Dust generation would be one of the main air quality issues relevant to the Project. Depending upon the size and concentration of particles in the air and their composition, airborne dust has the potential to affect human health as well as contribute to the general degradation of the environment. The term *"particulate matter"* refers to a category of airborne particles typically less than 50µm in aerodynamic diameter and ranging down to 0.1µm in size. Particles less than 10µm and 2.5µm are referred to in this document as PM_{10} and $PM_{2.5}$ particles respectively. The human respiratory system has a built-in defensive system that prevents particles PM_{10} from reaching sensitive areas of the respiratory system. As particles larger than 10µm can also contribute to environmental degradation, the air quality assessment also considers the total mass of particles suspended in the air, ie. Total Suspended Particulate matter (TSP). Particles that have an aerodynamic sufficiently large so as not to be suspended in air (typically >35µm) are referred to as deposited dust.

Greenhouse gases would be produced as a consequence of the Project, both through the use of fuel to power mobile equipment on the Project Site and coal carrying trucks which transport the coal from the Project Site to the Whitehaven CHPP and Rail Siding, from the exposed coal seams of the open cut, as well as through the eventual burning of the coal to generate energy. The effects of greenhouse gas emissions on global temperatures, most notably the Greenhouse Effect, are well documented and an assessment of greenhouse gas emissions has been included in this assessment of air quality impacts.

Nitrogen dioxide (NO_2) and sodium dioxide (SO_2) are also emitted as a result of fuel use and, where present in substantial concentrations, can have detrimental environmental effects such as damaging leaf surfaces, limiting plant growth and in worst case scenarios, may lead to acid rain formation and acidification of soils. High concentrations of NO_2 and SO_2 have also been shown to impact on human health through decreasing lung function, lung inflammation and general exacerbation of symptoms in individuals with respiratory conditions such as asthma (DEC, 2000). This assessment considers emissions of NO_2 and SO_2.

The following sub-sections describe and assess the existing air quality environment, identify the air quality management issues and the proposed air quality controls, safeguards and mitigation measures. Additionally, the assessment of the residual impacts upon the air quality following the implementation of these safeguards and mitigation measures is also presented.

4B.10.2 Existing Air Quality

4B.10.2.1 Introduction

Air quality guidelines and goals refer to levels of "pollutants" in air which include both operational and existing sources. In order to fully assess impacts against all the relevant air quality guidelines and goals, it is therefore necessary to compile information or estimates on existing dust deposition levels and the existing concentrations of airborne particulates and gases such as SO_2 and NO_2.

In the absence of site-specific air quality data, existing background levels are described through reference to monitoring undertaken at nearby locations.

4B.10.2.2 Dust Deposition

An estimate of background dust deposition levels for the Project Site has been derived from dust deposition data obtained from monitoring points within and surrounding the Whitehaven Coal Mine approximately 10km west of the Project Site. Monitoring of dust deposition levels has been undertaken since July 2000 at a number of locations both adjacent to and distant from the mine. The results presented in **Table 4B.42** represent annual dust deposition attributable to the agricultural activities on the surrounding landholdings, natural sources and the activities undertaken at the Whitehaven Coal Mine.

Table 4B.42
Background Dust Deposition Levels (Whitehaven Coal Mine)

Site Location	Monitoring Period	Total Insoluble Solids (Non filtrable Residue) g/m^2/month	Non Combustible Material (Ash) g/m^2/month
D1 Whitehaven	Oct-01 – Oct-06	1.8	1.0
D2 Merton	Oct-01 – Oct-06	2.7	1.3
D5 Wilga	Oct-01 – Oct-06	1.2	0.7
D6 Bungalow	Jul-00 – Oct-06	1.2	0.7
D7 Wilgai	Sep-00 – Oct-06	1.8	1.0
D8 Gundawarra	Nov-00 – Oct-06	2.0	1.2
D9 Woodlands	Sep-00 – Oct-06	0.9	0.6
D10 Merton	Oct-00 – Oct-06	2.6	1.5
D11 Merton	Oct-00 – Oct-06	3.1	1.4
D12 Whitehaven	Oct-00 – Oct-06	1.3	0.8
D13 Womboola	Oct-00 – Oct-06	2.1	1.4
D14 Bungalow	Oct-01 – Oct-06	2.1	0.9
Source: RHA (2007) - Table 4			

For all monitoring locations, the average percentage of combustible solids within the total solids collected varied from 35% to approximately 55%. This is consistent with similar monitoring exercises conducted in areas of grazing / agricultural land use. Heggies (2007) note that the locations with the five highest dust deposition results correspond to those monitoring locations closest to the current open cut mining activities. The remaining monitoring locations have an annual average dust deposition rate varying between $1.2g/m^2$/month and $1.8g/m^2$/month. For assessment purposes $1.8g/m^2$/month has been considered as representing the "background" level of dust deposition.

4B.10.2.3 Particulate Matter

The term Particulate Matter refers to a category of airborne particles typically <50um in aerodynamic diameter and ranging down to 0.1um in size. Particles <10um and <2.5um are generally referred to as PM_{10} and $PM_{2.5}$ respectively.

The closest site monitoring Particulate Matter (PM_{10}) is maintained by the NSW Department of Environment and Climate Change (DECC) in Tamworth, approximately 110km to the southeast of the Project Site. Data from 2005 has been selected as the most recent validated data set available from the DECC and an annual average of 16.5µg/m^3 considered representative of the local area and Project Site.

In order to estimate a background concentration of annual Total Suspended Particulates (TSP), which is the combined total of all particulate matter, this report has taken the annual average PM_{10} records at Tamworth for 2004 (16.5µg/m^3), and uses the multiplier of two for ambient air where road traffic is not the dominant particulate source, to derive the annual average background TSP concentration of 33µg/m^3.

4B.10.2.4 Nitrogen Dioxide and Sulphur Dioxide

Existing background NO_2 and SO_2 concentrations are assumed to be negligible given the rural nature of the site although small concentrations would be emitted by vehicles travelling along the Kamilaroi Highway and diesel-powered trains travelling along the North Western Branch Railway.

4B.10.2.5 Carbon Dioxide and Methane

Existing background concentrations of carbon dioxide and methane are recognised to be negligible and typical of a rural area.

4B.10.2.6 Summary of Existing Air Quality

For the purposes of assessing the potential air quality impacts of the Project, **Table 4B.43** records the background levels adopted.

Table 4B.43
Background Air Quality Environment for Assessment Purposes

Air Quality Parameter	Averaging Period	Assumed Background Level
TSP	Annual	33µg/m^3
PM_{10}	24-Hour	Daily Varying
	Annual	16.5µg/m^3
Dust	Annual	1.65g/m^2/month
NO_2/SO_2/Odour	All Periods	Negligible
Source: Heggies (2007) – Table 4		

4B.10.3 Potential Sources of Air Contaminants

4B.10.3.1 Particulate Emissions

The main sources of dust generated during the development and operation of the proposed mine and use of the transport route would include:

- mining activities (including vegetation clearing, soil stripping, overburden ripping and placement, and drilling and blasting activities;
- road and hardstand area construction (on-site);
- road construction and delivery of road construction materials;
- coal processing area activities (crushing / screening plant, front-end loader);
- wind erosion off areas within the open cut area, emplacements and soil stockpiles;
- general movement of heavy vehicles on unsealed roads within the site (haul truck wheel dust); and
- transportation of product coal between the Project Site and the Whitehaven CHPP and rail loading facility.

