Millennium Expansion Project

Environmental Impact Statement

CHAPTER 11:

AIR

TABLE OF CONTENTS

FIGURES

TABLES

11.0 AIR QUALITY

11.1 EXECUTIVE SUMMARY

11.1.1 Values

Air quality values to be enhanced or protected within the Millennium Expansion Project (MEP) are:

- maintaining the local air shed standards;
- the wellbeing of the community or any part of the community, including its social and economic amenity; and
- the wellbeing of an individual without unreasonable interference from intrusive dust.

11.1.2 Issues

The MEP's air quality considerations include:

- at 22 km distance from the MEP, the town of Moranbah is well outside any dust deposition impacts;
- a slight increase in nuisance dust levels has been modelled for sensitive receptors within 10 km of the MEP;
- minimising dust emissions from mining operations; and
- minimise contribution to the cumulative dust impact of surrounding mines.

11.1.3 Mitigation Strategies

Strategies to mitigate the MEP's air quality issues and impacts include the following:

- Peabody's ongoing support of Coal 21;
- Peabody's active involvement and compliance with proactive greenhouse gas (GHG) abatement initiatives and all legislative requirements;
- disturb the minimum area necessary for mining and rehabilitate promptly;
- spoil will be removed as soon as practicable after blasting in order to limit the drying time where practicable;
- avoid topsoil stripping and replacement on days when the wind speed is sufficient to carry visible dust beyond the Mining Lease (ML) boundary where practicable;
- use water sprays and water trucks to keep handling areas, transfer points and roads moist, hence reducing dust lift-off;
- provide dust suppression sprays at coal transfer points in the Coal Handling and Preparation Plant (CHPP) which may produce dust (e.g. dump hopper, conveyor);
- investigate the use of approved chemical dust suppressants if haul roads become too slippery from use of water;
- keep the number of roads to a minimum and maintain those required in good condition;
- vehicular access within the site will be strictly limited to authorised vehicles and designated routes, i.e. bitumen and major haul/access roads;
- the internal speed on unsealed roads will be limited to 80 km/h; and
- dump truck routes will be kept as short as practicable.

11.2 BACKGROUND

The MEP operations will include extraction, handling and placement of soil, overburden and coal, These activities have the potential to generate air emissions that may impact on nearby sensitive receivers. The potential air quality impacts from the MEP have been assessed by:

- reviewing legislative requirements and ambient air quality goals;
- identifying existing air quality and dispersion meteorology within the MEP site;
- identifying the nearest sensitive receivers;
- air dispersion modelling to predict concentrations of particulate matter at nearest sensitive receivers;
- determining the likelihood for potential air quality impacts through comparison with air quality goals; and
- identifying mitigation measures to assist with the management of any air quality impacts from the MEP.

Air quality impact assessments for the MEP were undertaken by Noise Mapping Australia Pty Ltd. The report from this assessment is contained in **Appendix F-5-Air**.

GHG are also generated by a number of mining activities, and potentially from the coal seam itself. GHG emissions are addressed in **Section11-9** below.

11.3 AIR QUALITY GUIDELINES

11.3.1 Environmental Protection (Air) Policy

The *Queensland Environmental Protection (Air) Policy 2008* (*EPP (Air)*) commenced on 1 January 2009. The *EPP (Air)* (Part 2 Section 5) aims to achieve the object of the *Environmental Protection Act 1994* (*EP Act*) in relation to Queensland's air environment. The object of the *EP Act* is '*to protect Queensland's environment while allowing for development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends (ecologically sustainable development)'.*

Specifically, the *EPP (Air)* addresses the environmental values to be enhanced or protected namely;

- the qualities of the air environment that are conducive to protecting the health and biodiversity of ecosystems;
- the qualities of the air environment that are conducive to human health and wellbeing;
- the qualities of the air environment that are conducive to protecting the aesthetics of the environment, including the appearance of buildings, structures and other property; and
- the qualities of the air environment that are conducive to protecting agricultural use of the environment.

In order to meet these environmental values, Schedule 1 of the *EPP (Air)* nominates relevant air quality indicators and goals. Relevant air quality indicators from Schedule 1 dealing with particulates, are as follows:

- total suspended particulate 90 µg/m^3 averaged over a year;
- $PM_{2.5}$ 8 µg/m^3 averaged over one year;
- $PM_{2.5}$ 25 µg/m^3 averaged over 24 hours; and
- PM_{10} 50 µg/m^3 averaged over 24 hours, and no greater than five occurrences per year.

All these indicators are qualities of the air environment that are conducive to human health and wellbeing. The indicators apply at any sensitive or commercial place, such as residences, parks, gardens, schools, shopping precincts, etc.

The *EPP (Air)* implements the goals and indicators prescribed by the *National Environment Protection (Ambient Air Quality) Measure 2003* (*Air NEPM*) and makes them enforceable in Queensland.

11.3.2 Greenhouse Gas Legislation and Guidelines

The *National Greenhouse and Energy Reporting Act 2007* (*NGER Act*) introduced a national framework for the reporting and dissemination of information about GHG emissions, GHG projects, and energy use and production of corporations.

In order to assist organisations in their reporting, the Australian Department of Climate Change and Energy Efficiency (DCCEE) published the *National Greenhouse Accounts (NGA) Factors* (June 2009) (*NGA Workbook*) to enable industry to calculate GHG emissions using appropriate methods and emission factors. The *NGA Workbook* was used to estimate anticipated emissions from the MEP.

11.3.3 DERM Guideline

Although the *EPP (Air)* is the primary reference for air quality criteria in Queensland, it does not address dust deposition.

The relevant guideline for the assessment of dust concentration in relation to the MEP is the DERM guideline *Preparing an Environmental Management Overview Strategy (EMOS) for Non-standard Mining Projects*. This guideline requires that the release of dust or particulate matter, or both, resulting from the mining activity must not cause an environmental nuisance at any sensitive or commercial place. According to the guideline, the maximum permissible measured dust levels relevant to the proposed MEP comprise:

- dust deposition of 120 milligrams/m^2/day, averaged over one month; and
- PM_{10} 150 µg/m^3 averaged over 24 hours, at a sensitive or commercial place downwind of the operational land.

The PM_{10} criterion has been superseded by the more recent and more stringent *EPP (Air)* levels for PM_{10}.

11.4 EXISTING ENVIRONMENT

The MEP is situated approximately 22 km east of Moranbah in a well established grazing and mining region. The area surrounding the site is undulating, comprising of mines, open grazing land and native scrublands. The agricultural land includes improved pastures as well as small areas of natural tree cover. Most of the roads to property homesteads are unpaved and generally well maintained.

There are several existing mines near the proposed MEP site, the largest being Peak Downs Mine, situated approximately 20 km south-west of the site. Isaac Plains mine lies to the north-west while Poitrel Mine is situated immediately to the south of the site. Carborough Downs underground mine lies to the north and the existing Millennium open-cut mine is situated to the west of the MEP site.

The railway spur servicing the Millennium Mine also services Peak Downs Mine, which rails approximately 9 Mtpa (BHP, 2009) along this spur. The spur connects to the main line at Coppabella, approximately 17 km to the north east of MEP.

The sensitive receptors and separation distances to the closest approach of the MEP site are contained in **Table 11-1** and shown in

Figure 11-1. It is relevant to note that each of the homesteads mentioned below is closer to one of the other mines situated in the area, for example the Winchester Downs Homestead is only 8 km from Peak Downs, while Moorvale and Annandale are both closer to the Moorvale mine.

Table 11-1 Properties Adjacent to the Site

Sensitive Receptors	Description
Moorvale Homestead	Approximately 8 km north-east
Annandale Homestead	Approximately 8 km north-east
Wotonga Homestead	Approximately 9 km west
Broadlea Homestead	Approximately 11 km north-west
Winchester Downs Homestead	Approximately 15 km south-west

11.4.1 Existing Air Quality and Sensitive Receptors

Potential sources of particulate emissions from the surrounding environment primarily comprise:

- farming and grazing activities;
- existing mining operations;
- unsealed roads; and
- smoke from grass/bush fires (permitted or otherwise).

Since easterly winds prevail, predominant impacts will be expected to the west of the operations. A survey of the existing dust levels was therefore obtained at two locations, south-west and north-west of the proposed MEP site. The equipment used comprised a TSI Dusttrak Aerosol monitor configured to record PM_{10} concentrations at five minute intervals. The equipment was located within homestead compounds at least 4 m from buildings.

Specific air quality monitoring was undertaken at the Winchester Downs and Wotonga homesteads.

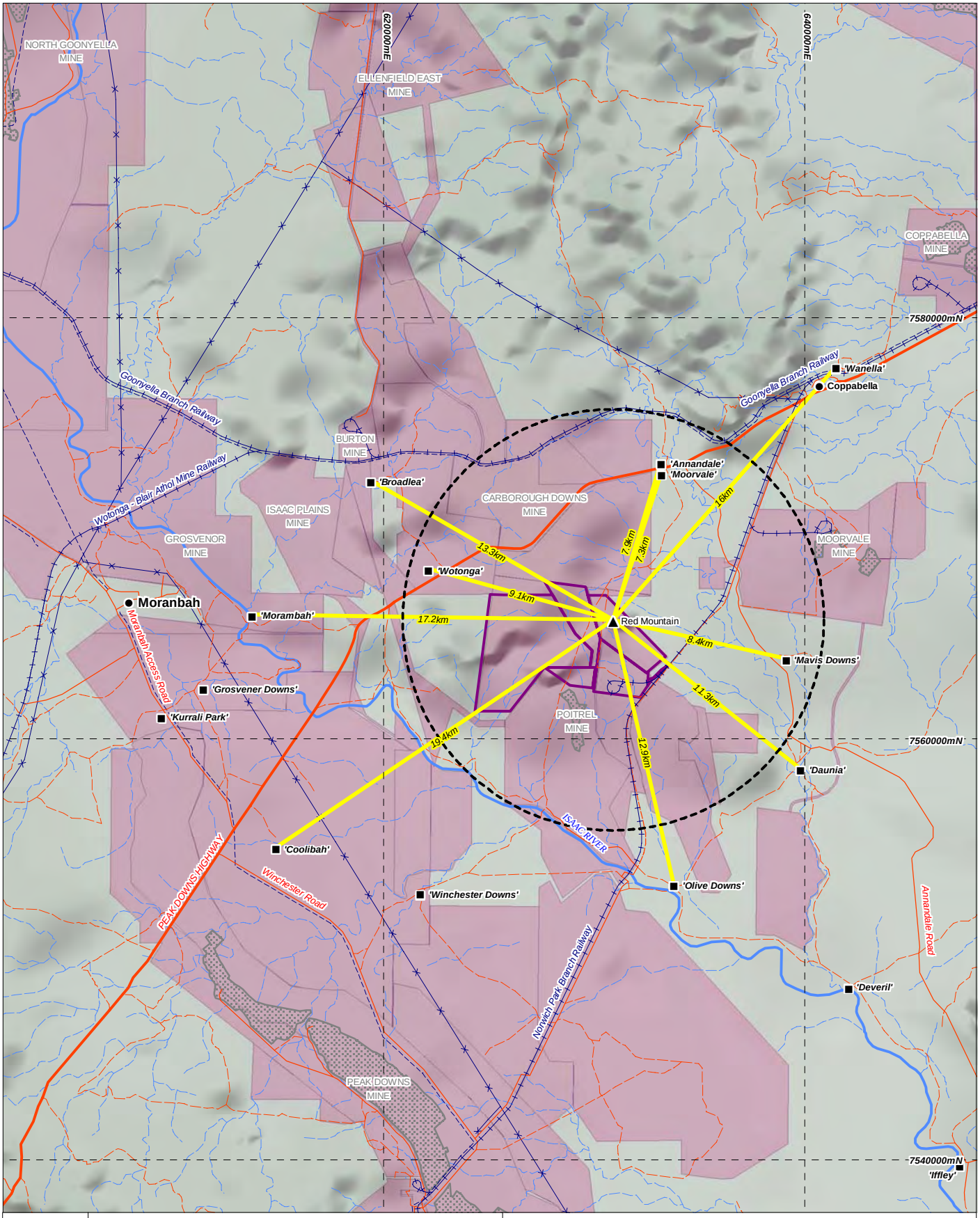
Existing atmospheric dust concentrations were obtained at Winchester Downs homestead over a one week period from 16 March 2009 to 24 March 2009. The dust sampler recorded the PM_{10} in five minute intervals and the $PM_{10\ (24\ hour)}$ was calculated from the samples. A daily cycle in dust concentration levels was observed. The minimum dust levels occurred about 18:00 and varied between 3-4 µg/m^3. The daily maximums occurred about 12 hours later and were typically about 5 µg/m^3 higher. A number of short-term peaks, up to 80 µg/m^3 (60 minute average), occurred over the monitoring period. This was due to dust sources in the immediate vicinity of the monitor, such as cars on dirt roads.

