14 Air quality

14.1 Assessment objectives

The DGRs for the environmental assessment of air quality for the Project are:

Air Quality – including a quantitative assessment of potential:

- construction and operational impacts, with a particular focus on dust emissions (including $PM_{2.5}$ and PM_{10} emissions, and dust generation from coal transport), as well as diesel and blast fume emissions;
- spontaneous combustion properties of overburden or reject material;
- reasonable and feasible mitigation measures to minimise dust, diesel and blast fume emissions, including evidence that there are no such measures available other than those proposed; and
- monitoring and management measures, in particular real-time air quality monitoring and predictive meteorological forecasting.

14.2 Assessment method

This chapter summarises the results of the air quality assessment for the Project, which was prepared by Environ Australia Pty Limited (Appendix M). The assessment was in accordance with the following regulations, methods and guidance documents as specified in the DGRs:

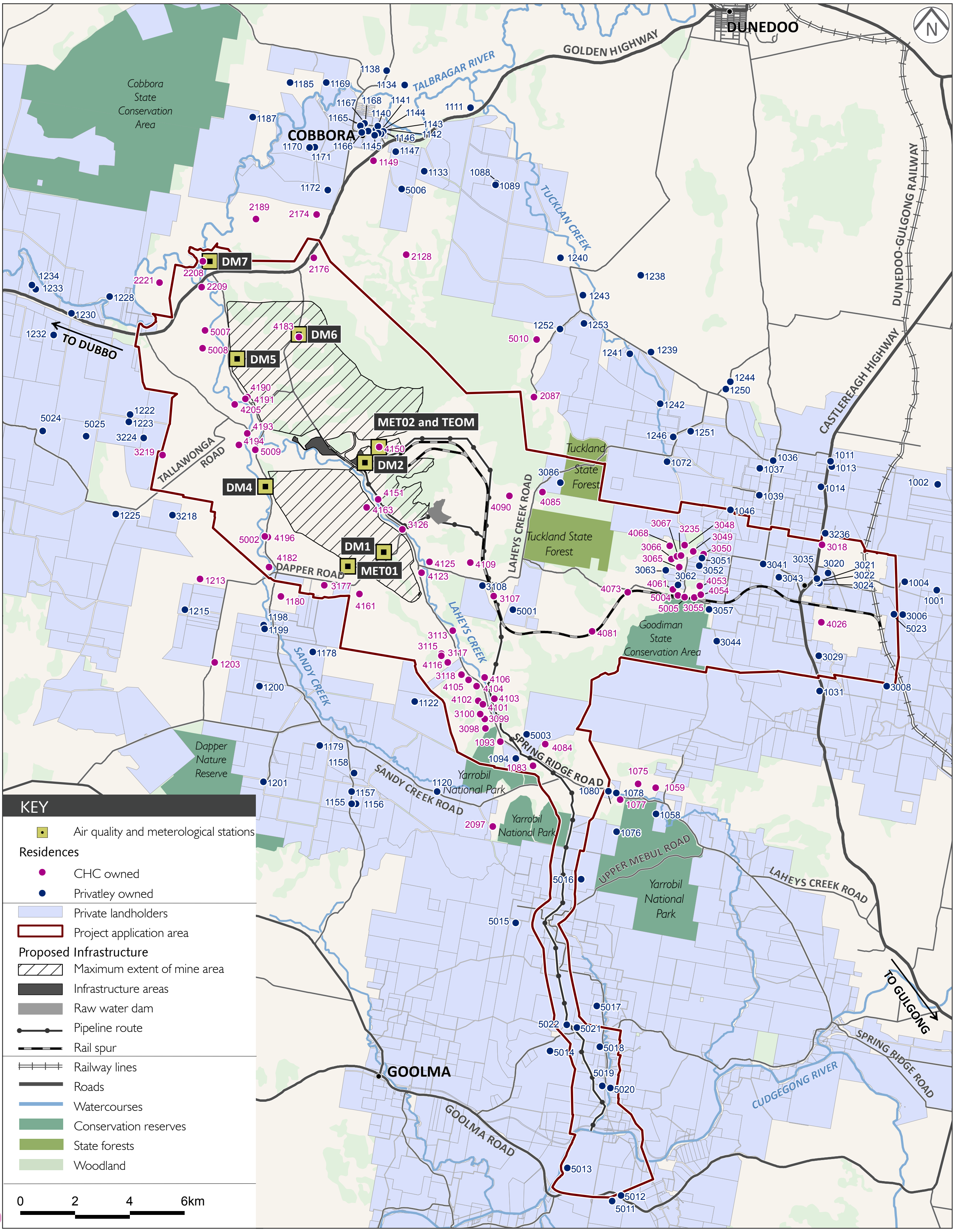
- Protection of the Environment Operations (Clean Air) Regulation 2000;
- *The Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (DEC 2005b); and
- *Coal Mine Particulate Matter Control Best Practice, Site-specific Determination Guideline* (OEH 2011b).