4B.10.3.2 Greenhouse Gas and Other Gas Emissions

The Project has the potential to generate greenhouse and other polluting gas emissions from a number of sources, including:

- the combustion of fuel by diesel-powered equipment and vehicles, including front-end loaders, excavators, bulldozers, scrapers, graders, drill rigs, explosives trucks and haul trucks;
- combustion of diesel fuel for on-site power generation for the processing plant, mine facilities, and lighting towers;
- the release of coal bed methane; and
- the use of explosives during blasting.

The product coal sold to predominantly export markets would ultimately be burnt to create energy. This process also produces significant volumes of greenhouse gases which are therefore attributable to the Project.

Although carbon dioxide (CO_2) would be the principal gas produced, greenhouse gases emitted as a result of the Project would also include carbon monoxide (CO), methane (CH_4), oxides of nitrogen (NO_X), SO_2 and non-methane volatile organic compounds (NMVOCs). All greenhouse gas levels are expressed in CO_2 equivalent units.

4B.10.4 Air Quality Guidelines

4B.10.4.1 Particulate Matter and Dust Deposition

Goals Applicable to PM_{10}

Emissions of PM_{10} and $PM_{2.5}$ particles are considered important pollutants in terms of impact due to their ability to penetrate into the respiratory system.

The NSW DECC PM_{10} assessment goals as expressed in the Approved Methods for the Modelling and Assessment of Air Pollutants in NSW, (DEC 2005) are:

- a 24-hour maximum of 50µg/m^3; and
- an annual average of 30µg/m^3.

The 24-hour PM_{10} reporting standard of 50µg/m^3 is numerically identical to the equivalent National Environment Protection Measure (NEPM) reporting standard except that the NEPM reporting standard allows for five exceedances per year.

Goal Applicable to Total Suspended Particulates

The annual goal for Total Suspended Particulates (or TSP) is given as 90µg/m^3, as recommended by the National Health and Medical Research Council (NHMRC). This goal was developed before the more recent results of epidemiological studies suggested a relationship between health impacts and exposure to PM_{10} concentrations.

In rural areas, the PM_{10} particle size fraction is typically of the order of 50% of the TSP mass, and as such, this goal is consistent with an annual PM_{10} goal of approximately 45µg/m^3. Thus, the historical NHMRC goal may be regarded as less stringent than the newer DECC PM_{10} goal of 30µg/m^3 expressed as an annual average. Therefore, as the annual TSP goal is seen to be achieved if the annual PM_{10} goal is satisfied, TSP has not been considered further in this assessment.

Goals Applicable to $PM_{2.5}$

The ambient Air Quality NEPM was amended in 2003 to extend its coverage to $PM_{2.5}$. This document references the following goals for $PM_{2.5}$.

- A 24-hour maximum of 25µg/m^3.
- An annual average of 8µg/m^3.

Historical quantitative assessments of air quality impacts of coal mining projects undertaken by Heggies Pty Ltd have indicated that providing maximum predicted PM_{10} concentrations satisfy Project air quality goals, goals applicable to $PM_{2.5}$ are similarly met. In view of the foregoing, it is assumed that providing adequate mitigation of PM_{10} is achieved, goals applicable to $PM_{2.5}$ would be satisfied. Potential impacts of $PM_{2.5}$ have thus not been considered further in this assessment.

Deposited Dust

In NSW, accepted practice regarding the nuisance impact of dust is that dust-related nuisance can be expected to impact on residential areas when annual average dust deposition levels exceed 4g/m^2/month.

In order to avoid dust nuisance the DECC (EPA) developed assessment goals for dust fallout. **Table 4B.44** presents the allowable increase in dust deposition relative to the ambient levels.

Table 4B.44
DECC Goals for Dust Deposition

Averaging Period	Maximum Increase in Deposited Dust Level	Maximum Total Deposited Dust Level
Annual	2g/m^2/month	4g/m^2/month
Source: Approved Methods for the Modelling and Assessment of Air Pollutants in NSW, (DEC 2005)		

Based upon the maximum levels in **Table 4B.44** and the initial site-based and longer term regional dust deposition data, a site-specific goal for all dust sources attributable to site activities would be in the order of 3.3g/m^2/month.

4B.10.4.2 Gas Emissions

Goals Attributable to Greenhouse Gas Emissions

- There are no specific guidelines are provided for maximum emissions of greenhouse gases.

Goals Applicable to Nitrogen Dioxide and Sulphur Dioxide

Table 4B.45 lists the DECC (EPA) goals for nitrogen dioxide (NO_2) and sulphur dioxide (SO_2), as outlined in the AMMAAP.

Table 4B.45
DECC (EPA) Air Quality Goals - NO_2 and SO_2

Pollutant	Averaging Time	Maximum Concentration
Nitrogen Dioxide (NO_2)	1 hour Annual	246µg/m^3 62µg/m^3
Sulphur Dioxide (SO_2)	10 Minutes 1 hour 24 hours Annual	712µg/m^3 570µg/m^3 228µg/m^3 60µg/m^3
Source: Heggies (2007) – Table 7		

4B.10.4.3 Project Air Quality Goals

In summary, the DECC (EPA) project specific air quality goals are as follows.

PM_{10}: A 24-hour maximum of 50µg/m^3
An annual average of 30µg/m^3

$PM_{2.5}$: A 24-hour maximum of 25µg/m^3
An annual average of 8µg/m^3

Dust: Nuisance expected to impact on surrounding residences when incremental annual average dust deposition levels exceed 2g/m^2/month

NO_2: A 1 hour maximum of 246µg/m^3
An annual average of 62µg/m^3

SO_2: A 10-minute maximum of 712µg/m^3
A 1-hour maximum of 570µg/m^3
A 24-hour maximum of 228µg/m^3
An annual average of 60µg/m^3

4B.10.5 Operational Air Quality Controls

4B.10.5.1 Introduction

The Proponent would apply a wide range of air pollution control measures to ensure air quality standards are not compromised by its activities. These operational controls have been categorised as either dust control measures or controls for other air contaminants.

4B.10.5.2 Dust Control Measures

The proposed controls to the primary dust generation sources identified in Section 4B.10.3.1 are presented as follows.

Vegetation clearing and soil stripping

- Cleared trees and branches would be retained for use in stabilising slopes identified for rehabilitation with native woodland communities. No burning of vegetation would be permitted.
- Where practicable, soil stripping would be undertaken at a time when there is sufficient soil moisture to prevent significant lift-off of dust.
- Whenever possible, the Proponent would avoid stripping soil in periods of high winds.
- Dust suppression by water application would be used to increase soil moisture should stripping occur during periods of high wind or low soil moisture.

