Table 4B.31
Predicted $L_{eq(15\text{-}minute)}$ Operational Noise Levels (Scenario 2a)

Location		Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Criterion dB(A)	Maximum Differential dB(A)*
		Lapse (calm)	Inversion (^{0}C/100m) 2	4	6	SE wind (3m/s)		
Scenario 2a								
R1	"Bow Hills"	29	35	≤35*	**37***	27	35	**+2***
R2	"Ardmona"	25	31	33	35	20	35	0
R3	"Naroo"	29	35	≤35*	**37***	25	35	**+2***
R4	"Oakleigh"	22	30	32	34	<20	35	-1
R5	"Pineview"	<20	27	29	31	<20	35	-4
R6	"Matilda"	<20	28	30	32	<20	35	-3
R7	"Haylin View"	20	30	32	34	<20	35	-1
R10	"Merrilong"	<20	26	27	30	<20	35	-5
R11	"Kurrajong"	23	32	35	≤35*	23	35	0*
R13	"Newhaven"	29	34	35	≤35*	35	35	0*
R15	"Greylands"	31	≤35*	<35*	≤35*	**37**	35	**+2***
R16	"Belah Park"	26	34	35	≤35*	31	35	0*
R17	"Bungaree"	24	30	32	33	29	35	-2
R18	"Merulana"	21	27	30	31	27	35	-4
Scenario 2b								
R1	"Bow Hills"	30	36	≤35*	**37***	27	35	**+2**
R2	"Ardmona"	25	31	34	35	20	35	0
R3	"Naroo"	30	35	≤35*	**37***	25	35	**+2**
R4	"Oakleigh"	23	30	33	35	20	35	0
R5	"Pineview"	<20	27	29	32	<20	35	-3
R6	"Matilda"	<20	28	30	33	<20	35	-2
R7	"Haylin View"	20	30	32	34	<20	35	-1
R10	"Merrilong"	<20	26	28	31	<20	35	-5
R11	"Kurrajong"	26	34	35	<35*	24	35	0
R13	"Newhaven"	30	34	35	<35*	35	35	0
R15	"Greylands"	35	≤35*	<35*	≤35*	**40**	35	**+5**
R16	"Belah Park"	34	≤35*	<35*	≤35*	35	35	0
R17	"Bungaree"	25	30	33	34	29	35	-1
R18	"Merulana"	22	28	31	33	28	35	-2

Note: **Bold** = Exceedance of criterion
Note *: Incorporates the proposed noise mitigation measures of Section 4B.7.4
Source: Modified after Spectrum Acoustics (2009) – Tables 8 and 9 (after incorporation of the noise mitigation measures of Section 4B.7.4)

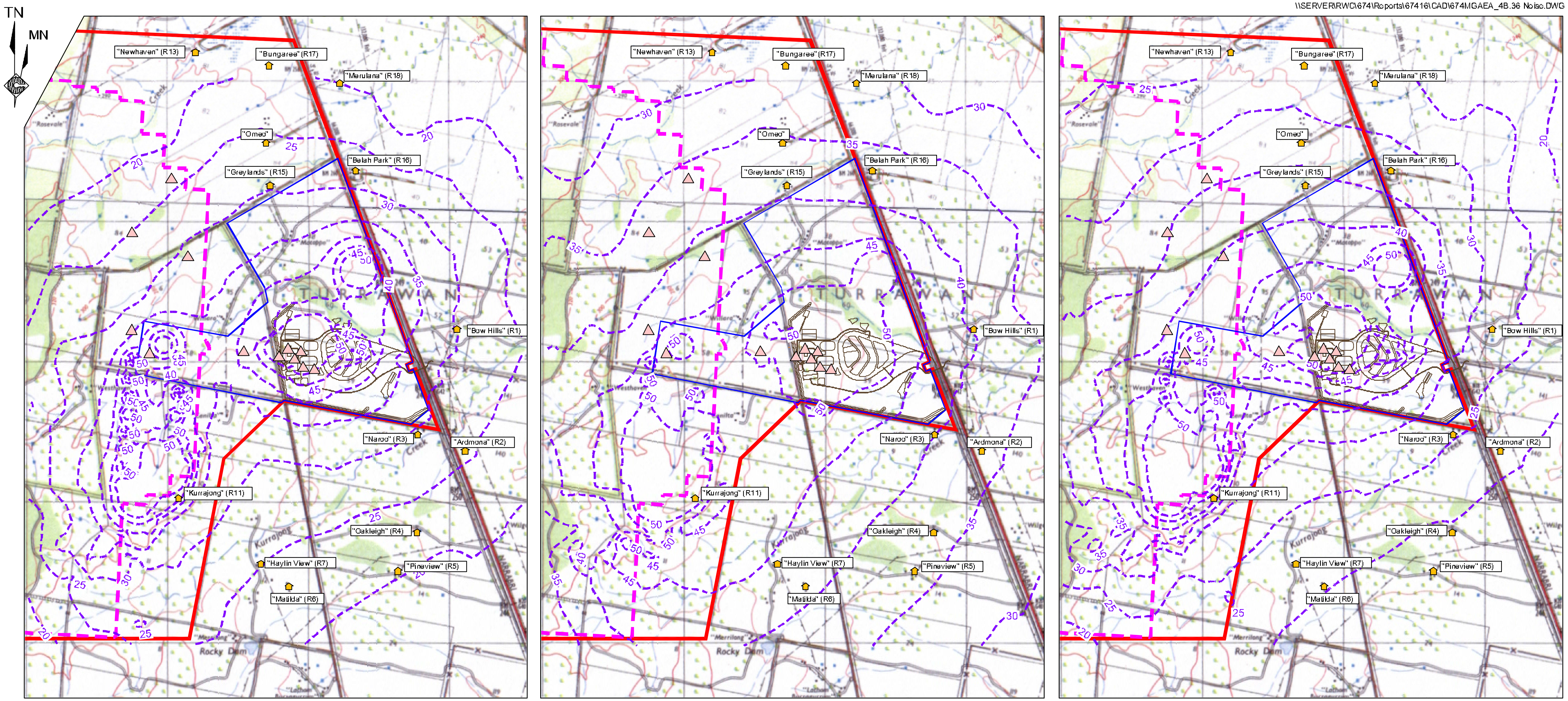
Scenario 3a and 3b

Figure 4B.37 presents noise contours generated by the noise modelling of Spectrum Acoustics for Scenario 3(b) under severe inversion and southeast wind conditions[15]. **Table 4B.32** presents the predicted operational noise levels at the nominated residential receivers on and surrounding the Mine Site under calm and noise enhancing conditions.

Notably, the proposed noise mitigation measures described in Section 4B.7.4 would reduce the noise levels received at most residences such that compliance with noise criteria could be achieved. Moderate exceedances of up to 3dB(A) (within the noise management zone) are still predicted under moderate inversion, severe inversion and/or southeast wind conditions at three residences, namely: "Bow Hills", "Naroo", and "Greylands".

[15] The contours supplied by Spectrum Acoustics (2009) and presented on **Figure 4B.37** are the unmitigated noise levels, ie. these do not incorporate the noise mitigation measures described in Section 4B.7.4 which are predicted to reduce received noise levels to the levels presented in **Table 4B.32**.