14.2.1 Air quality assessment criteria

In NSW, proposed developments must demonstrate that cumulative air pollutant concentrations and dust deposition levels will be within EPA ambient air quality criteria at applicable receptors (DEC 2005b). For some pollutants there are no EPA air quality criteria and, in these cases, the National Environment Protection Council (NEPC) goals apply (NEPC 2003). Criteria relevant to the Project are described below.

i Airborne particulates

Air quality criteria for particulates apply to specific particle size fractions. These fractions are total suspended particulates (TSP); inhalable particulates or PM_{10} (particulates with an aerodynamic diameter of less than 10 µm); and respirable particulates or $PM_{2.5}$ (particulates with an aerodynamic diameter of less than 2.5 µm). Criteria for each of these particulates fractions are provided in Table 14.1. The criteria apply to the cumulative airborne particulates concentration (ie the total of the Project-generated and background concentrations). They are applicable at the nearest existing, or likely future, dwellings or establishments. The locations of the residences owned by CHC and privately owned that were assessed are shown in Figure 14.1. There are no non-residential establishments that are potential receptors.



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EMM

Cobbora Holding Company Pty Limited

Air Quality Assessment Locations

Cobbora Coal Project - Environmental Assessment

Figure 14.1

Table 14.1 Airborne particulates criteria

Pollutant	Averaging period	Concentration (µg/m³)	Reference
TSP	Annual	90	DEC (2005b)[1]
PM_{10}	24 hours	50	DEC (2005b)
	24 hours	50[2]	NEPC (2003)
	Annual	30	DEC (2005b)
$PM_{2.5}$	24 hours	25	NEPC (2003)
	Annual	8	NEPC (2003)

Note: 1. EPA impact assessment criterion based on the subsequently rescinded National Health and Medical Research Council (NHMRC) recommended goal.
2. Provision made for up to five exceedences of the limit a year.

ii Dust deposition

Airborne dust that deposits on surfaces may cause nuisance impacts. The assessment criteria for dust deposition are set to protect against nuisance impacts on a cumulative basis for all dust sources. The assessment criteria are provided in Table 14.2.

Table 14.2 Dust deposition criteria

Pollutant	Maximum increase in dust deposition	Maximum total dust deposition
Deposited dust (assessed as insoluble solids)	2 g/m²/month	4 g/m²/month

Source: DEC (2005b).

iii Gaseous emissions

Gaseous air emissions will occur from the Project as a result of fuel combustion, including from mobile mining equipment, diesel locomotives and blasting. Emissions of sulfur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO) and volatile organic compounds (VOCs) have been assessed. While numerous VOC species are emitted during combustion of diesel, the air quality assessment used benzene, toluene and total xylene as indicators of the potential health impact of VOCs. Air quality criteria for gaseous emissions are provided in Table 14.3.

Table 14.3 Gaseous air pollutants criteria

Pollutant	Averaging period	Concentration		
		µg/m³	pphm	Reference
NO_2	1 hour	246	12	DEC (2005b)
		246	12	NEPC (2003)[1]
	Annual	62	3	DEC (2005b)
		62	3	NEPC (2003)