Drilling and blasting activities	• The drill rig would utilise water injection or alternatively, be fitted with dust collectors. • Coarse Aggregates would be used for blast hole stemming to prevent venting of explosion gases. • Blasts would be initiated either before the establishment, and after the break-up of low-level atmospheric temperature inversions which typically occur after 4:00pm and can remain until 8.00am. It is noted the earliest permitted blast time is 9.00am.
Overburden ripping and placement	• Softer overburden material would be not be ripped during periods of high wind.
Coal Mining	• Low moisture coal would be sprayed with water prior to excavation to raise moisture content to >6%.
Road and hardstand area construction (on-site)	• Clearing ahead of construction activities would be minimised. • Cleared areas would be watered regularly during construction.
Road Construction and delivery of construction materials	• Clearing ahead of road construction would be minimised. • Active construction areas would be watered regularly. • Truck speeds on roads under construction would be restricted to <60kph.
Crushing and screening	• Notwithstanding the moist nature of the ROM coal, water would be applied to the coal at the feed hopper, crusher and at all conveyor transfer and discharge points at the rate of approximately 1.5L/t coal processed. This rate of application has been established to be effective at the nearby Whitehaven Coal Mine. • Some flexibility would exist to temporarily cease operation in the event of protracted dry periods, high winds, and significant dust generation and dispersal towards the surrounding residences.
Wind erosion of open pit and stockpiles	• The extent of clearing/site preparation in advance of mining would be minimised. • Access or haul roads and the restriction of vehicles and equipment to those roads would be clearly defined. • Water with or without chemical dust suppressants would be routinely added to exposed surfaces. Water would be sprayed onto stockpiles and hardstand areas at a rate of approximately 17kL/hr in winter and 35kL/hr in summer during 4 x 15 minute watering periods each day.

	• Progressive rehabilitation of areas of disturbance including topsoil and subsoil stockpiles.
	• Installation of bund walls and windbreaks as required.
Internal coal transport and general movement of heavy vehicles within the Project Site	• Internal haul roads would be regularly watered. The frequency of water application to the various internal haul roads and exposed surfaces would be dependent on climatic factors, in particular wind and temperature, and usage. Generally, water would be applied at a rate of >2L/m^2/application with an estimated 70-75ML to be used each year for the purpose of dust suppression.
Transportation of product coal between the Project Site and the Whitehaven CHPP	• Coal would not be loaded above the truck body sides, thereby preventing the accidental loss of the coal from the trucks during transportation.
	• All trucks carrying product coal from the mine would be covered with approved covers and the tailgates securely fixed to prevent windblown dust emission or spillages.

4B.10.5.3 Control Measures for Other Potential Air Contaminants

Nitrogen dioxide (NO_2), sulphur dioxide (SO_2) and greenhouse gases would be emitted as a result of vehicle exhausts and any blasting fumes. The following operational controls would be implemented to reduce the emission of these gases.

Exhausts

Earthmoving equipment and on-site vehicles would be fitted with exhaust controls which satisfy the NSW DECC emission requirements. The Proponent would ensure that all equipment is properly maintained to ensure no unacceptable exhaust emissions occur and commit to the removal of any vehicle or item of mobile equipment from on-site activities which is observed not to comply with NSW DECC guidelines. The exhausts of all equipment would be directed upwards or to the side so as not to impinge on the ground and cause dust lift-off.

Blasting Fumes

The following factors contributing to non-ideal detonation behaviour and higher emission concentrations (principally of NO_2), would be avoided whenever possible.

- Weak overburden. Weak overburden which reduces the necessary explosive confinement, would be ripped and excavated in preference to blasting.
- Water infiltration.

- Long explosive columns.
- Explosive pre-compression caused by hole-to-hole shock propagation due to wet overburden and clay veins.

4B.10.5.4 Greenhouse Gas Reduction

Renewable energy sources would be impractical given the relatively short life of the Project (8 to 10 years) and cost associated with establishing larger scale renewable energy sources such as windfarms or multiple solar panels.

4B.10.6 Assessment of Impacts

4B.10.6.1 Introduction

The assessment of impacts of the proposed Belmont Coal Project was primarily undertaken through computer modelling to establish likely concentrations of PM_{10}, deposited dust, emissions of SO_2, NO_2 and greenhouse gases around the Project Site. The modelling undertaken by Heggies (2007) at six of the closest non-project related residences ("assessment locations") assumes the adoption of operational controls as set out in Section 4B.10.5. Specific distances of the assessment locations to Project Site activities are presented in **Table 4B.46**.

Table 4B.46
Details of Nominated Assessment Locations

Residence	Distance (km) / Direction from Residence		
	Mining	Crushing / Processing	Out-of-pit Emplacement
"Costa Vale"	3 060	4 970	3 160
"Penryn"	4 900	6 800	5 870
"The Retreat"	4 780	6 720	4 800
"Roseglass"	5 230	6 970	5 150
"Surrey"	3 730	3 550	3480
"Carlton"	5 100	4950	4 900

In order to assess the level of impact, the predicted concentrations are compared against the air quality goals established in Section 4B.10.4.

4B.10.6.2 Air Quality Modelling

Computer predictions of fugitive emissions from the Project Site were undertaken using the Ausplume Gaussian Plume Dispersion Model software (Ausplume) developed by EPA (Victoria). Ausplume combines the particulate emission factors for the various Project Site activities, meteorological data and local topography to predict the dispersion of dust and other particulate matter.

Particulate Emission Factors

The inputs to the Ausplume model have been taken primarily from the default emission factors identified in the *Emission Estimation Technique Manual for Mining* (DEH, 2001). Where the moisture content of materials on the Project Site was not adequately reflected within the defaults emission factors, the equations presented within DEH (2001) were used.

Meteorological Data

The Air Pollution Model (TAPM) software, developed by the Commonwealth Scientific and Industrial Research Organisation (CSIRO), was used to simulate the meteorology around the Project Site. Data obtained from the Bureau of Meteorology's (BoM) Gunnedah Airport Automatic Weather Station (AWS) (Station Number 055202), located approximately 25km southeast of the Project Site, and observations from the Project Site itself using data gathered by the onsite weather station. Where possible, direct meteorological observations from the on-site weather station at "Belmont" were substituted back into TAPM generated meteorological outputs. The generated meteorological data set has been compared with observed wind data from 2001 – 2005 at the Gunnedah Airport Automatic Weather Station (AWS) (Station Number 055202) and a good correlation between the generated and observed wind directions and wind speeds obtained (Heggies, 2007). This good correlation validates the generated data set and therefore increases the level of confidence that can be placed in the predictions from the modelling.

Local Topography

There are no significant topographic features which would impede atmospheric dispersion between the Project Site and surrounding residences. Considering such uncomplicated near field topography, topography has not been considered in the Ausplume dispersion model.

Modelled Scenarios

Two operational scenarios were modelled to reflect different stages of the proposed mine development, with the scenarios selected to reflect the years of greatest surface exposure. The construction activities on site and the road construction activities within the transport route have not been modelled given their comparatively short duration in any one area and the recognition that adoption of dust controls are standard activities for such works.

The two operational scenarios which also take into consideration the movement of mobile plant and equipment across different sections of the Project Site, are as follows.

(i) Year 2 – mining at the northern end of the open cut with the Western Emplacement established and in operation. Auger mining activities potentially being conducted.
(ii) Year 7 - mining at the southern end of the open cut with the Western Emplacement only in use. Auger mining activities potentially being conducted.

