

CENTENNIAL COAL COMPANY LIMITED

**MANNERING COLLIERY  
CONTINUATION OF MINING**

**ENVIRONMENTAL ASSESSMENT**

*Prepared by:*

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SINGLETON NSW 2330

March 2007

*for:*

**Centennial Coal Company Limited**

PO Box 1000

TORONTO NSW 2283

## ENVIRONMENTAL ASSESSMENT STATEMENT

### Submission of Environmental Assessment (EA)

Under Section 75H of the *Environmental Planning and Assessment Act 1979*

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#### EA Prepared by

Name: James Bailey  
Qualifications: B Nat Res., MBA  
Company: Hansen Bailey Pty Limited  
Address: PO Box 473  
SINGLETON NSW 2330  
In Respect Of: Manning Colliery Continuation of Mining

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#### Applicant Name:

Centennial Coal Company Limited

#### Applicant Address:

Rutleys Road  
MANNERING PARK NSW 2259

#### Land to be Developed:

See Appendix C of Environmental Assessment.

#### Proposed Development:

Proposed continuation of underground coal mining operations and utilisation of surface facilities as outlined in Section 3.0 of the Environmental Assessment.

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#### Environmental Assessment

An Environmental Assessment for the project is attached.

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#### Certification

I certify that I have prepared the contents of the EA, and to the best of my knowledge:

- it is in accordance with Sections 75E and 75F of the *Environmental Planning and Assessment Act 1979*;
- it contains all available information that is relevant to the Environmental Assessment of the activity to which the statement relates; and
- the information contained in the statement is neither false nor misleading.

Signature:



Name:

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James Bailey  
Director

Date:

March 2007

# EXECUTIVE SUMMARY

## BACKGROUND

Manning Colliery is an underground coal mine which is wholly owned and operated by Centennial Manning Pty Ltd, a fully owned subsidiary of Centennial Coal Company Limited. Manning Colliery is located approximately 40 kilometres south of Newcastle. The Manning Surface Facilities (including administration building, workshops and coal crushing facility) are located nearby to Vales Point Power Station, 3 kilometres south of Manning Park.

Manning Colliery is located within the proclaimed Mine Subsidence Districts of West Lake Macquarie and Swansea - North Entrance and is within both the Lake Macquarie and Wyong Local Government Areas.

Manning Colliery has operated for over 45 years under various ownerships. Due to recent amendments to the *Environmental Planning & Assessment Act 1979*, Manning requires Project Approval under Part 3A, from the Minister for Planning by August 2007 to ensure the continued use of its surface facilities.

This Environmental Assessment has been compiled in support of the Project Approval Application in accordance with the Environmental Assessment Requirements as issued by the Department of Planning.

## THE PROJECT

The Manning Colliery Continuation of Mining Project (the Project) broadly incorporates the components in **Table 1**.

These activities are currently occurring at Manning Colliery. The Project involves the gaining of a contemporary planning approval for current scaled-down operations at the existing mine site. It does not involve the construction of any new or additional infrastructure or the expansion of operations beyond what has previously occurred.

It should also be noted that Manning Colliery is a conventional bord and pillar mine, involving first workings development only. Manning Colliery is specifically designed to avoid any noticeable impacts as a result of mine subsidence. Significantly, no secondary extraction is proposed by the Project. As such, its environmental impact footprint is almost entirely limited to the surface area of its existing infrastructure compound.

**Table 1**  
**Project Summary**

Key Feature	Description
Project Name	Manning Colliery Continuation of Mining
Proponent	Centennial Manning Pty Limited
Local Government Area	Lake Macquarie Shire (87%) and Wyong Shire (13%) of Environmental Assessment Boundary
Project Application Area	Figure 2 – Area shown as Environmental Assessment Boundary and previous workings
Mining Method	Bord and pillar, underground mining of the Fassifern coal seam
Production	Up to 1.1 Million tonnes per annum for up to 10 years generally in accordance with the conceptual mine plan shown in <b>Figure 7</b>
Coal Preparation	Coal is crushed on-site at the Manning Coal Crushing Facility
Infrastructure	All existing surface and underground infrastructure at Manning Colliery, including previous surrounding workings (for ongoing ventilation and access), will continue to be relied upon
Employment	Approximately 90 directly employed persons
Hours of Operation	24 hours per day, 7 days per week
Product Coal Transport	All coal produced is transported via a dedicated conveyor to Vales Point Power Station
Mine Access	Access to Manning's Surface Facilities is off Rutleys Road

## STAKEHOLDER CONSULTATION

An independent stakeholder consultation program was undertaken for the Project which comprised the identification of stakeholders, scoping of issues and the development of appropriate responses to issues of concern. Additionally, the consultation undertaken has provided a two-way mechanism for ongoing communications between Manning Colliery and its neighbours.

Approximately 1,000 individual land holdings were identified as being within or immediately adjacent to the Environmental Assessment Boundary.

Additionally, numerous regulatory agencies, non-government organisations and other stakeholders were also identified as parties who may have an interest in the Project.

Consultation was primarily conducted through the distribution of a Project Newsletter to identified stakeholders.

Presentations to relevant government regulators and discussions with immediate neighbours in close proximity to Manning's Surface Facilities were also undertaken. Minor concerns were raised during consultation by some stakeholders, which included the potential for impacts on surface features, groundwater and surface water resources as a result of subsidence.

A Voluntary Planning Agreement is being negotiated between Manning Colliery and each of Wyong and Lake Macquarie Shire Councils. This Agreement will allow Manning Colliery to contribute monies to both councils to assist with community infrastructure projects, commensurate with annual saleable production levels from the operation.

## ENVIRONMENTAL IMPACT ASSESSMENT

### Introduction

This Environmental Assessment has been completed in accordance with the requirements of Part 3A of the *Environmental Planning and Assessment Act 1979* and addresses both the Environmental Assessment Requirements for the Project (as issued by the

Department of Planning in February 2007) and issues raised through the stakeholder consultation process.

A Risk Assessment approach was implemented in relation to potential environmental impacts from the Project. A summary of the key findings of the Environmental Assessment is provided below. For further detail, please refer to the Environmental Assessment sections and the individual technical reports which are appended to this document.

### Subsidence

A conceptual mine plan formed the basis for the subsidence assessment. It involved first workings in seven loadings forming pillars on 30 metre centres. It also required subsidence in all areas to be unnoticeable at the surface (i.e. less than 20 millimetres).

Coal mining will be conducted in the Fassifern Seam in areas where the overlying Great Northern Seam has not been extracted within the conceptual mine plan. The Fassifern Seam has no records of unpredicted subsidence behaviour related to roof and floor strata failure. Similar mining layouts have been used in the Fassifern Seam at Manning Colliery over the last two years and at Myuna Colliery for 25 years without any reported subsidence impacts or pillar failure.

A geotechnical model has been developed, based on previous assessments conducted for Manning Colliery, which included due consideration of the material properties in and around the roadways. This model was used to predict subsidence of the first workings identified within the conceptual mine plan.

Model predictions show that the maximum vertical subsidence from all mechanisms will be less than 20 millimetres (which is conventionally taken as the onset of mining induced movement or subsidence).

Therefore it has been concluded that there will be no noticeable surface impacts as a result of mining the conceptual mine plan.

## Surface Water

There are a number of major surface water resources within the Environmental Assessment Boundary. These include Pourmalong, Pallamanaba, Wyee and Cobra Creeks, their associated wetland areas and Lake Macquarie.

The environmental footprint of the Manning Surface Facilities will remain unchanged and mining within the conceptual mine plan will have no noticeable surface impacts. As such, there will be no impact on the existing surface water resources identified within the Environmental Assessment Boundary.

A surface water assessment was undertaken for the Project to determine the future water requirements for Manning Colliery. As part of this assessment a detailed water balance was developed for the Project.

Sources of water include water supplied by the Wyong Shire Council, local rainfall run-off from the Manning Surface Facilities and groundwater inflow to the underground workings. Water demands include water for domestic use, machinery wash-down water and water for dust suppression.

No coal washing is undertaken at Manning Colliery. Excess groundwater is pumped to the surface, managed through a settlement pond system and discharged off-site in accordance with the conditions of Manning Colliery's Environmental Protection Licence 191.

All water required for the operation of the Project will continue to be sourced from externally supplied water, as the poor quality (highly saline and turbid) of the inflowing groundwater makes it unsuitable for reuse in mining activities. Previously water usage at Manning Colliery has been recorded at up to 115 Mega litres per annum. The maximum predicted external water demand has been estimated at 70 Mega litres per annum for 1.1 Million tonnes per annum Run of Mine coal.

It is expected that site water usage will continue to decline with the implementation of targeted water management strategies designed to minimise the external water demand.

The maximum mine water surplus predicted to occur is approximately 660 Mega litres per annum in a year of extremely high rainfall which corresponds to an average daily discharge volume of 1.7 Mega litres. Manning Colliery's licensed discharge as permitted by Environmental Protection Licence 191 is 4 Mega litres per day, which will continue to be relied upon due to variability of discharges required from site.

## Groundwater

A groundwater impact assessment was undertaken to assess the potential impacts of the Project on the groundwater resources in the vicinity of the Environmental Assessment Boundary. The assessment took into consideration the current condition (as a result of previous mining), as well as a prediction of the impacts of the project, and cumulative impact of surrounding collieries.

Given that the bord and pillar method of mining is less disruptive to overburden strata than longwall mining, and that even for subsidence associated with longwall mining in the past, it has been shown that the intermediate and upper strata form a barrier to vertical drainage. As such the Project is not predicted to significantly impact on the alluvial and regolith / shallow bedrock aquifers within the vicinity of the Environmental Assessment Boundary.

Groundwater inflow to the mine is predicted to be approximately 515 Mega litres per annum which corresponds to an average of 1.41 Mega litres per day. Environmental Protection Licence 191 permits a discharge of 4 Mega litres per day and therefore it is anticipated that the Project will not result in this licensed discharge volume being exceeded.

The Project will have only minor impacts on the piezometric surface of the Fassifern Seam aquifer. This aquifer has already been depressurised and extensively impacted by previous mining in the area. Additionally, the coal seam aquifers contain poor quality water which has no economic or environmental value.

Of the 15 registered bores within a 6 kilometre radius there are only three that overly the footprint of the Environmental Assessment Boundary.

Based on the extensive studies undertaken in the past at Mannering Colliery and for the Project, and given the ongoing history of mining in the area, it is predicted that the Project will not have significant adverse impacts on these shallow groundwater bores or on any groundwater dependent ecosystems.

## Acoustics

A noise assessment was undertaken to determine the potential noise impacts associated with the Project. This included a survey of existing environmental noise levels at three representative rural residential receiver areas surrounding Mannering's Coal Crushing Facility and an analysis of weather conditions in the area to determine the occurrence of noise enhancing winds and temperature inversions. Underground mining activities will not be audible at the surface and hence are not the subject of this assessment.

No private residences are located within 2 kilometres to the north and west of Mannering's Surface Facilities. The closest residences are located to the east and south and are 0.8 kilometres and 1 kilometre from the Mannering Coal Crushing Facility, respectively.

Mannering Colliery has been operating since the 1960s. At its peak, Mannering produced over 1.7 Million tonnes per annum of Run of Mine coal, and consequently its surface activities were more intense. Since Mannering Colliery's purchase by Centennial Coal Company Pty Limited, the recommencement of scaled-back mining operations and the incorporation of all feasible and reasonable noise control measures (such as the decommissioning of the Coal Crushing Facility exhaust fan and enclosing the rotary breaker) has ensured that Mannering Colliery has not received any noise complaints from its neighbours.

Although not always the dominant noise source, close neighbours are accustomed to some audible noise in certain weather conditions from the Mannering Surface Facilities.

Based on the results of this assessment and considering historical noise levels, environmental noise levels from Mannering Colliery are considered acceptable.

## Blasting & Vibration

No blasting is required to be undertaken on the surface for the Project (i.e. no ventilation shafts are required to be constructed). Therefore, there will be no impacts from blasting and vibration as a result of the Project.

## Air Quality

The air quality assessment considered potential sources of emissions of the Project including emissions from ventilation shafts, coal crushing, coal stockpiling, wind erosion, stacked coal reclamation and the conveyor from Mannering Colliery to Vales Point Power Station.

Mannering Colliery operates a network of five dust deposition gauges within the Mannering Surface Facilities and Delta Electricity also monitors total suspended particulate concentrations in the area. The data from these monitoring programs was reviewed and indicates that the existing air quality surrounding Mannering Colliery complies with the assessment criteria.

The estimated total dust emissions from the Project remain minor, at less than 2 grams per second. Mannering Colliery has not received any complaints in relation to air quality impacts in recent years.

## Greenhouse Gas

There are both direct and indirect sources of greenhouse gas emissions from Mannering Colliery's activities. The direct emissions are from dilute gas emissions from the underground mining process. Indirect emissions are related to the full life cycle analysis of the direct consumption of electricity and diesel at the site. These types of emissions are known as Scope 1 and Scope 2 emissions.

There are also indirect emissions from the downstream burning of the coal product to produce electricity. These are known as Scope 3 emissions. Inclusions of Scope 3 emissions in the Mannering Colliery inventory results in double counting of emissions and is not conventional practice. However, inclusion of Scope 3 emissions has been requested by the Department of Planning.

The approximate average annual emissions from Scope 1 and 2 sources is 584,000 tonnes CO<sub>2</sub><sup>e</sup>. This equates to approximately 0.001 % of Australia's annual emissions, which were 564.7 Million tonnes CO<sub>2</sub><sup>e</sup> in 2004 (National GHG Inventory 2004, May 2006).

The approximate average annual emissions from Scope 3 (downstream burning of the product) is 2.2 Million tonnes CO<sub>2</sub><sup>e</sup>. With an approximate annual global emission rate of 40 Gigatonnes CO<sub>2</sub><sup>e</sup> the burning of the coal product equates to approximately 0.007 % of global greenhouse gas emissions.

It is therefore considered that there is no material affect on national or global greenhouse gas emissions from the Project.

### Traffic

A performance assessment of the Manning Access Road and Rutleys Road intersection has been undertaken for the Project.

Manning Colliery is accessed via a single entrance off Rutleys Road in the suburb of Manning Park. The intersection is within the Wyong Local Government Area and current vehicle usage on the access road consists of Manning employees and service vehicles associated with the operation.

The current workforce at Manning Colliery of approximately 90 full time employees will remain unchanged for the Project. Coal will continue to be transported to Vales Point Power Station via a dedicated overland conveyor and no coal will be transported by road. Traffic generated by Manning Colliery's activities is not expected to increase.

The traffic assessment reveals that the intersection currently operates at an acceptable level with only small delays experienced on the right turn into and out of the Manning Access Road. Under future conditions (i.e. 2016 and 2026) the intersection will continue to operate satisfactorily.

There will be a slight decrease in the operating conditions of the intersection, but not to any extent that will warrant treatment. The future performance

change is due to the natural growth of Rutleys Road and not due to activities resulting from the Project.

### Economics

An economic assessment was undertaken to determine the economic costs and benefits associated with the Project.

The benefit cost analysis compared the Project to the base case of the discontinuation of coal mining, rehabilitation of the mine site and the provision of coal to Vales Point Power Station from other Centennial Coal Company Pty Limited mines.

At a 7% discount rate, the net incremental production benefits of the Project (incorporating direct greenhouse gas costs) will be in the order of \$17 million net present value.

An assessment of the likely impacts on the regional economy found that the Project is estimated to make the following contributions to the Newcastle economy:

- \$53 million in annual direct and indirect regional output or business turnover;
- \$27 million in annual direct and indirect regional value added;
- \$13 million in annual household income; and
- 182 direct and indirect jobs.

### Visual

A visual impact assessment was undertaken to determine the impacts of the surface infrastructure at Manning Colliery on the surrounding area. The surface infrastructural remain relatively unchanged throughout the life of the Project. The conceptual mine plan will not have any visual impact as it has been designed to not cause any noticeable surface impacts.

The visual impact was determined utilising a combination of visual effect and sensitivity from four potential receptors within 2 kilometres of the product coal bin (highest potential visual point at Manning Colliery Surface Facilities). The surrounding topography limits views to the Manning Surface

Facilities which is situated at approximately 22 metres Reduced Level.

All potential sensitive viewing locations adjacent to the operation are located in low lying areas (ranging from 12 to 20 metres Reduced Level). Dense and well developed vegetation provides an effective visual screen between the Project and surrounding neighbours. The dominant height of woodland vegetation in the immediate vicinity is approximately 10 metres, effectively reducing the visual impact to very low.

The visual assessment concluded that there are no locations surrounding Manning Colliery that will have views of the Manning Surface Facilities.

### Rehabilitation & Final Land Use

At mine closure, the Manning Surface Facilities will be decommissioned and the site will be rehabilitated using endemic native plant species in consultation with the landholder (Delta Electricity) and relevant regulators. Rehabilitation plans will consider any requirements for closure which pertain to the buffer land for Vales Point Power Station.

### Flora & Fauna

The Environmental Assessment Boundary covers terrestrial landscapes as well as coastal lagoons, lakes and estuaries. It consists of a matrix of remnant woodlands, rocky complexes, riparian zones and aquatic and estuarine communities, interspersed with urban and industrial developments. Based on the *Lower Hunter & Central Coast Extant Vegetation Community Map* (HCCREMS 2003), there are four dominant vegetation communities present within the Environmental Assessment Boundary, namely Coastal Plains Smooth-barked Apple Woodland, Redgum Rough Barked Apple Forest, Coastal Plains Scribbly Gum Woodland and Riparian Melaleuca Swamp Woodland. Other vegetation communities present in the EA Boundary include Swamp Mahogany – Paperbark Forest, Mangrove-Estuarine Complex and Melaleuca Scrub communities (HCCREMS 2003).

Database searches were undertaken of the New South Wales Wildlife Atlas, BioNet, PlantNet and FaunaNet for the Environmental Assessment

Boundary (including a 10 kilometre radius) which showed that 1,367 records of 556 flora species have been recorded in the locality. Of these, five species are of conservation significance (Vulnerable or Endangered) under the *Threatened Species Conservation Act 1995*.

This search also revealed 2,286 records for 255 fauna species of which 22 species are listed as Vulnerable or Endangered under the *Threatened Species Conservation Act 1995*.

The *Environment Protection & Biodiversity & Conservation Act 1999* Protected Matters Search Tool found a total of 10 Threatened flora species and 38 Threatened fauna species (including marine species) as potentially occurring within 10 kilometres of the Environmental Assessment Boundary. An additional 42 species are listed as Migratory under the *Environment Protection & Biodiversity & Conservation Act 1999*.

The environmental footprint of the Manning Surface Facilities will remain unchanged and mining within the conceptual mine plan will have no noticeable surface impacts. As such, there will no impact on the existing flora and fauna identified within the Environmental Assessment Boundary.

### Aboriginal Cultural Heritage

A search of the Department of Environment and Conservation's Aboriginal Heritage Information Management System was conducted to identify any known sites of Aboriginal Cultural Heritage. Four known sites were identified within the Environmental Assessment Boundary.

The environmental footprint of the Manning Surface Facilities will remain unchanged and mining within the conceptual mine plan will have no noticeable surface impacts. As such, there will no impact on any of the Aboriginal Cultural Heritage sites identified within the Environmental Assessment Boundary.

### Non-Aboriginal Cultural Heritage

An investigation was undertaken to determine whether any sites of known Non-Aboriginal Cultural Heritage were located within the Environmental Assessment



Boundary. This included a search of the Australian Heritage Database, the New South Wales Heritage Register, relevant heritage legislation as well as both the Lake Macquarie and Wyong Local Environmental Plans. The Morisset Hospital Precinct (including the associated ward facilities, residences and infrastructure) is listed as State Significant under the New South Wales *Heritage Act 1977* and is also listed in the Lake Macquarie Local Environmental Plan 2004.

This identified site is located within the conceptual mine plan for the Project. Mining will have no noticeable surface impacts. As such, there will be no impact on any of the Non-Aboriginal Cultural Heritage sites identified within the Environmental Assessment Boundary.

### **Manning Surface Disturbance Protocol**

As part of the Project, additional mining related infrastructure such as downcast bores, ballast holes, emergency manholes and minor power lines and vehicular access tracks may be required to be constructed as mining progresses in the Environmental Assessment Boundary.

The nature of underground mining does not allow permanent locations for this infrastructure to be determined at this early planning stage. If and when the nature and location of this infrastructure is determined, such minor mining related infrastructure may be determined to be exempt or complying development under State Environmental Planning Policy (Mining).

In circumstances where this is not the case, the Manning Surface Disturbance Protocol will enable the best positioning of any required additional mining related infrastructure from an operational, safety and environmental perspective and ensure that all regulatory expectations are met.

### **PROJECT JUSTIFICATION**

Manning Colliery has operated for over 45 years under various ownerships, utilising both longwall and

bord and pillar methods of mining. Production, manning and environmental impacts have been greater in previous years to that proposed in the Project.

Despite urban encroachment, the mine operates in harmony with its immediate neighbours and has not had any complaints or major environmental incidents since 2002 when the operation was acquired by Centennial Coal Company Pty Limited.

Due to recent amendments to the *Environmental Planning & Assessment Act 1979*, planning approval is sought for Manning's Surface Facilities and current mining operations.

Manning provides a low sulphur (0.34%), preferred product coal to Vales Point Power Station via a purpose built overland conveyor situated on Delta Electricity owned land. No coal will be railed or hauled by public roads.

No private residences exist to the north and west of the Environmental Assessment Boundary with limited neighbours to the east and south at a significant distance to Manning's Surface Facilities.

The economic assessment undertaken for this Environmental Assessment has demonstrated the ongoing benefit to the immediate and surrounding Community. No significant issues have been raised during regulatory consultation or in response to the Project Newsletter which was distributed to over 1,000 individual landholders.

The application of a stringent, contemporary environmental assessment has not identified any significant environmental impacts associated with the Project.

The Project will involve the continuation of mining operations at Manning Colliery via a conceptual mine plan which has been specifically designed to result in no noticeable surface impact. Consequently, the Project has a relatively very small environmental footprint and as such will continue to offer a boutique product coal to the adjoining Vales Point Power Station.

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# 1.0 BACKGROUND

## 1.1 INTRODUCTION

Manning Colliery (Manning) is an underground coal mine which has been owned and operated by Centennial Manning Pty Limited (a wholly owned subsidiary of Centennial Coal Company Limited (Centennial) since 2002). Manning is located approximately 40 kilometres (km) south of Newcastle.

The Manning Surface Facilities (including administration, workshops and the Manning Coal Crushing Facility (CCF)) are located adjacent to Vales Point Power Station, 3 km south of the township of Manning Park (see **Figure 1**). Manning is located within the proclaimed West Lake Macquarie and Swansea - North Entrance Mine Subsidence Districts and is within both the Lake Macquarie and Wyong Local Government Areas (LGAs).

Development of Manning commenced in 1960 in conjunction with the construction of Vales Point Power Station and has previously been known as the Wye State Colliery. Manning has extracted coal utilising both the bord and pillar and longwall mining methods in the Great Northern and Fassifern coal seams for over 45 years (see **Figure 2**).

At peak production, during the 1994-95 reporting period, Manning produced over 1.7 Million tonnes per annum (Mtpa) of Run of Mine (ROM) coal. Manning produces ROM coal which is transported via a dedicated overland conveyor to Vales Point Power Station for domestic electricity generation.

## 1.2 DOCUMENT PURPOSE

Following recent amendments to the *Environmental Planning & Assessment Act 1979* (EP&A Act) Manning is seeking a Project Approval under Part 3A in respect of continued operations of its surface facilities and coal extraction via underground bord and pillar mining methods (the Project).

A Major Projects Application and supporting Manning Project Description Document (PDD) was submitted to the Department of Planning (DoP) in

November 2006 under Section 75E of Part 3A of the EP&A Act. Subsequently, Director-General's Environmental Assessment Requirements (EARs) were issued from DoP for the Project in February 2007 (included in **Appendix A**).

The Environmental Assessment (EA) applies to the EA Boundary (and previous underground workings, as relevant) as shown on **Figure 2** and supports the application for Project Approval.

## 1.3 DOCUMENT STRUCTURE

**Section 2.0** provides relevant information on the existing environmental setting. **Section 3.0** provides a detailed description of the Project with **Section 4.0** introducing the regulatory framework relevant to the Project.

**Section 5.0** details stakeholder consultation undertaken and issues raised. Specifically, this section lists the EARs and identifies where these issues are addressed in the EA.

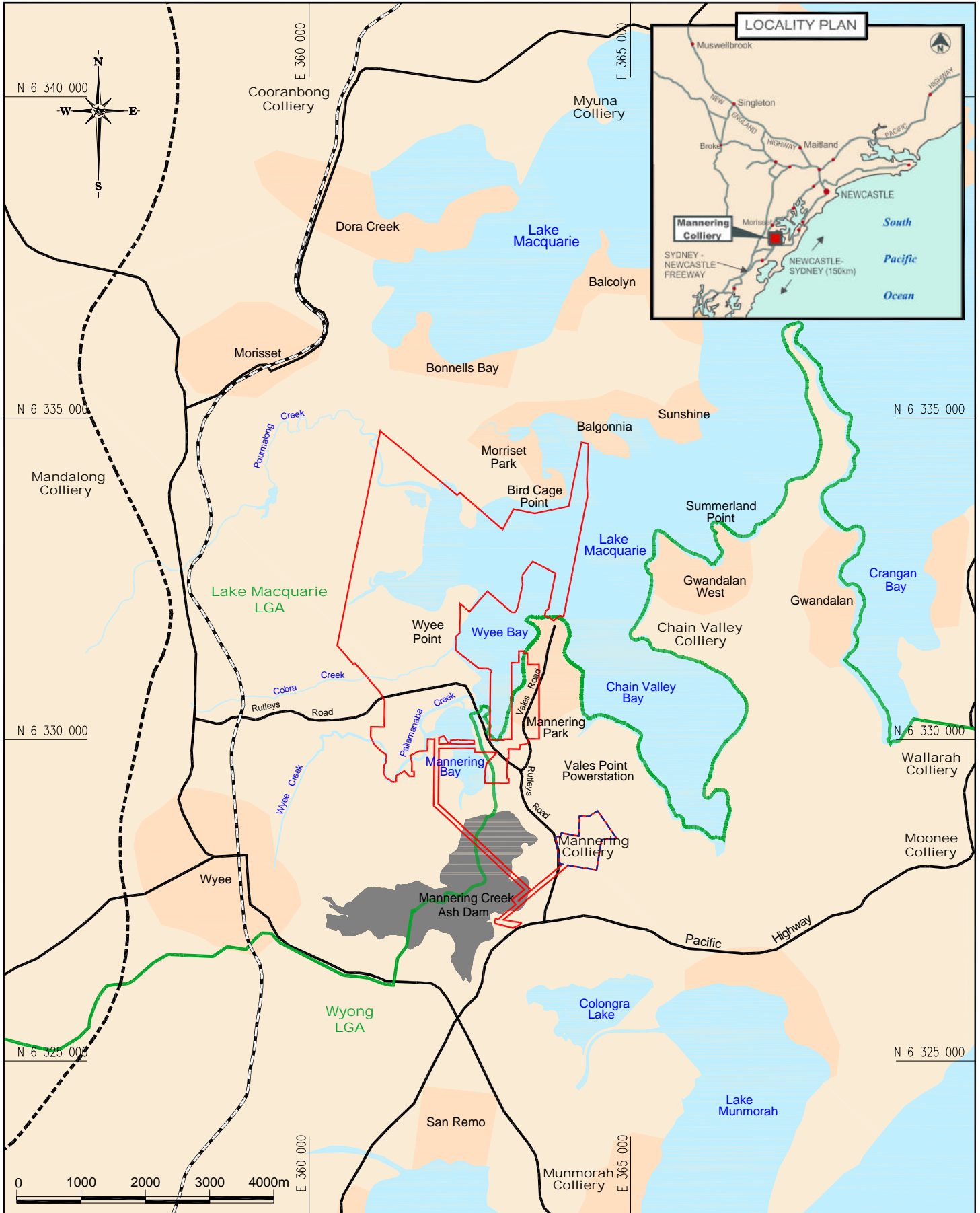
**Section 6.0** details the risk assessment process adopted to rank all identified environmental issues and determine the appropriate level of assessment of potential impacts. **Section 7.0** outlines management and mitigation measures for the Project.

