
4.1	Monitoring	30
4.2	Record Keeping	34
4.3	Reporting	34
4.3.1	Incident Reporting and Compliance Evaluation	35
4.3.2	Corrective Action	37
4.3.3	Greenhouse Gas Reporting	37
4.4	Complaint Resolution	38
4.5	Independent Review	39
4.6	MGO Air Quality Management Coordination Protocol	39
<b>5</b>	<b>Review and Improvement</b>	<b>40</b>
5.1	Plan Review	40
5.2	Audit	41
5.3	Training and Communication	41
<b>6</b>	<b>Commitments</b>	<b>42</b>
<b>7</b>	<b>Accountabilities</b>	<b>44</b>
<b>8</b>	<b>Definitions</b>	<b>45</b>
<b>9</b>	<b>Document Information</b>	<b>46</b>
9.1	Relevant Legislation	46
9.2	Related Documents	46
9.3	Reference Information	47
9.4	Change Information	48
<b>Appendix A</b>	<b>Statutory Requirements</b>	<b>49</b>
<b>Appendix B</b>	<b>External Consultation Records</b>	<b>59</b>
<b>Appendix C</b>	<b>Air Quality Plan Approval</b>	<b>61</b>
<b>Appendix D</b>	<b>Best Practice Emissions Management Measures</b>	<b>62</b>

# 1 Commitment and Policy

## 1.1 Background

This Air Quality and Greenhouse Gas Management Plan (AQGGMP) is one of a series of Environmental Management Plans that together form the Environmental Management Strategy (EMS) for the Mount Owen Glendell Operations (MGO).

Current and approved operations at MGO include the Mount Owen Mine (North Pit and Bayswater North Pit also referred to as Ravensworth East (BNP)) and Glendell Mine (Barrett Pit).

Mining operations at the MGO include the integrated use of the Mount Owen coal handling and preparation plant (CHPP), coal stockpiles and rail load-out facility.

## 1.2 Purpose

The purpose of this AQGGMP is to facilitate the statutory requirements for the MGO operation and to outline the controls to be implemented for the management of air quality, greenhouse gas and energy efficiency associated with the MGO.

This Management Plan forms part of the MGO Environmental Management System (EMS) and should be read in conjunction with the MGO ***Environmental Management Framework***.

## 1.3 Scope

The AQGGMP applies to all activities within the MGO and addresses the current conditions of SSD 5850 (Mt Owen and Ravensworth East Mines) and DA80/952 (Glendell Mine) as well as conditions of the Environmental Protection Licences (EPL) as detailed in **Section 1.5**.

## 1.4 Objectives

The objectives of the AQGGMP are to:

- Identify the potential impacts of MGO on the local air quality environment;
- Identify energy efficiencies associated with MGO;
- Detail the controls to be implemented to minimise air quality impacts, including greenhouse gas emissions;
- Establish an air quality monitoring system to assess the air quality impact;
- Provide a protocol to assess monitoring results against air quality impact assessment criteria to evaluate compliance;
- Maintain compliance with conditions of development consents, environmental protection licences and legislation relating to greenhouse gas management and energy use efficiency;
- Provide employees and contractors with a clear and concise description of their responsibilities in relation to greenhouse gas management and energy use efficiency;
- Manage air quality-related community complaints in a timely and effective manner; and
- Detail the procedure for reporting air quality criteria exceedances to relevant stakeholders.

## 1.5 Requirements of the Air Quality and Greenhouse Gas Management Plan

### 1.5.1 Statutory Requirements

#### *Development Consent(s)*

Both the Mount Owen Continued Operations (SSD 5850) and Glendell Mine (DA 80/952) development approvals stipulate requirements related to this AQGGMP. A summary of these requirements and where they are addressed within this plan are presented in 0

#### *Environmental Protection Licences (EPLs)*

MGO surrendered Ravensworth East Mine EPL No 10860 to the Environmental Protection Authority (EPA) on the 19<sup>th</sup> of September 2019. Activities from within this license were amalgamated in the Mt Owen Mine EPL No 4460.

Activities within Glendell Mine are captured under the EPL No. 12840. Air quality monitoring and reporting conditions are detailed in the respective Licence conditions.

#### *EPL No 4460 - Mt Owen/ Ravensworth East Mine conditions:*

O3.1 All operations and activities occurring at the premises must be carried out in a manner that will minimise the emission of dust from the premises.

O3.2 The premises must be maintained in a condition which minimises or prevents the emission of dust from the premises.

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

#### *EPL No 12840 – Glendell Mine conditions:*

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

O3.2 Activities occurring in or on the premises must be carried out in a manner that will minimise the generation, or emission from the premises, of wind-blown or traffic generated dust.

## 1.5.2 GCAA Requirements

The GCAA **Air Quality Management Protocol** (GCAA-625378177-10324) and **Emissions and Energy** (GCAA-625378177-13661) are internal site documents which identify the minimum requirements for air quality management across GCAA operations.

The primary objectives of this protocol are targeted at achieving a consistent approach towards air quality management in order to achieve compliance with regulatory standards, conditions and commitments. The protocol also aims to mitigate air quality complaints from the surrounding community. The overall purpose of this protocol is to:

- Provide guidance on effective dust management measures implementable at surface operations to reduce the potential for impacts on ambient air quality;
- Provide a framework for the use of automated systems for early identification of adverse meteorological conditions likely to result in dust impacts;
- Provide guidance and direction for awareness raising and training of employees to support effective and timely identification, reporting and mitigation of dust;
- Establish minimum requirements for dust management at MGO, and to provide the framework for coordinated dust management; and
- Provide guidance so that dust management is integrated into the entire life of mine.

In addition, the protocol also details the site wide management measures as well as source specific management measures to be implemented at MGO. Site wide management measures specific to MGO include:

- Mine planning in order to minimise emissions to air;
- Development of an Air Quality Management Plan;
- Identification of air quality risks, via a dust risk register;
- Development of response plans, in the form of Dust Trigger Action Response Plans (TARP);
- Continuous air quality and meteorological monitoring systems;
- Visual monitoring, such as environmental cameras; and
- Daily forecasting of air quality risks to inform operations, that is, the Air Quality Control System (AQCS).

Source specific management measures across MGO include:

- Classification of unsealed roads to determine minimum requirements;
- Preventative measures (i.e. water cart) to avoid emissions to air where unsealed traffic surfaces adjoin sealed roads;
- Minimise disturbed areas and undertake timely rehabilitation of disturbed areas;
- Water spraying systems on ROM coal stockpiles;
- Shaping and seeding topsoil stockpiles;
- Rehabilitate shaped overburden emplacement areas;
- Minimise double handling of material during extraction activities;
- Restricting dozer and scraper operations during adverse weather conditions;
- Implementation of a pre-blast assessment checklist; and
- Implementation of an efficient load profiling system during rail load out operations.

The requirements of the GCAA Air Quality Management Protocol are detailed further in the sections below. Other internal technical instructions and procedures implemented at MGO are listed in **Table 9.1<sup>1</sup>**. These are not made publicly available and are strictly for internal use by MGO personnel only.

---

<sup>1</sup> It is noted that internal procedures have not been reviewed or endorsed by DPIE. It is the responsibility of MGO to facilitate the implementation of site procedures and align them with this AQGGMP and the conditions of consent.

## 1.6 Consultation

### 1.6.1 Consultation with Internal (Mount Owen) Stakeholders

Internal communications are conducted in accordance with the **GCAA Internal Communication Standard** and the MGO EMF. These documents provide a protocol for achieving effective and timely internal communication.

This AQGGMP has been reviewed by members of the Mount Owen Health, Safety, Environment and Community (HSEC) Committee and endorsed at the meeting of 23 December 2016. Details of Training and Communication arrangements are outlined in **Section 5.3**.

### 1.6.2 Consultation with External Stakeholders

A final revision of the currently approved Air Quality Management Plan was submitted to the Department of Planning, Industry and Environment (DPIE) (formerly DP&E) on 27th April 2017. A copy of the DPIE approval of the Plan is in **Appendix C**.

Correspondence undertaken in relation to this revision of the AQGGMP is presented in **Table 1.1**. A copy of the consultation records are shown in **Appendix B**.

In accordance with Schedule 3, Condition 19 of SSD 5850 and Schedule 3, Condition 23A of DA 80/952 (Glendell Mine) this plan is required to be prepared in consultation with the EPA and to the satisfaction of the Secretary. Schedule 2, Condition 17 of SSD 5850 and Schedule 2, Condition 16 of DA 80/952 also requires evidence of consultation to be provided to DPIE, which includes:

- The outcome of any consultation, matters resolved and unresolved; and
- Details of any disagreement remaining between the party consulted and the Applicant and how the Applicant has addressed the matters not resolved.

Evidence of consultation undertaken during the development of this Plan with the EPA is provided in Appendix B.

From November 2019, consultation records can also be found on the DPIE major projects website.

**Table 1.1 – External Stakeholder Consultation**

Date	Consultation Undertaken
October 2017	Draft AQMP submitted to EPA and DPIE for review.
July 2018	Comments received from DPIE.
September 2018	Updated AQMP re-submitted to DPIE in response to comments.
November 2019	AQGGMP revised and provided to DPIE following approval of MOCO MOD 2 (SSD 5850).
March 2020	AQGGMP revised and provided to DPIE and EPA for review following approval of MOCO MOD 3 (ssd-5850) and DA80/952 MOD 4 (Glendell Mine).



## 2 Planning

### 2.1 Environment Baseline

Local environmental conditions with direct implications for air quality management include the prevailing meteorology and location of sensitive receptors in relation to MGO. The nearest sensitive receptors are predominantly to the east, southeast and south of the MGO.

Meteorological conditions are important for determining the direction and rate at which emissions from activities, such as mining, will disperse. The key meteorological parameters for air quality management are wind speed and wind direction.

The prevailing winds in the vicinity of the MGO are from either the northwest or southeast, depending on the season. This is demonstrated by the wind-roses shown in **Figure 2.1 – 2.3** which summarise the data collected by the SX13M1 weather station 2016 - 2018. The prevailing south-easterly winds, which typically occur in the summer months, are favourable for transporting emissions from the MGO away from most of the sensitive receptors. However the north-westerly winds that occur in autumn, winter and spring would transport emissions from the MGO towards the sensitive receptors.

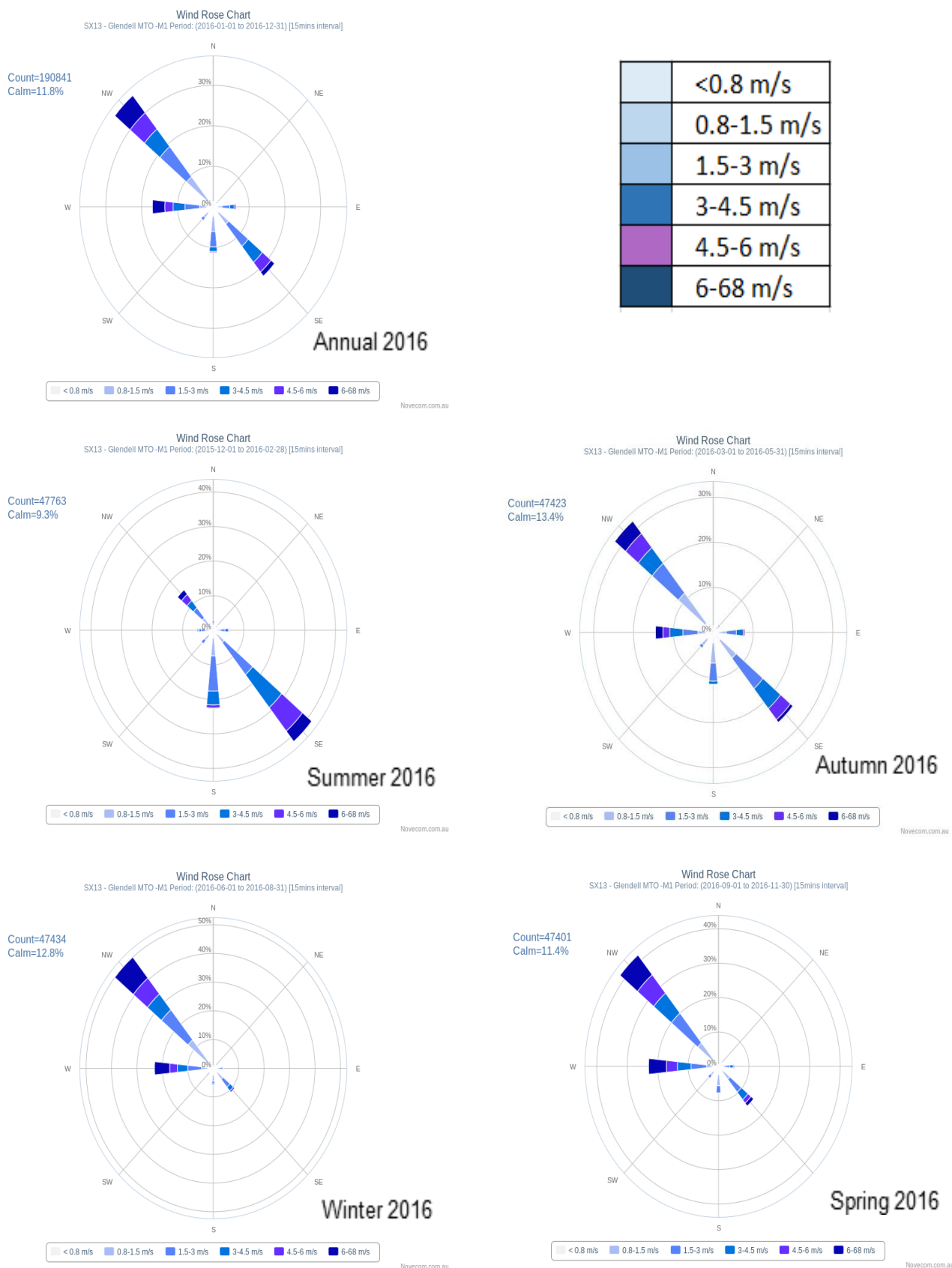
The meteorological conditions that most commonly lead to elevated dust concentrations include:

- Warm weather and extended periods without rainfall, resulting in less surface moisture.
- Wind speeds greater than 5 m/s. These winds are conducive to higher wind erosion rates.
- Stable conditions, such as at night with light winds and when a temperature inversion is present. Under these conditions, plume dispersion is poor and elevated dust concentrations can occur due to mechanically generated emissions. Temperature inversions are most common during the cooler months from May to August.

The existing environment is characterised by higher rainfall in summer and lower rainfall in winter. There are prevailing north-westerly winds in autumn, winter and spring which means that sensitive receptors will be downwind of existing mining activities.

The most effective emission mitigation measures focus on controlling emissions under unfavourable meteorological conditions, such as dry, windy, stable night-time conditions and/or when winds are blowing from mining activities towards sensitive receptors.





**Figure 2.1 – Measured wind patterns in the vicinity of the MGO (SX13M1, 2016)**

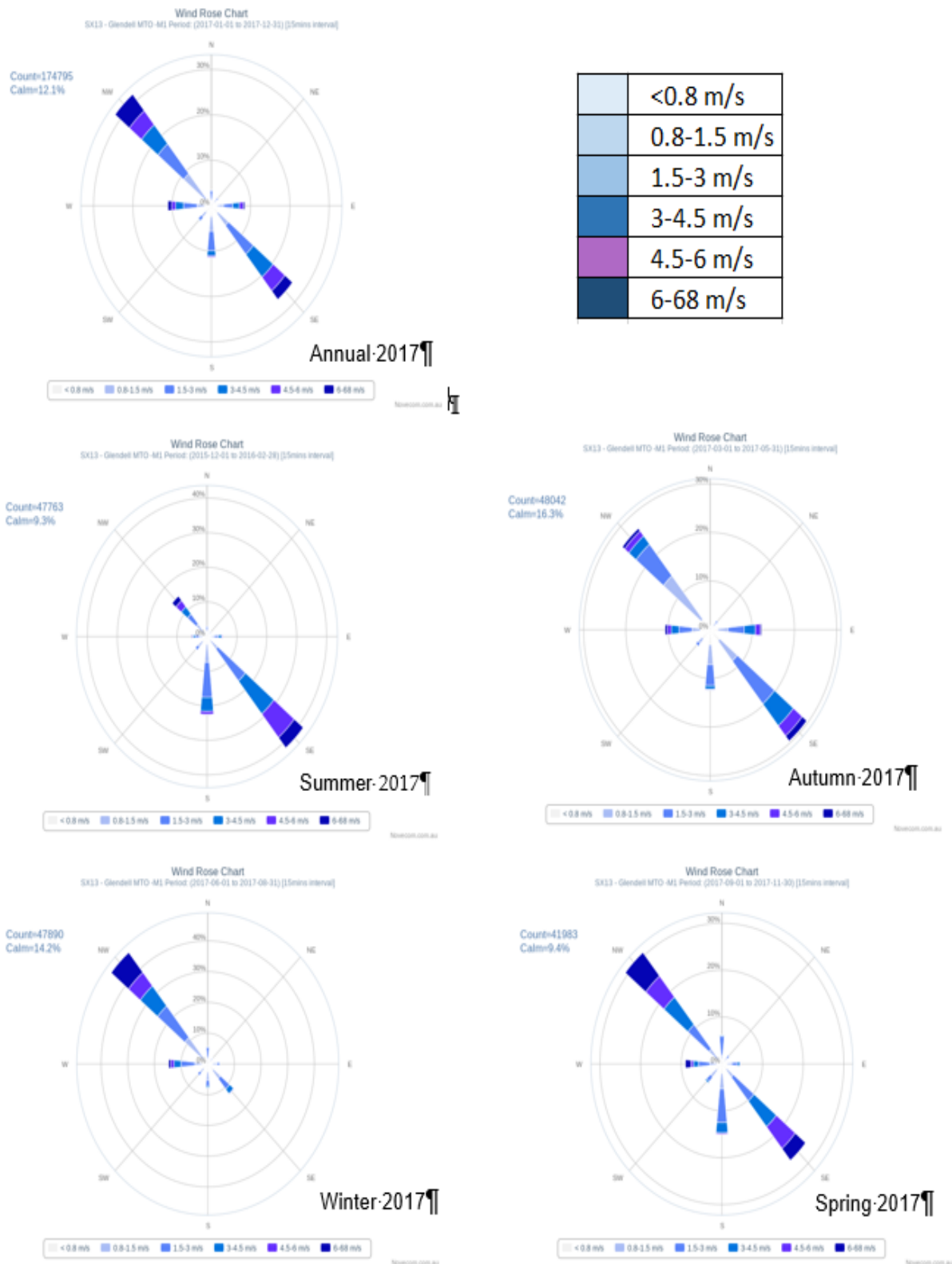
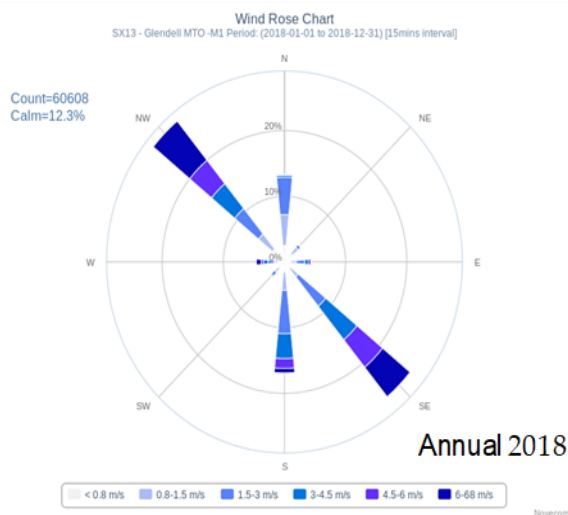


Figure 2.2 – Measured wind patterns in the vicinity of the MGO (SX13M1, 2017)



