# Narrabri Coal Pty Ltd

ABN: 76 107 813 963

# Narrabri Coal Project

# Preferred Project Report

Compiled by:

R.W. CORKERY & CO. PTY. LIMITED

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# 1 INTRODUCTION

Following the receipt of comments and recommendations from several NSW government agencies, notably the Department of Environment and Climate Change (DECC) and Department of Water and Energy (DWE), the Proponent has revised several elements of the Project to reduce the environmental impact of Project-related activities. In accordance with Section 75H(6)(c) of Part 3A of the *Environmental Planning and Assessment Act 1979*, this Preferred Project Report has been prepared to outline the proposed changes to the project description and adjust previous assessments of impact relating to relevant environmental issues.

The Preferred Project Report is structured as follows.

**Section 1**: provides an introduction to the preferred project report process, outlines the format of the report and identifies the environmental assessment reviews completed.

**Section 2:** presents the preferred project description through identification of those elements of the project description provided in the *Environmental Assessment* that have been altered.

**Section 3:** provides a revised assessment of air quality (including greenhouse gas emissions) related to the preferred project description.

**Section 4:** provides a revised assessment of noise related to the preferred project description.

**Section 5:** provides an assessment of other potential impacted elements of the local environment.

The preparation of this report has involved a study team managed by Mr Rob Corkery, M.Appl.Sc., B.Appl.Sc (Hons), Principal of R.W. Corkery & Co Pty. Limited, assisted by Mr Alex Irwin, B.Sc. (Hons) of the same company.

On behalf of Narrabri Coal Pty Ltd (the "Proponent"), Mr Chris Burgess (General Manager – New Projects) and Mr Ben Bomford (Project Manager) both of Narrabri Coal Pty Ltd, provided technical information related to the proposed changes to the project description.

The following consultancy firms were commissioned by the Proponent to prepare the following specialist consultant studies and provide advice regarding the likely environmental impacts of the preferred project description.

- Noise and Vibration Assessment: Spectrum Acoustics Pty Ltd
  (*Dr Neil Pennington – PhD, B.Sc (Physics), B.Math (Hons)*).
- Air Quality Assessment: Heggies Australia Pty Ltd
  (*Mr Damon Roddis – B.Sc (Hons)*).

# 2 PREFERRED PROJECT DESCRIPTION

## 2.1 Introduction

The Narrabri Coal Project would be developed and operated in generally accordance with the description of the Project provided by Section 2 of the *Environmental Assessment*.

The following sub-sections outline the proposed changes to this description based on comments and recommendations received during the public exhibition period for the Project. Specifically, Section 2.2 addresses the proposed revision to the ventilation system for the underground workings and Section 2.3 addresses the commitment of the Proponent to constructing a reverse osmosis water conditioning plant within the rail loop of Pit Top Area once dewatering rates exceed the operational water requirements by an amount sufficient to sustain the operation of such a plant (the design of which is outlined in Appendix 4 of the *Environmental Assessment* (Parsons Brinckerhoff (PB), 2007)).

**Figure 2.1 (preferred)** presents the preferred Project Site Layout while **Figure 2.5 (preferred)** presents the preferred Pit Top Area layout.

## 2.2 Project Ventilation

### 2.2.1 Proposed Operation

#### Submissions to the *Environmental Assessment*

The DECC submission to the Department of Planning, following a review of the *Environmental Assessment,* recommended disturbance to native vegetation within the Ventilation Shaft Area for the installation and management of a ventilation fan be avoided.

#### Consideration of Alternative Ventilation

In response to the DECC submission, the Proponent reviewed a number of alternative locations for construction of a ventilation shaft and installation of a ventilation fan, or alternatively, the construction of an additional drift to ventilate the underground workings. The relative benefits and potential drawbacks for each option were considered.

The benefits of relocating the ventilation shaft and fan were limited to the following.

- Avoids impact on remnant vegetation.
- May provide a shorter route for power supply.

Potential additional environmental impacts associated with the relocated ventilation shaft include the following.

- Increased risk of noise and vibration exposure to surrounding residences, eg. “Kurrajong” and “Westhaven”.
- Increased potential for disturbance to items or places of Aboriginal heritage due to the proposed relocated ventilation shaft area not being previously disturbed or surveyed.

