

In accordance with the requirements of the *Water Management Act 2000*, which requires any access to water within a groundwater source included within a Water Sharing Plan to be licensed, the Proponent holds Water Access Licence (WAL) AL811436, with an annual entitlement of 248ML from the Intake Beds of the Great Artesian Basin groundwater source.

The Proponent also holds an Aquifer Interference Licence (N<sup>o</sup> 90BL254679) for 818ML for recovery of groundwater from Gunnedah Basin aquifers.

#### **1.4.3.2 Status of Existing Operations**

##### **Pit Top Area**

Following the receipt of PA 05\_0102 in November 2007, ML 1609 in January 2008, EPL 12789 in February 2008 and the preparation of a number of environmental management plans to the satisfaction of the Director-General for the Department of Planning, site works on the Pit Top Area commenced on 7 April 2008. **Figure 1.5** provides an aerial photograph (dated 19 November 2008) identifying the various completed components.

##### **Completed Components**

The Stage 1 components of the Narrabri Coal Mine completed to date include the following.

- Mine access road.
- Main office, administration area and light vehicle car park.
- Electrical sub-station.
- Equipment laydown area.
- ROM coal and product coal pad hard stands.
- Box cut and mine portals.
- Amenity bund.
- Rail loop.
- Water storage and evaporation dams (lined).
- Explosives magazine.

Each of these components would be operated throughout the life of the Narrabri Coal Mine with their operation integral to the increased production achieved through the Longwall Project.

##### **Outstanding Components**

At the time of completion of the *Environmental Assessment* for adequacy assessment, the following components, and estimated date of completion, remained outstanding to complete Stage 1 of the Narrabri Coal Mine.

- Construction of the coal crushing station – October 2009.
- Completion of the mine drifts to pit bottom – November 2009.
- Installation of the drift conveyor system – November 2009.



