



Report

SUNNYSIDE COAL MINE AIR QUALITY REVIEW

WHITEHAVEN COAL LIMITED

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CONTENTS

1	INTRODUCTION	1
2	BACKGROUND	1
3	OVERVIEW OF MODIFICATION	3
4	PREVIOUS ASSESSMENT	3
4.1	Air Quality Assessment	3
4.2	Project Approval Conditions	4
5	EXISTING ENVIRONMENT	6
5.1	Existing Air Quality	6
5.1.1	PM ₁₀ Concentrations	6
5.1.2	Dust Deposition	7
6	COMPARISON OF EA PREDICTIONS WITH MONITORING RESULTS	8
6.1	Estimated Emissions	8
6.2	Comparing Emissions to Monitoring Data	9
7	IMPACT ASSESSMENT FOR THE MODIFICATION	9
8	REFERENCES	9

List of Figures

Figure 2.1:	Regional Location	2
Figure 4.1:	Location of Nearest Residences and Monitoring Locations	5
Figure 5.2:	Measured 24-hour Average PM ₁₀ Concentration	7

List of Tables

Table 4.1:	EPA air quality assessment criteria for particulate matter concentrations	4
Table 4.2:	EPA criteria for dust deposition (insoluble solids)	4
Table 5.1:	Annual average PM ₁₀ concentrations (µg/m ³)	6
Table 5.2:	Annual average (insoluble solids) deposition levels (g/m ² /month)	7
Table 6.1:	Estimated emissions in AQA and PRP	8
Table 6.2:	Estimated emissions based on PM ₁₀ /ROM ratio	8

1 INTRODUCTION

Pacific Environment has been engaged by Whitehaven Coal Limited (Whitehaven) to complete an air quality review for a proposed modification to the Sunnyside Coal Mine approval (the Modification).

The Modification relates to potential recommencement of operations to extract remaining coal within the approved mining footprint and approval is sought under Section 75W of the New South Wales *Environmental Planning and Assessment Act 1979*.

2 BACKGROUND

The Sunnyside Coal Mine (Sunnyside) is located approximately 15 kilometres (km) west of Gunnedah in north western NSW. **Figure 2.1** shows the location of Sunnyside in its regional context.

Sunnyside is currently approved to extract up to 1 million tonnes per annum (Mtpa) of run-of-mine (ROM) coal. The coal mine is a conventional open cut operation, with associated mine-related infrastructure including a ROM coal stockpile, on-site primary crushing facility, conveyor, coal load-out bin, and ancillary surface facilities including offices and a workshop. The product coal is transported from the mine site to Whitehaven's Gunnedah coal handling and preparation plant (CHPP), which is located approximately 8 km to the east-northeast (approximately 16 km by road).

In accordance with Condition 5, Schedule 2 of Project Approval 06_0308, mining operations may take place for 7 years from the grant of the mining lease for the Sunnyside Coal Project. The Sunnyside mining lease (ML 1624) was granted on 5 November 2008, which means that mining operations are currently approved until 5 November 2015.

Due to unfavourable economic conditions, Whitehaven discontinued mining operations at Sunnyside on 29 November 2012, however, stockpiled ROM coal continued to be transported to Whitehaven's CHPP on a campaign basis until May 2013. Activities at the mine site since then have been limited to the clearing of remaining ROM coal stockpiles, environmental monitoring, ongoing rehabilitation, and care and maintenance of the site (including spontaneous combustion management).



Figure 2.1

Figure 2.1: Regional Location

3 OVERVIEW OF MODIFICATION

Whitehaven wish to maintain a current Project Approval at the Sunnyside Mine to enable the extraction of the remaining coal within the approved open cut footprint (i.e. approximately 1 million tonnes [Mt]) should current adverse economic conditions change.

The proposal would extend the life of Sunnyside beyond the currently approved 2015 date. Accordingly, Whitehaven requires the Modification to authorise the extraction of coal from the existing open pit area after November 2015 for a period of up to 5 years. The Modification would not change the following aspects of the approved operations, which are relevant to air quality:

- Maximum annual ROM coal or waste rock production.
- Extent of mining operations (i.e. no change to the approved footprints of the open pit or waste rock emplacement).
- Mining methods.
- Vehicle fleet.
- Progressive rehabilitation.
- Hours of operation.
- Product transport via on-highway truck to the Whitehaven CHPP in Gunnedah.