Table 14.3 Gaseous air pollutants criteria *(Cont'd)*

Pollutant	Averaging period	Concentration		
		µg/m³	pphm	Reference
SO_2	10 minute	712	25	DEC (2005b)
	1 hour	570	20	DEC (2005b)
		570	20	NEPC (2003)[1]
	24 hour	228	8	DEC (2005b)
		228	8	NEPC (2003)[1]
	Annual	60	2	DEC (2005b)
		60	2	NEPC (2003)
CO	1 hour	30,000	2,5	DEC (2005b)
	8 hour	10,000	9,000	DEC (2005b)
Benzene	1 hour	29	0.9	DEC (2005b)[2,3]
Toluene	1 hour	360	9	DEC (2005b)[2,4]
Xylene	1 hour	190	4	DEC (2005b)[2,4]

Note: pphm: parts per hundred million

1. *Provision made for one exceedence of the limit a year.*
2. *For a Level 2 Assessment (defined within the Approved Methods for Modelling), the concentration is expressed as the 99.9th percentile value. This is a Level 2 Assessment.*
3. *Assessment criterion specified for toxic air pollutant.*
4. *Assessment criteria specified for odorous air pollutants.*

14.2.2 Emissions inventory

An inventory of probable emissions was developed based on the proposed mine plan and mobile equipment fleet (see Section 3.5.9). Emissions from each source were quantified mainly using the United States Environmental Protection Agency (USEPA) AP-42 predictive emission factor equations (USEPA 2010), as required by the *Coal Mine Particulate Matter Control Best Practice, Site-specific Determination Guideline* (OEH 2011b).

The distance travelled by emitted particulates depends on the particle sizes, with larger particles deposited closer to the point of emission than fine particles. Particle size distributions in emissions were estimated using USEPA ratios.

i Construction

Construction activities will take around 2.5 years (see Chapter 3 'Project Description'). The emission intensity of particulates and gaseous emissions during construction will be significantly lower relative to operational emissions. Emissions generated during operations present a worst-case scenario. Therefore, emissions generated during construction have not been specifically quantified, as they will remain well within the modelled results for operations air emissions. Management measures will still be implemented during construction as described in Section 14.4.

ii Operations

Emissions for indicative mine development stages (years 1, 2, 4, 8, 12, 16 and 20) were estimated based on a number of dust-generating activities in the various mine areas. These will include: topsoil removal; waste rock extraction/unloading; ROM coal extraction/unloading; material handling by dozer; haulage of waste rock, topsoil, ROM coal and rejects; vehicles use; drilling use and blasts; and wind erosion. The emissions from these activities were considered with the implementation of the proposed management measures (see Section 14.4).

14.2.3 Air quality modelling

Dispersion of particulates (TSP, PM_{10}, $PM_{2.5}$ and dust) and gaseous emissions (SO_2, NO_2, CO, benzene, toluene and xylene) was modelled using the USEPA regulatory AERMOD model.

Site-specific meteorological monitoring between November 2010 and November 2011 (see Section 2.4.2) provided background data for dispersion modelling.

The locations of privately and CHC-owned residences are shown in Figure 14.1. Details of the locations of privately owned residences, including distances to the CHPP, are presented in Table 1 of Appendix M ('Air quality and greenhouse gas assessment').

Recently assessed projects have also included an assessment of air quality impacts on vacant land. Vacant land is considered affected if it is predicted air quality criteria will be exceeded over greater than 25% of a lot. Such lots were also included in this assessment.

14.2.4 Coal transport

The rail line between Tallawang and Ulan is not used for coal transport. Airborne particulates dispersion along a 5 km section of the rail line, mainly through the town of Gulgong, was modelled using the USEPA transportation dispersion model, 'CAL3QHCR'. The results were used to predict potential impacts along this section of the rail transport corridor.

14.3 Existing environment

14.3.1 Meteorology

Easterly winds prevail in the PAA, particularly during summer. During the other seasons, east winds continue to prevail but there are more south-westerly winds (see Figure 2.3).

14.3.2 Contributions to background air quality

Background air quality is determined from existing land uses and future developments, apart from the Project.

i Existing air emissions sources

The National Pollutant Inventory (NPI) and NSW EPA Environment Protection Licence databases were reviewed to identify any major existing sources of air pollutants in the surrounding area.

The Sibelco Tallawang magnetite mine is the only major industrial source of air pollutants near the PAA. It is about 3 km south of the Project rail spur and about 20 km east south-east of the CHPP. There are three coal mines — Ulan, Moolarben and Wilpinjong — about 50 km east south-east of the CHPP. All of these mines are too far from the mining area to contribute to the surrounding background air quality.