	<0.8 m/s
	0.8-1.5 m/s
	1.5-3 m/s
	3-4.5 m/s
	4.5-6 m/s
	6-68 m/s

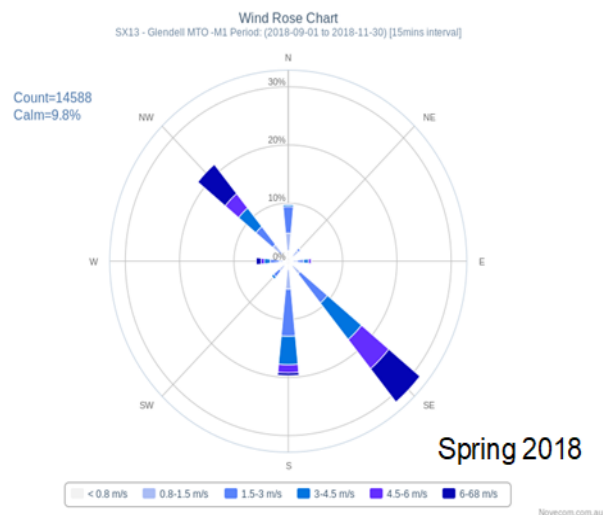
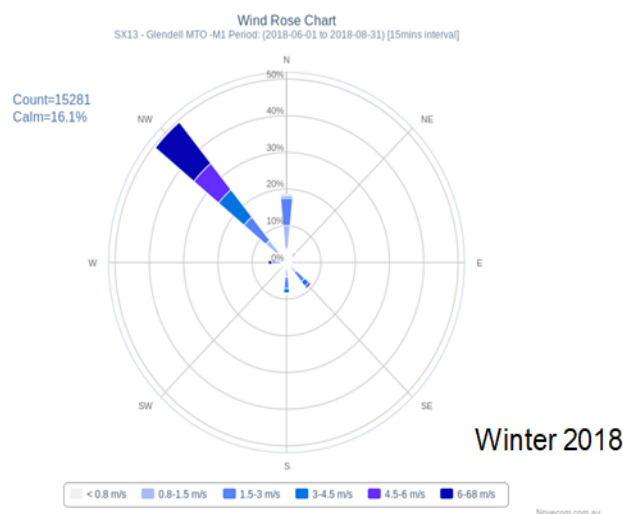
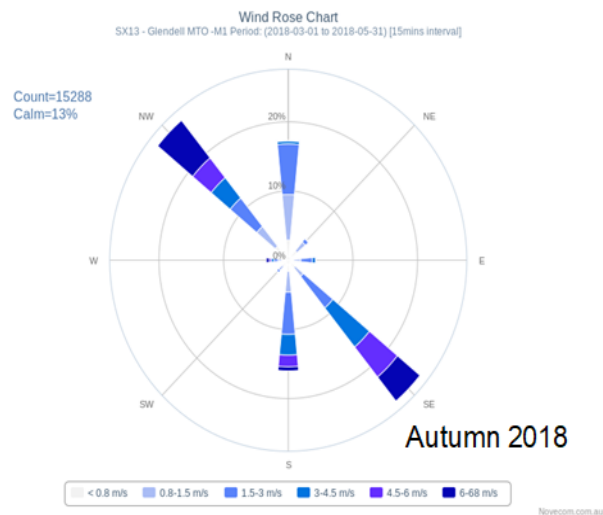
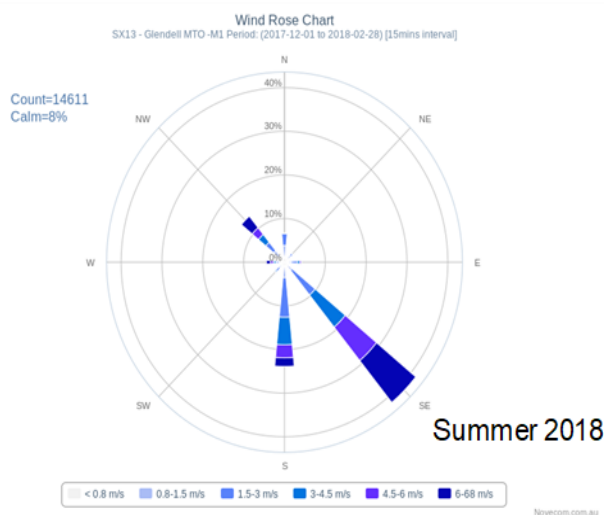
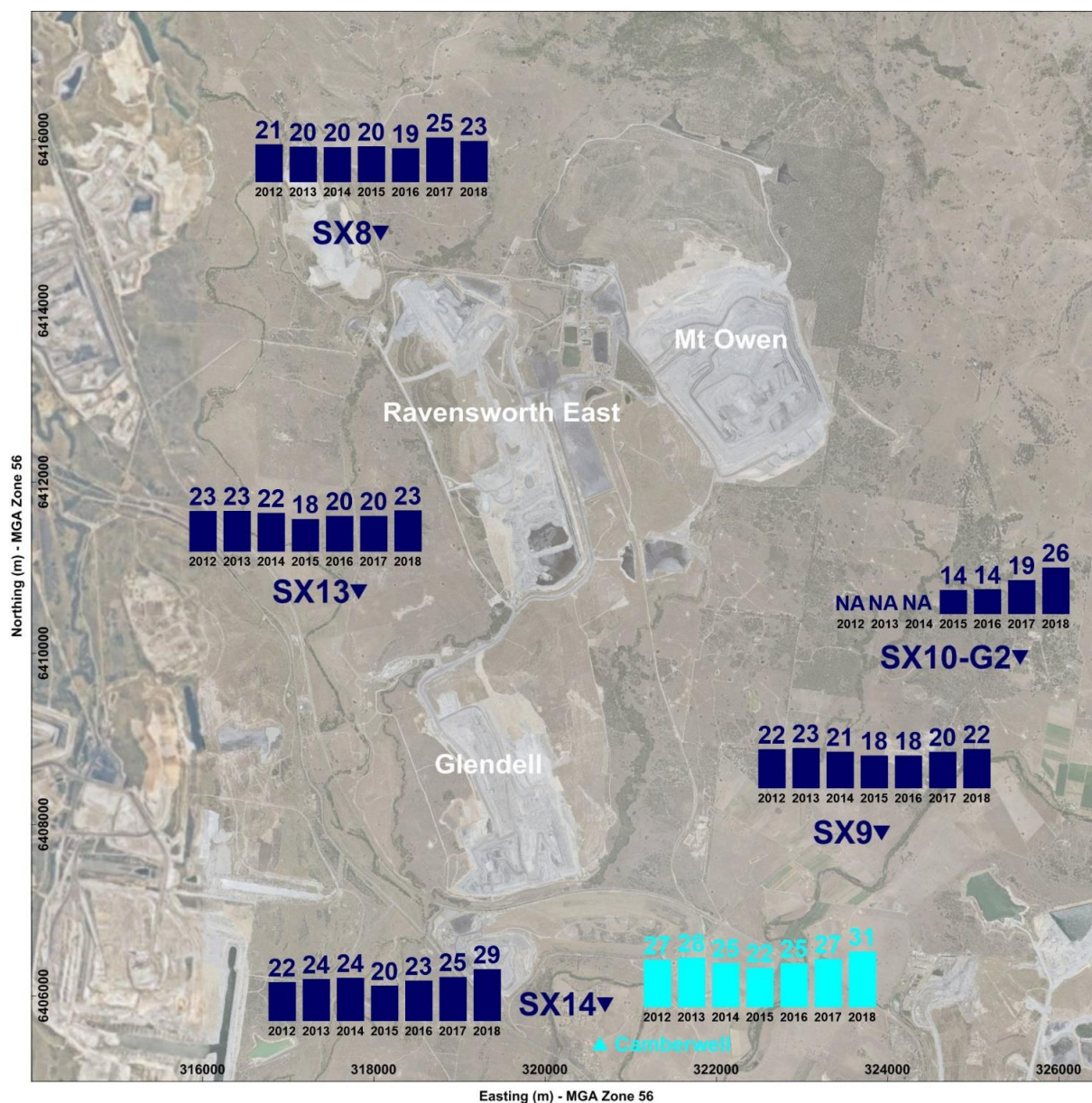


Figure 2.3 – Measured wind patterns in the vicinity of the MGO (SX13M1, 2018)

There was a slight variation within spring 2018/2017, compared to 2016, presenting south-easterly winds in addition to the north-westerly winds, transporting emissions from the MGO away from most of the sensitive receptors

A summary of the air quality baseline data is showed in **Figure 2.4**. This figure shows the annual average PM<sub>10</sub> concentrations in the vicinity of the MGO. Particle levels increased across the State in 2017 and 2018 due to dust from the widespread, intense drought and smoke from bushfires and hazard reduction burning.



**Figure 2.4 – Historical annual PM<sub>10</sub> concentrations in the vicinity of the MGO**



**Table 2.1** shows the annual average dust deposition levels from all data collected between 2012 and 2018. This data shows compliance with the MGO impact assessment criteria (4 g/m<sup>2</sup>/month) (see **Section 2.3**).

**Table 2.1 – Dust deposition data**

Monitoring site(s)	Average dust deposition level from 2012 to 2018 data (g/m <sup>2</sup> /month)
DG2/DD7	2.4
DG3	1.7
DG4/DD15	2.5
DG5	2.2
DG6	3.7
DG7	2.5
DG8	2.8
DD6	1.0
DD12	2.5
DD14	1.8
DD16	2.6

## 2.2 Potential Impacts

The key air quality and greenhouse gas related issues to be managed at MGO include:

- Dust (that is, particulate matter in the form of TSP, PM<sub>10</sub> or PM<sub>2.5</sub>) from general mining activities;
- Fume (that is, NO<sub>x</sub> emissions) from blasting;
- Odour and other substances due to potential spontaneous combustion; and
- Generation of greenhouse gas emissions.

### 2.2.1 Dust

Dust emissions from general mining activities are from a variety of sources including material handling, material transport, processing, wind erosion, and blasting. These emissions mainly comprise of particulate matter in the form of TSP, PM<sub>10</sub> and PM<sub>2.5</sub>.

The Mt Owen Continued Operations Project Environmental Impact Statement (Umwelt 2015) provided estimates of emissions from all significant dust-generating activities / sources at MGO. The three most significant sources, in terms of TSP emissions, are:

- Coal and overburden haulage, resulting in wheel-generated dust;
- Exposed mining and emplacement areas, resulting in wind-generated dust; and
- Loading and unloading coal and overburden to trucks.

The emission sources have been identified in order to develop the most effective management measures and to target the most significant sources.

### 2.2.2 Fume

Post-blast fume can be produced in non-ideal explosive conditions of ammonium nitrate / fuel oil (ANFO) and visible as an orange / brown plume.

Post-blast fumes comprise of oxides of nitrogen (NO<sub>x</sub>) including nitric oxide (NO) and nitrogen dioxide (NO<sub>2</sub>). In general, at the point of emission, NO will comprise the greatest proportion of the total emission. Typically, this is 90% by volume of the NO<sub>x</sub>. The remaining 10% comprises mostly of NO<sub>2</sub>. It is the NO<sub>2</sub>, which has been linked to adverse health effects.

## 2.2.3 Odour

Spontaneous combustion of coal and other carbonaceous materials is the main potential source of odour. "Self-heating" occurs when coal and other carbonaceous materials undergo an exothermic reaction when exposed to oxygen in the air, to generate heat. This process causes the temperature of the material to rise, which in turn accelerates the oxidation, and, in turn, the heat generation process. As the material temperature rises above about 70°C the temperature acceleration is rapid enough to result in ignition of the material. This ignition is referred to as spontaneous combustion.

The propensity of coal (or carbonaceous material) to self-heat and potentially combust is governed by many factors but most commonly by the type of coal, the carbon content, the size of the particles, the material temperature, the presence of oxygen and quantity of coal. Spontaneous combustion results in the emission of noxious gases including carbon dioxide, carbon monoxide, sulphur dioxide, hydrogen sulphide, nitrogen oxides, acid mist and a range of volatile organic compounds.

The emissions to air have the potential to lead to the following hazards:

- Adverse health effects due to inhalation;
- Nuisance effects due to odour;
- Fire and hot material; and
- Smoke and effects on visibility.

## 2.2.4 Greenhouse Gas

GG emissions associated with MGO are categorised into Scope 1, 2 and 3 emissions and are defined as:

- Scope 1 covers direct emissions from the combustion of fuels (e.g. diesel), fugitive emissions and industrial processes within the boundary of the operation;
- Scope 2 covers indirect emissions from the operation's consumption of purchased electricity produced by another organisation; and
- Scope 3 includes other indirect emissions as a result of the operation's activities that are not from sources owned or controlled by the organisation (e.g. product transport by rail).

### *Fugitive Emissions*

Fugitive emissions arise during the coal production/extraction process whereby methane and carbon dioxide trapped within the coal (coal mine waste gas) is released to the atmosphere. The volume and concentration of coal mine waste gas varies significantly from mine to mine.

### *Fuel Emissions*

Diesel use is responsible for the majority of MGO's energy use. Diesel combustion is also responsible for a significant proportion of MGO's gas emissions.

### *Electricity Use*

Electricity is minor source of total energy demand. The majority of electricity use at MGO is associated with the operations associated with the Mt Owen CHPP. Greenhouse gas emissions associated with electricity use are produced offsite and not under the direct operational control of MGO.

### *Industrial Emissions*

Gas insulated switch gear/ circuit breakers can slowly release Sulphur Hexafluoride (SF<sub>6</sub>) through normal operations. SF<sub>6</sub> is a highly potential greenhouse gas, with a global warming potential that is 3,200 times higher than carbon dioxide. Any gas insulated switch gear/ circuit breakers that contain SF<sub>6</sub> have the potential to emit very low levels of SF<sub>6</sub>.

## 2.3 Air Quality Criteria

### *Mt Owen Impact Assessment Criteria SSD 5850*

The impact assessment criteria for Mt Owen Mine and Ravensworth East Mine are detailed in Schedule 3 Condition 16 of the Mt Owen Development Consent (SSD 5850). These criteria are outlined in **Table 2.2**. The criteria apply for all residences on privately owned land. The table excludes any land listed in the Development Consents as being eligible for acquisition upon request on the basis of air quality impacts.

**Table 2.2 – SSD-5850 Impact Assessment Criteria**

Pollutant	Averaging Period	<sup>d</sup> Criterion
Long Term Impact Assessment Criteria for Particulate Matter		
Total Suspended Particulate (TSP) matter	Annual	<sup>a</sup> 90 µg/m <sup>3</sup>
Particulate Matter < 10 µm (PM <sub>10</sub> )	Annual	<sup>a</sup> 25 µg/m <sup>3</sup>
Particulate Matter < 2.5 µm (PM <sub>2.5</sub> )	Annual	<sup>a</sup> 8 µg/m <sup>3</sup>
<sup>c</sup> Deposited Dust (maximum increase)	Annual	<sup>b</sup> 2 g/m <sup>2</sup> /month
<sup>c</sup> Deposited Dust (annual average)	Annual	<sup>a</sup> 4 g/m <sup>2</sup> /month
Short Term Impact Assessment Criteria for Particulate Matter		
Particulate Matter < 10 µm (PM <sub>10</sub> )	24 Hour	<sup>b</sup> 50 µg/m <sup>3</sup>
Particulate Matter < 2.5 µm (PM <sub>10</sub> )	24 Hour	<sup>b</sup> 25 µg/m <sup>3</sup>

Notes:

- <sup>a</sup>. Total impact (i.e. incremental increase in concentrations due to the development plus background concentrations due to all other sources).
- <sup>b</sup>. Incremental impact (i.e. incremental increase in concentrations due to the development on its own).
- <sup>c</sup>. Deposited dust is to be assessed as insoluble solids as defined by Australian Standards, AS/NZS 3580.10.1:2003: Methods for sampling and Analysis of Ambient Air – Determination of Particulate Matter – Deposited Matter – Gravimetric Method.
- <sup>d</sup>. Excludes extraordinary events such as bushfires, prescribed burning, dust storms, fire incidents or any other activity agreed to by the Secretary.



### Glendell Impact Assessment Criteria DA 80/952

The impact assessment criteria for Glendell Mine is detailed in Schedule 3 Condition 20 of the Glendell Development Consent (DA 80/952). These criteria are outlined in **Table 2.3**. The criteria apply for all residences on privately owned land. The table excludes any land listed in the Development Consents as being eligible for acquisition upon request on the basis of air quality impacts.

**Table 2.3 – DA 80/952 Impact Assessment Criteria**

Pollutant	Averaging Period	<sup>d</sup> Criterion
Long Term Impact Assessment Criteria for Particulate Matter		
Total Suspended Particulate (TSP) matter	Annual	<sup>a</sup> 90 µg/m <sup>3</sup>
Particulate Matter < 10 µm (PM <sub>10</sub> )	Annual	<sup>a</sup> 30 µg/m <sup>3</sup>
<sup>c</sup> Deposited Dust (maximum increase)	Annual	<sup>b</sup> 2 g/m <sup>2</sup> /month
<sup>c</sup> Deposited Dust (annual average)	Annual	<sup>a</sup> 4 g/m <sup>2</sup> /month
Short Term Impact Assessment Criteria for Particulate Matter		
Particulate Matter < 10 µm (PM <sub>10</sub> )	24 Hour	<sup>b</sup> 50 µg/m <sup>3</sup>

Notes:

- <sup>a</sup> Total impact (i.e. incremental increase in concentrations due to the development plus background concentrations due to all other sources).
- <sup>b</sup> Incremental impact (i.e. incremental increase in concentrations due to the development on its own).
- <sup>c</sup> Deposited dust is to be assessed as insoluble solids as defined by Australian Standards, AS/NZS 3580.10.1:2003: Methods for sampling and Analysis of Ambient Air – Determination of Particulate Matter – Deposited Matter – Gravimetric Method.
- <sup>d</sup> Excludes extraordinary events such as bushfires, prescribed burning, dust storms, fire incidents or any other activity agreed to by the Secretary.

### Land Acquisition

Schedule 3 Condition 1 of both the Mt Owen Development Consent (SSD 5850) and Glendell Development Consent (DA 80/952) provides a list of land as being eligible for acquisition upon request on the basis of air quality impacts. These lists are shown in **Table 2.4**.

The procedures for land acquisition are outlined in Schedule 4 Conditions 5 and 6 of the Mt Owen Development Consent (SSD 5850) and Schedule 4 Conditions 9 to 11 of the Glendell Development Consent (DA 80/952).

**Table 2.4 – Land subject to acquisition upon request**

Acquisition basis	Land <sup>a</sup>
Air quality (SSD 5850)	105 <sup>b</sup> , 114, 115, 116 <sup>e</sup> , 133 <sup>c</sup> , 4, 112, 143 <sup>d</sup> , 150 <sup>d</sup> , 152 <sup>d</sup> , 154 <sup>d</sup> , 155 <sup>d</sup> , 156 <sup>d</sup> , Lot 4 DP 1166047 <sup>d</sup> , Lot 5 DP 1166047 <sup>d</sup> , Lot 175 DP 1002770 <sup>d</sup> and Lot 106 DP 855187 <sup>d</sup>
Noise (SSD 5850)	21, 22 <sup>e</sup> , 23
General (DA 80/952)	37a & 37b – Richards Lot 13 DP 6830 – Gardner (acquired) 61 – Donellan (acquired) Lot 12 DP 6830 – Noble (acquired) 62 – Noble (b) (acquired) Lot 1 DP 770733 – Noble (acquired) 65 – Noble (acquired)

Notes:

- The location of the land referred to in the table above is shown in Appendix 3 of SSD 5850.
- The Applicant is only required to acquire property 105 if its acquisition is not reasonably achievable under the approval for the Rix's Creek North open cut mine.
- The Applicant is only required to acquire Lot 31 DP6842 and Lot 2 DP1175728 within property 133.
- The Applicant is only required to acquire the identified land if acquisition is not reasonably achievable under the development consents for the Ashton South East Open Cut Project (MP 08\_0182), the Glendell Open Cut Coal Mine (DA 80/952), Ravensworth Operations Project (MP 09\_0176), Rix's Creek South Continuation of Mining Project (SSD 6300) or the Rix's Creek North Open Cut Project (MP 08\_0102).
- The identified land has been acquired by the Applicant.

### Mitigation Measures

Upon receiving a written request from the owner of residences listed within **Table 2.4**, MGO will implement additional mitigation measures at the residence in accordance with Schedule 3, Condition 2 of SSD 5850.

These measures will be determined in consultation with the landowner, in respect of the basis on which that residence is identified in **Table 2.4**.

These measures must be reasonable and feasible, and directed towards reducing the air quality and/or noise impacts of the development on the residence. In the case of air quality, mitigation may include measures such as air filters, a first flush drainage system and/or air conditioning.

If within 3 months of receiving this request from the owner, the Applicant and the owner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Secretary for resolution.