**Section 8.0** presents Manning's Statement of Commitments for the Project. A detailed project justification is presented in **Section 9.0**. A list of abbreviations used throughout the EA is presented in **Section 10.0** whilst referenced documents are listed in **Section 11.0**.

The EA has been prepared by environmental consultants Hansen Bailey Pty Ltd (Hansen Bailey). A full list of the EA study team is shown in **Section 12.0**.

## 1.4 THE PROPONENT

Established in 1989 and listed on the Australian Stock Exchange in 1994, Centennial is a coal mining and marketing company supplying thermal and coking coal to the domestic and export markets. The Company is a major fuel supplier to the New South Wales (NSW) energy industry, fuelling approximately 47% of the State's coal-fired electricity (Centennial, 2006).



**Legend**

- EA Boundary
- - - Surface Facilities
- F3 Freeway
- Great Northern Rail line
- LGA Boundary
- Creeks

**Hansen Bailey**

**Centennial Coal**  
Mannering

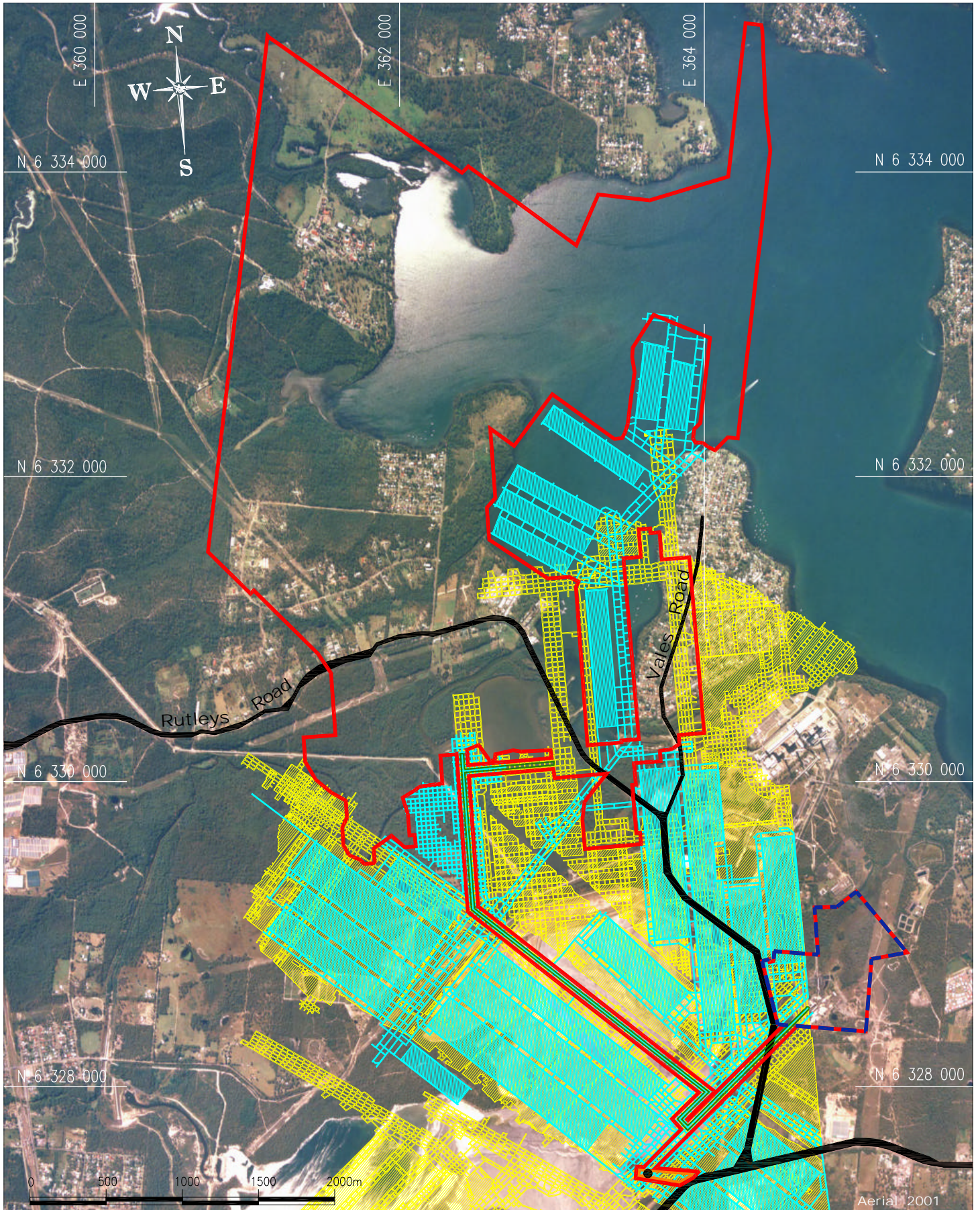
Co-ordinate System: MGA Zone 56

MANNERING COLLIERY EA










Regional Location Plan

Cad File: 02108D.dwg	Date: 16.03.07	Drawn: JD
Figure 1		





Aerial 2001

<b>Legend</b>		 <b>Hansen Bailey</b>
	EA Boundary	
	Surface Facilities	 <b>Centennial Coal</b> <b>Mannering</b>
	Underground Transport Corridor	
	Previously Mined Areas (1960-2006) Bord and Pillar	<small>Co-ordinate System: MGA Zone 56 Source: Centennial Mannering 2006</small>
	Previously Mined Areas (1986-2002) Longwall	
	Downcast Shaft	
	Downcast Shaft Boundary	

## MANNERING COLLIERY EA

### Previously Mined Areas

Cad File: 02109E.dwg

Date: 21.03.07

Drawn: JD

Figure  
2



## 1.5 EXISTING REGULATORY APPROVALS

No development consent under the EP&A Act exists for the operation.

Transportation of the coal via conveyor from Manning to Vales Point Power Station is conducted under relevant approvals held by Vales Point Power Station.

Mining operations at Manning occur within Consolidated Coal Lease (CCL) 721 and CCL 719 (see Figure 3).

Other mining leases registered within the current colliery holding include parts of CCL 720 and CCL 722 (held by Munmorah Colliery) and CCL 707 (held by Lake Coal).

Manning holds a Section 139 Approval for selected areas under the *Coal Mines Regulations Act 1982* (CMR Act) from the Department of Primary Industries - Mineral Resources (DPI) for the continuation of operations adjacent to the Pallamanaba Creek area.

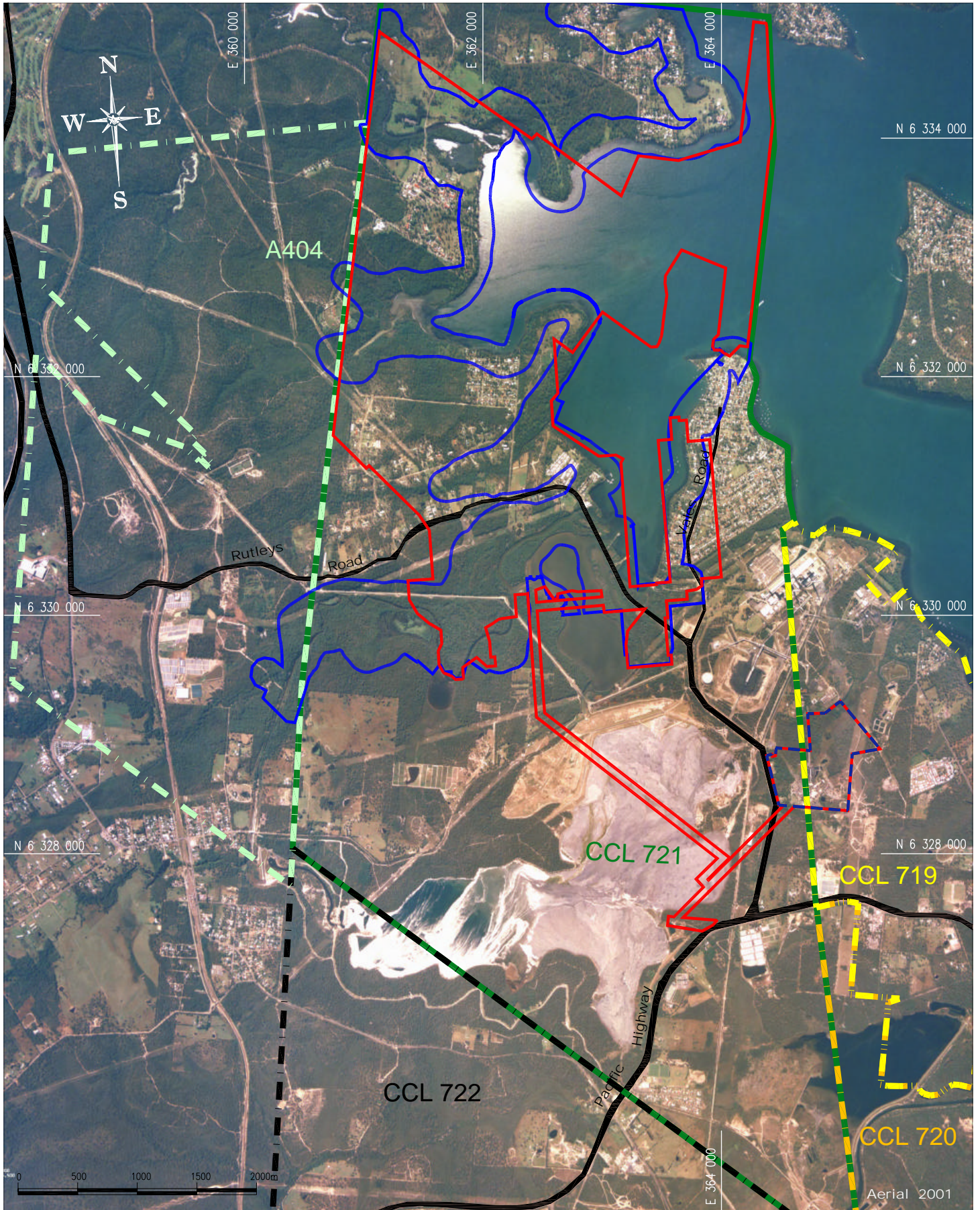
Table 2 lists approvals, leases and licences currently in place at Manning.

Table 2  
Manning Approvals, Leases & Licences

Reference	Title	Expiry Date
CCL 719	Consolidated Coal Lease 719 (including Manning Surface Facilities)	22/09/2009
CCL 720	Consolidated Coal Lease 720	22/04/2006 *
CCL 721	Consolidated Coal Lease 721 (including Manning Surface Facilities)	13/01/2008
CCL 722	Consolidated Coal Lease 722	05/07/2019
CCL 707	Consolidated Coal Lease 707	21/09/2009
A 404	Authorisation 404	31/07/2007
A 441	Authorisation 441	02/06/2006 *
A 383	Authorisation 383	02/06/2006 *
A 384	Authorisation 384	02/06/2006 *
A 372	Authorisation 372	02/06/2006 *
S139 Approval	Approval under Section 139 of the <i>Coal Mines Regulation Act 1982</i> to mine within the High Water Level Subsidence Control Zone of Pallamanaba Creek and Lake Macquarie.	31/03/2007 *
Environmental Protection Licence (EPL) 191	Issued under <i>Protection of the Environment Operations Act 1997</i> (POEO Act) for Coal Mining at Manning within the scale of 500,000 to 2,000,000 tonnes per year. This licence allows the discharge up to 4 Mega litres (ML) of water per day from site via licensed discharge points, with exceedances permitted under specific requirements under wet weather conditions. Monitoring of depositional dust is also required.	Anniversary date 1 January
Radiation Licence 31345	Licence issued under the <i>Radiation Control Act 1990</i> to sell/possess radiation apparatus and radioactive substances or devices that contain radioactive substances.	28/04/2007
Radiation Certificate 11241	Registration of the fixed gauge radiation source located on the coal conveyor at the CCF under the <i>Radiation Control Act 1990</i> .	24/10/2007

\* Application for renewal complete





**Legend**

- EA Boundary
- - - Surface Facilities
- High Water Level Subsidence Control Zone

**Hansen Bailey**

**Centennial Coal**  
Mannering

Source: Centennial Mannering 2006  
Co-ordinate System: MGA Zone 56

**MANNERING COLLIERY EA**

**Mannering Leases**

Cad File: 02110F.dwg	Date: 16.03.07	Drawn: JD
		Figure <b>3</b>



## 2.0 EXISTING SETTING

### 2.1 CLIMATE

The climatic conditions at Manning are characteristically described as warm temperate, with maritime effects playing a major role in influencing local trends. Generally seasonal variations produce summers and autumns that are relatively hot and wet, and winters and springs that are cool and dry (BOM, 2006).

Summer months in the Lake Macquarie region are the warmest, with February reaching an average daily maximum temperature of 25.2°C. The coolest month is July, with a mean daily minimum temperature of 9.3°C.

Humidity levels exhibit variation and seasonal flux throughout the year. Mean morning (9:00 am) humidity levels range from 70% - 83% and mean afternoon (3:00 pm) humidity levels range from 63% - 76%. The spring months are the driest of the year on average.

Rainfall data collected at Norah Head Bureau of Meteorology (BOM) meteorological station (1969-2004) shows that February is the wettest month with an average rainfall of 142 millimetres (mm) over 12 rain days. Annually the region experiences a mean rainfall of 1,227 mm which occurs over a mean of 136 rain days per year. Seasonally autumn is the wettest season, with a mean total rainfall of 379.3 mm. With a mean rainfall of 242.9 mm, spring is the driest season.

### 2.2 GEOLOGY

#### 2.2.1 Fassifern Seam

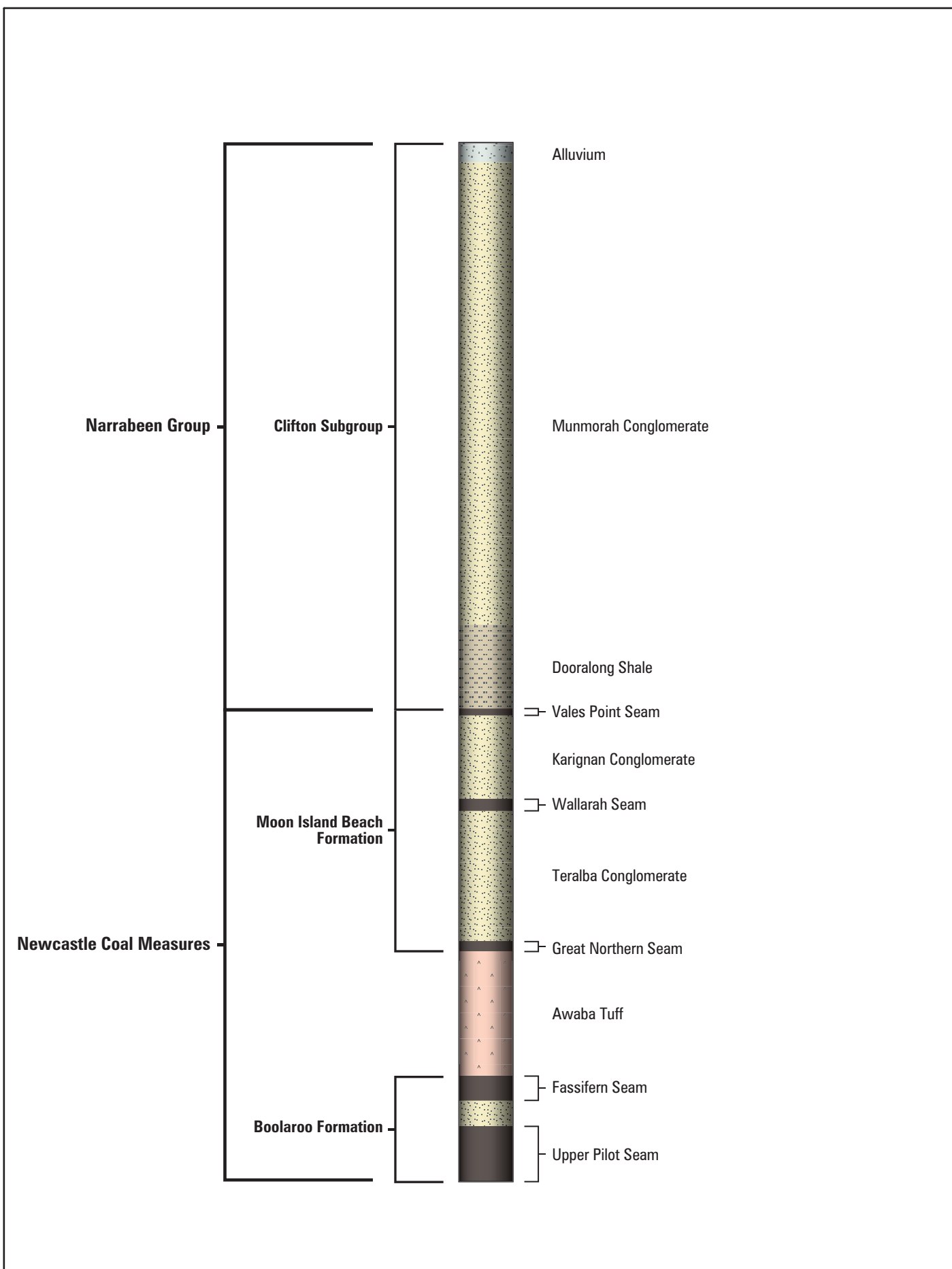
Manning's bord and pillar mining operations are located in the Fassifern Seam which is a part of the Boolaroo Formation within the Newcastle Coal Measures (see **Figure 4**). Within the conceptual mine plan, the Fassifern Seam lies at about 150 metres (m) to 205 m depth and is approximately 6.5 m thick. The proposed working section ranges from 2.9 m to 3.8 m in thickness.

Overlying the Fassifern Seam are the Great Northern and Wallarah Seams and their associated conglomerates and tuffs, as well as the Dooralong Shale and Munmorah Conglomerate, of the Narrabeen Group. The Wallarah Seam is mined in the surrounding area by other mining operations. The Great Northern Seam is the most continuous seam with a thickness ranging from 2 m to 3 m with workings in this seam being quite extensive.

Coal resources within the Fassifern seam have been well explored in the past with over 250 boreholes drilled in the vicinity of the conceptual mine plan. Known accessible reserves of approximately 11.6 Million tonnes (Mt) exist within the conceptual mine plan.

Extensive coal workings in the Fassifern seam have also contributed to the understanding of its continuity and variability within this area. These workings, in conjunction with various geophysical surveys in the area, provide a solid base of data regarding regional and local structural features. The area within the conceptual mine plan is dissected by a number of north-east striking faults and dyke zones at a regional spacing of 1.5 km to 2 km, with drilling and surface magnetometer surveys confirming the location of these structural features.

Using current mining methods, the Fassifern Seam is the most economically viable to mine within the conceptual mine plan. The two seams overlying the Fassifern (i.e. the Great Northern and Wallarah Seams) do not presently represent as significant a resource for Manning from an economic perspective. Borehole investigations suggest that seams below the Fassifern seam also have poor prospective potential.



**Legend**

	Coal
	Tuff
	Conglomerate
	Shale
	Alluvium

Hansen Bailey

**Centennial Coal**  
Manning

Source: Centennial Manning 2006

**MANNERING COLLIERY EA**

Typical Stratigraphic Column

Figure 4

Filename: MR006 - Typ Strat Column.ai	Date: 28.02.07
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### 2.2.2 Overburden Stratigraphy

The stratigraphic sequence beneath the conceptual mine plan is comprised of three distinct units:

- The upper Permian Newcastle Coal Measures, a sandstone/coal sequence with lesser siltstone;
- The overlying Clifton Sub-Group which is the basal unit of the Triassic Narrabeen Group; and
- Quaternary to recent alluvial sediments.

The Fassifern seam is overlain by the Great Northern seam in the Newcastle Coal Measures and the interval existing between the two is approximately 31 m. This interval is generally made up of two strata, characterised in the lower section by the Awaba Tuff (which is the stone roof of the Fassifern Seam) and a conglomerate/coarse-grained sandstone unit in the upper section.

The strata directly below the Fassifern seam are high strength sandstone formations, inter-bedded with thinner strata of other units such as shale, mudstone and coal.

There are no recognised aquifers within the stratigraphic sequence except for the coal seams themselves.

### 2.3 NATURAL FEATURES & TOPOGRAPHY

The conceptual mine plan encompasses a portion of Lake Macquarie which is Australia's largest coastal salt water lake, covering an area of 110 km<sup>2</sup> and is connected to the South Pacific Ocean via the Swansea Channel in the north-east (LMCC, 2006).

Within the vicinity of the EA Boundary, drainage is typically to the north and east towards Lake Macquarie where four main creeks feed into the lake. These are Wyee Creek and Pallamanaba to the south of the EA Boundary, and Cobra Creek and Pourmalong Creek to the north (see **Figure 1**). These creeks are tidal, as is Lake Macquarie (LMCC, 2006). Various unnamed gullies with small catchment areas also drain into the lake and creek systems.

The topography surrounding the EA Boundary is undulating around the foreshores of Lake Macquarie. Some higher topographic areas form points out into the lake with areas of low topography forming the bays. In general, the topography undulates between sea level and Reduced Level (RL) 45 m Australian Height Datum within the vicinity of the EA Boundary.

### 2.4 FLORA & FAUNA

The EA Boundary covers terrestrial landscapes, as well as coastal lagoons, lakes and estuaries. It consists of a matrix of remnant woodlands, rocky complexes, riparian zones and aquatic and estuarine communities, interspersed with urban and industrial developments. Based on the *Lower Hunter & Central Coast Extant Vegetation Community Map* (HCCREMS 2003), there are four dominant vegetation communities present within the EA Boundary, namely Coastal Plains Smooth-barked Apple Woodland, Redgum Rough Barked Apple Forest, Coastal Plains Scribbly Gum Woodland and Riparian Melaleuca Swamp Woodland. Other vegetation communities present in the EA Boundary include Swamp Mahogany – Paperbark Forest, Mangrove-Estuarine Complex and Melaleuca Scrub communities (HCCREMS 2003).

Database searches were undertaken of the NSW Wildlife Atlas, BioNet, PlantNet and FaunaNet for the EA Boundary (including a 10 km locality buffer) which showed that 1,367 records of 556 flora species have been recorded (NPWS 2007) in the locality. Of these, five species are of conservation significance (Vulnerable or Endangered under the *Threatened Species Conservation Act 1995* (TSC Act)).

This search also revealed 2,286 records for 255 fauna species of which 22 species are listed as Vulnerable or Endangered under the TSC Act (NPWS 2007).

The *Environment Protection & Biodiversity & Conservation Act 1999* (EPBC Act) Protected Matters Search Tool found a total of 10 Threatened flora species and 38 Threatened fauna species (including marine species). An additional 42 species are listed as Migratory under the EPBC Act (DEWR 2007).

The detailed results from the database searches are provided in **Appendix B**.

## 2.5 ABORIGINAL CULTURAL HERITAGE

A search of the Department of Environment and Conservation's (DEC) Aboriginal Heritage Information Management System (AHIMS) database was undertaken for the Project to identify any known sites of Aboriginal Cultural Heritage.

Four sites were identified as being present within the EA Boundary. These consisted of three middens and an open camp site. The Darkinjung Local Aboriginal Lands Council (DLALC) is known to be the traditional owners in the area and holders of the Cultural Heritage knowledge associated with it.

## 2.6 NON-ABORIGINAL CULTURAL HERITAGE

An investigation was undertaken to determine whether any sites of known Non-Aboriginal Cultural Heritage were located within the EA Boundary. This included a search of the Australian Heritage Database, the New South Wales Heritage Register, relevant heritage legislation as well as both the Lake Macquarie Local Environmental Plan (LEP) (2004) and Wyong LEP (1991).

From this investigation, one site was identified as being within the conceptual mine plan. This was the Morisset Hospital Precinct including the associated ward facilities, residences and infrastructure. This site is listed as being of State Significance under the NSW *Heritage Act 1977* and is also listed in the Lake Macquarie LEP 2004.

## 2.7 SURROUNDING LAND USE

A large range of land uses fall within the vicinity of the EA Boundary. The Mannering Surface Facilities are located on land owned by Delta Electricity. Lake Macquarie accounts for a proportion of the conceptual mine plan within the EA Boundary and is utilised for a range of recreational activities including sailing, skiing and recreational fishing.

Land within the EA Boundary is predominantly owned by the Crown (including Lake Macquarie) and Delta Electricity which acts as a buffer zone to the Vales Point Power Station. To the north and north-west of

the EA Boundary are the residential housing areas of Mannering Park, Wyee and Wyee Point.

Large areas in the vicinity of the EA Boundary have also been mined by previous underground coal extraction operations.

To the north are the workings of the Mandalong and Cooranbong Collieries, to the north-east is the Myuna Colliery, to the east is the Chain Valley Colliery and to the south are the existing workings of Munmorah Colliery (see **Figure 1**).

## 3.0 THE PROJECT

### 3.1 INTRODUCTION

Due to amendments to the EP&A Act, Manning requires approval from the Minister for Planning for its surface facilities by August 2007 and to continue current mining operations beyond 2010. The Project involves the gaining of a contemporary planning approval for operations at the existing mine site. It does not involve the construction of any new or additional infrastructure or the expansion of surface operations beyond what exists.

The Project broadly incorporates:

- Mining of coal from the Fassifern seam via the bord and pillar mining method;
- Coal extraction at a variable rate of up to 1.1 Mtpa of saleable coal over a period of up to 10 years within the conceptual mine plan;
- All coal produced will continue to be transported to Vales Point Power Station via a dedicated conveyor;
- Existing Manning Surface Facilities, previous underground workings and underground infrastructure will continue to be relied upon for the operation of Manning; and
- The project does not specifically involve new infrastructure, however additional minor infrastructure may be required to be developed as mining progresses such as (but not limited to) boreholes, minor access tracks and minor powerlines. As this cannot be specified at this time, a commitment to a process for managing such occurrences is included in the Statement of Commitments.

