13 Air quality

13.1 Project changes

The proposed Project changes will not significantly alter the mine layout or the mine fleet and therefore airborne particulate and gaseous emissions will be unchanged. Correspondingly, the air quality impacts will remain as assessed in EA Appendix M and summarised in EA Chapter 14.

13.2 Response to submissions

Submission

I-140

Issue

This submission asks, "Figure 14.1 Air Quality Assessment Locations indicates an area of Maximum extent of Mine, does this include stockpile areas for overburden and topsoil?".

Response

The out-of-pit waste emplacements are in the maximum extent of mine area shown in the main EA (Figure 14.1). This can be seen by comparing main EA figures 1.2 and 3.1, which show maximum mine extent and out-of-pit waste rock emplacements. An updated mine layout is provided in Figure 3.1 and, as described in Section 13.1, changes to the Project will not change air quality impacts.

13.2.1 Baseline environment – meteorology

Submissions

I-9, I-63, I-41, I-162, I-187, G-10

Issues

These submissions comment that the EA did not adequately represent the site's existing meteorological conditions, specifically:

- wind direction: predominant winds are from the west and south-west and not from the east as reported in the EA;
- meteorological stations: data from MET 02 were incomplete and do not satisfy modelling requirements; wind data from Dunedoo Post Office, which shows wind from the west and north-west, was not used; and the EA does not state why MET 02 is at the south-east corner of pit B;

- sampling period: 23 August 2011 to 3 November 2011 was not enough to represent wind directions and strengths; and the EA does not consider if a 12-month modelling period represents typical weather, particularly given the sampling period was during an “El Nino” [sic];

- data used: the air quality and noise assessments use different meteorological data; and

- data exclusion: data has been selectively excluded to show favourable weather and calculations reduce the impact to Gulgong.

Responses

The meteorological data used in the dispersion modelling was from the MET01 weather station between November 2010 and November 2011. As shown in Appendix M of the EA (figures A1 and A2), the dominant wind direction recorded at MET01 is from the east, with less dominant west-southwest winds also experienced. The diurnal wind roses (Figure A2 of Appendix M of the EA) show that the east winds are dominant between dusk and dawn, while south-westerly winds increase from early morning until late afternoon and occur about 25% of the time.

The November 2010 to November 2011 MET01 dataset comprises 8,400 hourly observations. All potential combinations of meteorological conditions within this dataset were paired with emission rates from Project mining sources to predict ground level concentrations of air pollutants. Therefore, the west to south-west winds have been included in the dispersion modelling.

Both MET01 and MET02 are sited and equipped with instrumentation in accordance with Australian Standard *AS/NZS 3580.14:2011, Methods for sampling and analysis of ambient air – meteorological monitoring for ambient air quality monitoring applications*. Therefore, these are sound meteorological data sources.

As noted in EA Appendix M (Section 4.1), MET02 recorded valid meteorological observations since it was installed in August 2011. However, when the dispersion was modelled (November 2011 to January 2012), based on OEH’s requirements of a minimum of 90% coverage of 1-hour data over 12 months (DEC 2005), insufficient data were available from MET02. However, the limited data from MET02 were compared with paired observations from the MET01 and showed strong agreement in recorded wind direction at the two locations.

The November 2010 to November 2011 data period was associated with a La Niña period. As detailed in Appendix M (Section 4.4 and Appendix A), the regional inter-annual meteorological variation was examined using data from the BoM stations at Mudgee and Dubbo from 2007 to 2011. This found that there was minimal variation in wind speed and direction (which are the most critical parameters in the dispersion modelling) between the years analysed. Therefore, it is reasonable to assume the November 2010 to November 2011 data are appropriate for use to assess air quality impacts for the Project.

The assessment of meteorological conditions for noise purposes involves assessing data during specific periods of the day for noise enhancing conditions and focuses on wind speeds less than 3 m/s where noise dispersion is maximised. Whereas air quality dispersion modelling uses all wind speeds in a recorded 12-month dataset.