Existing dust concentration levels were also recorded at Wotonga Homestead over a five day period from 10 March 2009 to 14 March 2009. No high dust episodes were observed during the monitoring period.

The existing $PM_{10\ (24\ hour)}$ dust levels for both these locations are presented in **Table 11-2** and illustrated in **Figure 11-2** and **Figure 11-3**.

Table 11-2 Measured Existing Air Quality at Homesteads Adjacent to the MEP

Location	PM10 (24 hour) µg/m3 Range
Winchester Downs Homestead	5 to 8
Wotonga Homestead	5 to 7



LEGEND

- Principal road
- Road (sealed)
- Road (unsealed)
- Railway
- Powerline
- Pipeline
- River
- Watercourse
- Town
- Homestead
- Peabody tenement
- Other ML & MDL tenement
- Existing mine
- 10km radius from Red Mountain

Data Source:
Peabody tenement - Minserve. Other tenement - EEDI.
Topography (250k) - Geoscience Australia.

MET SERVE

Peabody

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Peabody Energy Australia Pty Ltd

Millennium Expansion Project

Location of Homesteads near the MEP

0 5 10

Kilometres

Scale: 1:250,000 (A4)

20/10/2010

Datum: GDA94
Projection: MGA55

FIGURE 11-1

Figure 11-2 Measured Atmospheric Dust Concentration at Winchester Downs Homestead

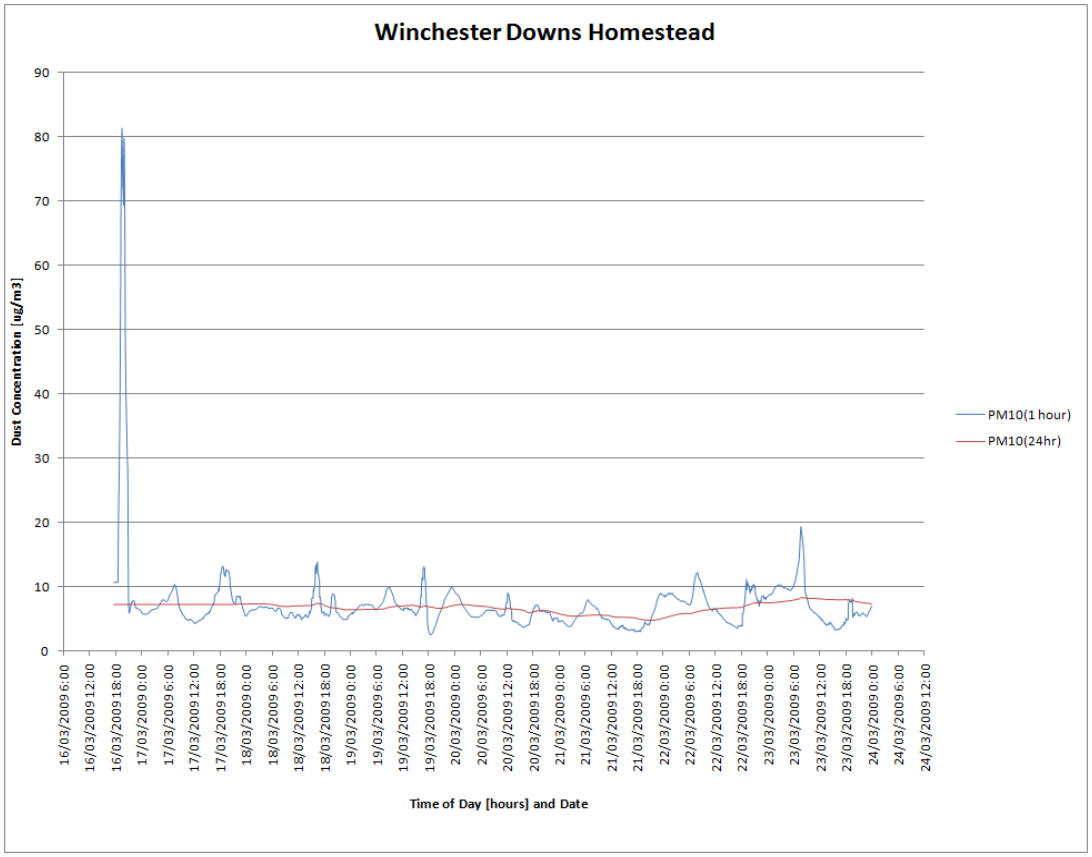
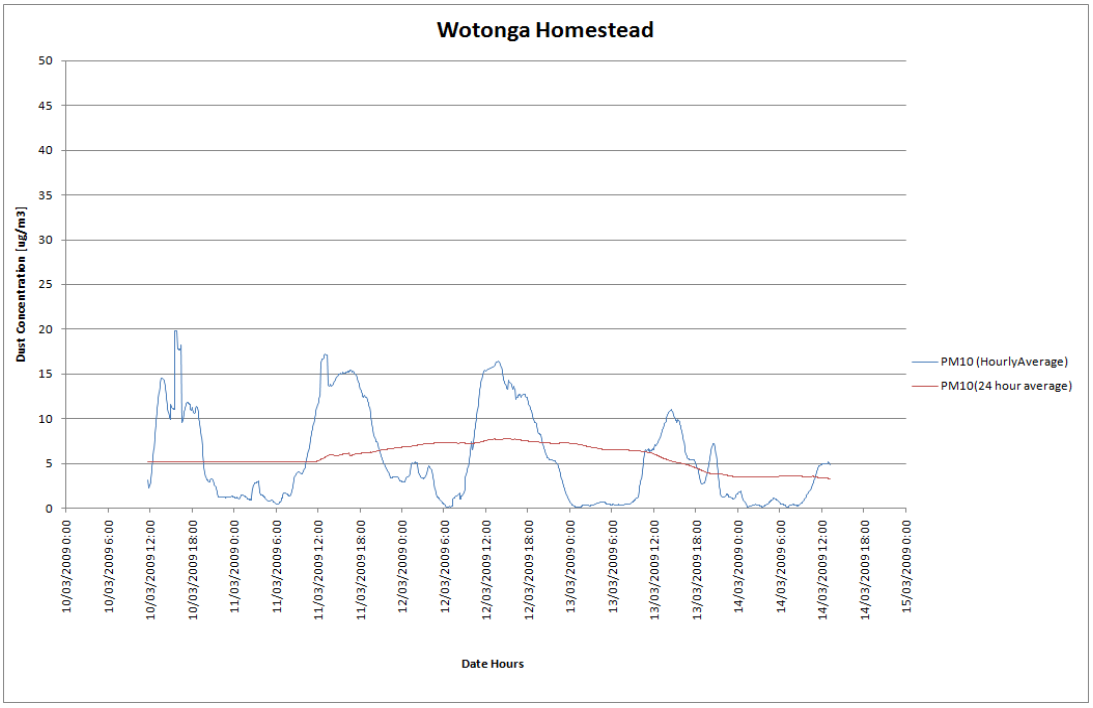


Figure 11-3 Measured Atmospheric Dust Concentration at Wotonga Homestead



11.4.2 Climate and Dispersion Meteorology

The closest manual Bureau of Meteorology (BOM) weather monitoring station to the MEP site is Moranbah while the closest BOM continuous recording automatic weather station (AWS) is at Emerald.

Moranbah is situated in an inland tropical area. The region has a warm climate with two distinct seasons, a dry winter season and a wet summer season. Winter temperatures average from 10ºC-25ºC, while summer temperatures range from around 20ºC-35ºC. The region averages approximately 600 mm of rainfall annually, falling mostly between November and March.

During the wet summer season the soil moisture content increases and increased grass ground cover results in lower dust emissions from most activities. During the dry winter season the soil moisture content reduces (particularly at the surface) and dust emissions are more prevalent from most activities as grass cover reduces.

There is a dominant easterly component to the winds at Moranbah. Thus any particulate or gaseous emissions from MEP are likely to travel toward the township.

11.5 POTENTIAL IMPACTS

11.5.1 Sources of Air Emissions

Sources of particulate emissions at the MEP are likely to be:

- clearing of vegetation and removal of topsoil;
- drilling and blasting of overburden and interburden;
- removing and relocating of overburden/interburden;
- extracting and handling coal using various pieces of machinery;
- coal crushing, stockpiling and rail load-out;
- gas emissions from mobile plant exhaust;
- wind erosion of stockpiles and areas of bare soil; and
- vehicle movement on unsealed roads (also partially wind generated).

11.5.2 Modelling Methodology

11.5.2.1 Dispersion Model

Relevant criteria for the MEP were entered into a The Air Pollution Model V3 (TAPM) program to predict ground-level concentrations or dry deposition of pollutants emitted from operations. This model was also used to develop the meteorology data set used in the modelling.

Specific criteria for air emission sources entered into the TAPM included the in-pit sources, the out-of pit sources and the Coal Handling and Preparation Plant (CHPP). All the sources were modelled as volume sources.

The in-pit dust sources were modelled as a volume source having a footprint of 1 km by 1 km and a height of 50 m above the natural surface, which takes into account dust emissions from the highest point of the MEP waste rock emplacements. This 50m height was applied to both in-pit and out-of-pit dumping cases.

The out-of-pit source was also modelled as a volume source having a footprint of 1.5 km by 1.5 km.

The CHPP, including wind erosion from stockpiles and the plant, was modelled as a volume source having a footprint of 0.6 km by 0.6 km and a height of 25 m above the natural surface.

11.5.2.2 Modelling Assumptions and Emissions Estimation

The emissions database for the model was based on the National Pollutant Inventory (NPI) *Emission Estimation Technique Manual for Mining Version 2.3 (NPI Emission Manual)*. The main mining activities and processes that produce, or could produce, dust emissions were identified for the MEP operations and throughput. Flowcharts for handling of overburden and coal were developed and an emission factor taken from the *NPI Emission Manual* was attributed to every handling point, handling activity and transport section. In addition, emissions for exposed surfaces were identified and included in the database.

All emission factor equations and default emission factors in the *NPI Emission Manual* are for uncontrolled emissions. However, the database used included the control effects from rainfall and from water trucks that are typically used at coal mines. In the MEP model, the emissions were calculated for every hour of the day for the two years of the modelling.

Rather than adopt a constant emission rate for all hours, the model uses a methodology that provides an emission rate from every operation, for each hour of the simulation period that includes the effects of dust emission controls due to rainfall and the operation of water trucks. In addition, the emissions from wind-generated dust have also been included, with control only provided by rainfall.