4B.10.6.3 Dust Deposition

Ausplume predictions for dust deposition at the nearest residences, including the assumed background level of dust deposition of 1.8g/m^2/month, are displayed in **Table 4B.47**. Total mean monthly dust deposition (background plus increment) rates associated with the Project are predicted to be less than 2.0g/m^2/month at all residences for the scenarios modelled and readily satisfy the dust deposition criterion of 3.8g/m^2/month.

Table 4B.47
Predicted Dust Deposition at Nearest Residences

Residence	Dust - Annual Average (g/m^2/month)			
	Background	Increment attributable to the Project	Background + Increment	Project Goal
Scenario 1 - Year 2 Mining				
"Costa Vale"	1.8	0.3	2.1	3.8
"Penryn"	1.8	0.1	1.9	3.8
"The Retreat"	1.8	0.2	2.0	3.8
"Roseglass"	1.8	0.3	2.1	3.8
"Surrey"	1.8	0.2	2.0	3.8
"Carlton"	1.8	0.1	1.9	3.8
Scenario 2 – Year 7 Mining				
"Costa Vale"	1.8	0.2	2.0	3.8
"Penryn"	1.8	0.1	1.9	3.8
"The Retreat"	1.8	0.1	1.9	3.8
"Roseglass"	1.8	0.3	2.1	3.8
"Surrey"	1.8	0.2	2.0	3.8
"Carlton"	1.8	0.1	1.9	3.8
Source: Heggies (2007) – Table 9				

4B.10.6.4 PM_{10}

The maximum 24-hour average PM_{10} concentration at the nearest residences was predicted using Ausplume over a one-year time frame (see **Table 4B.48**). It has been assumed that background levels of PM_{10} vary on a daily basis with these background levels incorporated into the model. Appendix 2 of Heggies (2007) provides an explanation regarding the use of varying background PM_{10} levels.

Table 4B.48
24-hour Average PM_{10} Concentrations at the Nearest Assessment Locations

Residence	PM_{10} – 24-hour Average (µg/m^3)			
	Background	Increment attributable to the Project	Background + Increment	Project Goal
Scenario 1 - Year 2 Mining				
"Costa Vale"	30.7	10.4	41.1	50
"Penryn"	30.7	10.8	41.5	50
"The Retreat"	39.5	0.0	39.5	50
"Roseglass"	39.5	3.5	43.0	50
"Surrey"	39.5	4.2	43.7	50
"Carlton"	30.7	10.1	40.8	50
Scenario 2 – Year 7 Mining				
"Costa Vale"	39.5	0.0	39.5	50
"Penryn"	30.7	9.9	40.5	50
"The Retreat"	39.5	0.0	39.5	50
"Roseglass"	39.5	6.0	45.5	50
"Surrey"	39.5	6.6	46.1	50
"Carlton"	30.7	9.9	40.8	50
Source: Modified after Heggies (2007) – Table 10				

No exceedance of maximum 24-hour average PM_{10} concentrations are predicted with the highest concentration of 46.1µg/m^3 predicted to be received at the "Surrey" residence during Year 7 operations.

Table 4B.49 presents the predicted annual average PM_{10} concentrations assuming a background annual PM_{10} concentration of 16.5µg/m^3 at the nearest residences. **Table 4B.49** shows that for the scenarios modelled, annual average PM_{10} concentrations as a consequence of the Project would be less than 19µg/m^3 and satisfy the project goal of 30µg/m^3.

Table 4B.49
Annual PM_{10} Concentrations at the Nearest Assessment Locations

Residence	PM_{10} - Annual Average (µg/m^3)			
	Background	Increment attributable to the Project	Background + Increment	Project Goal
Scenario 1 - Year 2 Mining				
"Costa Vale"	16.5	2.0	18.5	30
"Penryn"	16.5	1.0	17.5	30
"The Retreat"	16.5	1.2	17.7	30
"Roseglass"	16.5	1.7	18.2	30
"Surrey"	16.5	1.3	17.8	30
"Carlton"	16.5	0.9	17.4	30
Scenario 2 – Year 7 Mining				
"Costa Vale"	16.5	1.6	18.1	30
"Penryn"	16.5	0.9	17.4	30
"The Retreat"	16.5	1.0	17.5	30
"Roseglass"	16.5	2.2	18.7	30
"Surrey"	16.5	1.6	18.1	30
"Carlton"	16.5	0.8	17.4	30
Source: Modified after Heggies (2007) – Table 11				

4B.10.6.5 $PM_{2.5}$

Generalised particulate size distributions for activities likely to contribute to the air quality surrounding the Project Site have been used to derive a relationship between concentrations of the $PM_{2.5}$ and the PM_{10} particle size fractions. Heggies (2007) note that based on this relationship (ie. approximately 30% of the PM_{10} particle size fraction would constitute $PM_{2.5}$), when the annual 24-hour average PM_{10} concentration goal of 50µg/m^3 is achieved, the 24-hour average $PM_{2.5}$ concentration goal of 25µg/m^3 would be satisfied. Heggies (2007) predicts the annual average $PM_{2.5}$ to be approximately 13µg/m^3, thereby satisfying the project goal of 25µg/m^3.

4B.10.6.6 Sulphur Dioxide and Nitrogen Dioxide

Atmospheric emissions of SO_2 and NO_2 have been modelled by Heggies (2007) based on the diesel consumption presented in Section 2.4.4.7. Combustion emissions were modelled as a point source emission from the coal processing area assuming:

- 3m release height – this is considered a low height of release. By selecting such a low height, pollutant dispersion potential is reduced, creating the potential for higher concentrations near the source; and
- 5m/s exit velocity – this is considered a relatively low velocity. By selecting a low velocity, plume rise would be reduced, reducing pollutant dispersion and therefore creating the potential for higher concentrations near the source.

Accordingly, emissions of NO_2 and SO_2 from all combustion sources have been modelled in a conservative manner both from the point of view of initial concentration and subsequent dispersion processes.

Emissions (including NO_2) would be released following each blast event but would be quickly dispersed and therefore not impact significantly on either the 1 hour or annual average concentrations of NO_2 at the assessment locations surrounding the Project Site. As such, these are not modelled by Heggies (2007). The operational safeguards designed to minimise post-blast emissions are presented in Section 4B.10.5.3.

Modelling of SO_2 and NO_2 indicated negligible emissions as a consequence of fuel consumption, and satisfaction of all project goals (Tables 13 and 14 of Heggies, 2007).

4B.10.6.7 Greenhouse Gases

Project mining and related activities have the potential to generate greenhouse gas emissions from a number of sources. These sources include the following.

(i) The combustion of fuel by diesel-powered equipment and vehicles.

(ii) The release of coal bed methane during excavation and post-excavation activities.

(iii) Distribution of Product materials.

(iv) The use of purchased electricity in Project Site buildings.

(v) End use of produced materials.

Greenhouse gas emitting sources are classified according to accepted greenhouse gas protocol as either Scope 1, 2 or 3 emissions as follows.

Scope 1 Emissions

Those emissions resultant from activities under the Proponent's control or from sources which they own. Emission sources (i), (ii) and (iii) are considered Scope 1 emissions.

Scope 2 Emissions

Those emissions result which relate to the generation of purchased electricity consumed in its owned or controlled equipment or operations. Emission source (iv) is considered a Scope 2 emission, however, this is likely to be a relatively minor source of greenhouse gas emissions.