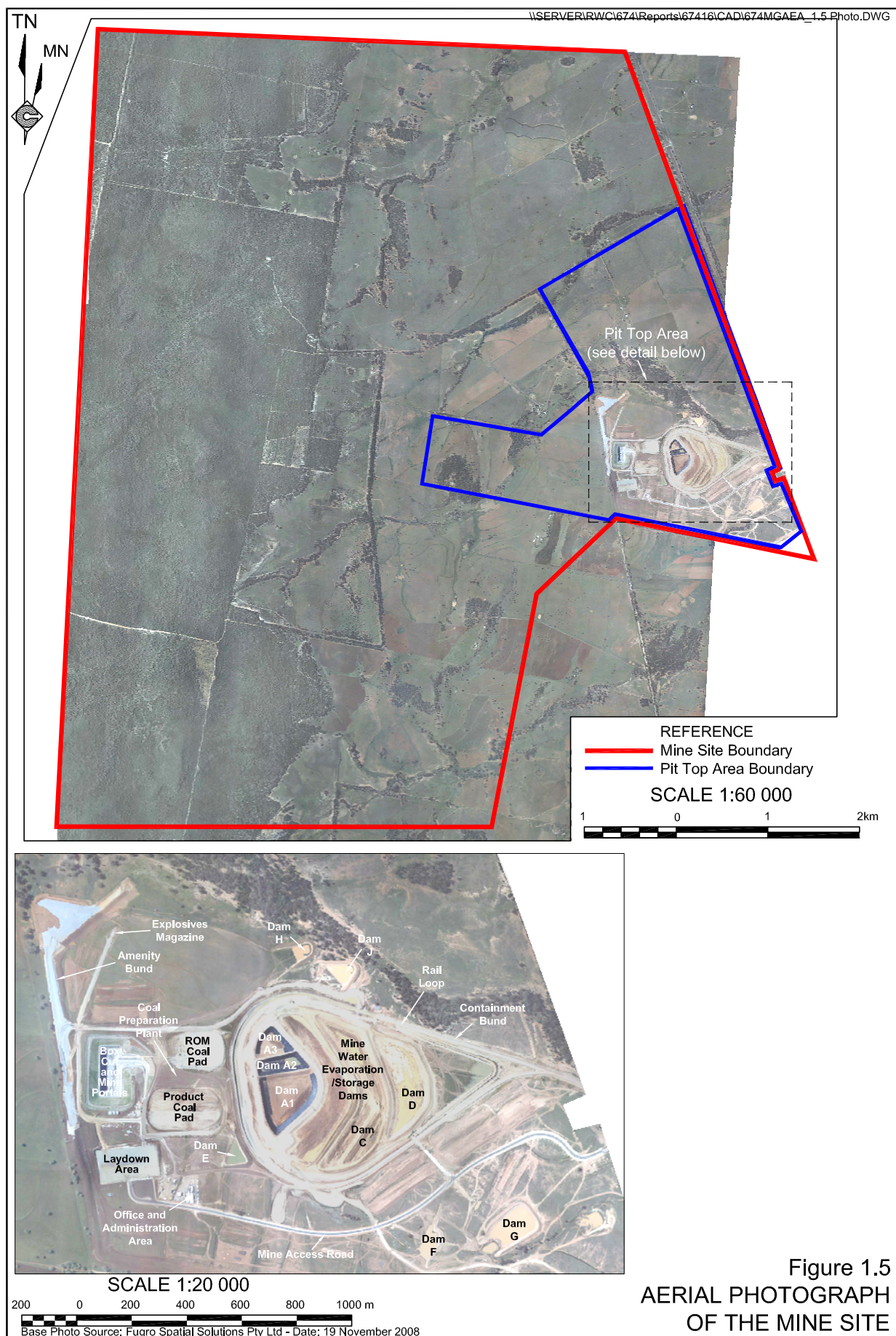


Figure 1.5  
 AERIAL PHOTOGRAPH  
 OF THE MINE SITE



- Construction of conveyor system on the coal pads – November 2009.
- Installation of the train load-out bin and train loader – November 2009.
- Commencement of coal production and first despatch from the Mine Site by rail – January 2010.

These components would also be integral to long term operations of the Narrabri Coal Mine.

#### **1.4.3.3 Environmental Management, Documentation and Performance**

##### **1.4.3.3.1 Environmental Management and Objectives**

On-going environmental management at the Narrabri Coal Mine, including the Proponent's performance with respect to this document and the implementation of any lease, licence or project approval conditions, is the responsibility of the General Manager of Narrabri Coal Operations Pty Ltd. The Mine Manager is responsible for the integrated implementation of all environmental safeguards identified in the approved Mining Operations Plan and additional documentation developed throughout the life of the mine. The Group Environmental Manager coordinates the day to day environmental activities on the mine site in conjunction with environmental and field staff within the WCL Technical Services Team. The environmental and field support staff report to the Mine Manager, and the Group Environmental Manager (whose responsibilities include managing the compliance of the Narrabri Coal Mine with the environmental conditions of the project approval and other licences and leases). Assistance is provided by specialist consultants, as and when required.

The Proponent is committed to continuing the development and operation of all components of the Narrabri Coal Mine in a responsible and pro-active manner which:

- i) adheres to all conditions of PA 05\_0102, ML 1609 and EPL 12789;
- ii) enables the co-existence of the various land uses in the area;
- iii) is environmentally and socially responsible; and
- iv) minimises any real or perceived impacts on other members of the community.

##### **1.4.3.3.2 Environmental Documentation**

Successful environmental management invariably involves regular, organised documentation to ensure that, irrespective of personnel changes, all aspects of planning, environmental control, monitoring and responses to problems are properly recorded.

The Proponent is committed to the Mining, Rehabilitation and Environmental Management Process (MREMP) managed by the Department of Industry and Investment-Mineral Resources (DII-MR) with input from other relevant government agencies. This process involves the preparation of the following documentation.

- Mining Operations Plan (MOP) – prepared to provide more detailed mining design and operational information for the mine and surface activities. The MOP for the Stage 1 Narrabri Coal Mine was finalised on 31 January 2009 and approved by the DPI-MR on 8 February 2008. An amendment to the MOP relating to additional topsoil storage areas was approved on 21 May 2008.