### Mine Owned Land

In accordance with the Schedule 3, Condition 17 of SSD 5850 and Schedule 3, Condition 20 of DA 80/952, all reasonable and feasible avoidance and mitigation measures will be employed so that particulate matter emissions generated by the development do not cause exceedances of the criteria listed in **Table 2.2** or **Table 2.3** at any occupied residence on mine-owned land. Actions to address the requirements of SSD 5850 and DA 80/952 are also outlined in the **MGO Land Acquisition, Mitigation and Compensation Procedure**.

## 3 Implementation

### 3.1 Dust Management

Air quality management at MGO includes a combination of the following types of measures:

- Engineering Controls (such as enclosure of conveyors);
- Source specific control measures routinely implemented as outlined below (for example, water spraying roads for dust suppression during hauling), and
- Contingency measures implemented during periods of high particulate matter concentrations or adverse meteorological conditions. These measures include modification or ceasing of operations as required, that is, a Trigger Action Response Plan (TARP).

In accordance with Schedule 3, Condition 18 of SSD 5850 and Schedule 3, Condition 22 of DA 80/952, MGO has adopted a series of controls to minimise any impacts on the air quality surrounding the complex. Dust impacts have been defined as those where dust emissions generated by the MGO have been identified as causing an exceedance of the criteria outlined in **Table 2.2** or **Table 2.3** at any residence on privately owned land, except where there is an agreement in place with private residences.

In these circumstances, MGO will (upon receiving a written request) implement additional mitigation measures in accordance with SSD 5850 Schedule 3, Condition 2 and in accordance with the ***MGO Land Acquisition, Mitigation and Compensation Procedure***.

A summary of the dust management controls implemented at the MGO is provided in the sections below. Accountabilities for whom is responsible for the implementation of these measures is presented in **Section 7**.

#### 3.1.1 Mine Planning

The following controls will be considered in the mine planning stages:

- Water fill points to be located close to mining operations at both Glendell and Mt Owen, thus reducing turnaround time and providing quick filling opportunities. Opportunities to relocate or construct additional water fill points closer to mining operations will be undertaken as required;
- Truck capacity will be utilised and the shortest haul distances will be used, as far as practical; and
- Mine planning will make provision for sheltered dumping areas where possible which will be utilised in adverse conditions.

#### 3.1.2 Unsealed Roads

All roads at the MGO will be classified as either:

- Haul Roads used for bulk materials movement;
- 'Other Unsealed Roads' comprising all other trafficked unsealed roads on site which are not used as haul routes, including traffic routes used during exploration drilling operations; or
- Unsealed areas (e.g. hardstand areas).

The following controls will be considered to reduce dust emissions from unsealed roads:

- Any roads as being identified as obsolete are to be ripped and revegetated;
- Long term haul roads will be selected in locations to minimise dust generation;
- Haul roads will be constructed with competent material and regularly maintained to reduce fine build up and minimise dust generation;
- Source emission reduction measures will be prioritised, such as minimising haul distances and traffic reduction measures ;
- Haul roads and hardstand areas will be treated with water, with the use of chemical stabilisers at Glendell Mine as required;

- Vehicle speed will be restricted on unsealed roads that have not been treated with water or chemical stabilisers;
- Temporary haul roads will be managed on a risk basis to reduce dust generation (e.g. speed restrictions, chemical suppression, gravel surfacing);
- Stormwater drainage will be designed to minimise erosion and sediment laden material to be directed into dirty water management systems;
- All haul roads will be graded and shall be subject to regular maintenance (use of crushed gravel to sheet roads etc.);
- A haul road management system will be implemented whereby water carts are equipped with chemical stabilising equipment, application rates are monitored, water cart fill stations are located strategically around the mining areas, overloading of trucks which could result in spillage is minimised, operators are trained in dust control actions and meteorological monitoring is conducted;
- Unsealed non-haul roads will be included as part of the dust monitoring inspection regime;
- Shoulders of sealed roads will be vegetated, sealed or chemically stabilised;
- Wash down facilities will be made available prior to vehicles leaving site to minimise mud and silt transfers offsite; and
- Regular cleaning and removal of surface material from bitumen park-up areas will be carried out.

If there are any changes to the way in which roads are constructed or managed, monitoring will be carried out to demonstrate that haul road dust control efficiency achieves the target of 85 per cent.

### 3.1.3 Exposed Areas

The MGO is required to implement all reasonable and feasible measures to minimise the total area exposed for dust generation at any time. Alternatively, interim stabilisation and temporary vegetation strategies must be employed when areas prone to dust generation cannot be permanently rehabilitated. The following controls will be considered as a potential management measure to reduce dust emission from exposed areas:

- Disturbance areas ahead of mining will be minimised;
- Overburden emplacement areas will be designed to minimise the disturbance areas;
- Timely rehabilitation of obsolete roads;
- Progressive reshaping of overburden emplacement and topsoil areas in preparation for rehabilitation;
- Establishment of cover crops to provide for quick groundcover until desirable species have established. This will be carried out in accordance with the **MGO Mining Operations Plan (Rehabilitation Management Plan)**;
- Rehabilitation of the overburden emplacement areas and backfilled pits will be conducted progressively over the life of the mine. This will be carried out in accordance with the **MGO Mining Operations Plan (Rehabilitation Management Plan)**;
- All rehabilitation works will be scheduled to occur progressively as soon as practicable after mining disturbance;
- Rehabilitation of infrastructure areas will occur as soon as practical following decommissioning of infrastructure; and
- Vehicular access to rehabilitation areas will be prohibited once rehabilitation is complete (unless authorised).

### 3.1.4 Coal Handling and Stockpiles

The following controls will be implemented to reduce dust emission from coal handling operations and stockpiles:

- Visual monitoring of ROM coal stockpiles for dust emissions will be conducted by CHPP Supervisors. Water carts will be utilised in the event dust emissions from the coal stockpiles are excessive. Visual monitoring of the product coal stockpiles are undertaken however, as the moisture content of the product coal is around 9%, no dust issues are anticipated with this area;
- Automated sprays will be fitted and used on the hoppers;
- Conveyors will be partially or fully enclosed;
- Telescopic chutes will be utilised;
- A programme for cleaning any coal spillage will be implemented; and
- Misting sprays will be operated at various locations along the coal transfer system.

### 3.1.5 Topsoil Management

The following controls will be implemented to reduce dust emission from topsoil management and handling activities:

- Small water carts will be utilised on topsoil haulage routes;
- Topsoil stripping to be undertaken with appropriate soil moisture to minimise dust generation;
- Topsoil stockpiles stored for more than 3 months will be fertilised and sown with pasture as soon as practical to reduce the possibility of weed contamination and erosion, vehicle access will be restricted and signage will be posted on topsoil stockpiles; and
- Topsoil stripping / handling activities will be visually monitored with activities amended or ceased if conditions are unsuitable or dust cannot be adequately controlled.

### 3.1.6 Drill and Blast Operations

The following controls will be implemented to reduce dust emission from drill and blast operations:

- Dust suppression systems (such as water sprays, dust curtains, extraction systems etc.) will be utilised on drills at all times;
- Drill cuttings on the surface will be watered to create a crust and minimise dust generation;
- Coarse material (gravel) will be used as stemming to reduce dust generation in blasting;
- Pre-blast meteorological assessments will be conducted prior to all blasts and blasting will be undertaken in accordance with the internal criteria stipulated in the sites blasting procedure(s);
- Adequate stemming of all blast holes and recording of stemming levels;
- Drilling operations will be ceased if dust suppression systems are inoperable or dust is visible above the drill deck level for a sustained period;
- Blast areas will be watered prior to the loading of shots to suppress the dispersion of fine and dry material; and
- Drill and blast operations will be undertaken in accordance with the following GCAA protocols and procedures:
  - CAA HSEC PRO 0004 – 11.10 Drill Dust Management.
  - CAA HSEC PCL 0002 – 11.12 Blast Management

### 3.1.7 Material Extraction and Handling

The following controls will be implemented to reduce dust emissions from material extraction and handling operations:

- Drop distances between truck and excavator bucket will be kept to a minimum;
- Inspections of work areas will be conducted to assess air quality and implement additional controls where necessary;
- Double handling of material will be minimised; and
- Dumping operations will be reduced in adverse weather conditions in high positions on the tip head face and redirect dumping of overburden to in-pit or to a more sheltered location. If dust still cannot be adequately managed, operations will be ceased until conditions improve.

### 3.1.8 Dozer Operations

The following controls will be implemented to reduce dust emission from dozer operations:

- Dozer travel speeds will be minimised in dusty conditions;
- Dozer use will be avoided at wind exposed areas under adverse weather conditions; and
- Visual monitoring of dust levels from dozer operations will be undertaken, with operations modified or ceased when elevated dust levels are observed to occur.

### 3.1.9 Scraper Operations

The following controls will be implemented to reduce dust emission from dozer operations:

- Scraper use will be avoided at wind exposed areas under adverse weather conditions;
- Visual monitoring of dust levels from scraper operations will be undertaken, with operations modified or ceased when elevated dust levels are observed to occur; and
- Water carts will be used to suppress dust on scraper travel roads and work areas if possible.

### 3.1.10 Material Crushing and Screening

All mobile crushing plants will be located away from elevated and exposed locations and will incorporate sufficient dust suppression systems to minimise dust generation in accordance with the following GCAA procedure:

- CAA HSEC PRO 0003 – 11.10 Mobile Crushing Unit Dust Management.

### 3.1.11 Rail Loading Operations

The rail loading facility will use efficient load profiling systems to create streamlined and consistent coal surfaces within rail wagons, with the purpose of reducing dust emissions during rail operations.

## 3.2 Fume Management

MGO control blasting activities with the aim to reduce the potential for fume (that is, nitrogen dioxide or NO<sub>2</sub>) generation. Factors identified as being influential in the generation of fume include:

- Explosive formulation and quality assurance;
- Explosive product selection;
- On bench practices;
- Rainfall;
- Blast design;
- Geological conditions;
- Contamination of explosive in the blast-hole; and
- Sleep time.

Post blast fume management will be managed and reported in accordance with the MGO Blast Management Plan, which can be found on the Mt Owen Complex Website ([www.mtowncomplex.com.au](http://www.mtowncomplex.com.au))

Numerical modelling of NO<sub>2</sub> has been carried out for the MGO BNP & North Pit (Umwelt 2015). This modelling indicated that current blast management practices will be appropriate to mitigate exceedances of the EPA criteria for NO<sub>2</sub> at sensitive receptors.

Management practices are documented in the MGO Blast Management Plan are based on pre blast meteorological assessments and restrictions are placed on blasting when there is increased risk of blast plumes being transported towards sensitive receptors.

## 3.3 Odour Management

Source-specific odour emission control measures to be implemented on a routine basis are outlined in the ***MGO Spontaneous Combustion Procedure***. In general the measures include:

- Elimination – processing and shipping of coal for its end use before the oxidation reaction that leads to spontaneous combustion occurs;
- Separation – Where material has or is showing signs of spontaneous combustion it is stockpiled separate from other inert coals to avoid spreading the heating;
- Engineering – Controls that minimise the impact of hot material such as establishing sprinklers/bench flooding to cool material prior to mining and selective digging and/or burying;
- Procedures – Including early identification of spontaneous combustion; dealing with heated materials; provision of protective or first response capacity; and preparing for / cleaning up after spontaneous combustion;
- Personnel skills and training – Relevant personnel will be trained and educated on the effects of spontaneous combustion focusing on incident prevention on affected areas; and
- PPE – Including gas monitors, masks, respirators and eye protection are required when potentially exposed to spontaneous combustion.



## 3.4 Greenhouse Gas Management

MGO use a number of processes to minimise greenhouse gas emissions.

These include:

- Optimising the design of haul roads to minimise the distance travelled between the pit, ROMs and overburden dumping locations;
- Minimising the re-handling of material;
- Managing truck payloads to utilise the tray space without overloading;
- Length of haulage routes are optimised to minimise dust, noise, fuel use and improve operating efficiency.
- Ramp gradients are optimised according to pit geometry parameters and mobile equipment performance characteristics.
- Reducing idle times will be an ongoing performance measure. Initiatives to reduce idle times will continue to be introduced over the life of the Project. A reduction in idle times will improve fuel consumption rates per volume of material moved.
- Long, medium and short term operational plans will be developed to optimise the recovery of approved resources. Managing truck utilisation rates to minimise truck waiting times.
- Maintaining the mine fleet in good operating order.

MGO also uses a Greenhouse and Energy Efficiency Process to monitor greenhouse gas emissions and energy use generated by the operation, and to provide a framework for investigating and implementing measures to reduce greenhouse gas emissions and energy use. This process includes:

- Quantifying annual energy use and allocating energy use to site specific processes;
- An annual energy efficiency review and workshop to review the efficacy of energy savings measures;
- Prioritising technically feasible energy saving opportunities; and
- Monitoring the efficacy of management measures.

### 3.4.1 Managing Excess Greenhouse Gas Emissions

MGO aim to maintain annual covered scope 1 greenhouse emissions below its Safeguard Baseline Number of 448,015 t CO<sub>2</sub>-e for Glendell and 534,145 t CO<sub>2</sub>-e for Mt Owen. All reasonable measures are undertaken to limit covered Scope 1 greenhouse gas emissions using the processes described in this plan. Should reportable covered emissions exceed the Safeguard Baseline Number, MGO will either apply for a multi-year monitoring period to allow additional time to reduce emissions, or purchase the required Australian Carbon Credit Units to offset excess emissions.

## 3.5 Emissions

Emissions from the MGO are from a variety of activities including material handling, material transport, processing, diesel engine exhausts, wind erosion, blasting and potentially, the spontaneous combustion of coal. These emissions would mainly comprise of particulate matter (TSP, PM<sub>10</sub> and PM<sub>2.5</sub>) although there would also be emissions from machinery exhausts such as carbon monoxide (CO), oxides of nitrogen (NO<sub>x</sub>) and particulate matter. To a lesser extent there would be emissions from the spontaneous combustion of coal, should that occur.

SSD 5850 Schedule 3 Condition 19(e) requires an initial baseline estimate of the PM<sub>2.5</sub> emissions from all diesel engines used for the MGO. Similarly Schedule 3, Condition 23A K(i) of DA 80/952 also requires the establishment of a diesel combustion emissions baseline. **Table 3.1** shows the baseline estimate from MGO. It should be noted that this estimate is based on generic emission factors for the industry and is not specific to data produced directly from the Original Equipment Manufacturers (OEMs) of equipment used at the BNP and North Pit at MGO.

**Table 3.1 – Baseline estimate of PM<sub>2.5</sub> emissions from diesel engines at MGO**

Equipment	Fuel consumption (kL/y)	PM <sub>2.5</sub> emission factor (kg/kL)	PM <sub>2.5</sub> emissions (kg/y)
All (calculation assumes all diesel is consumed by haul trucks)	18,510	1.1 (NPI 2008)	20,361
<b>Total</b>	<b>18,510</b>	<b>-</b>	<b>20,361</b>

\* Source = Umwelt MOCO Environmental Impact Statement (2015)

**Table 3.2** provides the estimates of PM<sub>10</sub> and PM<sub>2.5</sub> emissions due only to diesel plant and equipment exhausts which were included in the SEE (Mod 2) (Umwelt, 2018).

Emission factors for “Industrial off-road vehicles and equipment” from the EPA’s 2008 Air Emissions Inventory (EPA 2012) were used for the calculations below. These factors relate to diesel exhaust and evaporative emissions.

It is noted that these estimates are based on generic emission factors for the industry and are not specific to data produced directly from the Original Equipment Manufacturers of equipment used at the Mount Owen Mine.

**Table 3.2 – Estimate of PM<sub>2.5</sub> emission from Diesel Engines**

Year	Fuel Consumption from data provided by Mount Owen (L/y)	Emission Factors (kg/kL)		Emissions (kg/y)	
		PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
2	50,999,945	2.84	2.75	144,840	140,495
8	46,767,575	2.84	2.75	132,820	128,835
10	21,512,920	2.84	2.75	61,097	59,264

By comparison, the National Pollutant Inventory (NPI) provides emissions factors for diesel vehicle exhausts related to heavy good vehicles (>25 t GVM). An emission factor of 1.2 kg/m<sup>3</sup> (1.2 kg/kL) is provided for PM<sub>10</sub> and 1.1 kg/m<sup>3</sup> (1.1 kg/kL) for PM<sub>2.5</sub> (NPI, 2008). Comparison of the NPI factors with the EPA factors highlight the potential variability of emissions, depending on the referenced emission factors. This further reinforces the position that the EPA’s 2008 Air Emissions Inventory (EPA, 2012) emission factors provide a more conservative base for the assessment.

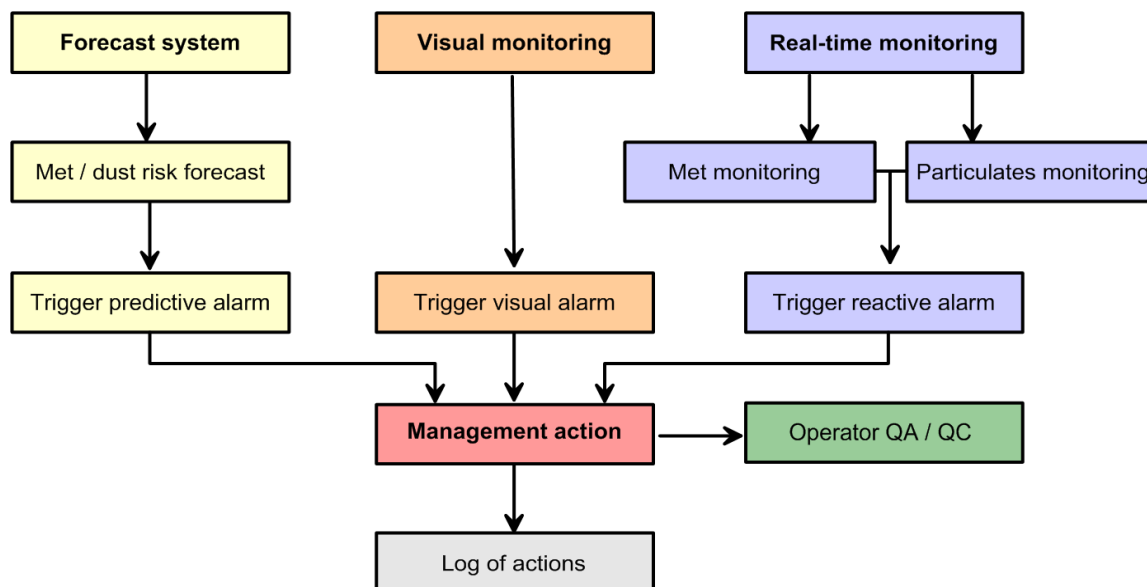
Controls for the emission of PM<sub>2.5</sub> within the diesel exhaust include:

- Servicing all machinery in accordance with maintenance contracts and adopting original equipment manufacturer recommendations for maintenance;
- Targeting the maintenance so equipment remains fit for purpose over its whole life cycle; and
- Defining failure modes, effects and criticality.

## 3.6 Strategies Overview

This section provides an overview of the air quality control strategies, that is, those in addition to the routine air quality management measures.

The air quality control strategy will be based on a combination of automated daily forecasting, visual monitoring, meteorological monitoring and real time air quality monitoring to determine air quality risk on a daily basis. These strategies, which will be used to inform necessary control actions, are shown in **Figure 3.1**. Further detail on real time air quality and meteorological monitoring is provided both below and in **Section 4.1**.



**Figure 3.1 - Overview of the air quality control strategy**

As shown in **Figure 3.1**, provision is made for:

- **Real Time air quality triggers**, based on real-time PM<sub>10</sub> concentration monitoring at sensitive receptors, and including real-time meteorological monitoring to identify conditions conducive to elevated dust events.
- **Visual triggers**, based on on-going daily visual monitoring of dust emissions by site personnel.
- **Forecast triggers**, based on daily automated dispersion modelling of site dust (and air) emissions using forecast meteorological conditions.

Trigger levels that require action for managing dust (and air quality) will be defined as per **Table 3.3.3**.

