AIR QUALITY MANAGEMENT STRATEGY

For Boggabri – Tarrawonga – Maules Creek Complex

OCTOBER 2025

Idemitsu Australia
Boggabri Coal Operations Pty Ltd

Whitehaven Coal Limited
Tarrawonga Coal Pty Ltd, Maules Creek Coal Pty Ltd

AIR QUALITY MANAGEMENT STRATEGY

IDEMITSU
BOGGABRI COAL

DOCUMENT CONTROL				
Version	**Date**	**Prepared by**	**Reviewed by**	**Approved by**
01	27 Sep 12	PAE Holmes	B Bird	J Green, D Martin, D Young
02	21 March 14	PAE Holmes / Parsons Brinckerhoff	J Green, D Martin, D Young	J Green, D Martin, D Young
03	16 December 14	Parsons Brinckerhoff	J Green, D Martin, J Johnson	J Green, D Martin, J Johnson
04	03 March 15	Parsons Brinckerhoff	J Green, D Martin, J Johnson	J Green, D Martin, J Johnson
05	15 May 15	Parsons Brinckerhoff	J Green, D Martin, T Dwyer	J Green, D Martin, T Dwyer
06	October 15	S.Crick	C Simmons / L Johnson / T Dwyer,	H. Russell, J Johnson
07	11 December 2015	Parsons Brinkerhoff	C Simmons / L Johnson / T Dwyer,	H. Russell, J Johnson
08	5 May 2017	Parsons Brinkerhoff	C Simmons / L Johnson / T Dwyer,	D. Martin, J Johnson
09	October 2025	J. Crowe	E Bulkeley / M Hollis	L Tolson

IDEMITSU
BOGGABRI COAL

Contents

Contents

Tables

Figures

Appendices

Glossary

Glossary	
AEMR	Annual Environmental Management Report
AQGHGMP	Air Quality and Greenhouse Gas Management Plan
AQMS	BTM Complex Air Quality Management Strategy
BCM	Boggabri Coal Mine
BCOP	Boggabri Coal Operations Pty Ltd
BTM Complex	Boggabri-Tarrawonga-Maules Creek Complex (previously known as the Leard Forest Mining Precinct)
CALPUFF	An air quality dispersion model
CCC	Community Consultative Committee
CHPP	Coal Handling and Preparation Plant
CL	Coal Lease
DCCEEW	Climate Change, Energy, the Environment and Water
DPE	NSW Department of Planning and Environment
EA	Environmental Assessment
EPA	Environment Protection Authority
EP&A Act	*Environmental Planning and Assessment Act, 1979*
EPL	Environment Protection Licence
GHG	Greenhouse Gas
HVAS	High Volume Air Sampler
IA	Idemitsu Australia Pty Limited
LAN	Local Area Network
MCCM	Maules Creek Coal Project
Mtpa	Million Tonnes Per Annum
PAC	NSW Planning Assessment Commission
PM_{10}	Particulate matter < 10 µm
$PM_{2.5}$	Particulate matter < 2.5 µm
ROM	Run of Mine
TCM	Tarrawonga Coal Mine
TEOM	Tapered Element Oscillating Microbalance
TCPL	Tarrawonga Coal Pty Ltd
TSP	Total Suspended Particulate
WRF	Weather Research and Forecasting

1. Introduction

1.1 Background and purpose

The purpose of this cumulative air quality management strategy (AQMS) is to document the approach that mines within the Boggabri-Tarrawonga-Maules Creek Complex (BTM Complex)[1] will take to monitor and manage cumulative air quality impacts. The AQMS details the relevant cumulative air quality impact assessment criteria for each mine and outlines the cumulative air quality management protocols that will be implemented within the BTM Complex.

The BTM Complex is an existing mining precinct located within and around the Leard State Forest, approximately 15 kilometres (km) northeast of Boggabri in the Narrabri Local Government Area (LGA). The BTM complex includes Boggabri Coal Mine (BCM) with Tarrawonga Coal Mine (TCM) to the Southeast and Maules Creek Coal Mines (MCCM), to the Northwest.The extent of the relevant tenements for each of the mines that comprise the BTM Complex are presented in **Figure 1-1**. BCM is managed by Boggabri Coal Operations Pty Limited (BCOP), a wholly owned subsidiary of Idemitsu Australia Pty Limited (IA). TCM is managed by Tarrawonga Coal Pty Ltd, a wholly owned subsidiary of Whitehaven. MCCM is managed by Maules Creek Coal Pty Ltd, a wholly owned subsidiary of Whitehaven Coal Mining Limited (Whitehaven). A Summary of the ownership details for the mines within the BTM Complex is provided below in **Table 1-1**.

Table 1.1-1 Management and ownership of BTM Complex mines

Mine	Management	Ownership	Share
Boggabri Coal Mine	Boggabri Coal Operations Pty Ltd	Boggabri Coal Pty Ltd	90%10%
		NS Boggabri Pty Limited	
Maules Creek Coal Mine	Maules Creek Coal Joint Venture	Aston Coal 2 Pty Limited (owned 100% by Whitehaven Coal Limited)	75%
		Itochu Coal Resources Australia Maules Creek Pty Ltd (ICRA MC)	15%
		J-Power Australia (J-Power)	10%
Tarrawonga Coal Mine	Tarrawonga Coal Pty Limited	Whitehaven Coal Mining Limited	100%

Project applications for the continued operation of BCM (application number 09_0182) and the development of the MCCM (application number 10_0138) were determined by the NSW Planning Assessment Commission (PAC) in July and October 2012 respectively, under delegation by the NSW Minister for Planning and Infrastructure. Subsequent to this, the (now) Commonwealth Department Climate Change, Energy, the Environment and Water (DCCEEW) granted conditional approval for both the BCM Extension (EPBC 2009/5256) and the MCCM Project (EPBC 2010/5566) on 11 February 2013. Given the level of public interest in these projects and the potential for cumulative impacts, approvals were granted subject to stringent conditions related to the management of cumulative impacts.

[1] In previous environmental assessments and approval documents this group of mines has been referred to as the Leard Forest Mining Precinct. For the purposes of this AQMS and all other relevant cumulative impact management documents, all references to the 'Leard Forest Mining Precinct' have been replaced with the term 'BTM Complex'.

The TCM application for continuation of mining was approved on 22 January 2013, with similar cumulative impact management conditions to those detailed in the BCM and MCCM approvals. The (now) DDCCEEW granted EPBC approval for the Tarrawonga project on 11th March 2013.