- Annual Environmental Management Report (AEMR) – prepared to record operational progress and all relevant environmental issues on an annual basis. The first AEMR was submitted to the Departments of Planning, Environment and Climate Change, Water and Energy and Primary Industries and Narrabri Shire Council in May 2009.

In accordance with various conditions of PA 05\_0102, the Proponent operates the Narrabri Coal Mine in accordance with a number of environmental management plans, strategies and monitoring programs. **Table 1.3** summarises the documentation, date of approval and condition against which the documentation has been prepared for Stage 1 of the Narrabri Coal Mine.

**Table 1.3**  
**Environmental Documentation for Stage 1 of the Narrabri Coal Mine**

Document Title	Date	Comment
Interim Surface Water Management Plan	Feb 2008	Prepared in compliance with Conditions 3(8) to 3(10) of PA 05_0102
Noise Monitoring Program	Dec 2007	Prepared in compliance with Condition 3(14) of PA 05_0102
Blast Monitoring Program	Dec 2007	Prepared in compliance with Condition 3(22) of PA 05_0102
Air Quality Monitoring Program	Dec 2007	Prepared in compliance with Condition 3(24) of PA 05_0102
Aboriginal Cultural Heritage Management Plan	Dec 2007	Prepared in compliance with Condition 3(33) of PA 05_0102
Energy Savings Action Plan	Oct 2008	Prepared in compliance with Condition 3(38) of PA 05_0102
Waste Management Plan	Dec 2007	Prepared in compliance with Condition 3(41) of PA 05_0102
Environmental Management Strategy	Dec 2007	Prepared in compliance with Condition 4(1) of PA 05_0102
Environmental Monitoring Program	Jan 2009*	Prepared in compliance with Condition 4(2) of PA 05_0102
Note *: Lodged with the Department of Planning in January 2009		
Source: Narrabri Coal Operations Pty Ltd		

The Proponent has also prepared a Construction Phase or Interim Water Management Plan, to account for the requirements of Condition 3(3) and 3(7) of PA 05\_0102 as they relate to site establishment. This document was approved in February 2008. The Water Management Plan is currently being modified to account for the commencement of production late in 2009.

A Landscape Management Plan, incorporating a Rehabilitation Management Plan and Mine Closure Plan in accordance with Condition 3(29) of PA 05\_0102, is currently being prepared and is expected to be completed in August 2009. A Greenhouse Gas Minimisation Plan is also still to be prepared for the Narrabri Coal Mine and is due for completion by October 2009 (prior to the commencement of production).

#### **1.4.3.3 Environmental Performance and Monitoring**

Since the commencement of activities on ML 1609, the Proponent has monitored noise, vibration, air quality, groundwater and surface water to determine compliance with the conditions of PA 05\_0102 and EPL 12789. **Figure 1.4** identifies the locations of all environmental monitoring undertaken on and adjacent to the Mine Site. The environmental performance of the Stage 1 operations to date can therefore be assessed using the completed monitoring data and a review of cultural heritage management and complaints received from the general public.



## Noise Monitoring

Condition 3(12) of PA 05\_0102 states:

*“The Proponent shall ensure that the noise generated by the project does not exceed the levels set out in Table 1 at any privately-owned residence.*

Location	Day	Evening	Night	
	LAeq(15 minute)	LAeq(15 minute)	LAeq(15 minute)	LA1(1 minute)
All privately owned residences	35	35	35	45

Table 1: Impact assessment criteria dB(A).”

In addition to monitoring undertaken on construction equipment (prior to entry onto ML 1609) to ensure compliance with sound power levels defined in the Noise Monitoring Program for the Stage 1 operations, and in response to a complaint from an adjacent property owner (“Kurrajong”), an initial construction noise monitoring event was undertaken on 15 May 2008 by acoustic consultants, Spectrum Acoustics. Monitoring on this occasion measured the  $L_{Aeq(15 \text{ minute})}$  noise level (at the boundary of the “Claremont” and “Kurrajong”<sup>1</sup>) to be 26dB(A), well below the noise criterion for construction noise.