Manning is currently a conventional bord and pillar mine involving first workings development only. Significantly, no secondary extraction is proposed by the Project. The conceptual mine plan has been

specifically designed to avoid any noticeable surface impacts. The Project environmental impact footprint is almost entirely limited to the surface area of its existing Surface Facilities.

The EA refers to a number of distinct areas for the purposes of the assessment of impacts for the Project:

- EA boundary;
- Existing workings;
- Manning Surface Facilities;
- Conceptual mine plan (which generally encompasses the existing surface facilities, conceptual mine plan, a ventilation shaft and the underground transport corridor); and
- Minor Infrastructure.

### 3.2 INFRASTRUCTURE

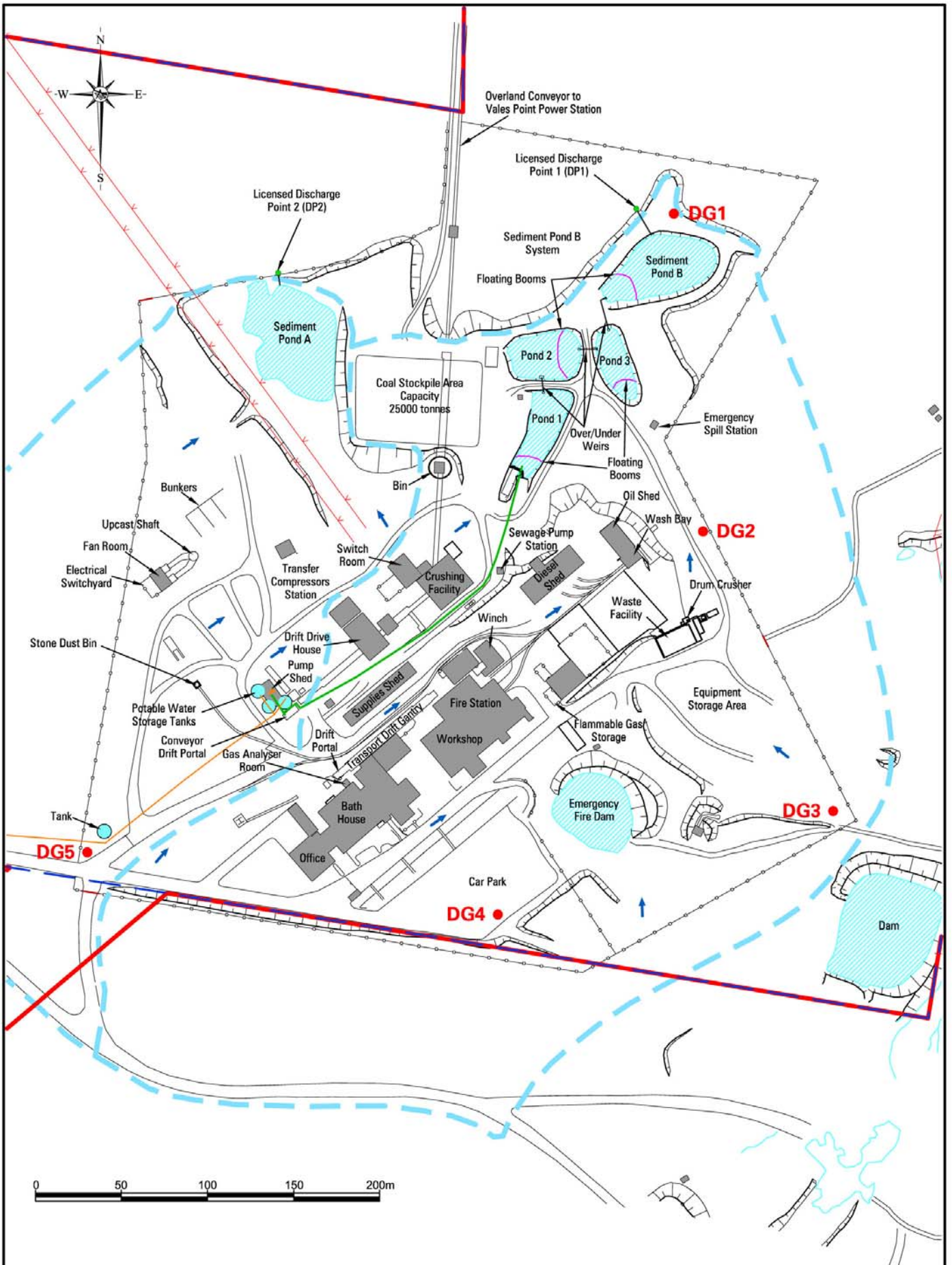
Manning will continue to utilise current infrastructure facilities (see **Figure 5**) including: administration offices, workshops, the CCF, upcast shaft, downcast shaft, diesel storage facilities, parking facilities, water management infrastructure, bitumen access roads, boreholes and a 25,000 t coal stockpile.

The Surface Facilities also include a downcast shaft off the Pacific Highway to the south-west of the main Surface Facilities. This 5.5 m diameter shaft allows fresh air ingress to the underground workings. It is benign, appropriately fenced for security purposes and has been designed such that it is not visually intrusive.

Consequently general reference to the Surface Facilities in the EA is to the main Surface Facilities off Rutleys Road.

The Project incorporates all activities at Manning and the equipment up to the airspace through which coal falls onto the overland conveyor to Vales Point Power Station. Assessments of impacts in the EA incorporate consideration of additional activities, as relevant.





**Legend**

- EA Boundary
- Surface Facilities
- Fence Line
- Dust Gauges
- Earth Bunding
- Sub-Catchment Boundaries
- Potable Water Pipeline
- Pump Line Underground Mine Water
- Direction Of Flow

Hansen Bailey

**Centennial Coal**  
Mannering

Coordinate System: MGA Zone 56  
Source: Centennial Mannering 2006

**MANNERING COLLIERY EA**

Surface Infrastructure &  
Water Management System

Filename: MR006 - Surface Infra & Water Man System.dwg

Date: 21.03.07

Figure  
**5**

### 3.3 COAL CRUSHING FACILITY

Coal is transported from the Manning underground workings to the CCF via the drift conveyor. The CCF is a hammer roll design crushing facility and has a capacity of 400 tonnes per hour (tph). It consists of a rotary breaker to decrease the average lump size and remove any rocks or other material. The coal then passes through screens and crushers to produce a maximum lump size of 50 mm. This is then conveyed to the product bin and transported via overland conveyor to Vales Point Power Station (see **Figure 6**).

### 3.4 EQUIPMENT FLEET

Manning relies upon three continuous miners for coal extraction and utilises a range of other ancillary equipment both in the underground workings and during operations at the Surface Facilities.

No significant changes are proposed to the current equipment fleet.

### 3.5 RESOURCE AND MINE PLAN

Manning proposes to mine a known, accessible resource of approximately 11.6 Mt of coal from the Fassifern seam at a rate of up to 1.1 Mtpa.

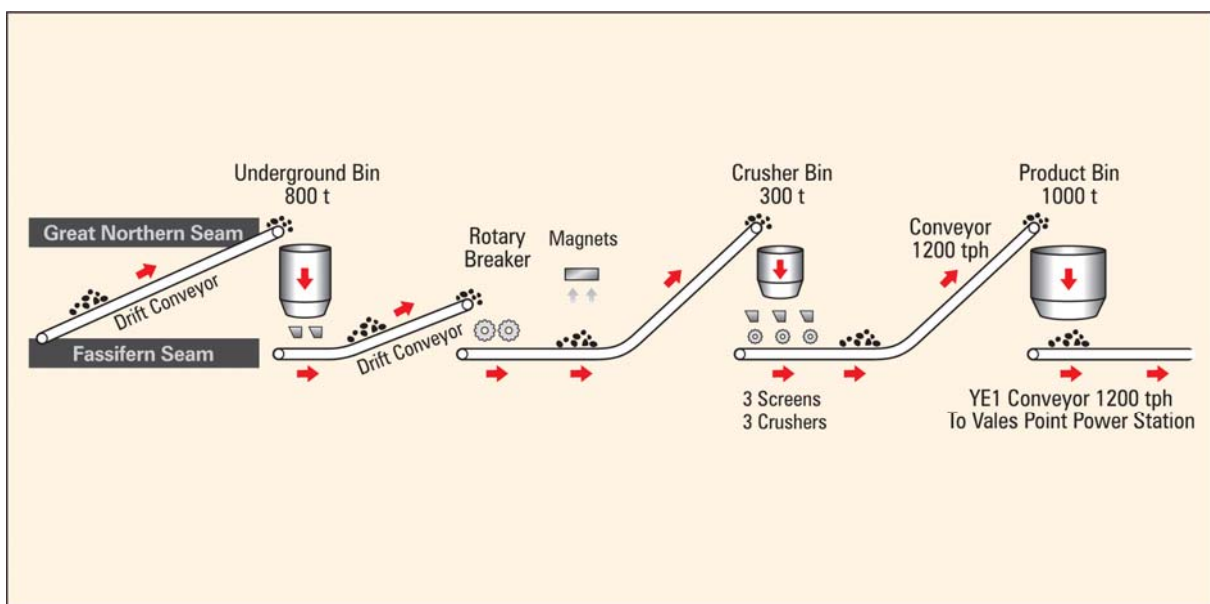
The coal resource mined by Manning from the Fassifern seam has a low sulphur content which makes it a preferable supply for Vales Point Power Station. The geology of the conceptual mine plan is discussed further in **Section 2.2**.

The conceptual mine plan (see **Figure 7**) is located within the proclaimed West Lake Macquarie and Swansea - North Entrance Mine Subsidence Districts. Mining is proposed to be conducted within the conceptual mine plan, however the exact layout and orientation will be subject to ongoing review.

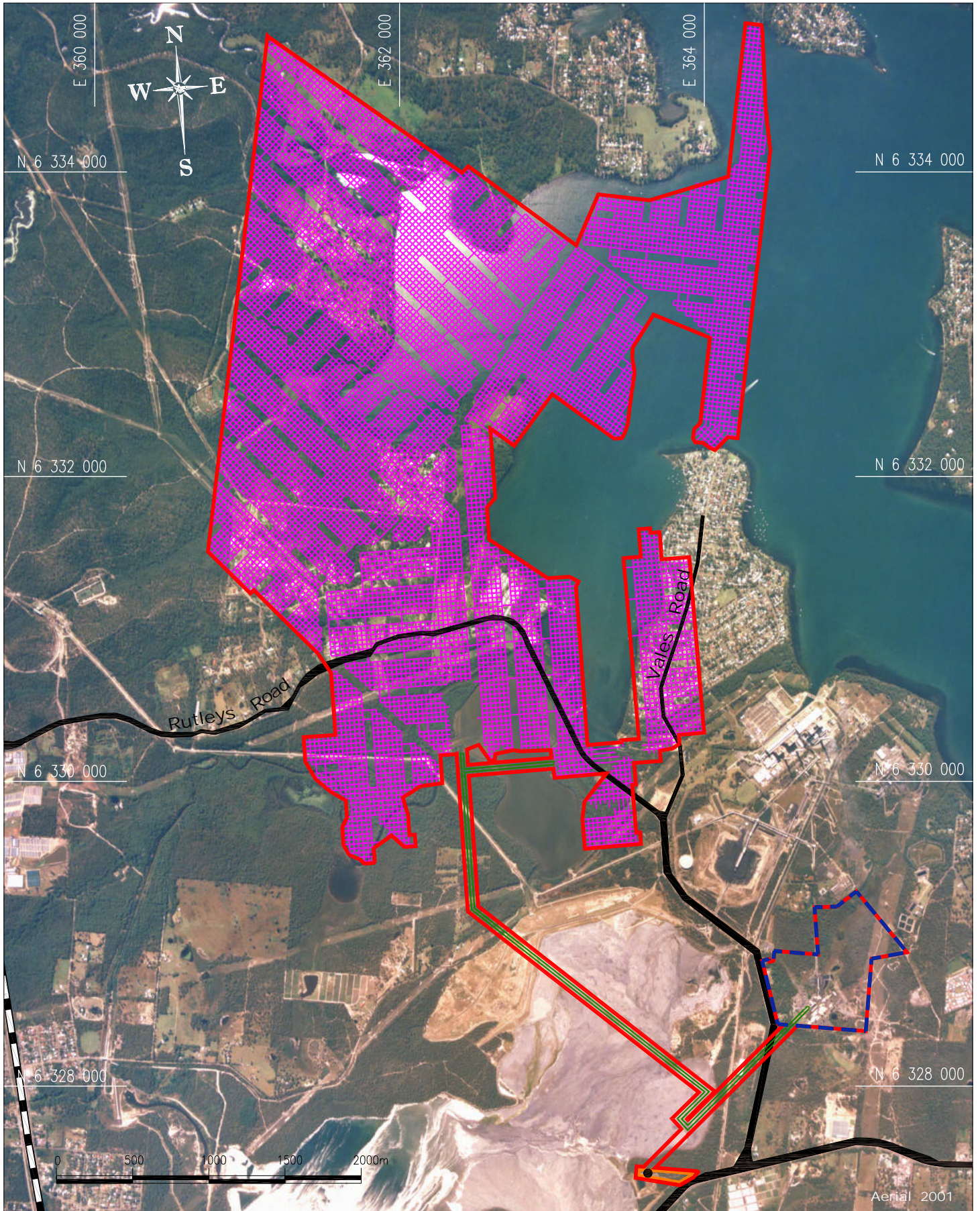
The progression of underground mining will be regularly reviewed (as is presently the case) dependant on ongoing monitoring and geological conditions within the conceptual mine plan.

The existing workings (see **Figure 2**) will continue to be relied upon for purposes including ventilation and as a means of egress in the case of an emergency.

Figure 6  
Manning Coal Crushing Facility Schematic









**Legend**

- EA Boundary
- Surface Facilities
- ▨ Conceptual Mine Plan
- Underground Transport Corridor
- Downcast Shaft
- Downcast Shaft Boundary



Hansen Bailey



**Centennial Coal**  
Mannering

Co-ordinate System: MGA Zone 56  
Source: Centennial Mannering 2006

## MANNERING COLLIERY EA

### Conceptual Mine Plan

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		Figure <b>7</b>



### 3.6 MINOR INFRASTRUCTURE

Additional minor infrastructure including boreholes, minor powerlines, access tracks, and emergency manholes may be required to be developed as mining progresses within the EA Boundary. The nature of underground mining does not allow exact positioning of such infrastructure to be determined at this early stage. As such, the Manning Surface Disturbance Protocol described in **Section 7.16** has been developed to enable the best positioning of facilities that may not be exempt or complying development.

### 3.7 BORD & PILLAR MINING METHOD

The mining method implemented at Manning is a form of bord and pillar mining where extraction is limited to first workings only. Roadways are driven with pillars created which are not subsequently extracted. Mining is limited to coal which is cut from the first workings roadways. The working area of the seam is mined in two panels, one using two continuous miners collectively known as a "Super Unit", and the second by the place-changer method using a single continuous miner.

This mining method involves utilising the continuous miner systems to develop the panels with seven headings and associated cut-throughs, defining pillars on 30 m centres. The panels are separated by barrier pillars that are approximately 54 m wide. The roadways are generally maintained at 5.5 m wide and 2.9 m high. This method of extraction forms the basis on which all impact assessments in the EA have been based and is illustrated conceptually in **Figure 8**. Mined coal is fed via a conveyor system to the surface where it is crushed at the CCF. While this mining method extracts less coal than methods implemented at other operations, it has the advantage of long-term pillar stability and therefore avoids any noticeable surface subsidence impacts. The conceptual mine plan has been designed so that the proposed workings avoid any areas where secondary extraction has previously taken place in the Great Northern Seam.

Bord and pillar mining at Manning has been specifically designed in this manner to ensure no

noticeable surface impact. Centennial has successfully mined under portions of the township of Manning Park, Vales Point Power Station and Lake Macquarie.

### 3.8 HOURS OF OPERATION & MANNING

Manning will continue to operate up to 24 hours a day, seven days per week.

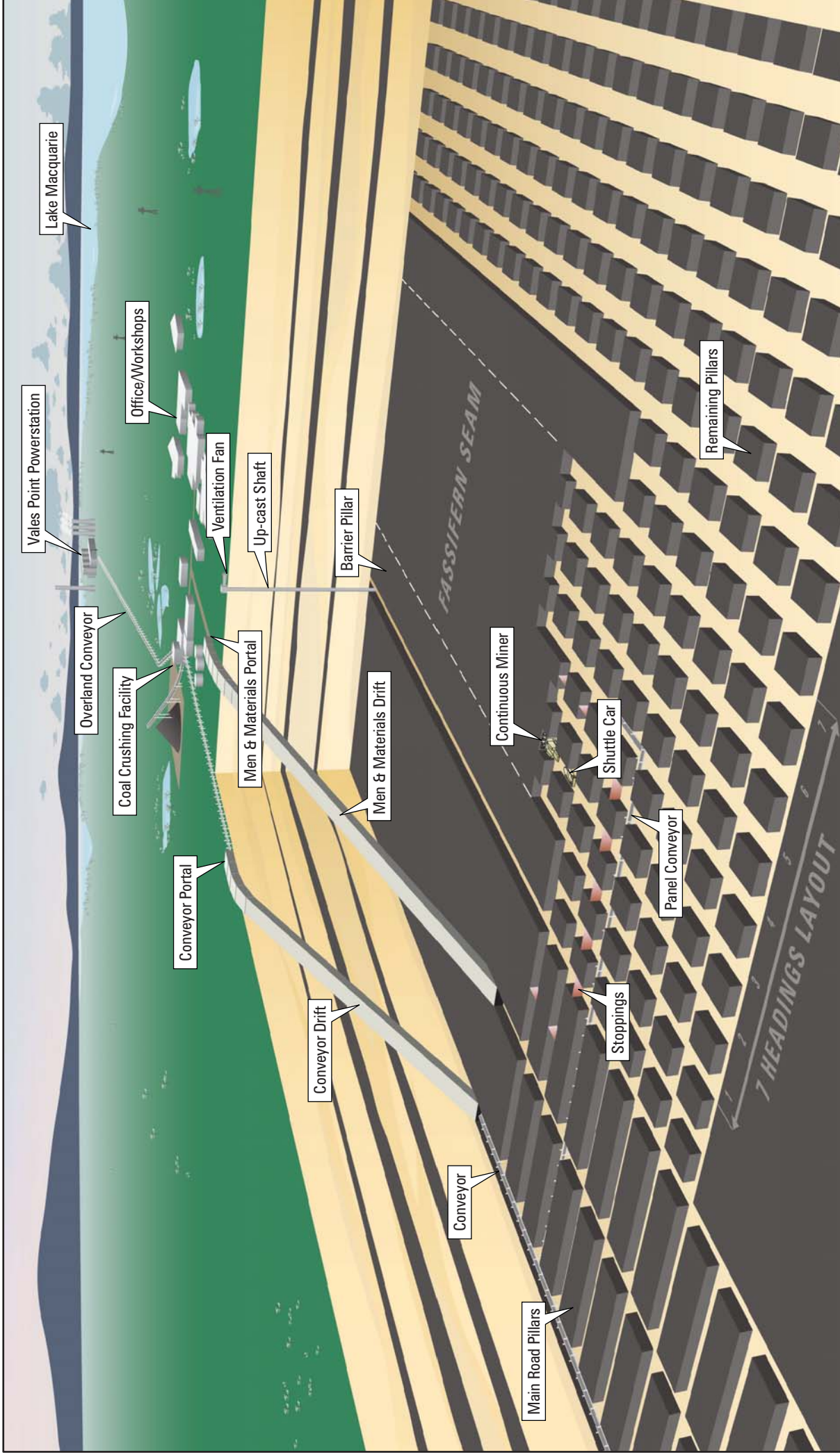
Manning will remain unchanged from the current workforce at approximately 90 directly employed persons. A variable number of additional contractors are employed from time to time as required.

### 3.9 TRANSPORT

All coal produced by Manning will continue to be supplied directly to Vales Point Power Station via a purpose-built dedicated overland conveyor which is operated, maintained and located on land held by Delta Electricity, owners of Vales Point Power Station. In periods when Vales Point is unable to accept deliveries due to scheduled maintenance or conveyor breakdown, a small ROM coal stockpile (up to 25,000 t) may be utilised on-site (see **Figure 5**).

Reclamation from the stockpile is undertaken with an excavator or front end loader (FEL) to load the ROM hopper. At all other times, coal is directly-fed to Vales Point Power Station from the CCF via the dedicated overland conveyor.

No coal will be transported from the site by road. The usage of public roads in the vicinity of the Project is by employees and contractors for delivery purposes only.



**MANNERLING COLLIERY EA**

Bord and Pillar Mining Schematic




Source: Centennial Mannerling 2006

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 Date: 16.02.07  
 Figure **8**

### 3.10 LAND OWNERSHIP

Land ownership types within the EA Boundary and its surrounds are shown on **Figure 9**. The full schedule of land to which the EA applies is provided in **Appendix C**.

The conceptual mine plan is predominately positioned within Crown or government agency owned land (including Lake Macquarie), with mining also proposed to continue under some residential areas and Delta Electricity owned land.

Part of the land within the conceptual mine plan was gazetted as Lake Macquarie State Recreation on 22 January 1999 (see **Figure 9**). This reservation, as a State Recreation Area (SRA), is restricted to a depth of 40 m below the surface. In those areas in which the surface is SRA, the Project Application is made only in respect of the land below a depth of 40 m.

Delta Electricity owns the land upon which Manning's Surface Facilities are located. Use of this land is included in the conditions contained within the mining titles and via an Agreement with Delta Electricity which will be maintained.

The nearest private landholder to the Manning Surface Facilities is the Macquarie Shores Home Village located approximately 800 m to the east. Located to the north-east is the Chain Valley Bay residential area. To the west is the Manning Creek Ash Dam which occupies an area of 390 hectares (ha). To the south is the Pacific Highway where a small number of rural properties are located, and to the north are Vales Point Power Station and Lake Macquarie.

### 3.11 ENVIRONMENTAL MANAGEMENT

#### 3.11.1 Introduction

Manning currently utilises a Risk Assessment process to identify environmental, safety and business risks to its operation. This process involves its employees (and contractors where appropriate) recommending any necessary controls for all risks

identified. The focus is on the inter-relationship between people, machinery, methods of work and the environment.

#### Policy

Centennial has an Environmental Policy that clearly states that it values its role in sustainable development and aims to manage its business to achieve balanced environmental, economic and social aspects. The Policy states Centennial's commitment to minimising environmental impacts and to continual improvement in environmental management and performance.

#### Training

Training in environmental management procedures and practices is provided to all employees and contractors as part of the Manning site induction.

#### Complaints & Incidents

Manning maintains an environmental complaints database on-site as part of their operation.

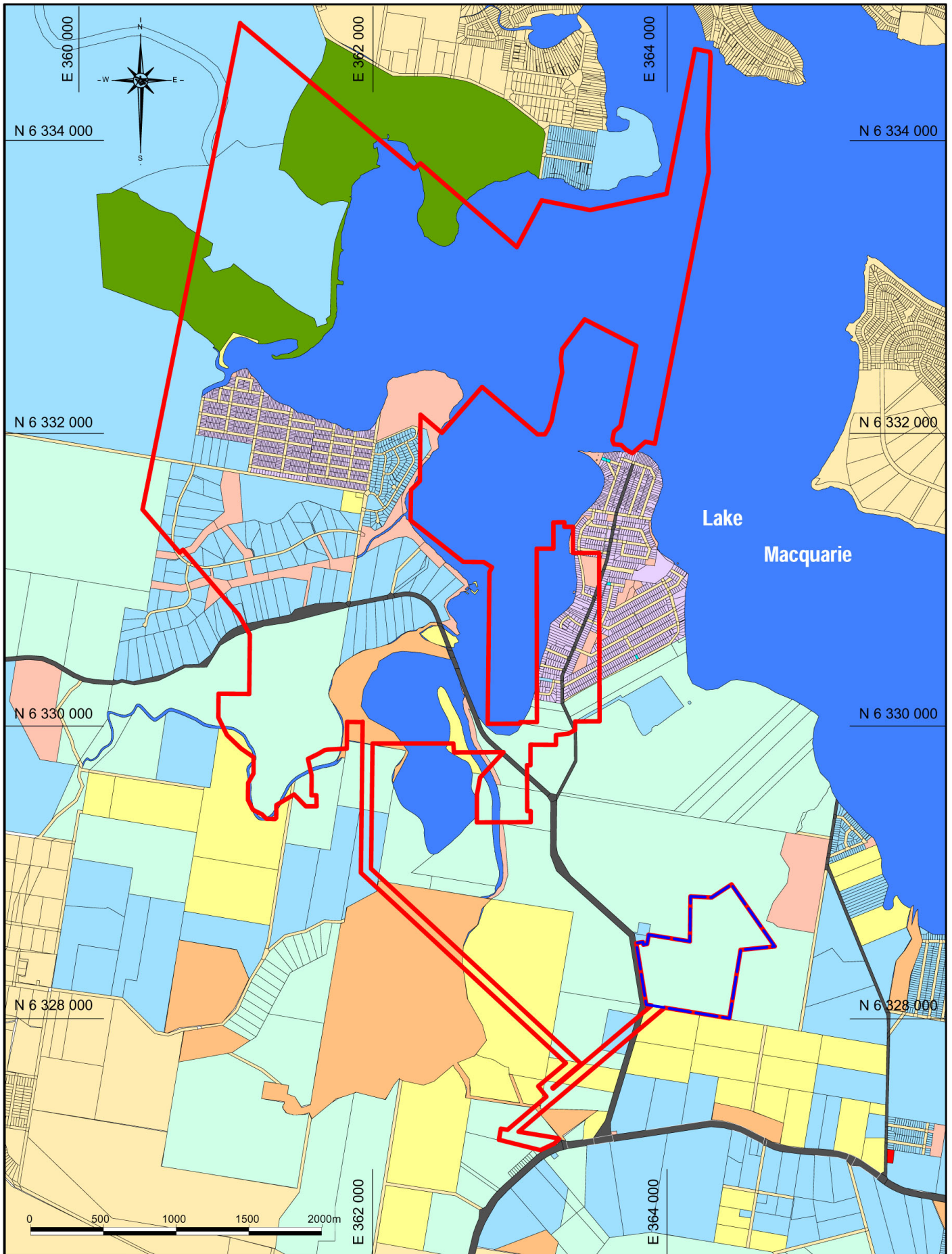
Manning has received no community complaints and had no occurrence of a reportable environmental incident since 2002 when Centennial took ownership of the operation.

#### 3.11.2 Water Management

All water pumped out of the underground workings, together with run-off from the Manning Surface Facilities, is directed through the Water Management System as shown on **Figure 5** and as discussed further in **Section 7.3**. Manning is committed to the ongoing introduction of on-site, targeted water management initiatives to minimise water usage wherever reasonable and feasible.

Manning monitors daily water discharge from site at the licensed discharge points in accordance with EPL 191. Water quality monitoring for oil and grease, total suspended solids and pH is conducted in compliance with EPL 191.





