



Centennial Coal



Environmental Assessment

Volume 1 – Main Text

Volume 2 - Appendices

Mannering Colliery – Extension of Mine Project

Section 75W Modification to Project Approval 06_0311

January 2012



Manning Colliery - Extension of Mine Project

Section 75W Modification to Project Approval 06_0311

Environmental Assessment

Prepared on behalf of:

Centennial Manning Pty Limited



By:-

GSS Environmental



GSS ENVIRONMENTAL

Environmental, Land and Project
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Date: January 2012

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Submission of Environmental Assessment (EA)

Prepared under Part 3A of the *Environmental Planning and Assessment Act 1979*

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Development Application:

Proponent Name: Centennial Mannering Pty Limited

Proponent Address: PO Box 1000, Toronto NSW 2283

Land to be Developed: Refer to Appendix G
Mannering Colliery
Rutleys Road, Doyalson NSW 2262
Local Government Areas of Lake Macquarie and Wyong Shire

Development Description: Mannering Colliery - Extension of Mine Project
Section 75W Modification to Project Approval 06_0311

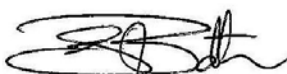
Declaration:

We hereby certify that we have prepared the contents of this document and to the best of our knowledge:

- It contains all available information that is relevant to the environmental assessment of the proposed development to which the document relates; and
- It is true in all material particulars and does not, by its presentation or omission of information, materially mislead.

Name: GSS Environmental
Eryn Bath

Signature:



Date: January 2012

EXECUTIVE SUMMARY

INTRODUCTION

Manning Colliery is an existing underground coal mine located on the southern side of Lake Macquarie approximately 40 kilometres south of Newcastle in New South Wales (NSW). Manning Colliery is operated by Centennial Manning Pty Limited (Centennial Manning), which is a wholly owned subsidiary of Centennial Coal Company (Centennial). Centennial is a wholly owned subsidiary of Banpu Public Company Limited (Banpu), who purchased Centennial in 2010.

This Environmental Assessment (EA) has been prepared to support an application by Centennial Manning to the Department of Planning and Infrastructure (DP&I) seeking to modify the project approval pertaining to Manning Colliery (PA 06_0311), pursuant to Section 75W of the *Environmental Planning and Assessment Act 1979* (EP&A Act). In summary, the Manning Colliery Extension of Mine Project will enable an extension of underground mining operations within both the Fassifern and Great Northern coal seams, along with additional employment.

CURRENT APPROVED OPERATIONS

Development of Manning Colliery (formerly Wyee State Mine) commenced in 1960 in conjunction with the construction of Vales Point Power Station. Manning Colliery has mined coal resources in the Fassifern and Great Northern coal seams using both longwall and bord-and-pillar mining methods for close to 50 years. It produces up to 1.1 million tonnes per annum (Mtpa) of run-of-mine (ROM) coal that is supplied to the nearby Vales Point Power Station for domestic electricity generation.

Following the introduction of Part 3A to the EP&A Act in 2005 and the related passing of the former *State Environmental Planning Policy (Major Projects) 2005*, Manning Colliery was required to obtain planning approval for continued operations of its underground mining activities and surface facilities. On the 12 March 2008, and following submission of *Manning Colliery Continuation of Mining Environmental Assessment* (Hansen Bailey 2007), Manning Colliery was granted Project Approval PA 06_0311 under Part 3A of the EP&A Act for on-going underground mining activities and the continued operation of surface facilities.

PROPOSED MODIFICATION

As a result of the life of mine planning and review process at Manning Colliery, Centennial Manning is seeking a modification to Project Approval PA 06_0311 to allow for the Extension of Mine Project. In summary, the primary components of this Project are:

- An extension of underground mining operations within the Fassifern Seam beyond the 2008 Project Approval boundary using bord-and-pillar mining methods to recover approximately 3.2 million tonnes of ROM coal;
- An extension of underground mining operations into the Great Northern Seam using bord-and-pillar mining methods to recover approximately 1.4 million tonnes of ROM coal; and
- The provision of an additional 40 full-time employment positions.

The proposed combination of mining in the Fassifern and Great Northern seams will not exceed the 1.1 Mtpa of coal recovery previously assessed and approved under PA 06_0311. No changes to the current approved hours of operation, methods of coal mining, handling and transport, surface infrastructure, site servicing or waste management are required. Furthermore, the proposal will not extend the life of Manning Colliery beyond the existing approved 2018 life of the mine.

The approved method of mining is a form of bord-and-pillar mining where coal recovery is limited to first workings only. This mining method, combined with the mine design, will achieve long-term stable pillars resulting in less than 20 millimetres of cumulative subsidence on the surface.

The primary objectives of the Extension of Mine Project at Manning Colliery are:

- Develop the on-going underground operations with a focus on maximising resource recovery and improving the efficiency in which coal recovery is achieved;
- Provide access to improved coal quality suitable for the continuation of coal supply to Vales Point Power Station for electricity generation, while allowing coal from other Centennial operations to be directed to alternative export markets;
- Maintain continuity of coal production from the existing Manning operation within the currently approved life of mine;
- Secure on-going employment opportunities and socio-economic flow-on benefits; and
- Continue to conduct mining in an environmentally responsible manner to ensure the potential for adverse impact is minimised.