Further construction noise monitoring was undertaken on 26 June 2008, this time including all nominated receiver locations as specified in the Noise Monitoring Program. This monitoring identified a 1 decibel (dB) exceedance at “Westhaven” (monitoring location N2), a 3dB exceedance at “Greylands” (monitoring location N4) and 13dB exceedance at “Kurrajong” (monitoring location N5) due to the effects of an inversion condition much stronger than originally assumed in the noise assessment prepared for the Stage 1 operations. Notably, noise measurements taken following the completion of the inversion event were up to 18dB less than those measured whilst the inversion conditions prevailed and complied with the requirements of Condition 3(12).

Following the receipt of results from this monitoring event, the frequency of monitoring at the “Kurrajong” monitoring point was increased in an effort to further assess the extent of inversion impacts early of a morning. The effects of the much stronger than anticipated inversion event were confirmed during monitoring on 11 July 2008, after which the Proponent modified its start-up sequence to reduce noise-related impacts at the “Kurrajong” residence during early morning inversion events.

Whilst the noise monitoring program has identified noise levels in excess of the criteria of Condition 3(12) of PA 05\_0102, the following is noted.

- The atmospheric conditions present at the time of monitoring, with inversion strengths of up to 6°/100m, has resulted in the monitoring being outside the relevant meteorological conditions nominated by the NSW Industrial Noise Policy. On this basis, the monitoring results cannot be classified as an exceedance of PA 05\_0102 criteria.

<sup>1</sup> The property owner has denied access to the “Kurrajong” property as such all noise monitoring in relation to the “Kurrajong” property has been undertaken from the boundary of the “Claremont” and “Kurrajong” properties.



- These increased strength inversion events are expected to be of short term duration during the winter period. Notably, most surface construction activities on the Mine Site have now been completed, reducing the potential for higher levels of noise generation.
- Notwithstanding the two points above, the Proponent has modified its operations to reduce the noise levels received at the residences surrounding the Mine Site and increased the frequency of monitoring to better understand the impacts of local meteorological conditions of noise propagation.

### Air Quality Monitoring

Deposited dust levels have been recorded at eight monitoring locations around the Mine Site since January 2006. Considering only the monitoring results recorded since the commencement of the Narrabri Coal Mine, and excluding those results which are likely to be erroneous, the monitoring results demonstrate that dust deposition criteria for the Stage 1 operations have been met with the monthly average not exceeding 3.7g/m<sup>2</sup>/month at any non-project residence surrounding the Pit Top Area. **Table 1.4** provides a summary of the results of deposited dust monitoring completed for the Stage 1 Narrabri Coal Mine since the commencement of operations in April 2008.

**Table 1.4**  
**Operation Deposited Dust Monitoring Results<sup>1</sup>**

Date	Monitoring Location <sup>2</sup>							
	ND1	ND2	ND3	ND4	ND5	ND6	ND7	ND8
April 08	2.5	1.1	0.9	1.2	1.7	1.0	1.0	0.6
May 08	3.5	2.6	2.2	2.1	2.3	1.0	0.6	1.5
June 08	4.2	1.7	3.5	0.9	1.7	0.4	1.3	0.6
July 08	3.1	0.6	4.4	0.5	1.9	0.4	0.3	0.3
August 08	1.2	0.5	3.6	1.6	3.3	0.4	0.5	0.5
September 08	3.8	1.4	1.4	8.6	4.3	1.0	0.8	0.6
October 08	<u>28.6</u>	0.8	0.8	<u>10.9</u>	1.9	4.6	0.9	0.6
November 08	<u>13.1</u>	1.6	0.9	<u>24.9</u>	1.3	1.5	1.4	1.1
December 08	2.2	1.3	0.8	<u>15.6</u>	1.5	2.3	1.1	1.1
January 09	3.2	2.3	1.4	<u>27.9</u>	1.9	2.6	0.8	1.6
February 09	1.8	1.9	0.5	9.4	2.0	<u>13.8</u>	1.0	0.8
March 09	0.6	<u>13.8</u>	3.1	5.1	<u>35.5</u>	6.6	3.6	3.5
<b>Average</b>	<b>2.6</b>	<b>1.4</b>	<b>2.0</b>	<b>3.7</b>	<b>2.2</b>	<b>2.0</b>	<b>1.1</b>	<b>1.1</b>
Note 1: maintained since Stage 1 construction activities commenced								
Note 2: see <b>Figure 1.4</b>								
<i>Italics = excluded results – considered erroneous</i>								
Source: Narrabri Coal Operations Pty Ltd								