**Legend**

- Government Agency Owned
- Unknown
- Centennial Owned
- Urban Housing Areas
- Delta Electricity
- Freehold Land
- Crown Land
- No Title Information Available
- State Recreation Area

- Road
- EA Boundary
- Surface Facilities

HansenBailey



**Centennial Coal**  
Manning

Co-ordinate System: MGA Zone 56  
Source: Legal Stream, 2006

**MANNERING COLLIERY EA**

Land Ownership

Filename: MR006 - Landownership.wor

Date: 21.03.07

Figure

**9**

### 3.11.3 Noise Management

At the commencement of scaled-down mining operations at Manning, Centennial applied all feasible and reasonable noise reduction measures at its Surface Facilities. This included the decommissioning of the CCF exhaust fan and substantially enclosing the rotary breaker.

No noise complaints have been received by Manning from its neighbours since mining operations recommenced under Centennial's management in 2002. Prior to the acquisition, Manning also generated minimal complaints.

### 3.11.4 Air Quality Management

#### Dust

Dust suppression systems are utilised at Manning on underground coal cutting and conveying equipment, surface conveyors and at the CCF to limit the generation of air borne dust. Depositional dust is monitored at five locations in accordance with the requirements of EPL 191 as shown on **Figure 5**.

#### Greenhouse

Centennial is committed to improving energy efficiencies within its operations and limiting greenhouse gas emissions. As part of this commitment, Centennial invests in research for clean coal technologies through its participation in Coal21 and is involved in the Federal Government's Greenhouse Challenge Plus Program.

Additionally, the Manning Gas Project (MGP) was established in 2002 and involves piping waste coal mine gas (methane) from the old Newvale workings to a methane utilisation plant at Vales Point Power Station. Following a period of non-operation (from 2003-2006), the MGP recommenced in 2007.

The MGP is one of many greenhouse gas emission abatement initiatives implemented by Centennial with similar projects being utilised by Centennial's Tahmoor, Mandalong, and Munmorah operations.

### 3.11.5 Hydrocarbon Management

Diesel fuel is stored on-site at Manning in two 14,000 litre (L) above-ground tanks which are sufficiently bunded to contain 110% of the largest storage container should any spill occur. Minimal oils and greases are also stored within an adequately bunded area. The quantities of these hydrocarbons are below the manifest quantities requiring notification of storage to Workcover as listed under the *Occupational Health & Safety Act 2000*.

In accordance with Manning's waste management system, waste oil is collected within three oil separators and two 1,000 L cubicles located at the Manning Surface Facilities. A licensed contractor working within the waste tracking provisions of the POEO Act removes all waste hydrocarbons from site.

Regular inspections are conducted and systems are maintained as required. Manning also maintains a tracking register for all wastes generated on-site.

### 3.11.6 General Waste

Waste generated at Manning is managed in accordance with the WMS to ensure the regulatory requirements of the POEO Act are met. Wastes generated at Manning include waste oil and grease, scrap metal, paper and cardboard, recyclable plastics, wooden pallets and general waste. These wastes are collected and segregated into appropriate bins for recycling, reuse and land-fill waste. The WMS is monitored via weekly environmental inspections to ensure its compliance within the waste tracking guidelines under the POEO Act.

Sewage waste generated at Manning is pumped to the Manning Park Sewerage Treatment Works at a rate of around 2 Litres/second (L/s) under trade waste agreement 173 with Wyong Shire Council (WSC).

### 3.11.7 Explosives

No explosives are stored on-site at Manning. In the rare event that explosives are required for underground mining operations they are delivered by a suitably qualified contractor and taken immediately underground for use.



## 4.0 REGULATORY FRAMEWORK

### 4.1 INTRODUCTION

Manning is applying for a Project Approval under Part 3A of the EP&A Act from the Minister for Planning. In addition to Project Approval, the Project may also require approvals under additional Acts or State Environmental Planning Policies (SEPP) not exempted under Part 3A of the EP&A Act. These are discussed in detail below as relevant to the Project. **Figure 10** presents a flowchart which shows the planning approvals and consultation process undertaken for the Project.

### 4.2 RELEVANT NSW ACTS

#### 4.2.1 Environmental Planning and Assessment Act 1979

The Project requires approval under Part 3A of the EP&A Act as the Minister for Planning has formed the opinion that it is a Major Project within the description in Schedule 1 of SEPP (Major Projects) 2005. The Minister for Planning will be the consent authority for the Project.

#### Permissibility of Mining

Approximately 60% of the proposed EA Boundary is within Land Zones in which mining is permissible. As such, mining is not wholly prohibited within the EA Boundary.

Section 75J (1) of the EP&A Act provides that the Minister for Planning may approve or disapprove of the carrying out of a project if:

- (a) *the proponent has duly applied to the Minister for approval under this Part to carry out a project, and*
- (b) *the environmental assessment requirements under this Division with respect to the project have been complied with,*

The Minister's power under Section 75J(1) is constrained in relation to the zoning of land on which the Project is located only by Section 75J(3), which provides: *"The Minister cannot approve of the carrying out of a project that would (but for this Part) be wholly prohibited under an environmental planning instrument"*.

In this case, the Project is not *'wholly prohibited'* as mining is permissible within a number of the zonings of both the Lake Macquarie LEP 2004 and Wyong LEP 1991. As the Project is not *'wholly prohibited'*, it is available to the Minister to approve the Project under Part 3A of the EP&A Act.

#### Requirement for EA

In accordance with Section 75H, an EA under Part 3A of the EP&A Act must be prepared in accordance with the guidelines published by the Minister for Planning under Section 75F(1) and the requirements determined by the Director-General under Section 75F(2).

The EARs were issued on 9 February 2007 and include a comprehensive list of matters to be addressed in the EA (see **Section 5.4.1**).

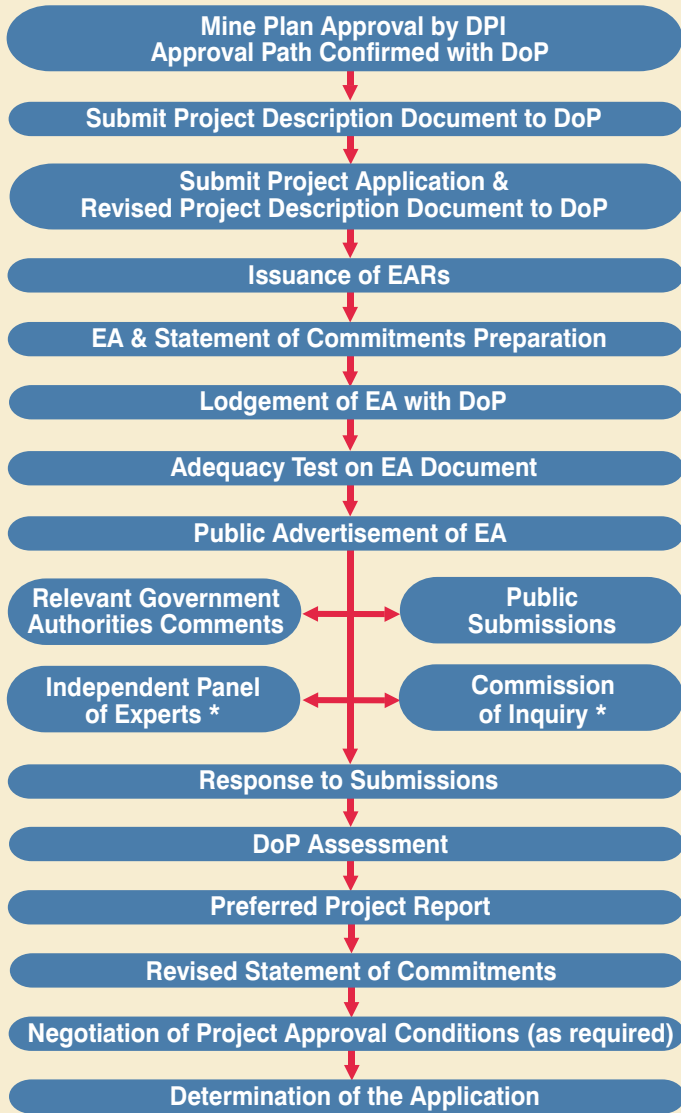
#### 4.2.2 Environmental Planning and Assessment Regulation 2000

#### Landholder Consent

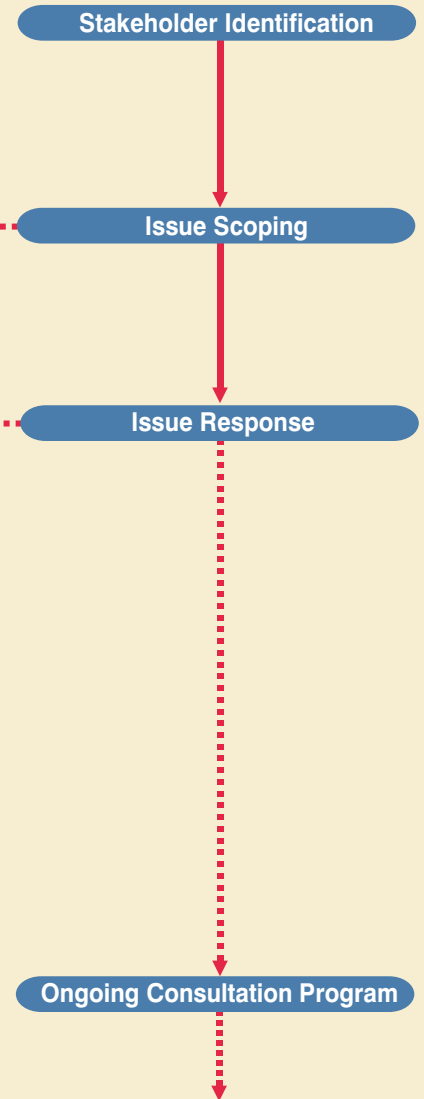
Clause 8F of the *Environmental Planning and Assessment Regulation 2000* requires the consent of the owner of the land to which the project relates for an application for project approval under Part 3A except in certain circumstances, including where the application relates to a mining project.

The Project is a mining project; therefore the consent of the owner of the land to which the Project Application applies is not required.

## Part 3A (EA Process)



## Consultation Process



\* Options available to the Minister

Hansen Bailey



**Centennial Coal**  
Manning

## MANNERING COLLIERY EA

Planning Approvals and Consultation Process

Cad File: CPF.cdr

Date: 27.02.2007

Drawn: JF

Figure  
**10**

#### 4.2.3 Protection of the Environment Operations Act 1997

The POEO Act establishes the procedure for the issuance of licences for environmental protection, including waste, air, water and noise pollution control. The owner or operator of a premise that is engaged in scheduled activities is required to hold an EPL and comply with the conditions of that licence.

Manning holds EPL 191 as granted by the DEC. Following Project Approval, a variation to EPL 191 will be sought under the POEO Act should amendments be required.

#### 4.2.4 Mining Act 1992

Activities associated with the mining of coal in NSW are subject to the provisions of the *Mining Act 1992* (Mining Act), which is administered by the Minister for Primary Industries. Section 5 of the Mining Act states that an authority, for an exploration licence, assessment lease or a mining lease must be obtained before any prospecting or mining of a public mineral (including coal) can be carried out. Section 65(2) of the Mining Act prohibits the Minister from granting a mining lease over land unless "appropriate development consent" is in place.

The Minister has the power to impose conditions on a mining lease (Section 70 of the Mining Act). A typical condition of a mining lease is that a Mining Operations Plan (MOP) be submitted to the DPI for approval. The MOP is required to specify details of the mining operations, which must be generally in accordance with the development consent and as described in the EA.

The conceptual mine plan is entirely within CCL 721 and the Manning Surface Facilities are partially within CCL 721 and CCL 719 as discussed in **Section 3.0**. Manning's MOP will be updated as required to incorporate details of mining operations associated with the Project. Pursuant to Condition 4 of CCL 721 Manning will seek the consent of the Minister for Primary Industries to mine any coal within the High Water Level Subsidence Control Zone (defined on **Figure 3**) within the conceptual mine plan.

A condition imposed in every ML is that a Subsidence Management Plan (SMP) be prepared prior to the commencement of any underground mining which will potentially lead to subsidence of the land surface. For the purpose of the SMP approval process, subsidence is defined as:

*"mining induced movements and deformations at the ground surface where the vertical downward surface movements are greater than 20 mm; or the potential impacts on major surface infrastructure, structures or natural features may be significant, notwithstanding that the vertical downward surface movements are less than 20 mm."*

As the Project subsidence is predicted to be less than 20 mm with no noticeable surface impacts (refer to **Section 7.2**), it is unlikely a SMP will be required.

#### 4.2.5 Coal Mines Health and Safety Act 2002

The *Coal Mines Health and Safety Act 2002* (CMHS Act) came into effect on 23 December 2006 with the enactment of the *Coal Mines Health and Safety Regulations 2006* (CMHSR). At this time, the *Coal Mines Regulation Act 1982* and *Coal Mines Regulations 1999* were repealed.

Manning may be directed by the Minister for Primary Industries in accordance with Section 87 of the CMHS Act to leave barrier pillars within areas of the conceptual mine plan that undermine either the High Water Level Subsidence Control Zone (see **Figure 3**) or sensitive surface infrastructure.

#### 4.2.6 Coal Mines Health and Safety Regulations 2006

Clause 88 of the CMHSR states that a method of mining other than the bord and pillar system must not be used in an underground mine except with the approval of the Minister and subject to such conditions as the Minister may impose. As such Manning will not require a clause 88 approval from the DPI for the mining of the Project.

#### 4.2.7 Roads Act 1993

Approval under Section 138 of the *Roads Act 1993* (Roads Act) will be required for the Project. Rutleys Road will be undermined and therefore consent will be required to carry out any works under this public road.

#### 4.2.8 Dams Safety Act 1978

The *Dams Safety Act 1978* (Dams Safety Act) requires the NSW Dams Safety Committee to "*formulate measures to ensure the safety of dams*" and to "*maintain a surveillance of prescribed dams*". A "*prescribed dam*" is one listed in Schedule 1 of the Dams Safety Act.

There are two dams within the vicinity of, but external to the conceptual mine plan which are listed as Prescribed Dams under the Dams Safety Act. These are the Manning Creek Ash Dam and Vales Point Ash Dam No 2 which are owned and utilised by Vales Point Power Station.

These dams will not be impacted by the Project, and therefore no approval or modifications to any existing approval will be required as a result of the Project under the Dams Safety Act.

#### 4.2.9 Water Management Act 2000

The licensing and approval provisions of the *Water Management Act 2000* (WM Act) have commenced in areas where a water sharing plan is in force.

The Project is not located within an area covered by a water sharing plan, therefore no licence or approval under the WM Act will be required for the Project.

#### 4.2.10 Water Act 1912

Part 5 of the *Water Act 1912* (Water Act) applies where the water supply work and aquifer interference approval provisions of the WM Act do not apply, therefore the Water Act applies to the Project.

In accordance with Part 5 of the Water Act, Manning will require a bore licence for the groundwater extracted from the underground workings as part of the Project from the Department of Natural Resources (DNR).

#### 4.2.11 National Parks and Wildlife Act 1974

Section 47J of the *National Parks and Wildlife Act 1974* (NPW Act) provides that a mining lease may not be granted or renewed over a State Conservation Area (including a SRA) except with the concurrence of the Minister administering the NPW Act.

A small section of the surface of the land of the EA Boundary and the subsurface to a depth of 40 m comprises part of Lake Macquarie SRA. In those areas mining is restricted to a depth of 40 m or greater. The concurrence of the Minister administering the NPW Act is therefore not required.

### 4.3 RELEVANT NSW SEPPS

#### 4.3.1 SEPP (Mining, Petroleum Production and Extractive Industries)

SEPP (Mining, Petroleum Production and Extractive Industries) 2007 (SEPP (Mining)) was gazetted on 16 February 2007. Under SEPP (Mining) underground mining on any land is permissible with development consent. Facilities for the processing or transportation of minerals are permissible with development consent on land on which mining may be carried out (with or without development consent) if the minerals were mined from that land or adjoining land.

Part 3 of SEPP (Mining) imposes matters for consideration of the consent authority when determining an application for development consent under Part 4 of the EP&A Act. Part 3 of SEPP (Mining) does not apply to an application for Project Approval under Part 3A of the EP&A Act.

Additionally, SEPP (Mining) does not apply to an application for an approval under Part 3A of the EP&A Act that had been made but not finally determined before the commencement of the policy. Therefore SEPP (Mining) does not apply to this Project Application.

#### 4.3.2 SEPP 33 (Hazardous and Offensive Development)

SEPP 33 requires the consent authority to consider whether an industrial project is a potentially hazardous industry or a potentially offensive industry.

A hazardous assessment has been conducted for the Project (see **Appendix D**), the findings from which have determined that the Project is neither potentially hazardous nor an offensive development.

#### **4.4 REGIONAL STRATEGIES & PLANS**

##### **4.4.1 Draft Central Coast Regional Strategy**

DoP's Draft Central Coast Regional Strategy (CCRS) dated 2006 aims to promote careful planning for future population growth within the Central Coast Region while maintaining and improving quality of life for the Region's current and future residents and visitors. The CCRS recognises that future development patterns must be well managed to protect the environmental assets that attract new residents to the area. The key objectives of the CCRS include making the best use of existing infrastructure, improving employment and self containment and providing a variety of local jobs.

As discussed in **Section 3.8** the Project will maintain approximately 90 existing jobs and will continue to contribute to the region's economic growth. Under the CCRS, Manning Park, where Manning's Surface Facilities are located, is described as being 'rural and resource lands'. By maintaining existing employment and continuing to contribute to the region's economy, the Project is consistent with key objectives of the CCRS.

Further discussion on the application of the objectives of this strategy and how they apply to the Project is provided in **Section 7.11**.

##### **4.4.2 Central Coast Catchment Blue Print**

The Central Coast Catchment Blue Print (CCCBP) (also known as the 'Integrated Catchment Management Plan for the Central Coast Catchment 2002') has been developed by the Central Coast Catchment Management Board (CCCMB) to provide a framework for the strategic direction of investment in catchment management. The major catchments to which the CCCBP pertains are those associated with Lake Macquarie, Tuggerah Lakes and Brisbane Waters.

The objectives of the CCCBP include to maintain the health of aquatic ecosystems and land capability by reducing soil degradation/erosion, and increase native vegetation and terrestrial biodiversity (CCCMB, 2002).

Further discussion on the application of the objectives of this strategy and how they apply to the Project is provided in **Section 7.11**.

##### **4.4.3 Hunter and Central Coast Regional Environmental Management Strategy**

The Hunter and Central Coast Regional Environmental Management Strategy (HCCREMS) dated 2004 is a regional initiative implemented through the collaborative efforts of 14 Councils in the Hunter, Central and Lower North Coast of NSW. HCCREMS seeks to facilitate a regional approach to ecologically sustainable development by actively encouraging greater co-operation between member Councils, State and Federal authorities, industry and community groups (HCCREMS 2004).

HCCREMS has become widely regarded as a model approach to integrating local government planning and environmental management at the regional level. The key objectives of HCCREMS are to:

- Provide a framework for co-ordinated action in relation to environmental management issues impacting on the region;
- Address those environmental and natural resource issues that are best managed at a regional scale (e.g. biodiversity conservation and water quality management); and
- Facilitate regional partnerships and resource sharing to address key environmental management issues in a co-ordinated, pro-active and efficient manner (HCCREMS 2004).

Further discussion on the application of the objectives of this strategy and how they apply to the Project is provided in **Section 7.11**.

## 5.0 STAKEHOLDER CONSULTATION

### 5.1 INTRODUCTION

An independent stakeholder consultation program was undertaken by Hansen Bailey which comprised the identification of stakeholders, scoping of issues and the development of relevant responses to the identified issues of concern. Additionally, the consultation undertaken has assisted in promoting an ongoing, two-way mechanism for communications between Manning and its stakeholders.

### 5.2 STAKEHOLDER IDENTIFICATION

A comprehensive list of relevant stakeholders was developed through background research, approaches from interested parties and cadastral analysis (land title and white page searches). Various stakeholder groups have been identified, including:

- Regulators (including NSW government departments and local councils);
- Near neighbours (private properties adjacent to the Surface Facilities);
- Landholders (private land holdings within the EA Boundary); and
- Other interested parties (including non-government organisations or individuals with an interest in the Project, shareholders and employees).

**Table 3** provides an overview of the stakeholders identified and the communication methods implemented during consultation.

### 5.3 ISSUE SCOPING

#### 5.3.1 Objectives

The objectives of the issue scoping phase of the consultation program were to:

- Provide stakeholders with information on the Project and planning approvals process;
- Initiate open, two-way communication with stakeholders;
- Identify community issues and concerns in relation to the Project; and
- Identify potential strategies to address the issues raised in the EA.

#### 5.3.2 Project Newsletter

A Project Newsletter was developed in November 2006 and distributed either personally at meetings or via post to over 1,100 stakeholders. The Project Newsletter provided a brief history of mining operations at Manning, an overview of the Project, the approvals and consultation processes and contacts for Manning and is shown in **Appendix E**. Only one response was received and the issues presented in that response are included in **Section 5.5**.

#### 5.3.3 Personal Briefings

From August 2006 to February 2007, approximately 10 issue scoping meetings were conducted with near neighbours, Local and State government agencies, industry bodies, neighbouring industry and other interested parties. The issues raised during this process have been incorporated in the EA. A copy of the Project Newsletter was provided at these meetings and the issues raised during these meetings are included in **Section 5.5**.

#### 5.3.4 Project Description Document

DoP confirmed that a Planning Focus Meeting was not required to be held for the Project. A Manning PDD was provided to DoP with the Major Projects Application in November 2006 for distribution to other relevant regulators for consideration when developing the EARs for the Project. The Manning PDD was also publicly displayed on DoP's website.

#### 5.3.5 Consultation Timeline

**Table 4** summarises the stakeholder consultation that has occurred throughout the preparation of the EA.

**Table 3**  
**Stakeholder Communication Methods**

Stakeholders	Method
DoP	Briefing, PDD, Newsletter
DPI	Briefing, PDD, Newsletter
DNR	Briefing, PDD, Newsletter
DEC	Briefing, PDD, Newsletter
Lake Macquarie City Council (LMCC) Mayor Councillors & Officers	Briefing, PDD, Newsletter
WSC Mayor, Councillors & Officers	Briefing, PDD, Newsletter
Mine Subsidence Board (MSB)	Letter, PDD, Newsletter,
Roads & Traffic Authority (RTA)	Letter, PDD, Newsletter
Relevant State & Federal MPs	Newsletter, Centennial Website
Near Neighbours and Landholders	Newsletter, Offer of Briefing, Centennial Website
Relevant Neighbouring Mines and Industry	Offer of Briefing, Newsletter, Centennial Website
Manning and Centennial Employees	Toolbox Talk, Newsletter, Centennial Website
Non-Government Organisations, Shareholders and Employees	Briefings, Newsletter, Centennial Website

**Table 4**  
**Stakeholder Consultation Timeline**

Date	Activity
31 August 2006	Approval Path discussion and Project overview with DoP
16 October 2006	Consultation and presentation to DPI
16 October 2006	Presentation to LMCC Officers
25 October 2006	Consultation with WSC Planning Department
31 October 2006	Consultation with DNR
24 October 2006	Consultation with Vales Point Power Station
1 November 2006	Presentation to a full sitting of the WSC (including the Mayor)
15 November 2006	Distribution of over 1,100 copies of the Project Newsletter to regulators, interested parties and all individual residences within the EA Boundary
15 November 2006	Submission of Project Application and PDD to DoP
20 November 2006	Newsletter distributed to Manning employees
1 December 2007	Project Application and PDD on DoP website for public display (30 days)
21 November 2006	Issue scoping interviews with near neighbours in close proximity to the Manning Surface Facilities
November 2006	Newsletter placed on Centennial Coal website
9 February 2007	Receipt of EARs for the Project
22 February 2007	Consultation letters Sent to RTA and MSB
1 March 2007	Presentation to DEC Newcastle
5 March 2007	Consultation letters sent to LMCC and WSC regarding Voluntary Planning Agreement

## 5.4 ISSUES RESPONSE AND FEEDBACK

The objectives of this stage were to:

- Proactively respond to all issues raised; and
- Work with stakeholders to develop appropriate responses to perceived issues associated with the Project.

### 5.4.1 Regulatory Feedback

In response to the submission of the Major Projects Application and Manning PDD, DoP issued the EARs for the Project on 9 February 2007 (appended as **Appendix A**). **Table 5** lists the EARs and where each issue is addressed in the EA.

### 5.4.2 Community Contributions

During consultation undertaken with LMCC and WSC, Manning was requested to consider an appropriate monetary community contribution relevant to the Project. As such, negotiations were initiated by Manning in relation to the development of a Voluntary Planning Agreement (VPA) between Manning, LMCC and WSC. The Agreement will allow for Manning to contribute monies to both councils to assist with community infrastructure projects commensurate with annual coal sales from the operation.

## 5.5 CONSULTATION PROGRAM

During the consultation process a number of potential issues of concern were raised in relation to the Project by stakeholders. Five near neighbours within 1 km of Manning's Surface Facilities, (Vales Point Power Station, Chain Valley Colliery, the Central Coast Model Aero Club, Property 3 and Property 8) were offered personal briefings and raised two issues. In addition, only one response with a single issue was received in relation to the Project Newsletter.

The issues raised by community stakeholders during the consultation process are addressed in **Section 7.0** and are listed below:

- Will Manning look at decreasing water usage onsite;

- Is there potential for subsidence to damage residences; and
- Will the Project impact traffic volumes on Rutleys Road.

## 5.6 FUTURE CONSULTATION

The consultation undertaken to date has provided a two-way mechanism to continue future communications between Manning and its neighbours. Consultation will continue to occur between Manning and its immediate neighbours throughout the approval process and throughout the future life of the mine.