The following table summarises and compares the major components of the existing Manning Colliery operation approved under PA 06_0311 and the proposal to modify PA 06_0311 for the Extension of Mine Project.

Comparison of Approved Operation and Proposed Modification

Aspect	Approved Manning Colliery Operation	Proposed Extension of Mine Project
Project Site Area	Approximately 1,164 hectares.	Approximately 1,420 hectares (an increase of 256 hectares or 22 percent).
Life of Mine	31 March 2018.	No change.
Operational Hours	24 hours a day, 7 days per week.	No change.
Operational Employment	While the <i>Manning Colliery Continuation of Mining Environmental Assessment</i> (Hansen Bailey 2007) advised that the operation would maintain a workforce of around 90 full-time employees, Manning currently employs approximately 130 full-time employees.	170 full-time employees (an additional 40 full-time positions).
Coal Seams	Fassifern Seam.	Fassifern Seam and Great Northern Seam.
Mine Plan	<u>Fassifern Seam</u> – as approved under PA 06_0311.	<u>Fassifern Seam</u> - modified mine plan comprising five additional mining areas beyond the approved project boundary. <u>Great Northern Seam</u> – mine plan comprising two mining areas extending beyond the approved project boundary.
Annual Production	Mining and processing of up to 1.1 Mtpa of ROM coal.	No change.
Coal Mining Method	Bord-and-pillar mining method where coal recovery is limited to first workings only.	No change.
Mining Equipment	A range of equipment is utilised to carry out mining operations, facilitate men and materials access from the surface to the underground workings and undertake coal handling operations. Primary equipment items include continuous miners, roof bolters, shuttle cars and drift conveyor systems.	Additional items of equipment, including continuous miners, shuttle cars and roof bolters, will be required to facilitate coal mining operations.

Aspect	Approved Manning Colliery Operation	Proposed Extension of Mine Project
Surface Infrastructure	Primary infrastructure includes: <ul style="list-style-type: none"> - Pit-top facilities, including offices, workshops, bathhouse, stores, lamp room, diesel and oil storage, fire fighting equipment and water tanks; - Access roads and car parking facilities; - A 25,000 tonne coal stock pile area; - The Coal Crushing Facility (CCF), with a capacity of 800 tonnes per hour; - Conveyors for ROM and product coal - Mine ventilation shafts; and - Water management infrastructure. 	No Change
Coal Handling and Transport	Coal is transported from the underground workings via a drift conveyor to the on-site CCF for screening and crushing. All of the coal produced at Manning is supplied directly to Vales Point Power Station via a dedicated overland conveyor.	No change.
Servicing	Systems in place for potable water, operational water, power, communications and fuel.	No change.
Water Management	On-site surface water management system comprising: <ul style="list-style-type: none"> • Settlement Pond A; • Settlement Pond B system, comprising Ponds 1, 2 and 3 and Pond B; and • Licensed Discharge Points LDP001 and LDP002. Manning Colliery Environmental Protection Licence (EPL 191) permits the discharge of up to 4,000 kilolitres per day from site.	No change.
Production Waste Management	No production waste or reject material generated.	No change.
General Waste Management	Management systems in place for the various non-production waste streams generated by the mining operation, including general waste, maintenance consumables, waste oils and grease and sewage.	No change.
Progressive rehabilitation	Manning adopts a progressive approach to the rehabilitation of disturbed land as mining progresses.	No change.
Post Mining Closure and Rehabilitation	As required by Condition 15 of Schedule 3 of PA 06_0311, it is intended that the current Mine Decommissioning Plan will be further developed into a detailed Mine Closure Plan by the end of March 2013 (i.e. five years prior to the planned mine closure).	No change. Decommissioning of the extended underground mining operations will be considered and addressed during the preparation of the Mine Closure Plan.
Environmental Management and Monitoring	As part of Manning's EMS, a comprehensive set of environmental management plans have been developed and implemented. These plans are backed by an environmental monitoring network including metrological, air quality, noise, surface water, groundwater and subsidence monitoring.	No change. Current environmental management plans and monitoring program to be reviewed and updated (as required) to incorporate the proposed modification.

KEY ENVIRONMENTAL ISSUES

The assessment of environmental and socio-economic issues has been multi-disciplinary and involved consultation with the DP&I and other relevant stakeholders. As facilitated by a pre-project risk assessment, where a specific environmental impact/risk was considered unacceptable, or where a knowledge gap was identified, a specialist study was commissioned and additional mitigation measures and/or management responses nominated. While the risk assessment did not identify any 'extreme', 'high' or 'significant' ranking environmental risks relating to the Project, three 'moderate' risks relating to subsidence, water discharge and community action were identified.

In summary, the Extension of Mine Project is anticipated to pose negligible additional environmental impacts beyond those already approved under PA 06_0311. In terms of potential cumulative impacts, it is worth reiterating that the proposed project modification does not involve any change to the current approved life of mine, hours of operation, coal production rate or mining intensity, methods of coal mining, handling and transport, surface infrastructure, site servicing or waste management.

While the information presented within the body of this EA and within the appended specialist assessments should be read in their entirety, the following table provides a very broad overview of the key outcomes of the environmental assessment.