Other sources of background emissions in the PAA are:

- wind-generated particulates from exposed soil;
- airborne particulates from agricultural activities on neighbouring properties;
- particulates entrained by vehicles travelling along public roads;
- fine particulates from seasonal burning of wood for household heating;
- fine particulates from bush or grass fires; and
- fine particulates from remote, extreme natural events including dust storms and large bushfires.

Baseline air quality monitoring has been conducted in the PAA since September 2009. It includes all of the above sources and quantifies the baseline air quality environment. There are no major sources of gaseous air emissions in the locality.

ii Review of approved developments

As of March 2012, the DP&I's Major Project Assessment website did not list any new developments likely to influence local air quality. The approved developments farther afield (eg approved expanded operations at Ulan, Wilpinjong and Moolarben coal mines) will not contribute to airborne particulates or gaseous pollutant concentrations in the PAA due to their remoteness from the PAA.

14.3.3 Baseline air quality monitoring

The baseline air quality monitoring in the PAA measured continuous ambient PM_{10} concentrations and dust deposition. PM_{10} concentrations were measured using a tapered element oscillating microbalance (TEOM) located at the MET01 station; dust deposition was measured at six deposition gauges across the PAA (see Figure 14.1).

i TSP

The TSP concentrations in the PAA have not been measured. However, PM_{10} mass is typically 40% of the TSP mass in rural areas. On this basis, the annual average background TSP concentration in the PAA is estimated to be 42 $\mu g/m^3$.

ii PM_{10}

The 24-hour average background PM_{10} concentration in the PAA was 16.8 $\mu g/m^3$ between September 2009 and November 2011. It was less than 30 $\mu g/m^3$ for about 95% of the time.

The rolling 12-month average PM_{10} concentration over this period was between 9.8 $\mu g/m^3$ and 21.9 $\mu g/m^3$. Elevated PM_{10} concentrations were recorded between September 2009 and January 2010, mainly due to large-scale events such as dust storms or bushfires.

iii PM$_{2.5}$

The PM$_{2.5}$ concentrations in the PAA have not been measured. Based on Environ's experience of paired PM$_{10}$ and PM$_{2.5}$ monitoring datasets from rural NSW, PM$_{2.5}$ mass is typically 40% of the PM$_{10}$ mass. On this basis, the maximum 24-hour average PM$_{2.5}$ background concentration is estimated at 6.7 µg/m³ and the annual average background concentration is between 3.9 µg/m³ and 8.8 µg/m³. These derived PM$_{2.5}$ background concentrations are conservative estimates of likely PM$_{2.5}$ concentrations near the PAA, particularly in the higher concentration range.

iv Dust deposition

The rolling 12-month average dust deposition rates at each of the six dust deposition gauges from September 2009 to September 2011 were between 0.8 g/m²/month and 1.9 g/m²/month. Across the six sites, the overall average deposition rate was 1.4 g/m²/month.

v Other pollutants

The gaseous air pollutants concentrations in the PAA were not measured. As there are no major local emission sources, existing ambient concentrations will be very low.

14.4 Environmental management

An air quality management plan will be prepared to detail management measures to minimise the emission of particulates and gaseous pollutants. This plan will include adaptive management measures, including real-time airborne particulates monitoring and meteorological forecasting (see Section 14.2.1). The main management measures are described below.

14.4.1 Particulates emissions

i Mitigation measures – operations

Mitigation measures to minimise dust emissions during operations will include the following:

- haul roads will be constructed from material that minimises the silt content in the road surface;
- all mobile plant travel paths will be watered to reduce dust emissions;
- wherever possible, empty coal haul trucks will be used for backhauling rejects to minimise the total number of truck movements;
- the height from which waste rock or coal is dropped when loading or unloading haul trucks will be minimised;
- double handling material will be minimised wherever practicable;
- the ROM coal hopper will be within a three-sided enclosure;
- coal crushing and screening will be enclosed;
- water sprays will be used on fixed coal stockpiles where required to minimise dust emissions;
- a telescopic chute will be used for train loading;