**Table 5**  
**Environmental Assessment Requirements**

Issue	Description	EA Section
<b>General Requirements</b>	The Environmental Assessment must include: <ul style="list-style-type: none"> <li>An executive summary</li> </ul>	<b>Executive Summary</b>
	<ul style="list-style-type: none"> <li>A detailed description of the project including the: <ul style="list-style-type: none"> <li>Need for the project;</li> <li>Various components and stages of the project; and</li> <li>The likely inter-relationship between the proposed operations and existing or approved mining operations at the site;</li> </ul> </li> </ul>	<p>3.0</p> <p>3.0 &amp; 9.1</p> <p>3.0</p> <p>3.0</p>
	<ul style="list-style-type: none"> <li>Consideration of any relevant statutory provisions;</li> </ul>	4.0
	<ul style="list-style-type: none"> <li>A general overview of the environmental impacts of the project, identifying the key issues for further assessment, and taking into consideration the issues raised during consultation;</li> </ul>	5.0 & 6.0
	<ul style="list-style-type: none"> <li>A detailed assessment of the key issues specified below, and any other significant issues identified in the general overview of environmental impacts of the project (see above), which includes: <ul style="list-style-type: none"> <li>A description of the existing environment; and</li> <li>An assessment of the potential impacts of the project including potential cumulative impacts that may arise from the combined operation of the project, together with the approval and existing mines in the area;</li> </ul> </li> </ul>	<p>7.0</p> <p>2.0 &amp; 3.0</p> <p>7.0</p>
	<ul style="list-style-type: none"> <li>A description of the measures that would be implemented to avoid, minimise, mitigate, offset, manage and/or monitor the impacts of the project;</li> </ul>	7.2.4, 7.3.4, 7.4.4, 7.5.4, 7.7.4, 7.8.4, 7.9.4, 7.10.4 & 8.0
	<ul style="list-style-type: none"> <li>A draft Statement of Commitments, outlining environmental management, mitigation and monitoring measures;</li> </ul>	8.0
	<ul style="list-style-type: none"> <li>A conclusion justifying the project, taking into consideration the environmental impacts of the proposal, the suitability of the site, and the benefits of the project; and</li> </ul>	9.0
	<ul style="list-style-type: none"> <li>A signed statement from the author of the Environmental Assessment certifying that the information contained in the report is neither false nor misleading.</li> </ul>	<b>EA Statement</b>
<b>Key Issues</b>	<ul style="list-style-type: none"> <li>Surface and Groundwater – Including detailed assessment of potential surface and groundwater impacts, a detailed site water balance and a salinity balance, erosion and sediment control, and details of the proposed water monitoring program. Potential impacts of any planned water discharges (especially saline discharges) must be assessed, particularly impacts on any receiving water body.</li> </ul>	7.3 & 7.4
	<ul style="list-style-type: none"> <li>Noise – Including operation, and on-site and off-site road noise impacts.</li> </ul>	3.1 & 7.5
	<ul style="list-style-type: none"> <li>Subsidence -</li> </ul>	7.2
	<ul style="list-style-type: none"> <li>Air Quality -</li> </ul>	7.7
	<ul style="list-style-type: none"> <li>Traffic and Transport -</li> </ul>	7.8

Issue	Description	EA Section
	<ul style="list-style-type: none"> <li>• Flora and Fauna – including any impacts on critical habitats, threatened species, populations, ecological communities.</li> </ul>	7.12
	<ul style="list-style-type: none"> <li>• Rehabilitation and Final Landuse – including a justification of the proposed final landuse plans and objectives (including the Draft CCRS, the CCCBP and the HCCREMS). The Rehabilitation Strategy must also describe what measures would be put in place for the long term protection and management of the site following cessation of mining.</li> </ul>	4.4.1, 4.4.2, 4.4.3, 7.11 & 8.0
	<ul style="list-style-type: none"> <li>• Blasting and Vibration – potential impacts from shaft construction;</li> </ul>	7.6
	<ul style="list-style-type: none"> <li>• Greenhouse Gasses – a greenhouse gas assessment (including a quantitative analysis of the greenhouse emissions associated with the combustion of product coal, and a qualitative assessment of the impacts of these emissions on the environment).</li> </ul>	7.7.3
	<ul style="list-style-type: none"> <li>• Heritage – both Aboriginal and non-Aboriginal.</li> </ul>	7.14 & 7.16
	<ul style="list-style-type: none"> <li>• Visual -</li> </ul>	7.10
	<ul style="list-style-type: none"> <li>• Social and Economic -</li> </ul>	5.0 & 7.9
<b>References</b>	The Environmental Assessment must take into account relevant State Government technical and policy guidelines. While not exhaustive, guidelines which may be relevant to the project are included in the attached list.	11.0
<b>Consultation</b>	<p>During the preparation of the Environmental Assessment, you must consult with the relevant local, State or Commonwealth government authorities, service providers, community groups or affected landholders. The consultation process and the issues raised must be described in the Environmental Assessment. In particular with:</p> <ul style="list-style-type: none"> <li>• Department of Environment and Conservation;</li> <li>• Department of Natural Resources</li> <li>• Department of Primary Industries;</li> <li>• NSW Roads and Traffic Authority;</li> <li>• Mine Subsidence Board;</li> <li>• Lake Macquarie City Council; and</li> <li>• Wyong Shire Council.</li> </ul> <p>The consultation process and the issues raised must be described in the Environmental Assessment.</p>	5.0

## 6.0 RISK ASSESSMENT

### 6.1 INTRODUCTION

A preliminary risk assessment was undertaken for the Project as part of the PDD (which accompanied the Major Projects Application to DoP) to identify potential environmental issues.

Following the receipt of the EARs, a revision of the Risk Assessment was undertaken to incorporate any additional requirements specified. Additionally the risk assessment was revised to incorporate any additional issues that were raised during the issues scoping phase of the stakeholder consultation process. The revised Risk Assessment is presented in full in **Appendix F**.

### 6.2 FINDINGS

Each potential environmental issue was ranked as either being a high, medium, low or very low risk to the environment.

The findings of the risk assessment were used to prioritise and focus the required environmental assessments for the Project to ensure that each of the identified environmental issues was addressed to the relevant extent.

Findings from the revised risk assessment indicated that no issues associated with the Project were rated as high risk, with all the environmental issues rating as either medium, low or a very low risk (see **Table 6**).

### 6.3 DISCUSSION

Issues identified through the risk assessment process as being medium and low risk have been assessed as part of the EA in **Section 7.0**. Issues identified as very low were determined as such due to the Project having no noticeable surface impact, and hence no impact on these surface features.

Detailed assessments were not conducted for flora & fauna, Aboriginal Cultural Heritage and Non-Aboriginal Heritage. Additionally, the Manning Surface Facilities are less than 50 years old and as such do not require assessment under the *Heritage Act 1977* (Heritage Act).

**Table 6**  
**Environmental Impacts Risk Rankings**

Medium Risk	Low Risk	Very Low
Surface Water	Subsidence	Flora and Fauna
Groundwater	Traffic and Transport	Aboriginal Cultural Heritage
Noise	Social and Economics	Non-Aboriginal Cultural Heritage
Air Quality (including greenhouse)	Visual and Lighting	Blasting and Vibration
	Waste Management	
	Rehabilitation and Final Land Use	

## 7.0 IMPACTS, MANAGEMENT & MITIGATION

### 7.1 INTRODUCTION

Potential environmental impacts of the Project have been assessed as part of the EA with a summary of findings presented below. Additional recommended management and mitigation measures for each of the identified issues have also been developed, where required.

This section is ordered such that it generally presents issues associated with the underground conceptual mine plan, followed by issues associated with the Manning Surface Facilities.

### 7.2 SUBSIDENCE

#### 7.2.1 Introduction

A subsidence impact assessment was undertaken by Seedsman Geotechnics Pty Ltd for the Project and is presented in full in **Appendix G** and summarised below. The report includes detailed subsidence predictions and the predicted subsidence effects associated with the Project.

#### 7.2.2 Background

The conceptual mine plan described in **Section 3.5** has been used to provide a basis for quantitative predictions of the likely subsidence impacts associated with the Project. The conceptual mine plan is based on the mining method currently adopted at Manning. First workings roadways are driven to form pillars which are not extracted and thus provide continued support for the roof system. This method extracts less coal than other methods, however it has the advantage that the resulting subsidence at the surface is not noticeable.

#### 7.2.3 Impact Assessment

##### Mine Subsidence Predictions

A geotechnical model based on previous assessments conducted for Manning that includes a consideration of the material properties in and around the roadways was used to predict subsidence of the first workings identified within the conceptual mine plan. A detailed explanation of the model used is provided in **Appendix G**.

The maximum compression of the pillar system is less than 20 mm and hence this is the maximum predicted subsidence level. At these levels of subsidence the maximum tilts and strains will be of the order of 1 mm/m and 0.3 mm/m respectively.

An examination of the geology of the floor, seam and roof has also determined that the likelihood of floor heave or subsidence, plug collapse and pillar failure is extremely low. Engineering considerations of the inevitable flooding of the mine (when the mine is abandoned) lead to the conclusion that the pillars and the floor will become more stable over time.

##### Reliability of Predictions

The reliability of subsidence predictions can be discussed in terms of field verification and model robustness. The following were used to test the reliability of predictions:

- Surface subsidence surveys along the line of the conveyor belt indicate that the maximum vertical subsidence to date is 10 mm (+/- 2 mm). This result is consistent with the prediction for vertical subsidence to be less than 20 mm; and
- Predictive models can be assessed in the context of parameter and model uncertainty:
  - Parameter uncertainty relates to the geological assumptions that are made. In this context, the Fassifern Seam is known to be a remarkably uniform sequence, with the plies and bands having the same dimensions over very

broad areas. In addition, there has been a large amount of drilling in the area. The good correspondence between predictions and outcomes to date also demonstrates that the parameters have been appropriately selected; and

- In terms of model uncertainty, the prediction of subsidence is based on the application of elastic deformation theory to stable pillars and footings. This method has been used in other projects, but it is important to note that there has not been any validation of the approach because the predicted subsidence has been less than the resolution of survey techniques (i.e. 20 mm).

### Mine Subsidence Impacts

The following list of identified potentially sensitive surface features, also shown on **Figure 11**, were considered for subsidence impacts associated with the Project:

- Lake Macquarie;
- Creeks;
- Wetlands;
- Residential areas;
- Morisset Hospital;
- 330 kV power lines;
- Roads; and
- Coal conveyor.

The predicted subsidence is less than 20 mm, with tilts typically less than 1 mm/m and strains less than 0.3 mm/m. These are well within the relevant impact tolerances of these features and therefore no adverse impacts are predicted.

#### 7.2.4 Mitigation and Management

Subsidence management at Manning is by mine design, which has been developed by geotechnical

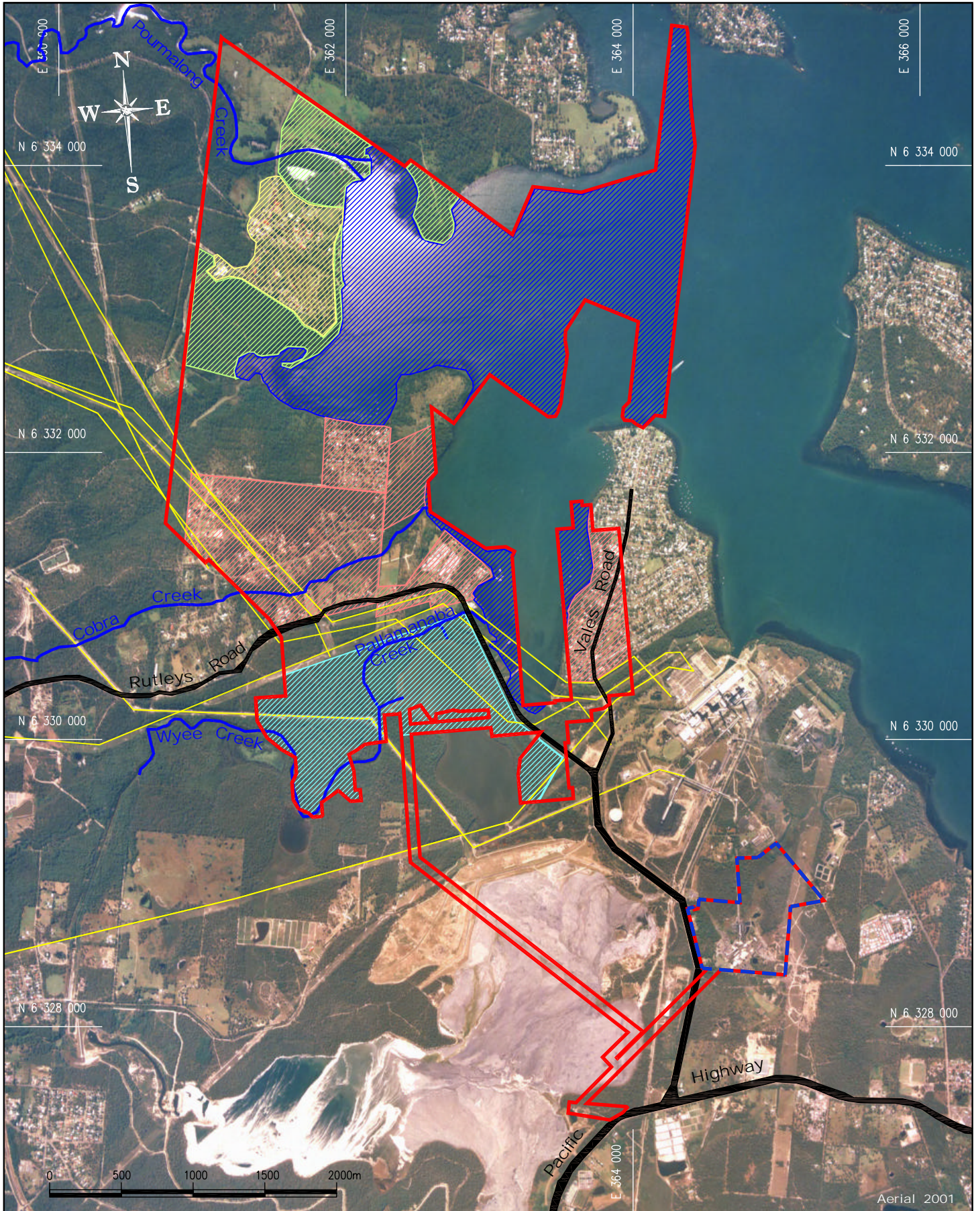
experts employing geological data and a geotechnical model, predicting no noticeable surface impacts. The model is calibrated and monitored as mining progresses utilising surface subsidence monitoring as well as underground roof and floor coring. This continual monitoring provides the mechanism to confirm predictions and monitor any potential mining impacts.

Subsidence monitoring where current mine design has been employed has been undertaken via subsidence survey lines along existing clear corridors (e.g. conveyor and road easements). Results to date show that the vertical subsidence has been less than 12 mm (inclusive of an error rate of +/-2 mm), with the associated tilts of less than 0.2 mm/m.

Where required, annual monitoring of a limited number of subsidence lines will be undertaken and reported in the Annual Environmental Management Report (AEMR), for a period of up to three years after mining has been completed. For further detail see **Appendix G**.

Any confirmation of deviation from predicted impacts will trigger consultation with DPI and any impacted landholder, to determine appropriate mitigation and mine design revisions as required.





<b>Legend</b>		
<ul style="list-style-type: none"> <li><span style="color: red;">—</span> EA Boundary</li> <li><span style="color: blue;">- - -</span> Surface Facilities</li> <li><span style="background-color: #ccccff; border: 1px solid black;"> </span> Lake Macquarie</li> <li><span style="background-color: #ffe6e6; border: 1px solid black;"> </span> Residential Area</li> <li><span style="background-color: #e6ffe6; border: 1px solid black;"> </span> Lake Macquarie State Recreational Area</li> <li><span style="background-color: #ffffe6; border: 1px solid black;"> </span> Morisset Hospital</li> <li><span style="background-color: #e6ffff; border: 1px solid black;"> </span> Wetland</li> </ul>	<ul style="list-style-type: none"> <li><span style="color: blue;">—</span> Creeks</li> <li><span style="color: yellow;">—</span> 330kV Powerlines</li> </ul>	
		<small>Co-ordinate System: MGA Zone 56</small>

<b>MANNERING COLLIERY EA</b>			
<b>Potentially Sensitive Features</b>			
Cad File:02095F.dwg	Date: 21.03.07	Drawn:JD	
			<b>Figure</b> <span style="font-size: 2em; font-weight: bold;">11</span>



## 7.3 SURFACE WATER

### 7.3.1 Introduction

A surface water assessment was undertaken by Hansen Bailey for the Project and is presented in **Appendix H**. The report includes an assessment of the water requirements for the Project and provides a water balance for the continuation of operations. This section provides a summary of the surface water assessment for the Project.

### 7.3.2 Background

Sources of mine water include external water (supplied by the WSC), local rainfall run-off water from the surface facilities and groundwater inflow to the underground workings. Water demands include water for domestic use, sewage, machinery wash-down and dust suppression. No coal washing is undertaken at Manning. Excess groundwater is pumped to the surface and passed through the on-site settlement pond system prior to discharge off-site.

The key features of Manning's surface water system are shown on **Figure 5** and consist of the following:

- Settlement Pond A;
- Settlement Pond B system, which includes Settlement Ponds 1, 2, 3 and B; and
- Licensed Discharge Points DP1 and DP2.

Surface water management is based on the following key water management strategies:

- Diversion of clean surface water run-off away from areas disturbed by surface infrastructure;
- Collection of surface water run-off from disturbed areas in catch drains and direction to sediment traps and settlement dams for control of suspended sediment prior to discharge off-site; and
- Collection of run-off from industrial areas in catch drains and direction to the settlement pond system for control of suspended sediment and pollution prior to discharge off-site.

Surface water collected on-site is unreliable in supply and generally unsuitable for reuse in the mine water management system. Surface water run-off from the south and east of Manning's Surface Facilities is directed toward the Settlement Pond B system which consists of four sediment control dams. Water in this system passes successively through Pond 1, Pond 2, Pond 3 and Pond B prior to discharge off-site from DP1 under the conditions of EPL 191.

Surface water run-off from the western side of the Manning Surface Facilities is directed toward Settlement Pond A and discharged off-site via DP2 in accordance with EPL 191.

Mine water is derived from two sources – process waste water, which is generated from underground mining operations, and groundwater, which enters the underground workings from the adjacent strata. The groundwater is highly saline and as such is unsuitable for reuse in the mine water management system due to its corrosive nature. Water from both sources is passed through an extensive goaf system that allows filtration and settlement, prior to pumping to the surface for transfer to the Settlement Pond B system.

Manning holds EPL 191 which permits the discharge of water off-site from two licensed discharge points (DP1 and DP2) into Lake Macquarie, via an unnamed drainage line. The licence permits daily discharge of up to 4 ML and further allows this limit to be exceeded during periods of wet weather.

EPL 191 also specifies pollution concentration limits and monitoring requirements including requirements that Manning submit an Annual Return under the POEO Act, summarising compliance and monthly monitoring results.

In 2005, approximately 294 ML was pumped to the surface from the underground workings and approximately 289 ML of excess mine water was discharged off-site.

### 7.3.3 Impact Assessment

The Project will be undertaken so as to ensure no noticeable impacts to surface structures or water features, including Lake Macquarie and the major

creeks that flow into it which overlie the operations (see **Figure 1**).

No additional surface facilities are proposed to be constructed as part of the Project and the existing Manning mine water management system will continue to be utilised in its entirety. The water management strategies described in **Section 3.11.2** will continue to be implemented.

The water demand associated with mining activities will remain well below the peak historical water demand of 115 ML which was associated with the maximum previous mine production of 1.7 Mtpa during the 1994-95 reporting period.

### **Project Water Demands**

All water required by mining activities will continue to be sourced from water supplied from WSC, as the quality of the inflowing groundwater makes it unsuitable for reuse in mining operations. The maximum predicted external water demand has been estimated at 70 ML / annum at maximum production although it is expected that with the continued implementation of ongoing water management strategies designed to minimise the external water demand, actual annual usage is likely to be much less.

### **Project Water Supplies**

Additional groundwater inflow from underground operations and surface water run-off from industrial areas will be generated by the Project and contribute to the mine water management system.

Water collected in the underground workings will continue to be pumped to the surface for transfer through the Settlement Pond B system prior to discharge off-site. Surface water run-off will continue to be managed in accordance with the existing system but will not increase with the Project and does not contribute a significant volume of water to the system.

The volume of surface water run-off entering the mine water management system is dependent on rainfall and has been predicted by calculating the areas of the various sub-catchments and applying an appropriate run-off coefficient. Run-off volumes were then calculated for wet, dry or average annual rainfall years

by using the rainfall data recorded at the BOM's Wyee Post Office Station over a period exceeding 100 years.

Water will be collected in the underground workings due to process mine water and groundwater inflow. The volume of process mine water remaining underground after dust suppression and processing has been conservatively estimated as 40 ML / annum.

The total daily groundwater inflow from both the Great Northern and Fassifern seams has been estimated by the groundwater assessment for the EA and is provided in **Section 7.4**. From the groundwater assessment, it has been determined that groundwater will contribute a predicted rate of inflow of 1.41 ML/day for a coal production rate of 1.1 Mtpa.

There will be no opportunity for the accumulation of salt within the mine water management system, therefore modelling of a salinity balance is not required for the Project. Water collected in the underground workings may have high salinity levels, due to the salinity of the groundwater inflow. However, the salinity of this water will be diluted during mixing with excess fresh process water and retained surface water run-off when pumped to the existing settlement pond system.

Random sampling of surface water quality was undertaken in November 2006 at DP1, and relevant sites in Lake Macquarie. Electrical Conductivity (EC), a typical indicator of salinity, was recorded as part of this sampling.

The EC level in Lake Macquarie was determined to be approximately 39,000 microsiemens ( $\mu\text{S}/\text{cm}$ ), indicating that it is more saline than the mine water being discharged upstream at DP1, a sample of which had an EC level of approximately 24,900  $\mu\text{S}/\text{cm}$ .

As such, water from Manning is of a higher quality and substantially lower salinity level than the downstream receiving waters and will continue to be discharged off-site regularly in accordance with EPL 191, with no predicted significant adverse impacts on either downstream users or the natural environment.



## Water Balance

All water required for the operation of the Project will continue to be supplied by WSC.

The critical issue for the water management system will be its ability to continue to control and discharge excess water which may be generated during mining. As such, the water balance for the Project has been assessed for the maximum coal production of 1.1 Mtpa which will correspond to the maximum surplus water inflow. The corresponding annual mine water surplus has been calculated for this level of coal production for dry, average and wet annual rainfall scenarios and is summarised in **Table 7**.

The mine water surplus predicted to occur is approximately 660 ML/annum, in a year of high rainfall which corresponds to an average daily discharge volume of approximately 1.7 ML. Manning's EPL 191 licenses discharge up to 4 ML per day and will be required to be maintained due to the variability of daily discharge volumes from site.

In the event of an abnormally high rainfall event resulting in very high short term rainfall run-off, it is possible that Manning may need to discharge surface water in excess of the 4 ML daily volume. Manning's EPL 191 permits this exceedance as long as all practical measures are taken to minimise pollution.

## 7.3.4 Mitigation and Management

No substantial changes are proposed to the Manning mine water management system for the Project. The following key components of the existing site water management system will continue to be implemented:

- Ongoing water management to minimise usage of raw water supplied by WSC;
- Monthly surface water quality monitoring both up and downstream of DP1 and DP2;
- Collection of surface water run-off from surface infrastructure areas and direction to the existing sediment pond systems prior to discharge off-site; and
- Pumping of underground mine water and groundwater to the surface and transfer to the Settlement Pond B system for pollution control prior to discharge off-site in accordance with EPL 191.

A post-mining water management plan will be prepared as part of a Mine Closure Plan within five years prior of the cessation of mining operations.

**Table 7**  
**Predicted Water Generation**

Water Supply Sources	Annual Water Volume (ML)		
	Dry Year (10th percentile rainfall)	Average Year (Average rainfall)	Wet Year (90th percentile rainfall)
Surface Water Run-off	55	80	105
Process Mine water	40	40	40
Groundwater Inflow	515	515	515
<b>Total Surplus</b>	<b>610</b>	<b>635</b>	<b>660</b>

*Source: Hansen Bailey (2007)*

## 7.4 GROUNDWATER

### 7.4.1 Introduction

A groundwater impact assessment was undertaken by Australasian Groundwater and Environmental Consultants Pty Ltd for the Project and is presented in **Appendix I**. The report includes an assessment of the potential impacts to groundwater resources associated with mining activities in the conceptual mine plan (see **Section 3.5**). This section provides a summary of the groundwater assessment for the Project.

### 7.4.2 Background

The objective of the study was to assess the impact of the Project on the groundwater regime considering the cumulative impact of surrounding mines. The hydrogeological regime of the area is described below along with an assessment made as to the potential subsidence and dewatering impacts on the groundwater system.

The impact assessment relies on past, detailed studies that were undertaken to determine the impact of subsidence on the hydrogeological regime of the area, and the fact that extensive mining has been undertaken at Manning and surrounding collieries which has significantly altered the groundwater regime.

#### Groundwater Regime

The regional groundwater regime is considered to consist of three aquifer systems:

- Alluvial aquifers associated with creeks that discharge into Lake Macquarie;
- Regolith/shallow bedrock aquifers that comprise surficial soils and weathered bedrock; and
- Permian coal seam aquifers of the Upper Newcastle Coal Measures.

The coal seam aquifers are located within hydrogeologically tight, very low yielding, dry sandstone, siltstone and shale formations that comprise the majority of the interburden and

overburden. The overburden above the Fassifern Seam is of very low permeability with the exception of occasional zones of higher permeability associated with joints, fracture zones and faults.

#### Existing Groundwater Users & Environmental Value

A search of the DNR database indicates that within a 6 km radius of the conceptual mine plan, there are 13 bores that are licensed for domestic and stock supply. The bores are up to 85 m deep, are generally low yielding and are constructed in the upper weathered and fractured part of the Munmorah Conglomerate. The majority of these registered bores are located at a distance of greater than 3 km from the conceptual mine plan. Overall it is concluded that the importance and reliance on groundwater within the conceptual mine plan by local landholders and residents is limited.

The alluvial sections of the creeks within the conceptual mine plan are influenced by tidal fluctuations of the saline Lake Macquarie and therefore contain highly brackish to saline water, with alluvial groundwater levels maintained by the level of Lake Macquarie. An environmental value could not be assigned to the low-lying alluvial aquifers within the conceptual mine plan as the ecosystems in these areas are dependent on tidal flushings and the water quality of Lake Macquarie rather than the very small groundwater fluxes that may discharge to the creeks.

Most of the licensed bores are located within the regolith/shallow bedrock and as the water is fresh to slightly brackish the environmental value could be classified as "primary industry".

The groundwater in the Permian is mostly of poor quality as is typical of coal seam water with an electrical conductivity in the range 22,900  $\mu\text{S}/\text{cm}$  to 38,200  $\mu\text{S}/\text{cm}$  compared to water in Lake Macquarie of approximately 39,000  $\mu\text{S}/\text{cm}$ . Given the depth and very poor quality of groundwater in the coal seams, it is considered that it has no "environmental value".

### 7.4.3 Impact Assessment

The impact assessment considers the current conditions of the groundwater system as well as a prediction of the impacts from the Project.

#### Impact of Existing Mines

Manning commenced operation in the 1960s with coal extracted from the Great Northern and Fassifern Seams. Since 2004 mining has progressed only in the Fassifern Seam and the Project will remain in this seam. Manning is essentially completely surrounded by other collieries, some of which are now closed, which have extracted coal from one or both of these seams from as early as the 1940s (see Figure 1).

These existing mining operations have led to extensive dewatering and depressurisation of the coal seams resulting in a regional cone of depression of the coal seam aquifers potentiometric surface.

Extensive studies were undertaken at Manning in 1992 (Forster and Enever, 1992) in order to assess the impact of longwall mining on the hydrogeological properties of the overburden strata. The studies found that for the upper strata (115 m above the Great Northern Seam) the hydrogeological properties were generally similar to those measured prior to mining. That is, strata at heights of greater than 115 m above the seam were not impacted by longwall mining. The impact of the existing mines and the studies of the impact of longwall mining were used to assess the potential impacts and risks of the Project on the groundwater regime.

#### Impact of Subsidence

The Project will utilise the bord and pillar mining method in an area where the depth of cover ranges between 150 m – 205 m. Existing bord and pillar mining operations indicate that there is minimal vertical subsidence and cracking of the overburden strata, and as discussed in Section 7.2, the predicted subsidence is less than 20 mm and there will be no noticeable impacts on the surface.