Wind data from the BoM station at Gulgong and Dunedoo was not used in the dispersion modelling. While wind speed and direction are recorded at these locations, observations are only made at 9 am and 3 pm (see Figure 13.1). For an entire calendar year, this equates to 730 hourly observations from a possible total of 8,760 1-hour records. This does not meet the OEH requirement for 90% data completeness.

The 9am and 3pm wind roses from the Dunedoo climate station between January 1965 and September 2010, Gulgong climate station between March 1970 and September 2010 (www.bom.gov.au/climate/averages/tables/cw_064009.shtml) and the 9 am and 3 pm wind roses from data recorded at MET01 between November 2010 and November 2011 (Figure 13.1) show the similarities between the three monitoring locations. While there are slight differences between the three stations, the Gulgong station shows a good correlation with the MET01 wind roses. Whereas the dominant wind in Dunedoo at 3 pm is westerly, while the dominant wind at MET01 at 3 pm is south-westerly. The wind roses reinforce the suitability of the MET01 dataset, which was recorded in the centre of the mining area against long-term regional wind data. The prediction of dust impacts using the MET01 data set is considered valid for downwind receptors in Gulgong.

13.2.2 Baseline environment – air quality

Submissions

I-41, I-140

Issues

Submissions comment that the EA did not adequately represent the site's existing air quality, specifically:

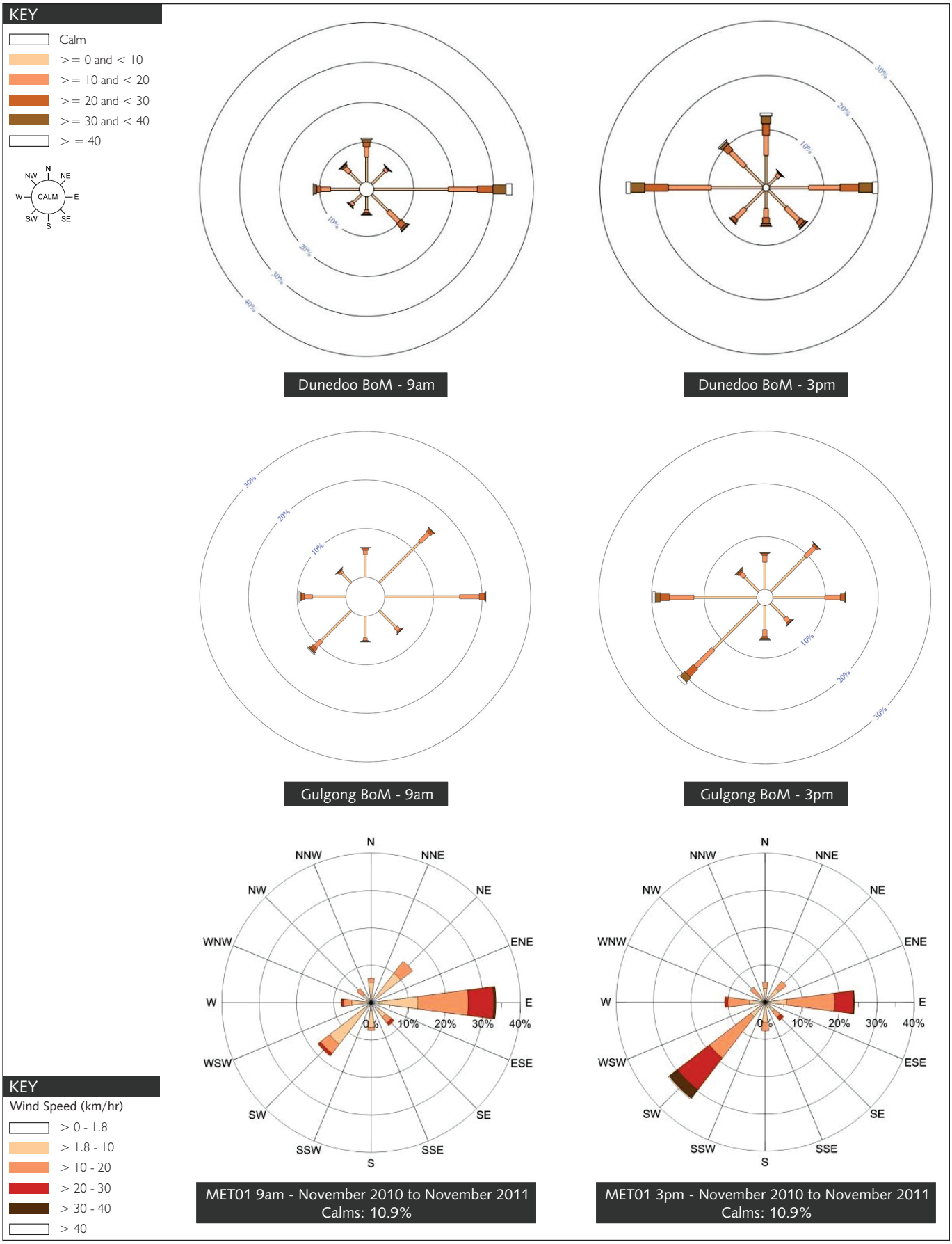
- comparison of cities: data from Tamworth and Bathurst were used even though these cities are in different climate zones and a figure comparing Bathurst and Cobbora is presented in a manner which hides some data;
- base data: there was no monitoring for total suspended solids (TSP) meaning comparisons cannot be drawn; and
- sampling sites: the sample sites are adjacent to unsealed roads which leads to higher dust levels than if the sampling sites were away from roads. This misrepresents regional ambient dust levels.