\\SERVER\RWC\674\Reports\67416\CAD\674MGAEA_4B.36 Noise.DWG



Operational Noise under Calm Conditions

Operational Noise under Severe Inversion Conditions (6°/100m)

Operational Noise under Southeast Wind Conditions

REFERENCE
- Mine Site Boundary
- Indicative Limit of Underground Workings
- Pit Top Area Boundary
- Approved Disturbance within the Pit Top Area
- Noise Generating Activity (see Figure 4B.34 for Detail)
- 25 Noise Contour (dB(A)), Leq(15 minute)
- Residential Receiver

SCALE 1:60 000

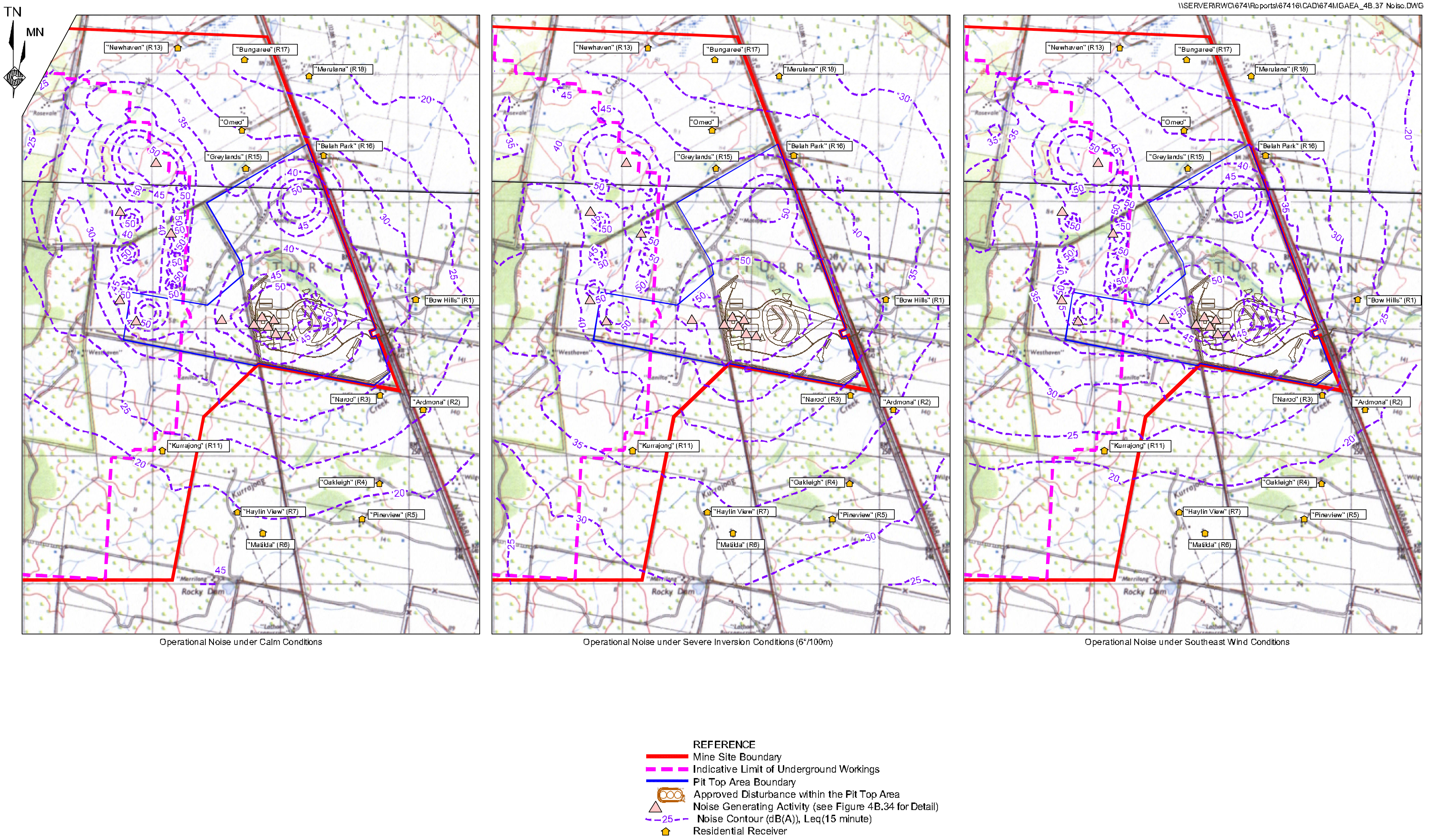
1 0 1 2 3km

Source: Spectrum Acoustics Pty Ltd (2009) - Figures B4, B5 & B6

Figure 4B.36
PREDICTED OPERATIONAL NOISE
(SCENARIO 2B)

This page has intentionally been left blank

This page has intentionally been left blank



SCALE 1:60 000

1 0 1 2 3km

Source: Spectrum Acoustics Pty Ltd (2009) - Figures B4, B5 & B6

Figure 4B.37
PREDICTED OPERATIONAL NOISE
(SCENARIO 3B)

This page has intentionally been left blank
This page has intentionally been left blank

Table 4B.32
Predicted $L_{eq(15\text{-}minute)}$ Operational Noise Levels (Scenario 3)

Location		Scenario 1 Lapse (calm)	Scenario 2 Inversion (^{0}C/100m) 2	Scenario 3 Inversion (^{0}C/100m) 4	Scenario 4 Inversion (^{0}C/100m) 6	Scenario 5 SE wind (3m/s)	Criterion dB(A)	Maximum Differential dB(A)*
Scenario 3a								
R1	"Bow Hills"	30	<35*	**36***	**37***	27	35	**+2**
R2	"Ardmona"	25	<33*	<34*	34	21	35	-1
R3	"Naroo"	29	34*	**36***	**38***	25	35	**+3**
R4	"Oakleigh"	23	<33*	<35*	35*	20	35	0
R5	"Pineview"	20	32	33	35	<20	35	0
R6	"Matilda"	22	34	<35*	<35*	20	35	0
R7	"Haylin View"	25	<35*	<35*	<35*	22	35	0
R10	"Merrilong"	24	<35*	<35*	<35*	20	35	0
R11	"Kurrajong"	**>40**	**>40**	**>40**	**>40**	**43**	35	**8**
R13	"Newhaven"	21	25	28	29	25	35	-6
R15	"Greylands"	30	34*	**37***	**38***	**37**	35	**+3**
R16	"Belah Park"	26	<34*	33*	35*	31	35	0
R17	"Bungaree"	20	28	30	31	28	35	-4
R18	"Merulana"	20	27	29	31	27	35	-4
Scenario 3b								
R1	"Bow Hills"	30	<35*	**36***	**37***	27	35	**+2**
R2	"Ardmona"	25	<33*	<34*	34	21	35	0
R3	"Naroo"	30	34*	**36***	**38***	25	35	**+3**
R4	"Oakleigh"	23	<34*	<35*	35*	20	35	0
R5	"Pineview"	20	32	33	35	<20	35	0
R6	"Matilda"	23	<35*	<35*	<35*	20	35	0
R7	"Haylin View"	25	<35*	<35*	<35*	22	35	0
R10	"Merrilong"	24	<35*	<35*	<35*	20	35	0
R11	"Kurrajong"	**>40**	**>40**	**>40**	**>40**	**46**	35	**11**
R13	"Newhaven"	20	27	28	30	26	35	-5
R15	"Greylands"	30	34*	**37***	**38***	**38**	35	**+3**
R16	"Belah Park"	26	<34*	33*	35*	34	35	0
R17	"Bungaree"	22	28	30	31	28	35	-4
R18	"Merulana"	21	28	30	31	27	35	-4

Note: **Bold** = Exceedance of criterion
Note *: Incorporates the proposed noise mitigation measures of Section 4B.7.4
Source: Modified after Spectrum Acoustics (2009) – Tables 10 and 11 (after incorporation of the noise mitigation measures of Section 4B.7.4)

Predicted noise levels received at the "Kurrajong" residence, however, are unable to be reduced to within the noise management zone through the proposed noise mitigation measures (due to the noise generated by drilling activities over LW24 to LW26). It is important to note, however, that Scenario 3 activities would not be undertaken for at least 20 years. Within this period, noise monitoring would be undertaken to validate the noise predictions presented in **Table 4B.32**, with further noise mitigation to be investigated and negotiations continuing in relation to possible acquisition of the "Kurrajong" residence by the Proponent.