The combustion of diesel in mining machines will result in gaseous emissions of CO, NO_x and SO_2. Blasting also results in gaseous emissions. In practice, the sources of gaseous emissions are widely dispersed and have low levels of emission and a very localised impact. Thus the likelihood of exceeding environmental air quality goals beyond the mining lease boundary is minimal. As a consequence these diesel emissions were not included in the model.

11.6 MODELLING RESULTS

Modelled air quality concentrations at the most exposed existing off-site sensitive receptors have been compared with the appropriate ambient air quality standards including the *EPP (Air)*, the *Air NEPM* and DERM's guideline *Preparing an Environmental Management Overview Strategy (EMOS) for Non-standard Mining Projects*.

11.6.1 On-Site Dust Emissions

Modelling indicates the main dust sources comprise the in-pit crusher, excavator, unpaved roads, conveying and stockpiling ROM coal, placing and spreading overburden, loading trucks and loading trains.

Two potential impact cases have been addressed for the MEP.

- Case 1: the initial phase of the mine where overburden is placed out of the pit in External Waste Rock Emplacements (EWRE).
- Case 2: a fully developed mine with in-pit placement of overburden, where Internal Waste Rock Emplacements (IWRE) are used.

The modelling parameters for Case 1 and Case 2 are listed in **Table 11-3**.

Table 11-3 Modelling Parameters for Case 1 and Case 2

Item	Case 1 Parameters	Case 2 Parameters
Title.	Out-of-pit spoil dumping.	In pit spoil dumping.
Annual Product Coal (Mtpa)	7.5.	7.5.
In-pit operations.	Two 30 m^3 excavators on overburden. One 16 m^3 excavator on coal/waste parting. Nine 230 t rear dump trucks to EWRE. Four 140 t rear dump trucks to CHPP.	Two 45 m^3 electric rope shovel on overburden. One 30 m^3 excavators on overburden. One 16 m^3 excavator on coal/waste parting. Fourteen 230 t rear dump trucks to IWRE. Four 140 t rear dump trucks to CHPP.
Out-of-pit operations.	EWRE. Haul road.	Haul Road.
Plant.	Stockpiles.	Stockpiles.

The annual emission rates for the individual dust sources are contained in **Table 11-4**. The total annual emission rates for the combined dust sources including the pit retention factor are contained in **Table 11-5**.

Case 1 represents year 2015 as the highest production year where waste rock is still being placed out-of-pit, and therefore represents the worst case scenario for this stage of the operations. The current Millennium pit is still active and the Mavis Pit is producing coal with significant overburden removal. All the waste rock material is placed out of the pit onto an EWRE approximately 50 m above natural terrain.

Case 2 represents year 2019. The current Millennium Pit has ceased operations and the Mavis pit is providing the full production. All the overburden is returned to the previously extracted areas of the Mavis Pit. The year 2019 has the highest annual projected overburden removal for the Mavis Pit during the in-pit overburden placement, and therefore represents the worst case scenario for this stage of the operations.

Table 11-4 Dust Emissions for Main Dust Activities in Tonnes/Annum (excluding Pit retention factor)

Location	Activity	Emissions [t/a] for Dust Fraction and Year					
		Case 1 (2015)			Case 2 (2019)		
		$PM_{2.5}$	PM_{10}	TSP	$PM_{2.5}$	PM_{10}	TSP
Mavis Pit	Coal-Excavator	15.10	125.83	261.73	20.49	170.72	355.09
	OB*-Excavator	5.79	48.28	102.07	6.77	56.43	119.31
	OB-Loading in Pit	-	-	-	6.76	56.37	119.17
	OB-Dozer in Pit	-	-	-	4.20	35.01	148.78
	OB-Dump Truck Dumping	-	-	-	57.64	480.32	1340.43
	OB-Truck Movement	-	-	-	9.70	80.82	393.99
	Wind Erosion Pit Works	0.15	1.29	2.58	0.15	1.29	2.57
	Wind Erosion OB Dump	-	-	-	0.31	2.57	5.15
Millennium Pit	Coal-Excavator	4.27	35.57	73.99	-	-	-
	OB-Excavator	0.89	7.40	15.65	-	-	-
	OB-Truck Movement	0.43	3.59	17.52	-	-	-
	Wind Erosion Pit Works	0.15	1.29	2.58	-	-	-
Mavis EWRE	OB-Loading in Pit	5.79	48.22	101.95	-	-	-
	OB-Dozer in Pit	4.20	35.01	148.78	-	-	-
	Wind Erosion OB Dump	0.31	2.57	5.15	-	-	-
	OB-Dump Truck Dumping	49.31	410.92	1146.76	-	-	-
Millennium EWRE	OB-Loading in Pit	0.05	0.39	0.82	-	-	-
	OB-Dozer in Pit	4.20	35.01	148.78	-	-	-
	Wind Erosion OB Dump	0.31	2.57	5.15	-	-	-
	OB-Dump Truck Dumping	7.56	62.99	175.78	-	-	-
OB Haul Route	Mavis Haul Route	6.48	54.03	263.42	-	-	-
	Millennium Haul Route	3.17	26.43	128.86	-	-	-
CHPP	Coal-Truck Dumping	2.61	21.73	51.74	2.61	21.73	51.74
CHPP	Coal-Handling	0.00	0.02	0.04	0.00	0.02	0.04
CHPP	Coal-Wind Erosion	0.15	1.29	2.57	0.15	1.29	2.57
Coal Haul Route	Truck-Coal Haul	3.11	25.95	126.51	3.30	27.48	133.99

*OB: Overburden

Table 11-5 Dust Emissions for Main Dust Sources in Tonnes/Annum (including Pit Retention Factor)

Operation	Emission type	Case 1-Out-Of-Pit Dumping			Case 2-In Pit Dumping		
		$PM_{2.5}$	PM_{10}	TSP	$PM_{2.5}$	PM_{10}	TSP
In-pit sources combined	Coal and Overburden	25	212	452	101	839	2,360
Out-of-pit sources	Overburden	84	704	2,252	3	27	134
CHPP	Coal	3	23	54	3	23	54

11.6.2 Impacts on Sensitive Receptors

The calculated dust emissions for site activities were included in the TAPM model at the appropriate locations. The likely dust levels due to the operation of the mine at each nearby sensitive receptor have been determined and these are shown in **Table 11-6** for Case 1, the out-of-pit dumping case and **Table 11-7** for Case 2, the in-pit dumping case.

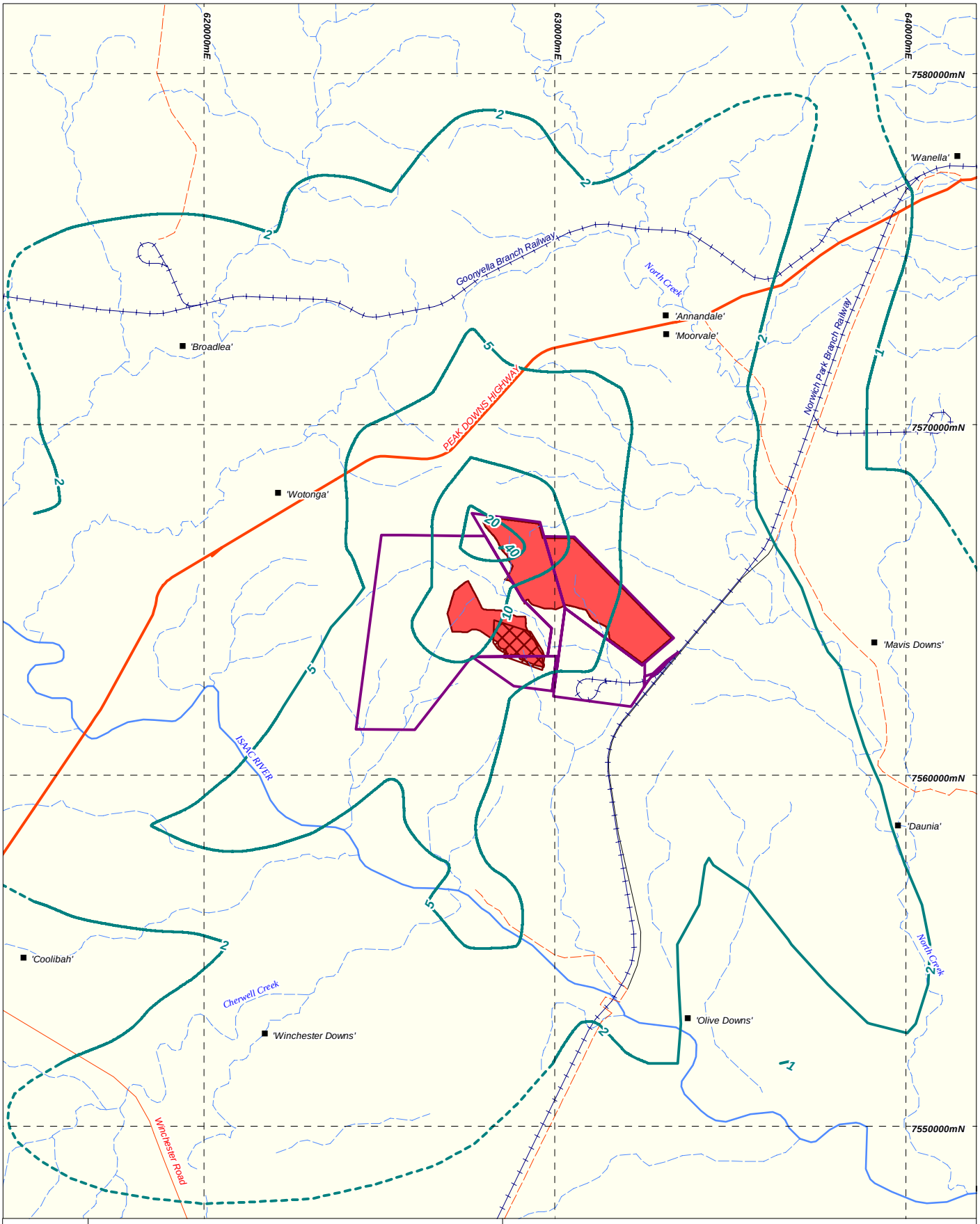
The calculated dust deposition and concentration contours are illustrated in **Figure 11-4** to **Figure 11-13**.

Table 11-6 Predicted Dust Concentration and Dust Deposition for Sensitive Receptors (Including Assumed Ambient Levels) – Case 1

Homestead	Calculated Dust Levels At Nearby Residences				
	$PM_{2.5}$ (24 hour) (Maximum) (µg/m³)	$PM_{2.5}$ (Annual Average) (µg/m³)	PM_{10} (24 hour) (5th Highest) (µg/m³)	TSP(Annual Average) (µg/m³)	Dust Deposition (Annual) (mg/m²/day)
Limit	25	8	50	90	120
Existing Ambient	*2*	*2*	*8*	*28*	*25*
Winchester Downs	5	2	16	30	28
Wotonga	6	2	26	34	35
Broadlea	6	2	24	32	31
Moorvale	3	2	13	29	27
Annandale	3	2	13	29	27

Table 11-7 Predicted Dust Concentration and Dust Deposition for Sensitive Receptors (including assumed ambient levels) – Case 2

Homestead	Calculated Dust Levels At Nearby Residences				
	$PM_{2.5}$ (24 hour) (Maximum) (µg/m³)	$PM_{2.5}$ (Annual Average) (µg/m³)	PM_{10} (24 hour) (5th Highest) (µg/m³)	TSP(Annual Average) (µg/m³)	Dust Deposition (Annual) (mg/m²/day)
Limit	25	8	50	90	120
Existing Ambient	*2*	*2*	*8*	*28*	*25*
Winchester Downs	4	2	18	30	28
Wotonga	6	2	27	33	31
Broadlea	5	2	23	31	30
Moorvale	4	2	16	29	27
Annandale	4	2	16	29	27



LEGEND

- Principal road
- Road (sealed)
- Road (unsealed)
- Railway
- River
- Watercourse
- Peabody tenement
- Existing Millennium Pit
- Proposed MEP mine
- Dust concentration contour in µg/m³
- Estimated continuation contour

MET SERVE

Peabody

Data Source:
Infrastructure, Tenement - Minserve. Topography (250k) - Geoscience Australia.
Air Quality - Noise Mapping Australia.