**Table 3.3 – Trigger level definitions**

<b>Normal state</b>	Reasonably expected conditions in day to day operations No cause for action, but routine dust management to be continued
<b>Yellow Triggers</b>	Change from normal indicating a potential risk Not of a serious nature, but acts as an alert and requires monitoring to detect further trends
<b>Orange Triggers</b>	Moderate risk of dust related impacts occurring Remedial action needs to be planned and executed
<b>Red Triggers</b>	High risk of dust related impacts occurring A situation has occurred that poses an immediate risk and remedial action must be undertaken

## 3.6.1 Proactive Management Strategies

### *Dust Risk Forecast System*

To build on the existing proactive measures implemented on site a range of air quality management and mitigation measures are utilised by MGO to limit the generation of dust (refer to **Section 3-1**). MGO operates an Air Quality Control System (AQCS) which comprises meteorological forecasting and dust dispersion modelling for MGO. This system provides early warning of adverse meteorological conditions and potential dust risks, thus facilitating proactive management of mining activities to reduce dust generation potentials.

Meteorological and dust risk forecasts from the AQCS are automatically sent via email to the Environment and Community Department and key personnel from the Mine Production Department and Coal Handling and Preparation Plant. Forecasts can also be accessed by site personnel via the website (<http://envforecasting.com>)<sup>2</sup> and include two-day forecasts of dust risk index, dust transport, and meteorological conditions.

Mining Supervisors are to review the daily forecast prior to beginning of each shift. Based on the dust transport contour plots, dust risks are assigned as Level 1, Level 2 and Level 3 depending on the risk of dust transmission off site.

In the event that high dust risks are forecast the Mining Supervisor and/or Mining Superintendent will plan for contingency measures so that that dust generation potentials are reduced. Contingency measures may include the following:

- Optimise water cart operation;
- Minimise haul distances;
- Minimise drop height when loading;
- Minimise double handling;
- Dumping at lowest and most protected locations;
- Minimise dozer and truck speeds;
- Cease dozer and grader activity in exposed areas; and
- Restricting crusher operations.

The Environment and Community Department is responsible for providing additional environmental information. This information will be used to inform the production personnel's actions.

Further review of dust risk, weather conditions and the performance of control measures will also be discussed during pre-shift toolbox talks.

<sup>2</sup> Dust forecast website is for internal personnel only and is accessed via an approved site login.

## 3.6.2 Reactive Management Strategies

In addition to the operational controls outlined in **Section 3.1**, specific reactive management measures will be implemented in response to identified triggers. Meteorological and air quality alarms will be triggered and sent to the below recipients and respond appropriately.

In the event an alarm is triggered, the site will record actions taken in response to the alarms in accordance with the site procedures. This includes relocating, modifying or ceasing operations as necessary to minimise dust generation.

### Alarms Recipients

Alarms will be sent via SMS to the following departments:

- Environment and Community (E&C Manager, E&C Coordinator, E&C Officer)
- Production (Production Superintendent, Mining Supervisors)
- CHPP (Supervisors)

Wind direction ranges have been calculated based on the position of each monitor relative to MGO operations so that alarms are representative of impacts from MGO. The wind direction ranges are provided in **Table 3.4** below. These triggers are reviewed annually to facilitate consistency with the progressing mining operations.

**Table 3.4 – Wind direction ranges for dust alarms**

EPL	Station	Location	Alarm trigger directions <sup>1</sup>	Meteorological Station
<b>4460</b>	<b>Mt Owen SSD -5850</b>			
8	SX13 D8	Hebden Road – Mt Owen	110° - 150°	SX13M8
10	SX13 D9	Glennies Creek Road	330° - 10°	SX13M2
9	SX13 D10 <sup>2</sup>	Greenlands (Olive Grove)	260° - 350°	SX13M2
-	SX13 D11	Middle Falbrook Area	290° - 0°	SX13M2
<b>12840</b>	<b>Glendell DA 80/952</b>			
-	SX13 D4	Camberwell Village	305° - 22°	SX13M1
-	SX13 D9	Glennies Creek Road	260° - 330°	SX13M2
-	SX13 D1	Hebden Road – Glendell	10° - 170°	SX13M1
13	SX 13 D5 <sup>2</sup>	Hebden Road – Glendell	10° - 170°	SX13M1
12	SX 13 D6 <sup>2</sup>	Glendell HMA Offset	251° - 352°	SX13M1

1. Wind direction ranges are expressed as clockwise bearing ranges.

2. SX13 – D5, SX13 – D6 & SX13 - D10 are located on Mine Owned Land and is not representative of nearby neighbours. These units are used as a short term and early warning alarms management purposes.

## Meteorological Triggers

Meteorological triggers are defined in **Table 3.5** Table 3.5 - Meteorological triggers and are applied to wind speed, ambient air temperature and rainfall data logged at 5-minute intervals.

**Table 3.5 - Meteorological triggers**

Yellow Weather Alert	Orange Weather Alarm	Red Weather Alarm
5-minute average wind speed exceeds 8 m/s (for 4 or more consecutive 5-minute periods)	5-minute average wind speed exceeds 10 m/s (for 4 or more consecutive 5-minute periods)	5-minute average wind speed exceeds 12 m/s (for 4 or more consecutive 5-minute periods)
AND	AND	AND
24-hour rolling total rainfall is less than 2mm	24-hour rolling total rainfall is less than 2mm	24-hour rolling total rainfall is less than 2mm

Weather alarms will be sent via SMS to the recipients listed above. In the event an alarm is triggered, the site will record actions taken in response to the alarms in accordance with the site procedures. This includes relocating, modifying or ceasing operations as necessary to minimise dust generation.

Due to the close proximity of neighbouring mining operations, assessment of compliance with criteria will require careful consideration of meteorological conditions and other contributing sources in order to determine the contribution from the individual MGO operations. This will include an assessment of the upstream monitoring results against the downstream monitoring results.

## Real Time Air Quality Triggers

This section refers to Real Time air quality alarms trigger levels for compliance units. The real time air quality monitors have been setup to record directional dust sources. Alarms have been set up to trigger when one the following criteria is exceeded. The criteria are summarised in **Table 3.6** below.

**Table 3.6 Air Quality Trigger Levels Compliance Monitors**

	Yellow Air Quality Alarms	Orange Air Quality Alarms	Red Air Quality Alarms
Short Term Alarm	Site specific contribution 30 mins rolling average greater than 80 µg/m³.	Site specific contribution 1-hr rolling average greater than 80 µg/m³.	Site specific contribution 1-hr rolling average greater than 200 µg/m³.
Long Term Alarm	Site specific contribution 24-hr rolling average greater than 40 µg/m³.	Site specific contribution 24-hr rolling average greater than 45 µg/m³.	Site specific contribution 24-hr rolling average greater than 50 µg/m³.

### ***Air Quality Trigger Action Response Plan (TARP)***

Following the receipt of a short or long term alarm, the mining supervisor will investigate potential sources of dust generation onsite and undertake an inspection of current operations. To assist in the response to the alarms set for the site and visual inspections, a Dust TARP has been developed outlining the actions to be taken in the event of receiving a short or long term alarm.

This includes relocating, modifying or ceasing operations as necessary to minimise dust generation.

Depending on the level of the alarm received, actions which may be taken include relocating, modifying or ceasing operations. These include, but are not limited to:

- Ensuring water suppression devices are active on machinery;
- Directing water suppression vehicles to area of management;
- Hot-seating water suppression vehicles;
- Minimise hauling distances;
- Minimise double handling;
- Minimise dozer and truck speeds;
- Minimise drop height when loading;
- Re-locate operations to more protected areas within pit;
- Restrict crusher operations;
- Cease activity in exposed areas; and
- Shutdown of equipment.

## **3.7 Air Quality Information**

In accordance with **Schedule 4 Condition** 1 of SSD 5850 and DA80/952, MGO will provide a copy of the NSW Health fact sheet entitled "Mine Dust and You" to the owners and / or existing tenants of any land where the predictions in the Mt Owen Continued Operations Project Environmental Impact Statement (Umwelt 2015) identify that dust emissions generated by the development are likely to be greater than air quality criteria.

## **3.8 Rain Water Tank Inspection and Cleaning**

Mount Owen has committed to contacting all residences within 4 kilometres of the North Pit or BNP within 6 months of project approval (SSD 5850) and discuss the inspection and cleaning of tanks. Rainwater tanks at privately-owned properties within a 4 kilometre radius from the approved mining limit will be inspected at least every two years with cleaning carried out should the inspection identify that this is required. Residents will also be advised that additional management options are available if cleaning alone is not adequate in managing the impacts and further management measures are required. MGO will implement these measures in accordance with the **MGO Land Acquisition, Mitigation and Compensation Procedure**.

## **3.9 Best Practice Measures**

MGO have adopted best practice dust control measures where reasonable and feasible to minimise air quality impacts. A comparison of the controls implemented at MGO in comparison to those identified 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) is provided in **Appendix D**.



## 4 Measurement and Evaluation

### 4.1 Monitoring

The following processes will be implemented at the MGO to monitor and respond to dust events:

- Maintain a documented register of all air quality monitoring units utilised across the complex;
- Locate monitoring stations in line with monitoring objectives, Australian Standards and EPA requirements;
- Establish and operate air quality monitoring stations and analyse and assess monitoring data in accordance with the following:
- Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales;
- Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales; and
- Periodically conduct inspections of dust management across the MGO.

All air quality monitoring is undertaken in accordance with the statutory requirements associated with the MGO EPLs and Development Consent Conditions, which specify required methods of sampling, analysis and frequency of monitoring. Air quality criteria set for the site is detailed in **Section 2.3**.

The MGO air quality monitoring program includes a combination of Dust Deposition Gauges, TSP & PM<sub>10</sub> High Volume Air Samplers (HVAS) and Continuous PM<sub>10</sub> and PM<sub>2.5</sub> monitoring units (TEOMs and EBAMs). Monitors are positioned to allow for the contribution of MGO to local air quality to be determined for both nearby residents and tenanted properties owned by the MGO. For example, in upwind and downwind positions under the prevailing weather conditions. The locations of air quality and meteorological monitoring equipment in the vicinity of MGO are shown in **Figure 4.1**.

The monitoring sites used for compliance purposes, the equipment, frequency of monitoring and relevant monitoring standards are summarised in **Table 4.1**. **Table 4.2** provides a list of monitoring sites that complement the monitoring network, but are not used for demonstrating compliance, generally as a result of being located within mine-owned land.

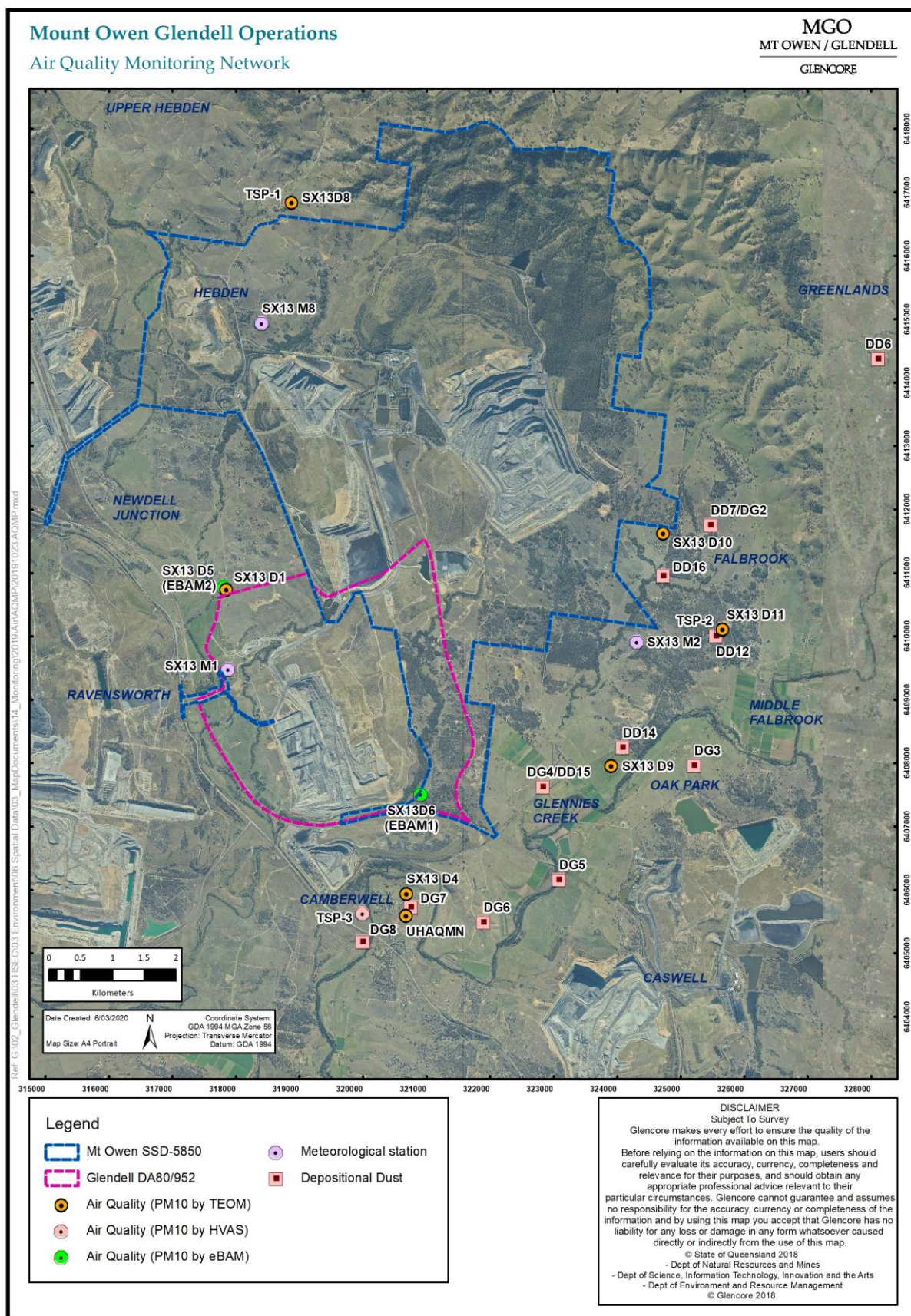
**Table 4.1 – Air quality and meteorological compliance monitoring**

Development Consent	Monitoring site(s)	Indicator(s)	Frequency	Standard
SSD 5850	DD6, DD7/DG2, DD12, DD14, DD15/DG4	Insoluble solids	Monthly	AS/NZS 3580.10.1:2016
DA 80/952	DD7/DG2, DD15/DG4, DG3, DG5, DG6, DG7 and DG8.	Insoluble solids	Monthly	AS/NZS 3580.10.1:2016
SSD 5850 DA 80/952	TSP-2, TSP-3	TSP	Six day cycle	AS/NZS 3580.9.3:2015
SSD 5850	Sentinex 13 – D11;	PM <sub>2.5</sub>	Continuous	AS/NZS 3580.9.3:2015
SSD 5850	Sentinex 13 – D9; Sentinex 13 – D11;	PM <sub>10</sub>	Continuous	AS/NZS 3580.9.8:2008
DA 80/952	Sentinex 13 – D4; Sentinex 13 – D9;	PM <sub>10</sub>	Continuous	AS/NZS 3580.9.8:2008
SSD 5850	Sentinex 13 – M2; Sentinex 13 – M8 ;	Meteorology	Continuous	AS 3580.14:2011
DA 80/952	Sentinex 13 – M1; Sentinex 13 – M2;	Meteorology	Continuous	AS 3580.14:2011

**Table 4.2 – Other air quality monitoring**

Monitoring site(s)	Indicator(s)	Frequency	Standard	Purpose
DD16	Insoluble solids	Monthly	AS/NZS 3580.10.1:2016	Compliments compliance monitoring network for determination on mine owned land
TSP-1	TSP	Six day cycle	AS/NZS 3580.9.3:2015	Compliments compliance monitoring network for determination on mine owned land
Sentinex 13 – D8;	PM <sub>2.5</sub>	Continuous	AS/NZS 3580.9.3:2015	Compliments compliance monitoring network for determination on mine owned land
Sentinex 13 – D5 Sentinex 13 – D6	PM <sub>10</sub>	Continuous	None	EPL 12840 Monitoring Points Compliments compliance monitoring network for determination on mine owned land
Sentinex 13 – D8; Sentinex 13 –D10;	PM <sub>10</sub>	Continuous	AS/NZS 3580.9.8:2008	EPL 4460 Monitoring Point Compliments compliance monitoring network for determination on mine owned land
Sentinex 13 – D1;	PM <sub>10</sub>	Continuous	AS/NZS 3580.9.8:2008	Compliments compliance monitoring network for determination on mine owned land





**Figure 4.1 - MGO Meteorological and Air Quality Monitoring Network**

### **Meteorological Monitoring**

Meteorological monitoring is undertaken at MGO in accordance with the Development Consents at the locations shown on **Figure 4.1**. The meteorological monitoring provides the MGO with information to allow for the most appropriate response to changes in weather conditions. Meteorological monitoring includes the parameters outlined in **Table 4.3**.

**Table 4.3 – Parameters Measured at Meteorological Monitoring Stations**

Parameter	Mt Owen	Glendell
Wind Direction	degrees	degrees
Wind Speed	metres per second	metres per second
Air Temperature	degrees Celsius	degrees Celsius
Relative Humidity	percent	percent
Rainfall	millimetres	millimetres
Barometric Pressure	-	Pascal
Sigma Theta	degrees	degrees

(a) Air temperature measured at 2m and 10m above ground, with difference in concurrent temperatures logged as "Delta T".

The MGO continuous meteorological monitoring network includes three (3) 10 metre tower weather stations, Sentinex 13 (M1), Sentinex 13 (M2) and Sentinex 13 (M8), located to the, west, south-east and north-west of the active mining areas respectively.

Sentinex 13 (M2) was installed to the southeast of the active mining area of the Mt Owen North Pit (refer to **Figure 4.1**) on 21 June 2017. All weather stations have been installed and operated in accordance with the requirements of *Australian Standard AS2922-1987 Ambient Air – Guide for the siting of sampling units*.

All meteorological stations are capable of continuous real-time measurement of temperature lapse rate in accordance with the NSW Industrial Noise Policy. Each meteorological station will collect sigma-theta data, that is, the standard deviation of the horizontal wind direction. Sigma theta will be used to estimate the atmospheric stability class (an indication of the temperature lapse rate) in accordance with the procedures of the US EPA (2000).

### **Dust Deposition Gauges**

Dust deposition gauges are a series of bottle and funnel based gauges located in areas surrounding the MGO (refer to **Figure 4.1**). The dust deposition gauges are sampled monthly to determine the amount of dust that settles in a predetermined area. This is then analysed for contamination through insects, bird droppings etc. with the non-contaminated results assessed against the criteria for depositional dust outlined in **Table 2.2**.

### **High Volume Air Samplers (HVAS)**

High volume air samplers are run on a 6 day cycle and are operated for a period of 24 hours. The air is passed through a filter system to determine the amount of TSP and PM<sub>10</sub> dust is contained in the air. The samples are collected after running for a period of 24 hours and analysed, with the results assessed against the relevant criteria.

### **Continuous Environmental Monitoring Units (TEOMs and EBAMs)**

MGO operate a series of real time continuous Tapered Element Oscillating Microbalance (TEOM) monitoring units and EBAMs that are used to assess operations on a real time basis and to provide information that can be used to respond to air quality issues. Each unit records the following data that can be used to assess air quality from the complex:

- Real time PM<sub>10</sub> and PM<sub>2.5</sub> µg/m<sup>3</sup> recordings;
- 24 hour PM<sub>10</sub> and PM<sub>2.5</sub> µg/m<sup>3</sup> as a rolling average; and
- Wind direction, wind speed and rainfall.



Real time monitors are continuous monitors that can be accessed by site personnel to determine real time air quality conditions, or can be used to perform historical searches to respond to complaints or issues. Data from the monitoring system can be received at pre-set intervals or can be accessed remotely as required. Data records are stored on the Sentinex System for a period of 1 year. However, older data can be retrieved from archived records.

Each real time air quality monitoring unit is fitted with alarming capabilities that can advise relevant mining personnel that air quality at the monitor has reached a pre-set value. Alarms are sent via SMS to the Environmental Personnel, Mining Supervisor and other relevant Mining personnel to warn that air quality is reaching the predetermined limit. Action can then be instigated to modify operations where deemed necessary to maintain operational compliance.