Responses

As described in EA Appendix M (Section 5.3.2), the OEH Tamworth and Bathurst air quality monitoring stations, along with the regional mining stations, were used to illustrate the similarities in ambient PM_{10} concentrations levels between the Project site and the region. The analysis highlighted correlations between the assorted regional PM_{10} concentrations and those for the Project.

The PM_{10} concentrations from the on-site monitoring station were used as the primary source of background air quality data in the air quality assessment. This dataset contained two significant periods of missing data, which was due to instrument malfunction. To complete the air quality record, corresponding concentrations were adopted from the OEH Bathurst dataset, which is a sound, publicly available PM_{10} dataset and is shown to correlate well with the Project dataset. EA Appendix M (Figure 20) shows the Bathurst dataset is comparable with the Project dataset, which is reinforced by the correlation value between the two of 0.76 (EA Appendix M Table 10).

While TSP concentrations are not recorded near the Project site, the approach used to assess ambient TSP concentrations (ie derived from the onsite PM_{10} concentrations based on a typical rural TSP/PM_{10} relationship) is appropriate and is widely used for environmental assessments in NSW.



Comparison of Dunedoo, Gulgong and MET01 wind roses - 9am and 3pm

Cobbora Coal Project - Preferred Project Report and Response to Submissions

Figure 13.1

Background dust deposition values were based on monitoring results from six monitors located a variety of distances from roads (see main EA Figure 14.1). Consequently, the contribution of dust emissions generated by the low numbers of vehicles travelling along unsealed roads to recorded dust deposition levels will vary across the six monitors.

The use of dust deposition results that are influenced by unpaved road dust emissions to estimate background levels at residences removed from roads is a conservative approach. The cumulative dust deposition criterion requires the combined background and predicted incremental dust deposition levels be less than 4 g/m^2/month at sensitive receptors. If a higher background dust deposition level is used, this reduces the allowable contribution of dust deposition from a proposed development. Consequently, using a higher background dust deposition level (as a result of impacts of nearby local roads on recorded levels) at sensitive receptors is a conservative approach to assess cumulative dust deposition.

13.2.3 Multiple mining areas

Submissions

G-10, I-124

Issues

Submissions comment that dust from the Project will be three-fold if mining occurs in three pits simultaneously.

Responses

As described in the main EA (Section 3.5.7), coal will be simultaneously extracted from multiple locations to meet coal specification and production goals. Air quality impacts were assessed for years 1, 2, 4, 8, 12, 16 and 20 based on mining multiple areas simultaneously. The EA found that six privately owned residences will be impacted, with two impacted in Year 2 and all impacted in Year 20. These properties have been acquired, or are being negotiated, since the EA was completed. Residences 1222, 1223, 5025 and 1232 have been acquired, while offers have been made to residences 1230 and 3224 with negotiations continuing.