Particulate Matter (PM<sub>10</sub>) monitoring has been undertaken from High Volume Air Samplers located adjacent to the “Turrabaa” (ND1) and “Claremont” (ND8) residences. A single exceedance of the 24 hour PM<sub>10</sub> criteria of 50µg/m<sup>3</sup> was recorded at ND8. The annual average concentration at both locations, however, is well below the criterion of 30µg/m<sup>3</sup>. **Table 1.5** provides a summary of the results of PM<sub>10</sub> monitoring completed for the Stage 1 Narrabri Coal Mine since the commencement of operations in April 2008.





**Table 1.5**  
**PM<sub>10</sub> Monitoring Results**

Date	Monitoring Location <sup>1</sup>	
	ND1	ND8
April 08	15, 1, 7, 1, 1	14, 30, 1, 20
May 08	9, 3, 7, 3, 3	33, 25, 70, 28, 12
June 08	2, 2, 2, 1, 4	3, 24, 2, 1, 4
July 08	6, 3, 1, 6, 3	7, 1, 5, 11, 2
August 08	4, 1, 3, 14, 7	3, 6, 10, 18, 13
September 08	3, 1, 10, 23, 9	4, 3, 12, 35, 11
October 08	26, 8, 9, 16, 12	38, 10, 17, 37, 14
November 08	19, 9, 3, 3, 3	37, 33, 11, 3, 10
December-08	9, 15, 14, 9, 14, 28	16, 10, 15, 12, 13, 31
January 09	21, 18, 17, 13, 14	25, 20, 18, 15, 17
February 09	17, 20, 2, 11	23, 18, 5, 16
Annual Average	11.2	16.1
Note 1: see Figure 1.4		
Source: Narrabri Coal Operations Pty Ltd		

The air quality monitoring results have illustrated the effectiveness of the dust suppression techniques used on the Mine Site.

#### Surface Water Monitoring

Since the commencement of construction activities for Stage 1, there have been no discharge events from the Pit Top Area and consequently no monitoring of water against discharge limit criteria of EPL 12789.

The drainage lines which run through ML 1609, namely Kurrajong and Pine Creeks and their tributaries, are ephemeral and only flow during and immediately following significant rainfall events. The opportunity to sample water from these drainage lines has only occurred on four occasions, once in August 2006 prior any construction activities within the Pit Top Area and then in September 2008, December 2008 and February 2009 whilst construction activities were ongoing on the Pit Top Area. **Table 1.6** provides a summary of the Total Suspended Solids (TSS) measured at the surface water monitoring sites on each occasion.

**Table 1.6**  
**Total Suspended Solids Monitoring Results**

Monitoring Location <sup>1</sup>	Date			
	31/07/2006	23/09/2008	29/12/2008	14/02/2009
KCUS	22	168	NS	123
KCDS	163	150	26	132
KC1US	15	32	48	NS
KC1DS	39	NS	NS	142
KC2US	84	35	17	14
KC2DS	21	444	NS	1130
PC1	NS	294	NS	57
PC	NS	62	NS	38
Note 1: See Figure 1.4				
Source: Narrabri Coal Operations Pty Ltd				

NS = No Sample



Analysis of the results presented in **Table 1.6** indicates that the TSS level at the downstream monitoring locations has been elevated above that at the corresponding upstream monitoring location. Whilst this may be due to factors external to the construction activities on the Mine Site, it suggests that managing surface water flows on the Mine Site is likely to be an ongoing issue for the Longwall Project. Once construction is complete and the Landscape Management Plan fully implemented, erosion issues would be minimised throughout the ongoing operation of the mine.

Based on the limited monitoring undertaken to date, surface water management on the Mine Site requires further assessment and potentially additional controls.

### **Groundwater Monitoring**

The results of groundwater quality monitoring at the 20 piezometers on and surrounding the Mine Site indicates the box cut and drift development is having no impact on local groundwater levels.