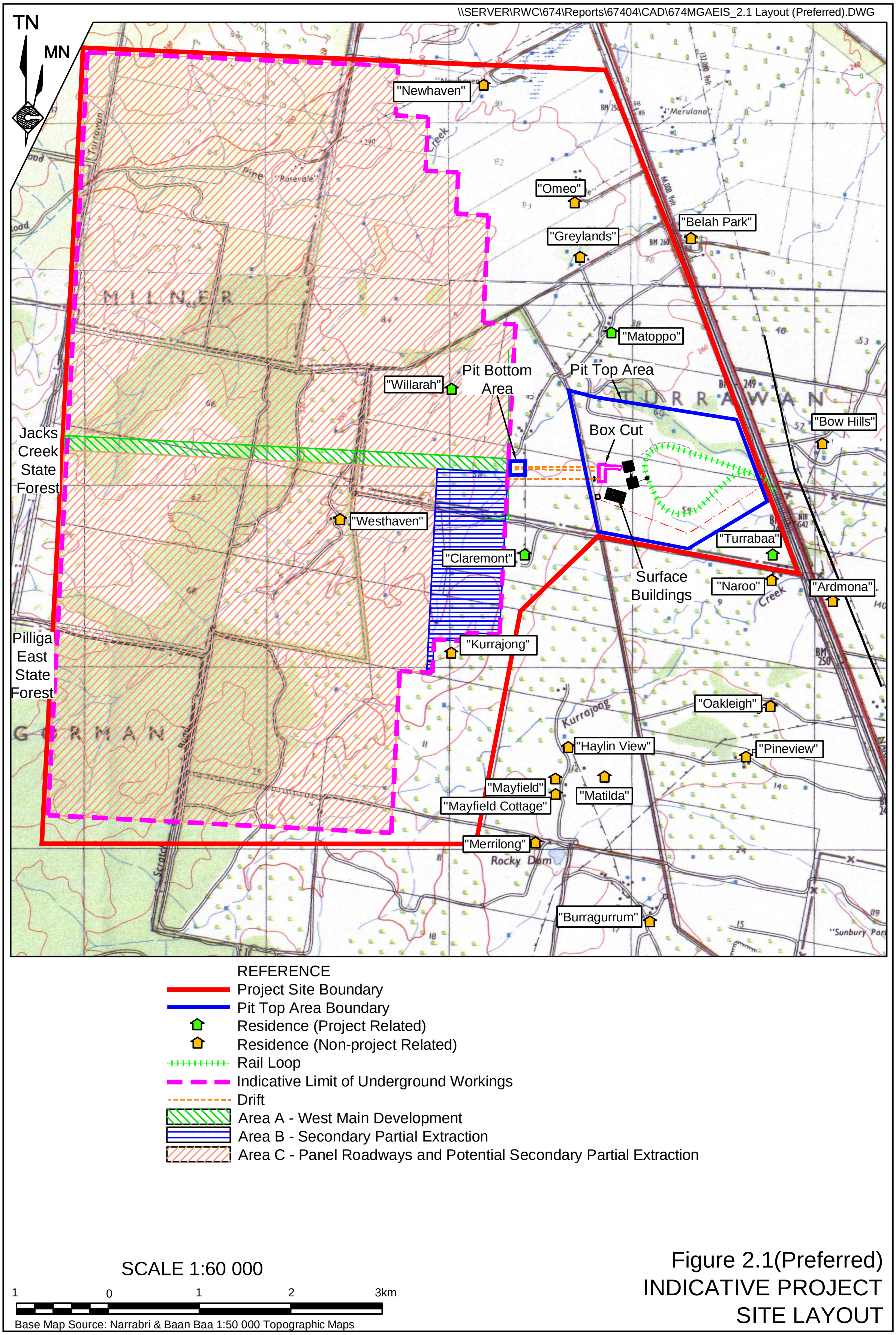



Figure 2.1(Preferred)
INDICATIVE PROJECT SITE LAYOUT

- Increased impact on local visual amenity due to the necessity to construct an enclosing acoustic bund in open farmland.
- Additional land disturbance associated with a new access road.
- Possible flooding and other impacts on Kurrajong Creek associated with the required earthworks.

In contrast, the construction of a third "ventilation" drift would have the following benefits.

- Avoids impact on remnant vegetation within the previous Ventilation Shaft Area.
- Removes the necessity to disturb land to construct an access road, extend the power line and construct power infrastructure to service the fan.
- Likely to reduce noise levels given the sub-surface location of the ventilation fan, ie. in the box-cut.
- The areas of disturbance would be located within an areas assessed for issues of flora, fauna & Aboriginal heritage significance.
- Reduces the safety risks involved in constructing a vertical shaft.

The additional environmental impacts associated with the construction of a third drift were as follows.

- The necessity to extend the area of the box cut to the south to accommodate the third drift and fan infrastructure.
- The increase in ventilation power cost over the life of the mine due to an increase in ventilation distance and associated increase in friction.

#### Preferred Project Ventilation

Based on the assessment of these, the Proponent now proposes to ventilate the underground workings via a third "ventilation drift", the entry to which would from the floor of the box cut. In order to accommodate the third drift, the box cut excavation would be extended to the south, requiring an additional area of disturbance of 0.6ha. The additional overburden (approximately 176 500m$^3$) would be used to construct a secondary containment bund within the rail loop and downstream of the evaporation / waste water ("brine") storage ponds.

**Figure 2.11 (preferred)** illustrates the revised components of the Pit Top Area layout associated with the preferred ventilation system.

### 2.2.2 Possible Environmental Impacts

The relative impacts of the preferred ventilation system on air quality and noise were reviewed by Heggies Pty Ltd and Spectrum Acoustics Pty Ltd respectively. The results of these assessments are presented in Sections 3 and 4 respectively.