Broad Overview of Environmental Assessment Issues

Environmental Issue	Overview of Key Findings
Subsidence	<ul style="list-style-type: none"> • The Fassifern Seam has induced an average of 11 millimetres of maximum subsidence and it is predicted that this level will continue. In areas where the low strength floor is less than 0.5 metres thick, it is predicted that the proposed Great Northern Seam workings will induce an additional 8 millimetres of subsidence. • On this basis, for the proposed pillars on 30 metre centres, the proposed mine plan can be adopted with a high level of confidence that vertical subsidence will not exceed 20 millimetres for the combined Fassifern and Great Northern Seams, and maximum tilts and strains should be less than 0.5 millimetres per metre. • Predicted subsidence is well within the usual shrink/swell range for the district.
Water Management	<ul style="list-style-type: none"> • The primary objectives of the Manning Colliery water management system are related to the separation and effective management of clean and dirty water, along with the effective management of mine water. • Daily discharge through LDP001 will increase as a result of increased groundwater make into the underground mine and more regular and significant dewatering activities. Regardless, the volume and pollution load of the increased discharge is predicted to remain within the current EPL limits. • The impact on the geomorphology of surface waterways as a result of Project is expected to be negligible. • Negligible changes in groundwater levels are predicted and, therefore, the Project is not anticipated to adversely impact local users of shallow groundwater or groundwater dependant ecosystems (GDEs). • The impact on water quality as a result of the Project is considered negligible.
Terrestrial Ecology	<ul style="list-style-type: none"> • No impacts to threatened species, populations or communities are expected. • The proposal is unlikely to affect or fragment existing native vegetation corridors. • Any GDEs present within the study area are unlikely to be impacted. • Riparian ecology is unlikely to be significantly impacted. • The Project is unlikely to significantly impact upon any Government conservation estates, including the Lake Macquarie State Conservation Area (SCA). • The proposal is unlikely to impact on any 'potential' or 'core' koala habitat areas that may occur within the proposed project area.

Environmental Issue	Overview of Key Findings
Aquatic Ecology	<ul style="list-style-type: none"> It is unlikely that species assemblages associated with seagrasses, mangroves, saltmarsh and/or macroalgae would be lost and notably altered by the Project. Given the area of subtidal seabed potentially affected by the proposal is small, it is unlikely that a decrease in density of microalgae would have a significant impact on other ecosystem components. Fish would not be directly impacted by the Project, and the potential for impact on important fish habitats is considered negligible. The Project is not anticipated to impact any threatened or protected species and a species impact statement is not considered necessary. It is unlikely that the potential minor impacts to seagrass would impact populations of species listed under the <i>Environmental Protection and Biodiversity Conservation Act 1999</i> and/or protected under the <i>Fisheries Management Act 1994</i>. No areas of conservation significance occur within or near the proposed additional areas of mining and no impacts to areas of conservation significance are expected.
Aboriginal Heritage	<ul style="list-style-type: none"> Consultation with Aboriginal stakeholders was undertaken by Centennial and RPS in accordance with the <i>Aboriginal Cultural Heritage Consultation Requirements for Proponents</i> (DECCW 2010). A search of the Aboriginal Heritage Information Management System (AHIMS) identified three Aboriginal cultural heritage sites, comprising two shell middens and an artefact scatter, within the proposed areas of extended mining. A field survey identified a further two sites within the proposed areas of extended mining, being a midden and a culturally modified tree. With the Project expected to have negligible surface impacts, no impact to the identified Aboriginal cultural heritage sites or any potential cultural heritage sites are anticipated.
European Heritage	<ul style="list-style-type: none"> A search of the <i>Australian Heritage Database</i> found no references for the Manning Park, Wyee Point or Wyee areas. A further search of the <i>NSW Heritage Database</i> found no references to items of State Significance in these areas. However the Wyee Coal Conveyor to Vales Point and the Wyee Channel, which are removed from the Project Site, were identified as items of local heritage significance. A field survey failed to identify any non-indigenous heritage within the Project Site. With the Project expected to have negligible surface impacts and no items of non-indigenous heritage significance identified within the Project Site, no impacts to non-indigenous heritage are anticipated.
Air Quality	<ul style="list-style-type: none"> Air quality emissions are not expected to increase or alter noticeably from those previously assessed and approved under PA 06_0311. Monitoring results between 2005 and 2010 indicate that dust deposition has remained well below the OEH's air quality goal of 4 g/m²/month (grams per square metre per month).
Noise	<ul style="list-style-type: none"> Noise emissions are not expected to increase or alter noticeably from those previously assessed and approved under PA 06_0311. The additional mining equipment required to support the Extension of Mine Project and additional staff traffic movements is unlikely to noticeably increase noise emissions. Quarterly noise monitoring undertaken during 2009 and 2010 indicates that noise emissions from Manning Colliery are compliant with the applicable noise criteria at all receiver locations.
Greenhouse Gas Emissions	<ul style="list-style-type: none"> The Extension of Mine Project will not exceed the currently approved coal recovery rate and will not extend the life of the Colliery. Furthermore, it will not change the methods of coal mining, handing and transport, mine ventilation and gas management, or involve any additional surface infrastructure. On this basis, greenhouse gas emissions are not expected to increase or alter noticeably from those previously assessed and approved under PA 06_0311. The additional mining equipment required to support the Project is unlikely to have any significant impact.