TEOMs and EBAMs are continuous monitoring units, and therefore 'operational' 24/7. TEOMs consist of an air conditioner, TEOM unit (dust calculator) and a modem. These units may occasionally be exposed to connectivity (i.e. Telstra) and power supply outages out of the control of MGO as well as intrinsic maintenance tasks and breakdowns. All units are maintained in accordance with relevant Australian Standards as identified in **Table 4.1**. There may also be other outages outside of the control of MGO such as theft or vandalism. In such situations, MGO will exercise the reasonable and feasible engaging a qualified technician to visit the affected TEOM or EBAM unit as soon as practical.

For EBAMs and TEOMs breakdowns, MGO will engage a qualified technician to visit the unit as soon as practicable, noting that adverse weather, weekends and breakdowns that require parts replacement will delay the process. MGO will report those outages and breakdowns in the Annual Review.

#### **Haul Road Dust Emissions Monitoring**

Haul road dust monitoring will be carried out every three years, with the last monitoring undertaken in 2018. This monitoring will be used to determine the control efficiency of dust mitigation measures, such as those outlined in **Section 3.1.2**. The target control efficiency is 85%. The haul road dust monitoring will involve:

- Measuring dust (as PM<sub>10</sub>) emissions from an unsealed, uncontrolled haul road.
- Measuring dust (as PM<sub>10</sub>) emissions from an unsealed, controlled haul road.
- Determining the control efficiency (as a percentage) from the relationship between measurements from uncontrolled and control haul roads.

Records of the monitoring will be reported in the Annual Review, where relevant to that reporting year.

#### **Greenhouse Gas Emissions Monitoring**

In accordance with Schedule 3, Condition 23A of DA 80/952, diesel combustion emissions baseline monitoring will be established. Greenhouse gas emissions and energy use will be monitored using monthly data entered into AQS, as discussed further in **Section 4.3.3** below.

## **4.2 Record Keeping**

All air quality monitoring data (including calibration certificates and service maintenance records) are maintained in accordance with the Environmental Management Strategy and retained on the premise for a period of 4 years. Additionally, calibration certificates and service maintenance records are kept in the Sentinex System. Alarm response data is emailed to site personnel each day and can be historically retrieved if required.

To comply with relevant legislation, MGO is required to retain records of their energy consumption, energy production, emissions data and estimations.

## **4.3 Reporting**

Environmental monitoring result summaries, compliance with Consent and Licence conditions and any required modifications to the air quality monitoring will be reported in the Annual Review. Summaries will also be made available to the public via the Mt Owen Complex Website in accordance with the EPA requirements for publishing monitoring data.

Considerations to Air quality and Greenhouse Gas management and compliance will be presented at Community Consultative Committee (CCC) meetings.

### 4.3.1 Incident Reporting and Compliance Evaluation

If monitoring results identify an exceedance of the criteria outlined in **Table 2.2** or **Table 2.3**, except where a negotiated agreement has entered into in relation to the impact, MGO will notify DPIE immediately.

Affected Landowners will be notified as soon as practicable. In accordance with **Schedule 5 Condition 9 of SSD 5850 and DA 80/952**, a report will be provided to the DPIE and other relevant agencies within 7 days of the date of the incident. The report will:

- Describe the date, time, and nature of the exceedance / incident;
- Identify the cause (or likely cause) of the exceedance / incident;
- Describe what action has been taken to date; and
- Describe the proposed measures to address the exceedance / incident.

Air quality monitoring results and compliance with Consent and Licence conditions will be reported in the Annual Return to the EPA and in the Annual Review. A summary of air quality monitoring results will be presented at CCC meetings and will also be made available to the public via the MGO Website. These results will be updated monthly.

If dust emissions generated by MGO have been identified as the cause of an exceedance of the criteria at the residences listed in **Table 2.4**, MGO will implement additional mitigation measures in accordance with Schedule 3, Condition 2 of SSD-5850. These measures will be implemented upon receiving a written request from the owner of the residence, except where there is an agreement relating to air quality in place between MGO and the private residence. MGO will also employ all reasonable and feasible avoidance and mitigation measures so that dust emissions from MGO do not cause exceedances of the criteria at any occupied residence on mine-owned land.

Following a written request being received, MGO will complete a compliance evaluation for the requesting residence by assessing the available results from the existing air quality monitoring network. The Upper Hunter Air Quality Monitoring Network (UHAQMN) will also be utilised to inform MGO of the regional dust levels at the time of the request. Outcomes of the compliance evaluation will be used to assist in determining MGO's total air quality contribution and will allow targeted consultation with the landholder to identify any additional mitigation requirements.

Compliance with the impact assessment criteria (refer to **Table 2.2** and **Table 2.3**) and land acquisition criteria requires a direct or indirect assessment of measured results, depending on the averaging period and requirements of the criteria in **Section 2.3**.

Compliance with the criteria in **Table 2.2** and **Table 2.3** will be demonstrated where the measured level is below the criteria. Measured levels above the criteria do not necessarily constitute non-compliance. In these circumstances additional investigations will be carried out to determine compliance. The specific investigations to be carried out are outlined in **Table 4.4** below.

**Table 4.4 – Methods for determining compliance against Impact Assessment Criteria**

Pollutant	Averaging Period	Methods for determining compliance
Long Term Impact Assessment Criteria for Particulate Matter		
Total Suspended Particulate (TSP) matter	Annual	Assessed annually. Compliance will be determined by direct comparison of the measured annual average (calendar year) against the relevant criterion. Results will be reported in the Annual Environmental Management Report. Non-compliances will be accompanied by actions for improvement and, in these circumstances, this AQGGMP will be updated, as appropriate, in accordance with <b>Section 5.1</b> .
Particulate Matter < 10 µm (PM <sub>10</sub> )	Annual	Assessed annually. Compliance will be determined by direct comparison of the measured annual average (calendar year) against the relevant criterion. Results will be reported in the Annual Environmental Management Report. Non-compliances will be

Pollutant	Averaging Period	Methods for determining compliance
		accompanied by actions for improvement and, in these circumstances, this AQGGMP will be updated, as appropriate, in accordance with <b>Section 5.1</b> .
Particulate Matter < 2.5 $\mu\text{m}$ (PM <sub>2.5</sub> )	Annual	Assessed annually. Compliance will be determined by direct comparison of the measured annual average (calendar year) against the relevant criterion. Results will be reported in the Annual Environmental Management Report. Non-compliances will be accompanied by actions for improvement and, in these circumstances, this AQGGMP will be updated, as appropriate, in accordance with <b>Section 5.1</b> .
Deposited Dust (maximum increase)	Annual	Assessed annually. Compliance will be determined by direct comparison of the measured annual average (calendar year) against the relevant criterion, taking into consideration the existing levels in <b>Section 2.1</b> and excluding contaminated samples). Results will be reported in the Annual Environmental Management Report. Non-compliances will be accompanied by actions for improvement and, in these circumstances, this AQGGMP will be updated, as appropriate, in accordance with <b>Section 5.1</b> .
Deposited Dust (annual average)	Annual	Assessed annually. Compliance will be determined by direct comparison of the measured annual average (calendar year, excluding contaminated samples) against the relevant criterion. Results will be reported in the Annual Environmental Management Report. Non-compliances will be accompanied by actions for improvement and, in these circumstances, this AQGGMP will be updated, as appropriate, in accordance with <b>Section 5.1</b> .
Short Term Impact Assessment Criteria for Particulate Matter		
Particulate Matter < 10 $\mu\text{m}$ (PM <sub>10</sub> )	24 Hour	<p>Assessed in the event of an exceedance of the 24-hour average criterion at any of the TEOM PM<sub>10</sub> monitors (i.e. greater than 50 <math>\mu\text{g}/\text{m}^3</math>). Compliance will be determined by calculating the contribution of the MGO to the measured 24-hour average result at the monitor where the exceedance was recorded.</p> <p>The 24-hour average contribution of the MGO will be calculated by firstly using an upwind / downwind approach. If this value exceeds the 24-hour average criterion, MGO will further investigate the background PM<sub>10</sub> concentration, prevailing wind speed and direction measurements of the previous 24-hour period.</p> <p>MGO will be considered non-compliant with the Short Term Impact Assessment Criteria for Particulate Matter if this investigation estimates MGO to have significantly contributed (i.e. an estimated contribution of &gt;75%).</p> <p>In accordance with Schedule 5, Condition 9 of SSD 5850 and DA 80/952, the Department will be notified immediately where MGO has estimated to have significantly contributed to greater than 50 <math>\mu\text{g}/\text{m}^3</math> of the 24-hour average result. A report detailing the event will be provided to the Department within 7 days of the event occurring.</p> <p>Results will also be reported in the Annual Environmental Management Report. Non-compliances will be accompanied by actions for improvement and, in these circumstances, this AQGGMP will be updated, as appropriate, in accordance with <b>Section 5.1</b>.</p>
Particulate Matter < 2.5 $\mu\text{m}$ (PM <sub>2.5</sub> )	24 Hour	<p>Assessed in the event of an exceedance of the 24-hour average criterion at any of the TEOM PM<sub>10</sub> monitors (i.e. greater than 25 <math>\mu\text{g}/\text{m}^3</math>). Compliance will be determined by calculating the contribution of Mt Owen to the measured 24-hour average result at the monitor where the exceedance was recorded.</p> <p>The 24-hour average contribution of the MGO will be calculated by firstly using an upwind / downwind approach. If this value exceeds the 24-hour average criterion, MGO will further investigate the background PM<sub>2.5</sub> concentration, prevailing wind speed and direction measurements of the previous 24-hour period.</p> <p>MGO will be considered non-compliant with the Short Term Impact Assessment Criteria for Particulate Matter if this investigation</p>



Pollutant	Averaging Period	Methods for determining compliance
		<p>estimates MGO to have significantly contributed (i.e. an estimated contribution of &gt;75%).</p> <p>In accordance with Schedule 5, Condition 9 of SSD5850, the Department will be notified immediately where MGO has estimated to have significantly contributed to greater than 25µg/m<sup>3</sup> of the 24-hour average result. A report detailing the event will be provided to the Department within 7 days of the event occurring.</p> <p>Results will also be reported in the Annual Environmental Management Report. Non-compliances will be accompanied by actions for improvement and, in these circumstances, this AQGGMP will be updated, as appropriate, in accordance with <b>Section 5.1</b>.</p>

## 4.3.2 Corrective Action

**Table 4.5** summarises the potential air quality issues that may arise and the appropriate corrective action(s) that will be taken.

**Table 4.5 - Corrective actions**

Issue	Action(s)
Visible dust emissions leaving the site.	Notify OCE and Mining Personnel of the issue so it can be investigated and remediated. In the event excessive dust is being generated from a neighbouring mine, the E&C Team will contact the mine and advise them of the issue.
Potential to exceed air quality criteria based on a trigger (alarm) and interpretation of trends in monitoring data	Investigation of trends, undertaking mitigating measures. Report potential exceedance to Senior Management. In the event the investigation reveals a particular event at a neighbouring mine site has been determined to be the predominant impact, notification to the other site shall be undertaken by the E&C Manager.
Exceedance of air quality criteria	Investigation of exceedance, undertaking mitigating measures. Report exceedance to the relevant regulatory agencies, senior management and notify impacted residents as required. Update this AQGGMP with results and recommendations from the exceedance investigations, in accordance with <b>Section 5.1</b> . Where the AQGGMP is updated, it will be resubmitted to DPIE for approval.
Community complaints	Investigation of complaint, taking mitigating measures into account and provide feedback to complainant. Report complaint to senior management. Provide feedback to mine planning and production personnel, where relevant. If the complaint relates to another site, the E&C Manager will contact the other site and advise of the nature and results of the investigation.

## 4.3.3 Greenhouse Gas Reporting

Through its parent entity GCAA, MGO reports annually on emissions performance as required under Commonwealth National Greenhouse and Energy Reporting (NGER) Act 2007.

The NGER report will contain:

- Energy usage;
- Energy production; and
- Greenhouse gas emissions.

## 4.4 Complaint Resolution

All complaints received by MGO are managed in accordance with the GCAA Community Complaint Management standard and the MGO **Environmental Management Framework** that details the process so that complaints are properly documented and handled in accordance with licence requirements and company policy.

In response to dust complaints, an investigation into the complaint will be completed by a member of the MGO E&C team. The subsequent complaint notification report shall provide details on the following:

- Project specific air quality levels from the nearest Sentinex monitor(s) adjacent to the sensitive receiver or from the Upper Hunter Air Quality Monitoring Network (where applicable);
- Current operational activities and changes, if any made to the operation in response to the complaint, comparison of air quality concentration levels with compliance limits, assessment of weather conditions (wind speed and direction, rainfall) including a review of data in the lead up to and at the time of the complaint; and
- Follow up response to the complainant.

Following the complaint investigation, the complainant will be provided with the details of the investigation report including what actions were taken to mitigate any further air quality risks.

MGO maintains a dedicated free-call community response line (1800 730 883) that is advertised at least quarterly in the local newspapers, provided in each edition of the Greater Ravensworth Community Newsletter and displayed on the MGO website ([www.mtowencomplex.com.au](http://www.mtowencomplex.com.au)).

As a minimum, notification of complaints received via the community response line is provided by immediate SMS relay to the MGO E&C Manager, and the Mt Owen and Glendell Production Supervisor on-shift as required.

Complaints and enquiries do not have to be received on the Hotline and may be received in any other form. Any complaint or enquiry relating to environmental management or performance is to be relayed to the MGO E&C Manager as soon as practical. All employees are responsible for ensuring the prompt relaying of complaints.

The MGO E&C Manager or their delegate is responsible for ensuring that all complaints are appropriately investigated, actioned and that information is fed back to the complainant, unless requested to the contrary.

A summary of complaints received and actions taken is presented in the Annual Review and to the MGO CCC as part of the operational performance review. A complaints register is to be updated monthly on the MGO website located at [www.mtowencomplex.com.au](http://www.mtowencomplex.com.au).

## 4.5 Independent Review

If a landowner considers the operation to be in exceedance of the impact assessment criteria, they may request an independent review of the effects of the operation on their land. Such a request must be made in writing to the Secretary of the DPIE. If the Secretary determines that an independent review is to be undertaken, MGO must follow the procedures outlined in Schedule 4, Condition 4 of the development consents.

## 4.6 MGO Air Quality Management Coordination Protocol

In accordance with the Mt Owen Development Consent, MGO will use its best endeavours to coordinate air quality management with nearby mines to reasonably and feasibly minimise cumulative air quality impacts.

A quarterly environmental meeting is in place with Integra, Rix's Creek, Ashton, Liddell and Ravensworth Operations. Where elevated air quality conditions (that is, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations) are measured at compliance monitoring stations, discussions are initiated with the relevant mining operations to inform them of the measurements and reviewed in the quarterly meeting. Additionally, where other operations are identified as being the source of the emissions to air, either when investigating a complaint or in the response to air quality alarms, notification of the air quality impact to the mining operations will be made to advise them of the issue.

When appropriate, data are shared between the mining operations with real time air quality monitoring equipment being shared between other mining operations.

Management of potential cumulative air quality impacts will also involve:

- Use of continuous dust monitors upstream and downstream of the mine sites to estimate the project specific contribution by taking the difference between the monitors.
- Use of continuous dust monitors which are representative of the community and have alarms which are activated if a high dust peak is evident and the wind direction is from the mine site to the monitor, allowing for immediate investigation and actions to be taken where necessary; and
- Publishing air quality results, available to the community, in terms of the cumulative result and performance of the mine against the project specific criteria.

## 5 Review and Improvement

### 5.1 Plan Review

This Air Quality and Greenhouse Gas Management Plan will be reviewed in accordance with the **MGO Environmental Management Strategy**, that is:

- Every three years;
- Following an independent environmental audit, with findings relevant to this Plan;
- Following an environmental incident or community complaint relevant to the control measures outlined in this Plan;
- Within 3 months of the submission of an Annual Review; or
- Following relevant outcomes from a risk assessment or change management process.

If any significant modifications to the **Air Quality and Greenhouse Gas Management Plan** are required as an outcome of the review, relevant government agencies will be consulted regarding the changes and the revised Plan will be submitted to DPIE for approval. Minor changes such as formatting edits will be discussed verbally with DPIE prior to completion and will be made following DPIE confirmation. These edits will be tracked with version control (refer to **Section 9.4**) on the Project Website.

This AQGGMP may also be revised due to:

- Deficiencies being identified;
- Introduction of additional mitigation measures or controls;
- Results from the monitoring and review programme, including exceedances of criteria;
- Recommendations resulting from the monitoring and review programme;
- Changing environmental requirements;
- Improvements in knowledge or technology becoming available;
- Changes in legislation;
- Identification of a requirement to alter this AQGGMP following a risk assessment; or,
- Updating of the Mining Operation Plan.

As the site progresses, monitoring results in the Middle Falbrook area will be reviewed along with the adequacy of the monitoring program. This will be done to make sure that the air quality monitoring program is providing adequate spatial coverage to support the Air Quality management System at the MGO.

## 5.2 Audit

In accordance with the Development Consents of Mt Owen and Glendell, initially within 12 months of approval, and every three years thereafter, MGO will commission an Independent Environmental Audit to the satisfaction of DPIE. The Audit will include an assessment of the adequacy of the **Air Quality and Greenhouse Gas Management Plan** and air quality monitoring program. Where necessary following the audit, the Plan will be updated to include action taken to improve air quality performance and air quality management practices.

## 5.3 Training and Communication

Training for MGO employees and contractors is undertaken in accordance with the MGO EMF. Generic air quality management and greenhouse gas and energy efficiency training is provided to all employees and contractors through the GCAA *Generic Surface Induction* and the *Site Familiarisation (Glencore)* and the *Thiess Site Induction (Thiess)*.

From time to time, workforce communication days and toolbox talks allow for discussion of the objectives and requirements of this and any other relevant Management Plans.

To facilitate the effective implementation of air quality and greenhouse gas management controls, all Mt Owen Complex personnel involved in the supervisory and operator roles will undertake general air quality awareness training annually, additionally, air quality awareness training will be undertaken if there is a change in personnel.

Training will be provided to all relevant personnel on environmental obligations, operation of air quality and weather monitoring systems in relation to emission controls in accordance with the site based training needs analysis.

## 6 Commitments

All commitments outlined within this management plan are detailed in **Table 6.1** below. Management commitments requiring actioning will be entered into the MGO Compliance Management system (CMO) and actioned. Records of documentation associated with the management commitments will also be maintained within CMO.

**Table 6.1 - Management Plan Commitments**

No.	Commitment	Where addressed in Management Plan	Completion Status
1	Continued use of visual triggers and associated procedures and training for wheel generated dust from unpaved haul roads, bulldozer operations, overburden emplacement, loading trucks and windblown erosion.	<b>Section 3.1 and 3.6</b>	<b>Ongoing</b>
2	Implement the air quality controls outlined in <b>Section 3.1</b> , namely: <ol style="list-style-type: none"> <li>1. Environmental Management</li> <li>2. Mine Planning</li> <li>3. Unsealed Roads</li> <li>4. Exposed Areas</li> <li>5. Coal Handling and Stockpiles</li> <li>6. Topsoil Management</li> <li>7. Drill and Blast Operations</li> <li>8. Material Extraction and Handling</li> <li>9. Dozer Operations</li> <li>10. Scraper Operations</li> <li>11. Material Crushing and Screening</li> <li>12. Rail Loading Operations</li> </ol>	<b>Section 3.1</b>	<b>Ongoing</b>
3	Use of the Mount Owen Complex proactive air quality control system to inform operational dust management which includes: <ul style="list-style-type: none"> <li>• Real Time air quality triggers, based on real-time PM10 concentration monitoring at sensitive receptors, and including real-time meteorological monitoring to identify conditions conducive to elevated dust events.</li> <li>• Visual triggers, based on on-going daily visual monitoring of dust emissions by site personnel.</li> <li>• Forecast triggers, based on daily automated dispersion modelling of site dust (and air) emissions using forecast meteorological conditions.</li> </ul>	<b>Section 3.6</b>	<b>Ongoing</b>
4	Wind direction ranges have been calculated based on the position of each monitor relative to MGO operations to so that the alarms are representative of impacts from MGO. The wind direction ranges are reviewed annually to facilitate consistency with the progressing mining operations.	<b>Section 3.5</b>	<b>Annually</b>

<i>No.</i>	<i>Commitment</i>	<i>Where addressed in Management Plan</i>	<i>Completion Status</i>
<b>5</b>	Weather and dust alarms will be sent via SMS to the registered recipients. In the event an alarm is triggered, the site will record actions taken in response to the alarms in accordance with the site procedures. This includes relocating, modifying or ceasing operations as necessary to minimise dust generation.	<b>Section 3.5</b>	<b>Ongoing</b>
<b>6</b>	Mount Owen will contact all residences within 4 kilometres of the North Pit and BNP within 6 months of project approval (SSD 5850) and discuss the inspection and cleaning of tanks. Rainwater tanks at privately-owned properties within a 4 kilometre radius from the approved mining limit will be inspected at least every two years with cleaning carried out should the inspection identify that this is required. Residents will also be advised that additional management options are available if cleaning alone is not adequate in managing the impacts and further management measures are required.	<b>Section 3.8</b>	<b>Completed</b> (February 2017 and November 2017) <b>and ongoing</b>
<b>7</b>	Greenhouse Gas emissions and energy use will be monitored and evaluated with measures identified to minimise emissions	<b>Section 3.4</b>	<b>Ongoing</b>
<b>8</b>	Haul road dust monitoring will be carried out every three years (2018, 2021, 2024) to determine the control efficiency of dust mitigation measures. The target control efficiency is 85%.	<b>Section 4.1</b>	<b>Ongoing</b>
<b>9</b>	Training will be provided to all relevant personnel on environmental obligations, greenhouse gas and energy efficiency, operation of air quality and weather monitoring systems in relation to emission controls in accordance with the site based training needs analysis.	<b>Section 5.3</b>	<b>Ongoing</b>



## 7 Accountabilities

**Section 3.1** of the MGO EMF identifies the roles and responsibilities of all employees and contractors for the environmental management of the complex. In addition to this, the key accountabilities associated with this AQGGMP are presented in **Table 7.1**.