13.2.4 Health impacts – general

Submissions

G-2, I-12, I-13, I-37, I-86, I-150, I-155

Issues

Submissions comment about the air quality related health impacts from the Project, specifically:

- that dust emanating from the mine, processing and transport is a health concern;
- that dust from the open cut mine, ore processing and transportation systems will be a health concern; and
- there will be health impacts from using poor quality coal.

Response

The air quality assessment has predicted concentrations of particulate matter and combustion pollutants for a series of key operational years for the Project. These predictions have been paired with background concentrations where applicable and compared against NSW and Commonwealth assessment criteria designed to protect human health. With the exception of six individual receptors to the west of the Project site, the applicable health-based criteria were not predicted to be exceeded at privately-owned residential receptors. These have all been acquired or are in the process of being acquired (see Section 13.2.3).

Exceedances of applicable assessment criteria are not predicted beyond distances of 10 km to the west and not beyond 2 km to north, east or south of the limit of mining activities. Consequently, emissions are not predicted to exceed NSW or Commonwealth air quality assessment criteria regionally.

Health impacts have been recently considered by the Planning Assessment Commission with reference to the World Health Organization's guideline value for annual mean PM_{10} of 20 $\mu g/m^3$ (WHO 2013). This guideline is exceeded at one private residence (3224) in mining years 8, 12, 16 and 20. This residence is in the process of being acquired (see Section 13.2.3).

There is an ongoing debate about the level of PM_{10} exposure that may result in health effects. However, current NSW and Commonwealth assessment criteria take into account the known health effects of particulates on sufferers of asthma, lung conditions and heart disease (NSW Health 2013). Potential Project particulate emissions have been assessed against these, and the only private residence where these could be exceeded (3224) is in the process of being acquired.

The air quality of emissions from power stations may be influenced by the quality of the coal that is burned. ROM coal will be cleaned at the mine to produce coal that meets the coal quality specifications of the power stations. The specifications of coal from the Project will be similar to that sourced from other mines and therefore there will be no significant change to the emissions of these power stations as a result of sourcing part of their coal from the Project.

13.2.5 Dust deposition

Submissions

NA-4, I-138

Issues

Submissions comment on the health impacts of dust deposition. In particular, NSW Health comments:

> In many rural areas away from towns, water caught on the roof of buildings and directed to storage tanks is the source of potable drinking water for the occupants. The impacts on water quality and therefore health, of dust and particulate emissions that may fall on these same roof catchments has not been addressed in the Environmental Assessment.

Response

Lucas et al. (2009) investigated the potential for health impacts from coal dust deposited on rooftops and washed into water tanks. The study analysed coal samples and rainwater tank samples from houses near the Dalrymple Bay Coal Terminal in Queensland. It included leaching tests on coal dust samples to determine the potential for release of major and minor trace elements from a wide range of coal types into the water supply. All testing by Lucas et al. (2009) was done at the School of Environmental and Life Sciences at University of Newcastle.

The coal sample leaching tests and rainwater sample analysis showed that all trace elements were well below Australian drinking water quality guidelines. Lucas et al. (2009) concluded the study results showed the potential for human health implications from coal dust in rainwater was negligible.

Review of dust deposition monitoring results from near the Dalrymple Bay Coal Terminal (August 2011 to November 2012) show the average dust deposition within 1.5 km of the terminal was 0.6 g/m^2/month to 2.5 g/m^2/month. With the exception of six CHC-owned residences within or next to proposed mining areas, the incremental dust deposition predicted for the Project at private and CHC-owned receptors is less than 2 g/m^2/month in all modelling years. Taking the predicted dust deposition levels, the spatial separation of receptors from the Project and the findings of Lucas et al. (2009) into account, the potential for adverse impacts to rainwater tanks from the deposition of coal dust is low, even at the closest receptors.