Approval conditions require the preparation of a suite of regional strategies for environmental management, developed in partnership by all three mines of the BTM Complex. This AQMS has been developed to serve as the Leard Forest Mining Precinct Air Quality Management Strategy, in accordance with each project's approval requirements. Approval conditions relevant to the management of cumulative air quality impacts within the BTM Complex are detailed in Table 1.2.

Table 1.1-2 Approval requirements for cumulative air quality impact management

Boggabri Coal Mine Project Approval 09-0182	Maules Creek Coal Mine Project Approval 10_0138	Tarrawonga Project Approval PA 11_0047	Details	Section reference in AQMS
Schedule 3, Condition 30 (b)	Schedule 3, Condition 33 (b)	Schedule 3, Condition 28(b)	The proponent shall… "Operate a comprehensive air quality management system on site that uses a combination of predictive meteorological forecasting, predictive and real time air dispersion modelling and real-time air quality monitoring data to guide the day to day planning of mining operations and implementation of both proactive and reactive air quality mitigation measures to ensure compliance with the relevant conditions of this approval".	Whole of document, specifically Sections 4.2 and 4.6
Schedule 3, Condition 30 (g)	Schedule 3, Condition 33 (g)	Schedule 3, Condition 28(g)	"Co-ordinate the air quality management on site with the air quality management at other mines within the Leard Forest Mining Precinct to minimise the cumulative air quality impacts of the mines, to the satisfaction of the Director-General"	Whole AQMS, including Section 5.3
Schedule 3, Condition 31 (h)	Schedule 3, Condition 34 (g)	Schedule 3, Condition 29(g)	Prepare and implement an Air Quality and Greenhouse Gas Management Plan that… "includes a Leard Forest Mining Precinct Air Quality Management Strategy that has been prepared in consultation with other coal mines in the Complex (formerly Precinct) to minimise the cumulative air quality impacts of all mines within the Complex (formerly Precinct), that includes: ▪ Systems and processes to ensure that all mines are managed to achieve their air quality criteria; ▪ A shared environmental monitoring network and data sharing protocol ▪ Control monitoring site(s) to provide real time data on background air quality levels (i.e. not influenced by mining from the Leard Forest Mining Precinct and representative of regional air quality); ▪ A shared predictive and real time air dispersion model covering the Leard Forest Mining Precinct to be used for the assessment of cumulative impacts, optimising location of the shared real time monitoring network, validation of air	Whole of AQMS, specifically Section 4

Boggabri Coal Mine Project Approval 09-0182	Maules Creek Coal Mine Project Approval 10_0138	Tarrawonga Project Approval PA 11_0047	Details	Section reference in AQMS
			predictions and optimising mitigation measures; and ▪ Procedures for identifying and apportioning the source/s and contribution/s to cumulative air impacts for both mines and other sources, using the air quality and meteorological monitoring network and appropriate investigative tools such as modelling of post incident plume dispersion, dual synchronised monitors and chemical methods of source apportionment.	Section 5.1
			Notes: The requirement for regionally based control sites can be further reviewed if a regional air monitoring network is implemented and operated by the EPA as recommended in the draft Strategic Regional Land Use Plan for New England and North West. The Leard Forest Mining Complex (formerly Leard Forest Mining Precinct) Air Quality Management Strategy can be developed in stages and will need to be subject to ongoing review dependent upon the determination of and commencement of other mining projects in the area." The management plan should be consistent with the EPA's guidance on Best Management Practice reporting and Reactive Particulate Management Strategies.	Section 4.3
Schedule 3, Condition 31A			The proponent must implement the Air Quality and Green House Gas Management Plan to the Secretary	Whole AQMS