The proposed bord and pillar mining is much less disruptive to overburden strata than longwall mining

although even for subsidence associated with longwall mining, it has been shown that the intermediate and upper strata form a barrier to vertical drainage. As such it can be predicted with a high degree of certainty that the Project will have minimal to no impact on the alluvial and regolith/shallow bedrock aquifers.

The lack of impact of both longwall and bord and pillar mining in the area on overlying aquifers has been demonstrated over the past 50 – 60 years since mining began in the area. Mining at Manning and in the surrounding areas has been undertaken successfully without impacting overlying aquifers.

#### Impact on Other Groundwater Users

Of the 15 registered bores within a 6 km radius of the conceptual mine plan, there are only three that overlie the footprint of the conceptual mine plan, the deepest being 85 m. Based on the extensive studies undertaken in the past at Manning and for the Project, and given the history of mining in the area, it is predicted that the Project will not have a significant adverse impact on other groundwater users, either human or groundwater dependent ecosystems, in the immediate area.

#### Impact of Dewatering/Depressurising the Fassifern Seam

Extensive mining has been undertaken at Manning and in surrounding collieries, both in the Great Northern and Fassifern Seams over the past 50 – 60 years. This has led to the depressurisation of both seams with the potentiometric surface declining to the base of the seams in areas where coal has been extracted, and a cone of depression extending radially outwards from the workings.

Current on-going mining in the area suggests that at a regional level the piezometric surface/groundwater level will remain depressed into the future.

The impact of the Project, which will extend mining of the Fassifern Seam to the north-west, will dewater the Fassifern Seam and extend the cone of depression in this direction.

The overlying Great Northern Seam however has already been depressurised to some extent in this

area by the Cooranbong and Mandalong Collieries which are about 3 km to the north-west of the conceptual mine plan.

It is therefore concluded that the Project will only have a minor additional impact on the piezometric surface of the Fassifern Seam, which has already been extensively impacted by the existing mines in the area.

### **Inflow from Coal Seams**

In order to assess potential future groundwater inflows to the mine, an analytical assessment was made of inflow to the current workings and to the proposed workings of the Project.

The total estimated inflow to the existing Fassifern Seam workings is 0.76 ML/day and similarly the estimated inflow to the existing workings of the Great Northern Seam is 0.38 ML/day. The total assessed inflow to the mine at present is approximately 1.14 ML/day, which is considered to be in reasonable agreement with the average volume of groundwater pumped from the mine of 0.80 - 0.85 ML/day.

The estimated maximum inflow from the Fassifern Seam will increase from the current 0.76 ML/day to about 1.03 ML/day. The total volume of water inflow from both the Great Northern and Fassifern Seams will increase from the current 1.14 ML/day to 1.41 ML/day which equates to approximately 515 ML/annum.

Mannering's EPL 191 permits a discharge of 4 ML/day and based on the above analysis it is concluded that the Project will not result in this licensed discharge volume being exceeded, under normal climatic conditions.

### **Potential for Saline Intrusion from Lake Macquarie**

Investigations and current mining have demonstrated quite conclusively that the proposed bord and pillar mining of the Fassifern Seam will not cause subsidence that will impact the shallow aquifers. As such, groundwater levels in the aquifers should not be lowered which would allow potential for saline intrusion from Lake Macquarie.

### **Potential for Groundwater Contamination**

The potential for groundwater contamination exists from spills of chemicals, fuels and oils both at the surface and underground in the mine workings. Leaching of contaminated soil by infiltration of rainfall or direct migration of contaminants to the water table has a potential to contaminate the shallow aquifers. However, based on the hydrocarbon management measures utilised at Mannering (discussed in **Section 3.11.5**), it has been concluded that while there is a risk of groundwater contamination from the mine operations, Mannering has implemented management and monitoring strategies that significantly reduces this risk.

#### **7.4.4 Mitigation and Management**

Groundwater monitoring has not been required to date at Mannering and based on this impact assessment, it is considered that monitoring will not be undertaken for the Project going forward.

### **7.5 ACOUSTICS**

#### **7.5.1 Introduction**

A noise impact assessment was undertaken by Bridges Acoustics for the Project and is presented in full in **Appendix J**. The report includes an assessment of the potential noise impacts associated with the Project.

A summary of the noise assessment for the Project is discussed below.

#### **7.5.2 Background**

The noise impact assessment includes a survey of existing environmental noise levels at three representative rural residential receiver areas and analysis of weather conditions in the area to determine the occurrence of noise enhancing winds and temperature inversions.

Noise modelling applying widely accepted and best practice procedures and software has been used to predict environmental noise levels from Mannering to all potentially affected residents (or receivers).

Results are presented as noise contours over the receiver area and at each of the closest receivers. Sleep disturbance and road traffic noise levels have also been considered in the assessment.

**Table 8** lists the privately held property surrounding the Manning Surface Facilities that have been identified as potentially sensitive receivers. **Table 8** should be read in conjunction with **Figure 12**.

As underground mining activities have no noticeable acoustic effect on any sensitive receiver, this assessment is limited to noise produced by the Manning Surface Facilities including the CCF, workshop, ventilation equipment, conveyors and associated activities, including vehicle movements.

The overland conveyor from Manning to Vales Point Power Station is operated under separate approvals held by Vales Point Power Station and does not form part of the Project Application. However it is noted that if the Project were not to go ahead the overland conveyor will not operate. As such the noise impacts associated with the overland conveyor have been considered as part of this assessment.

### 7.5.3 Impact Assessment

#### Receivers

No private residences are located within 2 km to the north and west of Manning's Surface Facilities. The closest residences are located to the east and south and are 0.8 km and 1 km from the CCF, respectively.

Rural and residential receivers have been divided into three receiver areas (RAs) with similar geographical and acoustical features:

- RA1 – Three rural residences south of Manning and fronting the Pacific Highway;
- RA2 – Over 150 relocatable residences within the privately owned Macquarie Shores Home Village, east of Manning; and
- RA3 – Various scattered rural residences on Tall Timbers Road (north of the Macquarie Shores Home Village) and the adjacent Chain Valley Bay suburban area.

#### Background Noise Levels

Noise surveys have been carried out to measure existing background and ambient noise levels using a combination of long term unattended noise monitoring and short term operator-attended noise measurements at the three assessment locations described above, and shown on **Figure 12**.

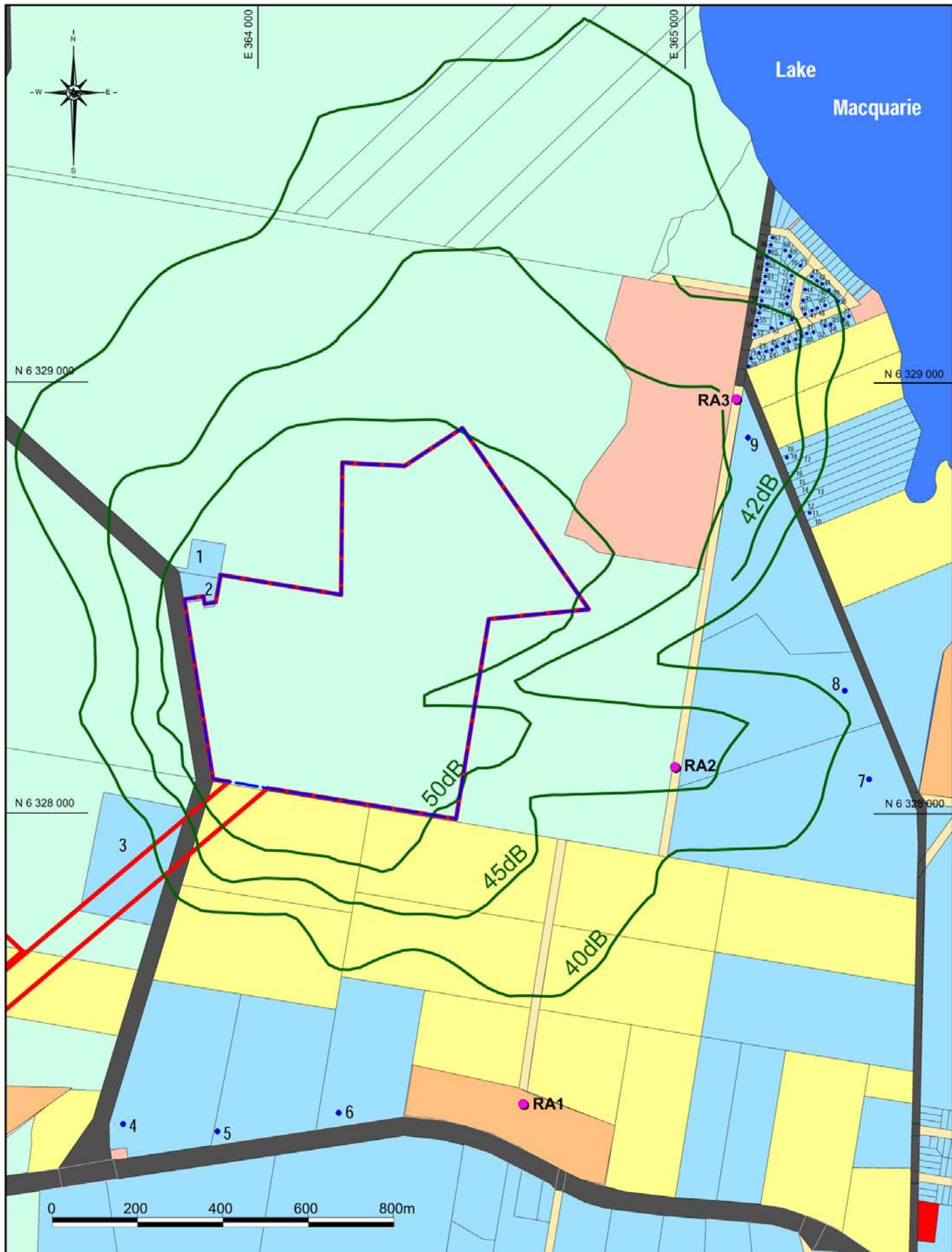
The background noise levels at each of the monitoring locations have been determined in accordance with recommended procedures in the NSW Industrial Noise Policy (INP). The background noise levels that have been adopted for this assessment are presented in **Table 9**.

**Table 8**  
**Private Property Surrounding Manning**

ID	Owner	ID	Owner	ID	Owner
1	Energy Australia	27	H Gleeson	53	H & J Beukers
2	Alcevski Investments	28	C Stead & M Garner	54	A Taylor-Stewart
3	Eaton & Sons Pty Ltd	29	A O'Keefe	55	G Kettles
4	O & J di Rocco	30	P Groen	56	R & E Brokenshire
5	A & M Keighran	31	M Parkin	57	B & S Fowler
6	Swan HydroPonics Pty Ltd	32	I Maclaren	58	B Sneddon
7	R Druitt	33	P Kranz	59	J & P Hanson
8	D & M May	34	T & V Wilding	60	L Crook & L Kelly
9	L F Jeans	35	G Williams	61	P & G Becker
10	L & J Jeans	36	P & C Byrnes	62	B Clover & R Alaban
11	L & J Jeans	37	G Holmes	63	T & O Becker
12	L & J Jeans	38	R & B Croucher	64	R Harris & D Kingsford
13	L & J Jeans	39	R & C Calvert	65	N Singleton
14	L & J Jeans	40	T & D Stolz	66	M Smith
15	L & J Jeans	41	A & S Whitbread	67	D & B Johnston
16	L & J Jeans	42	B Kelly	68	R & B Amos
17	L & J Jeans	43	L Preston	69	H & C Strand
18	L & J Jeans	44	G Bain	70	Physton Pty Ltd
19	L & J Jeans	45	C Clarke	71	R Howland
20	E & K Knight	46	W Carpenter	72	R & D Shannon
21	Jonita Homes Pty Ltd	47	S Mackay	73	P & B Williams
22	W & D Buchmasser	48	R Allen	74	P Batten
23	P McKee	49	S Jopp	75	G & A Dyer
24	J Farrell	50	P & M Davie	76	S Harrison & N Robertson
25	P Kretchmer & E Castle	51	D Olsen		
26	A Mearns	52	D Poulson & K Toope		

**Table 9**  
**Measured Background Noise Levels**

Ref	Receiver Area	Measured Background Level, (LA <sub>90,15min</sub> )		
		Day	Evening	Night
RA1	Pacific Highway Residences	46.7	42.8	34.4
RA2	Macquarie Shores Home Village	37.8	39.0	35.3
RA3	Tall Timbers Road Residences	37.4	37.9	36.8



**Legend**

	Road		EA Boundary	
	Government Agency Owned		Surface Facilities	
	Unknown		Freehold Land with Residence	
	Delta Electricity		Background Noise Monitoring Location	
	Freehold Land		Noise Contour	Co-ordinate System: MGA Zone 56 Source: Bridges Acoustics 2007
	Crown Land			
	Centennial Owned			
	No Title Information Available			

**MANNERING COLLIERY EA**

Noise Contours Night,  
Prevailing Weather Conditions

Filename: MR006 - Noise Contours.wor	Date: 21.03.07
--------------------------------------	----------------

Figure  
**12**

## Existing Noise Sources

Noise criteria shown in **Table 10** depends in part on the existing level of noise in each receiver area, excluding Manning's contribution. Observations made during the attended noise surveys indicate that at RA1 traffic is the dominant source of noise during all time periods with birds and insects contributing in the day and evening. Vales Point Power Station is also audible at times.

At RA2 the dominant noise source during the day was determined to be insects and birds with Vales Point Power Station also contributing. Delta Electricity's conveyor from the CCF to Vales Point Power Station is also likely to be audible at times.

At RA3 noise from birds and insects and intermittent traffic movements during the day are the dominant noise sources. During the evening and night the dominant noise sources are insects, Vales Point Power Station and intermittent traffic movements. Delta Electricity's conveyor from the CCF to Vales Point Power Station is also likely to be audible at times.

## Mining Noise Criteria

The lowest of the intrusive or amenity criteria are normally adopted as the limiting criterion for each receiver and time period as shown in **Table 10**.

Noise criteria listed in **Table 10** should be considered as being the levels above which some acoustic impact may be noticed by residents. Louder noise levels at a residence do not necessarily imply the noise is unacceptable at that residence.

The Project Approval being sought is unique in that what is being applied for is the continuation of existing activities at a lesser intensity than was previously the case at maximum production, in an environment which continues to be encroached by urbanisation.

The INP specifically recognises the potential for this scenario and stipulates that in such situations *'project-specific noise levels should not be applied as mandatory noise limits'*. It further states that once all *'feasible and reasonable'* control measures are in place (which has been demonstrated to be the case at

Manning) then the achievable noise limits may *'be above the project-specific noise levels'* (Section 10.1 of the INP).

## Sleep Disturbance Criteria

Sleep disturbance criteria are sourced from the State Pollution Control Commission (now DEC) ENCM which recommends a  $LA_{1,1min}$  limit of 15 decibels above the background noise level during the hours 10:00 pm to 7:00 am (or to 8:00 am on Sundays and public holidays). Sleep disturbance criteria based on the adopted night background levels in **Table 9** are listed in **Table 11**.

## Weather Conditions

Where inversions occur for 30% of the time or more in any season or time period, the INP recommends the following weather effects are modelled:

- A 3°C/100 m inversion during the night plus a 2 m/s drainage flow from source to receiver where the source is on higher ground; or
- A 3 m/s gradient wind.

Further details in relation to the weather conditions for this assessment are provided in **Appendix J**.

## Predicted Mining Noise Levels

Environmental noise levels produced by the Project have been calculated using RTA Technology's Environmental Noise Model (ENM) software. ENM is a general purpose noise modelling package that combines terrain and noise source information with other input parameters such as weather conditions to predict noise levels at specific receiver locations or as contours over a specified receiver area.



**Table 10**  
**Indicative Mining Noise Criteria at Private Property**

Ref	Receiver Area	Intrusive Criteria, (LA <sub>eq,15min</sub> )			Amenity Criteria, (LA <sub>eq, period</sub> )		
		Day	Evening	Night	Day	Evening	Night
RA1	Pacific Highway Residences	52	48	39	60	50	45
RA2	Macquarie Shores Home Village	43	44	40	60	50	45
RA3	Tall Timbers Road Residences	42	43	42	60	50	45

**Table 11**  
**Adopted Sleep Disturbance Criteria at Residences (LA<sub>1,1min</sub>)**

Ref	Receiver Area	Sleep Disturbance Criteria, (LA <sub>1,1min</sub> )
RA1	Pacific Highway Residences	49
RA2	Macquarie Shores Home Village	50
RA3	Tall Timbers Road Residences	52

### Calculated Noise Levels

A summary of the received noise levels are shown in **Table 12** for closest residences or over 25 % of each property, with calculated exceedances of the intrusive noise criteria shown in bold font. **Table 12** should be read in conjunction with **Table 8** which contains a list of relevant private properties surrounding Manning Surface Facilities.

The Project's operational noise levels have been modelled under both neutral and prevailing weather conditions for day, evening and night-time periods. Each set of results represents a normal operational scenario including intermittent vehicle movements.

### Summary of Affected Receivers

A summary of affected residences (i.e. those receiving noise levels over the intrusive criteria listed in **Table 10**) for all periods (day, evening and night) are presented in **Table 13** and assume the Macquarie Shores Home Village (owned by one individual) contains approximately 150 separate, relocatable dwellings.

When considering each relocatable home within Macquarie Shores Home Village as a separate

dwelling, these results indicate Manning is expected to affect 69 dwellings up to 3 dBA, 50 dwellings up to 5 dBA and 33 dwellings up to 6 dBA, above the intrusive criteria. Manning only affects approximately 33 relocatable dwellings within Macquarie Shores Home Village by up to 1 dBA above the night amenity criterion, with all other relocatable dwellings receiving acceptable noise amenity levels in all time periods. As noted above under the heading 'Mining Noise Criteria' it is argued that the project-specific noise levels calculated should not apply to the Macquarie Shores Home Village.

Properties 1 to 3 are used for industrial purposes and are therefore unaffected by the Project, while any rural residential properties not listed in **Table 13** do not exceed the criteria.

Table 12  
Summary of Received Noise Levels (LA<sub>eq,15min</sub>)

ID	Weather Conditions (Time Period)				Indicative Noise Criteria
	Neutral Weather		Prevailing Weather		
	Day	Evening / Night	Evening	Night	D / E / N
4	30.5	33.5	49.0	31.5	52/48/39
5	29.5	32.5	47.0	31.0	
6	32.5	35.0	43.5	34.0	
7	29.0	33.5	28.5	36.5	43/44/40
7 *	34.5	38.5	34.5	42.5	
8	38.0	41.5	37.0	46.0	
9	33.5	38.5	32.0	44.5	42/43/42
10, 12-17 *	30.0	34.0	28.5	<40	
11	30.5	35.5	29.5	39.5	
18	31.0	36.5	30.0	43.0	
19 *	30.0	34.5	28.5	41.0	
20	32.5	37.5	31.5	44.0	
21	32.5	37.0	31.0	44.0	
22	32.0	37.0	30.5	44.0	
23	32.0	36.5	30.5	43.5	
24	31.0	36.0	30.0	43.5	
25	31.0	36.0	30.0	43.0	
26	31.0	36.0	29.5	43.0	
27	30.5	35.5	29.5	42.5	
28	30.5	35.0	29.0	42.5	
29	30.0	35.0	29.0	42.0	
30-49	<30	<35	<29	<42	
50	30.5	35.5	29.0	42.0	
51	31.0	36.0	29.5	42.5	
52	31.5	36.5	30.0	43.0	
53	32.0	37.0	31.0	43.0	
54	32.0	37.0	31.0	42.5	
55	32.0	37.0	31.0	42.5	
56	32.0	37.0	31.0	42.5	
57	32.0	37.0	31.0	42.0	
58-76	<32	<37	<31	<42	
Appendix J	Fig A1	Fig A2	Fig A3	Fig A4	

\* Listed noise levels for unoccupied or large properties are calculated over 25% of the property

**Table 13**  
**Summary of Affected Receivers Compared to Intrusive Criteria**

Noise Impact	Receiver ID	Details
Minor impact up to 3 dBA over intrusive criteria	4	1.0 dBA in the evening
	7	2.5 dBA at night (over 25% of property)
	8 *(approx 32% or 48 dwellings )	0.0 to 3.0 dBA at night
	9	2.5 dBA at night
	18	1.0 dBA at night
	20	2.0 dBA at night
	21	2.0 dBA at night
	22	2.0 dBA at night
	23	1.5 dBA at night
	24	1.5 dBA at night
	25	1.0 dBA at night
	26	1.0 dBA at night
	27	0.5 dBA at night
	28	0.5 dBA at night
	29	<0.5 dBA at night
	50	<0.5 dBA at night
	51	0.5 dBA at night
	52	1.0 dBA at night
	53	1.0 dBA at night
	54	0.5 dBA at night
55	0.5 dBA at night	
56	0.5 dBA at night	
57	<0.5 dBA at night	
Moderate impact 3 to 5 dBA over intrusive criteria	8* (approx 33% or 50 dwellings)	3.0 to 5.0 dBA at night
Stronger impact 5 to 6 dBA over intrusive criteria	8* (22% or 33 dwellings)	5.0 to 6.0 dBA at night

\* Note – It is argued that the calculated theoretical intrusive criteria does not apply to this Project.

### Sleep Disturbance

Disturbance to sleep can occur when a short, sharp noise that is clearly audible over the background noise level occurs near a residence. Background noise levels for the Project have been used to develop the Sleep Disturbance Criteria listed in **Table 11**.

The conveyor start siren is the only source associated with Mannering's Surface Facilities that has the potential to disturb a resident's sleep. As the siren is understood to be located on the western side of the rotary breaker, it will be at least partially shielded from the closest residences and noise from the siren will be more than 4 dBA below the sleep disturbance criterion under prevailing weather conditions during the night.

Therefore no sleep disturbance impacts on receivers are expected from Mannering's Surface Facilities.

### Road Traffic Noise

Relevant traffic noise criteria are outlined in the ECRTN. Noise criteria for Situation 8 "*Land use developments with the potential to create additional traffic on collector roads*" are 60 LA<sub>eq,1hr</sub> during the day and 55 LA<sub>eq,1hr</sub> during the night and apply to all traffic including vehicles associated with Mannering. Noise criteria in the ECRTN only applies to residential receivers.

The nearest residential receiver is Property 4 (near the corner of Rutleys Road and the Pacific Highway). This residence is located approximately 45 m from the edge of Rutleys Road and is expected to receive 57 LA<sub>eq,1hr</sub> during the day and 54 LA<sub>eq,1hr</sub> during the night from Rutleys Road traffic in 2007. Traffic at Mannering will not increase as a result of the Project. Therefore operations at Mannering will not attribute to a change in these calculated noise levels throughout the duration of the Project.

Therefore calculated traffic noise levels from Rutleys Road are acceptable compared to the recommended ECRTN noise criteria.

#### 7.5.4 Mitigation and Management

Mannering has been operating since the 1960s. At its peak it produced over 1.7 Mtpa ROM coal at which time its surface activities were more intense than current activities. Since its purchase by Centennial, the recommencement of scaled-down mining operations together with the incorporation of all feasible and reasonable noise control measures such as the decommissioning of the CCF exhaust fan and adding enclosures to the rotary breaker, has ensured that it has received no noise complaints from its neighbours.

Although not always the dominant noise source, close neighbours are accustomed to some audible noise in certain weather conditions from the Mannering Surface Facilities.

The INP acknowledges significant variation in reaction to noise usually exists amongst an average

population. As the INP aims to protect the majority of people for most of the time, it follows that noise levels over the INP's recommended noise criteria for some of the time will not necessarily affect a large proportion of nearby residents. In this case, due to urban encroachment, many residents have moved to the area after Mannering was established and therefore have chosen to accept some audible noise from Mannering.

Noise monitoring results indicate Mannering is not the dominant source of environmental noise in the area, with the Vales Point Power Station audible at residences to the north and the Pacific Highway audible at residences to the south. All residences near Mannering therefore receive audible industrial or traffic noise from other sources in the area, which means Mannering noise is a part of the local noise climate rather than the only intrusive noise source in this area.

Sleep disturbance is unlikely to occur as a result of Mannering's activities as no exceedances of the sleep disturbance criteria are expected at any receiver. Traffic noise produced by vehicle movements on Rutleys Road, including some vehicle movements associated with Mannering, is acceptable at all nearby residences.

Mannering has achieved a significant reduction in environmental noise levels from its operations by discontinuing use of the CCF exhaust fan and by substantially enclosing the rotary breaker. These two sources were previously the loudest at Mannering. There are no remaining dominant sources associated with Mannering's Surface Facilities, based on a review of current sound power levels and the character of audible noise from Mannering, therefore further noise reductions are not required.

Based on the results of this assessment and considering historical noise levels, environmental noise levels from Mannering are considered acceptable.

Monitoring will be conducted in accordance with the Environmental Management Strategy & Monitoring Program (EMS & MP), as described in Section 7.17, and the results reported in the AEMR.

Should any noise impact concerns be raised over the scaled-down continuation of underground mining at Manning, the Company will use its best endeavours to resolve such issues in consultation with DEC.

## 7.6 BLASTING AND VIBRATION

No blasting is required to be undertaken on the surface as part of the operation of the Project (i.e. no ventilation shafts are required to be constructed). As such, no impacts to surface features will result from blasting activities associated with the Project.

## 7.7 AIR QUALITY

### 7.7.1 Introduction

The air quality impact assessment for the Project was undertaken by Holmes Air Sciences and is presented in **Appendix K**. The report includes an assessment of the potential air quality impacts associated with the Project, a summary of which is provided below.

### 7.7.2 Background

This assessment covers the following activities, which are potential sources of emissions (including greenhouse gases) for the Project:

- Ventilation shafts, which will liberate CO<sub>2</sub>, CH<sub>4</sub> (greenhouse gases) and particulate matter, as well as minor quantities of exhaust emissions from internal combustion engines used underground (although most equipment is electrically powered);
- The CCF with a capacity of 400 tph;
- Loading of coal to stockpile, (which will be a potential source of particulate matter);
- Wind erosion from the 25,000 t capacity stockpile, with a disturbance area of less than 0.5 ha; and
- Intermittent reclamation of stacked-out coal using an underground reclaim tunnel with coal pushed up towards the reclaim feed using an excavator or FEL; and
- The end use of the coal.

The overland conveyor from Manning to Vales Point Power Station is operated under separate approvals held by Vales Point Power Station. However, the air quality impacts associated with the overland conveyor from Manning to Vales Point Power Station have been considered as part of this assessment.

### Methodology

A qualitative assessment was undertaken including:

- Analysis of the Project to identify dust sources;
- Preparation of an emissions inventory;
- Review of existing monitoring data; and
- Review of dispersion condition.

A screening model test was also undertaken to assess the significance of emissions for the Project. The findings from this test are presented in **Section 7.7.3** and concluded that more detailed modelling is not justified.

### 7.7.3 Impact Assessment

#### Existing Air Quality & Criteria

**Table 14** and **Table 15** summarise the air quality assessment criteria that are relevant to the Project.

Manning operates a network of five dust deposition gauges within the Manning Surface Lease, the locations of which are shown on **Figure 5**.