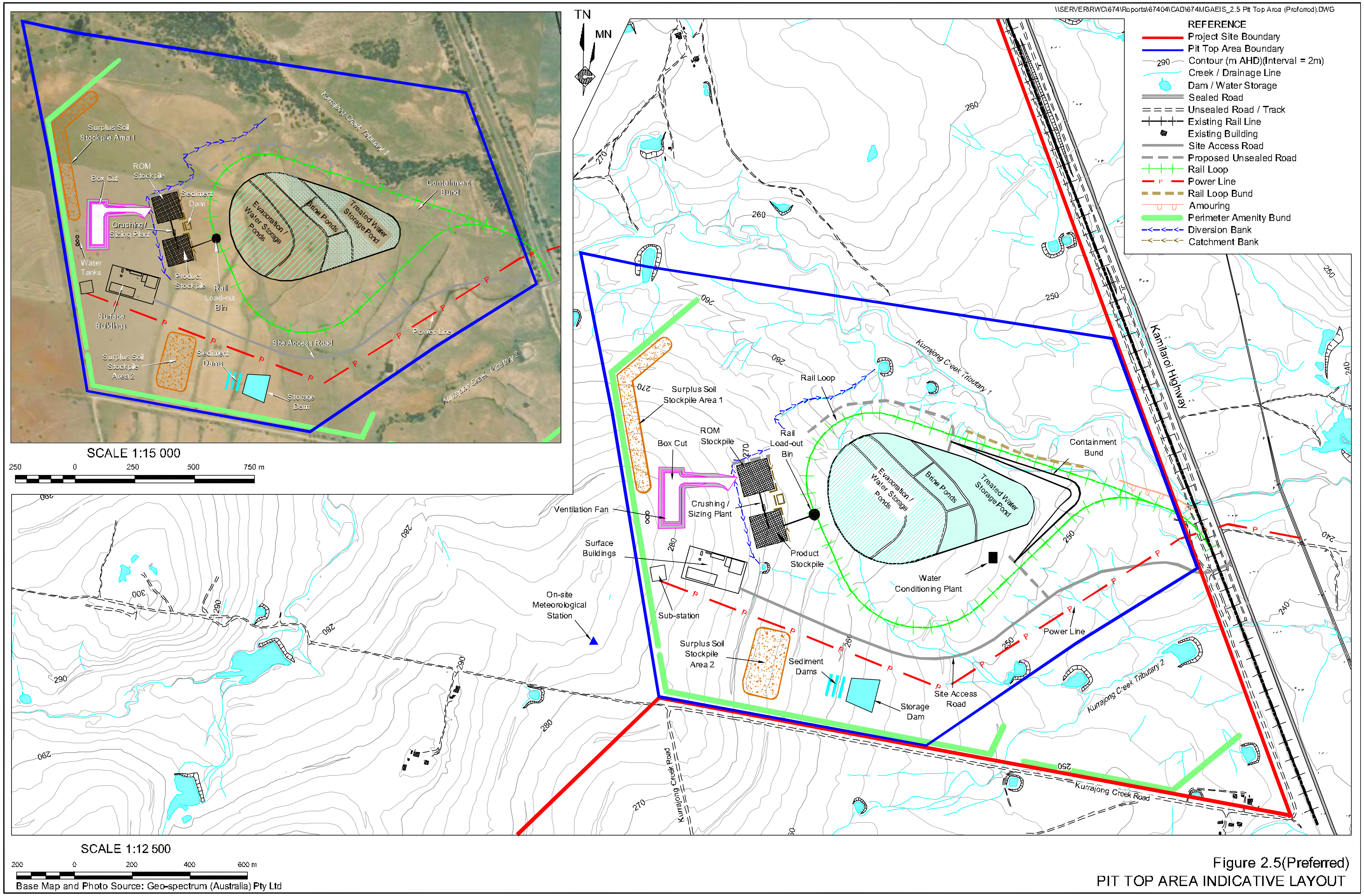
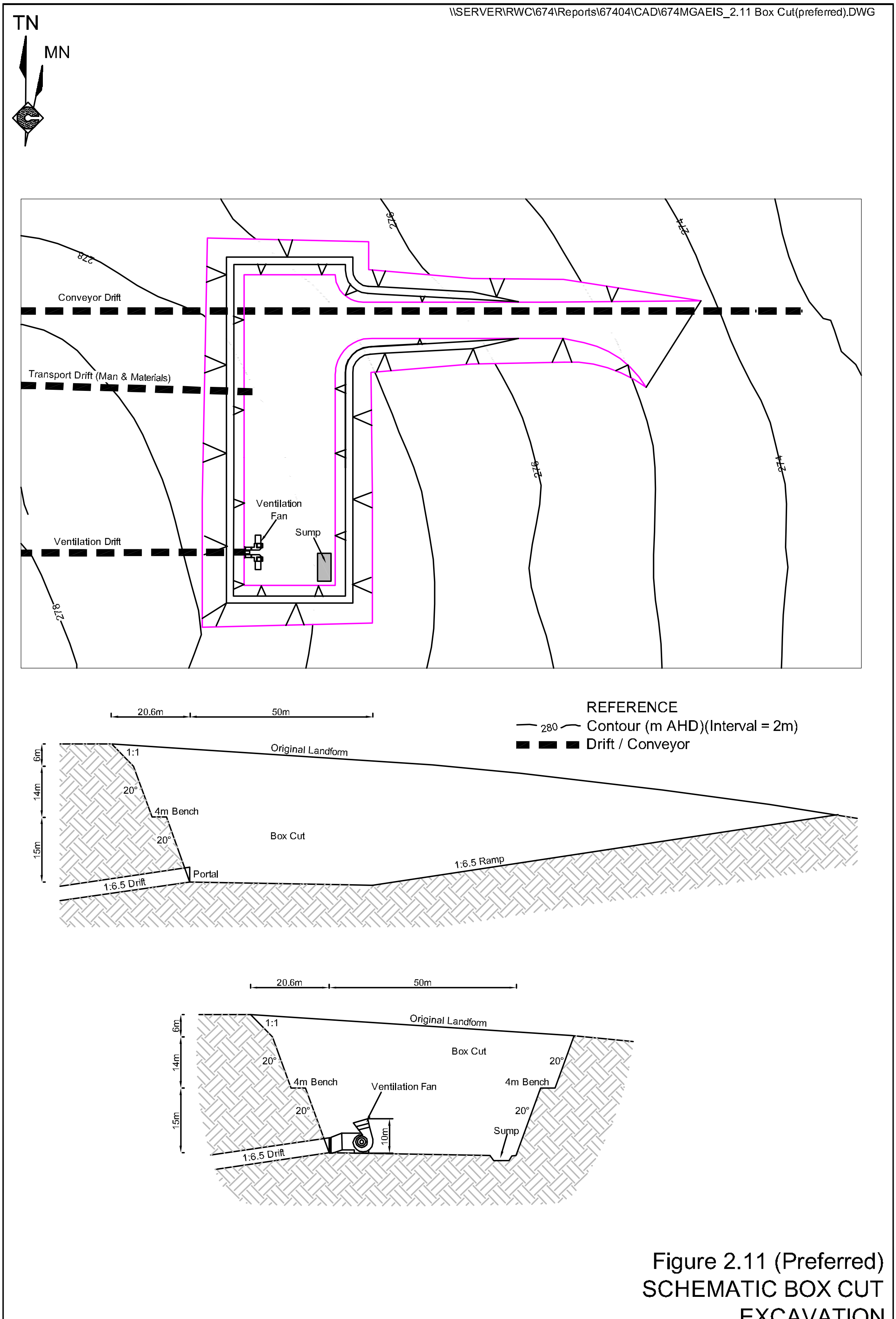



Figure 2.5(Preferred)
PIT TOP AREA INDICATIVE LAYOUT




Source:

Figure 2.11 (Preferred)
SCHEMATIC BOX CUT EXCAVATION

Note: A Colour Version of this figure is available on the project CD

## 2.3 Reverse Osmosis Water Conditioning Plant

### 2.3.1 Proposed Operation

**Submissions to the *Environmental Assessment***

In their submissions to the *Environmental Assessment* for the Narrabri Coal Project, the DECC and DWE requested further clarification regarding the ongoing management of dewatered mine in-flows, particularly as these were predicted to exceed the storage capacity of the evaporation ponds in the medium to long term. The Proponent had suggested contingent water management measures which would be progressively implemented dependent on the actual volume of mine in-flows. These measures included the construction of additional pond space and/or construction of a reverse osmosis water conditioning plant. The Proponent has further considered the possible future requirements for management of mine in-flows and has now committed to the construction of a reverse osmosis water conditioning plant as soon as observed dewatering volumes exceed operational requirements by a sufficient amount to sustain the operation of the reverse osmosis process. The mine in-flow trigger level for the construction of the plant has been calculated to be $880m^3$/day.