Environmental Issue	Overview of Key Findings
Traffic and Transport	<ul style="list-style-type: none"> • The additional employees will have minimal to no impact on performance of the existing road network and intersection in terms of capacity and operation. • Following receipt of approval from Wyong Shire Council, Centennial Manning will upgrade the Rutleys Road - Manning Colliery Access Road intersection to improve safety and operational efficiency. It is anticipated that this upgrade will be undertaken by the end of 2012.
Socio-Economic Considerations	<ul style="list-style-type: none"> • The Extension of Mine Project does not pose any notable social impacts over and above those previously assessed and approved under Project Approval PA 06_0311. • The Project will secure on-going and increased employment opportunities and socio-economic flow-on benefits.

A comprehensive set of environmental management plans have been developed and implemented at Manning Colliery in accordance with the relevant conditions of PA 06_0311, EPL 191 and the various mining authorities. The implementation of these plans and the integration of Centennial Coal's Environmental Management System Framework (April 2009) is a strong focus at Manning and demonstrates environmental due diligence. The environmental management plans are backed by an environmental monitoring network, which includes monitoring of subsidence, air quality, noise and surface water.

The environmental management plans and monitoring program will be reviewed and updated, as required, to incorporate the Extension of Mine Project, commitments made in this EA and any additional consent conditions. This EA includes a Statement of Commitments specifying the various actions that will be implemented at Manning Colliery, in addition to those already in place, in order to effectively monitor, mitigate and/or manage the potential environmental and socio-economic impacts of the Extension of Mine Project should it be approved.

PROJECT JUSTIFICATION AND CONCLUSION

The Extension of Mine Project at Manning Colliery will provide access to improved coal quality suitable for the continuation of coal supply to the Vales Point Power Station. The proximity and existence of established coal delivery infrastructure provides for on-going reliable coal supply conditions, which, in turn, reduces the energy demands and potential environmental impacts otherwise required to source coal from other NSW mining operations.

The 4.6 Mt of coal resource within the proposed mining extension areas will be mined as a priority over coal within the current approved mine plan that has been identified as less economical for mining at this point due to higher ash content and geological constraints. Centennial Manning is currently investigating future extensions of mining operations at the Manning Colliery both within the Fassifern and Great Northern coal seams. It is anticipated that the potential future mine extensions currently being investigated will provide a long term and secure supply of coal to the domestic electricity generation market and extend the mine life beyond 2018. These investigations have only recently commenced and if proven feasible will form part of a separate application to the DP&I under the EP&A Act. The Extension of Mine Project detailed within this EA will enable access to improved quality coal that is economical for mining while the investigations into future mine extensions are undertaken.

Based on the assessment of environmental and socio-economic considerations, the Manning Colliery Extension of Mine Project is anticipated to pose negligible additional environmental impacts beyond those already approved under PA 06_0311. The Project is justified in socio-economic terms as a catalyst for significant and sustained economic activity within the Lake Macquarie and Wyong Local Government Areas, including positive employment and flow-on benefits.

TABLE OF CONTENTS

1.0	INTRODUCTION	1
1.1	Overview	1
1.2	Project Site	1
1.3	The Proponent	2
1.4	Project Team.....	2
1.5	Project Overview	2
1.6	Project Approval Pathway.....	3
1.7	Environmental Assessment Structure.....	3
2.0	CONSULTATION AND ISSUE IDENTIFICATION	5
2.1	Identification of Issues	5
2.2	Pre-Project Risk Assessment	5
2.3	Consultation	6
2.3.1	Overview	6
2.3.2	Department of Infrastructure and Planning.....	7
2.3.3	Dams Safety Committee	8
2.3.4	Community Consultation.....	8
2.3.5	Aboriginal Community Consultation	9
2.3.6	Neighbouring Operations Consultation.....	10
3.0	SITE DESCRIPTION	11
3.1	Site Locality	11
3.2	Project Site	11
3.3	Land Ownership	11
3.4	Existing Land Use	11
3.5	Surrounding Residences.....	12
3.6	Natural Features and Topography.....	12
3.7	Geology.....	12
4.0	CURRENT APPROVED OPERATIONS	14
4.1	Background	14
4.2	Existing Approvals, Licences and Authorities	15
4.2.1	Project Approval	15
4.2.2	Environmental Protection Licence	15
4.2.3	Mineral Authorities	15
4.3	Life of Mine.....	15
4.4	Operational Hours	16
4.5	Operational Employment	16

4.6	Underground Mining	16
4.6.1	Mine Plan	16
4.6.2	Annual Production	16
4.6.3	Mining Method	16
4.6.4	Mining Equipment	17
4.7	Subsidence Monitoring	17
4.8	Surface Infrastructure	17
4.8.1	Overview	17
4.8.2	Mine Ventilation	18
4.8.3	Diesel and Oil Storage	19
4.9	Coal Handling and Transport	19
4.10	Water Management	20
4.10.1	Overview	20
4.10.2	Mine Dewatering	21
4.11	Waste Management	21
4.11.1	Production Waste	21
4.11.2	General Waste	21
4.12	Progressive Rehabilitation	22
4.13	Post Mining Closure and Rehabilitation	22
4.14	Environmental Management and Monitoring	22
4.15	Environmental Compliance	23
5.0	PROPOSED MODIFICATION	24
5.1	Overview and Objectives	24
5.2	Operational Employment	27
5.3	Mine Plan	27
5.4	Mining Equipment	28
5.5	Post Mining Closure and Rehabilitation	28
5.6	Environmental Management and Monitoring	28
6.0	PLANNING CONSIDERATIONS	29
6.1	Approval Pathway	29
6.2	Commonwealth Legislation	29
6.2.1	Environment Protection and Biodiversity Conservation Act 1999	29
6.2.2	Native Title Act 1993	31
6.2.3	National Greenhouse and Energy Reporting Act 2007	31
6.3	NSW State Legislation	31
6.3.1	Environmental Planning and Assessment Act 1979	31
6.3.2	Other Key NSW State Legislation	31
6.4	State Environmental Planning Policies	33
6.4.1	SEPP No. 14 – Coastal Wetlands	33
6.4.2	SEPP No. 33 – Hazardous and Offensive Development	33