Dust deposition data was reviewed for the period January 2001 – June 2006. For this period, both monthly and annual deposition levels are low and comply with the DEC's annual average assessment criteria of 4 g/m<sup>2</sup>/month. The data show that air quality complies with the assessment criteria, which is consistent with Manning having not received any complaints in relation to air quality impacts.

Delta Electricity has been monitoring Total Suspended Particulates concentrations in the Manning area since January 2004. The location of this TSP monitor is shown on **Figure 2** in **Appendix K**. A review of this data shows that annual average TSP concentrations comply with the DEC annual average assessment criterion of 90 µg/m<sup>3</sup>.



Table 14  
Air Quality Goals for TSP & PM<sub>10</sub>

Pollutant	Goal	Averaging Period	Agency
Total suspended particulate matter (TSP)	90 µg/m <sup>3</sup>	Annual mean	National Health and Medical Research Council (NSW DEC, 2005)
Particulate matter < 10 µm (PM <sub>10</sub> )	50 µg/m <sup>3</sup>	24-hour maximum	NSW DEC (2005) (assessment criteria)
	30 µg/m <sup>3</sup>	Annual mean	NSW DEC (2005) (long-term reporting goal)

Source: (DEC, 2005)

Table 15  
Air Quality Goals for Depositional Dust

Pollutant	Averaging Period	Maximum increase in deposited dust level	Maximum total deposited dust level
Deposited dust	Annual	2 g/m <sup>2</sup> /month	4 g/m <sup>2</sup> /month

Source: (DEC, 2005)

### Predicted Air Quality Impacts

The emissions from the major dust sources associated with the Project as identified in Section 7.7.2 have been calculated as part of the air quality assessment and are summarised in Table 16.

The estimated total emissions from the mine and operation of the overland conveyor from Manning to Vales Point Power Station will remain small, at less than 2 g/s. This level of emission will not affect the PM<sub>10</sub>, TSP or deposition levels significantly at the closest residential location (Property 8), which is at least 800 m from the stockpile and shown on Figure 12.

Currently, annual average TSP concentrations, inferred annual average PM<sub>10</sub> and annual average deposition levels comply with the DEC assessment criteria. The 24-hour PM<sub>10</sub> concentrations will exceed the 50 µg/m<sup>3</sup> assessment criterion during periods when bushfires are contributing high concentrations of smoke to the air, or remote dust storms transport significant quantities of particulate matter into the Lake Macquarie air shed.

Since the mine's ventilation system is already part of the existing operations and the effect of the emissions from the ventilation system will be captured in the historical monitoring data, the only new emissions (i.e.

TSP) will be 735 kg/y or 0.023 g/s, which is even less than the 1.5 g/s due to all sources. A screening model test to assess the significance of these emissions suggests that the maximum 24-hour PM<sub>10</sub> concentration and annual average concentration at the most affected receptor will be less than 0.5 mg/m<sup>3</sup> and less than 0.05 mg/m<sup>3</sup> respectively.

These are extremely small levels and therefore it has been determined that more detailed modelling is not justified.

### Predicted Greenhouse Gas Impacts

The procedures specified in the Australian Greenhouse Office's (AGO) Workbook (AGO, 2005) have been adopted for this assessment and are consistent with internationally applied methods.

The protocol identifies greenhouse gases as follows:

- Carbon dioxide (CO<sub>2</sub>);
- Methane (CH<sub>4</sub>);
- Nitrous oxide (N<sub>2</sub>O);
- Hydrofluorocarbons (HFCs);
- Perfluorocarbons (PFCs); and
- Sulphur hexafluoride (SF<sub>6</sub>).

The main sources of greenhouse gases from Manning have been identified as being from ventilation air, electricity consumption on-site, diesel usage and the end use of the coal. The emissions from these major sources have been calculated as part of the air quality assessment and are summarised in **Table 17**.

There are both direct and indirect sources of greenhouse gas emissions from Manning Colliery's activities. The direct emissions are from dilute gas emissions from the underground mining process. Indirect emissions are related to the full life cycle analysis of the direct consumption of electricity and diesel at the site. These types of emissions are known as Scope 1 and Scope 2 emissions.

There are also indirect emissions from the downstream burning of the coal product to produce electricity. These are known as Scope 3 emissions. Inclusions of Scope 3 emissions in the Manning inventory results in double counting of emissions and is not conventional practice.

However, inclusion of Scope 3 emissions has been requested by the Department of Planning.

The approximate average annual emissions from Scope 1 and 2 sources is 584,000 tonnes CO<sub>2</sub>-e. This equates to approximately 0.001 % of Australia's annual emissions, which were 564.7 Million tonnes CO<sub>2</sub>-e in 2004 (National GHG Inventory 2004, May 2006).

The approximate average annual emissions from Scope 3 (downstream burning of the product) is 2.2 Million tonnes CO<sub>2</sub>-e. With an approximate annual global emission rate of 40 Gigatonnes CO<sub>2</sub>-e the burning of the coal product equates to approximately 0.007 % of global greenhouse gas emissions.

Based on the Intergovernmental Panel on Climate Change (IPCC) estimate, a doubling of the CO<sub>2</sub>-e equivalent concentration in the atmosphere will lead to a 2.5°C increase in global average temperature, and that the current global CO<sub>2</sub>-e load is 2,750 Giga tonnes (Gt), it has been estimated that the emissions from the Project over one year, at maximum production will lead to an increase in the global temperature of 0.0000025°C.

It is therefore considered that there is no material affect on national or global greenhouse gas emissions from the Project.

**Table 16**  
**Summary of Emissions from Major Dust Sources**

Activity	TSP (kg/year)
Crusher (enclosed)	Negligible
Mine ventilation system	47,304
Loading 2% of coal to stockpile	8
Wind erosion from stockpile	268
Pushing coal on the stockpile using an Excavator/FEL	459
Dust loss from the conveyor system	Negligible
<b>Total</b>	<b>48,039</b>

Table 17  
Summary of Annual Greenhouse Gas Emissions

Activity	Annual Greenhouse Gas Emissions in Tonnes of CO <sub>2</sub> equivalent
CO <sub>2</sub> and CH <sub>4</sub> in the ventilation air	571,449
Electricity usage	11,751
Diesel usage	372
End use of the coal	2,223,000
<b>Total</b>	<b>2,806,572</b>

#### 7.7.4 Mitigation and Management

Based on the results of this assessment and considering the existing air quality data, it has been determined that there will be no noticeable impacts to nearby residences as a result of the Project. Therefore, no additional management or mitigation measures are required with regards to air quality. The current dust deposition monitoring which is conducted at Manning is proposed to continue.

### 7.8 TRAFFIC

#### 7.8.1 Introduction

A traffic impact assessment was undertaken by Parsons Brinckerhoff (PB) for the Project and is presented in **Appendix L**. The report provides an assessment of the performance of the intersection of the Manning Access Road with Rutleys Road. This section provides a summary of the traffic impact assessment for the Project.

#### 7.8.2 Background

Manning is accessed via a single entrance off Rutleys Road in the suburb of Manning Park. The intersection is within the Wyong LGA and current vehicle usage on the access road consists of Manning employees and service vehicles associated with the mine. Rutleys Road, classified as a local road, connects with the Pacific Highway 1 km to the south and Wye Road approximately 8 km to the north-west. It provides the only connection to the townships of Manning Park via Vales Point Road and Wye Point via Government Road.

The section of Rutleys Road near the Manning Access Road intersection is a two-lane, two-way road of a rural standard with an 80 km per hour (km/h) speed limit. The intersection is a simple T-type located on the outside of a bend on Rutleys Road. The grade on either side varies but it is generally level at the intersection and there is good sight distance to the north and south.

The lane widths of Rutleys Road on the approach and departure to the intersection vary between 4 m and 4.8 m with a maximum of 7.5 m on the south bound side. The Manning Access Road has two 3.8 m wide lanes, kerb and guttering and a 20 km/h posted speed limit.

#### 7.8.3 Impact Assessment

##### Average Daily Traffic

Traffic data on Rutleys Road and the Manning Access Road was gathered from 15 to 21 November 2006 to determine Average Daily Traffic (ADT) volumes and is shown within **Table 18**.

##### Intersection Counts

A peak period manoeuvre count was also undertaken as part of this study at the intersection of Rutleys Road and the Manning Access Road. The traffic counts provided a general indication of current traffic flows.

The survey results indicated that the morning peak hour of the intersection occurred between 7:30 am and 8:30 am, with the evening peak hour occurring between 3:00 pm and 4:00 pm. The traffic characteristics of the intersection have been summarised in **Table 19**.

### Future Traffic Volumes

The traffic generated by Manning will not increase significantly. The current weekday peak of approximately 244 vehicles per day and peak hour of 42 vehicles on the Manning Access Road is unlikely to change. The shift changeover times are also not expected to change.

Traffic data collected from WSC since 2001 has indicated an annual growth rate of between 6.6 % and 8.0 % on Rutleys Road. The higher growth has been experienced on the northern end of the road around 2.5 km from the Manning Access Road with the lower rate closer to the Manning Access Road. The average rate is 6.8 % per annum; however this growth rate does not correlate with the results from the commissioned counts, which found that traffic volumes increased by only 3.0 % per annum since 2004.

It was considered that the exceptionally high growth rate of 6.0 % will not be sustainable into the future. For the purposes of an analytical traffic assessment, a more realistic growth rate of 3.0 % per annum has been adopted for Rutleys Road traffic. It is assumed the proportion of heavy vehicles remains constant.

### Existing Intersection Performance

The intersection is currently operating exceptionally well with level of service B and degree of saturation of less than 0.3 during both peak periods. Traffic exiting the mine site experiences the highest delay in both peak periods, of approximately 20 seconds. The right turn traffic from Rutleys Road into the Manning Access Road experiences the next longest delays, around 10 - 15 seconds. Other movements at this intersection experience little to no delays.

Rutleys Road northbound traffic experiences queues of up to 20 m in both peak periods. This is due to the fact that the approach is a shared lane for through and right turning traffic, therefore, a vehicle waiting to turn right will block the through traffic.

The intersection is currently operating with ample spare capacity, minimal delays and virtually no queues, except for the right turn movement into the Manning Access Road. **Table 19** shows current intersection performance.

### Future Intersection Performance

Intersection analysis was repeated for 2016 and 2026 based on predicted future traffic volumes. The predicted future traffic volumes were estimated by assuming a 3% per annum growth of through traffic on Rutleys Road.

Superimposing 2016 predicted traffic conditions, the intersection will continue to operate exceptionally well with minimal delays and queuing. Existing level of service B operation will continue in 2016 for both peak periods. The degree of saturation will be in the order of 0.35 or less. The critical movements will continue to be traffic exiting the mine site, which will experience delays of up to 30 seconds during peak periods. The longest queue of 29 m at this intersection in 2016 will continue to be experienced by the northbound Rutleys Road traffic (including the right turning traffic). The intersection will continue to experience ample capacity resulting in minimal delays and queues.

Under 2026 conditions, this intersection will operate satisfactorily with level of service D or better in both peak periods. The longest delays will be in the order of 45 seconds or less, which will be experienced by traffic leaving Manning. Right turning traffic entering Manning Access Road will experience delays in the order of 15 seconds. The maximum queue length will continue to increase (to approximately 50 m) and will be experienced by Rutleys Road northbound traffic. The intersection will continue to have ample capacity in 2026.

Although the intersection will continue to operate satisfactory in both peak periods in 2016 and 2026, there will be a slight deterioration in the operating conditions in the future.

However, the delays and queues that will be experienced by motorists will still be within a tolerable threshold and not to the extent that will require treatment. It also should be noted that the change in the performance of the intersection will be due to natural growth of Rutleys Road traffic. The Project is not expected to generate additional traffic demand. **Table 20** shows predicted future intersection performance.

**Table 18**  
**Average Daily Traffic**

Period	Rutleys Road	Manning Access Road
Two Way Week Day	8,282	244
Two Way Weekend	6,828	73
Two Way Seven Day	7,867	195

**Table 19**  
**Current Intersection Performance**

Peak Hour	Degree of Saturation (DoS)	Ave Delay (sec)	Current Level of Service (LoS)	Max Queue (m)
AM peak	0.28	19	B	20
PM peak	0.25	19	B	19

**Table 20**  
**Future Intersection Performance**

Peak Hour	DoS	Ave Delay (sec)	Current LoS	Max Queue (m)
<b>2016 future cases</b>				
AM peak	0.34	26	B	29
PM peak	0.33	27	B	29
<b>2026 future cases</b>				
AM peak	0.39	37	C	46
PM peak	0.37	46	D	49

#### 7.8.4 Mitigation and Management

The Project will not result in any increase in traffic movements or change in the current traffic mix.

The Signalised and Un-signalised Intersection Design and Research Aid (SIDRA) traffic analysis revealed that the intersection currently operates at an acceptable level with only small delays experienced on the right turn into and out of the Manning Access Road.

The analysis also revealed that under future conditions (in 2016 and 2026) the intersection will continue to enjoy satisfactory operation. There will be a slight decrease in the operating conditions of the intersection, but not to the extent that will warrant treatment. The future performance change is due to

the natural growth of Rutleys Road and not due to activities resulting from the Project.

From a safety perspective, a traffic safety audit is proposed to be undertaken for the intersection of the Manning Access Road with Rutleys Road to ensure that it continues to operate effectively. This will be undertaken within five years of the granting of Project Approval (or as otherwise agreed with the Director-General).

#### 7.9 ECONOMICS

##### 7.9.1 Introduction

An economic impact assessment was undertaken by Gillespie Economics for the Project and is presented in **Appendix M**.



The report provides an assessment of the economic costs and benefits associated with the Project. This section provides a summary of the economic impact assessment for the Project.

### 7.9.2 Background

Economic analysis is primarily concerned with weighing up the potential incremental economic costs and benefits of the Project to the community (i.e. consideration of economic efficiency). This includes the incremental costs and benefits to the environment. The main technique that has been used to evaluate the Project with respect to economic efficiency is a benefit cost analysis.

Information on the regional economic impact or economic activity generated by the Project is also of interest to decision-makers and has direct links to the analysis of potential impacts on community infrastructure and population.

### 7.9.3 Impact Assessment

#### Benefit Cost Analysis

The benefit cost analysis compared the Project to the Base Case (discontinuation of coal mining, rehabilitation of the mine site and provision of coal to Vales Point Power Station from other Centennial mines). The incremental economic costs and benefits of the Project are summarised in **Table 21**.

It should be noted that the potential external costs listed in **Table 21** are only economic costs to the extent that they affect individual and community well-being through direct use of resources by individuals or non-use. If the potential external impacts are mitigated to the extent where community wellbeing is insignificantly affected, then no external economic costs arise.

The benefit cost analysis valued the incremental production costs and benefits of the Project based on financial information provided by Manning and valued the impacts of greenhouse gas directly generated by the Project. All other potential external environmental impacts were dealt with via threshold value analysis, due to the nature of their extremely low impact as assessed by the EA.

It was found that at a 7 % discount rate, the net incremental production benefits of the Project (incorporating direct greenhouse gas costs) will be in the order of \$17 million Net Present Value (NPV).

This net production benefit will be distributed amongst a range of stakeholders including:

- Company shareholders;
- The NSW Government via royalties; and
- The Commonwealth Government in the form of company tax.

The NSW Government will also receive additional benefits in the form of payroll tax.

The estimated \$17 million net production benefit represents the opportunity cost to society of not proceeding with the Project. Interpreted another way, any non-quantified environmental impacts from the Project after mitigation by Manning, will need to be valued at greater than \$17 million to make the Project questionable from an economic efficiency perspective.

This is equivalent to each household in the Newcastle Subdivision having a willingness to pay of over \$90 to avoid any of the residual environmental impacts of the Project, after mitigation by Manning.

**Table 21**  
**Potential Economic Costs and Benefits of the Project**

Project Components	Potential Costs	Potential Benefits
<b>Production (Mannering)</b>	<ul style="list-style-type: none"> <li>• Opportunity cost of land and capital</li> <li>• Mining and infrastructure capital and operating costs</li> </ul>	<ul style="list-style-type: none"> <li>• Residual value of land and capital at project cessation</li> <li>• Value of Mannering coal</li> <li>• Extra net premium achieved from diverting higher value thermal coal to export</li> <li>• Delayed decommissioning and rehabilitation costs</li> </ul>
<b>Potential External Impacts</b>	<ul style="list-style-type: none"> <li>• Air quality affecting neighbouring properties</li> <li>• Noise disturbing residents of neighbouring properties</li> <li>• Disturbance of surface and groundwater flows</li> <li>• Generation of greenhouse gas by the Project</li> <li>• Continuing traffic movements</li> </ul>	

### Regional Economic Impact Assessment

Regional economic impact assessment is primarily concerned with the effect of an impacting agent on an economy in terms of a number of specific indicators, such as employment, income, gross regional product and gross regional output.

This study examined the impact of the continued operation of Mannering at increased levels of production to current levels (but less than previously recorded production levels) on the Newcastle Region using input-output analysis.

The Newcastle Region is defined as the Newcastle Statistical Sub-division comprising the Statistical Local Areas of Newcastle, Lake Macquarie, Cessnock, Maitland and Port Stephens.

A 2001 input-output table of the regional economy was developed using the GRIT procedure. For the analysis of the Project, a detailed revenue, expenditure and employment profile for Mannering was developed and inserted into the regional input-output table.

The total and disaggregated annual impacts of the continuation of Mannering on the Newcastle economy, in terms of output, value-added income and employment was undertaken.

In total, the operation of the Project is estimated to make the following contribution to the Newcastle economy:

- \$53 million in annual direct and indirect regional output or business turnover;
- \$27 million in annual direct and indirect regional value added;
- \$13 million in annual household income; and
- 182 direct and indirect jobs.

The sectors most impacted by output, value-added and income flow-ons are likely to be related to the provision of goods and services.

#### 7.9.4 Mitigation and Management

The cost-benefit analysis indicates the trade-off between net production benefits (incorporating greenhouse gas costs). Minimisation of environmental externalities in the most cost effective manner helps maximise the net economic benefits of the Project.

Mitigation measures, where required, are addressed in other aspects of the EA.

## 7.10 VISUAL & LIGHTING

### 7.10.1 Introduction

A visual impact assessment was undertaken by Hansen Bailey for the Project and is discussed below. Photos of the representative viewing locations are shown in **Appendix N**.

### 7.10.2 Background

The visual impact assessment was undertaken to assess the potential impacts on the surrounding area from the Mannering Surface Facilities, (see **Section 3.2**). The conceptual mine plan has not been assessed as part of this study as it has been designed to not cause any noticeable surface impacts.

### 7.10.3 Impact Assessment

#### Setting

Mannering is located at a relatively high elevation with many of the potential sensitive viewing locations (private residences) in lower lying topographic areas such as the foreshores of Lake Macquarie.

Vales Point Power Station and Lake Macquarie to the north, the Mannering Creek Ash Dam (associated with the Power Station) to the west, and the Pacific Highway to the south are all dominant existing land uses that form the landscape setting at Mannering.

#### Methodology

Visual sensitivity is a measure of how critically a Project is viewed by people utilising different land uses in the vicinity.

Visual effect is a measure of the level of visual contrast and integration of a Project with the existing visual environment.

The visual impact of the Project has been determined using the matrix set out in **Table 22** by evaluating the visual effect of the Project and the visual sensitivity of receptors from which the Project may be visible.

The highest structure at Mannering Surface Facilities and thus the most likely to cause a visual effect is the Product Coal Bin, which stands approximately 25 m above the natural surface. Other structures at the Mannering Surface Facilities are at least 6 m lower.

A review of topographic maps and aerial photography up to 5 km from site confirmed that there are no locations that have views of the Mannering surface facilities. Additional ground truthing was undertaken via a field inspection whereby four representative potentially sensitive viewing locations up to 2 km from Mannering were chosen.

The locations from which the assessment was conducted are shown on **Figure 13** and included:

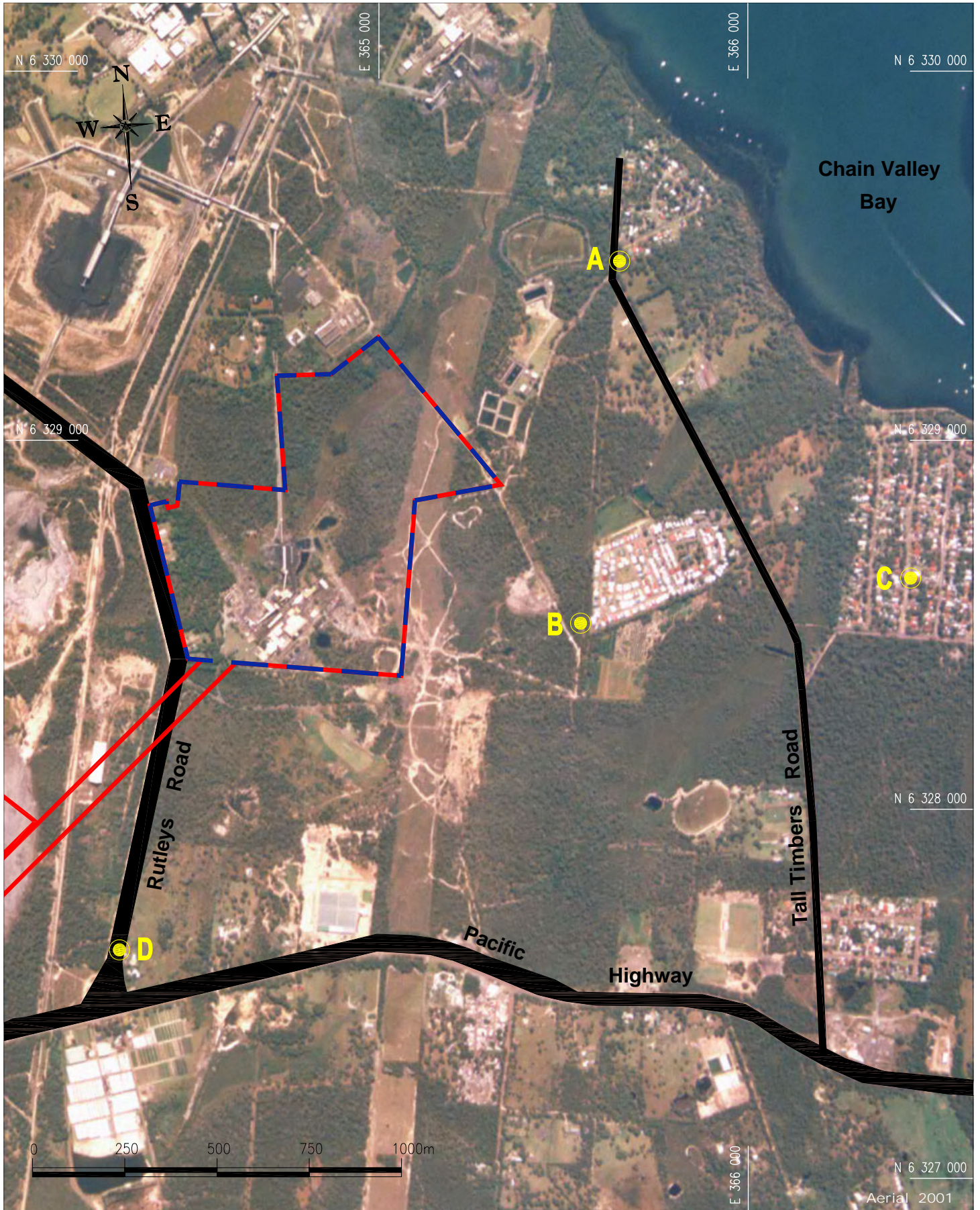
- A – Tall Timbers Road, Chain Valley Bay (representative of properties to north);
- B – Macquarie Shores Home Village (representative of residences to the east);
- C – Dale Avenue, Chain Valley Bay (representative of properties to east); and
- D – Intersection of Rutleys Road / Pacific Highway, Mannering Park (representative of residences to the south).

**Table 22**  
**Visual Impact Assessment**

Visual Sensitivity	Visual Effect			
	High	Moderate	Low	Very Low
High	High Impact	High Impact	Moderate Impact	Low Impact
Mod	High Impact	Moderate Impact	Low Impact	Low Impact
Low	Moderate Impact	Low Impact	Low Impact	Very Low Impact

*Source: JVP (2006)*





**Legend**

- - - EA Boundary
- - - Surface Facilities
- Viewing Location

Hansen Bailey



**Centennial Coal**  
Manning

Co-ordinate System: MGA Zone 56

**MANNERING COLLIERY EA**

Visual Assessment Locations

Cad File: 02114G.dwg

Date: 21.03.07

Drawn: JD

Figure  
**13**

## Discussion

The combination of Manning Surface Facilities being situated at approximately 22 m RL, the screening effects of the surrounding topography and native vegetation, and all potential sensitive viewing locations being located in low lying areas (from 12 m RL to 20 m RL), restrict all views to the site. Dense and well developed native vegetation located primarily on Vales Point Power Station buffer land provides an effective visual screen with the dominant height of woodland vegetation in the immediate vicinity being approximately 10 m.

The visual impact of the Project from all viewing locations has been determined to be very low. Views of the Manning Surface Facilities are limited to a small section off Rutleys Road immediately adjacent the Manning Access Road at which no sensitive receptors are located.

### 7.10.4 Mitigation and Management

The Manning Surface Facilities have been a part of the local environment for over 45 years. As described in **Section 3.0**, the Manning Surface Facilities will remain unchanged as a result of the Project.

Consideration of the location of adjacent neighbours and road users will continue to be undertaken when siting any required lighting to ensure orientation away from receivers. Any minor modifications or maintenance to the existing facilities will be designed to blend in with natural colour schemes with no reflective materials utilised. This visual impact assessment has concluded that no additional mitigation or management measures are required.

### 7.11 REHABILITATION & FINAL LAND USE

The key objectives of the CCRS, CCCBP and HCCREMS are described in **Section 4.4.1, 4.4.2 and 4.4.3** respectively and have been considered as relevant in regards to rehabilitation and final land-use for the Project.

At mine closure, the Manning Surface Facilities will be decommissioned and the site will be rehabilitated using endemic native plant species in consultation with

Delta Electricity and any requirements for closure which pertain to the buffer land for Vales Point Power Station. Planting of endemic native plant species as part of the rehabilitation and final land-use is consistent with the key objectives of the CCCBP and HCCREMS as it will assist in maintaining land capability, preventing soil degradation and erosion and will promote biodiversity conservation and water quality management.

The dams and water management structures on-site will be retained where possible to provide natural habitat and a water source for fauna in the area. Sufficient vehicular access will also be maintained so that these dams can be accessed for fire fighting, inspection and maintenance purposes as relevant.

By retaining and managing these water resources a number of the key objectives of the CCRS, CCCBP and HCCREMS have been incorporated into the final land use for the site as making the best use of the existing infrastructure, maintaining the health of these aquatic ecosystems and assisting in promoting biodiversity conservation and water quality management.

The land within Manning's Surface Lease will be handed back to Delta Electricity to form part of the natural buffer zone for Vales Point Power Station once rehabilitated. Should Delta Electricity prefer to utilise any or all of the infrastructure, they will be retained in consultation with DoP, DPI and WSC, as appropriate. This is consistent with the key objectives of the CCRS as it is making the best use of the existing infrastructure.