It is noted the profile of dust deposited on roof tops surrounding the Dalrymple Bay Coal Terminal would be dominated by coal dust. The dust deposited at locations surrounding the Project would consist of a higher percentage of crustal material due to more topsoil/overburden material than coal being extracted.

The potential health impacts of lead from coal mines has also been considered in NSW. In 2010, the NSW Department of Planning commissioned an independent study into cumulative impacts of dust on Camberwell Village in the Hunter Valley. Camberwell Village is within 5 km of four coal mines. As part of this study, lead levels in rainwater tanks were reviewed by the Centre for Mined Land Rehabilitation (2009). This study found that lead in all samples of tank water was below the Australian drinking water guidelines health-based lead levels, and they were therefore safe to drink. The analysis confirmed there is no transfer of lead from historical sludge present in the base of some tanks. The risk assessment indicated there is no significant difference between tank water from houses close to coal mining operations and background water samples, including Newcastle town water.

The NSW Health (2007) rainwater tanks brochure explains that installing first flush devices to the water tank system will prevent the first portion of roof runoff from entering the tank and will reduce the amounts of dust, bird droppings, leaves and so forth, which accumulate on roofs, from being washed into rainwater tanks. NSW Health recommends using first flush devices, irrespective of whether the rainwater tank is close to a mine.

13.2.6 Dust from coal transport

Submissions

NA-4, I-135, I-8, I-15, I-38, I-55, I-66, I-84, I-85, I-86, I-116, I-124, I-135, I-157, I-187

Issues

Submissions comment on health impacts from cumulative dust generated by truck and train transport of coal. In particular, NSW Health comments, "the Director General's requirements regarding dust generation from coal transport have been addressed in relation to the PAA, the nearby railway line and the town of Gulgong along the train route. No assessment has been made of the cumulative effects further to the east where the coal trains from the Cobbora mine will add further coal train movements to existing coal train railway lines passing through towns in the Hunter Valley eg Muswellbrook, Singleton and Maitland". One submission comments that rail wagons will not be enclosed, which will result in coal dust entering rainwater tanks in Gulgong and asked for $PM_{2.5}$ monitoring on the edge of town.

Responses

No coal will be transported to port or customers by truck.

Dispersion of coal dust from rail wagons was modelled (Appendix I of Appendix M of the EA). This showed that coal dust from rail wagons disperses rapidly and is unlikely to cause significant impacts beyond the rail corridor. Predicted 24-hour PM_{10} concentrations are predicted to be about 2 $\mu g/m^3$ within 10 m of the track and below about 1 $\mu g/m^3$ 50 m from the track. This modelling was conducted for the Project-related rail spur and the proposed route between the Project and Ulan (via Gulgong), but is indicative for the rest of the route.

The management of combustion emissions from locomotives and dust from rail wagons outside of the Project area will need to meet the requirements of Environmental Protection Licences 3142 and 12208. The ultimate responsibility for complying with these licences is with Australian Rail and Track Corporation (ARTC) and RailCorp.

As part of a pollution reduction program issued by EPA, ARTC was required to quantify the level of dust (TSP, PM_{10} and $PM_{2.5}$) generated from the rail transport of coal (in uncovered wagons) and other freight in the Newcastle area rail corridor (ENVIRON 2012). The following results from a month of continuous monitoring of airborne particulate matter along the rail corridor at Mayfield and Metford, in addition to train movements during the monitoring period (February/March 2012), were reported:

- train movements of all types (loaded coal, unloaded coal, freight and passenger) were shown to be sources of particulate matter;
- an increase in particulate matter concentrations was detected during passes by loaded coal trains compared with "no-train" periods, with average TSP concentrations less than about 7 $\mu g/m^3$ recorded within the rail corridor (less than 10 m from the track);
- at Mayfield, monitoring results showed no statistical difference between particulate matter concentrations recorded during passes by loaded coal trains compared with unloaded coal, freight or passenger trains; and
- at Metford, monitoring results showed that maximum recorded concentrations coincided with passenger train passes.

Given the dust modelling results reported in the EA and the dust monitoring results in the Newcastle area rail corridor, there are not expected to be significant dust impacts on towns along the rail corridor as a result of the trains transporting coal from the Project. ARTC and RailCorp may use dust monitoring programs in the future.