Peabody Energy Australia Pty Ltd

Millennium Expansion Project

Case 1 PM 2.5 24hr Maximum

0 3 6

Kilometres

Scale: 1:150,000 (A4)

18/10/2010

Datum: GDA94
Projection: MGA55

FIGURE 11-4

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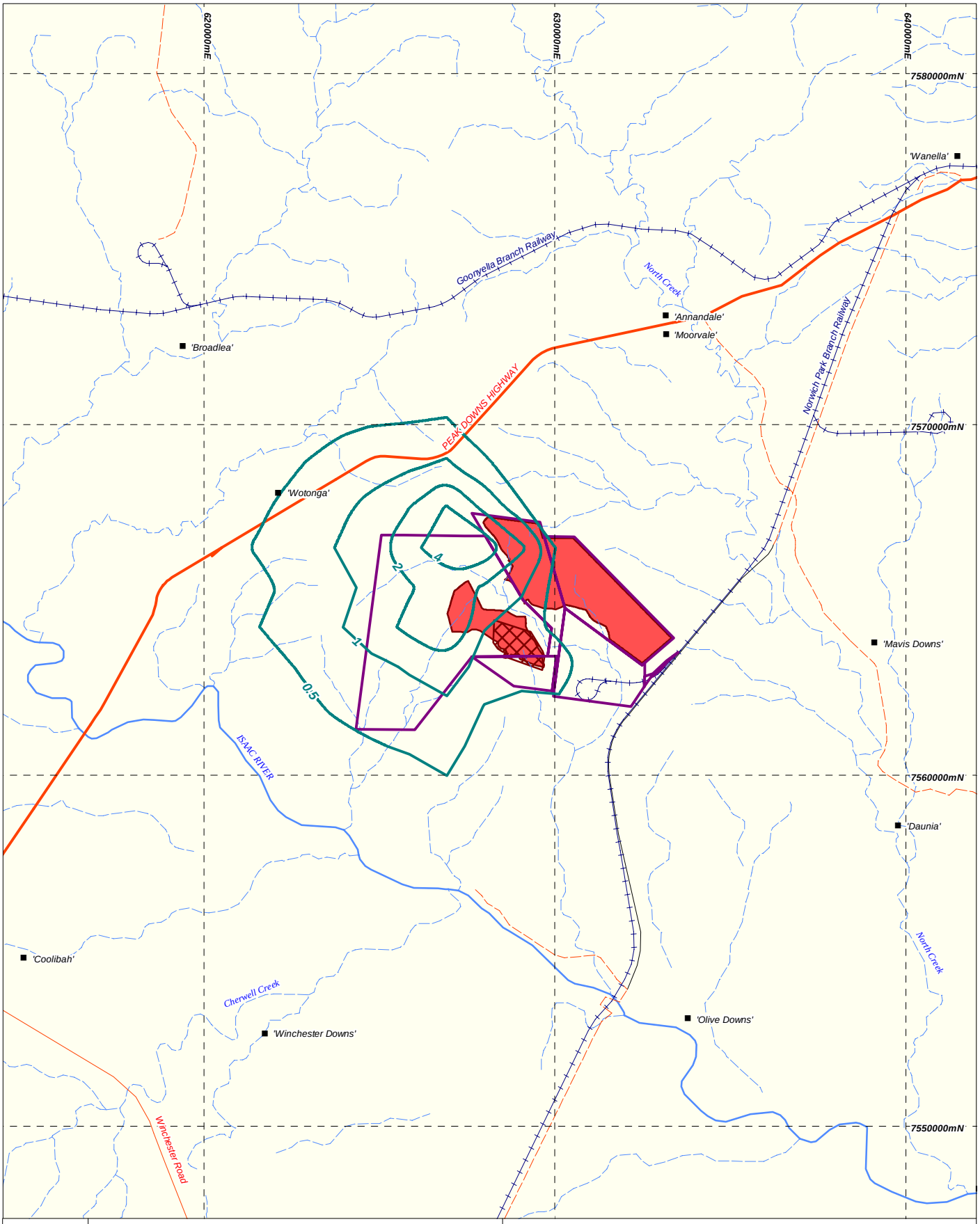

LEGEND

- Principal road
- Road (sealed)
- Road (unsealed)
- Railway
- River
- Watercourse
- Peabody tenement
- Existing Millennium Pit
- Proposed MEP mine
- Dust concentration contour in µg/m³

MET SERVE

Peabody

Data Source:
Infrastructure, Tenement - Minserve. Topography (250k) - Geoscience Australia.
Air Quality - Noise Mapping Australia.

Peabody Energy Australia Pty Ltd

Millennium Expansion Project

Case 1 PM 2.5 Annual Average

0 3 6

Kilometres

Scale: 1:150,000 (A4)

18/10/2010

Datum: GDA94
Projection: MGA55

FIGURE 11-5

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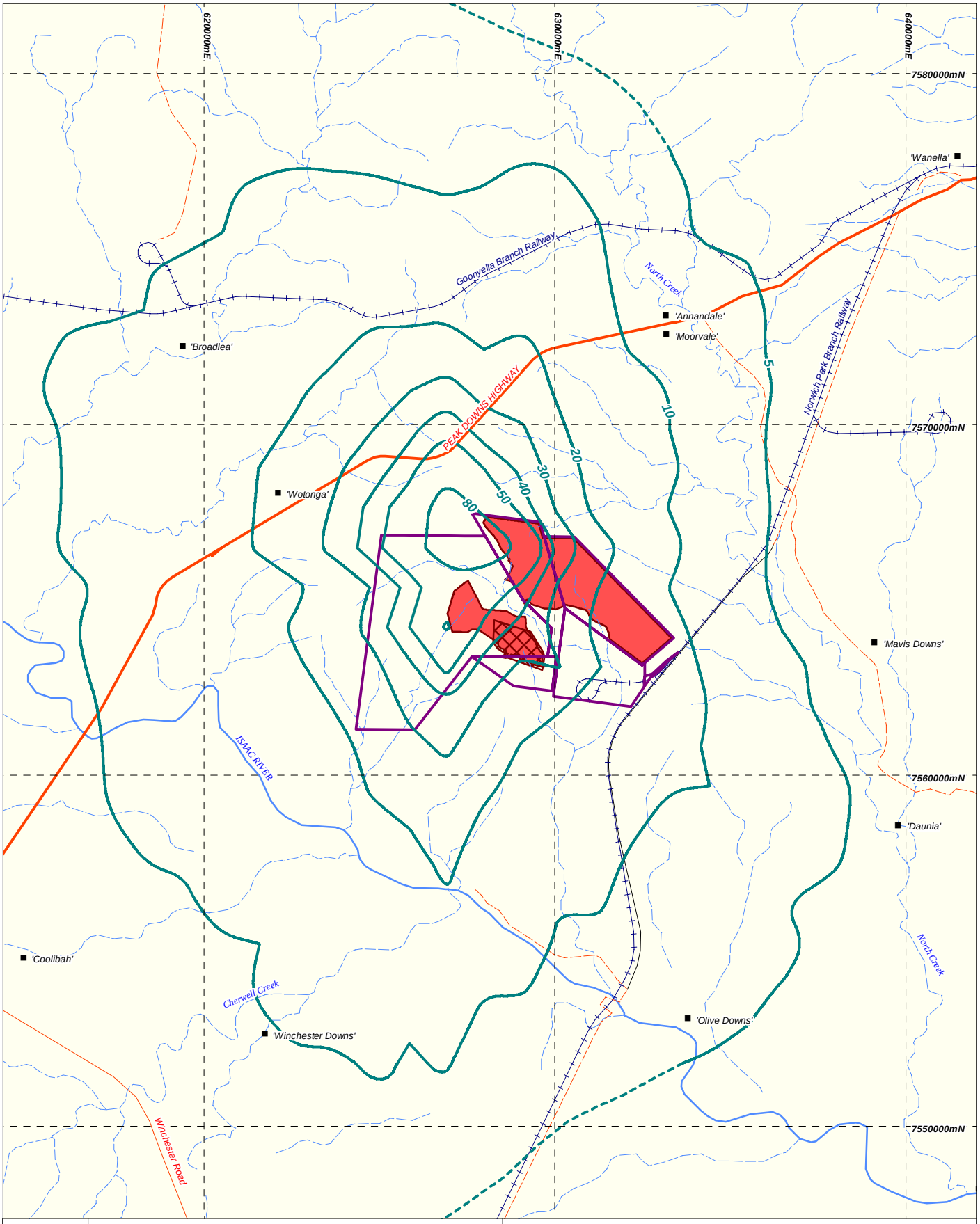

LEGEND

- Principal road
- Road (sealed)
- Road (unsealed)
- Railway
- River
- Watercourse
- Peabody tenement
- Existing Millennium Pit
- Proposed MEP mine
- Dust concentration contour in µg/m³
- Estimated continuation contour

MET SERVE

Peabody

Data Source:
Infrastructure, Tenement - Minserve. Topography (250k) - Geoscience Australia.
Air Quality - Noise Mapping Australia.

Peabody Energy Australia Pty Ltd

Millennium Expansion Project

Case 1 PM 10 5th Highest 24hr Average

0 3 6

Kilometres

Scale: 1:150,000 (A4)