Following closure, all connections from underground workings (including all drifts, shafts and open bore holes) to the surface will be filled, sealed and capped in accordance with the DPI guidelines *Bore Hole Sealing requirements on Land dated 1997* (DPI, 1997) or its latest version.

The mine workings will then progressively flood with groundwater which will provide a confining pressure to the pillars with the stability of the underground workings increasing due to the buoyancy effect of the water reducing pillar stresses.



A Mine Closure Plan will be prepared for Manning five years in advance of mine closure. This will detail the specific rehabilitation activities required to be undertaken to achieve the agreed final land use for the site in consultation with relevant stakeholders.

## 7.12 FLORA & FAUNA

Known flora and fauna to potentially occur within the EA Boundary is described in **Section 2.4**.

The environmental footprint of the Manning Surface Facilities will remain unchanged as a result of the Project and mining in the conceptual mine plan will have no noticeable surface impacts. As such there will be no impact on the existing flora and fauna identified within the EA Boundary.

## 7.13 ABORIGINAL CULTURAL HERITAGE

A search of the DEC's AHIMS database was conducted for the EA Boundary to identify any known sites of Aboriginal Cultural Heritage. The results of this search as well as a description of the sites identified are presented in **Section 2.5**.

The DEC's Interim Community Consultation Requirements for Applicants (DEC, 2004) have been considered as part of the EA. The DEC Guidelines state:

*"Input from the Aboriginal Community is an essential part of assessing the significance of those Aboriginal objects likely to be impacted by an activity."*

Due to the fact that no Aboriginal objects "are likely to be impacted" by the Project, no consultation with the local Aboriginal community has been undertaken.

Given that the environmental footprint of the Manning Surface Facilities will remain unchanged, and mining in the conceptual mine plan will have no noticeable surface impacts, there will no impact on any Aboriginal Cultural Heritage sites within the EA Boundary.

## 7.14 NON-ABORIGINAL CULTURAL HERITAGE

An investigation was undertaken to determine whether any sites of known Non-Aboriginal Cultural Heritage are located within the EA Boundary. The results of this search as well as a description of the sites identified are presented in **Section 2.6**.

Mining in the conceptual mine plan will have no noticeable surface impacts. As such there will no impact on any of the Non-Aboriginal Cultural Heritage sites identified within the EA Boundary.

## 7.15 WASTE

Management of waste at Manning is discussed in **Section 3.11.6**. No significant changes to current waste management techniques are proposed.

A qualitative Preliminary Hazard Analysis has been undertaken for the Project and is presented in **Appendix D**. The findings from the qualitative risk assessment indicate that the Project is not considered hazardous or offensive. As such, no further mitigation measures, in addition to those already implemented are proposed as a result of the Project.

## 7.16 MANNING SURFACE DISTURBANCE PROTOCOL

### 7.16.1 Introduction

Additional minor mining related infrastructure as described in **Section 3.3** may be required to be constructed as mining progresses within the conceptual mine plan area.

The nature of underground mining does not allow the exact location for this infrastructure to be determined at this early planning stage. If and when the nature and location of this infrastructure is determined, such minor mining related infrastructure may be determined to be exempt or complying development under SEPP (Mining).

In circumstances where this is not the case, the Manning Surface Disturbance Protocol (the Protocol) has been developed. The Protocol will enable the best positioning of any required additional mining related infrastructure from an operational,



safety and environmental perspective and ensure that all regulatory expectations are met.

Once the need for additional minor infrastructure has been identified, Manning will enact the Protocol with the aim of identifying and adequately assessing any potential issues regarding landownership, flora and fauna, cultural heritage (including both Aboriginal and Non-Aboriginal), and sediment and erosion control, so that these can be addressed.

Any proposed disturbance will be delineated prior to the assessments taking place. A due diligence approach will be adopted for the Protocol to relocate disturbance (where possible) to avoid any potential impact on listed flora and fauna, cultural heritage or where sediment and erosion control issues exist.

#### 7.16.2 Landownership

Manning will consult with any relevant landholder prior to the commencement of any work in relation to the construction of any minor mining-related infrastructure. As part of this consultation, Manning will seek to identify any additional issues raised by the landholder and address these where relevant throughout the construction process.

Where mining-related infrastructure is required to be constructed on freehold land, a Property Access Agreement will be developed in consultation with the appropriate landholder, as required.

#### 7.16.3 Flora and Fauna

A flora and fauna survey will be undertaken by a suitably qualified person for any required minor mining-related infrastructure. The assessment will determine if threatened species, their habitat or Endangered Ecological Communities (EECs) are present in the area proposed to be disturbed. In particular, such areas will be scrutinised for the presence of any species and Ecological Communities listed as threatened under the EPBC Act and the TSC Act.

Infrastructure will be sited to avoid areas containing threatened species, their habitat or EEC's.

#### Clearance Procedure

All areas to be disturbed will be cleared in accordance with the following Procedure:

- Area to be limited to the minimum area necessary;
- The area will be delineated to ensure that no disturbance occurs outside the area;
- Seasonal factors will be taken into account when removing vegetation, with the aim of minimising disturbance to breeding or hibernating species, particularly listed Threatened species; and
- Any trees to be removed will be subjected to a pre-clearing and post-clearing survey to inspect for fauna by a relevantly qualified person.

The practicality and relevance of implementing each management strategy will be dependent on the characteristics of the vegetation.

#### 7.16.4 Cultural Heritage

Consultation with the Aboriginal community will be conducted in accordance with the *Interim Community Consultation Requirements for Applicants* (DEC, 2004) or its latest version. A cultural heritage survey for both Aboriginal and Non-Aboriginal sites will be undertaken by a suitably qualified person for all mining related infrastructure to ensure that any cultural heritage sites, both Aboriginal and Non-Aboriginal are identified and avoided.

#### 7.16.5 Sediment & Erosion Control

An assessment will be undertaken by a suitably qualified person to identify any potential issues associated with sediment and erosion control prior to the construction of any mining-related infrastructure required for the Project.

This assessment will vary dependent upon the type of infrastructure required to be constructed, however will include an analysis of the site's drainage, potential for soil dispersivity / erosivity, identify any nearby creeks or drainage lines that may be impacted and allocate appropriate management and mitigation measures to be implemented.

Management and mitigation measures that may be implemented to manage sedimentation and erosion include:

- The installation of diversion banks and catch drains to divert clean water around disturbed areas;
- Topsoil stockpiles will be established in areas that allow free drainage and limit erosion and will be constructed to be no more than 2 m high;
- Geo-fabric sediment fences will be installed to contain topsoil stockpiles and prevent sediment leaving disturbed areas;
- Any erosion identified will be treated promptly to minimise damage to the land and protect the quality of surrounding waterways;
- Land will not be disturbed during excessively windy conditions to prevent wind erosion and dust generation; and
- All disturbed areas will be rehabilitated as soon as possible following construction.

Works within 40 m of a watercourse as defined on the 1:25,000 Department of Lands topographic maps will be avoided, where practical. If this cannot be achieved, then consultation will be undertaken with DNR and relevant approvals under the *Rivers and Foreshore Improvement Act 1948* sought if outside of a surface mining lease.

#### 7.16.6 Rehabilitation

Following completion of the construction of any minor mining related infrastructure, Manning will ensure that the surrounding area is rehabilitated to a standard commensurate at least to that prior to disturbance.

Any disturbed ground will be stabilised, seeded and rehabilitated to the satisfaction of the landholder, as relevant.

To ensure rehabilitation is conducted to the highest standard, the following practices will be implemented:

- Wherever land clearance is required, the topsoil will be stripped, stockpiled and reused as part of the rehabilitation process;
- Disturbed areas will be rehabilitated progressively wherever possible;
- Areas will be rehabilitated to ensure that they are free-draining to prevent ponding;
- Landholders will be appropriately consulted regarding rehabilitation on freehold land; and
- Rehabilitated areas will be managed and monitored to ensure they are successful.

The rehabilitation process described above will also be implemented at the time of decommissioning of all mining related infrastructure and further detail will be provided in the Manning Mine Closure Plan.

#### 7.16.7 Monitoring and Reporting

The environmental issues assessed as part of the Manning Surface Disturbance Protocol will be monitored during construction, operation and decommissioning, as relevant.

The outcomes of the Manning Surface Disturbance Protocol including the findings of the required assessments discussed in the sections above will be reported annually in the AEMR with photographic records kept as required.

#### 7.17 EMS & MONITORING PROGRAM

Manning operates to the Centennial Environmental Policy and operates an Environmental Management Strategy (EMS) which provides the structure, guidance and documentation to facilitate effective practice in environmental management.

A relevant Environmental Monitoring Program (EMP) will be developed in consultation with relevant regulators to the approval of DoP incorporating:

- Air quality monitoring;
- Noise monitoring;
- Subsidence monitoring;
- Surface water monitoring; and
- Waste monitoring.

## 8.0 STATEMENT OF COMMITMENTS

In addition to conditions of Project Approval, Manning commits to the operational controls outlined in **Table 23** for all activities associated with the Project.

The Statement of Commitments (SoC) summarises the major aspects of the Project as described in **Section 3.0** and commits to required management and mitigation measures identified in **Section 7.0**.

The aim of the SoC is to ensure that any potential environmental impacts resulting from the Project are minimised and managed throughout the operation of the Project by implementing relevant environmental management and monitoring strategies.

**Table 23**  
**Statement of Commitments**

Ref	Commitment	Section
<b>Mine Operation</b>		
1	The Project will not result in the extraction of more than 1.1 Mtpa of ROM coal. Annual production will be reported in the AEMR.	3.0
2	The Project will only result in the extraction of coal from within the conceptual mine plan over a 10 year period shown on <b>Figure 7</b> (with minor variations to headings and orientation).	3.0
3	Underground mining of coal will continue to be carried out utilising the bord and pillar mining method to ensure that there will be no noticeable surface impacts.	3.7
4	The hours of operation will remain unchanged at 24 hours a day, 7 days per week.	3.8
5	Manning full-time equivalent employees will remain at approximately 90 directly employed persons.	3.8
6	All coal produced will be transported directly to Vales Point Power Station via the dedicated overland conveyor. There will be no coal haulage on public roads.	3.9
7	Manning will continue to stockpile up to 25,000 tonnes of ROM coal on-site in periods when Vales Point Power Station are unable to accept deliveries.	3.9
8	The equipment fleet utilised at Manning will remain generally consistent with the current fleet.	3.4
9	The existing workings at Manning will continue to be relied upon for ventilation purposes and for any required emergency evacuation.	3.0
10	Manning will continue to utilise all current infrastructure as shown on <b>Figure 5</b> and downcast shaft shown on <b>Figure 7</b> .	3.2
<b>Surface Water</b>		
11	The maximum predicted external water extracted from WSC sources will not exceed 70 ML without prior consultation with WSC.	7.3
12	Manning will implement ongoing water management to minimise usage of water supplied by WSC.	7.3
13	All surface water run-off from surface infrastructure areas will continue to be captured and directed to the existing sediment pond systems prior to discharge off-site.	7.3
14	Manning will continue to pump underground mine water and groundwater to the surface and transfer to the Settlement Pond B system for pollution control prior to discharge off-site in accordance with EPL 191.	7.3

Ref	Commitment	Section
15	A Bore Licence will be obtained in accordance with Part 5 of the Water Act to extract groundwater from the underground workings.	4.2.10
<b>Groundwater</b>		
16	A flow meter will be installed on the pump from the underground workings to monitor the volume of water being pumped from the mine workings to the surface, the results from which will be reported in the AEMR.	7.4
<b>Noise</b>		
17	A relevant noise monitoring program will be developed and implemented for the Project. The results will be reported in the AEMR.	7.5
<b>Air Quality</b>		
18	Dust deposition will continue to be monitored at the locations shown on <b>Figure 5</b> in accordance with the requirements of EPL 191. The results will be reported in the AEMR.	7.7
19	Centennial will continue to invest in research for clean coal technologies to identify areas to improve energy efficiency within the business and limit its impacts towards greenhouse gas emissions.	3.11.4
<b>Traffic</b>		
20	A traffic safety audit will be undertaken for the intersection of the Manning Access Road with Rutleys Road within five years of receipt of Project Approval or as otherwise agreed with the Director General. This will be undertaken in consultation with relevant regulators.	7.8.4
<b>Manning Surface Disturbance Protocol</b>		
21	Manning will implement the Surface Disturbance Protocol outlined in <b>Section 7.16</b> for any minor mining related infrastructure that is required to be developed within the EA Boundary which is not exempt or complying development under section 10 of SEPP (Mining).	7.16
<b>Environmental Management Strategy and Monitoring Program (EMS &amp; MP)</b>		
22	Manning will develop and implement an EMS & MP which shall include Subsidence, Noise, Groundwater, Surface Water, Air Quality and Waste Management. The EMS & MP will be developed in consultation with relevant regulators, to the approval of DoP. Results will be reported annually in the AEMR.	7.17
<b>Community Contributions</b>		
23	A VPA is being negotiated with each of the WSC and LMCC to provide for infrastructure requirements associated with the Project.	5.4.2
<b>AEMR</b>		
24	Manning will prepare and submit to the relevant regulatory agencies an AEMR which shall include a discussion on predictions and commitments made within the EA. The AEMR will also be made publicly available at the mine.	8.0
<b>Mine Closure Plan</b>		
25	A Mine Closure Plan will be prepared for Manning five years in advance of mine closure.	7.11

## 9.0 PROJECT JUSTIFICATION

### 9.1 PROJECT NEED

Centennial is a publicly listed Australian owned coal mining and marketing company supplying thermal and coking coal to the domestic and export markets. The Company is a major coal supplier to the NSW power industry, fuelling approximately 47% of the State's electricity needs (Centennial, 2006). Centennial's environmental responsibilities go beyond those required under statutory regulations and encompass its social obligations to achieve sustainable development and minimise environmental impacts associated with their operations.

Manning has operated for over 45 years under various ownerships, utilising both longwall and bord and pillar methods of mining. Production, manning and environmental impacts have been greater in previous years to that which is sought approval by the Project. Despite urban encroachment, the mine operates in harmony with its immediate neighbours and has not had any major environmental or safety incidents since 2002 when the operation was acquired by Centennial.

Manning provides a low sulphur, preferred product to Vales Point Power Station via a dedicated, overland conveyor situated on Delta Electricity owned land. No coal will be railed or hauled by public roads. No private residences exist to the north and west of the EA Boundary with limited neighbours to the east and south at a significant distance to Manning's Surface Facilities.

Project Approval is sought due only to recent amendments to the EP&A Act, which requires Manning to gain approval for its surface facilities by August 2007 and to continue current mining operations until 2010.

The economic assessment undertaken for the EA has demonstrated the ongoing benefit to the immediate and surrounding community with no significant issues raised as a result of regulatory consultation and the

distribution of a Newsletter detailing the Project to over 1,000 individual landholders.

### 9.2 PROJECT ALTERNATIVES

Alternatives were considered during the development of the Project which included:

- *Option 1:* Continuation of environmentally sensitive bord and pillar mining operations as currently conducted utilising the existing workforce, infrastructure and equipment fleet (the Project);
- *Option 2:* Develop a mine plan consisting of both first and secondary workings (longwall mining) within the current leases; or
- *Option 3:* Do nothing.

Option 1 is the preferred option as it enables Manning to continue current mining operations with a very limited environmental impact footprint maintaining a reliable, high quality coal supply to Vales Point Power Station for NSW electricity generation.

Option 2, which included both longwall and bord and pillar mining under existing mined areas, was rejected due to potential environmental impacts associated with this mine plan.

If Option 3 was adopted, Manning will not have in place the relevant planning approvals to continue operations beyond 2007. This will result in the cessation of mining activities, the loss of approximately 182 direct and indirect jobs as well as the sterilisation of a significant coal resource.

Additionally, Vales Point Power Station will need to source coal from an alternative site. This product will either be railed or hauled by road contributing additional noise and dust impacts to the local environment, and potentially producing higher levels of greenhouse gas due to transport and higher deleterious sulphur emissions when burnt at Vales Point Power Station rather than continuing to rely on Manning's preferred product.

### 9.3 ENVIRONMENTAL CONSIDERATIONS

Despite the application of a stringent, contemporary environmental assessment, the EA has not identified any significant adverse environmental impacts associated with the Project. The Project will involve the continuation of mining operations at Manning via a conceptual mine plan which has been specifically designed to result in no noticeable surface impact. The Project is a low impact mining operation that will continue to offer boutique product coal to the adjoining Vales Point Power Station.

To ensure that Manning continues to have limited impacts on the environment, an EMS & MP will be developed and implemented for the life of the Project as described in **Section 7.17**.

\* \* \*



## 10.0 ABBREVIATIONS

Abbreviation	Description
ABS	Australian Bureau of Statistics
ADT	Average Daily Traffic Volume
AGO	Australian Greenhouse Office
AHD	Australian Height Datum
BOM	Bureau of Meteorology
CCL	Consolidated Coal Lease
CCCBP	Central Coast Catchment Blueprint
CCCMB	Central Coast Catchment Management Board
CCRS	Draft Central Coast Regional Strategy
Centennial	Centennial Coal Company Limited
dBA	The peak sound pressure level, expressed as decibels (dB) and scales on the 'A-weighted' scale, which attempts to closely approximate the frequency response of the human ear
dBL	The peak sound pressure level expressed as decibels with no frequency weighting
DEC	NSW Department of Environment and Conservation (incorporates NPWS and EPA)
DNR	NSW Department of Natural Resources
DoP	NSW Department of Planning (Incorporates former DIPNR, Planning NSW and DUAP)
DoS	Degree of Saturation
DPI-MR	NSW Department of Primary Industries (Incorporates the former Department of Mineral Resources, Department of Fisheries, and Department of Agriculture)
Dams Safety Act	Dam Safety Act 1978 (NSW)
EA	Environmental Assessment (formerly termed Environmental Impact Statement)
EARs	Environmental Assessment Requirements
ECRTN	The Environmental Criteria for Road Traffic Noise (EPA, 1999)
EIS	Environmental Impact Statement
ENCM	The Environmental Noise Control Manual
EPA	NSW Environmental Protection Authority
EP&A Act	Environmental Planning and Assessment Act 1979 (NSW)
EPBC Act	Environmental Protection and Biodiversity Conservation Act 1999 (Commonwealth)
EPI	Environmental Planning Instrument
EPL	Environmental Protection Licence
FEL	Front End Loader
ha	hectares
HB 436:2004	Risk Management Guidelines (Companion to AS/NZS 4360:2004)
HCCREMS	Hunter and Central Coast Regional Environmental Management Strategy
Heritage Act	Heritage Act 1977 (NSW)
HWLSCZ	High Water Level Subsidence Control Zone
INP	The NSW Industrial Noise Policy (EPA, 2000)
IPCC	Intergovernmental Panel on Climate Change
LA <sub>1</sub>	The noise level exceeded for 1% of the time
LA <sub>10</sub>	A noise level exceeded for 10% of the time

Abbreviation	Description
LA <sub>90</sub>	Commonly referred to as the background noise, this is the level exceeded 90% of the time
LA <sub>eq</sub>	The summation of noise over a selected period of time. It is the energy average noise from a source, and is the equivalent continuous sound pressure level over a given period
LEP	Local Environment Plan
LGA	Local Government Area
LMCC	Lake Macquarie City Council
LoS	Level of Service
Manning	Manning Colliery
CCF	Manning Coal Crushing Facility
Mining Act	Mining Act 1992 (NSW)
ML	Mining Lease
MSB	Mine Subsidence Board
m/s	Metres per second
m <sup>3</sup>	Cubic metres
mm/s	Millimetres per second
MOP	Mining Operations Plan
Mtpa	Million tonnes per annum
NPV	Net Present Value
NPW Act	National Parks and Wildlife Act 1974
NPWS	National Parks and Wildlife Service (Now part of NSW DEC)
pa	Per annum
PDD	Project Description Document
PFM	Planning Focus Meeting
POEO Act	Protection of the Environment Operations Act 1997
PM <sub>10</sub>	Particulate Matter <10um. Measured by High Volume Air Samplers (HVAS)
RL	Reduced Level
Roads Act	Roads Act 1993 (NSW)
ROM	Run of Mine
RTA	NSW Roads and Traffic Authority
SEPP	State Environmental Planning Policy
SIDRA	Signalised and Un-signalised Intersection Design and Research Aid
SLA	Statistical Local Area
SMP	Subsidence Management Plan
SRA	State Recreation Area
TSC Act	Threatened Species Conservation Act 1995 (NSW)
TSP	Total Suspended Particulates
WSC	Wyong Shire Council

## 11.0 REFERENCES

- AS/NZS 4360:2004 Australian/New Zealand Standard Risk Management
- Australian Bureau of Statistics (2006) <http://www.abs.gov.au/>
- Australian Greenhouse Office (2005) *AGO Factors and Methods Workbook*, DEH, Canberra
- Austroads (2005) *Guide to Traffic Engineering Practice*
- Bureau of Meteorology (2006) <http://www.bom.gov.au/climate/>
- Centennial (2006) *Centennial Coal Company Limited Annual Report 2006*
- CCCMB (2002) *Central Coast Catchment Blue Print*
- DEC (1999) *Environmental Noise Control Manual*
- DEC (2004) Interim Community Consultation Requirements for Applicants
- DEWR (2007c) Protected Matters Search Tool for the area 151.15063, -33.1150; 151.5580, -33.1193; 151.5498, -33.1890; 151.4979, -33.1847. <http://www.environment.gov.au/> (accessed March 2007)
- DoP (1992) *Hazardous Industry Planning Advisory Paper (HIPAP) No. 6 – Guidelines for Hazard Analysis*
- DoP (1994) Applying SEPP 33 – Hazardous and Offensive Development Application Guidelines'
- DoP (2006) Draft Central Coast Regional Strategy
- DPI (1997) Guidelines: Bore Hole Sealing requirements on Land
- DPI (2006) <http://www.dpi.nsw.gov.au>
- EPA (1999) *Environmental Criteria for Road Traffic Noise*
- EPA (2000) *NSW Industrial Noise Policy*
- Forster and Enever (1992) *Hydrogeological response of Overburden Strata to Underground Mining – Central Coast New South Wales*, Office of Energy
- HB 436:2004 Risk Management Guidelines (Companion to AS/NZS 4360:2004)
- HCCREMS. 2003. Extant Vegetation of the Lower Hunter & Central Coast, November 2003. Hunter & Central Coast Regional Biodiversity Conservation Strategy and Bushcare.
- HCCREMS (2004) <http://www.hccrems.com.au>
- IPCC (1996) *Climate Change 1995 - The Science of Climate Change - Contribution of Working Group 1 to the Second Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge University Press, Cambridge
- IPCC (2001) *Climate Change 2001 - The Scientific Basis*, Cambridge University Press, Cambridge
- JVP (2006) John Van Pelt Visual Planning & Design, Visual Impact Assessment, Bengalla Mine Statement of Environmental Effects
- LMCC (2006) <http://www.visitlakemac.com.au>
- NPWS (2007) NSW Wildlife Atlas for the Lake Macquarie LGA <http://wildlifeatlas.nationalparks.nsw.gov.au> (accessed March 2007)

## 12.0 EA STUDY TEAM

Section	EIS Component	Team Member & Company	
<i>EA Management</i>			
	Project Director	James Bailey	Hansen Bailey
	Project Manager	Dianne Munro	Hansen Bailey
<i>EA Sections</i>			
1.0	Background	Daniel Sullivan	Hansen Bailey
2.0	Existing Environmental Setting	Daniel Sullivan	Hansen Bailey
3.0	The Project	Daniel Sullivan	Hansen Bailey
4.0	Regulatory Framework	James Bailey / Dianne Munro	Hansen Bailey
5.0	Stakeholder Consultation	Daniel Sullivan	Hansen Bailey
6.0	Risk Assessment	Daniel Sullivan	Hansen Bailey
7.0	Impacts, Management & Mitigation	Dianne Munro / Daniel Sullivan	Hansen Bailey
7.1	Introduction	Daniel Sullivan	Hansen Bailey
7.2	Subsidence	Mark Bennett	Hansen Bailey
7.3	Surface Water	Juliet Bates	Hansen Bailey
7.4	Groundwater	Errol Briese	Australasian Groundwater and Environmental Consultants
7.5	Acoustics	James Bailey / Daniel Sullivan	Hansen Bailey
7.6	Blasting and Vibration	Daniel Sullivan	Hansen Bailey
7.7	Air Quality	Daniel Sullivan	Hansen Bailey
7.8	Traffic	John Waters	Parsons Brinkerhoff
7.9	Economics	Robert Gillespie	Gillespie Economics
7.10	Visual and Lighting	Dianne Munro / Daniel Sullivan	Hansen Bailey
7.11	Rehabilitation and Final Land Use	Daniel Sullivan	Hansen Bailey
7.12	Flora and Fauna	Monika Rhodes	Hansen Bailey
7.13	Aboriginal Cultural Heritage	Daniel Sullivan	Hansen Bailey
7.14	Non-Aboriginal Cultural Heritage	Daniel Sullivan	Hansen Bailey
7.15	Waste	Daniel Sullivan	Hansen Bailey
7.16	Manning Surface Disturbance Protocol	Dianne Munro / Daniel Sullivan	Hansen Bailey
7.17	Environmental Management Strategy & Monitoring Program	Dianne Munro / Daniel Sullivan	Hansen Bailey
8.0	Statement of Commitments	Dianne Munro	Hansen Bailey
9.0	Project Justification	James Bailey / Dianne Munro	Hansen Bailey
10.0	Abbreviations	Dorian Walsh	Hansen Bailey
11.0	References	Dorian Walsh	Hansen Bailey

Section	EIS Component	Team Member & Company	
12.0	EA Study Team	Dorian Walsh	Hansen Bailey
<b>Appendices</b>			
Appendix A	Regulatory Correspondence		
Appendix B	Existing Flora & Fauna Database Searches	Monika Rhodes	Hansen Bailey
Appendix C	Schedule of Land to which EA Applies	Dorian Walsh	Hansen Bailey
Appendix D	Preliminary Hazard Analysis	Daniel Sullivan	Hansen Bailey
Appendix E	Stakeholder Consultation	Daniel Sullivan	Hansen Bailey
Appendix F	Revised Environmental Risk Assessment	Daniel Sullivan	Hansen Bailey
Appendix G	Subsidence Impact Assessment	Ross Seedsman	Seedsman Geotechnics Pty Ltd
Appendix H	Surface Water Impact Assessment	Juliet Bates	Hansen Bailey
Appendix I	Groundwater Impact Assessment	Errol Briese	Australasian Groundwater and Environmental Consultants
Appendix J	Noise Impact Assessment	Mark Bridges	Bridges Acoustics
Appendix K	Air Quality Impact Assessment	Nigel Holmes	Holmes Air Sciences
Appendix L	Traffic Impact Assessment	John Waters	Parsons Brinkerhoff
Appendix M	Economic Impact Assessment	Robert Gillespie	Gillespie Economics
Appendix N	Visual Impact Assessment Photos	Daniel Sullivan	Hansen Bailey
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