4 PREVIOUS ASSESSMENT

4.1 Air Quality Assessment

In 2007 an Air Quality Assessment (AQA) was prepared for Sunnyside (**Heggies, 2007**). The AQA included an assessment of potential impacts due to onsite operations, including open cut mining within ML 1624, both in isolation and cumulatively with other surrounding mining and non-mining operations.

Dispersion modelling was used to predict offsite dust concentrations and deposition levels from mining activities associated with Sunnyside. Modelling took account of local meteorology and terrain and used dust emission estimates to predict ground level concentrations at the nine closest residences to the Sunnyside site. Dust emissions were estimated based on a maximum production rate of 1 Mtpa.

Figure 4.1 shows the nine residences for which predictions were made in the AQA.

Modelling predicted that Sunnyside would comply with all relevant NSW Environment Protection Authority (EPA) criteria at these locations.

4.2 Project Approval Conditions

The potential air quality impacts associated with Sunnyside, as described in Heggies (2007), were approved subject to conditions of Project Approval 06_0308, which included:

- Air quality impact assessment criteria, consistent with contemporary EPA criteria as presented in **Table 4.1** and **Table 4.2** below.
- Air quality monitoring using a combination of high volume air samplers and dust deposition gauges.

Table 4.1: EPA air quality assessment criteria for particulate matter concentrations

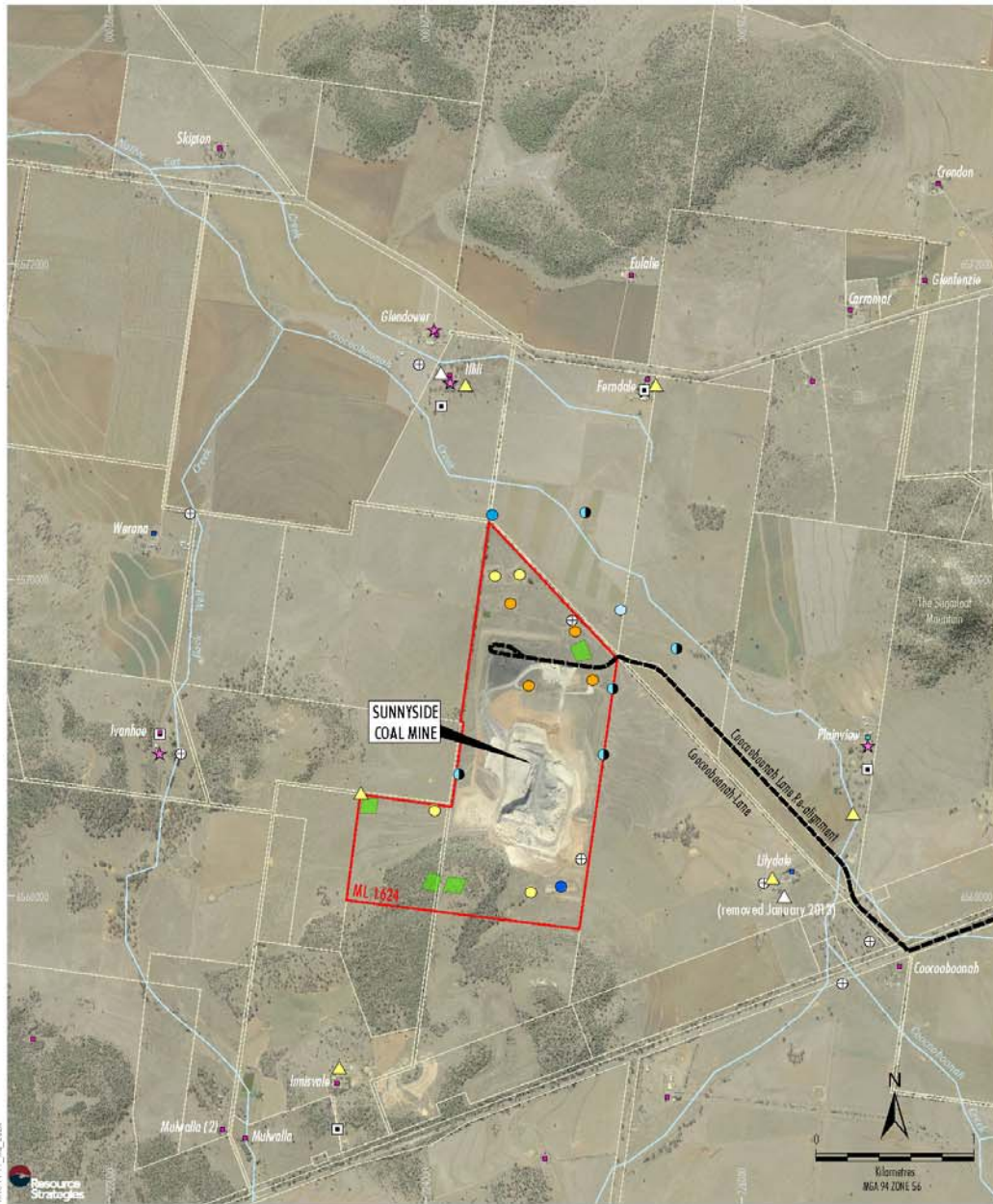
Pollutant	Averaging period	Criteria	Agency
PM ₁₀	24-hour	50 µg/m ³	EPA impact assessment criteria (cumulative) Ambient Air-NEPM reporting goal, allows five exceedances per year for bushfires and dust storms
	Annual mean	30 µg/m ³	EPA impact assessment criteria (cumulative)
TSP	Annual mean	90 µg/m ³	National Health and Medical Research Council (cumulative)