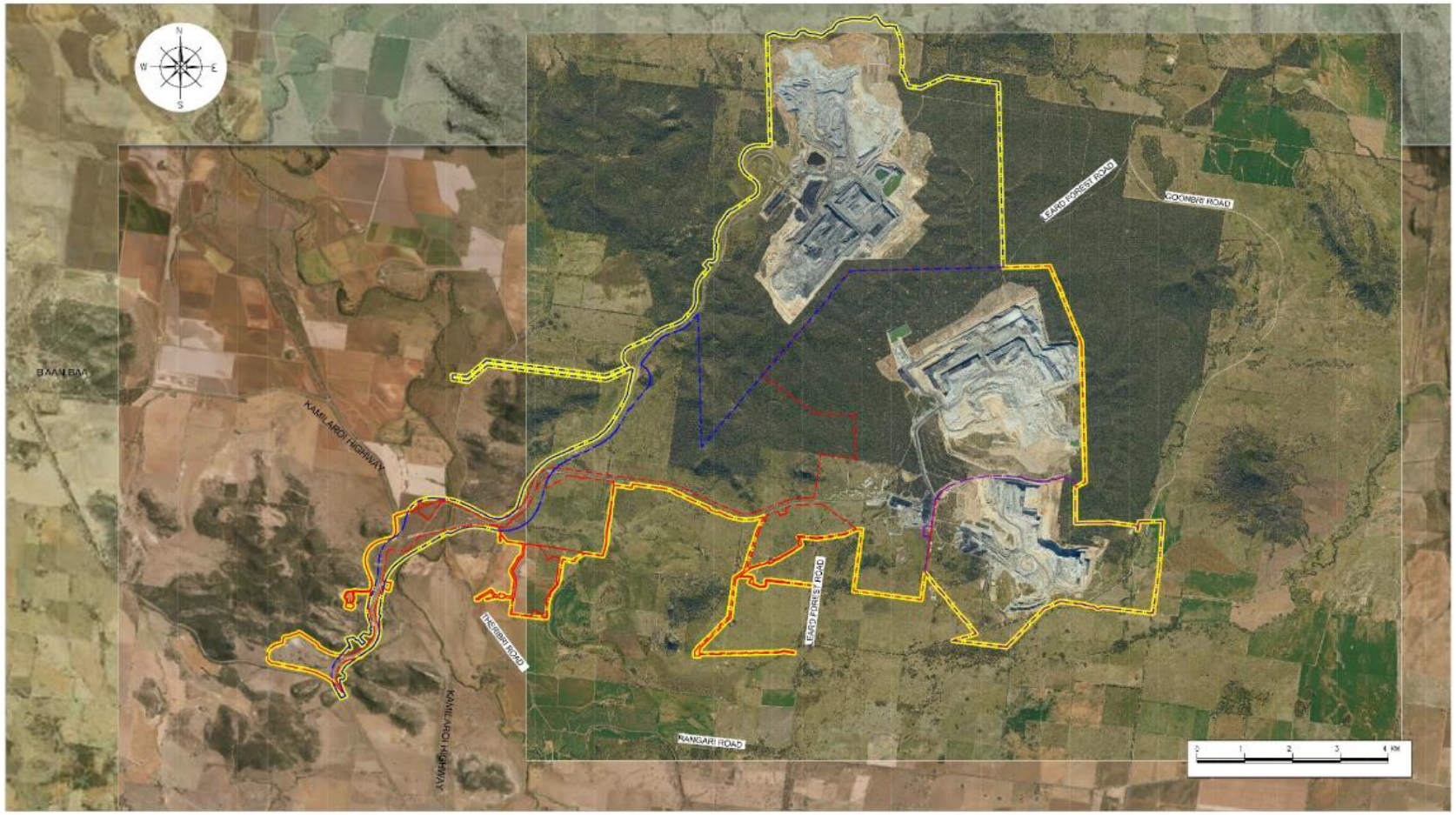

Figure 1-1 Location of the BTM Mines

1.2 Document structure

The structure of this report is as follows:

- **Section 1** provides an introduction to the AQMS, including the background to the AQMS, and the scope of the AQMS.
- **Section 2** provides an overview of the BTM Complex mines (BCM, TCM, and MCM).
- **Section 3** describes air quality criteria to be considered in the design and operation of the network and monitoring programs
- **Section 4** describes existing monitoring networks; sets objectives for cumulative monitoring; outlines the cumulative BTM Complex monitoring program;
- **Section 5** discusses corrective and preventative actions.
- **Section 6** discusses the review of the BTM air quality monitoring network.
- **Section 7** describes document control.

1.3 Section 8 provides a list of references used in this document.Scope

This document is the overarching strategy for management of the BTM Complex and associated zones of air quality affectation.

Individual mines will manage their ongoing operations and associated air quality in accordance with their site-specific Air Quality and Greenhouse Gas Management Plans (AQGHGMPs). Statutory requirements relating to air quality will be provided in each individual AQGHGMP and are summarised in this AQMS.

2. BTM Complex

2.1 Boggabri Coal Mine

BCM is an existing open cut mine that consists of an open cut pit, overburden dump, infrastructure area including coal processing facilities, water management structures, and a rail spur.

BCM obtained NSW State Government approval on the 18 July 2012, and Commonwealth Government approval on 11 February 2013. These approvals (as modified) allow operations at BCM to extend for a further 21 years at a rate of 8.6 million tonnes per annum (Mtpa) of run-of-mine (ROM) coal. The project approval for BCM provides for operation of existing ancillary equipment; construction and operation of a new coal handling and preparation plant (CHPP); 17 km rail spur line; bridges over the Namoi River and Kamilaroi Highway; a rail load-out facility located at the mine; upgrade of the overburden and coal extraction haulage fleet (with an option for a drag-line); upgrade of electricity transmission lines; and establishment of a water supply borefield and other ancillary infrastructure.

BCM has modified PA09_0182 on multiple occasions since approval with the most recent being in January 2024 (MOD 8), relating to mining two coal seams deeper than previously, and extending the life of mine until 2036.

2.2 Tarrawonga Coal Mine

The TCM is an existing coal mining operation that was granted approval by the (now) DPHI to extract 2Mtpa of ROM coal in 2005 (DA-4-2005). TCPL, a subsidiary of Whitehaven Coal, submitted a project application in July 2011 for an extension of open cut mining operations with an increased production rate of 3 Mtpa of ROM coal for a further 17 years from 2013 to 2030. The project application was determined by the PAC on January 22, 2013, and included, under condition 29 (g), the requirement that the proponent shall prepare and implement an AQMP and must include an AQMS for the BTM complex.

TCM has modified Project Approval 11_0047 on several occasions since then, increasing coal extraction to a maximum of 3.5 million tonnes in 2020. The most recent modification was determined in December 2023 to increase the road haulage hours of operation.

2.3 Maules Creek Coal Mine

The MCCM Project approval (PA10-0138) was granted by the PAC as delegate of the Minister of DP&E on 23 October 2012. The approval includes extraction of up to 13 Mtpa of ROM coal for 21 years, construction and operation of the site infrastructure including CHPP and associated facilities; train loading facility; rail spur and loop; a mine access road; communications and power reticulation; explosives storage; and a water pipeline from the Namoi River.

MCCM have modified Project Approval 10_0138 on several occasions since, with the most recent being in March 2024. The latest modification authorised changes to existing biodiversity strategy and construction and use of an electricity transmission line.

3. Air quality strategy criteria

3.1 Air quality assessment criteria

Relevant air quality impact assessment criteria have been extracted from the most recent BCOPL Project Approval, the MCCM Project Approval and the TCM Project Approval. These criteria are provided in Table 3.1,1 Table 3.1.2 and Table 3.1.3

The conditions require that BCOPL, MCCM and TCM must ensure particulate emissions generated by BTM Complex operational activities do not exceed the criteria listed in Tables 3.1 to 3.3 at any residence on privately-owned land or on more than 25 per cent of any privately owned land.

Table 3.1-1 BCOPL Air Quality Impact Assessment Criteria

Pollutant	Averaging period	[a,c] Criterion
PM10 µm (PM_{10})	Annual	[a]25 µg/m^3
PM 2.5 µm ($PM_{2.5}$)	Annual	[a]8 µg/m^3
PM 10 µm	24 hour	[a]150 µg/m^3
PM 10 µm	24 hour	[b]50 µg/m^3
PM 2.5 µm	24 hour	[b]25 µg/m^3
Deposited Dust	Annual	[a]4 g/m^2/month

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

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

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

Table 3.1-2 MCCM Air Quality Impact Assessment Criteria

Pollutant	Averaging period	[d]Criterion
		µg/m^3
PM 10	Annual	[a]30 µg/m^3
PM 10	24 hour	[a]50 µg/m^3

PM 10	24 hour	[b]50 µg/m^3
Deposited Dust	Annual	[b]2 g/m^2/month
Deposited Dust	Annual	[a]4 g/m^2/month

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

Table 3.1-3 TCM Air Quality Impact Assessment Criteria.