6.4.3	SEPP No. 44 – Koala Habitat Protection.....	34
6.4.4	SEPP No. 55 – Remediation of Land	34
6.4.5	SEPP (Mining, Petroleum Production and Extractive Industries) 2007.....	35
6.5	Local Environmental Plans	35
6.5.1	Lake Macquarie Local Environmental Plan 2004	35
6.5.2	Wyong Local Environmental Plan 1991.....	36
7.0	ENVIRONMENTAL ASSESSMENT	37
7.1	Subsidence	37
7.1.1	Seam Geometry.....	37
7.1.2	Impact Assessment	38
7.1.3	Management and Monitoring.....	38
7.2	Water Management.....	39
7.2.1	Surface Water Management.....	39
7.2.2	Mine Water Management	41
7.2.3	Water Balance	42
7.2.4	Impact Assessment	43
7.2.5	Cumulative Impact Assessment	44
7.2.6	Management and Monitoring.....	45
7.3	Terrestrial Ecology	46
7.3.1	Existing Environment.....	46
7.3.2	Key Threatening Processes.....	47
7.3.3	Impact Assessment	48
7.3.4	Key Thresholds Assessment	49
7.3.5	Other Legislative Considerations.....	49
7.3.6	Management and Mitigation	49
7.4	Aquatic Ecology	50
7.4.1	Existing Environment.....	50
7.4.2	Threatened Species, Populations and Ecology Communities.....	51
7.4.3	Areas of Conservation Significance.....	52
7.4.4	Impact Assessment	53
7.4.5	Cumulative Impact Assessment	55
7.4.6	Management and Monitoring.....	55
7.5	Aboriginal Heritage	56
7.5.1	Aboriginal Community Consultation	56
7.5.2	Aboriginal Heritage Context.....	56
7.5.3	Field Survey	56
7.5.4	Impact Assessment	58
7.5.5	Management and Monitoring.....	59
7.6	European Heritage.....	59
7.6.1	Historic Heritage Context.....	59
7.6.2	Field Survey	60
7.6.3	Impact Assessment	60
7.6.4	Management and Monitoring.....	60

7.7	Air Quality.....	61
7.7.1	Management and Mitigation	62
7.8	Noise	63
7.8.1	Management and Mitigation	64
7.9	Blasting and Vibration	64
7.10	Visual Amenity	64
7.11	Greenhouse Gas Emissions	65
7.11.1	Management and Monitoring	65
7.12	Traffic and Transport.....	66
7.12.1	Existing Environment.....	66
7.12.2	Traffic Generation	67
7.12.3	Intersection Upgrade	67
7.12.4	Impact Assessment	68
7.12.5	Management and Mitigation	70
7.13	Waste Management.....	70
7.14	Socio-Economic Considerations	70
7.14.1	Management and Mitigation	71
8.0	STATEMENT OF COMMITMENTS	72
9.0	JUSTIFICATION AND CONCLUSION	74
9.1	Project Justification	74
9.2	Ecologically Sustainable Development.....	75
9.2.1	The Precautionary Principle.....	75
9.2.2	Intergenerational Equity.....	76
9.2.3	Conservation of Biological Diversity and Ecological Integrity.....	76
9.2.4	Improved Valuation, Pricing and Incentive Mechanisms.....	77
9.3	Conclusion	77
10.0	REFERENCES.....	79
11.0	ABBREVIATIONS	80

FIGURES

Figure 1 – Regional Locality Plan	1
Figure 2 – Project Site.....	1
Figure 3 – Land Ownership	11
Figure 4 – Surrounding Land Use.....	12
Figure 5 – Typical Stratigraphic Column	12
Figure 6 – Mineral Authorities.....	15
Figure 7 – Approved Mine Plan.....	16
Figure 8 – Existing Surface Infrastructure.....	17
Figure 9 – Monitoring Locations.....	22
Figure 10 – Proposed Mine Plan	24
Figure 11 – Terrestrial Ecology.....	46
Figure 12 – Aquatic Ecology	50
Figure 13 – Aboriginal Heritage Sites.....	56

TABLES

Table 1 – Requirements for Risk Management	6
Table 2 – Stakeholder Consultation	7
Table 3 – Manning Colliery Mineral Authorisations	15
Table 4 – Summary of Independent Audit Compliance.....	23
Table 5– Comparison of Approved Operation and Proposed Modification	25
Table 6 – Water Balance Results	42
Table 7 – Previously Recorded Aboriginal Sites within Project Site	56
Table 8 – Aboriginal Sites Recorded During Field Survey within Project Site	57
Table 9 – Assessed Significance of Aboriginal Site	58
Table 10 – Local Heritage Items.....	60
Table 11 – Manning Colliery TSP and PM ₁₀ Criteria	61
Table 12 – Dust Depositional Monitoring Results Summary	62
Table 13 – Summary of Annual Greenhouse Gas Emissions	65
Table 14 – Current Intersection Performance	69
Table 15 – Current Intersection Performance with 2012 Operational Traffic.....	69
Table 16 – Upgraded Intersection Performance with 2012 Operational Traffic	69
Table 17 – Statement of Commitments	72