As noted previously, noise monitoring would be conducted monthly during the first winter of longwall operations to determine the level of impact at the four potentially affected residences. Criterion exceedances would be mitigated or otherwise addressed through the development and implementation of an updated Noise Management Plan.

Consideration of Modifying Correction Factors

The INP requires that a +5dB correction factor be added to measured or predicted noise levels if the received noise contains certain annoyance characteristics such as distinct tones, low frequency noise or is intermittent in nature. Spectrum Acoustics (2009) notes that activities associated with the Longwall Project, as perceived from neighbouring residences, are not tonal or intermittent, however, may have a low frequency content that should be assessed. Spectrum Acoustics (2009) assessed the low frequency content by comparing the C-weighted and A-weighted levels at the receiver and adding 5dB to the received A-weighted level if the difference is greater than 15dB.

The difference between C-weighted and A-weighted levels (C-A range) generally increases with separation distance between source and receiver, with Spectrum Acoustics (2009) determining that the C-A range at the receivers surrounding the mining operations varied from 6dB to 15dB. Notably, the noise level at the only residence with a C-A range of 15dB ("Newhaven" under moderate inversion conditions for Scenario 3a) would only rise to 33dB when the correction factor 5dB is added.

The Proponent will measure and apply INP correction factors as required by conditions of the project approval or requirements of a Noise Monitoring Program.

Summary

Noise modelling completed by Spectrum Acoustics (2009) and illustrated on **Figures 4B.35** to **4B.37**, predicts that without the incorporation of the noise mitigation measures summarised in Section 4B.7.4, exceedances of the operational noise criteria are expected. These exceedances are primarily a consequence of the following activities.

- Operation of the CPP and rotary breaker within the Pit Top Area.
- Surface preparation activities (using scrapers or bulldozers) within the Pit Top Area (specifically within the Reject Emplacement Area, Brine Storage Area and Longwall Unit Assembly Area).
- Drilling activities at the northern and southern ends of the eastern-most longwall panels (LW1 to LW3 and LW24 to LW26).

However, with the implementation of the proposed noise mitigation measures nominated in Section 4B.7.4, Spectrum Acoustics (2009) predicts the compliance could be achieved at all but four of the residences surrounding the Longwall Project operations. The noise criteria exceedances that are unable to be mitigated are summarised as follows.

- Exceedances of 1 to 5 decibels (Noise Management Zone).
  - "Bow Hills" (up to 3dB(A) under moderate and severe inversion conditions).
  - "Naroo" (up to 5dB(A) under inversion conditions).
  - "Greylands" (up to 5dB(A) under moderate and severe inversion, and southeast wind conditions).
- Exceedances of >5 decibels (Noise Affectation Zone).
  - "Kurrajong" (>10dB(A) under all conditions when drilling activities are undertaken above LW24 to LW26).

In all cases, it is assessed that all reasonable and feasible noise mitigation measures have been considered and would be implemented to reduce the noise levels received at all residences surrounding the activities of the Longwall Project.

4B.7.6.2 Sleep Disturbance Assessment

Table 4B.33 presents the sleep disturbance assessment for the Project.

The predicted maximum noise levels are all well below the sleep disturbance criterion.

Table 4B.33
Predicted Maximum $L_{A1(1\text{-}minute)}$ Operational Noise Levels

Location		Scenario 1 Lapse (calm)	Scenario 2 Inversion (°C/100m) 2	Scenario 3 Inversion (°C/100m) 4	Scenario 4 Inversion (°C/100m) 6	Scenario 5 SE wind (3m/s)	Criterion dB(A)	Maximum Differential dB(A)*
R1	"Bow Hills"	32	38	40	43	29	45	-2
R2	"Ardmona"	26	31	34	36	23	45	-9
R3	"Naroo"	31	37	39	41	26	45	-4
R4	"Oakleigh"	25	29	31	35	24	45	-10
R5	"Pineview"	21	24	30	33	23	45	-12
R6	"Matilda"	21	29	32	35	21	45	-10
R7	"Haylin View"	22	31	32	37	23	45	-8
R10	"Merrilong"	22	26	29	33	23	45	-12
R11	"Kurrajong"	27	36	40	41	30	45	-4
R13	"Newhaven"	24	29	31	30	29	45	-15
R15	"Greylands"	31	38	40	42	39	45	-3
R16	"Belah Park"	27	34	36	39	34	45	-6
R17	"Bungaree"	22	30	31	31	29	45	-14
R18	"Merulana"	23	28	30	30	29	45	-15

Note 1: Bold = Exceedance of criterion
Source: Spectrum Acoustics (2009) – Table 12

4B.7.6.3 Rail Noise

Mine Site to Baan Baa

The closest residence to the North Western Branch Railway Line within several kilometres of the Mine Site is on the "Ardmona" property and is a distance of approximately 140m from the railway line. At this distance, and assuming an average of 5 train loads of coal per day, or 10 train movements, $L_{eq(24\ hour)}$ and L_{max} train noise levels of 46dB(A) and 54dB(A) are predicted by Spectrum Acoustics (2009). These are well below the relevant rail noise assessment criterion of 55dB(A) and 80dB(A) respectively.

Trains travelling south on the North Western Branch Railway Line would travel through the village of Baan Baa. The closest residence to the rail line in Baan Baa occurs at a distance of approximately 60m to the west and approximately 65m from a level crossing which has recently been equipped with lights and warning bells. $L_{eq(24\ hour)}$ and L_{max} train noise levels at this distance are predicted by Spectrum (2009) to be 52dB(A) and 60dB(A) respectively. These are less than the relevant rail traffic noise assessment criteria of 55dB(A) and 80dB(A) respectively.

Baan Baa to Port Newcastle

A review of the ARTC's *"Standard working Timetable – freight and Country Passenger Services from 5th August 2007 – Book 5 North and North West"*, effective 8 January 2008, suggests that there are over 160 timetabled coal train slots (100+ during the day and 60+ during the night) on the Main Northern Line. This capacity is not filled by the current coal train numbers. Data presented in the *Environmental Assessment* for the Minimbah Third Track (GHD, 2008) suggest an actual maximum volume of 63 coal trains during the day and 35 coal trains at night through the most densely populated areas around Maitland.

The addition of up to ten additional trains per 24-hour period from the Longwall Project would increase existing L_{Aeq} train noise levels by an immeasurable and inaudible amount of approximately 0.4dB(A), with no increase in L_{Amax} levels. This insignificant increase in noise would not affect any current train noise set-back distances, and further assessment of train noise impacts from the proposal is not considered necessary.

4B.7.6.4 Road Traffic Noise

The estimated numbers of vehicle movements generated by the Longwall Project, is presented in **Table 2.11**. It is noted that the adopted traffic noise criteria (see Section 4B.6.3.5) apply to 1-hour noise levels rather than daily average levels. Maximum hourly traffic levels occur during shift changes and it is common for 25% of the total daily light vehicle traffic (workforce) to occur during a 1-hour period. It is therefore possible for up to 95 light vehicle movements to occur in 1-hour at shift change.