**Table 7.1 - Accountabilities**

Role	Accountabilities for this document
Operations Manager	<p>Approve the Air Quality and Greenhouse Gas Management Plan.</p> <p>Confirm that the plan is relevant to current operations</p> <p>Provide adequate resources for the implementation of this Plan.</p>
Environment and Community Manager	<p>Oversee the implementation of the Air Quality and Greenhouse Gas Management Plan.</p> <p>Coordinate monitoring in accordance with this Plan.</p> <p>Notify regulatory authorities and affected landholders of any air quality related exceedance and undertake associated reporting.</p> <p>Coordinate periodic reviews of this Plan.</p> <p>Oversee reporting of mining activities are undertaken in accordance with the requirements of this plan.</p> <p>Facilitate environmental training at MGO so that all personnel are trained in accordance with this Plan.</p>
Environment and Community Coordinator / Officer	<p>Assist the Environment and Community Manager as required in implementation of this Plan.</p> <p>Assist the Environment and Community Manager with investigations of air quality criteria exceedances, incidents or complaints.</p> <p>Liaise with the Environment and Community Manager to maintain the environmental hotline.</p> <p>Coordinate the implementation of the MGO air quality monitoring program in accordance with this Plan.</p> <p>Coordinate the management of records and reporting of air quality and greenhouse gas monitoring results.</p> <p>Manage air quality related complaints in accordance with the complaints management procedure.</p> <p>Provide training to all relevant personnel</p> <p>Develop and maintain a protocol to minimise the potential for simultaneous blasting with other nearby mines.</p>
Mining supervisor / open-cut examiner	<p>Respond to potential exceedances of air quality criteria as identified by the continuous monitoring system.</p> <p>Review operations in response to alerts and modify operations as appropriate.</p> <p>Report to Environment and Community Coordinator on response to alerts.</p> <p>Conduct regular inspections and reviews of open cut operations for potential and actual dust generation.</p> <p>Continually assess the need for dust control measures according to operational and climate conditions.</p> <p>Assist the Environment and Community Coordinator with investigations into dust exceedances, incidents or complaints.</p>
All personnel	<p>Comply with the requirements of this Plan.</p> <p>Report any activity which is generating excessive dust to the equipment operator (in the first instance), or OCE.</p>

## 8 Definitions

Term	Definition
CCC	Community Consultative Committee
DPIE	Department of Planning, Industry & Environment
Dust Deposition	Dust particles that settle out from the air - measured in grams per square metre per unit time (g/m <sup>2</sup> /time)
EPA	Environment Protection Authority
HVAS	High Volume Air Sampler
MGO	Mt Owen Glendell Operations
MOCO	Mount Owen Continued Operations
MTO	Mt Owen Pty Limited
OCE	Open Cut Examiner
PM <sub>10</sub>	Particulate matter less than 10 micrometers (µm) in size
PM <sub>2.5</sub>	Particulate matter less than 2.5 micrometers (µm) in size
TEOM	Tapered Element Oscillating Microbalance
TSP	Total Suspended Particulates (µg/m <sup>3</sup> ). The nominal size of this fraction has particles with a diameter of up to 50 micrometers (µm)
µg/m <sup>3</sup>	Micrograms per cubic metre

## 9 Document Information

### 9.1 Relevant Legislation

The following legislation is relevant to this Plan:

- *Environmental Planning and Assessment Act 1979*
- *Protection of the Environment Operations Act 1997*

### 9.2 Related Documents

Related documents, listed in **Table 9.1** below, are internal documents directly related to or referenced from this document. These documents have not been reviewed or endorsed by the DPIE as part of this Air Quality Management Plan.

**Table 9.1 - Related documents**

Number	Title
<b>GCAA</b>	
GCAA-625378177-10324	Corporate HSEC Protocol for Air Quality Management
GCAA-625378177-13661	11.13 Emissions and Energy
GCAA-625378177-13662	11.13 NGER Protocol
GCAA-625378177-1266	11.13.03 Utilisation of AQS Software Procedure
GCAA-625378177- 4042	11.13.01 NGER Facility – Contractors
GCAA-625378177- 4054	11.13.01 NGER Facility – Energy Consumed and Produced
GCAA-625378177- 4062	11.13.01 NGER Facility – Industrial Processes
GCAA-625378177- 4058	11.13.01 NGER Facility – Measurement of Fuel
GCAA-625378177- 1265	11.13.01 NGER Facility – Method 2 Open Cut Fugitives
GCAA-625378177- 769	11.13.01 NGER Facility – Waste
CAA HSEC PCL 0002	11.12 Blast Management
CAA HSEC PRO 0003	11.10 Mobile Crushing Unit Dust Management
CAA HSEC PRO 0004	11.10 Drill Dust Management.
<b>Mount Owen Glendell</b>	
MGOOC-1779562647-11191	Environmental Management Framework
630.11773-R02	Mining Operations Plan (Rehabilitation Management Plan)
MGOOC-1779562647-10878	Managing Spontaneous Combustion Procedure
MGOOC-1779562647-4852	Blast Fume Management.
MGOOC-1779562647-4199	Land Acquisition, Mitigation and Compensation Procedure
MGOOC-1779562647-11680	Air Quality Inspection Form

Note: Due to the sensitivity of content of these internal instructions and procedural documents, these are not made publically available and are strictly for internal use by MGO personnel only.

## 9.3 Reference Information

Reference information, listed in **Table 9.2** below, is information that is directly related to the development of this document or referenced from within this document.

**Table 9.2 - Reference information**

Reference	Title
NPI 2008	<i>Emission Estimation Technique Manual for Combustion Engines Version 3 June 2008</i>
Umwelt 2015	<i>Mount Owen Continued Operations Project Environmental Impact Statement</i>
Umwelt 2018	<i>Mount Owen Continued Operations Project Modification 2 Statement of Environmental Effects</i>
Umwelt 2018	<i>Modification 4 Statement of Environmental Effects Glendell Mine</i>
DEC 2007	<i>Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales.</i>
DEC 2005	<i>Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales.</i>
Donnelly et al 2011	<i>"NSW Coal Mining Benchmarking Study: International Best Practice Measures to Prevent and / or Minimise Emissions of Particulate Matter from Coal Mining". Prepared by Katestone Environmental Pty Ltd for NSW Office of Environment and Heritage, December 2010.</i>
AS/NZS 3580.10.1:2016	<i>Methods for sampling and Analysis of Ambient Air – Determination of Particulate Matter – Deposited Matter – Gravimetric Method.</i>
AS/NZS 3580.9.6:2015	<i>Methods for sampling and analysis of ambient air Method 9.6: Determination of suspended particulate matter – PM10 with high volume sampler with size selective inlet – Gravimetric method.</i>
AS/NZS 3580.9.3:2015	<i>Methods for sampling and analysis of ambient air Method 10: Determination of suspended particulate matter – Total suspended particulate matter (TSP) - High volume sampler gravimetric method.</i>
AS/NZS 3580.9.8:2008	<i>Methods for sampling and analysis of ambient air Method 9.8: Determination of suspended particulate matter – PM10 continuous direct mass method using a tapered element oscillating microbalance analyse.</i>
AS 3580.14:2011	<i>Methods for sampling and analysis of ambient air – Meteorological monitoring for ambient air quality monitoring applications.</i>

## 9.4 Change Information

A summary of the document history is provided in **Table 9.3** below.

**Table 9.3 - Change information**

Version	Date	Review team (consultation)	Change Summary
1.0	June 2005	HSEC Manager	Creation of a management plan
2.0	June 2008	HSEC Manager/ E&C Coordinator	Updated as result of development consent conditions
3.0	November 2011	MGO E&C Manager	Reviewed as regulatory requirement
4.0	March 2012	MGO E&C Manager	Updated with current practices and applicable standards
5.0	March 2013	MGO E&C Manager	Reviewed and updated with current practices.
6.0	Sept 2013	MGO E&C Manager	Updated to remove Xstrata reference and general review and update of document
7.0	July 2014	MGO E&C Manager, Thiess Senior Environmental Officer, Glendell E&C Coordinator	Updated in accordance with the comments from Department of Planning and Infrastructure (DP&I)
8.0	September 2014	MGO E&C Manager	Inclusion of real time air quality alarms and vector angles.
9.0	December 2017	MGO E&C Steering Committee	Updated to be generally in accordance with GCAA requirements and SSD 5850.
10.0	September 2018	MGO E&C Manager	Updated in accordance with comments received from the Department of Planning and Environment (DPIE).
11.0	March 2019	MGO E&C Department with advice from Air Quality expert.	Revised following approval of MOCO MOD 2 (SSD 5850) and Revised following approval of Glendell MOD 4 (DA80/952)
12.0	May 2020	MGO E&C Department	Updated in accordance with the comments from DPIE.
13.0	May 2020	MGO E&C Department	Updated exceedance notification requirements in consultation with DPIE.

## Appendix A Statutory Requirements

**Table A.1 - Relevant Development Consent Conditions**

Mount Owen Continued Operations (SSD 5850)	Glendell Mine (DA 80/952)	Condition	Relevant Section of Plan								
Schedule 3, Condition 1		<p><b>Acquisition upon request</b></p> <p>Upon receiving a written request from the owner of any land listed in Table 1, the Applicant must acquire the land in accordance with the procedures in Conditions 5 and 6 of Schedule 4.</p> <table><caption>Table 1: Land subject to acquisition upon request</caption><thead><tr><th>Acquisition Basis</th><th>Land <sup>a</sup></th></tr></thead><tbody><tr><td>Air Quality</td><td>105<sup>b</sup>, 114, 115, 116<sup>c</sup>, 133<sup>c</sup>, 4, 112, 143<sup>d</sup>, 150<sup>d</sup>, 152<sup>d</sup>, 154<sup>d</sup>, 155<sup>d</sup>, 156<sup>d</sup>, Lot 4 DP 1166047<sup>d</sup>, Lot 5 DP 1166047<sup>d</sup>, Lot 175 DP 1002770<sup>d</sup> and Lot 106 DP 855187<sup>d</sup></td></tr><tr><td>Noise</td><td>21, 22<sup>e</sup>, 23</td></tr></tbody></table> <p><sup>a</sup> The location of the land referred to in Table 1 is shown on the figure in Appendix 3. <sup>b</sup> The Applicant is only required to acquire property 105, if its acquisition is not reasonably achievable under the approval for the Rix's Creek North open cut mine. <sup>c</sup> The Applicant is only required to acquire Lot 31 DP6842 and Lot 2 DP1175728 within property 133. <sup>d</sup> The Applicant is only required to acquire the identified land if acquisition is not reasonably achievable under the development consents for the Ashton South East Open Cut Project (MP 08_0182), the Glendell Open Cut Coal Mine (DA 80/952), Ravensworth Operations Project (MP 09_0176), Rix's Creek South Continuation of Mining Project (SSD 6300) or the Rix's Creek North Open Cut Project (MP 08_0102). <sup>e</sup> The identified land has been acquired by the Applicant.</p>	Acquisition Basis	Land <sup>a</sup>	Air Quality	105 <sup>b</sup> , 114, 115, 116 <sup>c</sup> , 133 <sup>c</sup> , 4, 112, 143 <sup>d</sup> , 150 <sup>d</sup> , 152 <sup>d</sup> , 154 <sup>d</sup> , 155 <sup>d</sup> , 156 <sup>d</sup> , Lot 4 DP 1166047 <sup>d</sup> , Lot 5 DP 1166047 <sup>d</sup> , Lot 175 DP 1002770 <sup>d</sup> and Lot 106 DP 855187 <sup>d</sup>	Noise	21, 22 <sup>e</sup> , 23	Section 2.3		
Acquisition Basis	Land <sup>a</sup>										
Air Quality	105 <sup>b</sup> , 114, 115, 116 <sup>c</sup> , 133 <sup>c</sup> , 4, 112, 143 <sup>d</sup> , 150 <sup>d</sup> , 152 <sup>d</sup> , 154 <sup>d</sup> , 155 <sup>d</sup> , 156 <sup>d</sup> , Lot 4 DP 1166047 <sup>d</sup> , Lot 5 DP 1166047 <sup>d</sup> , Lot 175 DP 1002770 <sup>d</sup> and Lot 106 DP 855187 <sup>d</sup>										
Noise	21, 22 <sup>e</sup> , 23										
	Schedule 3, Condition 1	<p>Upon receiving a written request for acquisition from the owner of the land listed in Table 1, the Applicant must acquire the land in accordance with the procedures in conditions 9-11 of schedule 4.</p> <table><caption>Table 1: Land subject to acquisition upon request</caption><thead><tr><th>37a &amp; 37b – Richards</th><th>Lot 13 DP 6830 – Gardner</th></tr></thead><tbody><tr><td>61 – Donellan</td><td>Lot 12 DP 6830 – Noble</td></tr><tr><td>62 – Noble (b)</td><td>Lot 1 DP 770733 – Noble</td></tr><tr><td>65 – Noble</td><td></td></tr></tbody></table> <p><sup>a</sup> The locations of the land referred to in Table 1 are shown in Appendix 4</p> <p>Note: Lands titled 62 – Noble (b), 65 – Noble, Lot 13 DP 6830 – Gardner, Lot 12 DP 6830 – Noble and Lot 1 DP 770733 – Noble have been acquired and are now mine-owned.</p>	37a & 37b – Richards	Lot 13 DP 6830 – Gardner	61 – Donellan	Lot 12 DP 6830 – Noble	62 – Noble (b)	Lot 1 DP 770733 – Noble	65 – Noble		Section 2.3
37a & 37b – Richards	Lot 13 DP 6830 – Gardner										
61 – Donellan	Lot 12 DP 6830 – Noble										
62 – Noble (b)	Lot 1 DP 770733 – Noble										
65 – Noble											
Schedule 3, Condition 2		<p><b>Additional mitigation upon request</b></p> <p>Upon receiving a written request from the owner of any residence listed in Table 1 or Table 2, the Applicant must implement additional mitigation measures at the residence, in consultation with the landowner, in respect of the basis on which that residence is identified in Table 1 or Table 2.</p> <p>These measures must be reasonable and feasible, and directed towards reducing the air quality and/or noise impacts of the development on the residence. In the case of air quality, mitigation may include measures such as air filters, a first flush drainage system and/or air conditioning. In the case of noise, mitigation may include measures such as double-glazing, insulation and/or air conditioning.</p> <p>If within 3 months of receiving this request from the owner, the Applicant and the owner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Secretary for resolution.</p> <table><caption>Table 2: Land subject to additional mitigation upon request</caption><thead><tr><th>Mitigation Basis</th><th>Residence<sup>a</sup></th></tr></thead><tbody><tr><td>Noise</td><td>13, 19, 93</td></tr></tbody></table> <p><sup>a</sup> The location of the land referred to in Table 2 is shown on the figure in Appendix 3.</p>	Mitigation Basis	Residence <sup>a</sup>	Noise	13, 19, 93	Section 2.3				
Mitigation Basis	Residence <sup>a</sup>										
Noise	13, 19, 93										



Mount Owen Continued Operations (SSD 5850)	Glendell Mine (DA 80/952)	Condition	Relevant Section of Plan																													
Schedule 3 Condition 16		<p><b>Air Quality Criteria</b></p> <p>The applicant must ensure that all reasonable and feasible avoidance and mitigation measures are employed so that particulate matter emissions generated by the development do not cause exceedances of the criteria listed in Tables 5, 6 and 7 at any residence on privately owned land, except for the residences shown in Table 1 as being eligible for acquisition on request on the basis of air quality impacts.</p> <table><caption>Table 5: Long term impact assessment criteria for particulate matter</caption><thead><tr><th>Pollutant</th><th>Averaging Period</th><th><sup>d</sup>Criterion</th></tr></thead><tbody><tr><td>Total suspended particulate (TSP) matter</td><td>Annual</td><td><sup>a</sup>90 µg/m<sup>3</sup></td></tr><tr><td>Particulate matter &lt; 10 µm (PM<sub>10</sub>)</td><td>Annual</td><td><sup>a</sup>25 µg/m<sup>3</sup></td></tr><tr><td>Particulate matter &lt; 2.5 µm (PM<sub>2.5</sub>)</td><td>Annual</td><td><sup>a</sup>8 µg/m<sup>3</sup></td></tr></tbody></table> <table><caption>Table 6: Short term impact assessment criterion for particulate matter</caption><thead><tr><th>Pollutant</th><th>Averaging Period</th><th><sup>d</sup>Criterion</th></tr></thead><tbody><tr><td>Particulate matter &lt; 10 µm (PM<sub>10</sub>)</td><td>24 hour</td><td><sup>b</sup>50 µg/m<sup>3</sup></td></tr><tr><td>Particulate matter &lt; 2.5 µm (PM<sub>2.5</sub>)</td><td>24 hour</td><td><sup>b</sup>25 µg/m<sup>3</sup></td></tr></tbody></table> <table><caption>Table 7: Long term impact assessment criteria for deposited dust</caption><thead><tr><th>Pollutant</th><th>Averaging period</th><th>Maximum increase in deposited dust level</th><th>Maximum total deposited dust level</th></tr></thead><tbody><tr><td><sup>c</sup>Deposited dust</td><td>Annual</td><td><sup>b</sup> 2 g/m<sup>2</sup>/month</td><td><sup>a</sup> 4 g/m<sup>2</sup>/month</td></tr></tbody></table> <p>Tables 5-7: <sup>a</sup> Total impact (i.e. incremental increase in concentrations due to the development plus background concentrations due to all other sources). <sup>b</sup> Incremental impact (i.e. incremental increase in concentrations due to the development on its own). <sup>c</sup> Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air - Determination of Particulate Matter - Deposited Matter - Gravimetric Method. <sup>d</sup> Excludes extraordinary events such as bushfires, prescribed burning, dust storms, fire incidents or any other activity agreed to by the Secretary.</p> <p>For the purposes of this condition, reasonable and feasible avoidance and mitigation measures includes, but is not limited to, the requirements in conditions 18 and 19 to develop and implement a real time air quality management system that ensures effective operational response to the risk of exceedance of the criteria.</p>	Pollutant	Averaging Period	<sup>d</sup> Criterion	Total suspended particulate (TSP) matter	Annual	<sup>a</sup> 90 µg/m <sup>3</sup>	Particulate matter < 10 µm (PM <sub>10</sub> )	Annual	<sup>a</sup> 25 µg/m <sup>3</sup>	Particulate matter < 2.5 µm (PM <sub>2.5</sub> )	Annual	<sup>a</sup> 8 µg/m <sup>3</sup>	Pollutant	Averaging Period	<sup>d</sup> Criterion	Particulate matter < 10 µm (PM <sub>10</sub> )	24 hour	<sup>b</sup> 50 µg/m <sup>3</sup>	Particulate matter < 2.5 µm (PM <sub>2.5</sub> )	24 hour	<sup>b</sup> 25 µg/m <sup>3</sup>	Pollutant	Averaging period	Maximum increase in deposited dust level	Maximum total deposited dust level	<sup>c</sup> Deposited dust	Annual	<sup>b</sup> 2 g/m <sup>2</sup> /month	<sup>a</sup> 4 g/m <sup>2</sup> /month	Section 2.3 and 4.1
		Pollutant	Averaging Period	<sup>d</sup> Criterion																												
Total suspended particulate (TSP) matter	Annual	<sup>a</sup> 90 µg/m <sup>3</sup>																														
Particulate matter < 10 µm (PM <sub>10</sub> )	Annual	<sup>a</sup> 25 µg/m <sup>3</sup>																														
Particulate matter < 2.5 µm (PM <sub>2.5</sub> )	Annual	<sup>a</sup> 8 µg/m <sup>3</sup>																														
Pollutant	Averaging Period	<sup>d</sup> Criterion																														
Particulate matter < 10 µm (PM <sub>10</sub> )	24 hour	<sup>b</sup> 50 µg/m <sup>3</sup>																														
Particulate matter < 2.5 µm (PM <sub>2.5</sub> )	24 hour	<sup>b</sup> 25 µg/m <sup>3</sup>																														
Pollutant	Averaging period	Maximum increase in deposited dust level	Maximum total deposited dust level																													
<sup>c</sup> Deposited dust	Annual	<sup>b</sup> 2 g/m <sup>2</sup> /month	<sup>a</sup> 4 g/m <sup>2</sup> /month																													
Schedule 3 Condition 17	<p><b>Mine Owned Land</b></p> <p>The applicant must ensure that all reasonable and feasible avoidance and mitigation measures are employed so that particulate matter emissions generated by the development do not cause exceedances of the criteria listed in Tables 5, 6 and 7 at any occupied residence on mine owned land (including land owned by another mining company) unless:</p> <ul style="list-style-type: none"><li>a) The tenant and landowner (if the residence is owned by another mining company) have been notified of any health risks associated with such exceedances in accordance with the notification requirements under Schedule 4 of this consent;</li><li>b) The tenant of any land owned by the Applicant can terminate their tenancy agreement without penalty at any time, subject to giving reasonable notice;</li><li>c) Air quality monitoring is regularly undertaken to inform the tenant or landowner (if the residence is owned by another mining company) of the likely particulate emissions at the residence; and</li><li>d) Data from this monitoring is presented to the tenant and landowner in an appropriate format for a medical practitioner to assist the tenant and landowner in making informed decisions on the health risks associated with occupying the property.</li></ul>	Sections 3 and 4.1																														