APPENDICES

Appendix A – Project Approval PA 06_0311

Appendix B – Project Application Form and Political Donations Disclosure Statement

Appendix C – Pre-Project Risk Assessment Register

Appendix D – Correspondence from Department of Planning and Infrastructure

Appendix E – Correspondence from Dams Safety Committee

Appendix F – Cultural Heritage Assessment (RPS 2011b)

Appendix G – Schedule of Land Titles

Appendix H – Environmental Protection Licence

Appendix I – Subsidence Assessment (Seedsman Geotechnics 2011)

Appendix J – Water Management Assessment (GHD 2011a)

Appendix K – Terrestrial Flora and Fauna Assessment (RPS 2011a)

Appendix L – Aquatic Ecology Assessment (Cardno Ecology Lab 2011)

Appendix M – Traffic Impact Assessment (Parsons Brinkerhoff 2011)

Appendix N – Social Impact Assessment (Lantz Marshall 2011)

1.0 INTRODUCTION

1.1 Overview

Manning Colliery is an existing underground coal mine located on the southern side of Lake Macquarie approximately 40 kilometres south of Newcastle in New South Wales (NSW). It is operated by Centennial Manning Pty Limited (Centennial Manning).

Development of Manning Colliery (formerly Wyee State Mine) commenced in 1960 in conjunction with the construction of Vales Point Power Station. Manning Colliery has mined coal resources in the Fassifern and Great Northern coal seams using both longwall and bord-and-pillar mining methods for close to 50 years. It produces up to 1.1 million tonnes of run-of-mine (ROM) coal per annum that is supplied to the nearby Vales Point Power Station for domestic electricity generation.

Following the introduction of Part 3A to the *Environmental Planning and Assessment Act 1979* (EP&A Act) in 2005 and the related passing of the former *State Environmental Planning Policy (Major Projects) 2005*, Manning Colliery was required to obtain planning approval for continued operations of its underground mining activities and surface facilities. On the 12 March 2008, and following submission of *Manning Colliery Continuation of Mining Environmental Assessment* (Hansen Bailey 2007), Manning Colliery was granted Project Approval PA 06_0311 under Part 3A of the EP&A Act for on-going underground mining activities and the continued operation of surface facilities. A copy of the Project Approval is contained within **Appendix A**.

This Environmental Assessment (EA) has been prepared to support an application by Centennial Manning seeking a modification to Project Approval 06_0311 pursuant to Section 75W of the EP&A Act to allow for the extension of mining operations at Manning Colliery (Extension of Mine Project). In summary, the Project will enable an extension of its underground mining operations within both the Fassifern and Great Northern coal seams, along with additional employment. Copies of the completed project application form and political donations disclosure statement are contained within **Appendix B**.

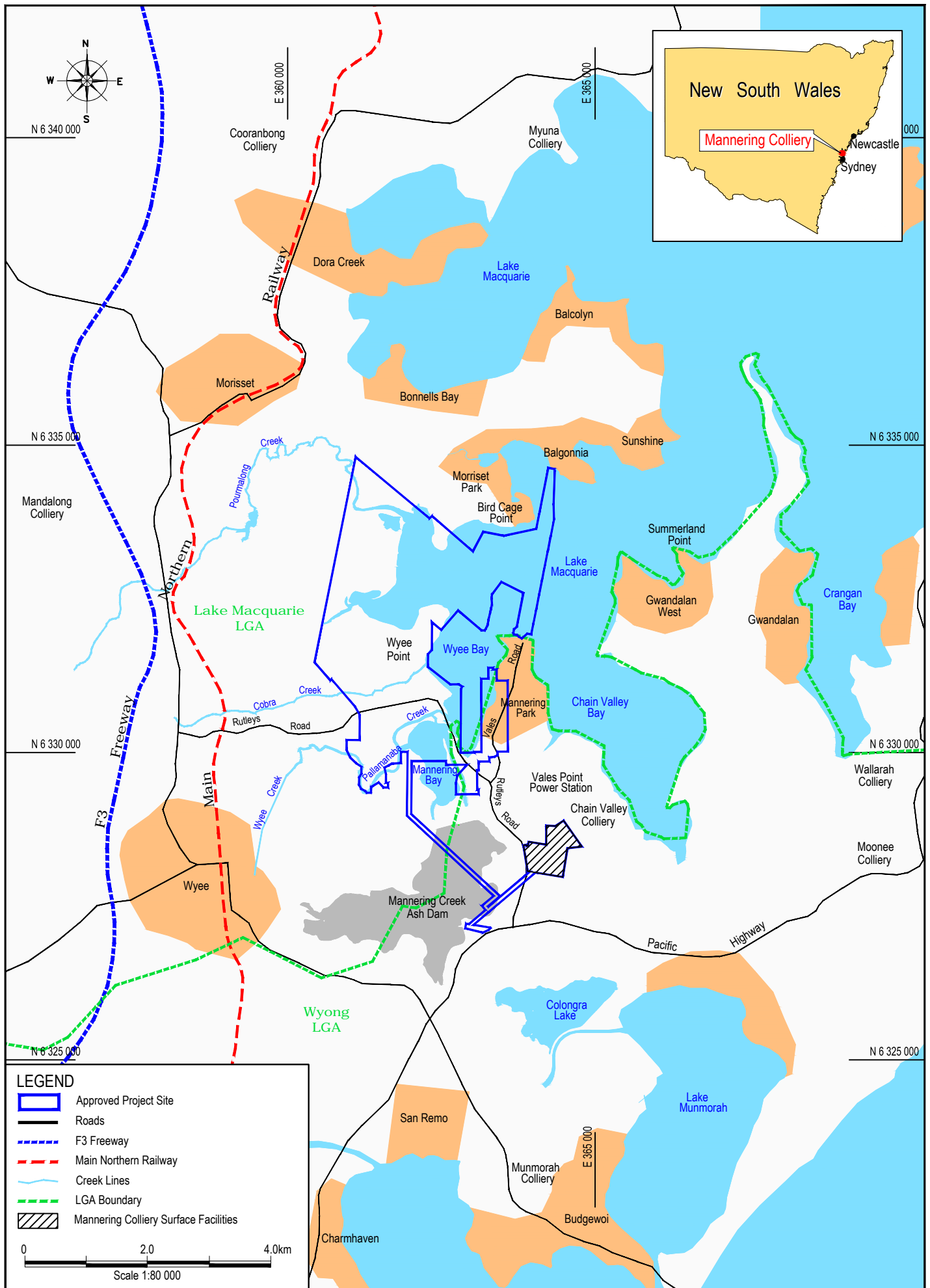
A Briefing Paper for the proposed modification at Manning Colliery was submitted to the Department of Planning and Infrastructure (DP&I) in August 2011. The DP&I responded by advising that the Briefing Paper correctly identified the issues to be addressed within the EA and consequently the Department has decided not to issue Director-General's Requirements (DGRs).