- rejects will be disposed in the footprint of the mining area, some 1.7 km away from privately owned residences;
- the CHPP and coal stockpiles will be located within the centre of the mining area, at least 5 km away from privately owned residences;
- vegetation clearing will not occur ahead of the time it is required for mining areas, thus minimising the area of exposed soil;
- where practical, soil will be stripped when the soil is moist to minimise dust emissions;
- waste emplacement areas will be progressively rehabilitated throughout the life of the Project to minimise the exposed area of soil and waste rock;
- operations will be altered during periods of dry, windy conditions to minimise dust emissions (eg restricting overburden placement to areas protected from the wind on the lee side of overburden emplacements or reschedule dust-generating activities);
- drill rigs will have water sprays attached;
- blasting (a primary source of NO_2 emissions) will not be used during meteorological conditions that may result in air quality criteria being exceeded at privately owned residences; and
- a reactive/predictive air quality control system will be used to determine if operations need to be modified or stopped during periods of adverse meteorological conditions or elevated airborne particulates concentrations (see Section 14.2.1).

ii Mitigation measures – construction

Mitigation measures to minimise dust emissions during construction will include the following:

- the extent of exposed areas will be minimised;
- exposed areas will be stabilised as soon as possible (eg through revegetation, hydromulching or chemical stabilisers);
- unsealed roads and other trafficked areas will be watered regularly to minimise dust emissions;
- meteorological forecasts will be considered in daily planning of construction operations, particularly when operations are close to privately owned residences;
- construction activities will be altered during dry and windy periods to minimise dust emissions;
- double handling of material will be minimised; and
- where practical, stockpiles will be placed in areas sheltered from the wind.

iii Best practice review

The proposed mitigation measures have been compared to the *NSW Coal Mining Study: International Best Practice Measures to Prevent and/or Minimise Emissions of Particulate Matter from Coal Mining* (Katestone Environmental 2011).

Based on the emissions inventory, four sources will emit 60% of the dust at the time of maximum emissions (Year 16). They are:

- vehicles moving along unpaved roads across the site;
- bulldozers moving coal (in-pit operations and stockpile management at the CHPP);
- excavators loading ROM coal to haul trucks in the active mining areas; and
- wind erosion from waste rock and soil emplacements that have not been rehabilitated.

The proposed management measures and best practice measures for these four major sources are summarised in Table 14.4.

Table 14.4 Management measures for top four dust emission sources

Highest ranked sources of particulates emissions	Proposed management methods	Best practice measures
Vehicles moving along unpaved roads	Water application (75% control efficiency) Average vehicle travel speed on haul roads of 40 km/hr Routine maintenance of haul roads to ensure low silt content within road surface material	Chemical suppression
Bulldozers moving coal	Watering of travel route Ceasing/modifying operations during dry, windy conditions	Watering of travel route Cease/modify operations during dry, windy conditions
Excavators loading ROM coal	Drop height minimisation Cease/modify operations during dry, windy conditions	Drop height minimisation Cease/modify operations during dry, windy conditions
Erosion from emplacements that have not been rehabilitated	Progressive rehabilitation of emplacements	Progressive rehabilitation of emplacements

Source: Katestone Environmental (2011).

Best practice emission controls are proposed for the majority of dust emission sources. Air quality modelling demonstrated that air quality criteria will be met at all but a small number of privately owned residences. CHC is discussing buying these properties with the owners.

14.4.2 Gaseous emissions

Mitigation measures to minimise gaseous pollutant emissions during operations and construction will include the following:

- mining equipment will be regularly maintained to maximise its operational efficiency;
- lower emission fuels (eg biodiesel or natural gas) will be used where practical; and
- the distance vehicles travel on site will be minimised as part of mine planning, minimising exhaust emissions.

Measures to minimise gaseous pollutant emissions from blasting are described in Section 14.4.4.