**Design, Operation and Management of the Reverse Osmosis Water Conditioning Plant**

Appendix 4 of the *Environmental Assessment* for the Narrabri Coal Project provides the detail of the design and operation of an appropriately sized reverse osmosis water conditioning plant. In the event that the reverse osmosis water conditioning plant is constructed, Evaporation Pond D would be constructed for the storage of the treated ("fresh") water (see **Figure 2.5 (preferred)**). While only to store fresh water, clay would be used to line the pond floor and walls to maximise water retention and minimise the risk of pond wall failure.

Evaporation Pond C would be converted to a series of storage cells of roughly 80m x 170m x 5m dimensions to store and evaporate the reverse osmosis water conditioning plant waste water ("brine") (see **Figure 2.5 (preferred)**). The floor and walls of the "brine ponds" would preferentially be lined with at least 900mm of clay material with a permeability not exceeding $1 \times 10^{-9}$m/s. Preliminary saturated permeability tests of clay material available from the Pit Top Area suggest this level of impermeability could be achieved, however, further testing will be undertaken following the receipt of project approval to confirm sufficient clay material is available. In the event either the material is found to be too permeable, or there is insufficient volume of the material, one or more of the ponds used to store saline water will be lined using an FML with a permeability not exceeding $1 \times 10^{-14}$m/day. A layer (up to 500mm) of fine clay (no rocks or gravel) would be prepared below the liner to minimise the potential for puncturing and a similar depth layer placed over the liner to reduce possible degradation by UV radiation and allow for excavation of accumulated salt without the risk of puncturing the liner.

In order to facilitate the evaporation and accumulation of salt within the brine ponds, at least two ponds would be in use at any one time. An active pond would accept the brine discharged from the reverse osmosis water conditioning plant while previously discharged brine would be allowed to evaporate within an inactive pond.

**Monitoring**

In order to monitor for potential contamination of surrounding lands and waters as a result of the operation of the evaporation, water storage and brine ponds, the Proponent proposes to install several shallow piezometers or soil lysimeters upstream and downstream of the ponds.

**Management Controls and Operational Safeguards**

The Proponent has committed to regularly excavate the accumulated salt in the inactive brine ponds to ensure the capacity of the ponds is maintained and to further reduce the potential for salt to leach through the pond floor and/or walls and contaminated surrounding land or water. Initially, the excavation of salt would be undertaken annually, however, the frequency may increase or decrease depending on salt deposition rates.

The excavated salt would be disposed of in one of two ways. The first option would be to sell the salt and therefore despatch it off-site. If a commercial market for the salt is not obtained, the salt would be placed within completed sections of the underground mine workings.

The Proponent has also committed to the preparation and implementation of a Salt Contamination Contingency Plan, incorporating monitoring and remedial measures to be implemented should salt contamination be identified. It is proposed the plan would be completed within 12 months of the commencement of coal extraction.

### 2.3.2 Possible Environmental Impacts

The reverse osmosis process requires large amounts of electricity and, as a consequence, the greenhouse gas emissions attributable to the Project are likely to increase. A revised greenhouse gas assessment has been completed for the Project to account for this energy use of the reverse osmosis water conditioning plant and is presented in Section 3.3.

# 3 AIR QUALITY

## 3.1 Introduction

Following the receipt of submissions to the *Environmental Assessment* for the Narrabri Coal Project, the Proponent has committed to enlarge the area of the mine entry box cut to enable a third drift to be excavated from the surface to the underground mine workings. This third drift would be used exclusively for mine ventilation purposes.

Given the altered location of the ventilation fan, the probable change in particulate matter concentrations at the previously assessed non-project related residences was considered.

Once mine in-flows exceed operational requirements, with the exceedance being sufficient to sustain a reverse osmosis water conditioning plant, such a plant would be constructed within the rail loop and suitable ponds constructed to retain the conditioned water and “brine”.

Reverse osmosis water conditioning plants are large users of electricity and as a consequence the greenhouse gas assessment completed for the Project has been reviewed to account for this energy use.

## 3.2 Ventilation Fan Remodelling

### 3.2.1 Introduction

A dual-ventilation fan evasee system is proposed for installation within the box cut area to provide sufficient ventilation to the underground operations at the Project Site. In order to quantitatively assess the extent of potential change in predicted particulate matter and odour concentrations at the nearest non-project related residences, modelling Scenario 2 (Mining Operations) of Heggies (2007) (see Section 5.5, p. 6-27 of Part 6 of the *Specialist Consultant Studies Compendium*), conducted during the original Air Quality Impact Assessment (AQIA), has been reconfigured to account for the relocation of the ventilation fan from the Ventilation Shaft Area to the Box Cut area.

### 3.2.2 Modelling Approach

The proposed release height of the evasee is 10m, however, as the revised location for the ventilation fan is within the Box Cut, approximately 35m below the original landform, a different modelling approach was required to that conducted in Heggies (2007).

Based on the in-stack concentrations used in Heggies (2007) and the revised evasee specifications, the following parameters have been adopted for the modelling of particulate matter and odour from the ventilation fan:

- an in-stack $PM_{10}$ concentration of the order of 1.6mg/m$^3$;
- an in-stack odour concentration of the order of 54OU;
- a volumetric flow rate of the order of 184m$^3$/s;
- a total release diameter of 4.7m;
- a release height of 10m above ground level within the box cut, ie. between 15m and 25m below surface;
- an exit velocity of 10.5m/s; and
- an exit temperature of 293K (20°C).

The ventilation fan has been modelled within Ausplume as a point source with a release point at 10m above ground level within the box cut. This approach is deemed as conservative for assessing the potential impact of the revised ventilation fan at the nearest non-project related residences as the release point does not account for the box cut void and the associated emissions containment/reduction potential of the void. It is acknowledged that this approach does not address the air pollutant concentrations within the box cut void itself, however, this is seen as an occupational health issue as opposed to an issue of potential environmental impact.

Emission rates for odour and particulate matter from the ventilation fan have been calculated based on the above specifications. The emission rates, dimensions and locations of the other sources of particulate matter present in modelling Scenario 2 are unchanged from the Heggies (2007). Residence locations and background pollutant levels are consistent with Heggies (2007).