Pollutant	Averaging period	Criterion
		µg/m^3
PM 10 µm (PM$_{2.5}$)	Annual	[ab]30µg/m^3
PM 10 µm (PM$_{10}$)	24 hour	[b]50 µg/m^3
PM 10 µm (PM$_{10}$)	24 hour	[b]50 µg/m^3
Deposited Dust	Annual	[b]2 g/m^2/month
Deposited Dust	Annual	[a]4 g/m^2/month

a. Total impact (project plus all other sources;
b. Project only impact

3.2 Air quality acquisition criteria

The acquisition criteria for operations is detailed and addressed in each mine site's individual AQGHGMPs.

4. Monitoring

The mines of the BTM complex operate comprehensive air quality monitoring systems. These networks are made up of a combination of High-Volume Air Samplers (HVAS) Real-Time Tapered Element Oscillating Microbalances (TEOMs) and portable E-sampler.

4.1 Monitoring network

The BTM Complex monitoring network includes monitoring stations from all three mines within the BTM complex. The requirements of the cumulative monitoring network at the BTM Complex are to:

- facilitate compliance with existing and likely future consent conditions
- allow proactive management and real-time dust monitoring to assist in day-to-day operations of each mine site
- develop an integrated and coordinated approach to air quality management of the BTM Complex
- consolidate existing monitoring
- allow for predictive meteorological forecasting
- include procedures for identifying and apportioning the source(s) and contribution(s) to cumulative air impacts for mines and other sources, using the air quality and meteorological monitoring network
- include appropriate investigative tools such as modelling of post incident plume dispersion.

The cumulative network is comprised of monitors from existing networks and additional management infrastructure. Four TEOM's, one capable of measuring PM2.5 and compliance HVAS units are included in the network. Additionally, four real-time pm10 monitors and a web-based system for the real-time management of monitoring data, weather, emissions, and modelling have been integrated into the cumulative monitoring network.

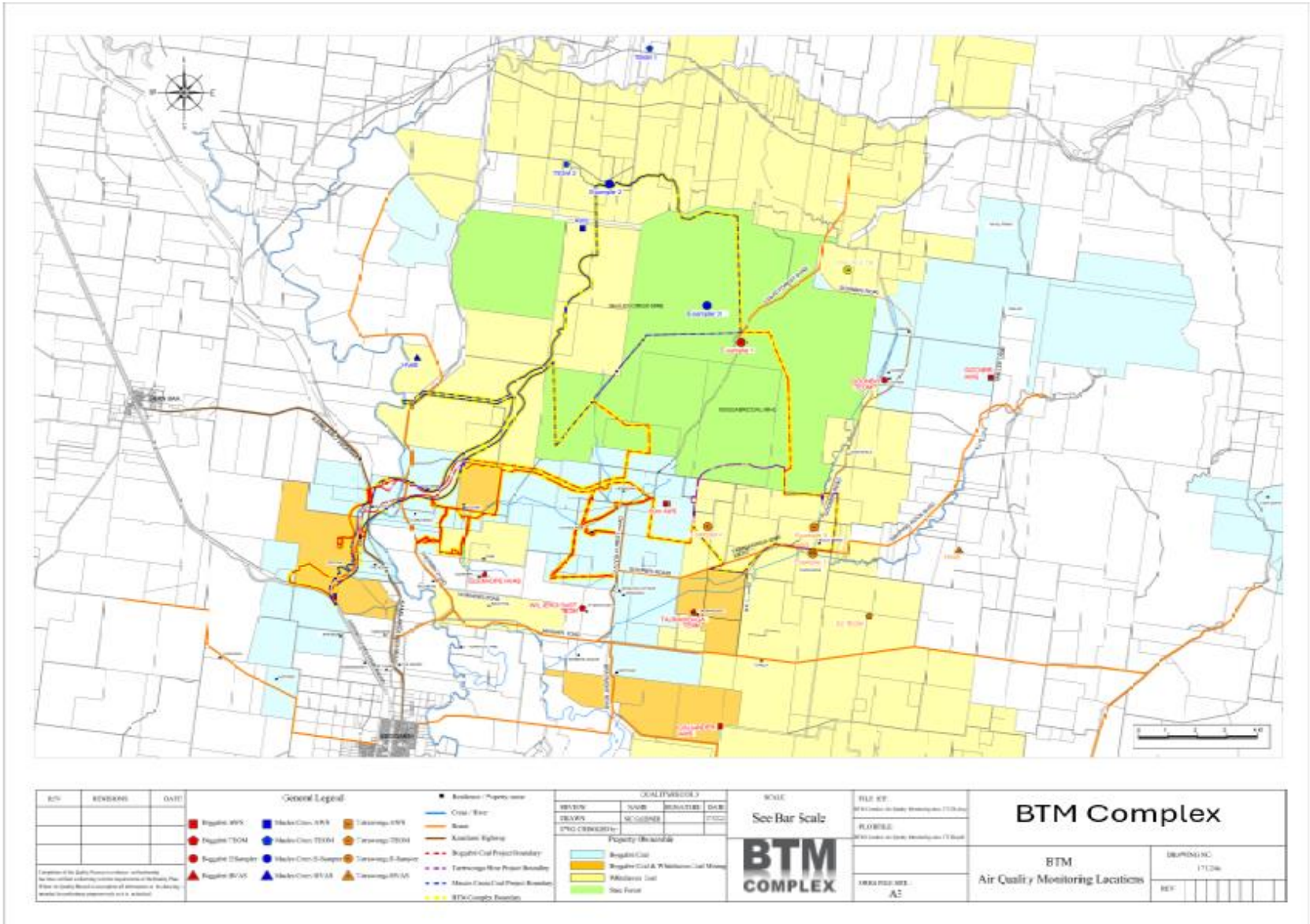

Figure 4-1 BTM Complex air quality monitoring locations

4.1.1 Real-time monitors (TEOMS)

Critical to the AQMS are the locations of the real-time monitors, which will guide the implementation of reactive dust management measures by respective mines. The four TEOMs used in the BTM cumulative system are in fixed locations described in each mine AQGHGMP. All TEOMs are capable of measuring PM10 and at least one is capable of measuring PM2.5. The monitors give real time feedback and are used to alert when pre-defined trigger levels have been reached. The real-time air quality monitoring allows relevant personnel to react when short term trigger levels are reached, which are set at a level that allows reactive dust management (to control 24-hour and ultimately annual average impacts).