14.4.3 Spontaneous combustion

Spontaneous combustion can occur within coal stockpiles, emplacement areas, coal outcrops, shallow seams and tailings impoundments. The potential for spontaneous combustion is site-specific, and is influenced by factors such as coal and climate characteristics, as well as stockpile and emplacement consolidation.

i Mitigation measures

The risk of spontaneous combustion will be minimised through measures detailed in a spontaneous combustion management plan. These will include:

- spontaneous combustion risk assessments will be made for coal seams, extracted coal, rejects and overburden;
- wastes containing carbonaceous material (ie uneconomic coal) will be progressively emplaced rather than stockpiled for long periods;
- and the residence time of coal in stockpiles will be monitored where the risk of spontaneous combustion is high;
- all coal storage facilities will be visually monitored for signs of spontaneous combustion;
- the temperature of high risk coal storage facilities will be routinely monitored;
- monitoring frequencies will be determined as part of spontaneous combustion risk assessments;
- contingency measures, such as early washing, dispatch, recycling or excavation, will be implemented in the event of visual signs of spontaneous combustion or temperatures of over 50°C;
- overburden emplacement will be sequenced so that carbonaceous material, particularly if pyritic, is buried under inert spoil;
- product coal stockpiles and coal in the mining areas will be moved before the heat generated within the stockpile raises the temperature enough to lead to spontaneous combustion; and
- any spontaneous combustion that occurs will be recorded along with potential causal factors and appropriate modifications made to management procedures.

14.4.4 Post-blast fume

Post-blast fume (nitrogen oxides) may be emitted as a result of incomplete ignition of explosives. Measures to minimise fume generation will be implemented in accordance with the *Code of Good Practice: Prevention and Management of Blast Generated NO_X Gases in Surface Blasting* (AEISG 2011) and will include the following:

- risk factors that may result in excessive blast fume will be identified and site-specific measures will be identified;
- post-blast fume risk assessments will be made before blasts, taking into account ground conditions, occurrence of water (wet holes and depth of water), the particular explosive products being used and the meteorological forecast, to determine whether blasting should be delayed;

- the potential for post-blast fume will be reduced by:
  - selecting an explosive product that is correct for the conditions;
  - minimising the amount of hydrocarbon (diesel) in the explosive;
  - minimise water ingress into blast holes using appropriate explosive products;
  - dewatering holes before loading;
  - keeping sleep time (the amount of time between charging and firing of a blast) to a minimum, and within manufacturer recommended times;
  - keeping ammonium nitrate dry;
  - using effective stemming techniques to contain blasting;
  - loading the product using the manufacturer-specified techniques;
- the blast area and the quantity of explosives to be used in areas prone to blast fume will be restricted; and
- where post-blast fumes occur, they will be investigated to better understand the causes and improve practices, and the results will be recorded.

14.5 Impacts

The impacts to air quality following the implementation of the management measures described in Section 14.4 are described below.

14.5.1 Airborne particulates

i On site

The air quality assessment determined that EPA annual average PM_{10}, TSP and dust deposition criteria will be met at all privately owned residences throughout the life of the Project.

The EPA 24-hour average PM_{10} criterion (50 µg/m^3) will be met at most privately owned residences. However, it is predicted the cumulative (Project and background) 24-hour average PM_{10} criterion will be exceeded at six privately owned residences on between one and two occasions for the mine stages assessed (Table 14.5). At two of these residences (1230 and 1232), the criterion will only be exceeded after Year 16. The maximum exceedence of the 24-hour average PM_{10} is predicted to be 12.2 mg/m^3 (ie a total of 62.2 µg/m^3) in Year 20.

Table 14.5 Predicted exceedences of 24-hour average PM_{10} criteria at privately owned residences

Mine year	1	2	4	8	12	16	20
Residence	**Number of predicted exceedences in mine year (maximum cumulative 24-hour average PM_{10} concentration, µg/m^3)**						
1222	-	-	1 (50.2)	1 (55.0)	1 (51.5)	1 (51.1)	1 (58.7)
1223	-	1 (50.6)	-	1 (55.1)	1 (50.2)	1 (50.9)	1 (59.1)
1230	-	-	-	-	-	-	1 (53.1)
1232	-	-	-	-	-	-	1 (56.9)
3224	-	1 (52.2)	1 (53.3)	1 (57.6)	2 (52.8)	1 (52.9)	1 (62.2)
5025	-	-	-	1 (52.4)	-	-	1(53.5)

The NEPC annual average $PM_{2.5}$ criterion (8 µg/m^3) will be met at all privately owned residences up to and including Year 4. However, it is predicted the cumulative annual $PM_{2.5}$ criterion will be exceeded at three privately owned residences in Years 8, 12, 16 or 20 (Table 14.6).