### 3.2.3 Modelling Results

#### Dust Deposition

**Table 3.1** details the Ausplume predictions for dust deposition generated by the amended Project at each of the nearest residences, comparing the levels predicted for the two ventilation fan location scenarios.

**Table 3.1**
**Background and Incremental Dust Deposition at Nearest Non-Project Related Residences**

| Residence / Property Name | Dust - Annual Average ($g/m^2$/month) | | | | | |
|---|---|---|---|---|---|---|
| | Background | Increment attributable to the Project | Background + Increment | Project Goal | Increment from Heggies (2007) | Percentage Change (%) |
| R1 – "Bow Hills" | 1.5 | <0.1 | 1.5 | 4.0 | <0.1 | 0 |
| R2 – "Ardmona" | 1.5 | <0.1 | 1.5 | 4.0 | <0.1 | 0 |
| R3 – "Naroo" | 1.5 | <0.1 | 1.5 | 4.0 | <0.1 | 0 |
| R4 – "Kurrajong" | 1.5 | <0.1 | 1.6 | 4.0 | <0.1 | 0 |
| R5 – "Westhaven" | 1.5 | <0.1 | 1.6 | 4.0 | <0.1 | 0 |

It can be seen in **Table 3.1** that the total mean monthly dust deposition (background plus increment) associated with the Project is predicted to be less than 1.6g/m$^2$/month, at all the nearest non-project related residences, for the preferred project description. As such, levels of dust deposition are predicted to satisfy the Project dust deposition goal.

When compared to the corresponding results of Heggies (2007), it can be seen that the relocation of the ventilation fan is not anticipated to cause any appreciable change to the predicted levels of dust deposition at the nearest residences.

#### $PM_{10}$ (24-Hour Average)

**Table 3.2** details the Ausplume predictions for 24-hour average $PM_{10}$ generated by the amended Project at each of the nearest residences, comparing the maximum ground level concentrations predicted for the two ventilation fan location scenarios.

**Table 3.2**
**Background and Incremental 24-hour Average $PM_{10}$ at Nearest Non-project Related Residences**

| Residence / Property Name | $PM_{10}$ – 24-hour Average ($\mu g/m^3$) | | | | | |
|---|---|---|---|---|---|---|
| | Background | Increment attributable to the Project | Background + Increment | Project Goal | Increment from Heggies (2007) | Percentage Change (%) |
| R1 – "Bow Hills" | 39.5 | <1 | 40.1 | 50 | <1 | 0 |
| R2 – "Ardmona" | 39.5 | <1 | 40.0 | 50 | <1 | 0 |
| R3 – "Naroo" | 39.5 | 1 | 40.4 | 50 | 1 | 0 |
| R4 – "Kurrajong" | 39.5 | 1 | 40.7 | 50 | 1 | 0 |
| R5 – "Westhaven" | 39.5 | <1 | 39.6 | 50 | <1 | 0 |

It can be seen in **Table 3.2** that the maximum 24-hour average $PM_{10}$ concentrations (background plus increment) associated with the Project are predicted to be less than 41µg/m$^3$, at all the nearest non-project related residences, for the revised modelling scenario 2. As such, 24-hour average $PM_{10}$ concentrations are predicted to satisfy the Project goal of 50µg/m$^3$.

When compared to the corresponding results of Heggies (2007), it can be seen that the relocation of the ventilation fan is not anticipated to cause a significant change in predicted 24-hour $PM_{10}$ concentrations at the nearest residences.

### $PM_{10}$ (Annual average)

**Table 3.3** details the Ausplume predictions for annual average $PM_{10}$ generated by operations at the Project Site at each of the nearest residences, comparing the ground level concentrations predicted for the two ventilation fan location scenarios.

**Table 3.3**
**Background and Incremental Annual Average $PM_{10}$ at Nearest Non-project Related Residences**

| Residence / Property Name | $PM_{10}$ - Annual Average (µg/m$^3$) | | | | | |
|---|---|---|---|---|---|---|
| | Background | Increment attributable to the Project | Background + Increment | Project Goal | Increment from Heggies (2007) | Percentage Change (%) |
| R1 – "Bow Hills" | 16.5 | <1 | 16.7 | 30 | <1 | 0 |
| R2 – "Ardmona" | 16.5 | <1 | 16.6 | 30 | <1 | 0 |
| R3 – "Naroo" | 16.5 | <1 | 16.7 | 30 | <1 | 0 |
| R4 – "Kurrajong" | 16.5 | <1 | 16.8 | 30 | <1 | 0 |
| R5 – "Westhaven" | 16.5 | <1 | 16.8 | 30 | <1 | 0 |

It can be seen in **Table 3.3** that the total annual average $PM_{10}$ concentrations (background plus increment) associated with the Project are predicted to be less than 17µg/m$^3$ at all the nearest non-project related residences, for the revised modelling scenario 2. As such, annual average $PM_{10}$ concentrations are predicted to satisfy the Project goal of 30µg/m$^3$.

When compared to the corresponding results of Heggies (2007), it can be seen that the relocation of the ventilation fan causes no significant change in predicted Annual $PM_{10}$ concentrations at the nearest residences.

### Odour Impact

**Table 3.4** shows the results of the Ausplume predictions for the maximum odour concentration at each of the nearest residences, comparing the ground level concentrations predicted for the two ventilation fan location scenarios.

**Table 3.4**
**Predicted Maximum Odour Concentrations at Nearest Non- project Related Residences**

| Residence / Property Name | Maximum (100$^{th}$ percentile) (OU/m$^3$) | Project Goal | Increment from Heggies (2007) | Percentage Change (%) |
|---|---|---|---|---|
| R1 – "Bow Hills" | <1 | 6 | <1 | 0 |
| R2 – "Ardmona" | <1 | 6 | <1 | 0 |
| R3 – "Naroo" | <1 | 6 | <1 | 0 |
| R4 – "Kurrajong" | <1 | 6 | <1 | 0 |
| R5 – "Westhaven" | <1 | 6 | -1 | 80% decrease |

The results presented in **Table 3.4** indicate that at all nearest non-project related residences, the predicted odour concentrations associated with the revised location of the ventilation fan do not exceed the Project goal of $6OU/m^3$ ($100^{th}$ percentile) expressed as a nose response average (1-second) value.