In addition to describing the Project, this EA contains a comprehensive and relevant assessment of the matters pertinent to the proposed modification to a level of detail commensurate with the scale of the Project, industry standards and the legislative framework under which it is permissible.

1.2 Project Site

Manning Colliery is an existing underground coal mine located on the southern side of Lake Macquarie, approximately 40 kilometres south of Newcastle in the locality known as Doyalson NSW. **Figure 1** positions Manning Colliery in its regional setting on Rutleys Road off the Pacific Highway. Manning Colliery's surface facilities are located adjacent to the Vales Point Power Station approximately 3 kilometres south of the Manning Park residential area.

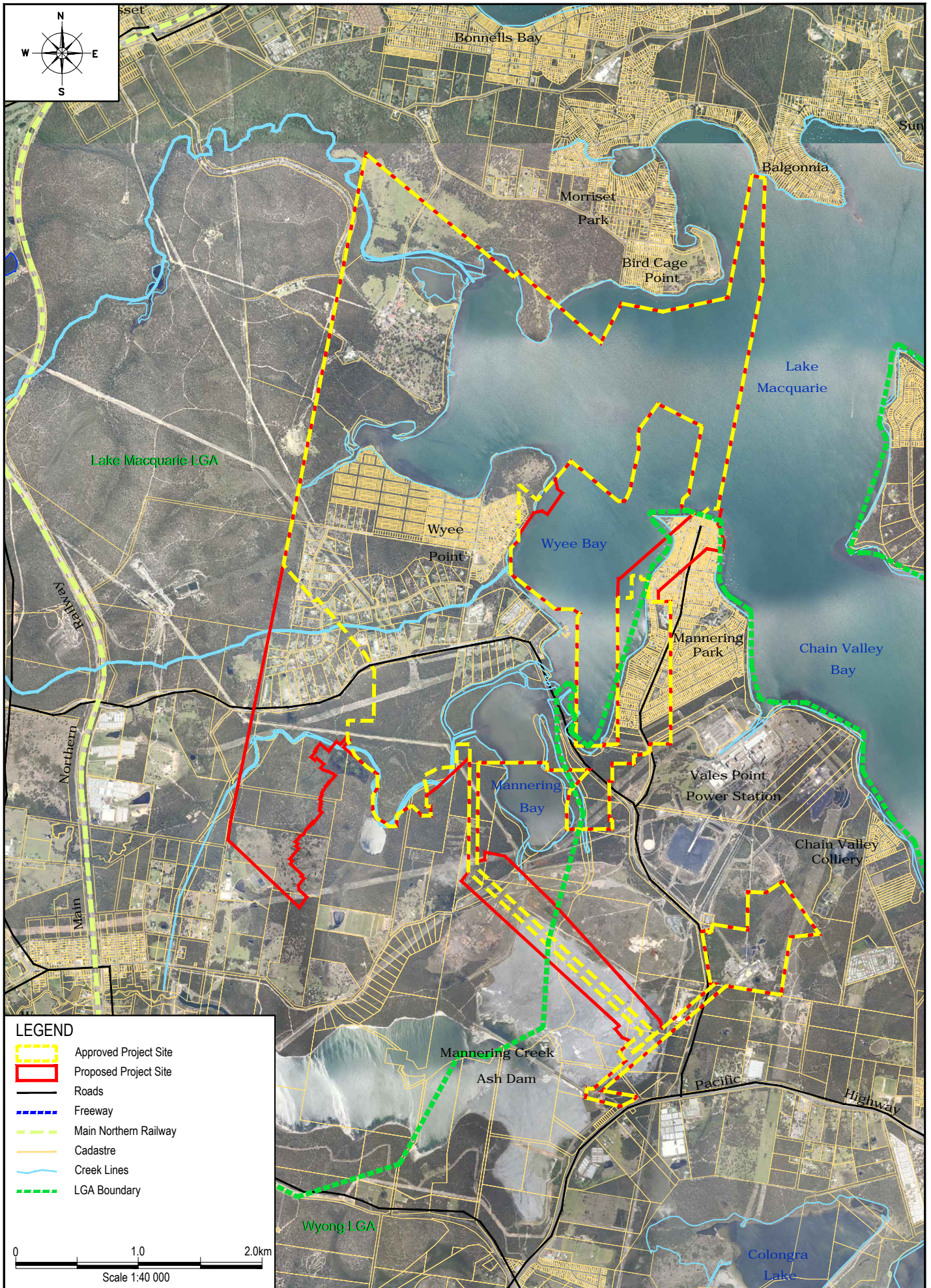
The Project Site is defined in **Figure 2** and encompasses the areas within which mining and mining related activities are currently approved under PA 06_0311 and those additional areas subject to the Section 75W modification proposal. The mining associated with the Extension of Mine Project will be undertaken within the bounds of Consolidated Coal Lease 721 (CCL 721) held by Centennial Manning.