Note: µg/m³ – micrograms per cubic metre
PM₁₀ – particulate matter less than 10 micrometres in size
TSP – total suspended particulates

Table 4.2: EPA criteria for dust deposition (insoluble solids)

Pollutant	Averaging period	Maximum increase in deposited dust level	Maximum total deposited dust level
Deposited dust	Annual	2 g/m ² /month	4 g/m ² /month

Note: g/m²/month – grams per square metre per month



- LEGEND
- Mining Lease Boundary
 - Proposed Coal Transport Route
 - Privately Owned Dwelling
 - Dwelling Subject to Private Agreement
 - Whitehaven Owned Dwelling
 - Blast
 - Deposited Dust
 - PM₁₀ Dust
 - Noise
 - Upstream Water
 - Downstream Water
 - Pit Water Storage
 - Sediment Basin
 - Storage Dam
 - Groundwater Piezometer
 - Water Bore
 - Fauna/Vegetation Monitoring Area
- Source: DEC (2013); Department of IP&I (2010); Orthophoto (2011)

WHITEHAVEN COAL
SUNNYSIDE COAL MINE
 Location of Nearest Residences
 and Monitoring Locations

Figure 4.1

Figure 4.1: Location of Nearest Residences and Monitoring Locations

5 EXISTING ENVIRONMENT

The Sunnyside air quality monitoring network, required in accordance with Project Approval 06_0308 (Section 4.2) consists of six dust deposition gauges, two PM₁₀ High Volume Air Samplers^a (HVAS) and a meteorological station, at the locations shown in Figure 4.1.

Monitoring was in operation for the duration of the Sunnyside mining operations and continues at the Sunnyside Coal Mine as a component of the ongoing care and maintenance of the site.

5.1 Existing Air Quality

5.1.1 PM₁₀ Concentrations

Figure 5.1 presents the 24-hour average PM₁₀ concentrations measured at the two HVAS sites during operations at Sunnyside. The annual average PM₁₀ concentrations are summarised in Table 5.1.

Figure 5.1 shows that levels are well below the EPA 24-hour average PM₁₀ criterion of 50 µg/m³ for the majority of the time during the Sunnyside operations. Peaks in late 2009 and 2012 are the result of dust storms and bushfires across parts of the state at those times rather than from operations at Sunnyside.

Table 5.1 shows the annual average PM₁₀ concentrations have been below the EPA 30 µg/m³ criterion in all years of Sunnyside operations at both HVAS monitors.

Table 5.1: Annual average PM₁₀ concentrations (µg/m³)

Year	SA1 – "Illili"	SA2 – Lilydale
2009	21.0	16.2
2010	9.3	7.7
2011	9.7	8.2
2012	13.6	11.1

^a Note that only one HVAS is currently in operation following approval of a revised Air Quality Monitoring Program (Namoi Mining, 2013) by the then NSW Department of Planning and Infrastructure in January 2013.