Mount Owen Continued Operations (SSD 5850)	Glendell Mine (DA 80/952)	Condition	Relevant Section of Plan
Schedule 3 Condition 18		<b>Air Quality Operating Conditions</b> The Applicant must:	
		a) implement all reasonable and feasible measures to minimise the odour, fume, spontaneous combustion, greenhouse gas and dust (including PM <sub>10</sub> and PM <sub>2.5</sub> ) emissions of the development, including through the proactive and reactive management for all emission sources (crustal and combustion);	<b>Section 3</b>
		b) minimise visible air pollution generated by the development;	<b>Section 3.1</b>
		c) minimise to the greatest extent practicable, the extent of potential dust generating surfaces exposed on the site at any given point in time;	<b>Section 3.1</b>
		c1) take all reasonable steps to improve energy efficiency and reduce greenhouse gas emissions from development;	<b>Section 3.4 and 3.5</b>
		d) operate a comprehensive air quality management system that uses a combination of predictive meteorological forecasting and real-time air quality monitoring data to guide the day to day planning of mining operations and the implementation of both proactive and reactive air quality mitigation measures to ensure compliance with the relevant conditions of this consent;	<b>Sections 3 and 4.1</b>
		e) install and operate a weather station with a 10 m high tower, located approximately between or at either dust monitoring stations SX9 and SX10, for use in managing potential air quality impacts to receivers situated to the south-east of the development;	<b>Section 4.1</b>
		f) minimise the air quality impacts of the development during adverse meteorological conditions and extraordinary events (see Note d above under Tables 5-7);	<b>Sections 3 and 4.1</b>
		g) co-ordinate air quality management on site with the air quality management at nearby mines (ie. Glendell and Rix's Creek North mines) to minimise cumulative air quality impacts; and	<b>Section 4.6</b>
Schedule 3 Condition 19		h) carry out regular monitoring to determine whether the development is complying with the relevant conditions of this consent, and report on this in the annual review referred to in condition 5 of Schedule 5.	<b>Section 4.1 and 4.3</b>
		<b>Air Quality and Greenhouse Gas Management Plan</b> The Applicant must prepare an Air Quality and Greenhouse Gas Management Plan for the development to the satisfaction of the Secretary. This plan must:	<b>Section 1.6</b>
		a) be prepared in consultation with the EPA, and submitted to the Secretary for approval prior to the commencement of development under this consent, unless the Secretary agrees otherwise	<b>Section 1.6 Appendix B and Appendix C</b>
		b) describe the method for the selection of a suitable site and installation timeframe for the weather station to be located approximately between, or at either dust monitoring stations SX9 and SX10	<b>Section 4.1</b>
		c) describe the measures that would be implemented to ensure compliance with the relevant air quality criteria and operating conditions of this consent	<b>Section 3.6, 4.1 and 7</b>
		d) describe the air quality management system in detail	<b>Section 4</b>
		e) include an initial baseline estimate of the emissions of PM <sub>2.5</sub> from all diesel engines used for the development; and	<b>Section 3.5</b>

Mount Owen Continued Operations (SSD 5850)	Glendell Mine (DA 80/952)	Condition	Relevant Section of Plan																							
		<p>f) include an air quality monitoring program that:</p> <ul style="list-style-type: none"><li>- adequately supports the air quality management system;</li><li>- evaluates and reports on the:<ul style="list-style-type: none"><li>o the effectiveness of the air quality management system;</li><li>o compliance with the air quality criteria;</li><li>o compliance with the air quality operating conditions; and</li><li>o defines what constitutes an air quality incident, and includes a protocol for identifying and notifying the Department and relevant stakeholders of any air quality incidents.</li></ul></li></ul>	Section 4																							
		The Applicant must implement the approved Air Quality and Greenhouse Gas Management Plan as approved from time to time by the Secretary.	Appendix B																							
Schedule 3 Condition 20		<p><b>Meteorological Monitoring</b></p> <p>Prior to the commencement of development, the Applicant must ensure that there is a meteorological station in the vicinity of the site that:</p> <p>a) complies with the requirements in the Approved Methods for Sampling of Air Pollutants in New South Wales guideline; and</p> <p>b) is capable of continuous real-time measurement of temperature lapse rate in accordance with the NSW Industrial Noise Policy, unless a suitable alternative (such as wind stability classes) is approved by the Secretary following consultation with the EPA.</p>	Section 4.1																							
	Schedule 3 Condition 20	<p>The Applicant must ensure that all reasonable and feasible avoidance and mitigation measures are employed so that particulate matter emissions generated by the development do not cause exceedances of the criteria listed in Tables 8, 9 and 10 at any residence on privately owned land, except for the residences shown in Table 1 as being eligible for acquisition on request on the basis of air quality impacts.</p> <p><i>Table 8: Long term impact assessment criteria for particulate matter</i></p> <table><tr><th>Pollutant</th><th>Averaging period</th><th><sup>d</sup> Criterion</th></tr><tr><td>Total suspended particulate (TSP) matter</td><td>Annual</td><td><sup>a</sup> 90 µg/m<sup>3</sup></td></tr><tr><td>Particulate matter &lt; 10 µm (PM<sub>10</sub>)</td><td>Annual</td><td><sup>a</sup> 30 µg/m<sup>3</sup></td></tr></table> <p><i>Table 9: Short term impact assessment criterion for particulate matter</i></p> <table><tr><th>Pollutant</th><th>Averaging period</th><th><sup>d</sup> Criterion</th></tr><tr><td>Particulate matter &lt; 10 µm (PM<sub>10</sub>)</td><td>24 hour</td><td><sup>b</sup> 50 µg/m<sup>3</sup></td></tr></table> <p><i>Table 10: Long term impact assessment criteria for deposited dust</i></p> <table><tr><th>Pollutant</th><th>Averaging period</th><th>Maximum increase in deposited dust level</th><th>Maximum total deposited dust level</th></tr><tr><td><sup>c</sup> Deposited dust</td><td>Annual</td><td><sup>b</sup> 2 g/m<sup>2</sup>/month</td><td><sup>a</sup> 4 g/m<sup>2</sup>/month</td></tr></table> <p><i>Notes to Tables 8-10:</i></p> <ul style="list-style-type: none"><li>• <sup>a</sup> Total impact (i.e. incremental increase in concentrations due to the development plus background concentrations due to all other sources).</li><li>• <sup>b</sup> Incremental impact (i.e. incremental increase in concentrations due to the development on its own).</li><li>• <sup>c</sup> Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air - Determination of Particulate Matter - Deposited Matter - Gravimetric Method.</li><li>• <sup>d</sup> Excludes extraordinary events such as bushfires, prescribed burning, dust storms, fire incidents or any other activity agreed to by the Secretary.</li></ul>	Pollutant	Averaging period	<sup>d</sup> Criterion	Total suspended particulate (TSP) matter	Annual	<sup>a</sup> 90 µg/m <sup>3</sup>	Particulate matter < 10 µm (PM <sub>10</sub> )	Annual	<sup>a</sup> 30 µg/m <sup>3</sup>	Pollutant	Averaging period	<sup>d</sup> Criterion	Particulate matter < 10 µm (PM <sub>10</sub> )	24 hour	<sup>b</sup> 50 µg/m <sup>3</sup>	Pollutant	Averaging period	Maximum increase in deposited dust level	Maximum total deposited dust level	<sup>c</sup> Deposited dust	Annual	<sup>b</sup> 2 g/m <sup>2</sup> /month	<sup>a</sup> 4 g/m <sup>2</sup> /month	Section 4.1
Pollutant	Averaging period	<sup>d</sup> Criterion																								
Total suspended particulate (TSP) matter	Annual	<sup>a</sup> 90 µg/m <sup>3</sup>																								
Particulate matter < 10 µm (PM <sub>10</sub> )	Annual	<sup>a</sup> 30 µg/m <sup>3</sup>																								
Pollutant	Averaging period	<sup>d</sup> Criterion																								
Particulate matter < 10 µm (PM <sub>10</sub> )	24 hour	<sup>b</sup> 50 µg/m <sup>3</sup>																								
Pollutant	Averaging period	Maximum increase in deposited dust level	Maximum total deposited dust level																							
<sup>c</sup> Deposited dust	Annual	<sup>b</sup> 2 g/m <sup>2</sup> /month	<sup>a</sup> 4 g/m <sup>2</sup> /month																							
	Schedule 3 Condition 21	(deleted)	N/A																							

Mount Owen Continued Operations (SSD 5850)	Glendell Mine (DA 80/952)	Condition	Relevant Section of Plan
	Schedule 3 Condition 22	<b>Operating Conditions</b> The Applicant must: <ul style="list-style-type: none"> <li>a) take all reasonable steps to: <ul style="list-style-type: none"> <li>i. minimise odour, fume and particulate matter emissions of the development, paying particular attention to minimising wheel-generated haul road emissions;</li> <li>ii. eliminate or minimise the risk of spontaneous combustion;</li> <li>iii. minimise any visible off-site air pollution generated by the development; and</li> <li>iv. minimise the extent of potential dust generating surfaces exposed on the site at any given point in time;</li> </ul> </li> </ul>	<b>Section 3</b>
		b) operate a comprehensive air quality management system that uses real-time air quality monitoring data to guide the day to day planning of mining operations and the implementation of both proactive and reactive air quality mitigation measures to ensure compliance with the relevant conditions of this consent;	<b>Section 3.6</b>
		c) minimise air quality impacts of the development during adverse meteorological conditions and extraordinary events (see Note c to Table 8 – 10 above);	<b>Sections 3.6 and 4.1</b>
		d) use all reasonable efforts to co-ordinate air quality management on the site with the air quality management at nearby mines to minimise cumulative air quality impacts;	<b>Section 4.6</b>
		e) carry out regular air quality monitoring to determine whether the development is complying with the relevant conditions of this consent;	<b>Section 4</b>
		f) regularly assess meteorological and air quality monitoring data, and modify operations on the site to ensure compliance with the relevant conditions of this consent.	<b>Section 4</b>
	Schedule 3 Condition 23	Until approval of the Air Quality and Greenhouse Gas Management Plan required under condition 23A of this Schedule, the Applicant must continue to implement its approved Air Quality Monitoring Program (as previously required by Condition 23 of this Schedule) and approved Greenhouse and Energy Efficiency Plan (as previously required by Condition 51 of this Schedule).	<b>Appendix C</b>
	Schedule 3 Condition 23A	Within 3 months of approval of Modification 4 the Applicant must prepare an Air Quality and Greenhouse Gas Management Plan for the development to the satisfaction of the Secretary. This plan must:	<b>Section 1.6</b>
		a) be prepared by a suitably qualified and experienced person/s;	<b>Section 9.4 Appendix B</b>
		b) be prepared in consultation with the EPA;	<b>Section 1.6 Appendix B</b>
		c) describe the measures to be implemented to ensure: <ul style="list-style-type: none"> <li>i. compliance with air quality criteria and operating conditions of this consent;</li> </ul>	<b>Section 3 Appendix D</b>

Mount Owen Continued Operations (SSD 5850)	Glendell Mine (DA 80/952)	Condition	Relevant Section of Plan
		<p>ii. best practice management is being employed to:</p> <ul style="list-style-type: none"> <li>• minimise the development's air quality impacts;</li> <li>• minimise the development's Scope 1 and 2 greenhouse gas emissions; and</li> <li>• improve the developments energy efficiency;</li> </ul> <p>iii. the air quality impacts of the development are minimised during adverse meteorological conditions and extraordinary events</p>	<p><b>Section 3</b> <b>Section 3.5</b> <b>Section 3.9</b> <b>Section 3.6</b></p>
		d) include a program to monitor greenhouse gas emissions and energy use generated by the development	<b>Section 3.4</b>
		e) describe the air quality management system in detail; and	<b>Section 4</b>
		<p>f) include an air quality monitoring program, undertaken in accordance with the <i>Approved Methods for Sampling and Analysis of Air Pollutants in New South Wales</i> (DEC, 2007), that</p> <ul style="list-style-type: none"> <li>(i) establishes a diesel combustion emissions baseline</li> <li>(ii) uses monitors to evaluate the performance of the development against the air quality criteria in this consent and to guide day to day planning of mining operations</li> <li>(iii) adequately supports the air quality management system; and</li> <li>(iv) includes a protocol for identifying any air quality related exceedance, incident or non-compliance and for notifying the Department and relevant stakeholders of these events</li> </ul>	<p><b>Section 3.5</b> <b>Section 3.6</b> <b>Section 4.1</b> <b>Section 4.3</b></p>
Schedule 5 Condition 12B		<p><b>Independent Environment Audit</b></p> <p>Noise, blast and/or air quality monitoring under this consent may be undertaken at suitable representative monitoring locations instead of at privately-owned residences or other locations listed in Schedule 3, providing that these representative monitoring locations are set out in the respective management plan/s.</p>	<b>Section 3.6</b>
Commitment 1		<p><b>Air Quality</b></p> <p>Mount Owen will contact all residences within 4 kilometres of the approved Project area within 6 months of project approval and discuss the inspection and cleaning of tanks. Rainwater tanks at privately-owned properties within a 4 kilometre radius from the approved mining limit will be inspected at least every two years with cleaning carried out should the inspection identify that this is required. Residents will also be advised that additional management options are available if cleaning alone is not adequate in managing the impacts and further management measures are required.</p>	<b>Section 3.8</b>
Commitment 2		Mount Owen will continue to implement an objective measurement method to demonstrate haul road dust control efficiency and target an overall dust control efficiency of 85%.	<b>Section 4.1</b>
Commitment 3		Continue to establish visual triggers and associated actions for wheel generated dust from unpaved haul roads, bulldozer operations, overburden loading and emplacement operations and loading coal to trucks and incorporate these within operational procedures and undertake operator training.	<b>Section 3.1</b>
Commitment 4		Modify bulldozing, overburden loading and emplacement and coal loading operations to reduce the potential for dust impacts.	<b>Section 3.1</b>

Mount Owen Continued Operations (SSD 5850)	Glendell Mine (DA 80/952)	Condition	Relevant Section of Plan
Commitment 5		<p>Continue to use the Mount Owen proactive air quality control system to inform operational dust management by undertaking the following:</p> <ul style="list-style-type: none"> <li>- integrate short-term triggers and alarms into the real-time PM10 and meteorological monitoring system to integrate short-term triggers and alarms;</li> <li>- develop a procedure linking triggers with associated actions;</li> <li>- document within the procedure the use of dust risk forecast information for proactive dust management planning; and</li> </ul> <p>make provision for recording actions taken in response to alarms.</p>	<b>Sections 3.6</b>
		<p><b>Air Quality</b></p> <ul style="list-style-type: none"> <li>- <b>Air Quality Controls</b></li> </ul>	
	SoC 1.4.1	The Applicant will minimise areas disturbed by mining activities and undertake prompt rehabilitation of disturbed areas following completion of mining.	<b>Section 3.1.4</b>
	SoC 1.4.2	The Applicant will undertake watering road surfaces, including haul roads, and hardstand areas using water carts, where required	<b>Section 3.1.3</b>
	SoC 1.4.3	The Applicant will continue monitoring of meteorological conditions and consideration of weather data in the timing of blasts to minimise the impacts of blast generated dust, particularly on residents to the south and south east of the project.	<b>Refer to Blast Management Plan</b>
	SoC 1.4.4	Ongoing use of an alarm generated for elevated dust levels from the Mt Owen Complex continuous PM10 monitoring network and notification of operational personnel to review the ability to restrict dumping where practical on exposed faces during periods of high winds.	<b>Section 4.1</b>
	SoC 1.4.5	Expansion of the existing dust monitoring network for the Mt Owen Complex to include additional continuous PM10 monitoring sites within the Camberwell Village area.	<b>Section 4.1</b>
	SoC 1.4.6	Provision of in-pit dumping locations for periods of high wind, where practical	<b>Section 3.1.78</b>
	SoC 1.4.7	Restricting vehicle movements to formed and watered roads, particularly during periods of potentially high dust generation.	<b>Section 3.1.23</b>
		<b><u>Greenhouse and Energy Management</u></b>	
	SoC 1.5.1	<p>The Applicant will assess the viability of the following approaches to improving energy efficiency and reducing greenhouse emissions from the proposed Glendell operations:</p> <ul style="list-style-type: none"> <li>• Use of energy management systems; and</li> <li>• Seeking continuous improvement in energy efficiency in the mining fleet, stationary equipment, mining processes and coal preparation.</li> </ul> <p>The applicant will continue to assess and implement energy and greenhouse management initiatives during the project design, operation and decommissioning.</p>	<b>Section 3.4</b>

*Note: SoC refer to the Statement of Commitments from the Glendell Development Consent*