Residences on the "Belah Park" and "Ardmona" properties are the closest residences to the Kamilaroi Highway and are approximately 230m and 140m east of the highway respectively. Assuming that all peak hour light vehicle movements pass these residences at 100km/hour, the predicted road traffic $L_{eq(1\ hour)}$ noise levels would not exceed 42dB(A) (Spectrum, 2009). Spectrum Acoustics (2009) also notes that taking a worst case scenario, where all heavy vehicles arrive at the Mine Site at shift change during the night, the predicted $L_{eq(1\ hour)}$ noise levels at "Belah Park" and "Ardmona" would not exceed 47dB(A). These predicted road traffic noise levels are less than the relevant night-time road traffic noise assessment criteria of 55dB(A).

4B.7.6.5 Blasting Assessment

Based on the formulae presented in Section 4B.6.5.5 and a minimum distance from a non-project related residence to a ventilation shaft (approximately 1900m to "Kurrajong"), blasts with a maximum instantaneous charge of ≤225kg would result in emissions that meet the overpressure and ground vibration criteria (Spectrum, 2009). As blast monitoring information is collected, a "site law" for the Narrabri Coal Mine would be developed allowing for more precise predictions of blasting impacts (which may allow for blasts with maximum instantaneous charges of >225kg).

4B.7.7 Monitoring

The Proponent would implement the following noise and vibration monitoring program to ensure that noise and vibration impacts associated with the Project are managed appropriately.

- Undertake attended noise monitoring quarterly at the following residences, subject to landholder agreement.
  - "Bow Hills".
  - "Naroo".
  - "Oakleigh".
  - "Newhaven".
  - "Greylands".
  - "Belah Park".
  - "Kurrajong".
  - "Matilda"[16].
  - "Haylin View"[16].
  - "Merrilong"[16].
- Increase the frequency of attended noise monitoring from quarterly to monthly during the first winter (May to September) of construction or mining operations. Following completion of this monitoring program, the frequency of monitoring during the subsequent winter period would be determined in consultation with DoP, DECCW and affected landholders.

4B.8 AIR QUALITY

The air quality assessment was undertaken by Heggies Pty Ltd. The full assessment is presented in Volume 2, Part 7 of the Specialist Consultant Studies Compendium, with the relevant information from the assessment summarised in the following subsections. The full air quality assessment is referred to as Heggies (2009a) throughout this report. Heggies Pty Ltd also undertook an assessment of the likely quantity and management of greenhouse gases relating to the Project, a copy of which is presented in full as Volume 2, Part 8 of the Specialist Consultant Studies Compendium. The full assessment of greenhouse gases for the project is referred to as Heggies (2009b) throughout this report.

4B.8.1 Introduction

Based on the risk analysis undertaken for the project (see Section 3.3 and **Table 3.5**), the potential air quality impacts requiring assessment and their **unmitigated** risk ratings are as follows.

- Deposited dust levels attributable to the project are unlikely to exceed the DECC guideline level, (low risk).
- PM_{10} levels may occasionally (once every 1 to 2 years) rise above the project goal (only on those days when background levels attributable to other sources are high) (moderate risk).
- Greenhouse gas emissions (high risk).

[16] Monitoring to commence as surface activities approach the eastern end of the southern longwall panels.

- Detection of odour at surrounding non-project related residences (moderate risk).
- Restricted impacts to predominantly non-native vegetation within immediate vicinity of ventilation shafts (moderate risk).
- Impacts on native vegetation or extending beyond immediate vicinity of ventilation shafts (high risk).
- Impacts extend beyond the Mine Site or impact on extensive areas of native vegetation (high risk).

The Director-General's Requirements issued by the DoP require that the assessment of air quality is undertaken with reference to the *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (DEC, 2005).

The air quality issues addressed in this section relate to the following.

- Generation of dust by both construction and operational activities throughout the Pit Top Area and in isolated areas of the mine surface associated with access and drilling activities.
- Emission of odourous products of diesel combustion from both surface activities and underground activities (via the ventilation shaft exhausts).
- Generation of dust from coal wagons during the transportation of the coal from the Mine Site to Port Newcastle.
- Emission of greenhouse gases – principally carbon dioxide (CO_2) and methane (CH_4) during and following the mining of the coal.

Depending upon the size and concentration of dust 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 larger than 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.

The amount of fuel used each year for project-related activities would be optimised due to the use of rail for transporting coal products. The fuel use associated with transporting coal by rail would be significantly less than for the road transport of a comparable quantity of coal. As a result, the emission of greenhouse gases attributable to the Longwall Project would be noticeably less. On-site use of diesel would be comparatively low given the emphasis upon use of electricity, wherever possible.

Whilst both nitrogen dioxide (NO_2) and sulphur dioxide (SO_2) are emitted as a result of diesel combustion, Heggies (2009a) concludes that based on the results of the Stage 1 air quality

assessment (Heggies, 2007), the quantity of these gases produced would be negligible and does not warrant further assessment.

Greenhouse gases, ie. CO_2 and CH_4 would be emitted principally from the coal seam during underground mining and following the transfer to and handling of coal at surface. These gases, as well as emissions from on-site consumption of diesel fuel are considered Scope 1 emissions. Scope 2 emissions relate to those released during the generation of purchased electricity whilst Scope 3 emissions relate to transportation and combustion of the coal beyond the Mine Site.

The following subsections 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 also presents the residual impacts upon air quality following the implementation of these safeguards and mitigation measures.

4B.8.2 Existing Air Quality

4B.8.2.1 Introduction

Air quality guidelines and goals refer to levels of "pollutants" in air which include both existing and proposed operational 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 concentrations of airborne particulates and odourous gases such as SO_2 and NO_2.

The description of existing air quality is provided based upon site-specific air quality data (a summary of which is provided in Section 1.4.3.3) and/or the best available regional data.

4B.8.2.2 Dust Deposition

As noted in Section 1.4.3.3.3, a total of eight dust deposition gauges (Sites ND1 to ND8) have been positioned within the vicinity of the Pit Top Area to obtain site-specific dust deposition data (see **Figure 1.4**). Five gauges were installed in December 2005 and three additional gauges were installed in April 2006. **Table 4B.34** provides a summary of all data collected from these dust deposition gauges since their installation.

The weighted background dust deposition rate attributable to predominantly rural activities and the initial surface earthworks within and surrounding the Mine Site is 1.9g/m^2/month, a level recognised to be typical of rural areas.

Table 4B.34
Mine Site Dust Deposition Monitoring Data

Site Location	Monitoring Period	Number of Samples	Total Insoluble Solids (g/m^2/month)
ND1	Dec 05 - Nov 08	36	2.8
ND2	Dec 05 - Nov 08	36	1.7
ND3	Dec 05 - Nov 08	36	1.2
ND4	Dec 05 - Nov 08	36	3.3
ND5	Dec 05 - Nov 08	36	2.6
ND6	June 06 - Nov 08	30	1.2
ND7	June 06 - Nov 08	30	1.0
ND8	June 06 - Nov 08	30	0.7
Weighted Average			**1.9**
Source: Heggies (2009a) – Table 6			* See **Figure 1.4**

4B.8.2.3 Particulate Matter

As also noted in Section 1.4.3.3.3, background levels of particulates <10µm (PM_{10}) specific to the Mine Site and surrounds have been established through two high volume air samplers measuring PM_{10} levels in accordance with the nominated DECC 6 day cycle. The first sampler (ND9) was established at the “Claremont” residence in December 2007 and the second (ND10) established at the “Turrabaa” residence in April 2008 (see **Figure 1.4**). The results of 24-hour PM_{10} monitoring conducted at these two locations are summarised in **Table 4B.35**.