13.2.7 Impacts to Siding Spring Observatory – dust increasing light spill

Submissions

CA-1, NA-1, I-138

Issues

Submissions comment on the potential for Siding Spring Observatory to be affected by dust increasing light spill from the mine. In particular, the EPA comments "there is a risk that rising dust around the mine will be illuminated by the mine's lighting equipment, effectively increasing light influx from the mine".

Responses

The air quality management measures in the EA will be enforced to minimise emissions of particulate matter. As described in Section 13.2.9, lighting will be designed to minimise any upward spill of light that could reflect off dust generated by the Project.

13.2.8 Dust levels at Siding Springs Observatory

Submission

CA-1, NA-1

Issues

The Australian Astronomical Observatory comments: "Although it is unlikely that dust ingress at the telescopes will be a major issue (since quite high levels of natural wind-borne dust are experienced from time to time at Siding Spring), there may be a requirement to enhance the dust-filtering equipment at the AAT and other telescopes in order to avoid any occurrence of problems." The EPA recommends the proposed air quality and lighting management plans consider measures to minimise potential impacts on the Siding Spring observatory.

Responses

Based on the air quality assessment predictions, in particular the reduction in dust concentrations with distance from the Project and the predominant east winds, it is not predicted that dust emissions from the Project will impact the Siding Spring Observatory (located approximately 90 km north of the Project's northern boundary). Any particulate matter emissions from the Project reaching the Siding Springs Observatory would not be discernible from existing ambient concentrations.

13.2.9 Australian Astronomical Observatory requested conditions

Submission

CA-1

Issue

The Australian Astronomical Observatory requests that the exploration licence holder, mining lease operator and mine owner meet the conditions listed below.

Responses

CHC will be responsible for meeting Project approval conditions and will direct contractors, including the mine operator, accordingly.

"1. familiarisation of the above parties with the risks and threats of mining activity to astronomical and astrophysical research, including dust and light pollution and possibly seismic disturbance;"

CHC will familiarise themselves with potential dust, light and seismic risks to the observatory.

"2. recognition of the potential of the Cobbora Coal Project to generate these risks and threats for Siding Spring Observatory, located near Coonabarabran in the Warrumbungle Shire;"

CHC recognises the potential for the Project to generate dust, light and seismic risks to the observatory.

"3. agreement to engage in formal consultation with the Australian National University and the Australian Astronomical Observatory regarding a mitigation program for the minimisation of these impacts;"

CHC will consult with the Australian National University and the Australian Astronomical Observatory during preparation of the Project's lighting management plan.

"4. implementation at the Cobborah [sic] mine site of an approved mitigation program;"

CHC will implement Department of Planning and Infrastructure approved lighting and air quality management plans.

"5. ongoing engagement with the ANU and AAO to monitor the efficacy of remedial measures, assess the impacts of any expansion of mining activity and explore the potential of new technologies to limit the detrimental effects of light and dust pollution;"

CHC will consult with the Australian National University and the Australian Astronomical Observatory regarding impacts to the observatory from the mine or mine expansions if they occur and which would be subject to environmental assessments. CHC will adopt best practice dust and light control measures and will continuously improve these.

"6. adoption of effective light and dust minimisation measures at the Cobbora mine, including Cobbora Coal providing suitable equipment for the monitoring of light and dust levels at both the mine site and at Siding Spring"

As discussed in Section 13.2.8, the Project is not predicted to affect dust levels at the observatory. Measurement of dust at the observatory would measure the dust concentrations from many dust emission sources in the region and would not determine any contribution that the Project has on these levels. CHC will monitor dust levels around the Project and meteorology in accordance with the air quality management plan. This monitoring data will show whether the Project has the potential to be significantly contributing to dust levels at the observatory.

It is understood the observatory already uses light monitoring. CHC will contribute to the understanding of light spill in the region by auditing lighting once the mine is operating at full capacity.

The Australian Astronomical Observatory submission also states it will continue to monitor dust levels at the observatory and requests a financial contribution from CHC to ahelp buy the required monitoring equipment.