4.1.2 Portable real-time PM_{10} monitors

The BTM complex operates four portable real time pm10 monitors (e-samplers or equivalent) for the day-to-day dust management on mining operations. The locations of the portable monitors are determined by several factors including:

- seasonally predominant daily wind patterns (e.g. upwind and downwind of operations given predominant SE/NW wind directions)
- the relative locations of each mines' highest controllable dust generating sources
- practicality of locating monitoring equipment close to the mining operations, and
- suitability of immediate location where sited e.g. not immediately next to unsealed roads.

The monitoring locations allow for the analysis of upwind PM_{10} concentrations along the north/south and southeast/northwest axis that correspond to the prevailing wind directions; and areas that are predicted to be impacted by BTM Complex operations. The portable monitors should also capture any impacts during less frequent wind directions.

This combined network of portable monitors and TEOMs allows for the identification of which mine may be contributing to any elevated measurements, so that appropriate mitigation measures can be employed.

4.1.3 High volume air samplers

Each of the BTM Complex mines operate HVAS for the purpose of compliance monitoring. The HVAS's sample PM_{10} by passing an air stream through a filter paper for a period of 24 hours every 6 days. The location and operation of each HVAS is illustrated in Figure 4.1 and detailed in each mines AQGHGMP.

4.2 Regional monitoring

Regional Air Quality data is available at **Northwest Slopes | Air Quality NSW**. PM10 and PM2.5 data is collected from two monitoring stations in Gunnedah, and one site each in Moree, Narrabri and Tamworth. The BTM mines use the information on this website as a control site to inform regional air quality compared to their own air quality monitoring networks.

4.3 Responsibility of the individual mines

Each mine shares responsibility for the maintenance, calibration, repair, operating costs, and site access agreements for the operation of the monitoring network. Arrangements have been confirmed between the mines regarding the ongoing logistics of operating the monitoring network.

4.4 Data management and interpretation

Air quality data will be summarised, validated and made available for the public and agencies monthly, via each mine site's website. The BTM Complex will also publish daily, real-time data on individual company webpages.

4.5 Predictive and real-time air quality management

4.5.1 Predictive forecast meteorology

The BTM complex is required to operate a predictive operational management system, the purpose of which is to minimise possible environmental impacts and cumulative effects. The system uses forecast weather data to predict whether there may be an issue soon, allowing time for operational changes to mitigate the potential impact. The BTM uses the DTN (formally WeatherZone) predictive system to address this requirement. The forecast model uses WRF/CALMET/CALPUFF modelling systems, a standard widely used for assessing long range transport of pollutants. The forecast includes temperature, wind direction, precipitation, relative humidity, rainfall, and lightning. Predictive 48-hour meteorological forecasts are accessed daily to assist in the planning for blasting and production operations.

As with any predictive forecast, confidence reduces with longer predictions, however the half hourly 48-hour forecasts will provide useful planning information for operations. The forecasts for the next 24-hour and 12-hour periods will provide more confidence in predictions for the day ahead and how weather may affect operations.

This system's performance is reviewed every three months, and validation reports will be produced.

Data from local automatic weather stations will be used to validate weather forecasting model performance over time.

4.5.2 Integrated real-time monitoring data

To enable real-time reactive feedback from the system, a connection has been established to receive a data feed from weather stations and air quality monitoring equipment in the BTM Complex network. These data feeds have been connected to the system from a central data repository and via a connection to loggers on infield monitors and weather stations using Wi-Fi and/or mobile networks to transfer data.

Real-time dust management capability builds on the information gained from predictive systems to proactively manage dust. Protocols will be put in place to react to rising dust levels, e.g. automated notices sent to Open Cut Examiners to alert the need to respond with control/mitigation, and focus can be given to the most significant identified dust source in accordance with site specific management measures.

.

4.5.3 Air quality dispersion model

The BTM Complex system uses the WRF/CAMLET/CALPUFF modelling system. CAMLET is a meteorological pre-processor that provides the meteorological inputs required to run the CALPUFF dispersion model. It creates a fine resolution, three-dimensional meteorological field and includes a wind field generator that considers the effect of terrain. CALMET produces fields of wind components, air temperature, relative humidity, mixing height and other micro-meteorological variables for each time average step of the modelling.

CALPUFF is a multi-layer, multi-species non-steady state puff dispersion model that can simulate the effects of time and space varying meteorological conditions on pollutant transport, transformation, and removal. The model contains algorithms for near-source effects such as building downwash, partial plume penetration, sub-grid scale interactions as well as longer-range effects such as pollutant removal, chemical transformation, vertical wind shear and coastal interaction effects. The model uses dispersion equations based on a Gaussian distribution of pollutants across the puff and takes account of complex arrangements of emissions from point, area, volume, and line sources. The CALPUFF model has been configured to the BTM Complex operations and will use a combination of forecast data and real-time data from the BTM weather station network.

Upper air data is provided by the WRF system that automatically downloads global meteorological conditions and processes these to provide local information. This information is required to generate upper air meteorological data as well as a forecast meteorology prediction.

4.6 Predictive and reactive triggers

Predictive triggers have been set for typical meteorological conditions that are known to have adverse impacts on air quality due to dust generated during mining operations. Over time predictive triggers can be updated for conditions resulting in observed increases in dust impacts. Reactive triggers are set to alert operations when monitoring data for short term average periods indicate that the 24-hour air quality criteria may be reached at areas of relevant exposure. Short term triggers allow for proactive dust management to control 24-hour and ultimately annual average impacts based on measured shorter term average concentrations.

Associated with each trigger level is a response which will inform the course of action taken by the relevant personnel. Two trigger levels are defined that require a response from the relevant personnel, as follows:

- investigation level
- action level.

An example of Investigation and Action trigger levels are shown in Table 4-1.These trigger levels have been set based on real-time monitoring data recorded at the Fairfax Public School. The relationship between peak 1-hour PM_{10} concentrations and mean 24-hour PM_{10} concentrations are analysed to determine the level of 1-hour PM_{10} concentrations that may result in elevated 24-hour PM_{10} concentrations.

Table 4.6-1 Investigation and trigger levels for Boggabri Coal Mine

Action level	Trigger level	Description/action required
Investigation	Two Consecutive 1-hour average PM_{10} concentration above 50 µg/m^3	Relevant personnel are required to identify what activities are occurring and notify plant/equipment operators that dust emissions may be elevated and additional dust controls may need to be implemented. Preparatory measures will be implemented or ready to be implemented.
Action	Four Consecutive 1-hour average PM_{10} concentration above 50 µg/m^3	Relevant personnel are required to implement controls such as additional water spraying or modifying work practices.