Water quality and standing water level (SWL) monitoring will continue over the life of the mine in accordance with an approved environmental monitoring program, however, at this time the Stage 1 operations are not having any noticeable impact on groundwater quality or SWL.

### **Blast Monitoring**

A total of four surface blasts were initiated within the Pit Top Area for the development of the box cut and rail loop. All blasts remained well within compliance parameters with the highest air overpressure recorded being 113.3dBL and highest ground vibration being 1.44mm/s. No further surface blasting is required for the development of the Narrabri Coal Mine although some underground blasting is required during the current drift excavation and may be required when constructing the bores for the ventilation shafts, particularly when traversing through the basalt sill (at least 100m below ground level).

#### **1.4.3.3.4 Aboriginal Cultural Heritage Management**

Throughout the construction phase of the development, all soil stripping activity was undertaken in conjunction with an Aboriginal Cultural Heritage Management Plan (ACHMP), prepared in conjunction with the Narrabri Gomeroi Traditional Owner Group, and supported by the Narrabri Local Aboriginal Land Council (LALC). Aboriginal Site Monitors were present to observe all soil stripping activity and monitor for any Aboriginal artefacts. No additional artefacts to those identified prior to construction were found throughout the site establishment and construction period. Those sites previously identified were appropriately signed and fenced, in accordance with the ACHMP, to avoid disturbance.

#### **1.4.3.3.5 Complaints Management**

Since the commencement of operations, the Proponent has received a total of 11 complaints. Ten of these complaints have been received from the owner of the “Kurrajong” property, with nine of these in relation to noise levels. As noted in Section 1.4.3.3.3, elevated noise levels during the early morning have occurred as a result of the local inversion condition being more severe than predicted as part of noise modelling incorporated in the Stage 1 *Environmental Assessment*. Actions have been taken by the Proponent to address this issue, including





modifying the equipment start-up sequence and monitoring on a more frequent basis to confirm compliance with noise criteria. Monitoring has since reverted back to quarterly on the basis of ongoing compliance with noise levels since October 2008.

Subsequent to the implementation of these actions, further noise-related complaints have been received from the owner of the “Kurrajong” property. The Proponent has liaised with the Department of Environment, Climate Change and Water and the Department of Planning in relation to these noise complaints and possible actions that could be taken. Notably, the Proponent installed and monitored from a “Barn Owl” real time and directional noise monitoring station over the period May-June 2009 to identify whether noise levels from the Pit Top Area of the Mine Site were exceeding the nominated noise criteria. The results of the “Barn Owl” monitoring has indicated noise levels at the “Kurrajong” residence would have been within compliance limits throughout the monitoring period. A formal report on the Barn Owl results has been provided to the Department of Planning and Department of Environment, Climate Change and Water.

A further complaint was received in relation to ARTC vehicles parked adjacent to the rail line obscuring views of the line from the crossing. Upon receipt of the complaint, the subject vehicles were moved accordingly to ensure sufficient line of sight to the rail line. Procedures were adopted to avoid a recurrence of this incident.

The response(s) to complaints received by the Proponent illustrates environmental management and performance on the Mine Site is generally very good.

#### **1.4.4 Background to the Accelerated Progression to Stage 2**

Following the submission of the application for project approval and the accompanying *Environmental Assessment* for Stage 1 (RWC, 2007), NCOPL continued its geological exploration and technical studies to evaluate the feasibility of converting the continuous miner operation to a longwall mining operation. The Proponent’s intent to pursue this evaluation was outlined in the *Environmental Assessment* for the Stage 1 project where it was noted that the required studies would be completed over a period of 2 to 3 years. Since the initial submission of the Stage 1 Environmental Assessment for adequacy assessment (in July 2006), a range of geological exploration and related technical studies have been completed, all of which support, albeit with a range of design and operational requirements, the development of a longwall mining operation. The principal studies relied upon to date in the technical evaluation of the proposed longwall mining operation are as follows.