Table 4B.35
Mine Site 24-hour Average PM_{10} Concentrations – From December 2007

Site Location	Number of Samples	Dataset Average (µg/m^3)	Dataset 24-hour Maximum (µg/m^3)
ND9	61	10.5	48
ND10	39	15.8	70
Weighted Average		12.6	
Source: Heggies (2009a) – Table 7			

A total of 100 samples collected at these locations established a weighted average 24hr PM_{10} level of 12.6µg/m^3.

Heggies (2009a) compares the site specific data drawn from the 6 day sampling regime with continuous data recorded during the sampling period recorded at the DECC Tamworth air quality monitoring station, approximately 115km southeast of the Mine Site. **Figure 4B.38** presents the comparison between the two data sets – which highlight a similar daily variation pattern across each data set. The annual average PM_{10} concentration for the Tamworth dataset was 15.8µg/m^3, a level consistent with that measured at Site ND10. Given the similarity in data between the data sets, Heggies (2009a) considers it appropriate to use the Tamworth 2008 24-hour average varying PM_{10} data set for the assessment of the Longwall Project. It is noteworthy that this data incorporates three exceedances of the DECC 50µg/m^3 24 hour guideline level which were attributable to anomaly regional natural events, such as bushfire or dust storm.

4B.8.2.4 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 Line.

4B.8.2.5 Carbon Dioxide and Methane

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

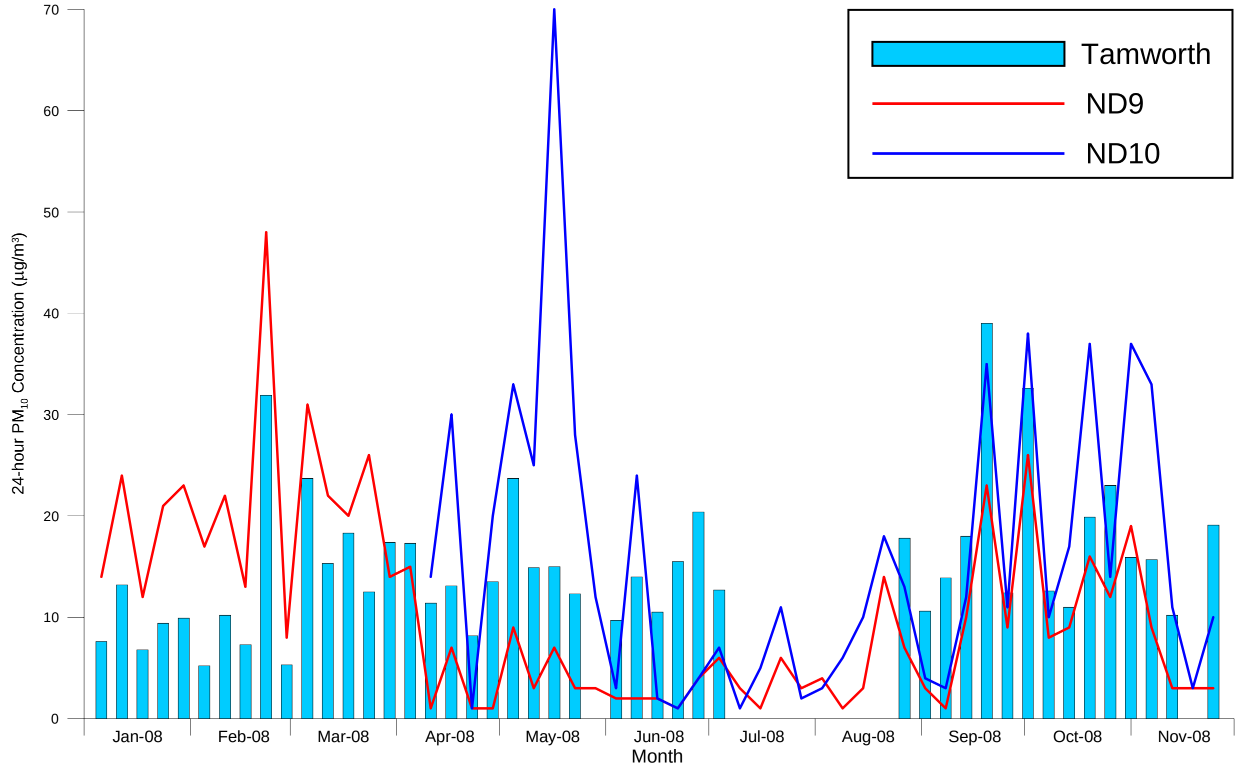


Figure 4B.38
24-hour Average PM_{10} Comparison (Tamworth Monitoring Station and Mine Site) 2008

4B.8.2.6 Summary of Existing Air Quality

For the purposes of assessing the potential air quality impacts of the project, **Table 4B.36** records the background levels adopted.

Table 4B.36
Background Air Quality Environment for Assessment Purposes

Air Quality Parameter	Averaging Period	Assumed Background Level	Source
PM_{10}	24-Hour	Daily Varying	DECC
	Annual	15.8µg/m^3	
Deposited Dust	Annual	1.9g/m^2/month	NCOPL
Odour	All Periods	Negligible	Assumed
Source: Heggies (2009a) – Table 8			

4B.8.3 Potential Sources of Air Contaminants

4B.8.3.1 Particulate Emissions

Specific project activities would contribute to the particulate emissions inventory during the Longwall Project. The following activities are related to specific site establishment or construction activities, operational and on-site transportation components attributable to the Longwall Project.

- Site construction activities involving earthmoving equipment to extend the ROM coal pad, construct the longwall unit assembly area, road construction and limited delivery of road construction materials.
- Drilling of pre-drainage and goaf drainage boreholes across the Mine Site.
- Conveying of additional quantities of coal:
  - from the conveyor drift portal to the ROM coal pad;
  - from the ROM coal pad to the coal breaker;
  - from the coal breaker to the Coal Processing Plant or coal product storage pad; and
  - from the product coal storage pad to the rail load-out bin.
- Coal processing activities within the Coal Processing Plant.
- Additional rail load-out activities.
- Movement of heavy vehicles on unsealed roads between the reject stockpile and the Reject Emplacement Area (predominantly truck wheel dust).
- Movement of light vehicles, drill rigs, etc. on the internal unsealed roads across the Mine Site.
- Wind erosion of the additional coal stored on the ROM coal and product coal on their respective pads and open areas around the Pit Top Area and disturbed areas throughout the Mine Site.

Particulate emissions would also be generated from open wagons transporting the coal between the Mine Site and Port Newcastle.

4B.8.3.2 Odour

The principal continuous source of odour generated on site would be the discharge of mine exhaust gases containing diesel fumes. These fumes would be vented to the atmosphere at one of the exhaust fans located along the central corridor above the West Mains.

It is possible, although unlikely, that small quantities of sulphurous gases may be produced as a result of localised spontaneous combustion of the coal stored on the ROM coal pad and / or the product coal storage pad. The likelihood of such an event is envisaged to be very small.

4B.8.3.3 Greenhouse Gas and Other Gas Emissions

The Longwall Project has the potential to generate additional greenhouse and other polluting gas emissions from a number of sources during both the establishment of additional site components and operations.

Establishment of Additional Stage 2 Components

- The combustion of fuel by diesel-powered equipment and vehicles, including front-end loaders, excavators, bulldozers, scrapers, graders, drill rigs and haul trucks.
- Combustion of diesel fuel for on-site power generation in remote areas on the Mine Site.

Operations

- The combustion of fuel by diesel-powered equipment, particularly the bulldozer on the ROM coal pad and product coal storage pad, site vehicles, trains and vehicles delivering consumables.
- The release of gas emissions during both underground mining and its handling on the surface.
- The product coal sold to predominantly export markets would ultimately be burnt to create energy. This process would generate 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).