Actual predictive and reactive triggers will be reviewed regularly and be based on the initial air quality data collected during commissioning of air quality monitoring equipment as well as ongoing monitoring results.

SMS and email alerts will be sent to relevant personnel and monitoring data will be displayed in near real-time on a customised web-based reporting system.

Real-time dust management alerts are sent if the trigger conditions outlined above are met. The notification will also identify which criteria have triggered the alert.

Alerts will be sent when a new level is triggered, i.e. subsequent time periods that result in the same dust level will not generate multiple warnings. When the conditions increase to a higher alert level or when conditions return to a lower alert level, the system will send a new notification alerting all relevant personnel to the new dust management alert level.

All alerts are recorded by the system in an alert log that can be analysed at any time to identify trends or patterns in alerts that may lead to improvements in operational planning and/or dust control that is focussed on certain areas of operations or times of the day.

4.6.1 System outputs

System outputs include:

- Daily forecast reports providing information on temperature inversions, wind conditions, dust risk, and recommended control actions.
- Graphical representation of the forecasted meteorology and real-time monitoring data via the system's web interface.
- Capability to analyse and confirm the likely source(s) of dust and path(s) that the dust has travelled. This functionality is critical in apportioning responsibility to operations for mitigating emissions.

This analysis provides the modelled path of a parcel of air and alternative paths accounting for uncertainty. It provides an indication of the time that the plume will have travelled over a certain area, which may assist operations in pinpointing activities that were occurring at that time in the locations highlighted for investigation.

A source apportionment chart can also be generated from modelled predictions and monitoring data at a selected location.

5. Corrective and preventative actions

5.1 Process to identify main source of dust impacts

The dust management system is designed to process real-time data from PM_{10} monitors and weather stations. It generates outputs (such as those outlined in Section 4.7.1) that are used with predetermined triggers to assess the potential for dust impacts from operations. The system notifies operators when triggers are activated. The system is used to analyse and provide information on potential dust sources that are responsible for the increase in monitored dust.

For the BTM Complex, real-time monitors are used to measure PM_{10}concentrations at several locations around the operations (for example as shown in Figure 4-1 and AQGHGMPs). The dust monitoring data is sent in short time steps to a web server where it will be processed by the air quality management system. Trigger levels are set for the real-time monitors (i.e. TEOMs and portable samplers). As the system operates over time the trigger levels will be refined through consideration of historical data and any other relevant observations.

If a real-time monitor triggers an alert, the system will query the monitoring data to determine if mining operations are upwind of the triggered monitor. If so, it will be used to assess whether activities occurring between upwind and downwind monitors are creating an increased level of dust that has set off an alert. The system will use available weather data to determine the likely area of the operations that contains the dust generating source. This can be done by activating a reverse trajectory analysis of the plume that has triggered an alert.

5.2 Mitigation

Processes to mitigate air quality outcomes associated with operations are addressed in each mine sites individual AQGHGMPs.

Dust generation assessment will be undertaken by experienced site personnel (e.g. OCE), with the assistance of various specialists (e.g. operations, environment and air quality specialists) as required.

5.3 Communication

Regular meetings are held by the BTM complex to discuss any concerns relating to cumulative impacts associated with regional Air Quality. Meeting minutes will be documented and distributed.

The trigger levels initiate automated system alerts to relevant personnel within the BTM Complex to allow the complex to implement management measures to reduce dust generation.

When air quality criteria are exceeded, discussions will be held within the BTM Complex, regulatory agencies and affected landholders (where an exceedance occurs on privately-owned land).

Reporting of air quality exceedances will also be made in accordance with relevant project approval conditions.

5.4 Reporting

External reporting will include:

- updates on individual company websites
- presentations to Community Consultative Committees (CCCs)
- reporting as required under each mines approvals.

5.5 Unpredicted contingency

Unpredicted events such as dust storms, bushfires, agricultural activities, hazard reduction burning or similar activities that influence dust levels will be identified and reported as impacting on air quality trigger levels on a case-by-case basis.

Where air quality triggers occur and are outside forecast predictions or unexpected from model inputs and can't be identified from specific source information from the BTM Complex operations, an air quality specialist will be consulted to investigate the cause of the impact. The specialist will refine the predictive model and recommend appropriate action to address the outcomes of the unpredicted event.

6. Review

6.1

An air quality expert was engaged to conduct a review of the BTM cumulative monitoring network and predictive system in 2024.

6.1.1 Review of BTM AQ Network and Forecast Model

A review of equipment in the BTM cumulative monitoring network was conducted by an air quality expert. The findings were that no significant issues existed. A possible wind direction averaging error has been detected in two weather stations and amended. Forecasted wind speed and direction data are critical parameter for predictive management of operational impacts. Using inaccurate wind forecasts can severely skew results, leading to false alarms or missed critical events.

A review of the DTN forecast predictions and the measured data at the weather stations within the BTM Complex monitoring network shows a very poor correlation between the predicted and measured wind speed and direction data. This occurs across all stations. The wind speed is underpredicted in the daytime and overpredicted during the nighttime when compared with the observational data for the same period. The spread of wind directions does not correlate well between the predicted and observed datasets. Wind direction data shows less than ideal correlation between the observed data for both day and night periods.

Members of the BTM met with technical specialists at DTN (formerly weatherzone) to discuss poor correlation between the predictive model and observed data. This meeting resulted in a review of the model from DTN and the proposal of a new forecast model.

DTN is currently integrating a OneFX forecast model across all their platforms. The new generation forecast data model, OneFX, will ingest observation data in a more sophisticated manner, allowing for an improved downscaled WRF to be available as a dispersion input. OneFX will be more accurate than any single model due to its near real time optimisation and machine learning capabilities.

Once available, the BTM will implement DTN's new OneFX model for improved reliability in forecasting. In the interim, DTN will recalibrate the BTM's existing model for improved correlation between predicted and observed data.

.

7. Document control

This cumulative air quality management strategy has been developed with the input of representatives of BCM, TCM and MCCM.

7.1 Review and revision

In accordance with the project approvals, the AQMS will also be reviewed within three months of:

- an annual review
- incident threatening material harm, requiring notification of the Secretary / relevant agencies
- statutory audit, and
- modification of project approval.

8. References

Boggabri Coal Mine, 2013. Draft Air Quality and Greenhouse Gas Management Plan. Prepared by Parsons Brinckerhoff.

Maules Creek Coal Project, 2014. Air Quality and Greenhouse Gas Management Plan. Prepared by PAE Holmes.