Scope 3 Emissions

These emissions are defined as those which do not result from the activities of the proponent although arise from sources not owned or controlled by the Proponent. In the case of the Project, this includes the transportation of sold coal and the use of this coal, either domestically or overseas, ie. emission source (v).

A full life cycle assessment of both the Project's annual and total (7 years) greenhouse gas emissions from the above sources was conducted by Heggies (2007). The results of this assessment indicate that the total annual emissions of CO_2-equivalent as a result of the operations at the Project are predicted to be of the order of 5.6Mt of CO_2-equivalent per annum.

A comparison of the predicted annual average and potential maximum (worst case) annual emissions from the Project for combined Scope 1 and 2, Scope 3 and Total CO_2-equivalent emissions are presented in **Table 4B.50**. Additionally, greenhouse gas emissions for each Scope breakdown are compared against total Australian and International emissions of CO_2-equivalent, where relevant. It is noted that total Australian emissions for 1990 and International emissions for 2000, estimated to be 551.9Mt CO_2-equivalent (AGO, 2006) and 33 666Mt CO_2-equivalent (WRI, 2005) respectively, have been used in this comparison.

Table 4B.50
Comparison of Project Emissions of Greenhouse Gases with Australian 1990 Estimations

Emissions Estimation Period	Scope 1 & 2 Emissions CO_2-e (%-age Comparison with Australian 1990 emissions[1])	Scope 3 Emissions CO_2-e (%-age Comparison with International 2000 emissions[2])	Total Project Emissions CO_2-e (%-age Comparison with International 2000 emissions[2])
Annual Average	104kt (0.02%)	3.1Mt (0.009%)	3.2Mt (0.009%)
Worst Case Year	113kt (0.02%)	4.6Mt (0.014%)	4.7Mt (0.014%)
Note 1: From AGO (2006), National Greenhouse Inventory 2004 Source: Modified after Heggies (2007) – Table 15			

A comparison of the predicted maximum emissions from the Project with the 1990 estimate demonstrates that worst-case Scope 1 and 2 emissions would represent an increase of approximately 0.02% on the total baseline Australian emissions. Worst case Scope 1, 2 and 3 emissions that would be generated by the Project would represent a similar increase in total baseline international emissions (0.014%).

4B.10.6.8 Impacts on Livestock

Livestock are exposed to dust from many natural sources, including airborne dust as a result of dust storms, yarding or general stock movements. This dust tends to accumulate on the coat or fleece of the animals and generally falls out or is washed out in heavy rain (Hunt, 1999). Increases to dust deposition associated with the proposed mine would be considerably less than the DECC goal for allowable dust deposition of $2g/m^2$/month for all potential grazing land outside the Project Site. It is therefore unlikely there would be any noticeable dust-related impact on livestock.

4B.10.6.9 Impacts on Pasture

Dust accumulation on pasture at the projected rate of deposition would have no effect on pasture palatability or stock production. In grazing trials with dairy cattle, coal dust added to pasture at a rate equivalent to $8g/m^2$/day, or 1 200 times the maximum incremental increase to dust deposition predicted at the assessment locations surrounding the Project Site, has been shown to have no effect on palatability or production by the cattle (Hunt, 1999).

4B.10.7 Monitoring

The above assessment indicates that both deposited dust levels and PM_{10} concentrations are likely to be acceptable and as such air quality is not anticipated to be adversely affected at the surrounding residences.

However, in order to demonstrate compliance with the Project air quality goals (refer Section 4B.10.4) the Proponent would undertake an air quality monitoring program to demonstrate compliance with the nominated air quality goals. The program would involve the following monitoring.

(i) Deposited dust monitoring at selected residences and strategic locations surrounding the Project Site. The most suitable locations for dust deposition monitoring would be as follows.

- Between the Project Site and the "Costa Vale" residence.
- Between the Project Site and the "Surrey" residence.
- Beyond the eastern boundary of the Project Site.
- Beyond the western boundary of the Project Site.

(i) Continuous wind speed and direction at the Project Site weather station.

Monitoring would be undertaken in accordance with:

- AS 2922-1987 "Ambient Air - Guide for the Siting of Sampling Units" (NSW DECC Method AM-1); and
- AS 3580.10.1-1991 "Methods for Sampling and Analysis of Ambient Air - Determination of Particulates - Deposited Matter - Gravimetric Method" (NSW DECC Method AM-19).

If the dust deposition monitoring identifies levels greater than those predicted by the assessment, the Proponent would expand the monitoring program to include 24 hour concentrations of PM_{10} adjacent to either or both "Surrey" or "Costa Vale".

Monitoring would be undertaken in accordance with:

- "Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales", DEC 2001;
- AS 2922-1987 "Ambient Air - Guide for the Siting of Sampling Units" (NSW DECC Method AM-1); and
- AS 3580.9.6-1990 "Particulate Matter - PM_{10} - high volume sampler with size-selective inlet".

4B.11 SOCIO-ECONOMIC SETTING

4B.11.1 Introduction

Based on the risk analysis undertaken for the Project (see Section 3.3 and **Table 3.6**), the potential environmental socio-economic impacts requiring assessment and their unmitigated risk rating are as follows.

- Alteration of social activities or employment due to employment generation and capital expenditure (no risk rating).
- Perceived or real impacts on local amenity of neighbouring properties (unranked).

In addition, the Director-General's requirements issued by the Department of Planning require that the assessment of socio-economic impacts make particular reference to any increased demand for infrastructure and services.

4B.11.2 Background

The Belmont Coal Project is located within a regional and rural setting in central northern NSW which, like many other regional areas, has been in relative decline in socio-economic terms over the past twenty years. Recent demographic trends in Australia have demonstrated acceleration in the trend to the "move to the coast" phenomenon, or to large community centres, placing considerable stress and change on areas in decline.

Regional areas are often sensitive to employment loss where the economic support for villages and towns can be relatively single dimensional, ie. dominated by a single industry or even a single employer. Technology change, industry reform and rationalisation have led to closure of many regional businesses including key employers and economic drivers in a region.

In recent times, the reintroduction of a viable coal mining industry in the Gunnedah local government area has provided welcome diversification of industry, employment generation and skills provision. In this context, the Project has the potential to maintain and increase the economic drive provided by this industry.

It should be noted however, that the structure within the towns likely to benefit from the development and operation of the Project, ie. Gunnedah, may be tested in terms of their social structure and their employment and housing capacity. To assess the potential positive implications of the Project, the proportional distribution of these impacts, as well as the possible negative socio-economic impacts associated with any added strain on infrastructure capacity, this sub-section builds on the results of a previous socio-economic study completed by Key Insights Pty Ltd (social impact assessment) and Castlecrest Consulting (economic impact assessment) for a similar scale coal mine development (the East Boggabri Coal Mine) in 2005 (Key Insights – Castlecrest, 2005).

4B.11.3 Method

The socio-economic assessment was undertaken in phases. The first phase involved an analysis of the Key Insights – Castlecrest (2005) social and economic assessment in order to obtain a general understanding of the local setting, social issues of greatest concern and community views/opinions on mining.