When compared to the corresponding results of Heggies (2007), it can be seen that the relocation of the ventilation fan is anticipated to either have no significant effect or to cause a slight decrease in predicted odour concentrations at the nearest residences.

### 3.2.4 Conclusions

The results of the modelling presented in the preceding sub-section indicate that particulate matter, dust deposition, odour and combustion emissions attributable to the proposed operation would satisfy the Project air quality goals at all surrounding residences following alteration of the ventilation shaft discharge parameters.

Additionally, the predicted modelling results associated with the location of the ventilation fan within the box cut area at the Project Site are shown to not differ significantly from those predicted in the Heggies (2007).

## 3.3 Revised Greenhouse Gas Assessment

### 3.3.1 Reverse Osmosis Water Conditioning Plant Energy Consumption

The operation of a reverse osmosis water conditioning plant would noticeably increase the energy consumption of the project. A design provided by Parsons Brinckerhoff (2007) (see Appendix 4 of the *Environmental Assessment*), estimated the power demand of the reverse osmosis water conditioning plant at $2.8KWh/m^3$ (see p. A4-14).

### 3.3.2 Reverse Osmosis Water Conditioning Plant Water and Energy Consumption

Predicted mine in-flows have been estimated by GHD (2007) (see Part 2 of the *Specialist Consultant Studies Compendium*) and anticipated operational water demand of $820m^3$/day (see Page 2-53 of the *Environmental Assessment*) the surplus water that would potentially require treatment would be as presented in **Table 3.5** (modified after Table 4B.19 in the *Environmental Assessment*).

Based on the power consumption requirements of the reverse osmosis water conditioning plant identified in **Table 3.5**, Heggies Pty Ltd prepared a revised greenhouse gas assessment and compared it against that included in Heggies (2007).

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

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

ii) The release of coal bed carbon dioxide and methane during mining and post-mining activities.

iii) Consumption of electricity from off-site generation.

iv) Distribution of coal products (all to Port Newcastle).

v) End use of coal products.

**Table 3.5**
**Mine In-Flow and Surplus Water Over Time**

| Year | Mean Conductivity (kh)[1] | | Water Surplus to Operational Requirements [2] $m^3$/day | Electricity Consumption (MWh/year) |
|---|---|---|---|---|
| | $m^3$/day | ML/year | | |
| 1 | 61.0 | 22.3 | - | - |
| 2 | 294.0 | 107.3 | - | - |
| 3 | 245.9 | 89.8 | - | - |
| 4 | 294.2 | 107.4 | - | - |
| 5 | 517.1 | 188.7 | - | - |
| 10 | 618.1 | 225.6 | - | - |
| 15 | 820.0 | 299.3 | 0 | - |
| 20 | 1269.6 | 463.4 | 449 | 459 |
| 25 | 2149.2 | 784.5 | 1329.2 | 1,358 |
| 30 | 1971.4 | 719.6 | 1151.4 | 1,176 |
| 35 | 1905.4 | 695.5 | 1085.4 | 1,109 |
| 40 | 1903.0 | 694.6 | 1083 | 1,107 |
| 45 | 1896.8 | 692.3 | 1076.8 | 1,100 |
| 50 | 1862.2 | 679.7 | 1042.2 | 1,065 |

Note 1: Hoskissons Coal Seam (HCS) kh = 0.002, Arkarula Formation (Ark) kh = 0.003
Note 2: Based on daily water requirements of 820$m^3$/day

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

**Scope 1 Emissions**

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

**Scope 2 Emissions**

Those emissions result which relate to the generation of purchased electricity consumed in its owned or controlled equipment or operations. Emission source (iii) is considered a Scope 2 emission. In the original greenhouse gas assessment completed by Heggies (2007), this emission source was considered to be a relatively minor source of greenhouse gas emissions. However, with the introduction of the reverse osmosis water conditioning plant, there will be a significant increase in Scope 2 greenhouse gas emissions.

**Scope 3 Emissions**

Those emissions which do not result from the activities of the Proponent, although arise from sources not owned or controlled by the Proponent. In the case of the Project, this includes the transportation of product coal and the combustion of that coal, either domestically or overseas. Emission sources (iv) and (v) are considered Scope 3 emissions.

The results of the greenhouse gas assessment indicate that the total annual emissions of $CO_2$-Equivalent as a result of the Project operations are predicted to be of the order of 7.397Mt of $CO_2$-Equivalent per annum. This figure is inclusive of both transportation emissions and emissions associated with the burning of the coal at its end-use. Previous calculations of total annual emissions conducted in Heggies (2007), without consideration of the water treatment plant, indicated emissions to be 7.395Mt of $CO_2$-Equivalent per annum.

Taking into account the operation of the reverse osmosis water conditioning plant, as well as those emissions considered above, the total annual $CO_2$-Equivalent emissions are calculated to be 9.461Mt per annum. Without consideration of the water treatment plant, the emissions calculated in Heggies (2007) to be 9.446Mt per annum based on a review of the proposed 50 year mine life.

This indicates that the operation of the water treatment plant at the Project Site will result in an increase of approximately 2kt in emissions of $CO_2$-Equivalent per annum on the total greenhouse gas emissions calculated in Heggies (2007).

A comparison of the predicted annual average and potential maximum (worst case) emissions from the Project Site (including water treatment operations) for combined Scope 1 and 2, Scope 3 and Total $CO_2$-Equivalent emissions are presented in **Table 3.6**. Additionally, greenhouse gas emissions for each Scope are compared against estimated total Australian and International emissions of $CO_2$-equivalent, where relevant. It is noted that total Australian emissions for 1990 and International emissions for 2000, estimated to be 551.9Mt $CO_2$-equivalent (AGO, 2006) and 33,666Mt $CO_2$-equivalent (WRI, 2005) respectively, have been used in this comparison.

**Table 3.6**
**Comparison of Project Emissions of Greenhouse Gases with Australian and International Emissions**

| Emissions Estimation Period | Scope 1 & 2 Emissions $CO_2$-e (%-age Comparison with Australian 1990 emissions[1]) | Scope 3 Emissions $CO_2$-e (%-age Comparison with International 2000 emissions[2]) | Total Project Emissions $CO_2$-e (%-age Comparison with International 2000 emissions[2]) |
|---|---|---|---|
| Annual Average | 120kt (0.022%) | 7.3Mt (0.022%) | 7.4Mt (0.022%) |
| Worst Case Year (Potential Project Total/50years) | 137kt (0.025%) | 9.3Mt (0.028%) | 9.4Mt (0.028%) |

1: From AGO (2006), *National Greenhouse Inventory 2004*
2: From WRI (2005), *Navigating the Numbers – Greenhouse Gas Data and International Climate Policy*

### 3.3.3 Conclusions

The results of the greenhouse gas assessment based on the preferred project description would have minimal impact on the overall emissions of greenhouse gas attributable to the project.