PAEHolmes, 2011. Report: Review and Recommendations for Boggabri/Tarrawonga/Maules Creek Cumulative Air Quality Monitoring, Prepared for Boggabri Coal Pty Ltd, Tarrawonga Coal Pty Ltd and Maules Creek Project by PAEHolmes, August 2011.

PAE Holmes, 2012. Report: Tarrawonga Coal Mine – Particulate Matte Control Best Practice Pollution Reduction Program, June 2012.

Project Approval (PA 09_0182) for Boggabri Coal Mine.

Project Approval (PA 10_0138) for Maules Creek Coal Mine.

Project Approval (PA 11_0047) for Tarrawonga Coal Mine.

Tarrawonga Coal Mine, 2015. Air Quality and Greenhouse Gas Management Plan

Appendix A

Requirements of Project Approvals

Boggabri Coal Mine

Table A.1 Project Conditions from Project Approval for Boggabri Coal Mine (Application No. 09-0182), July 2012.

Applicable Condition	Requirement	BCM Plan/BTM Complex Strategy	Section
Schedule 3 Condition 23	Unless otherwise authorised by an EPL, the Proponent shall ensure that no offensive odours are emitted from the site, as defined under the POEO Act	AQGHGMP	5.1 to 5.6
Schedule 3 Condition 24	The Proponent shall implement all reasonable and feasible measures to minimise the release of greenhouse gas emissions from the site	AQGHGMP	5.1 to 5.6
Schedule 3 Condition 25	Upon receiving a written request for acquisition from an owner of the land listed in Table 7, Boggabri Coal shall acquire the land in accordance with the procedures in the Project Approval Schedule 4 Condition 8 and 9.	AQGHGMP	5.7
Schedule 3 Condition 26	Upon receiving a written request from the owner of any residence on the land listed in Table 7 or the land listed in Table 8, the Proponent shall implement additional air quality mitigation measures (such as air filters, a first flush roof water drainage system and/or air conditioning) at the residence in consultation with the owner. These measures must be reasonable and feasible and directed towards reducing the air quality impacts of the project on the residence. If within 3 months of receiving this request from the owner, the Proponent 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 Director-General for resolution.	AQGHGMP	5.6
Schedule 3 Condition 26	The Proponent shall ensure that all reasonable and feasible avoidance and mitigation measures are employed so that particulate matter emissions generated by the development do not exceed the criteria listed in Tables 6, 7 or 8 at any residence on privately-owned land or on more than 25 percent of any privately-owned land.	AQGHGMP	4.2, 5.1-5.6, 6.1-6.3
Schedule 3 Condition 27	Except for the air quality affected land in Table 7, the Proponent shall ensure that particulate matter emissions generated by the project do not exceed the criteria listed in Table 9, Table 10 and Table 11 at any residence on privately owned land or on more than 25 percent of any privately-owned land.	AQGHGMP	4.2
Schedule 3 Condition 28	Boggabri Coal shall ensure that particulate matter emissions generated by the project do not exceed the criteria listed in Tables 4-1, 4-2 and 4-3, at any occupied residence on any mine owned land (including land owned by adjacent mines) unless: (a) all reasonable and feasible avoidance and mitigation measures have been employed to prevent exceedance of the criteria (b) the tenant, and landowner (where owned by a mine other than Boggabri Coal), has been notified of health risks in accordance with the notification requirements under Schedule 4 of the Project Approval (c) the tenant on project owned land can terminate their tenancy agreement without penalty, subject to giving reasonable notice, and Boggabri Coal uses its best	AQGHGMP	4.2

Applicable Condition	Requirement	BCM Plan/BTM Complex Strategy	Section
	endeavours to provide assistance with relocation and sourcing of alternative accommodation (d) air mitigation measures such as air filters, a first flush roof water drainage system and/or air conditioning) are installed at the residence, if requested by the tenant and landowner (where owned by a mine other than Boggabri Coal) (e) particulate matter air quality monitoring is undertaken to inform the tenant and landowner (where owned by a mine other than Boggabri Coal) of potential health risks (f) the monitoring data are provided to the tenant in an appropriate format, for a medical practitioner to assist the tenant in making an informed decision on the health risks associated with occupying the property, to the satisfaction of the Director-General.		
Schedule 3 Condition 29	If particulate matter emissions generated by Boggabri Coal exceed, or contribute to an exceedance of the relevant cumulative criteria, in Table 12, 13 or 14 at any residence on privately-owned land or on more than 25 percent of any privately-owned land, then upon receiving a written request for acquisition from the landowner, the Applicant shall acquire the land in accordance with the procedures in Project Approval Conditions 8 and 9 of Schedule 4.	AQGHGMP	4.2 and 5.7
Schedule 3 Condition 30	The Proponent shall: (a) implement best management practice to minimise the odour, fume and dust emissions of the project, including best practice coal loading and profiling and other measures to minimise dust emissions from coal transportation by rail (b) operate a comprehensive air quality management system onsite that uses a combination of predictive meteorological forecasting, predictive and real time air dispersion modelling and real-time air quality monitoring data to guide the day to day planning of mining operations and implementation of both proactive and reactive air quality mitigation measures to ensure compliance with the relevant conditions of the project approval (c) manage PM2.5 levels in accordance with the requirements of the EPL (d) minimise the air quality impacts of the project during adverse meteorological conditions and extraordinary events (e) minimise any visible air pollution (f) minimise the surface disturbance of the site generated by the project (g) co-ordinate the air quality management onsite with the air quality management at other mines within the Leard Forest Mining Precinct (Tarrawonga and Maules Creek) to minimise the cumulative air quality impacts of the mines, to the satisfaction of the Director-General.	AQGHGMP	5.1 to 5.6
Schedule 3 Condition 31	The Proponent shall prepare and implement an Air Quality and Greenhouse Gas Management Plan for the project to the satisfaction of the Director-General. This plan must: (a) be prepared in consultation with the EPA and CCC, and be submitted to the Director-General for approval within 6 months from the date of project approval	AQGHGMP	Whole AQGHGMP Document