Table 14.6 Predicted exceedences of annual average $PM_{2.5}$ criteria at privately owned residences

Mine year	1	2	4	8	12	16	20
Residence	**Predicted exceedence in mine year (maximum cumulative annual average $PM_{2.5}$ concentration, µg/m^3)**						
1222	-	-	-	8.1	8.4	8.7	8.3
1223	-	-	-	8.1	8.4	8.6	8.3
3224	-	-	-	8.4	8.5	8.7	8.8

It is predicted that the 24-hour average $PM_{2.5}$ criteria (25 µg/m^3) will be exceeded once in Year 20 at three properties (Table 14.7).

Table 14.7 Predicted exceedences of 24-hour average $PM_{2.5}$ criteria at privately owned residences

Mine year	1	2	4	8	12	16	20
Residence	**Predicted exceedence in mine year (maximum cumulative annual 24-hour $PM_{2.5}$ concentration, µg/m^3)**						
1222	-	-	-	-	-	-	25.4
1223	-	-	-	-	-	-	26.2
3224	-	-	-	-	-	-	28.4

Note: The maximum cumulative value for 24-hour $PM_{2.5}$ concentrations is not a sum of the maximum increment and the maximum baseline concentrations, since these maximums may occur on different days. Rather the maximum 24-hour cumulative concentrations reflect days on which background levels plus the concurrent Project-related increment were highest.

The six privately owned residences where air quality criteria exceedences are predicted are downwind of the mining areas during the prevailing east wind. CHC has offered to buy the six residences and is discussing this with these landowners. Should CHC be unable to buy the properties before operations begin, CHC will buy properties during the life of the mine at the request of the owner.

The NEPC 24-hour average PM_{10} criterion (50 µg/m^3) provides for up to five exceedences a year, which will be met for the life of the Project. However, EPA (DEC 2005b) does not provide for any exceedences in this criterion.

It is predicted air quality criteria will be exceeded at 24 CHC-owned residences during the Project life. These houses will not be leased and/or occupied where health-based air quality criteria (Table 14.1) are likely to be exceeded.

The air quality assessment provides a conservative (upper bound) estimate of the potential for air quality impacts. Emission reductions from the best practice management measures the Project will implement were accounted for where the control effectiveness of measures could be quantified. However, real-time operational dust management, informed by the predictive air quality control system was not included in the assessment. Real-time operational dust management will help control dust emissions, particularly during meteorological conditions when potential emissions are high.

Sections of the Year 16 and Year 20 mine plans were modified in August 2012 to reduce the sizes of voids and out-of-pit emplacements in the final landform. The modifications relocate a number of haul road alignments and waste rock dumping points to more sheltered locations and/or locations further removed from the boundary of the operations. There modifications result in negligible change in the annual amounts of material (ie run-of-mine coal, waste rock) extracted and dumped. As a result there will be only minor changes in the emissions calculated for Year 16 and Year 20, while the discussed relocation of emission sources would result in a reduction in the spatial extent of predicted ground level concentrations. Therefore, modelling for the Year 16 and Year 20 are considered a conservative representation of ground level pollutant concentrations likely to be experienced for the modified Year 16 and Year 20 layouts.

ii Coal transport

The peak 24-hour average TSP concentration of coal particulates emitted from uncovered rail wagons is predicted to be around 2 $\mu g/m^3$ within 10 m of the rail line, falling to less than 1 $\mu g/m^3$ 50 m from the line. If it is assumed that PM_{10} concentration is 50% of the TSP concentration (based on the USEPA predictive emission factor for wind entrained particulates from stockpiles), the incremental PM_{10} concentration will be around 1 $\mu g/m^3$ within 10 m of the rail line. The results indicate that coal dust levels at the edge of the rail corridor are below levels that are known to affect amenity.

While empty wagons returning to the Project will contain coal dust, most it will be on their internal surfaces. As the coal dust will be less exposed to the wind, emissions will be lower. However, the assessment is conservative, as it has assumed empty wagons will produce the same level of emissions as loaded wagons.