Phase 2 involved more detailed qualitative research of those social issues identified by the Phase 1 assessment to be of greatest significance to local stakeholders, namely:

- housing;
- education;
- industry diversification;
- employment opportunities; and
- community services and facilities.

4B.11.4 Results

4B.11.4.1 Phase 1 - Literature Review

Key Insights – Castlecrest (2005) identified the following in relation to the local setting and socio-economic issues of greatest concern.

- The Gunnedah region has been experiencing declining populations over recent decades.
- There had been net out-migration from rural areas, especially as a result of young people moving to regional centres in search of further work and educational opportunities.
- There is generally wide community support for mining in the area. Residents apparently welcomed the economic and employment benefits that would flow through to the areas as a result of expanded mining activity.
- The communities saw mining as a positive way to achieve population growth and much needed diversity to the local economy.
- Housing supply concerns were raised with separate houses being the overwhelmingly dominant form of housing in the area. While there is land that would accommodate population increase in Gunnedah, an influx of new workers may provide short-term stress on the market.
- The Gunnedah economy is primarily driven by agriculture and subsequently, the labour market and skills pool are not particularly deep. The labour market is quite tight in the areas of professionals and skilled trades. The development and

operation of the Whitehaven and Tarrawonga Coal Mines in the region has provided increased opportunities for the necessary skills to be attained through employment direct or ancillary to these mines, however, it still might be necessary to import a proportion of the workforce, notably those with highly developed, mining-related skills.

- There may be some transfer of workers from the agriculture sector to the better paid mining sector, however, high levels of youth unemployment suggest a considerable pool of young workers, who would be available to engage in low-skill jobs or participate in structured training.

4B.11.4.2 Phase 2 - Qualitative Research

4B.11.4.2.1 Existing Services and Facilities

The following information on existing services and facilities has been taken from (Key Insights – Castlecrest, 2005) and has been confirmed by the Proponent's Community Liaison Officer.

Educational Facilities and Services

Gunnedah is serviced by four primary schools: 2 State schools, 1 Catholic and 1 Christian Community School. There are also two high schools in Gunnedah, a State school and a Catholic High School, St Mary's College. Gunnedah is served by a range of childcare centres and preschools. Gunnedah TAFE operates from Hunter Street, providing a range of State-approved courses, and local content. It is most likely that Gunnedah TAFE would benefit from mining growth in the region and is likely to provide flexible delivery options to new and young workers.

The nearest university campus is the University of New England, which has a campus in Armidale.

Healthcare Facilities and Services

Gunnedah has a 50 bed capacity hospital which provides a high standard of general medical and surgical services including a Slow Stream Rehabilitation Unit, a day surgery care facility, a Public Health Dental Clinic and a Physiotherapy Unit. A range of additional healthcare services including but not limited to mental health, drug and alcohol, dental, family health and speech therapy are provide by the Gunnedah Community Health Service.
Other healthcare facilities are available in Gunnedah include the following.

- The Gunnedah Nursing Home has 58 nursing home places. The Alkira has 32 hostel places and McAuley Aged care has 22 hostel places. Yalambi has 13 units. The Frail Aged hostel provides 24 hour-a-day care.
- NSW Ambulance.

- Baby health centre.
- X-ray facilities.
- Pathology services.

General Facilities and Services

Gunnedah, as a larger regional centre, provide numerous sporting and recreational clubs, sporting grounds and facilities, restaurants, retail facilities and several franchises.

Gunnedah sees itself as attractive to business because of its rail and road transport links. There is an airport at Gunnedah with daily connections to Sydney, but it is expensive compared to flying in and out of Sydney and Brisbane from Tamworth. A focal point for activity of a cultural nature within Gunnedah and surrounding areas is the Gunnedah Cultural Centre. It includes the Civic theatre, which houses new cinema/theatre facilities. Also included are the original town hall and the creative arts centre. The creative arts centre displays the Shire's art collection. Gunnedah also boasts a swimming centre which includes a 50m Olympic pool, 25m indoor heated pool, children's wading pool, kiosk and BBQ facilities.

Gunnedah has the following business and industry groups.

- Gunnedah and District Chamber of Commerce and Industry.
- Gunnedah Stock and Station Agents Association.
- New South Wales Farmers Association.
- Tourism Gunnedah (Gunnedah Visitors Information Centre).
- Gunnedah District Unlimited. (Main Street Program).

4B.11.4.2.2 Local Capacity: Demand and Supply

As indicated in Section 4B.11.4.2.1, the Gunnedah Shire is well serviced by a range of clubs, service organisations, facilities and government services and have high levels of social capital.

Key Insights (2005) prepared a profile of the current demand placed on local services such as health and education. This assessment builds on this profile and attempts to quantify the subsequent extra demand placed on local services as a result of new residents being drawn to the area as a result of employment, or employment of an immediate family member. While the estimates on changes in demand for 'soft' infrastructure such as access to education and health services are purposefully provided as indicative only, they provide a basis for assessing the potential impact on the ability of Gunnedah and surrounding communities to manage any potential population increase.

Existing Supply and Demand

- Gunnedah is serviced by 4 primary schools and 2 high schools. In 2001[9], there were reportedly, 819 primary school children and 580 high school aged students, most of whom were presumably attending a local school (ABS, 2001).
- Varying over time, Gunnedah is serviced by between 5 and 6 general practitioners, providing a FTE GP Ratio of around 1:1 400. This is generally higher than optimal, however, is generally within the range considered adequate.
- Additional 'soft' infrastructure such as clubs and sporting groups are well represented as indicated in Section 4B.11.4.2.1.

Predicted Changes to Local Demographics

At this point it is worth noting that as the Project commences and is developed to maximum production levels, operations at the similarly sized Whitehaven Coal Mine would be scaling down. As such, the necessity to source experienced mining employees from outside the region would be reduced as there would be an element of transfer between the scaled down Whitehaven Coal Mine and scaling up Belmont Coal Project. The Project would be required to source very few employees from outside the region, however, it is anticipated that up to five technically based positions may be sourced from established mining regions such the Hunter and Illawarra. The average household size of 2.6 persons for the incoming workforce was assumed (the 2001 NSW average) with a representative split of child ages.

While there is no clear indication where new residents may choose to live, it is predicted that most would choose to reside in Gunnedah, due to its higher levels of servicing than smaller towns such as Boggabri and Baan Baa. Subsequently, it is assumed that all incoming residents would reside there.

Based on these assumptions, the following change in Gunnedah demographics is predicted.

Workers sourced from outside local areas	=	5
NSW mean household size	=	2.6
Projected incoming population	=	**13**
Estimated children under 5 (NSW average = 7%)	=	1
Estimated primary school children (NSW average = 9%)	=	1
Estimated high school children (NSW average = 7%)	=	1

These estimates reveal an essentially modest increase in population associated with the Project. There is sufficient capacity within education, healthcare and social infrastructure to accommodate this increase.

[9] 2006 Census data was unavailable at the time of writing.

4B.11.5 Management Measures

4B.11.5.1 Social

Employment and Training

The Proponent is committed to the implementation of a policy which encourages employment of local district personnel. Arrangements for training and certification of suitable local persons would be made and the Proponent intends to use its association with other operational mines in the region to provide the training required for the bulk of its workforce. Given the reliance of modern farming on heavy machinery, the transition of local residents previously employed in agriculture to mining would be relatively simple. The local indigenous community would be encouraged to be involved in this program.