4B.8.4 Air Quality Goals

4B.8.4.1 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 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 (2009a) 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 adopts the following goals to assess dust fallout. **Table 4B.37** presents the allowable increase in dust deposition relative to the ambient levels.

Table 4B.37
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.38** 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 3.9g/m^2/month.

4B.8.4.2 Gas Emissions

While no specific guidelines are provided for maximum emissions of greenhouse gases, the *National Greenhouse Gas Inventory* (Australian Greenhouse Office, 2008) estimates of the carbon dioxide emissions allow for an assessment as to the relative level of impact the proposal would have on Australian greenhouse gas emissions. The estimates for greenhouse emissions throughout Australia are given as 553.7MtCO_2 equivalent.

4B.8.4.3 Goals Applicable to Odour Emissions

Impacts from odorous air contaminants are often nuisance-related rather than health-related and as such, odour performance criteria are not specifically intended to achieve “no odour”. The methane released during mining of coal is not odourous. The detectability of an odour is a sensory property that refers to the theoretical minimum concentration that produces an olfactory response or sensation. This point is called the odour threshold and defines one odour unit per cubic metre (OU/m^3).

In practice, the character of a particular odour can only be judged by the receiver’s reaction to it, however, based on the literature available, the level at which an odour is perceived to be a nuisance can range from 2OU/m^3 to 10OU/m^3.

Odour performance criteria need to be designed to take into account the range in sensitivities to odours within the community, and provide additional protection for individuals with a heightened response to odours, using a statistical approach which depends on the size of the affected population. A summary of odour performance criteria for various population densities is shown in **Table 4B.38**.

Table 4B.38
DECC Odour Performance Criteria vs. Population Density

Population of Affected Community	Odour Performance Criteria OU
Urban area (≥ 2 000)	2.0
500 – 2 000	3.0
125 - 500	4.0
30 - 125	5.0
10 - 30	6.0
Single residence (≤ 2)	7.0
Note: These should be regarded as interim criteria to be refined over time through experience and case studies.	
Source: "Technical Notes: Draft Policy, Assessment and Management of Odours from Stationary Sources in New South Wales", DECC 2006	

The area surrounding the Mine Site is primarily rural, hence it is assumed that the population that may potentially be affected by odour emissions associated with coal seam gases is of the order of 10 and 30 people. Consequently, the project odour performance goal adopted for this assessment is a maximum of 6.0 odour units (OU) expressed as a nose response average (1-second) value.

4B.8.4.4 Project Air Quality Goals

In summary, the DECC 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

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

Odour: A maximum of 6.0OU expressed as a nose response average (1-second) value.

4B.8.5 Operational Air Quality Controls

4B.8.5.1 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.8.5.2 Dust Control Measures

The individual sources of dust and the proposed controls for Mine Site activities are listed in **Table 4B.39**.

4B.8.5.3 Control Measures for Other Potential Air Contaminants

Earthmoving equipment and on-site vehicles would be fitted with exhaust controls which satisfy the NSW DECCW 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 DECCW 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.

The Proponent would proactively minimise the use of diesel by:

- optimising and scheduling vehicle operations;
- maintaining engines according to manufacturers' guidelines and keeping tyres at optimum pressure;
- minimising vehicle idling time; and
- considering the use of alternative fuels with a reduced carbon content.

Table 4B.39
Dust Control Measures for Mine Site Activities

Page 1 of 2

Dust Emission Source	Operational Controls
Vegetation Clearing	• Cleared trees and branches would be retained on the margins of cleared areas for use in stabilising disturbed areas once they are no longer required.
Soil Stripping	• Where practicable, soil stripping would be undertaken at a time when there is sufficient soil moisture to prevent significant lift-off of dust. • The Proponent would avoid stripping soil in periods of high winds • Dust suppression by water application would be used to increase soil moisture, if required.
Continuous Miners and Longwall Unit	• Strategically located water sprays would be operational on all continuous miners, the longwall unit and the breaker feeder to minimise dust creation underground.
Coal Transfer, 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. • All conveyors would be fitted with appropriate cleaning and collection devices to minimise the amount of material falling from the return conveyor belts. • The coal breaker would be enclosed. • All surface conveyors would be partly enclosed to minimise dust lift off. • 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.
Construction of the Brine Storage Ponds	• When the prevailing winds are from the northwest quadrant, construction activities within the Brine Storage Area would cease.

Table 4B.39 (Cont'd)
Dust Control Measures for Mine Site Activities

Page 1 of 2

Dust Emission Source	Operational Controls
Wind Erosion from Exposed Surfaces and Stockpiles	• Minimising the extent of clearing/site preparation during site establishment and preparation of operational sites across the Mine Site including the campaigns to construct the area for reject emplacement. • Clear definition of all site roads and the restriction of vehicles and equipment to those roads. • Progressive rehabilitation of areas of disturbance including topsoil and subsoil stockpiles. • Routine application of water sprayed onto stockpiles and hardstand areas. • Maintenance of the perimeter amenity bund and windbreaks.
Coal Loading to Rail Wagons	• The coal loaded onto the conveyor to the rail load-out facility would be watered as required to maintain a sufficient moisture content to prevent dust lift-off during loading – noting the wagons would be loaded within the rail cutting where wind protection would be achieved.

The above control measures relating to diesel fumes are also relevant to controlling odour arising from the underground mine. The generation of odour on either the ROM coal pad or product coal storage pad (arising from localised spontaneous combustion) would be avoided / minimised through constant monitoring of each pad. In the unlikely event localised spontaneous combustion is detected on either pad, the Proponent would isolate the affected coal, drench the coal with water and either process or despatch the subject coal as quickly as possible.

4B.8.5.4 Coal Transportation

The field studies documented by Heggies (2009a) indicate that no specific controls are required for the rail wagons to be used to transport coal between the Mine Site and Port Newcastle. (see Section 4B.8.6)

4B.8.5.5 Greenhouse Gas Reduction

The major greenhouse gas reduction initiative of the Longwall Project involves the use of rail over road transportation of coal products. The fuel use associated with transporting up to 8Mtpa of coal by rail would be significantly less than for the road transport of a comparable quantity of coal. The control measures outlined in Section 4B.8.5.3 would also assist to reduce greenhouse gases attributable to the Longwall Project.

The Proponent is committed to the implementation of the measures outlined in the approved Energy Savings Action Plan (ESAP) for Narrabri Coal Mine Stage 1. The ESAP would be updated following approval of the Longwall Project to reflect the modified mining operations.

4B.8.6 Assessment of Impacts

4B.8.6.1 Introduction

The assessment of impacts of the proposed additional activities involved with the Longwall Project was primarily undertaken through computer modelling to establish likely concentrations of PM_{10}, deposited dust, odour and greenhouse gases around the Mine Site. The modelling undertaken by Heggies (2009a) at the surrounding non-project related residences ("assessment locations") assumes the adoption of operational controls as set out in Section 4B.8.5.

In order to assess the level of impact of the Longwall Project, the predicted concentrations are compared against the air quality goals established in Section 4B.8.4.

4B.8.6.2 Air Quality Modelling

Computer predictions of fugitive emissions from the Mine Site were undertaken using CALPUFF (Version 6.2), a dispersion model developed for use in complex atmospheric dispersion situations. The model combines the particulate emission factors for the various Stage 2 activities, meteorological data and local topography to predict the dispersion of dust and other particulate matter.

Particulate Emission Factors

The inputs to the CALPUFF 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 Mine 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 of the area.

The simulation of the three-dimensional meteorological data was achieved using the 2008 data set compiled from the on-site meteorological station. The principal meteorological inputs to the modelling included wind speed and direction (and calm conditions), temperature, atmospheric stability, mixing depth, relative humidity and precipitation.