**Table A.2 - Relevant Conditions of the Environment Protection Licence**

Condition No	Condition	Relevant Section of Plan																				
EPL 4460																						
2 P1 P1.1	<p><b>2 Discharges to Air and Water and Applications to Land</b></p> <p><b>P1 Location of monitoring/discharge points and areas</b></p> <p>P1.1 The following points referred to in the table below are identified in this licence for the purposes of monitoring and/or the setting of limits for the emission of pollutants to the air from the point.</p> <table><tr><th colspan="4">Air</th></tr><tr><th>EPA identification no.</th><th>Type of Monitoring Point</th><th>Type of Discharge Point</th><th>Location Description</th></tr><tr><td>8</td><td>Particulate Matter Monitoring</td><td></td><td>TEOM "SX13 D8" identified as 8 at coordinates 318877, 6416848 (Easting Northing) on Figure 1</td></tr><tr><td>9</td><td>Particulate Matter Monitoring</td><td></td><td>TEOM "SX13 D10" identified as 9 at coordinates 324739, 6411628 (Easting Northing) on Figure 1</td></tr><tr><td>10</td><td>Particulate Matter Monitoring</td><td></td><td>TEOM "SX13 D9" identified as 10 at coordinates 323944, 6407999 (Easting Northing) on Figure 1</td></tr></table>	Air				EPA identification no.	Type of Monitoring Point	Type of Discharge Point	Location Description	8	Particulate Matter Monitoring		TEOM "SX13 D8" identified as 8 at coordinates 318877, 6416848 (Easting Northing) on Figure 1	9	Particulate Matter Monitoring		TEOM "SX13 D10" identified as 9 at coordinates 324739, 6411628 (Easting Northing) on Figure 1	10	Particulate Matter Monitoring		TEOM "SX13 D9" identified as 10 at coordinates 323944, 6407999 (Easting Northing) on Figure 1	Section 4.1
Air																						
EPA identification no.	Type of Monitoring Point	Type of Discharge Point	Location Description																			
8	Particulate Matter Monitoring		TEOM "SX13 D8" identified as 8 at coordinates 318877, 6416848 (Easting Northing) on Figure 1																			
9	Particulate Matter Monitoring		TEOM "SX13 D10" identified as 9 at coordinates 324739, 6411628 (Easting Northing) on Figure 1																			
10	Particulate Matter Monitoring		TEOM "SX13 D9" identified as 10 at coordinates 323944, 6407999 (Easting Northing) on Figure 1																			
O3 O3.1	<p><b>O3 Dust</b></p> <p>O3.1 All operations and activities occurring at the premises must be carried out in a manner that will minimise the emission of dust from the premises.</p>	Section 3																				
O3.2	<p>O3.2 The premises must be maintained in a condition which minimises or prevents the emission of dust from the premises.</p>	Section 3																				
O3.3	<p>O3.3 All trafficable areas, coal storage areas and vehicle manoeuvring areas in or on the premises must be maintained, at all times, in a condition that will minimise the generation, or emission from the premises, of wind-blown or traffic generated dust.</p>	Section 3.1.2 Section 3.1.3																				
M2 M2.1	<p><b>M2 Requirement to monitor concentration of pollutants discharged</b></p> <p>M2.1 For each monitoring/discharge point or utilisation area specified below (by a point number), the licensee must monitor (by sampling and obtaining results by analysis) the concentration of each pollutant specified in Column 1. The licensee must use the sampling method, units of measure, and sample at the frequency, specified opposite in the other columns:</p>	Section 4.1																				
M2.2	<p>M2.2 Air Monitoring Requirements</p> <p>POINT 8,9,10</p> <table><tr><th>Pollutant</th><th>Units of measure</th><th>Frequency</th><th>Sampling Method</th></tr><tr><td>PM10</td><td>micrograms per cubic metre</td><td>Continuous</td><td>AM-22</td></tr></table>	Pollutant	Units of measure	Frequency	Sampling Method	PM10	micrograms per cubic metre	Continuous	AM-22	Section 4.1												
Pollutant	Units of measure	Frequency	Sampling Method																			
PM10	micrograms per cubic metre	Continuous	AM-22																			
M3 M3.1	<p><b>M3 Testing methods - concentration limits</b></p> <p>M3.1 Monitoring for the concentration of a pollutant emitted to the air required to be conducted by this licence must be done in accordance with:</p> <p>a) any methodology which is required by or under the Act to be used for the testing of the concentration of the pollutant; or</p> <p>a) if no such requirement is imposed by or under the Act, any methodology which a condition of this licence requires to be used for that testing; or</p> <p>b) if no such requirement is imposed by or under the Act or by a condition of this licence, any methodology approved in writing by the EPA for the purposes of that testing prior to the testing taking place.</p> <p>Note: The <i>Protection of the Environment Operations (Clean Air) Regulation 2010</i> requires testing for certain purposes to be conducted in accordance with test methods contained in the publication "Approved Methods for the Sampling and Analysis of Air Pollutants in NSW".</p>	Section 4.1																				
M4	<p><b>M4 Weather monitoring</b></p>	Section 4.1																				

Condition No	Condition	Relevant Section of Plan																																			
M4.1	<p>M4.1 At the point(s) identified below , the licensee must monitor (by sampling and obtaining results by analysis) the parameters specified in Column 1 of the table below , using the corresponding sampling method, units of measure, averaging period and sampling frequency, specified opposite in the Columns 2, 3, 4 and 5 respectively.</p> <p>POINT 16,17</p> <table><tr><th>Parameter</th><th>Sampling method</th><th>Units of measure</th><th>Averaging period</th><th>Frequency</th></tr><tr><td>Wind Direction at 10 metres</td><td>AM-2 &amp; AM-4</td><td>Degrees</td><td>15 minutes</td><td>Continuous</td></tr><tr><td>Wind Speed at 10 metres</td><td>AM-2 &amp; AM-4</td><td>metres per second</td><td>15 minutes</td><td>Continuous</td></tr><tr><td>Sigma Theta</td><td>AM-2 &amp; AM-4</td><td>Degrees</td><td>15 minutes</td><td>Continuous</td></tr><tr><td>Rainfall</td><td>AM-4</td><td>millimetres</td><td>15 minutes</td><td>Continuous</td></tr><tr><td>Temperature at 10 metres</td><td>AM-4</td><td>degrees Celsius</td><td>15 minutes</td><td>Continuous</td></tr><tr><td>Relative humidity</td><td>AM-4</td><td>percent</td><td>15 minutes</td><td>Continuous</td></tr></table>	Parameter	Sampling method	Units of measure	Averaging period	Frequency	Wind Direction at 10 metres	AM-2 & AM-4	Degrees	15 minutes	Continuous	Wind Speed at 10 metres	AM-2 & AM-4	metres per second	15 minutes	Continuous	Sigma Theta	AM-2 & AM-4	Degrees	15 minutes	Continuous	Rainfall	AM-4	millimetres	15 minutes	Continuous	Temperature at 10 metres	AM-4	degrees Celsius	15 minutes	Continuous	Relative humidity	AM-4	percent	15 minutes	Continuous	
Parameter	Sampling method	Units of measure	Averaging period	Frequency																																	
Wind Direction at 10 metres	AM-2 & AM-4	Degrees	15 minutes	Continuous																																	
Wind Speed at 10 metres	AM-2 & AM-4	metres per second	15 minutes	Continuous																																	
Sigma Theta	AM-2 & AM-4	Degrees	15 minutes	Continuous																																	
Rainfall	AM-4	millimetres	15 minutes	Continuous																																	
Temperature at 10 metres	AM-4	degrees Celsius	15 minutes	Continuous																																	
Relative humidity	AM-4	percent	15 minutes	Continuous																																	
M8 M8.1	<p><b>M8 Other monitoring and recording conditions</b> <b>Requirement to Monitor Particulate Matter</b> M8.1 The Licensee must record the average PM10 concentration at Monitoring Points 8, 9 and 10 at intervals of 10 minutes. This data must be made available upon request by any Authorised Officer of the EPA.</p>	<b>Section 4</b>																																			
<b>EPL 12840</b>																																					
2 P1 P1.1	<p><b>2 Discharges to Air and Water and Applications to Land</b> <b>P1 Location of monitoring/discharge points and areas</b> P1.1 The following points referred to in the table below are identified in this licence for the purposes of monitoring and/or the setting of limits for the emission of pollutants to the air from the point.</p> <table><tr><th colspan="4"><i>Air</i></th></tr><tr><th>EPA identification no.</th><th>Type of Monitoring Point</th><th>Type of Discharge Point</th><th>Location Description</th></tr><tr><td>12</td><td>Particulate Matter Monitoring</td><td></td><td>Monitor "EBAM 1" at coordinates E:320922.01 N:6407493.72 (GDA94 MGA56) as shown on plan titled "Mt Owen Complex Glendell EBAM Locations" dated 24/04/2017. EPA reference DOC17/246946.</td></tr><tr><td>13</td><td>Particulate Matter Monitoring</td><td></td><td>Monitor "EBAM 2" at coordinates E:317848 N:6410750 (GDA94 MGA56) as shown on plan titled "Mt Owen Complex Glendell EBAM Locations" dated 24/04/2017. EPA reference DOC17/246946.</td></tr></table>	<i>Air</i>				EPA identification no.	Type of Monitoring Point	Type of Discharge Point	Location Description	12	Particulate Matter Monitoring		Monitor "EBAM 1" at coordinates E:320922.01 N:6407493.72 (GDA94 MGA56) as shown on plan titled "Mt Owen Complex Glendell EBAM Locations" dated 24/04/2017. EPA reference DOC17/246946.	13	Particulate Matter Monitoring		Monitor "EBAM 2" at coordinates E:317848 N:6410750 (GDA94 MGA56) as shown on plan titled "Mt Owen Complex Glendell EBAM Locations" dated 24/04/2017. EPA reference DOC17/246946.	<b>Section 4.1</b>																			
<i>Air</i>																																					
EPA identification no.	Type of Monitoring Point	Type of Discharge Point	Location Description																																		
12	Particulate Matter Monitoring		Monitor "EBAM 1" at coordinates E:320922.01 N:6407493.72 (GDA94 MGA56) as shown on plan titled "Mt Owen Complex Glendell EBAM Locations" dated 24/04/2017. EPA reference DOC17/246946.																																		
13	Particulate Matter Monitoring		Monitor "EBAM 2" at coordinates E:317848 N:6410750 (GDA94 MGA56) as shown on plan titled "Mt Owen Complex Glendell EBAM Locations" dated 24/04/2017. EPA reference DOC17/246946.																																		
O3.3	<p><b>O3 Dust</b> O3.1 The premises must be maintained in a condition which minimises or prevents the emission of dust from the premises.</p>	<b>Section 3</b>																																			
O3.2	O3.2 Activities occurring in or on the premises must be carried out in a manner that will minimise the generation, or emission from the premises, of wind-blown or traffic generated dust.	<b>Section 3</b>																																			
M2 M2.1	<p><b>M2 Requirement to monitor concentration of pollutants discharged</b> M2.1 For each monitoring/discharge point or utilisation area specified below (by a point number), the licensee must monitor (by sampling and obtaining results by analysis) the concentration of each pollutant specified in Column 1. The licensee must use the sampling method, units of measure, and sample at the frequency, specified opposite in the other columns:</p>	<b>Section 4.1</b>																																			
M2.2	<p>M2.2 Air Monitoring Requirements</p> <p>POINT 12,13</p> <table><tr><th>Pollutant</th><th>Units of measure</th><th>Frequency</th><th>Sampling Method</th></tr><tr><td>PM10</td><td>micrograms per cubic metre</td><td>Continuous</td><td>Special Method 1</td></tr></table>	Pollutant	Units of measure	Frequency	Sampling Method	PM10	micrograms per cubic metre	Continuous	Special Method 1	<b>Section 4.1</b>																											
Pollutant	Units of measure	Frequency	Sampling Method																																		
PM10	micrograms per cubic metre	Continuous	Special Method 1																																		
M2.3	M2.3 Special Method 1 requires the Licensee to undertake the monitoring of PM10 concentration in strict accordance with the manufacturer's operating manual supplied with the continuous monitoring equipment and titled "EBAM Particulate Monitor Operation Manual E-BAM-9800 REV M", or any updated version as supplied by the manufacturer.	<b>Section 4.1</b>																																			

Condition No	Condition	Relevant Section of Plan
M3 M3.1	<p><b>M3 Testing methods - concentration limits</b></p> <p>M3.1 Monitoring for the concentration of a pollutant emitted to the air required to be conducted by this licence must be done in accordance with:</p> <ul style="list-style-type: none"> <li>a) any methodology which is required by or under the Act to be used for the testing of the concentration of the pollutant; or</li> <li>b) if no such requirement is imposed by or under the Act, any methodology which a condition of this licence requires to be used for that testing; or</li> <li>c) if no such requirement is imposed by or under the Act or by a condition of this licence, any methodology approved in writing by the EPA for the purposes of that testing prior to the testing taking place.</li> </ul> <p>Note: The <i>Protection of the Environment Operations (Clean Air) Regulation 2010</i> requires testing for certain purposes to be conducted in accordance with test methods contained in the publication "Approved Methods for the Sampling and Analysis of Air Pollutants in NSW".</p>	<b>Section 4.1</b>
M7 M7.1	<p><b>M7 Other monitoring and recording conditions</b></p> <p><b>Requirement to Monitor Particulate Matter</b></p> <p>M7.1 The Licensee must record the average PM10 concentration at Monitoring Points 12 and 13 at intervals of 10 minutes. This data must be made available upon request by any Authorised Officer of the EPA who asks to see them.</p>	<b>Section 4</b>
E1 E1.1	<p><b>Special Conditions</b></p> <p><b>E1 Optimised Real-time Air Quality Monitoring</b></p> <p>E1.1 The Licensee does not have to commence the continuous PM10 monitoring at Monitoring Points 12 and 13 as required by Condition M2 of this licence until 1 September 2017.</p>	<b>Noted</b>
E1.2	E1.2 The Licensee must advise the EPA at hunter.region@epa.nsw.gov.au of the commissioning of the continuous PM10 monitoring network required by Condition M2 of the licence by 1 September 2017.	<b>Noted</b>
E2.1	<p><b>Hunter Valley Dust Risk Forecasting Trial - Spring 2017</b></p> <p>E2.1 From 1 September 2017 to 30 November 2017 inclusively, the licensee must electronically record the following information:</p> <ul style="list-style-type: none"> <li>1) Daily Total Tonnes Moved; and</li> <li>2) Timestamped PM10 concentrations from upwind and downwind of the premises, recorded in ten minute intervals at monitoring points: 12 and 13.</li> </ul> <p>For the purposes of this condition 'Total Tonnes Moved' is calculated as: Total Tonnes Moved = Run of Mine (ROM) coal moved + Total Overburden Moved (TOM) Where:</p> <ul style="list-style-type: none"> <li>(a) ROM must be expressed in tonnes; and</li> <li>(b) TOM must be expressed in tonnes and must be determined by multiplying bank cubic metres of overburden moved by a density of 2.4 tonnes per bank cubic metre. TOM must include rehandled overburden.</li> </ul>	<b>Trial Complete</b>
E2.2	E2.2 The licensee must provide an electronic set of Excel spreadsheets with a separate tab for each of the items identified in Condition E2.1 to the EPA at hunter.region@epa.nsw.gov.au by 19 January 2018.	<b>Trial Complete</b>

## Appendix B External Consultation Records

**Jacobs**

Level 4, 12 Stewart Avenue  
Newcastle West NSW 2302 Australia  
PO Box 2147 Dangar NSW 2309  
Australia  
T +61 2 4979 2600  
F +61 2 4979 2666  
www.jacobs.com

6 March 2020

Attention: Mike Pereira  
Environment and Community Officer  
Mt Owen / Glendell Operations, Glencore

Project Name: Mt Owen / Glendell Operations  
Project Number: IA005400

Dear Mike

### **Air Quality and Greenhouse Gas Management Plan**

As requested I have reviewed the *Mt Owen / Glendell Air Quality and Greenhouse Gas Management Plan* (version 11, March 2020). This plan represents an update of the currently approved plan to reflect an update to DA80/952 following approval of Modification 4.

The original air quality and greenhouse gas management plan (version 9) was prepared by Jacobs (Shane Lakmaker) and Mt Owen in January 2017, and subsequently approved by Department of Planning, Industry and Environment in June 2017.

I have reviewed version 11 of the *Mt Owen / Glendell Air Quality and Greenhouse Gas Management Plan* and confirm satisfaction of this document for finalisation.

Yours sincerely



**Shane Lakmaker**  
Principal (Air Quality)  
(02) 4979 2663  
shane.lakmaker@jacobs.com

Jacobs Group (Australia) Pty Limited ABN 37 001 024 095



DOC20/195871-4

Mount Owen Pty Limited  
Returned via the Major Projects Portal

16 March 2020

The Proper Officer

**Post Approval Air Quality and Greenhouse Gas Management Plan  
Mount Owen Continued Operations (SSD 5850)**

Thank you for consulting with the Environment Protection Authority (EPA) in regard to the Post Approval Air Quality and Greenhouse Gas Management Plan for the Mount Owen Continued Operations (SSD 5850).

The EPA encourages the development of Environmental Management Plans/Programs to ensure that proponents/licensees have determined how they will meet their statutory obligations and environmental objectives as specified by any Project/Development Approval and/or the conditions of an environment protection licence. However, the EPA does not review these plans/programs (unless in circumstances deemed necessary) as the role of the EPA is to set conditions/criteria for environmental protection and management, not to be directly involved in the development of strategies to comply with such conditions/criteria.

The EPA has therefore not reviewed this management plan and offers no comments in relation to it.

As a management tool, such plans/programs should assist Mount Owen Pty Limited in meeting their commitment to statutory compliance and wider environmental management and where appropriate should be integrated with other management plans. The EPA recommends that such plans be audited to an industry standard or certified to the ISO 14001 standard (if applicable) as part of any overall environmental management system.

If you have any questions about this matter, please contact me on 02 4908 6830 or by email to [hunter.region@epa.nsw.gov.au](mailto:hunter.region@epa.nsw.gov.au). Natasha Ryan can also be contacted on 02 4908 6833.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Matthew Corradin'.

**MATTHEW CORRADIN**  
Senior Operations Officer  
Environment Protection Authority

Phone 131 555  
Phone 02 4908 6800

Fax 02 4908 6810  
TTY 133 677  
ABN 43 692 285 758

PO Box 488G  
Newcastle  
NSW 2300 Australia

117 Bull Street  
Newcastle West  
NSW 2302 Australia

[www.epa.nsw.gov.au](http://www.epa.nsw.gov.au)  
[hunter.region@epa.nsw.gov.au](mailto:hunter.region@epa.nsw.gov.au)

## Appendix C Air Quality Plan Approval

To be inserted once approved by the Department.



## Appendix D Best Practice Emissions Management Measures

Table D.1 – Emission Management Measures

Activity	Issue	Action(s)	Consistent with Best Practice
Stripping topsoil by scraper	Watering of haul routes. Restricting vehicle speeds.	Control measures for this activity are not specifically identified but can be inferred from the bulldozers information below.	Y
Drilling overburden	Water injection and application of water to drill cuttings upon removal. Dust curtains. Ceasing operations if dust suppression. Systems are inoperable or if dust is visible above the drill deck level for a sustained period.	<i>"Best practice control measures include air extraction to a bag filter. No mines were found to use this practice."</i>	N (bag filters are not best practice in NSW)
Blasting overburden	Pre-blast checks including review of meteorological conditions.	<i>"Best practice control measures include delaying shot to avoid unfavourable weather conditions and minimising the area blasted."</i>	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.	<i>"Control measures include watering, grading, well-defined haul routes, speed limits to 40 km/h and/or the use of suppressants."</i>	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.	<i>"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".</i>	Y
Unloading coal to ROM hopper	Water sprays and partial enclosure.	<i>"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."</i>	N (additional Control devices are not best practice in NSW)
Coal processing	Enclosure.	Control measures for this process are not specifically identified.	N/A
Dozers or loaders on ROM and product coal stockpiles	Watering of travel routes. Minimisation during dusty conditions. Reduced travel speed during dusty conditions.	<i>Best practice control measures include minimising the travel speed and distance travelled by bulldozers and the application of water to keep travel routes moist."</i>	Y
Conveyors to stockpiles	Covered / enclosure. Belt cleaning.	<i>The use of wind shielding on conveyor sides, water sprays at conveyor transfers, enclosure of transfer points, and, soft-loading chutes."</i>	Y (except for water sprays and soft-loading chutes)

Wind erosion from partially rehabilitated dumps	Partial rehabilitation / stabilisation	<i>Control measures include watering exposed areas, minimising areas of disturbance, progressive rehabilitation and use of suppressants."</i>	Y
Wind erosion from ROM and product coal stockpiles	Water sprays on the hoppers, triggered by wind conditions. Water carts in the event of excessive dust emissions. Minimisation of FEL drop heights when loading.	<i>"Control measures include watering exposed areas, minimising areas of disturbance, progressive rehabilitation and use of suppressants."</i>	Y
Grading Roads	Watering of haul routes. Restricting vehicle speeds. Clearly marked routes.	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 & equipment	Servicing all machinery in accordance with maintenance contracts and adopting original equipment manufacturer recommendations for maintenance. Targeting the maintenance to ensure equipment remains fit for purpose over its whole life cycle. Defining failure modes, effects and criticality. Constructing timelines for downtimes.	Control measures for this activity are not specifically identified.	N/A