Acknowledging that a small proportion of the initial mine workforce may be sourced from more established mining area such as the Hunter Valley or Illawarra, and to assist in the community integration process, the Proponent would provide assistance, where possible, in identifying job opportunities for the partners of potential employees. The Proponent would also provide a local induction kit to new workers including contact details for community groups and services throughout the region.

Housing

Notably, the Proponent would encourage and promote the employment of people already residing in the area which would limit any impacts on available housing. For those employees sourced from other regions, a short-term worker accommodation plan, involving the provision of temporary accommodation, would also be considered by the Proponent.

The anticipated increase in population is a modest one and it is concluded that sufficient capacity is present within the housing market of Gunnedah to accommodate this modest increase in households. This notwithstanding, and in order to assist the local Councils in the planning of development within the respective shires, the Proponent would inform them of the predicted increase in population based on employment at the Project.

Infrastructure and Services

As identified in Section 4B.11.4.2.1, Gunnedah has an established infrastructure and service level which would be able to cater for any population increase. The Proponent would, however, investigate contributing to community facilities and infrastructure should significant population increases associated with the Project impact on the local infrastructure and/or service provision.

Notably, the Proponent has a strong history of contributing to local infrastructure and facilities as part of similar and associated developments.

Agricultural Lands

The Proponent has minimised this potential impact through a commitment to return a proportion of the Project Site to land with a capability class of at least III (see Section 4B.9.3.3).

4B.11.5.2 Economic

Apart from the potential contributions to the surrounding local communities, which may be either financial or in-kind contributions, the Proponent would be contributing significantly to the local economy through wages and payment for services. The Proponent would implement a policy that encourages employment of local district personnel, with arrangements for training and certification put in place to ensure suitable applicants can acquire the necessary skills.

4B.11.6 Impact Assessment

4B.11.6.1 Local Capacity

Impacts on local capacity are likely to be relatively modest considering the Whitehaven Coal Mine is unlikely to keep operating beyond 2008, with the Belmont Coal Project therefore largely replacing, rather than adding to, the demands on employment, housing etc. created by the Whitehaven Coal Mine.

There would however, be a limited transition period between the Whitehaven Coal Mine closing and the Belmont Coal Project commencing when there may be some cumulative demand on local capacity. In light of the range of available services in Gunnedah, and particularly the courses and expertise offered by the local TAFE colleges, combined with the positive attitude of the local Councils, it is concluded that the region currently has, or would quickly develop, capacity in the three key areas of education/training, housing capacity and economic development to meet the demands during this transition period.

With particular focus on the increased demand for 'soft' infrastructure such as health care and schooling, the following assessment has been made.

- The estimated additional 1 primary and 1 high school age children represents an increase of less than 1% to potential school enrolments.
- The addition of another 13 people would only marginally alter the person to GP:patient ratio.
- The maintenance of employment at current or increased levels in the mining industry, and follow-on economic contributions to the local community, may contribute to the increased vitality of local clubs, sporting groups and volunteer organisations.

It is assessed that any increase in demand on 'soft' infrastructure such as schools and medical services would be relatively minor and manageable:

4B.11.6.2 Social

In addition to the direct and indirect employment opportunities that would arise from the Project, the following positive social impacts may occur.

- Reduction of social stress through maintenance of employment levels in the mining and related industry for the next seven years.
- Training opportunities for local people, including young people and indigenous people, in a growth industry (mining).
- Stimulus to local businesses, particularly in Gunnedah, including motel and hotel trade, cafes and restaurants, mining-related engineering and surplus spending activity such as gyms, cinema, recreational goods and services, beauty salons, and hair dressers.
- Maintenance of, or increase to, the population to participate in locals clubs, sporting groups, cultural activities, and organisations, therefore contributing to stronger social networks and social capital.
- More volunteers for community service organisations.

With respect to potentially adverse social impacts resulting from the Project, the following assessments are made.

- Noise levels in areas immediately surrounding the Project Site and transport route would increase marginally, however, these would not raise noise above the applicable noise criteria (refer to Section 4B.5.4).
- The number of trucks using the Hoad Lane, Blue Vale Road, Kamilaroi Highway route may increase, however, appropriate controls are currently in place, and would be maintained for the Belmont Coal Project, to minimise impacts on other road users, in particular the school bus services that share the route.
- The Project would require a cessation of agricultural activities on the Project Site for the duration of the Project. This would be partially mitigated through the rehabilitation of a portion of the Project Site to agricultural land of a similar agricultural suitability class. The area is restricted to 366ha and the loss of such a small parcel of agricultural land is not seen as a significant impact.

4B.11.6.3 Economic

4B.11.6.3.1 Introduction

The activity concerned with the development and operation of the project would produce a range of distinctive economic outputs. These are principally analysed in terms of:

(i) employment output as both the mine and other businesses employ additional workers to service the industry; and

(ii) income derived from the additional wages and salaries paid within the respective industries and local economy.

The proposed construction work would also generate impacts consequential to the development of the project.

The output from the proposed Belmont Coal Project would, in terms of employment and income, largely maintain the significant contribution made to the local and regional economy currently provided by the Whitehaven Coal Mine (due to cease production in late 2008). In light of this, the economic assessment considers the existing contribution of the Whitehaven Coal Mine to the local, regional and wider economies, and through extrapolation, assesses the contribution the Belmont Coal Project would make. Conversely, this method of assessment illustrates the possible impact the closure of the Whitehaven Coal Mine would have on these economies should the Belmont Coal Project (or a project of similar types and scale) not proceed.

4B.11.6.3.2 Direct Economic Impact

Table 4B.51 presents the economic contribution made by the Proponent, in the form of wages, other payments and taxes/royalties for the Whitehaven Coal Mine and the likely contribution to be made by the Belmont Coal Project.

The Proponent would also continue to contribute to the local council through road maintenance contributions (~ $100 000pa) and the local community via charitable donations. In the last 12 months, the Proponent has contributed $45 500 to community based and charitable organisations in the Gunnedah Shire and $20 000 in the Narrabri Shire. In addition, the Proponent has provided for ongoing training and employment opportunities for the local Indigenous community through the establishment of a tree planting initiative. The Proponent donated land and provided for start-up services such as power and water (to the estimated value of $30 000) for a joint TAFE / Red Chief LALC project to initiate a native tree nursery and tree-planting service. The ongoing benefits to TAFE will be felt in terms of training and skills development whilst providing an income stream for the Red Chief LALC.

Community based and charitable contributions such as these would be continued as part the Proponents ongoing commitment to ensuring the economic benefits of the Belmont Coal Project are not restricted to the Proponent, employees and various levels of government.