Local Topography

There are no significant topographic features within or surrounding the Mine Site which would impede atmospheric dispersion between the Mine Site and surrounding residences. Considering such uncomplicated near field topography, topography has not been considered in the dispersion model. Heggies (2009a) notes that whilst the amenity bund walls on the Pit Top Area locally influence wind patterns, their exclusion from the CALPUFF model suggests the predicted air quality impacts would be conservative.

Modelled Scenarios

Two scenarios were modelled to reflect different stages of the Longwall Project. The scenarios chosen take into consideration the movement of mobile equipment on the Pit Top Area and elsewhere on the Mine Site along with all fixed plant emissions. The scenarios aim to be representative of worst case conditions during the site establishment and operational phases of the Longwall Project.

The two scenarios modelled by Heggies (2009a) are as follows.

- Site Construction - incorporates the construction of Stage 2 Longwall Project components within the Pit Top Area including expansion of ROM coal pad, longwall unit assembly area, Coal Processing Plant, Reject Emplacement Area, ventilation and pre-drainage shaft areas and road and power line path construction.
- Longwall Mining Operations – incorporates the construction within the Brine Storage Area, increased coal production attributed to the Longwall Project, including conveying of coal, coal processing, stockpiling of ROM and processed coal, stockpile management, reject emplacement and loading of train wagons.

To determine the impact of coal dust emissions along the rail route from the Mine Site to Port Newcastle, Heggies (2009a) ran the transportation dispersion model CAL3QHCR, developed by the United States Environmental Protection Agency (USEPA).

4B.8.6.3 Dust Deposition

CALPUFF predictions for dust deposition at the assessment locations, including the assumed background level of dust deposition of 1.9g/m^2/month, are displayed in **Table 4B.40**. Total mean monthly dust deposition (background plus increment) rates associated with the proposal are predicted to be less than or equal to 2.0g/m^2/month at all assessment locations for the two scenarios modelled and readily satisfy the dust deposition criterion of 3.9g/m^2/month.

Table 4B.40
Dust Deposition at Nearest Assessment Locations

Residence	Average Monthly Dust Deposition Rate (g/m^2/month)			
	Scenario 1		Scenario 2	
	Increment	Background+ and Increment	Increment	Background+ and Increment
R1 - "Bow Hills"	0.1	2.0	0.1	2.0
R2 - "Ardmona"	0.2	2.1	0.1	2.0
R3 - "Naroo"	0.4	2.3	0.2	2.1
R4 - "Oakleigh"	0.1	2.0	<0.1	1.9
R5 - "Pineview"	<0.1	1.9	<0.1	1.9
R6 - "Matilda"	<0.1	1.9	<0.1	1.9
R7 - "Haylin View"	<0.1	1.9	<0.1	1.9
R10 - "Merrilong"	<0.1	1.9	<0.1	1.9
R11 - "Kurrajong"	<0.1	1.9	<0.1	1.9
R13 - "Newhaven"	0.1	2.0	0.1	2.0
R15 - "Greylands"	0.3	2.2	0.2	2.1
R16 - "Belah Park"	0.5	2.4	<0.1	1.9
R17 – “Bungaree”	0.1	2.0	<0.1	1.9
R18 – “Merulana”	0.1	2.0	<0.1	1.9
+ Background Monthly Dust Deposition Rate = 1.9g/m^2/month				
Source: Heggies (2009a) – Tables 14 and 15				

Figures 4B.39 and **4B.40** presents the predicted dust deposition on and surrounding the Mine Site in 1g/m^2/month increments for Scenarios 1 and 2. This reiterates that the residential receivers on and surrounding the Mine Site are located well away from those areas likely to be subject to significant dust deposition.

4B.8.6.4 PM_{10}

The maximum 24-hour average PM_{10} concentration at the nearest assessment locations was predicted for both Scenarios 1 and 2 using CALPUFF over a one-year time frame based on 2008 data (see **Table 4B.41**). 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 (2009a) provides an explanation regarding the use of varying background PM_{10} levels. A contour plot of the maximum incremental 24-hour PM_{10} concentrations attributable to each scenario at the Mine Site is presented in **Figures 4B.39** and **4B.40.**

Table 4B.41
Predicted Maximum 24-hour PM_{10} Concentrations

Residence	Maximum 24 hour PM_{10} Concentration (µg/m^3)			
	Scenario 1		Scenario 2	
	Increment	Background+ and Increment	Increment	Background+ and Increment
R1 - "Bow Hills"	<0.1	46.4	7.8	48.4
R2 - "Ardmona"	0.6	47.0	32.8	51.2
R3 - "Naroo"	1.2	47.6	30.8	58.2
R4 - "Oakleigh"	0.5	46.9	0.8	47.2
R5 - "Pineview"	<0.1	46.7	0.4	46.8
R6 - "Matilda"	<0.1	46.4	0.0	46.4
R7 - "Haylin View"	<0.1	46.4	0.0	46.4
R10 - "Merrilong"	<0.1	46.4	0.0	46.4
R11 - "Kurrajong"	<0.1	46.4	0.0	46.4
R13 - "Newhaven"	<0.1	46.4	0.0	46.4
R15 - "Greylands"	<0.1	46.4	0.0	46.4
R16 - "Belah Park"	<0.1	46.4	6.2	47.6
R17 – “Bungaree”	<0.1	46.4	0.0	46.4
R18 – “Merulana”	<0.1	46.4	0.0	46.4
+ Variable background – see Heggies 2009a				
Source: Heggies (2009a) – Tables 16 and 17				

Given the predicted exceedance of 24-hour maximum PM_{10} at two of the residences, Heggies (2009a) considers both the incidences of the 10 highest background levels (and their corresponding predicted increment) and the 10 highest predicted incremental increases (and their corresponding background) at these two non-project related residences (R2 – “Ardmona” and R3 – “Naroo”). The results of this assessment are presented in **Table 4B.42** and provide some perspective in relation to the potential for the 24-hour maximum PM_{10} to be exceeded. **Table 4B.42** identifies that the maximum (increment plus background) 24-hour PM_{10} concentration is predicted to exceed the assessment criterion twice at “Ardmona” and four times at “Naroo”, beyond the exceedance initially reported in **Table 4B.42**.