18/10/2010

Datum: GDA94
Projection: MGA55

FIGURE 11-6

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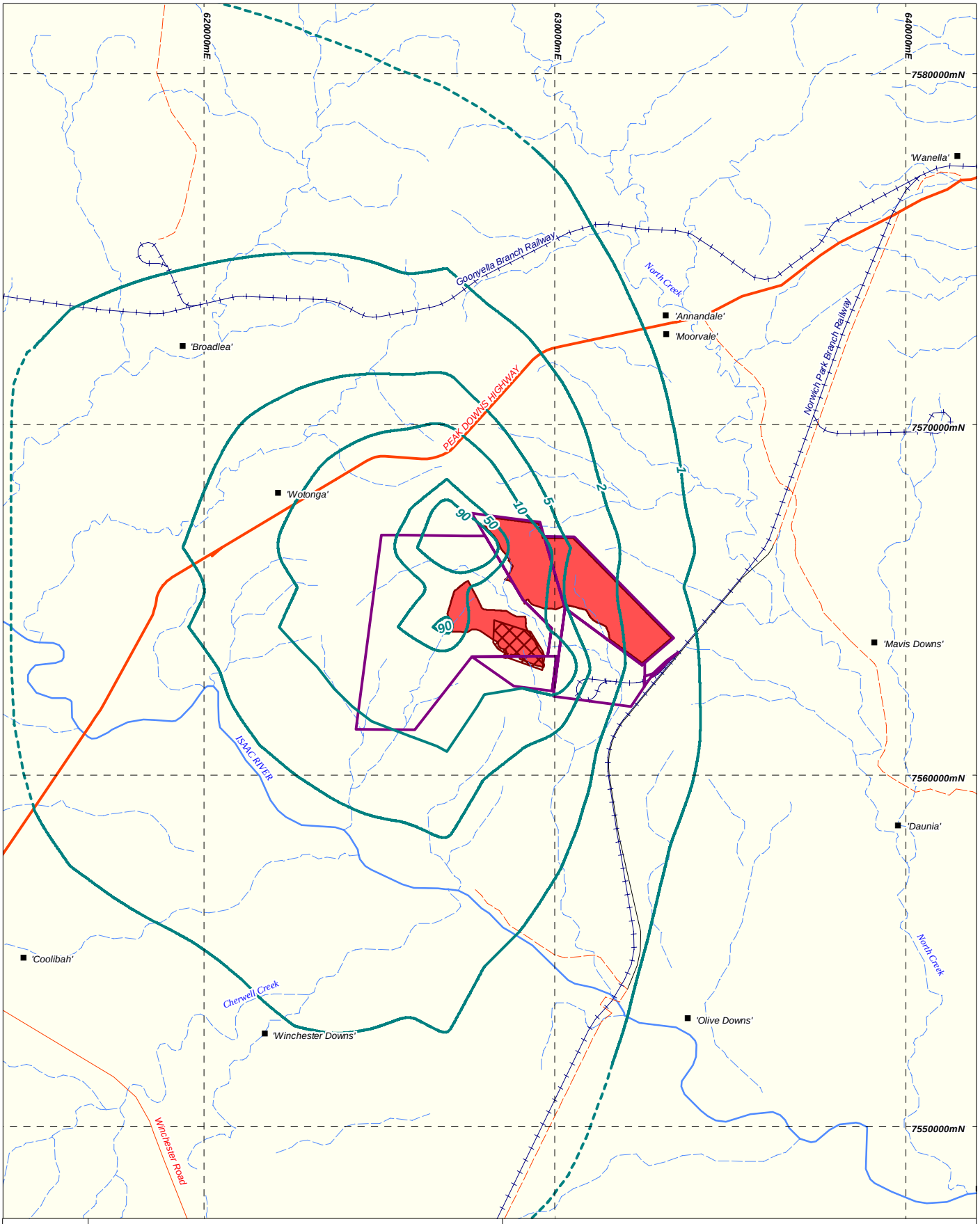


LEGEND

- Principal road
- Road (sealed)
- Road (unsealed)
- Railway
- River
- Watercourse
- Peabody tenement
- Existing Millennium Pit
- Proposed MEP mine
- Dust concentration contour in µg/m³
- Estimated continuation contour

MET SERVE

Peabody

Data Source:
Infrastructure, Tenement - Minserve. Topography (250k) - Geoscience Australia.
Air Quality - Noise Mapping Australia.

Peabody Energy Australia Pty Ltd

Millennium Expansion Project

Case 1 TSP Annual Average

0 3 6

Kilometres

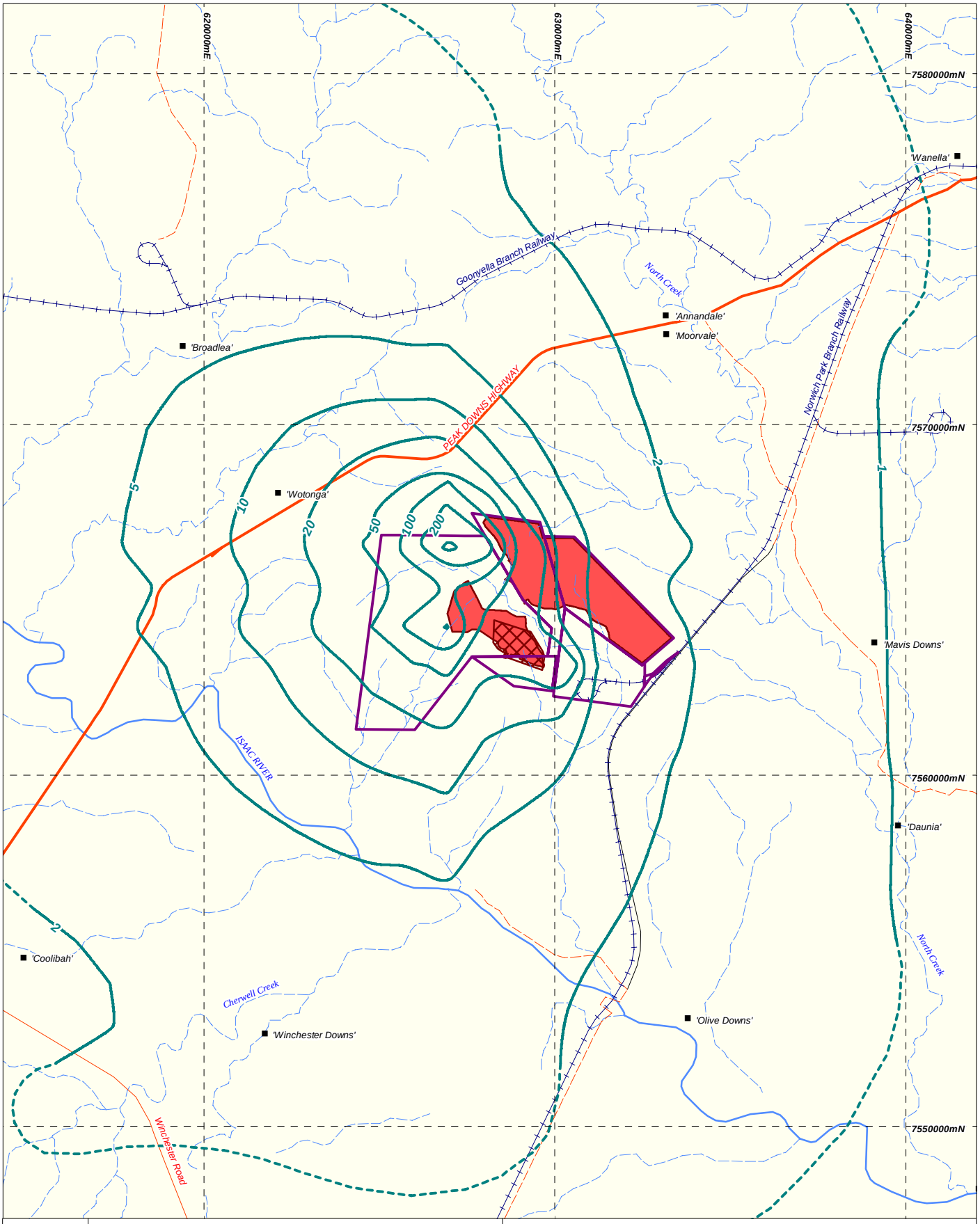
Scale: 1:150,000 (A4)

18/10/2010

Datum: GDA94
Projection: MGA55

FIGURE 11-7

S:\Projects\PE001 Millennium Coal EIS_MapInfo\Workspaces\PE001_M236A.wor



LEGEND

- Principal road
- Road (sealed)
- Road (unsealed)
- Railway
- River
- Watercourse
- Peabody tenement
- Existing Millennium Pit
- Proposed MEP mine
- Dust concentration contour in mg/m2/day
- Estimated continuation contour

MET SERVE

Peabody

Data Source:
Infrastructure, Tenement - Minserve. Topography (250k) - Geoscience Australia.
Air Quality - Noise Mapping Australia.

Peabody Energy Australia Pty Ltd

Millennium Expansion Project

Case 1 TSP Annual Average in mg/m2/day

0 3 6

Kilometres

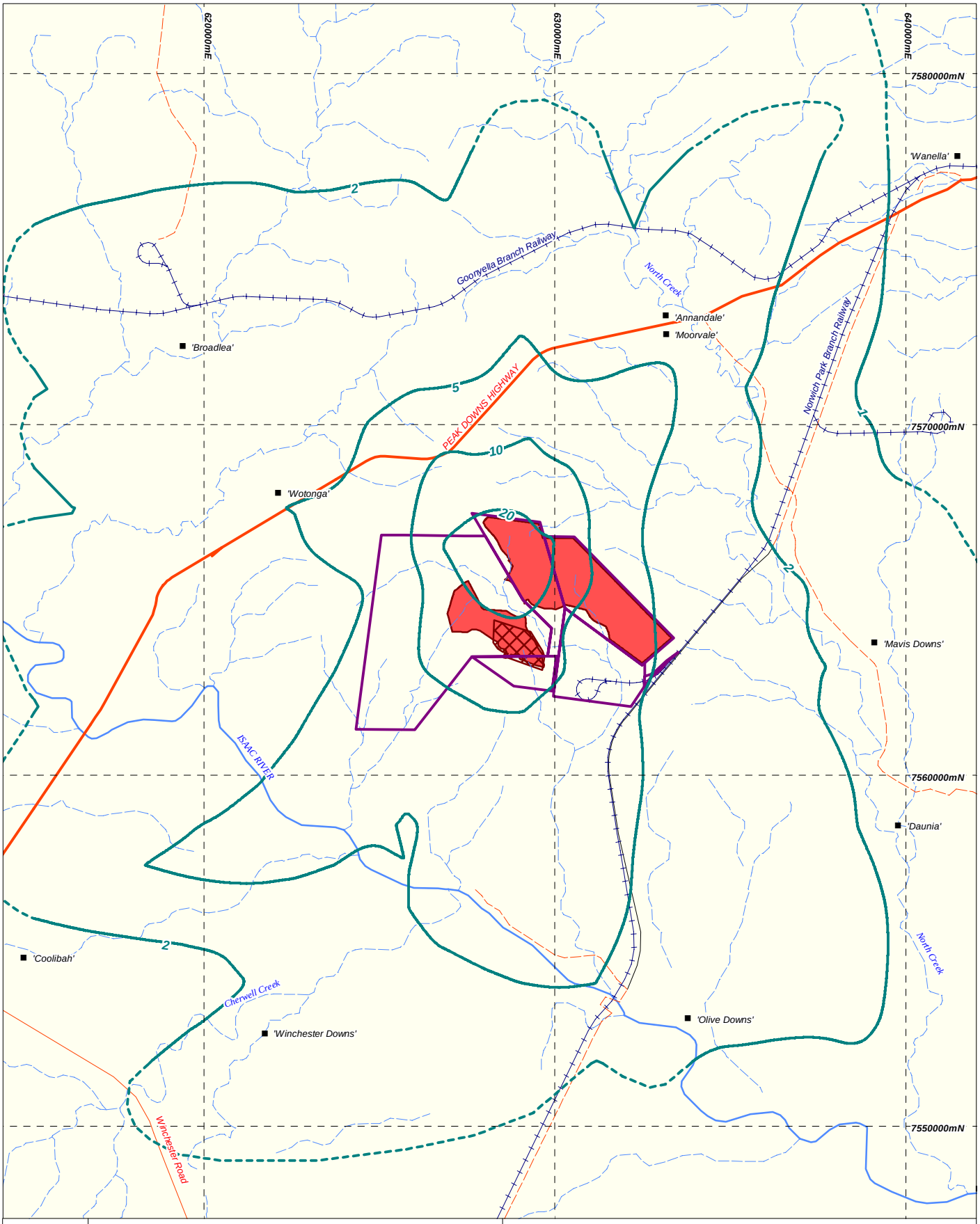
Scale: 1:150,000 (A4)

18/10/2010

Datum: GDA94
Projection: MGA55

FIGURE 11-8

S:\Projects\PE001 Millennium Coal EIS_MapInfo\Workspaces\PE001_M237A.wor



LEGEND

- Principal road
- Road (sealed)
- Road (unsealed)
- Railway
- River
- Watercourse
- Peabody tenement
- Existing Millennium Pit
- Proposed MEP mine
- Dust concentration contour in µg/m³
- Estimated continuation contour

MET SERVE

Peabody

Data Source:
Infrastructure, Tenement - Minserve. Topography (250k) - Geoscience Australia.
Air Quality - Noise Mapping Australia.