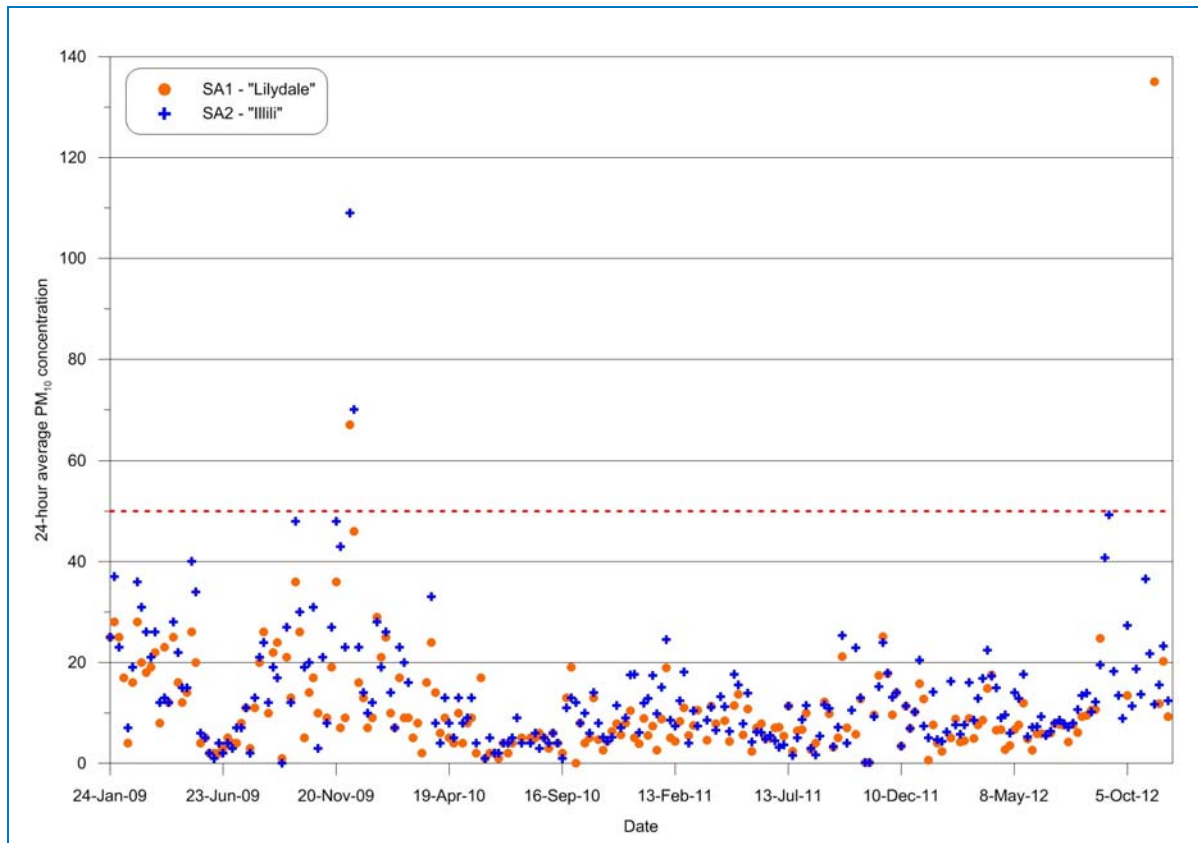


Figure 5.1: Measured 24-hour Average PM₁₀ Concentration

5.1.2 Dust Deposition

Table 5.2 summarises the monitored insoluble solids deposition levels since 2010. Levels are highest at gauges SD-1 and SD-5. SD-5 is on the western boundary of the Sunnyside mining lease. This gauge is closest to the operations and as such may be expected to have the highest levels of dust deposition.

All monitoring locations show levels well below the EPA dust deposition criteria during Sunnyside operations.

Table 5.2: Annual average (insoluble solids) deposition levels (g/m²/month)

Gauge	2010	2011	2012	2013	Average
SD-1	3.1	2.4	1.1	2.3	2.2
SD-3	1.7	1.2	1.6	2.2	1.7
SD-4	1.1	1.0	2.2	-	1.4
SD-5	2.7	1.9	3.0	1.8	2.4
SD-6	1.8	0.9	1.4	1.0	1.3
SD-7	1.2	1.8	1.4	1.8	1.5

6 COMPARISON OF EA PREDICTIONS WITH MONITORING RESULTS

6.1 Estimated Emissions

Estimates of dust emissions are presented in Section 5.7 and Appendix 6 of the Sunnyside AQA (Heggies, 2007). These estimates took into consideration the movement of mobile plant and equipment across different sections of the Sunnyside site and were derived to reflect the worst-case scenario for emissions over a 24-hour period and mean average operational conditions over the course of a year. The emission estimates were based on the maximum ROM production rate of 1 Mtpa.

The emissions presented in Heggies (2007) are presented as kilograms per annum (kg/annum) in Table 6.1 for the approved ROM coal extraction rate. Assumptions have been made for annual emissions from wind erosion based on the information available in the AQA.