Table 4B.51
Contribution of the Whitehaven Coal Mine (Actual) and Belmont Coal Project (Predicted)

Economic Contribution	Whitehaven Coal Mine	Belmont Coal Project
Local and Regional Contributions		
Wages	$2 900 000 [2]	$4 950 000 [3]
Payments to contracting companies:		
Coal Haulage	$3 300 000	$4 950 000 [5]
Other	$1 500 000	$2 250 000 [5]
Expenditure on other goods and services:		
Local	$6 000 000	$9 000 000 [5]
Sub-total	**$13 700 000**	**$21 150 000**
NSW, Australia and Global Contributions		
Income tax	$770 000 [4]	$1 300 000 [4]
Royalty paid on the coal [1]	$2 400 000	$3 600 000
Payroll tax to the NSW government	$140 000	$240 000
Payments to contracting companies:		
Rail related	$8 400 000	$12 600 000 [5]
Expenditure on other goods and services:		
Other	$9 000 000	$13 500 000 [5]
Sub-total	**$20 710 000**	**$31 240 000**
Total	**$34 410 000**	**$52 390 000**

Note 1: Based on coal sales of 1.5Mtpa
Note 2: Based on 30 employees – average annual income = $95 000pa
Note 3: Based on 56 full-time equivalent positions.
Mote 4: Estimated
Note 5: Extrapolation based on respective production levels

Source: Whitehaven Coal Mining Pty Ltd

4B.11.6.3.3 Indirect Economic Impact

The proposed development and operation of the Belmont Coal Project would also indirectly generate employment opportunities through requirement for ancillary services to the mine and general stimulus to the local economy. The average income derived from indirect employment is likely to be less than that of the direct employees of the mine and for the purpose of this assessment is based on median household income for the Gunnedah LGA of the 2006 Census of $714 per week ($37 000pa).

Site Establishment

Based on the employment figures presented in Section 2.11.1, and a multiplier value of 1.7 for construction-based employment (ABS, 1994/1995), the development of the Belmont Coal Project would generate approximately 34 indirect jobs. This would contribute approximately $1 258 000 in wages (pro-rata) during the site establishment phase.

Mining Operations

The forecast operational workforce for the Project would grow comparatively with production. Assuming the direct employment levels noted in Section 2.11.2 and a multiplier value of 2.5 adopted for mining related projects (ABS, 1994/1995), the project would provide indirect employment for approximately 130 people. This would equate to a contribution in wages of $4 810 000pa.

4B.11.6.3.4 Total Economic Impact

A review of all the economic contributions likely to be made by the Belmont Coal Project indicates that an estimated $27 250 000 would be injected into the local / regional economy each year (see **Table 4B.51**). An estimated additional $200 000pa would also be provided directly to the local Council and community groups for community based projects. The Belmont Coal Project would be likely to contribute an additional $26 100 000 to the NSW, Australian or global economy with an estimated $5 140 000 paid to the NSW and Commonwealth government through various taxes and royalties (see **Table 4B.51**).

Conversely, should the Whitehaven Coal Mine cease production and the Belmont Coal Project not proceed, the current economic contribution of $34 410 000pa (see **Table 4B.51**) would be removed from the local, regional and wider economy.

The Belmont Coal Project would contribute significantly to the local Gunnedah economy, and more importantly, maintain and build on the current contribution of the Whitehaven Coal Mine.

4B.12 EUROPEAN HERITAGE

4B.12.1 Desktop Search of Heritage Listed Items

A desktop search of the Gunnedah Local Government Area on the following heritage databases was conducted in February 2006.

- Gunnedah Local Environmental Plan 1998 – Schedule 1.
- Australian Heritage Database (which includes places listed in the World Heritage List, National Heritage List, Commonwealth Heritage list and Register of the National Estate) .
- State Heritage Register.
- State Heritage Inventory.

No listed heritage sites were identified within the Project Site, nor within the vicinity of the Project Site.

4B.12.2 Management Measures

As no sites were identified, no management measures are required.

4B.12.3 Assessment of Impacts

As no sites were identified, there would be no impact on any items or places of European heritage significance.

4B.13 BUSHFIRE HAZARD

4B.13.1 Existing Bushfire Hazard

Much of the Project Site has been cleared for agricultural activities and would be expected to exhibit a low bushfire hazard. The Project Site does, however, contain remnant stands of mature or regenerating trees. The vegetation along and adjacent to the transport route similarly comprises a mixture of cleared areas and small patches of native woodland vegetation.

To assess the existing bushfire hazard of the Project Site, a Type A assessment for bushfire prone areas (NSW RFS, 2001) was performed. The vegetation was categorised as open woodland (despite the fact that much of the Project Site has been cleared for agricultural purposes) with the terrain categorised as predominantly level (0^o to 5^o) rising to hilly (5^o to 10^o). Following the assessment guide of NSW RFS (2001), the Project Site has been assessed as displaying a low-medium hazard rating.

The vegetation of the northern section of the transport route was also categorised as open woodland (despite the fact that much has been cleared for agricultural activities) with the terrain categorised as level (0^o to 5^o). Following the assessment guide of NSW RFS (2001), the northern section of the transport route has been assessed as displaying a low hazard rating.

Areas like the Project Site and transport route should not be considered in isolation as the bushfire risk of surrounding areas may raise the level of bushfire risk associated with the site. The vegetation of land surrounding the transport route is very similar to that of the route itself and is therefore likely, if anything, to decrease bushfire risk. In contrast, to the west of the Project Site, Vickery State Forest contains significant areas of dense woodland / forest vegetation over hilly terrain. This would increase the risk of bushfire on the Project Site although given its largely cleared nature, the risk would not be unacceptably high.

4B.13.2 Safeguards and Controls

The activities of the Project that may increase the risk of fire on the Project Site and transport route, and the controls proposed to limit the risk posed by these are presented in **Table 4B.52**.

Table 4B.52
Bushfire Hazard – Activities and Controls

Activity	Possible Ignition Source	Safeguards and/or Controls
Blasting	• Coal dust • Ejected Shot	• Clear vegetation away from blast (>20m). • Remove all coal from open cut around blast. • Blast design to be undertaken by qualified personnel. • Inspection of blast conducted prior to blast. • Blast Management Plan to be prepared and followed. • Water truck available to douse any smouldering vegetation etc.
Refuelling	• Spilt fuel ignited by spark	• Refuelling undertaken within designated fuel bays or within cleared area of the Project Site. • Vehicles to be turned off during refuelling. • No smoking policy to be enforced in designated areas of the Project Site. • Fire extinguishers maintained within site vehicles.
Product Stockpiling	• Spontaneous Combustion	• The coal has a low propensity for spontaneous combustion. • Stockpiles to be regularly inspected and watered. • Stockpile height and volume to be controlled to limit the duration coal retained in stockpiles.
General Activities	• Cigarette • Rubbish, eg. glass, metal.	• No smoking policy to be enforced in designated areas of the Project Site. • Focus on housekeeping to be maintained by mine management. • Water cart available to assist in extinguishing any fire ignited. • Site vehicles to carry a fire extinguisher.

The Proponent would also regularly liaise with NSW Forests personnel in relation to the bushfire hazard provided by Vickery State Forest and to a lesser extent Community Conservation Area Zone 2 - Kelvin. This regular liaison would be incorporated into a Bushfire Management Plan which the Proponent would prepare in consultation with NSW Forests and the local rural fire service.

4B.13.3 Assessment of Impact

The Project would undoubtedly increase the number and type of ignition sources in the local area. The proposed controls and safeguards, in conjunction with general clearing activities associated with the mining activities would, however, ensure that a low bushfire hazard was maintained on the Project Site and along the transport route.

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