Peabody Energy Australia Pty Ltd

Millennium Expansion Project

Case 2 PM 2.5 24hr Maximum

0 3 6

Kilometres

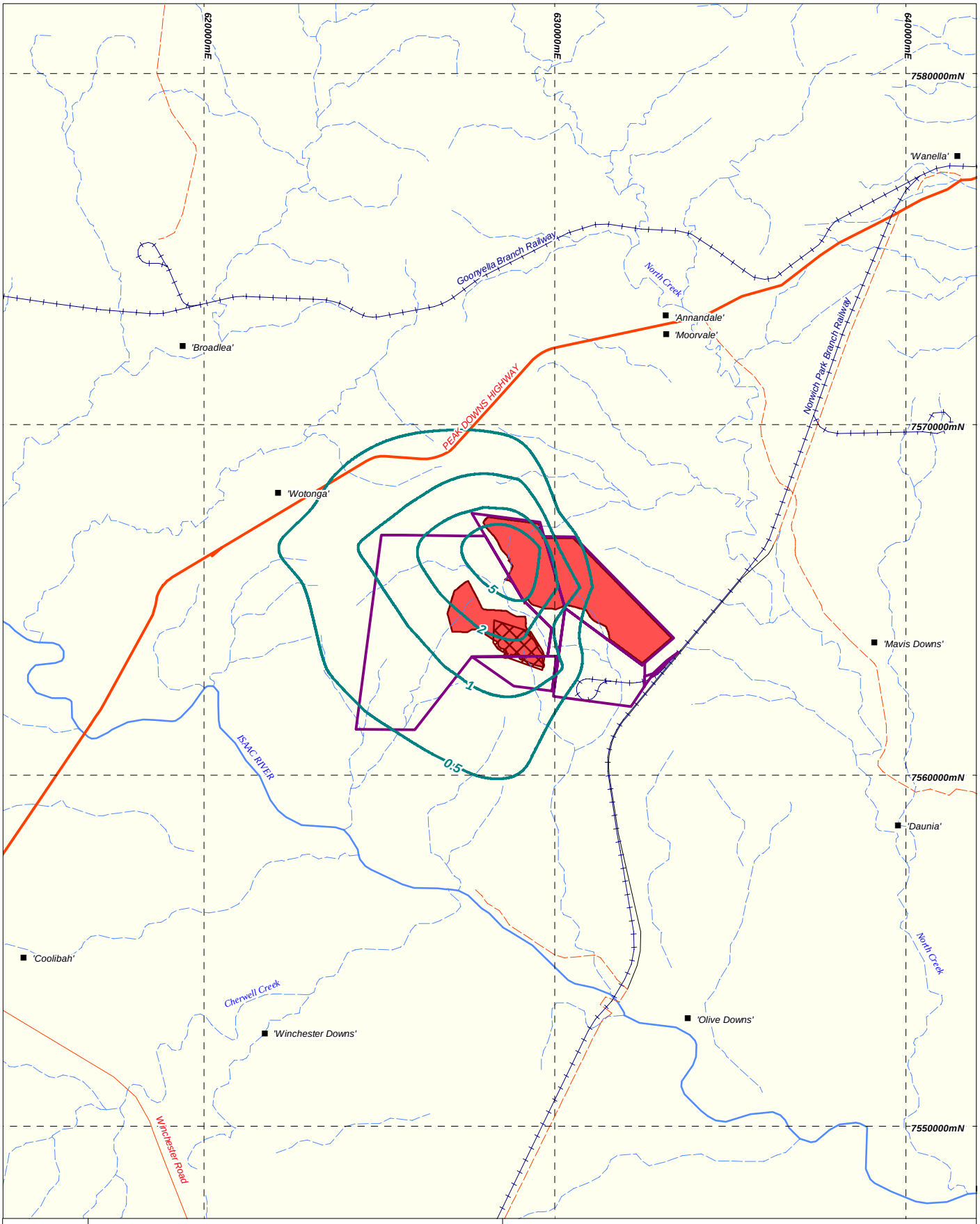
Scale: 1:150,000 (A4)

18/10/2010

Datum: GDA94
Projection: MGA55

FIGURE 11-9

S:\Projects\PE001 Millennium Coal EIS_MapInfo\Workspaces\PE001_M238A.wor



LEGEND

- Principal road
- Road (sealed)
- Road (unsealed)
- Railway
- River
- Watercourse
- Peabody tenement
- Existing Millennium Pit
- Proposed MEP mine
- Dust concentration contour in µg/m³

MET SERVE

Peabody

Data Source:
Infrastructure, Tenement - Minserve. Topography (250k) - Geoscience Australia.
Air Quality - Noise Mapping Australia.

Peabody Energy Australia Pty Ltd

Millennium Expansion Project

Case 2 PM 2.5 Annual Average

0 3 6

Kilometres

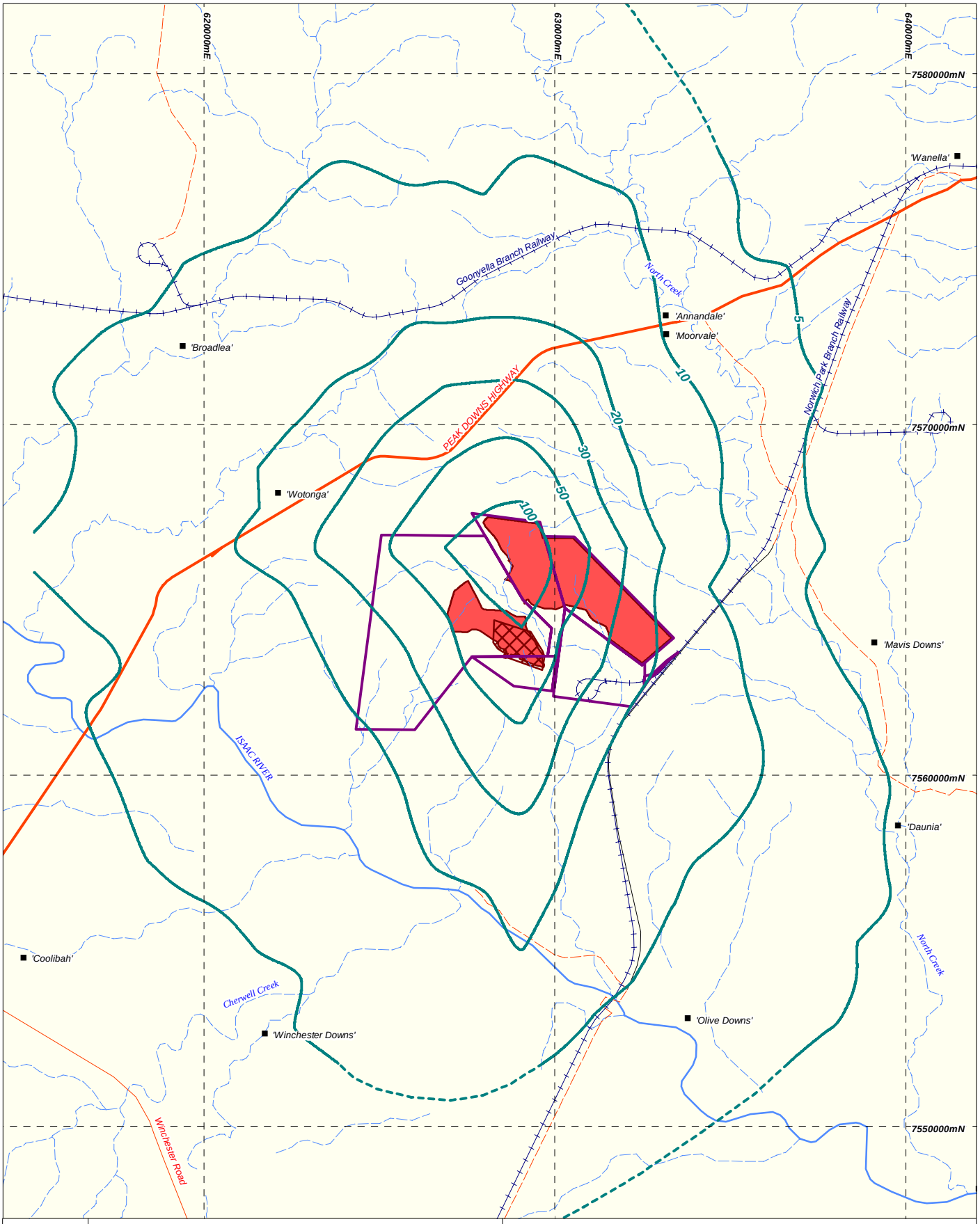
Scale: 1:150,000 (A4)

18/10/2010

Datum: GDA94
Projection: MGA55

FIGURE 11-10

S:\Projects\PE001 Millennium Coal EIS_MapInfo\Workspaces\PE001_M239A.wor



LEGEND

- Principal road
- Road (sealed)
- Road (unsealed)
- Railway
- River
- Watercourse
- Peabody tenement
- Existing Millennium Pit
- Proposed MEP mine
- Dust concentration contour in µg/m³
- Estimated continuation contour

MET SERVE

Peabody

Data Source:
Infrastructure, Tenement - Minserve. Topography (250k) - Geoscience Australia.
Air Quality - Noise Mapping Australia.

Peabody Energy Australia Pty Ltd

Millennium Expansion Project

Case 2 PM 10 5th Highest 24 hr Average

0 3 6

Kilometres

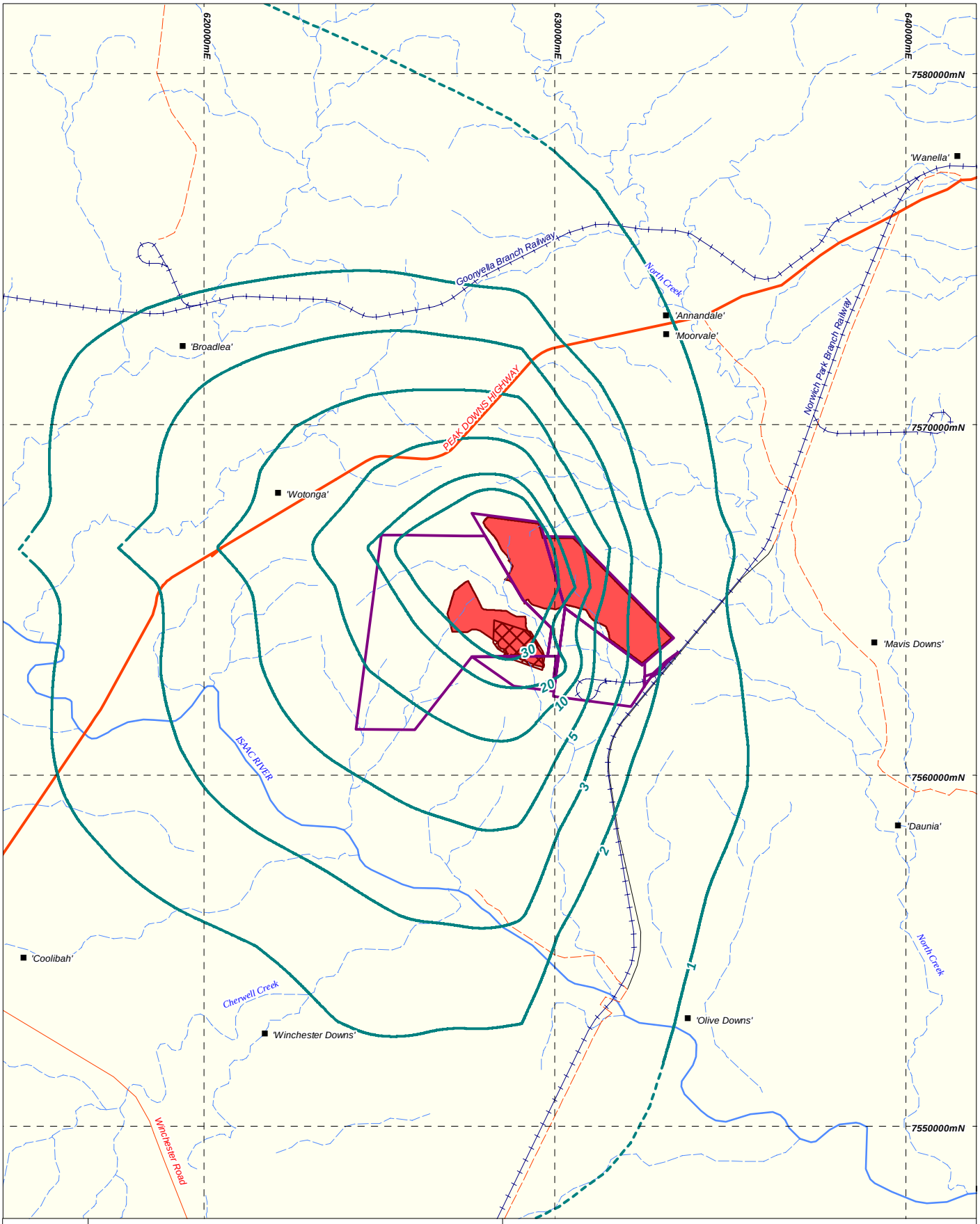
Scale: 1:150,000 (A4)