As discussed above, it is believed that monitoring close to the mine in the direction of Siding Spring will provide a better indication of potential dust impacts of the Project on the observatory; however, this matter will be discussed directly with the observatory.

"7. observance of the proposed new State Environmental Planning Policy (SEPP) especially governing lighting developments and conditions of consent for mines within 200 km of Siding Spring."

CHC will operate the Project in accordance with all applicable legislation, regulations and policies, including any State Environmental Planning Policies.

13.2.10 Mitigation measures

Submission

NA-1

Issue

The EPA comments:

> [The EA] predicts potential for impacts significantly above EPA impact assessment criteria at residences surrounding the mine. The assessment does not include mitigation measures expressed in a form that is quantifiable, measureable, auditable and enforceable for all major emission sources.

Response

The EA (Section 14.5.1) found there were six individual private residences at which exceedances of EPA assessment criteria were predicted for some stage of the Project. These properties have or are in the process of being acquired and there will be no privately-owned residences in the surrounding area where exceedances of EPA assessment criteria are predicted.

As stated in EA Appendix M (Section 8.1.9) residents and mine employees renting CHC-owned properties will be protected from health impacts by managed mining operations. Properties will not be leased as residences where health-based criteria are predicted to be exceeded or monitoring shows exceedances.

13.2.11 Mitigation measures

Submission

NA-1

Issues

The EPA recommends:

> 1 – The proponent must conduct a site specific Best Management Practice determination to identify the most practicable means to reduce particle emissions.
>
> 2 – The proponent must prepare a report which includes, but is not necessarily limited to, the following:

- Identification, quantification and justification of best practice measures that could be used to minimise particle emissions.
- Evaluation of the practicability of implementing these best practice measures.
- A proposed timeframe for implementing all practicable best practice measures.

Responses

The application of best practice management measures was assessed in EA Appendix M (Section 6.4.2). The assessment found the following sources of particulate matter will be the most significant:

- vehicle movements on unpaved roads;
- operating bulldozers on coal;
- loading ROM coal; and
- wind erosion of unrehabilitated waste rock and topsoil emplacements.

As stated in Section 6.4.2 of EA Appendix M, the control measures proposed for implementation at the Project for the four top-ranked sources of particulate matter emissions are comparable to current best practice control measures, with the exception of unpaved road emissions. The application of chemical suppression to unpaved haul roads is not proposed for the Project, alternative management measures are planned to achieve a comparable control effectiveness. These are:

- water application, which is likely to have 75% efficiency;
- limiting vehicle speeds to 40 km/h; and
- routine maintenance to ensure low silt content in road surface material.

It is proposed to prepare an operations air quality management plan that incorporates site-specific best practice management measures. The plan will identify the following for each key emission source:

- key performance indicators;
- monitoring method;
- location, frequency and duration of monitoring;
- record keeping;
- response mechanisms; and
- compliance reporting.

13.2.12 Real-time response system

Submission

NA-1, I-187

Issue

The EPA notes that one of the main proposed management measures is a real-time monitoring, prediction and response system, but that detailed design and implementation of the system has not been determined.

Response

CHC is developing a real-time monitoring network. The monitoring network would be to demonstrate ongoing compliance with ambient air quality criteria and help with the reactive management of emissions from the Project.

The final specifications of the real-time monitoring network will be documented in a comprehensive operations air quality monitoring plan. Guidance will be sought from the EPA in the finalisation of the air quality monitoring network and air quality monitoring plan. The air quality monitoring plan will be designed to facilitate auditing of project environmental performance.

13.3 Conclusion

The proposed Project changes will not change the outcomes of EA Chapter 14 and the air quality assessment in EA Appendix M. Any potentially affected receptors have been or are being acquired by CHC. Therefore, no sensitive receptors will have air quality impacts.

CHC commits to the Australian Astronomical Observatory conditions in Section 13.2.9 apart from Condition 6.

CHC will implement an operations air quality management plan for the life of the Project. The plan will include best practice management measures and describe the proposed real-time air quality monitoring network.