Also presented in Table 6.1 are emissions estimates made for Sunnyside's Pollution Reduction Program (PAEHolmes, 2012) for the mining period June 2010 to July 2011. The ROM production rate, on which the estimates are made, is also shown and a corresponding PM₁₀/ROM ratio is derived. The actual production level for the mining period June 2010 to July 2011 was significantly less than the maximum approved 1 Mtpa and, as expected, the resultant PM₁₀ emissions are significantly less.

Based on the higher PM₁₀/ROM ratio of 0.8 presented in Table 6.1, estimates of PM₁₀ emissions for the past three Annual Environmental Management Report (AEMR) reporting periods are made and presented in Table 6.2. The AEMR period that is closest to the maximum approved production is the December 2011 to November 2012 period, where 690,014 tonnes ROM coal was produced. Although the ROM production is lower than maximum approved (1 Mtpa), using the PM₁₀/ROM ratio of 0.8 the estimated emissions are higher than those presented in Heggies (2007).

Table 6.1: Estimated emissions in AQA and PRP

Source of estimate	ROM production scenario (Mtpa)	PM ₁₀ emission (kg/annum)	kg PM ₁₀ / tonne ROM
Heggies (2007)	1.0	468,493	0.5
PAEHolmes (2012)	0.3	261,700	0.8

Table 6.2: Estimated emissions based on PM₁₀/ROM ratio

Reporting Year	ROM production scenario (Mtpa)	kg PM ₁₀ / tonne ROM	PM ₁₀ emission (kg/annum)
December 2011 - November 2012	0.7	0.8	575,233
December 2010 - November 2011	0.4	0.8	300,609
December 2009 - November 2010	0.3	0.8	248,839

6.2 Comparing Emissions to Monitoring Data

By comparing predictions made in **Heggies (2007)** with the existing monitoring data presented in **Section 5.1**, it is clear an overestimate of impact was presented in the AQA. **Heggies (2007)** used a conservative background for annual average PM₁₀ of 16.5 µg/m³ and predicted increments from Sunnyside ranging from 0.6 µg/m³ to 5.6 µg/m³.

The existing monitoring data presented in **Section 5.1**, indicates that ambient concentrations are typically much lower than this, even with the operation of Sunnyside. For example, during 2012, the measured annual average PM₁₀ concentration was 13.6 µg/m³ and 11.1 µg/m³ at the two HVAS. This also corresponds to the period where the highest ROM production was reported for Sunnyside.

It is noted that during 2009 the annual average PM₁₀ concentration is higher than other years, however this is attributed to generally dryer conditions across NSW during 2009 as well as dust storms and bushfire events in the latter half of the year.

The existing monitoring data presented in **Section 5.1** also indicates that, on a few occasions, the 24-hour PM₁₀ concentrations are above the criterion of 50 µg/m³, however these are generally attributed to dust storms and bushfires. During 2012, the period when the highest ROM production was reported in AEMRs, there was only one exceedance of the impact assessment criteria.

Although the ROM production reported in the AEMRs did not reach the maximum approved 1 Mtpa, in the 2012 period, ROM production did reach ~0.7 Mtpa. During 2012, for a ROM production rate of 0.7 Mtpa, the annual average PM₁₀ was less than 30% of the impact assessment criteria.

The measured deposition levels for each of the nine nearest residences are well below their relevant impact assessment criteria which indicates operations at Sunnyside did not result in ambient air quality above the impact assessment criteria for PM₁₀ or dust deposition, consistent with the conclusions of **Heggies (2007)**.

7 IMPACT ASSESSMENT FOR THE MODIFICATION

The Modification does not seek an increase in approved production or a change to daily operations.

As such, consistent with the conclusions of **Heggies (2007)** and air quality monitoring data collected during Sunnyside operations, the Modification is unlikely to result in any exceedance of the existing annual average Project Approval air quality criteria for PM₁₀, TSP or dust deposition, or any additional exceedances of the 24-hour average Project Approval air quality criteria for PM₁₀.

8 REFERENCES

Heggies (2007). "Air Quality Assessment for the Sunnyside Coal Project", prepared by Heggies Pty Ltd for Namoi Mining Pty Ltd, October 2007

Namoi Mining Pty Ltd (2013). "Air Quality Monitoring Program for the Sunnyside Coal Project incorporating an Air Quality Monitoring Protocol". January 2013.

PAEHolmes (2012). "Sunnyside Coal Mine – Particulate Matter Control Best Practice Pollution Reduction Program", prepared by PAEHolmes for Whitehaven Coal Pty Ltd, June 2012