# 4 NOISE

## 4.1 Introduction

Following the receipt of submissions to the *Environmental Assessment* for the Narrabri Coal Project, the Proponent committed to enlarging the mine entry box cut to enable a third drift to be excavated from the surface to the underground mine workings. This third drift would be used exclusively for mine ventilation purposes.

Given the altered location of the ventilation fan, the probable change in noise levels received at the previously assessed non-project related residences was remodelled. Section 4.2 presents an analysis of the revised modelling results. **Figure 4B.27** (preferred) presents the revised Project Site layout and noise contours predicted under worst-case conditions (inversion). The inversion condition was used as this allows direct comparison to a similar figure (Figure 6) presented within Part 7 of the *Specialist Consultant Studies Compendium* (Spectrum, 2007).

## 4.2 Revised Modelling Results

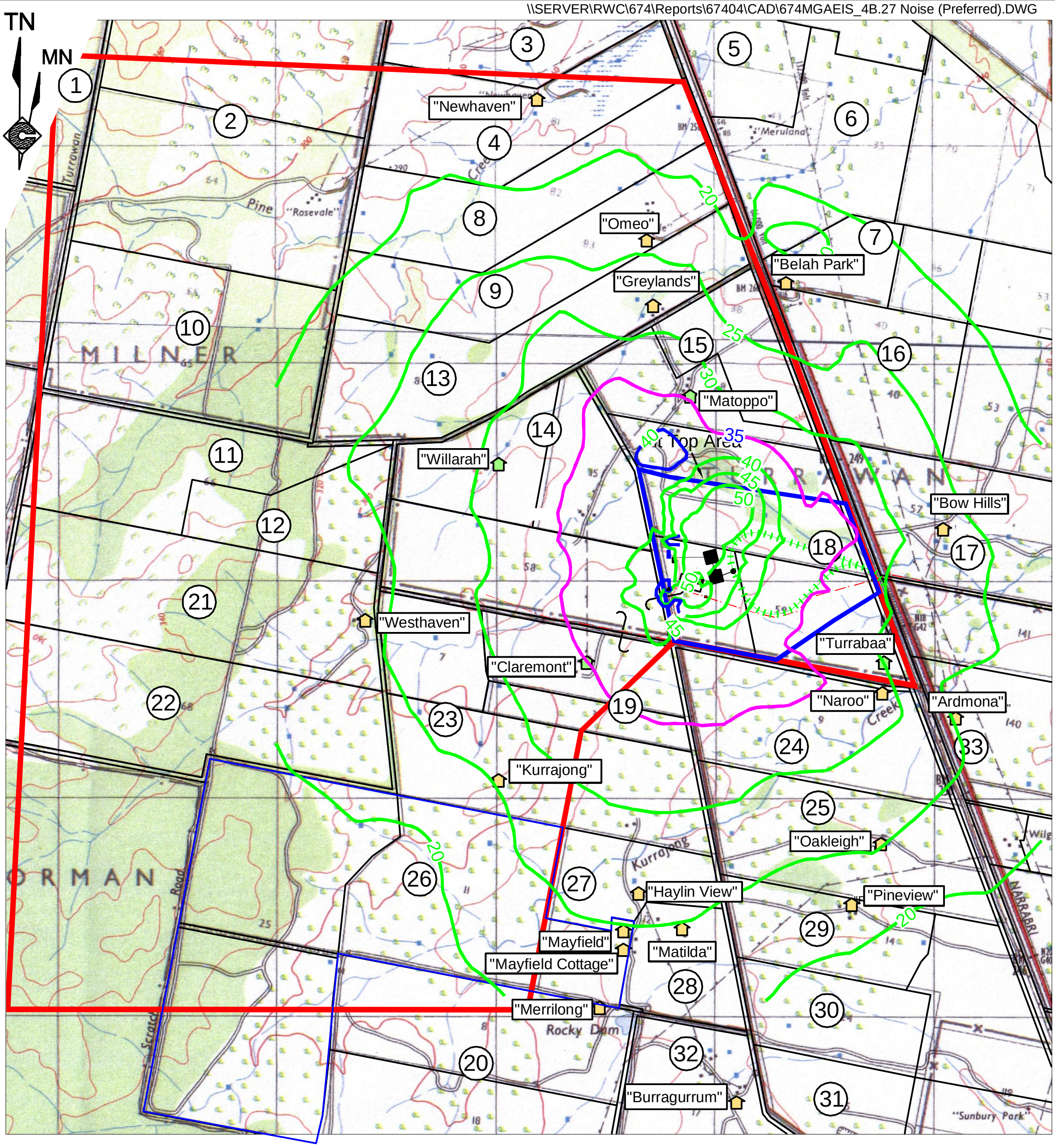
### 4.2.1 Introduction

The impact of the altered ventilation infrastructure on noise levels received at non-project related residences surrounding the proposed Project activities was modelled in two different ways. In both cases, an unattenuated sound power level of 116dB(A) emitted from a height of 10m above the floor of the box cut at the entry to the ventilation drift was used to simulate the operation of the ventilation fan. It is noted that the top of the fan unit would be approximately 20m below but close to the western face of the box cut and approximately 18m bellow the top of the eastern face of the box cut.

### 4.2.2 Ventilation Fan Noise Level

An initial modelling assessment was conducted to identify the relative noise contribution of the ventilation fan at the nearest non-project related residence. Noise calculations were conducted for each of the four meteorological conditions considered by Spectrum (2007).