- Belford Dome Resources – Geological Report. *This initial geological investigation provided a general understanding of the geological environment existing within the Mine Site and provided baseline information for subsequent resource reports and other aspects of mine design.*
- SRK Consulting (Australasia) Pty Ltd – JORC Assessment of Coal Resources. *This assessment compiled the information available from exploration on the coal resources of the Hoskissons Seam available for exploitation within ML 1609. Concentrating on the geological and quality aspects of the deposit, the assessment provided information on the resource required for use in detailed mine planning.*



- SRK Consulting (Australasia) Pty Ltd – aeromagnetic survey of coal seam floor contours. *The report provided information on a technique used to determine the potential presence of igneous and other features that may otherwise not be detected by conventional drilling means. Such features, if present, would severely limit or prevent the use of longwall mining equipment. As a result, greater confidence can be placed on the geological reports prepared for the resource, which in turn impacts on mine design.*
- Mining Geotechnical Services Pty Ltd – Geotechnical Assessment. *An assessment of the geotechnical environment and its impacts on the ground support requirements. This report also provided an assessment of the roadway and pillar design aspects to ensure the safety and stability of the mine openings.*
- SMG – Longwall Mine Scheduling Assessment. *Preliminary mine design and schedule based on the available information on geology, ground stability and the coal resource.*
- Geogas Pty Ltd – Gas and Ventilation Assessment. *This study was completed to provide information on the gas composition and quantity within the mining area. This information has been used to design the mine ventilation and other gas related requirements, eg. drilling and gas drainage of the seam, to ensure that the mine can operate in a safe and efficient manner.*
- Dr Basil Beamish – Spontaneous Combustion Assessment. *This report provided an analysis of the spontaneous combustion potential of the coal to be mined. This information on spontaneous combustion potential has subsequently been used in the design of the mine and associated ventilation systems to minimize the risk of a spontaneous combustion event.*
- Roy Moreby – Mine Ventilation and Gas Drainage Assessment and Recommendations. *With reference to the information obtained on mine gas, spontaneous combustion and preliminary mine design, this report provided recommendations for mine gas drainage and ventilation to ensure a safe environment is maintained for the life of the mine.*
- Palaris Mining – Longwall Mine Design and Schedule. *This report incorporated the information on geology, the coal resource, ground stability, gas composition and spontaneous combustion to provide an optimised mine design and schedule.*
- Ditton Geotechnical Services Pty Ltd – Mine Subsidence Assessment. *With reference to the information compiled on geology and ground stability, and the mine design and schedule provided by Palaris Mining, this report provided an assessment of the impacts of proposed coal extraction on the geological strata above the Hoskissons Seam and at surface. This report is included as Part 1 of the Specialist Consultant Studies Compendium accompanying the Environmental Assessment.*
- Aquaterra Consulting Pty Ltd – Groundwater Assessment. *Incorporating a review of geological exploration data, targeted groundwater monitoring and investigations, local groundwater data and local expertise, an upgraded*



*hydrogeological model was established for the Mine Site and surrounds. The mine design and schedule were then modelled, incorporating information on subsidence impacts on geological strata supplied by DGS (2009), to determine the likely in-flow of groundwater to the mine and therefore dewatering requirements to ensure the operation of a safe mine. This report is included as Part 2 of the Specialist Consultant Studies Compendium accompanying the Environmental Assessment.*

Based on the completion of these studies, the Proponent has obtained a sufficient level of confidence in local geology, ground stability, gas content, spontaneous combustion potential, subsidence and mine in-flow data to enable the completion of mine planning for the proposed Longwall Project. The hydrogeological component and a more detailed understanding of mine in-flows was originally considered to be a significant issue in the design of the longwall mining operation that would require substantial data from the Stage 1 mine workings to accurately predict mine in-flows for Stage 2. However, monitoring of inflows during Stage 1 would be of only limited value, as it would only provide information on inflows under conditions where no significant subsidence occurs. The absence of data under subsidence conditions would not provide any information on the hydrogeological behaviour of the strata in the subsidence zone above extracted panels. This can only be obtained once longwall extraction commences.