18/10/2010

Datum: GDA94
Projection: MGA55

FIGURE 11-11

S:\Projects\PE001 Millennium Coal EIS_MapInfo\Workspaces\PE001_M240A.wor



LEGEND

- Principal road
- Road (sealed)
- Road (unsealed)
- Railway
- River
- Watercourse
- Peabody tenement
- Existing Millennium Pit
- Proposed MEP mine
- Dust concentration contour in µg/m³
- Estimated continuation contour

MET SERVE

Peabody

Data Source:
Infrastructure, Tenement - Minserve. Topography (250k) - Geoscience Australia.
Air Quality - Noise Mapping Australia.

Peabody Energy Australia Pty Ltd

Millennium Expansion Project

Case 2 TSP Annual Average

0 3 6

Kilometres

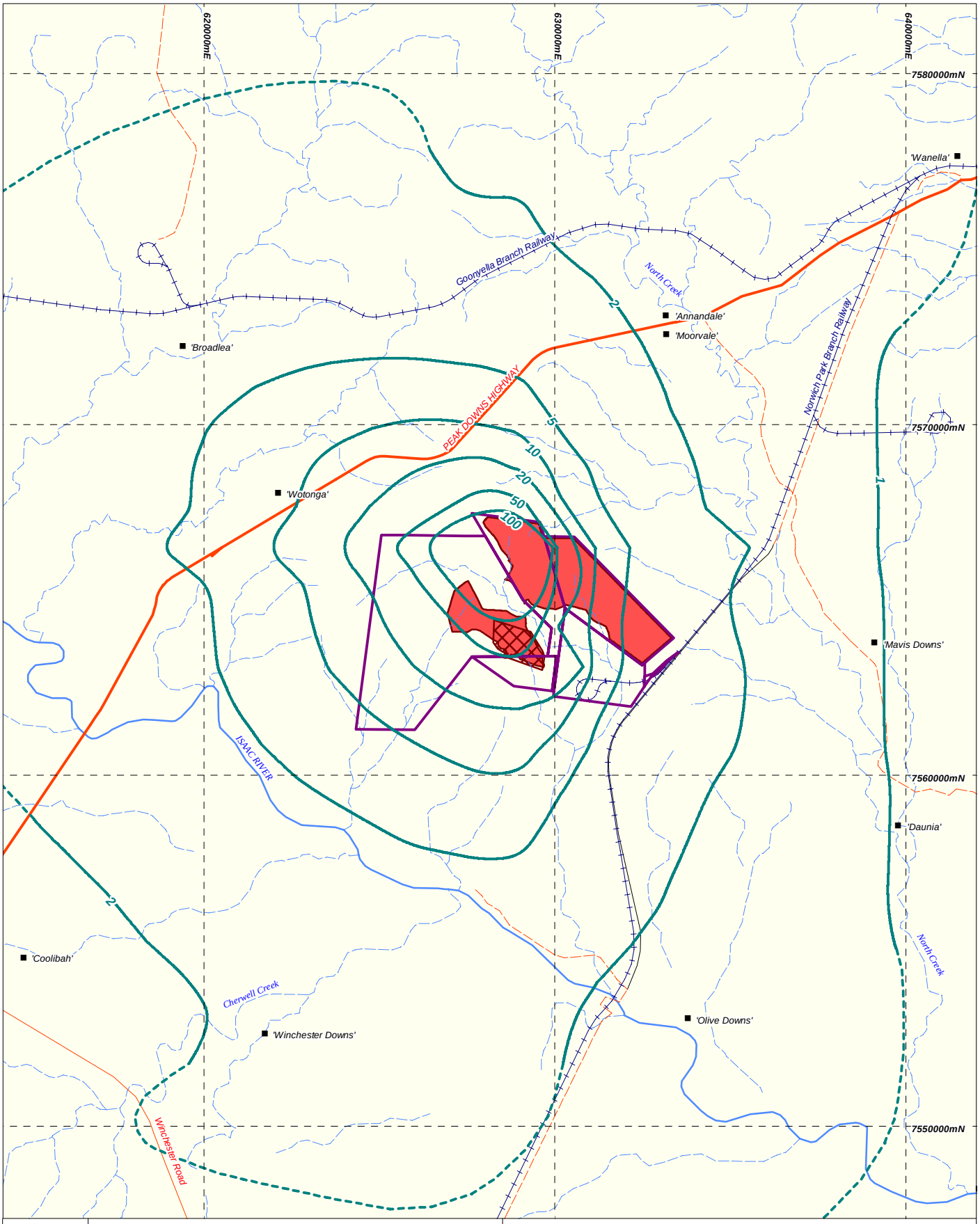
Scale: 1:150,000 (A4)

18/10/2010

Datum: GDA94
Projection: MGA55

FIGURE 11-12

S:\Projects\PE001 Millennium Coal EIS_MapInfo\Workspaces\PE001_M241A.wor



LEGEND

- Principal road
- Road (sealed)
- Road (unsealed)
- Railway
- River
- Watercourse
- Peabody tenement
- Existing Millennium Pit
- Proposed MEP mine
- Dust concentration contour in mg/m2/day
- Estimated continuation contour

MET SERVE

Peabody

Data Source:
Infrastructure, Tenement - Minserve. Topography (250k) - Geoscience Australia.
Air Quality - Noise Mapping Australia.

Peabody Energy Australia Pty Ltd

Millennium Expansion Project

Case 2 TSP Annual Average in mg/m2/day

0 3 6

Kilometres

Scale: 1:150,000 (A4)

18/10/2010

Datum: GDA94
Projection: MGA55

FIGURE 11-13

S:\Projects\PE001 Millennium Coal EIS_MapInfo\Workspaces\PE001_M242A.wor

11.7 IMPACT ASSESSMENT

The predicted average ground level concentrations at nearby sensitive areas have been modelled by including both normal and expected maximum emission conditions and the worst case meteorological conditions. All the dust modelling figures show the effects of the prevailing easterly wind, with the highest levels recorded to the west of the MEP. These effects are mitigated to some extent by the mesa landform to the west of the MEP.

The averaging period for ground level concentrations of contaminants are consistent with the relevant averaging periods for air quality indicators and goals in the *EPP (Air)* and *Air NEPM*.

11.7.1 Case 1–Out-of-Pit Dumping until 2015

The out-of-pit dumping case is a short-term scenario to allow mining operations to commence in the new Mavis pit for the MEP, and progress far enough to allow in pit dumping to commence.

Out-of-pit dumping readily complies with the recommended dust limits at all sensitive receptors, however some increase in nuisance dust levels is shown in the modelled figures for the Wotonga and Broadlea homesteads, that are both to the west of the MEP. Homesteads located to the east of the MEP, such as Annandale and Moorvale, show even less of an impact and only for the 24 hour maximum emission cases.

The nuisance dust deposition levels for Broadlea and Wotonga Homesteads may increase by up to 20% on rare occasions, but this is under a worst-case scenario for both out-of-pit dump height and meteorological conditions. For the majority of times any increase in nuisance dust levels is likely to be undetectable. For Annandale, Moorvale and Mavis Downs Homesteads to the east, the increase in dust deposition rates is even lower and is not likely to be detectable by people in the area.

It should be noted that modelling results have been undertaken without taking into account proposed mitigation measures such as the use of water trucks or any other dust control measures. Even without the proposed controls and for the worst case scenarios, dust levels are still well below all recommended guidelines for both health and environmental dust levels, and are significantly less than the peak dust levels that were recorded from normal operations around the properties themselves, such as driving on dirt roads.

The township of Moranbah, at 22 km away, is well outside the range of any dust deposition from the MEP operations.

11.7.2 Case 2–In-Pit Dumping from 2015 until Mine Closure

The in-pit dumping case is the proposed standard operating condition for the mine, once mining has advanced far enough to allow in-pit dumping to commence.

In-pit dumping produces lower dust emissions than the out-of-pit scenario that was modelled in Case 1, as shown by comparing **Figure 11-4** to **Figure 11-8** with **Figure 11-9** to **Figure 11-13**. This is due to shorter haul routes and the protection that in-pit dumping provides. While a slight increase in dust deposition levels at the closest sensitive receptors is still detectable, it is noticeably less than that recorded for Case 1. Once again the Wotonga and Broadlea homesteads show the most potential impact with the dust deposition rate increasing by up to 10% for the worst case scenarios. Given the low base levels that this increase is relating to, an increase of 10% is extremely low and unlikely to be detectable by residents of the area. Homesteads to the east are even less affected and are unlikely to notice a difference in dust levels from the existing conditions.

Once again, it should be noted that modelling results have been undertaken without taking into account proposed mitigation measures such as the use of water trucks or any other dust control measures. Similarly to Case 1, even with the proposed controls and for the worst case scenarios, dust levels are well below all recommended guidelines for both health and environmental dust levels, and are significantly less than the peak dust levels that were recorded from normal operations around the properties themselves, such as driving on dirt roads.

The township of Moranbah, at 22 km away, is well outside the range of any dust deposition from the MEP operations.

11.8 MITIGATION MEASURES

Although the modelling has shown a very low impact, the mine will implement dust minimisation strategies particularly during easterly winds.

Table 11-8 provides a summary of control procedures to mitigate dust emissions.