The worst case noise impact for all meteorological conditions was 20dB(A) contribution to noise received at the “Bow Hills” residence. The noise contribution was less than 20dB(A) at all other receivers. Considering the minor contribution made by the ventilation fan, the overall noise level received during operation of the Project would not increase from the noise levels predicted by Spectrum (2007). In actual fact, received noise levels would be reduced by at least 10dB(A) at the “Westhaven” and “Kurrajong” residences as a consequence of removing the most proximal noise source, ie. fan operation within the Ventilation Shaft Area.




| | LAND OWNERSHIP | | |
|---|---|---|---|
| 1 | N. & F. King | 18 | Narrabri Coal Pty Ltd |
| 2 | C. & M. Clarke | 19 | Narrabri Coal Pty Ltd |
| 3 | A. & L. Grumley | 20 | R. & S. Chappel |
| 4 | K. & J. Scott | 21 | A. Castro |
| 5 | W. & A. Tick | 22 | D.,P.,B. & N. Grnearski |
| 6 | P. Smart | 23 | J. & G. Lennox |
| 7 | G. & C. Sevil | 24 | M. W. Foster |
| 8 | J. & M. Bish | 25 | C. Towns |
| 9 | A. Day | 26 | A. & L. Grumley |
| 10 | F. & A. Desanti | 27 | E. & L. Tuckey |
| 11 | P. & A. Mato | 28 | W. Chapman |
| 12 | R. & M. Cook | 29 | C. & D. Kirkby |
| 13 | M. & D. White | 30 | M. Thomas |
| 14 | Narrabri Coal Pty Ltd | 31 | B. Scott |
| 15 | Narrabri Coal Pty Ltd | 32 | G. & L. Stuart |
| 16 | C. Healion | 33 | P.C. Webb |
| 17 | J. & R. Stieger | | |

REFERENCE
Project Site Boundary
Pit Top Area Boundary
Residence (Project Related)
Residence (Non-project Related)
20 Noise Contour (dB(A))
35 35dB(A) Criterion

SCALE 1:60 000
1 0 1 2 3km

Source: Spectrum Acoustics (2007) - Figure 6

Figure 4B.27 (Preferred)
PREDICTED OPERATIONAL
NOISE LEVELS UNDER
INVERSION CONDITIONS

### 4.2.3 Combined Noise Level

Once the relative contribution of the ventilation fan in its revised position was established, the noise model including all operational noise sources was re-run (this time with the ventilation fan in its revised location) under inversion conditions. The inversion condition was chosen as this is considered a worst-case scenario and would allow direct comparison of the noise contours generated (see **Figure 4B.27** (preferred)) to those presented in Figure 6 of Spectrum (2007).

By comparing **Figure 4B.27** (preferred) to Figure 6 of Spectrum (2007) (also **Figure 4B.27** of the *Environmental Assessment*), it can be illustrated that there may be a minor increase in noise levels received at residences to the north, south and east (although still well below noise criteria of 35dB(A)). The non-project related residences that may experience slightly elevated noise levels include:

- "Naroo";
- "Ardmona";
- "Bow Hills";
- "Oakleigh";
- "Pineview";
- "Heylin View";
- "Greylands";
- "Belah Park"; and
- "Omeo".

Residences to the west of the Pit Top Area, however, would experience reduced noise levels (of at least 5dB(A)). Residences which would receive substantial benefit include:

- "Westhaven; and
- "Kurrajong".

The Proponent has committed to a noise monitoring program to confirm the noise modelling predictions provided by Spectrum Acoustics Pty Ltd. Any exceedances of noise criteria would be addressed immediately by the Proponent.

# 5 OTHER ENVIRONMENTAL IMPACTS

## 5.1 Introduction

The impact(s) of the preferred project description on other aspects of the local environment are briefly considered in this section. The environmental aspects considered include:

- water resources;
- ecology;
- Aboriginal heritage; and
- visual amenity.

## 5.2 Water Resources

By constructing and commissioning a reverse osmosis water conditioning plant well in advance of potential storage capacity shortfalls, the potential for evaporation, treated water storage or brine pond overtopping and contamination of local water courses would be minimised. The construction of a secondary containment embankment downstream of the treated water storage and brine ponds (see **Figure 2.5 (preferred)**), using additional material excavated from the box cut, would provide for containment of any spill from these ponds before it reached Tributary 2 of Kurrajong Creek.

Monitoring would assist in identifying any leaking or seepage from the ponds with remediation measures including pond emptying, material excavation and pond re-lining to be implemented immediately. The detailed procedures for implementation of remediation measures would be presented within a Saline Contamination Contingency Plan to be prepared within 12 months of commencement of coal extraction.

After consideration of the net benefit to management of water resources that would be provided by the construction of a reverse osmosis water conditioning plant and the additional controls committed to by the Proponent, the likely impact on water resources as a result of the preferred project description is considered minimal.

## 5.3 Ecology

The preferred project description would provide a net benefit to local ecology over the Project description presented in the *Environmental Assessment* given the avoidance of disturbance to remnant native vegetation within the previous Ventilation Shaft Area.

## 5.4 Aboriginal Heritage

Given there would be no additional disturbance associated with the preferred project description, there would be no additional impact on local or regional Aboriginal heritage.

## 5.5 Visual Amenity

The following changes to local visibility would occur as a consequence of operation of the Project as per the preferred project description.

(i) Activities within the previous Ventilation Shaft Area would no longer be undertaken and the remnant vegetation would remain undisturbed.

(ii) A secondary containment bund would be constructed within the rail loop with additional overburden excavated from the extended box cut.

(iii) A small reverse osmosis water conditioning plant is likely to be constructed within the rail loop.

The new structures within the rail loop would be largely screened by the vegetated perimeter amenity bund and so would have little impact on visual amenity. Ultimately, the relocation of the ventilation fan to a drift entry within the box cut (see **Figure 2.11** (preferred)) would provide a net benefit to impacts on visual amenity as it would remove the necessity for disturbance to the remnant vegetation within the previous Ventilation Shaft Area.

# 6 CONCLUSION

Impacts associated with the preferred project description would be limited to minor changes to the predicted noise emissions generated by the Project, changes to the management of saline water within the Pit Top Area and a small increase in greenhouse gas emissions.

The benefits would include:

- retention of remnant native vegetation within the previous Ventilation Shaft Area;
- greater security over the management of dewatered mine in-flows;
- reduced noise levels at residences to the west and south of the Pit Top Area;
- reduced particulate matter emissions at residences to the west and south of the Pit Top Area; and
- improved visual amenity associated of the Project Site.

The preferred project description therefore provides for reduced impacts on the local environment.