The upgraded groundwater model has been calibrated against considerably more groundwater monitoring data than was available during the studies for the Stage 1 *Environmental Assessment*, including more than a year of monthly monitoring records, and further hydraulic testing results. Recently, groundwater level responses were closely monitored during gas extraction trials which involved extended groundwater pumping from gas test wells in the Hoskissons Seam, allowing an assessment to be made of the hydraulic properties on the seam and the drawdown response to pumped extractions, in effect a dewatering trial. This data and the response to extended pumping have been taken into account in the model calibration. Accordingly, the model has been able to predict with greater confidence the likely inflows during longwall extraction. Only limited additional benefit would be gained from monitoring responses to Stage 1 mining without subsidence.

The Proponent was advised that the upgraded model (which has been independently peer reviewed) would be most appropriate to predict mine in-flows under longwall mining conditions. Data on mine in-flows and groundwater levels in surrounding piezometers available from the first two longwall panels could then be used to re-calibrate the longwall groundwater model.

In light of this advice in particular, the Proponent considered it unnecessary to wait until two years of data for Stage 1 mine in-flows is available to initiate the design of the longwall mining operation. Collectively, all assembled data supported, without equivocation, that the approved continuous miner operation could be converted to a longwall mining operation.

Notwithstanding the above approach, it is recognised that all underground mining operations continually review mine in-flow data given its importance to safe and efficient operations. Mine design and schedules would be revised, as required, to accommodate local variations from the data obtained studies.



## 1.5 MANAGEMENT OF INVESTIGATIONS

The preparation of this document 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 the Proponent, Messrs Greig Duncan, Ben Bomford, B.MEng (Hons), Brian Cullen, B.E (Mining) MBA, Mark Dawson, B.Sc. (Hons) and Danny Young, B.Sc (Environmental Science) provided technical information on the proposed longwall mining operations and associated mine management and assisted with finalising the document.

Strong emphasis has been placed upon a multi-disciplinary team approach to the design of the Longwall Project, the description of the existing environment and resultant impact assessment. The following consultancy firms were commissioned by the Proponent to prepare nominated specialist consultant studies for the Longwall Project.

- Subsidence Assessment: Ditton Geotechnical Services Pty Ltd  
(*Mr Stephen Ditton – B.Eng. (Civil/Hons)*).
- Groundwater Assessment: Aquaterra Consulting Pty Ltd  
(*Mr Peter Dundon – M.Sc, B.Sc.*)  
(*Mr Andrew Fulton – M.Sc., B.Sc.*).
- Surface Water Assessment: WRM Water and Environment Pty Ltd  
(*Mr Greg Roads – BE (Hons)*).
- Ecology Assessment: Ecotone Ecological Consultants Pty Ltd  
(*Mr Brian Wilson – B.App.Sc.*)  
(*Mr Steven Cox – B. Appl. Sc. (Hons)*).
- Aboriginal and Non-indigenous Heritage Assessments: Archaeological Surveys & Reports Pty Ltd  
(*Mr John Appleton – BA (Hons)*).
- Noise and Vibration Assessment: Spectrum Acoustics Pty Ltd  
(*Dr Neil Pennington – PhD, B.Sc (Physics), B.Math (Hons)*).
- Air Quality Assessment: Heggies Pty Ltd  
(*Mr Ronan Kellaghan – B.Sc, HDip, M.Sc.*)  
(*Mr Scott Fishwick – B.Sc. (Atmospheric Science)*).
- Soils Assessment: Geoff Cunningham Natural Resource Consultants Pty Ltd  
(*Mr Geoff Cunningham – B.Sc (Hons)*).

In addition to these studies:

- a peer review of the subsidence assessment was undertaken by Dr Bruce Hebblewhite (*PhD, B.E (Mining), Dip AICD*);
- a peer review of the groundwater modelling and Groundwater Assessment was undertaken by Dr Noel Merrick (*PhD, MSc, BSc*); and
- a peer review of the mine's water balance was undertaken by Mr Lindsay Gilbert (*M.App.L, M. Eng Sc, B.E (Civil)*).

Each peer review is incorporated at the end of the Subsidence, Groundwater and Surface Water Assessments respectively (Parts 1, 2 and 3 of the *Specialist Consultant Studies Compendium*).