Table 11-8 Dust Mitigation Measures

Source	Mitigation Measure
Mining Areas	Disturb the minimum area necessary for mining and rehabilitate promptly Spoil will be removed as soon as practicable after blasting in order to limit the drying time where practicable Avoid topsoil stripping and replacement on days when the wind speed is sufficient to carry visible dust beyond the ML boundary where practicable
Coal Handling Area	Use water sprays and water trucks to keep handling areas moist Provide dust suppression sprays at coal transfer points in the Coal Handling Facilities (CHF) that produce dust (e.g. dump hopper, conveyor)
Stockpile	Maintain water sprays on coal stockpile and transfer points
Haul Roads	Maintain haul roads in good condition and regularly use water truck Investigate the use of approved chemical dust suppressants if haul roads become too slippery from water use
Other Roads	Keep the number of roads to a minimum and maintain those required in good condition, including regular use of water truck Once a road is no longer in use, barricade and revegetate
Overburden Placement	Keep these areas moist, particularly areas used by dump trucks Place dry material low on overburden dump and damp material in the elevated areas of the overburden dump
General	Vehicular access within the site will be strictly limited to authorised vehicles and designated routes, i.e. bitumen and major haul/access roads The internal speed on unsealed roads will be limited to 80 km/h Dump truck routes will be kept as short as practicable

11.9 GREENHOUSE GAS EMISSIONS

Peabody is committed to minimising its GHG emissions. Peabody voluntarily joined the Greenhouse Challenge Plus when it commenced and has complied with all requirements of the recently introduced *NGER Act* by producing and submitting annual reports of GHG emissions.

Peabody's objectives are to reduce the GHG emissions of its operations, accelerate the uptake of energy efficiency options, integrate greenhouse issues into business decision-making and provide more consistent reporting of GHG emission levels. Peabody is successfully reducing its emissions, particularly at major projects such as Wilkie Creek Coal Mine and North Goonyella Mine.

11.9.1 MEP Greenhouse Gas Emissions Predictions

The MEP is proposed to commence mining in 2011-2012, mining approximately two million tonnes ROM coal in the first year. The production rate will be ramped up in the following years to a maximum of 5.5 million tonnes ROM coal by 2015. Tonnages will then remain relatively constant until 2027.

The scope that emissions are reported under is determined by whether the activity is within the MEP boundary or outside it.

Under the *NGER Act*:

- Scope 1 emissions are direct or point-source emissions originating from specific units of activity. Factors applied to those result in the kilograms of carbon dioxide equivalent ($CO_{2\text{-}e}$) emitted per unit of activity at the point of emission release (i.e. fuel use, energy use, manufacturing process activity, mining activity, on-site waste disposal).
- Scope 2 emissions are indirect emissions originating from the generation of the electricity purchased and consumed by an organisation as kilograms of $CO_{2\text{-}e}$ per unit of electricity consumed. Scope 2 emissions are physically produced by the burning of fuels (coal, natural gas, etc.) at the power station.
- Scope 3 emissions are indirect emissions that are attributable to the consequence of an organisation's activities but are not owned or controlled by the organisation such as the transport and combustion of the extracted coal.

Given that the CHPP is outside the MEP area and is already utilised and reported on for GHG emissions, that electricity usage is not incorporated into this report. Therefore, the principal sources of Scope 1 greenhouse gas emissions for the MEP are:

- the consumption of diesel by the mining fleet;
- methane emissions (fugitive) from coal; and
- burning of cleared vegetation.

Based on the regulated guidelines and standard assumptions contained within them, the projected emissions over the life of the MEP have been estimated and results are contained in **Table 11-9** for Scope 1 emissions and **Table 11-10** for Scope 2 and 3 emissions. It should be noted there are no Scope 2 emissions significant enough to be reported given the CHPP is not a part of this impact assessment process.

The electricity and diesel consumption figures used for the MEP have been estimated based on the actual reporting figures for the current Millennium Mine. It is therefore assumed that:

- diesel consumption is 0.45 l/tonne of ROM or overburden moved;
- ANFO consumption is 200 tonnes/million tonnes of overburden; and
- electricity consumption by Queensland Rail (QR) is approximately 11,500 kWh per return journey per 10,000 tonnes of coal between the site and the port.

Table 11-9 Greenhouse Gas Emissions for Life of Mine (Scope 1 Emissions)

Year	Source Data					Greenhouse Gas Emissions (tonnes *10³ CO_{2-e})				
	Coal ROM	Overburden	ANFO	Diesel for Machinery	Cleared and Burnt	Scope 1 Emissions				
	M tonnes	M tonnes	k tonnes	kL	ha	Coal ROM	Diesel	ANFO	Clearing Woodland	Total
2010	2.0	55	6	25,824	33	34	70	0.009	0.006	***104***
2011	3.8	112	11	52,117	90	65	141	0.019	0.016	***205***
2012	4.0	113	11	52,592	75	68	142	0.019	0.014	***210***
2013	5.2	110	11	51,631	65	88	139	0.018	0.012	***228***
2014	5.2	109	11	51,434	69	88	139	0.018	0.012	***227***
2015	5.2	111	11	52,185	71	88	141	0.018	0.013	***229***
2016	5.5	110	11	51,862	78	93	140	0.018	0.014	***234***
2017	5.5	109	11	51,552	66	93	139	0.018	0.012	***233***
2018	5.5	110	11	51,904	47	93	140	0.018	0.008	***234***
2019	5.5	112	11	52,995	47	93	143	0.019	0.008	***237***
2020	5.5	102	10	48,285	42	93	130	0.017	0.008	***224***
2021	5.5	108	11	50,976	53	94	138	0.018	0.010	***231***
2022	5.5	104	10	49,184	60	93	133	0.017	0.011	***226***
2023	5.5	105	10	49,652	51	93	134	0.018	0.009	***228***
2024	5.5	111	11	52,600	54	93	142	0.019	0.010	***236***
2025	5.5	76	8	36,552	116	94	99	0.013	0	***192***
2026	5.5	35	3	18,010	0	93	49	0.006	0	***142***
2027	0.1	0	0	0	0	2	0	0	0	***2***
Total	**86**	**1690**	**169**	**799,354**	**899**	**1,462**	**2,158**	**0.282**	**0.162**	***3,621***

Table 11-10 Greenhouse Gas Emissions for Life of Mine (Scope 2 and 3 Emissions)

Year	Source Data				Greenhouse Gas Emissions (tonnes * 10^3 CO_{2-e})			
	Coal ROM	Overburden	Diesel for Machinery	Train trips	Scope 2 Emissions	Scope 3 Emissions		
	M tonnes	M tonnes	kL		Total Scope 2	Diesel	Electricity QR	Total Scope 3
2010	2.0	55	25,824	20	0	5	0.23	**5.5**
2011	3.8	112	52,117	38	0	11	0.44	**11.1**
2012	4.0	113	52,592	40	0	11	0.47	**11.2**
2013	5.2	110	51,631	52	0	11	0.61	**11.2**
2014	5.2	109	51,434	52	0	11	0.61	**11.1**
2015	5.2	111	52,185	52	0	11	0.61	**11.3**
2016	5.5	110	51,862	55	0	11	0.64	**11.3**
2017	5.5	109	51,552	55	0	11	0.64	**11.2**
2018	5.5	110	51,904	55	0	11	0.64	**11.3**
2019	5.5	112	52,995	55	0	11	0.64	**11.5**
2020	5.5	102	48,285	55	0	10	0.64	**10.5**
2021	5.5	108	50,976	55	0	10	0.64	**11.1**
2022	5.5	104	49,184	55	0	10	0.64	**11.7**
2023	5.5	105	49,652	55	0	10	0.64	**10.8**
2024	5.5	111	52,600	55	0	11	0.64	**11.4**
2025	5.5	76	36,552	55	0	7	0.64	**8.1**
2026	5.5	35	18,010	55	0	4	0.64	**4.3**
2027	0.1	0	0	1	0	0	0.01	**0.01**
Total	**86**	**1,690**	**799,354**		**0**	**164**	**10.01**	**175.5**

11.9.2 Greenhouse Gas Mitigation Measures

Direct means of reducing GHG emissions include such measures as:

- minimising clearing at the site, thereby maximising carbon storage in vegetation;
- integrating transport for the MEP with other local industries in order to limit emissions generated by transport, thereby minimising fuel usage and the associated GHG emissions;
- maximising the use of renewable energy sources to minimise emissions from burning of fossil fuels for electricity; and
- improving accuracy in GHG measurement by advancing from default factors to direct measurement methodologies, thereby allowing more accurate management and control of GHG emissions.

Other matters that will be assessed for the MEP include the sizing and selection of mobile diesel powered equipment. Fuel consumption rates are an integral part of the Peabody decision matrix for the selection of equipment, for both economic and environmental reasons.

Indirect means of reducing greenhouse gas emissions include such measures as:

- carbon sequestration at nearby or remote locations by:
  - progressive rehabilitation of disturbed areas; and

  - revegetation of selected areas in order to achieve greater biomass than that cleared for the MEP; and
- carbon trading through recognised markets.

Specific GHG abatement measures are proposed in **Chapter 20-Draft Environmental Management Plan**, that will include:

- commitments to the abatement of GHG emissions from the MEP with details of the intended objectives, measures and performance standards to avoid, minimise and control emissions;
- commitments to energy management, including undertaking periodic energy audits with a view to progressively improving energy efficiency;
- a process for regular review of new technologies to identify opportunities to reduce emissions and use energy efficiently, consistent with best practice environmental management;
- any voluntary initiatives such as projects undertaken as a component of the national *Energy Efficiency Opportunities* program, or research into reducing the lifecycle, embodied energy and carbon intensity of the EEP's processes or products;
- opportunities for offsetting GHG emissions, including, if appropriate, carbon sequestration and renewable energy uses; and
- commitments to monitor, audit and report on greenhouse emissions from all relevant activities and the success of offset measures.

11.9.3 Climate Change Adaptation

The Garnaut Climate Change Review (Garnaut, 2008) states: 'Effects of future warming on rainfall patterns are difficult to predict because of interactions with complex regional climate systems. Best-estimate projections show considerable drying in southern Australia, with risk of much greater drying. The mainstream Australian science estimates that there may be a 10 per cent chance of a small increase in average rainfall, accompanied by much higher temperatures and greater variability in weather patterns.'

The life of the MEP is 16 years and the likely changes over this time will be gradual and relatively minor. A small increase in average rainfall will have the effect of reducing dust emissions from the MEP, while an increase in temperatures and higher evaporation rates will increase such emissions. As both a slight positive and slight negative impact is predicted, the best estimate at the moment is that climate change is unlikely to have any discernible impact on the air quality in the vicinity of the MEP.

Peabody commits to undertake, where practicable, a cooperative approach with Government, and other industry and sectors, to address the issue of adaptation to climate change. Peabody is committed to reducing its GHG emissions and is an active contributor to research programs to develop clean coal technologies, including supporting the Coal 21 program, a whole of coal industry funding approach to support GHG abatement.

11.10 CUMULATIVE IMPACTS

The cumulative impacts from the MEP on air quality is anticipated to be minimal. Dust deposition levels are predicted to be within 10% of ambient levels within 5 km of the mine and almost undetectable at greater than 10 km from the mine. It is not anticipated that this development will adversely impact on the air shed and, as a consequence, affect other developments or competing uses.

The separation distance between the MEP and neighbouring sensitive receptors is a minimum of approximately 8 km, which is deemed adequate to protect against any 'worst case' emissions that may occur during operations. The modelling procedure used for the MEP accounts for worst-case emissions by placing emission sources in the position likely to lead to the highest dust levels in the local area and by modelling without accounting for watering or other forms of dust control.

The human health risks associated with the air emissions from the MEP are all well within acceptable levels. All emissions are described by limits from either the *Air NEPM* or the *EPP (Air).*

Given the MEP is an extension of an existing operation that already reports its GHG emissions in compliance with the *NGER Act* and other requirements, the small incremental increase resulting from the MEP does not represent a significant increase in total GHG emissions.

The cumulative impacts to the region are addressed by including existing ambient conditions such that any impact from the MEP is modelled in addition to the impacts that are already produced by other projects, so a cumulative figure of air quality impact is determined and assessed against.

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