Applicable Condition	Requirement	BCM Plan/BTM Complex Strategy	Section
	(b) integrate the recommendations of a Site Specific Best Management Determination and Reactive Dust Management Strategy prepared to the satisfaction of the EPA (c) describe the measures that would be implemented to ensure: ‣ best management practice is being employed, consistent with the development of the site specific best management determination and reactive dust management strategy ‣ the air quality impacts of the project are minimised during adverse meteorological conditions and extraordinary events ‣ compliance with the relevant conditions of this consent. (d) describe the proposed air quality management system (e) include a risk/response matrix to codify mine operational responses to varying levels of risk resulting from weather conditions and specific mining activities (f) include commitments to provide summary reports and specific briefings at CCC meetings on issues arising from air quality monitoring (g) include an air quality monitoring program that: ‣ uses a combinations of real-time monitors and supplementary monitors to evaluate the performance of the project ‣ adequately supports the proactive and reactive air quality management system ‣ includes $PM_{2.5}$ monitoring ‣ includes monitoring of occupied project-related residences and residences of air-affected land listed in Table 7 and Table 8, subject to the agreement of the tenant or landowner ‣ evaluates and reports on the effectiveness of the air quality management system ‣ includes a protocol for determining any exceedances of the relevant conditions in this approval		
Schedule 3 Condition 31	(h) includes a Leard Forest Mining Precinct Air Quality Management Strategy that has been prepared in consultation with other coal mines in the Precinct to minimise the cumulative air quality impacts of all mines within the Precinct, that includes:	AQMS	Whole AQMS Document
	▪ systems and processes to ensure that all mines are managed to achieve their air quality criteria	AQMS	Whole AQMS Document
	▪ a shared environmental monitoring network and data sharing protocol	AQMS	Section 4.2
	▪ control monitoring site(s) to provide real time data on background air quality levels (i.e. not influenced by mining from the Leard Forest Mining Precinct and representative of regional air quality)	AQMS	Section 4.1 and 4.2
	▪ a shared predictive and real time air dispersion model covering the Leard Forest Mining Precinct to be used for assessment of cumulative impacts, optimising location of the shared real-time monitoring network, validation of air predictions and optimising mitigation measures	AQMS	Section 4.6

Applicable Condition	Requirement	BCM Plan/BTM Complex Strategy	Section
	▪ procedures for identifying and apportioning the source/s and contribution/s to cumulative air impacts for both mines and other sources, using the air quality and meteorological monitoring network and appropriate investigative tools such as the modelling of post incident plume dispersion, dual synchronised monitors and chemical methods of source apportionment.	AQMS	Section 5.1

Maules Creek Mine

Table A.2 Project Conditions from Project Approval for Maules Creek Coal Project (Application No. 10_0138), July 2012.

Applicable Condition	Requirement	BTM Complex Strategy	Section
Schedule 3 Condition 34 (g)	(The Proponent shall prepare and implement an Air Quality and Greenhouse Gas Management Plan for the project to the satisfaction of the Director-General. This plan) includes a Leard Forest Mining Precinct Air Quality Management Strategy that has been prepared in consultation with other coal mines in the Precinct to minimise the cumulative air quality impacts of all mines within the Precinct, that includes:	AQMS	Whole AQMS Document
	▪ systems and processes to ensure that all mines are managed to achieve their air quality criteria	AQMS	Whole AQMS Document
	▪ a shared environmental monitoring network and data sharing protocol	AQMS	Section 4.2
	▪ control monitoring site(s) to provide real time data on background air quality levels (i.e. not influenced by mining from the Leard Forest Mining Precinct and representative of regional air quality)	AQMS	Section 4.1 and 4.2
	▪ a shared predictive and real time air dispersion model covering the Leard Forest Mining Precinct to be used for assessment of cumulative impacts, optimising location of the shared real time monitoring network, validation of air predictions and optimising mitigation measures	AQMS	Section 4.6
	▪ procedures for identifying and apportioning the source/s and contribution/s to cumulative air impacts for both mines and other sources, using the air quality and meteorological monitoring network and appropriate investigative tools such as the modelling of post incident plume dispersion, dual synchronised monitors and chemical methods of source apportionment (where possible).	AQMS	Section 5.1

Tarrawonga Coal Mine

Table A.3 Project Conditions from Project Approval for Tarrawonga Coal Project (Application No. 11_0047), January 2013.

Applicable Condition	Requirement	BTM Complex Strategy	Section
Schedule 3 Condition 29 (g)	The Proponent shall prepare and implement an Air Quality and Greenhouse Gas Management Plan for the project to the satisfaction of the Director-General. This plan must: (g) include a Leard Forest Mining Precinct Air Quality Management Strategy that has been prepared in consultation with other coal mines in the Precinct to minimise the cumulative air quality impacts of all mines within the Precinct, that includes:	AQMS	Whole AQMS Document
	▪ systems and processes to ensure that all mines are managed to achieve their air quality criteria	AQMS	Whole AQMS Document
	▪ a shared environmental monitoring network and data sharing protocol	AQMS	Section 4.2
	▪ control monitoring site(s) to provide real time data on background air quality levels (i.e. not influenced by mining from the Leard Forest Mining Precinct and representative of regional air quality)	AQMS	Section 4.1 and 4.2
	▪ a shared predictive and real time air dispersion model covering the Leard Forest Mining Precinct to be used for assessment of cumulative impacts, optimising location of the shared real time monitoring network, validation of air predictions and optimising mitigation measures	AQMS	Section 4.6
	▪ procedures for identifying and apportioning the source/s and contribution/s to cumulative air impacts for both mines and other sources, using the air quality and meteorological monitoring network and appropriate investigative tools such as the modelling of post incident plume dispersion, dual synchronised monitors and chemical methods of source apportionment (where possible).	AQMS	Section 5.1

Department of Planning, Housing and Infrastructure

Our ref: MP09_0182-PA-121

Alexandra Williams
Environment and Community Manager
Boggabri Coal Pty Limited
Leard State Forest 386
Leards Forest Road
Boggabri, NSW, 2382

22/06/2026

Boggabri Coal – BTM Air Quality Management Strategy (AQMS)

Dear Ms. Williams

Thank you for submitting the BTM Air Quality Management Strategy submitted in accordance with Condition 31, Schedule 3 of the consent for the Boggabri Coal (MP09_0182).

I note that the BTM AQMS has been revised to include an update on project approval and monitoring locations; and contains the information required by the conditions of approval.

Accordingly, as nominee of the Planning Secretary, I approve the revised BTM AQMS (Rev version 09, July 2026).

You are reminded that if there are any inconsistencies between the Strategy and the conditions of approval, the conditions prevail.

Please ensure you make the document publicly available on the project website at the earliest convenience.

If you wish to discuss the matter further, please contact Charissa Pillay on 02 99955944.

Yours sincerely

Allison Sharp
A/Director
Resource Assessments

As nominee of the Planning Secretary