The assessment has shown that airborne particulates impacts are unlikely from wagons travelling to and from the Project. Therefore, there are no CHC or privately owned residences along the proposed rail spur that would be affected by airborne dust from the coal trains.

14.5.2 Gaseous pollutants

All of the air quality criteria for gaseous pollutants (Table 14.3) will be met at privately owned and residences owned by CHC throughout the life of the Project based on Project-related emissions alone. Given that the background levels of these pollutants are expected to be very low, it is predicted these criteria will also be met for cumulative (ie Project background) gaseous pollutant concentrations.

14.5.3 Spontaneous combustion

The greatest risk of spontaneous combustion will be from putting reject coal with overburden in emplacements. This and other identified risks will be managed according to the measures listed in Section 14.4 or as refined in the spontaneous combustion management plan. With these measures, the risks of spontaneous combustion are likely to be low. The measures are well proven and used in coal mines throughout NSW.

14.5.4 Post-blast fume

Air quality criteria are not predicted to be exceeded as a result of post-blast fume.

14.5.5 Vacant land

Of the assessed particulate matter pollutants and averaging periods, the 24-hour average PM_{10} footprint exceeding the criterion covered the greatest area. This parameter was therefore used for the vacant land assessment that considers the potential air quality impacts of the Project on private land not containing a residence. The assessment did not consider Crown-, State- and Council-owned land.

There are 28 lots (owned by seven private landholders) where the 24-hour average PM_{10} concentration exceeds the EPA criterion in greater than 25% of the lot area. Of these, CHC has reached an agreement to buy 12 lots. These exceedences will only occur on between one and four days of the year during the mine stages assessed. The affected private landholders and lots are presented in Table 14.8.

Table 14.8 Affected privately owned vacant land

Landholder	Lot/DP numbers
Land owner 1	39/754317, 46/754317, 47/754317
Land owner 2	2/180421, 1/726827, 2/726827
Land owner 3	1/586695, 1/795846, 2/795846, 3/795846, 10/754312, 27/754312, 32/754312, 33/754312, 39/754312, 67/754317, 71/754317
Land owner 4	34/754317, 35/754317, 54/754317, 61/754317
Land owner 5	5/754302, 3/754317
Land owner 7	116/754305
Land owner 8	41/754317, 42/754317, 43/754317, 62/754317

Note: CHC has bought 6/754305, 14/754305, 20/754305, 41/754305, 50/754305 (Landholder 5) since the completion of the air quality assessment (Appendix A – Schedule of land) and so they are not included in the table.

14.5.6 Air quality outcomes

With the implementation of mitigation measures, nearly all air pollutants will remain below the applicable air quality criteria, with the exception of the EPA 24-hour average PM_{10} concentration criterion and the NEPC 24-hour and annual average $PM_{2.5}$ air quality criteria. These exceedences are predicted to occur at six and three privately owned residences respectively. CHC is discussing buying of these residences with the owners.

An air quality management plan will be prepared to detail the measures in the EA to minimise the emission of particulates and gaseous pollutants. Real-time monitoring and meteorological forecasting will ensure that adverse conditions are known in advance and will allow necessary management measures to be put in place. The risk of spontaneous combustion is shown to be low for the coal resource; however, mitigation measures will be included in a spontaneous combustion management plan.

14.6 Monitoring

14.6.1 Air quality and meteorological monitoring network

There are two meteorological monitoring stations, one continuous PM_{10} monitoring (TEOM) station and six dust deposition gauges in the PAA. The network will be expanded to include more continuous particulate monitoring stations (TEOMs or similar) around the mining area. While monitoring locations are not yet determined, the results of the meteorological data recorded in the PAA and outputs from the air quality modelling will be used to identify the most appropriate locations.

The full monitoring program will be specified in the air quality management plan.

14.6.2 Air quality management system

The Project's predictive air quality management system will use meteorological forecasts to provide early warning of conditions that could result in air quality criteria being exceeded.

The management system will use real-time meteorological and particulates concentration data to identify adverse conditions. The system will use alarms to trigger contingency dust management measures, such as additional water sprays or modifications to mining operations, such as relocating equipment from exposed locations or ceasing certain activities.

The system will let CHC proactively manage short-term particulates emissions from the Project to prevent or minimise potential adverse impacts at any privately owned residences.