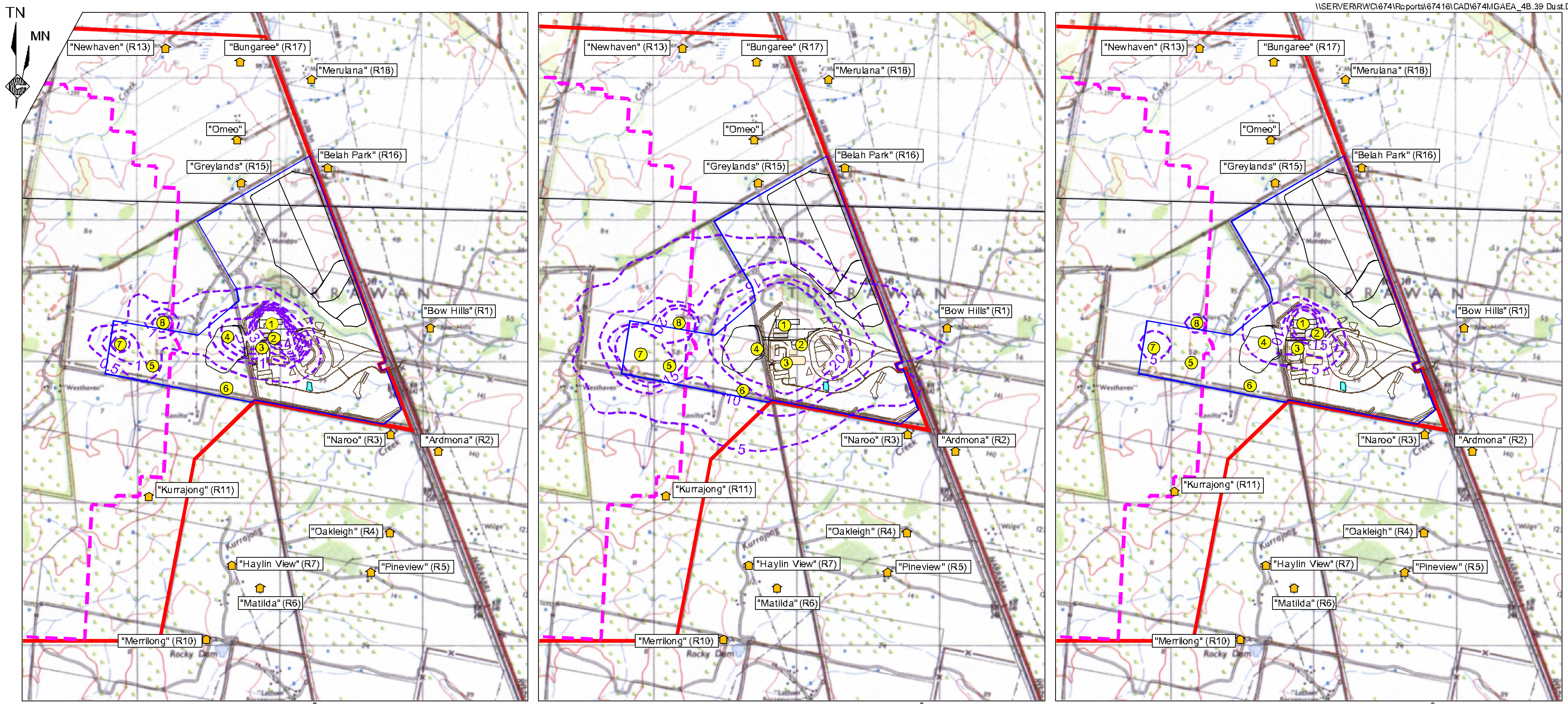
Table 4B.42
Predicted Background and Incremental 24-Hour PM_{10} Maxima at Receptors R2 and R3 – Scenario 2

Date	PM_{10} - 24-Hour Average ($\mu g/m^3$)			Date	PM_{10} - 24-Hour Average ($\mu g/m^3$)		
	Highest Background	Predicted increment	Highest Predicted Total		Background	Highest Predicted Increment	Total
R2 – "Ardmona"							
15/09/2008	46.4	3.6	50.0	27/04/2008	18.4	32.8	51.2
23/11/2008	41.4	0.6	42.0	17/05/2008	15.0	13.1	28.1
19/09/2008	40.9	1.7	42.6	07/08/2008	15.8	11.8	27.6
01/07/2008	40.6	0.8	41.4	27/10/2008	26.0	9.6	35.6
20/09/2008	39.0	4.7	43.7	10/08/2008	15.8	9.2	25.0
17/12/2008	38.9	2.3	41.2	28/09/2008	20.0	8.4	28.4
18/09/2008	38.8	1.3	40.1	21/03/2008	19.9	8.3	28.2
31/10/2008	35.4	6.4	41.8	20/01/2008	9.2	8.2	17.4
31/12/2008	34.3	1.5	35.8	02/04/2008	22.8	7.5	30.3
03/10/2008	33.0	5.8	38.8	31/07/2008	15.8	7.5	23.3
R3 – "Naroo"							
15/09/2008	46.4	3.6	50.0	18/12/2008	27.4	30.8	58.2
23/11/2008	41.4	0.3	41.7	27/04/2008	18.4	23.9	42.3
19/09/2008	40.9	3.6	44.5	27/10/2008	26.0	23.4	49.4
01/07/2008	40.6	0.7	41.3	07/08/2008	15.8	20.9	36.7
20/09/2008	39.0	3.9	42.9	17/05/2008	15.0	19.0	34.0
17/12/2008	38.9	3.9	42.8	21/08/2008	15.8	18.6	34.4
18/09/2008	38.8	2.0	40.8	02/04/2008	22.8	16.0	38.8
31/10/2008	35.4	4.0	39.4	10/08/2008	15.8	15.9	31.8
31/12/2008	34.3	2.3	36.6	31/10/2008	35.4	14.9	50.3
03/10/2008	33.0	4.9	37.9	21/03/2008	19.9	14.5	34.4
Source: Heggies (2009a) – Table 18							

Heggies (2009a) reviewed both the background meteorological dataset and contributions of the various activities on the Mine Site and determined that the 24-hour maximum PM_{10} exceedances occur when moderate to fresh winds from the northwest quadrant were dominant, with construction within the Brine Storage Area the largest contributor to incremental contribution of the Longwall Project. Heggies (2009a) concludes that given the periodic and temporary nature of the construction activities within the Brine Storage Area and the relatively low frequency of moderate to fresh winds from the northwest quadrant (<10% in 2008), the predicted incremental PM_{10} concentrations for Scenario 2 are a conservative representation of the impacts likely to be experienced in the surrounding area. Furthermore, by ceasing construction activities within the Brine Storage Area when the prevailing winds are from the northwest quadrant, the potential for exceedance of the 24-hour PM_{10} criterion would be further reduced.

Table 4B.43 presents the predicted annual average PM_{10} concentrations assuming a background annual PM_{10} concentration of 15.8$\mu g/m^3$ at the assessment locations. **Table 4B.43** shows that for the scenarios modelled, annual average PM_{10} concentrations as a consequence of the project would be less than 18.5$\mu g/m^3$ and satisfy the project goal of 30$\mu g/m^3$.

\\SERVER\RWC\674\Reports\67416\CAD\674MGAEA_4B.39 Dust.DWG



Dust Deposition (g/m²/month) | Maximum 24 Hour PM$_{10}$ Concentration (µg/m³) | Annual Average PM$_{10}$ Concentration (µg/m³)

Construction - Dust Generating Activities

1. **Longwall Unit Assembly Area**: Crane (x3), Scraper (x2), Excavator (35t) & Water cart.
2. **ROM Coal Pad Extension**: Cranes (x2), Scraper (x2), Excavator (45t), Bulldozer (D8), Grader (14G Cat) & Water cart.
3. **Coal Preparation Plant**: Cranes (x3) & Excavator.
4. **Reject Emplacement Area Construction**: Scraper (x2), 50t articulated haul truck & Water cart.
5. **General Road Construction**: Grader (14G Cat), Gravel truck (x2) & Water cart
6. **Powerline Construction**: Bulldozer (D8).
7. **Ventilation Shaft Construction**: Drill Rig, Bulldozer (D8), Gravel truck & Water cart
8. **Pre-Drainage Site Preparation**: Dril rig, Bulldozer (D8), Gravel truck & Water Cart.

REFERENCE
- Mine Site Boundary
- Indicative Limit of Underground Workings
- Pit Top Area Boundary
- Approved Disturbance within the Pit Top Area
- Area of Proposed Longwall Project Surface Disturbance
- 1 Dust / Particulate Matter Generating Activity
- 25 Air Quality Contour
- Residential Receiver

SCALE 1:60 000
1 0 1 2 3km

Source: Hoggies Pty Ltd (2009) - Figures A4.1, A5.1 & A6.1

Figure 4B.39
PREDICTED AIR QUALITY CONTOURS
SCENARIO 1 - SITE CONSTRUCTION