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Mannering Colliery - Extension of Mine Project
Regional Locality Plan

FIGURE 1



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Manning Colliery - Extension of Mine Project Site

FIGURE 2

1.3 The Proponent

Manning Colliery is operated by Centennial Manning, which is a wholly owned subsidiary of Centennial Coal Company (Centennial). Centennial is a wholly owned subsidiary of Banpu Public Company Limited (Banpu), who purchased Centennial in 2010.

Centennial operates 12 coal mines in NSW supplying thermal and coking coal to domestic and export markets and is one of the largest underground coal producers in the State. The company is a major fuel supplier to the NSW energy industry, fuelling approximately 47 percent of the State's coal-fired electricity. Approximately one third of the Centennial's coal is exported off-shore via the Port of Newcastle and Port Kembla in NSW

1.4 Project Team

GSS Environmental (GSSE) has prepared this EA on behalf of Centennial Manning. The following external consultants undertook specialist studies to assist in the assessment of the Project:

- Subsidence Assessment - Seedsman Geotechnics (Seedsman);
- Aquatic Ecology Assessment - Cardno Ecology Lab (Cardno);
- Terrestrial Ecological Assessment – RPS Australia East (RPS);
- Cultural Heritage Assessment – RPS Australia East (RPS);
- Traffic Impact Assessment - Parsons Brinkerhoff (PB);
- Water Management Assessment - GHD; and
- Social Impact Assessment - Lantz Marshall.

Centennial personnel, including James Wearne (Environment and Community Coordinator - Projects) and Alan Klein (Manning Colliery Mine Manager) provided direction in terms of project scope, technical input and finalisation of the EA.

1.5 Project Overview

Mining at Manning Colliery is currently approved to be undertaken only within the Fassifern Seam and within the 2008 Project Approval PA 06_0311 boundary. As a result of the life of mine planning and review process at Manning Colliery, Centennial Manning is seeking a modification to Project Approval PA 06_0311 to allow for the Extension of Mine Project. In summary, the primary components of this Project are:

- An extension of underground mining operations within the Fassifern Seam beyond the 2008 Project Approval boundary using bord-and-pillar mining methods to recover approximately 3.2 million tonnes of ROM coal;
- An extension of underground mining operations into the Great Northern Seam using bord-and-pillar mining methods to recover approximately 1.4 million tonnes of ROM coal; and
- The provision of an additional 40 full-time employment positions.

The proposed combination of mining coal from the Fassifern and Great Northern seams will not exceed the 1.1 million tonnes per annum (Mtpa) of coal recovery previously assessed and approved under PA 06_0311. No changes to the current approved hours of operation, methods of coal mining, handling and transport, surface infrastructure, site servicing or waste management are required, and the proposal will not extend the life of Manning Colliery beyond the existing approved 2018 life of the mine.

The approved method of mining is a form of bord-and-pillar mining where coal recovery is limited to first workings only. This mining method, combined with the mine design, will achieve long-term stable pillars resulting in less than 20 millimetres of cumulative subsidence on the surface.

Manning Colliery is strategically located in close proximity to the Vales Point Power Station. The Extension of Mine Project will provide access to improved coal quality suitable for the continuation of coal supply to the power station for electricity generation. The proximity and existence of established coal delivery infrastructure provides for on-going reliable coal supply conditions, which, in turn, reduces the energy demands and potential environmental impacts otherwise required to source coal from other NSW mining operations.

The 4.6 Mt of coal resource within the proposed mining extension areas will be mined as a priority over coal within the current approved mine plan that has been identified as less economical for mining at this point due to higher ash content and geological constraints. Centennial Manning is currently investigating future extensions of mining operations at the Manning Colliery both within the Fassifern and Great Northern coal seams. It is anticipated that the potential future mine extensions currently being investigated will provide a long term and secure supply of coal to the domestic electricity generation market and extend the mine life beyond 2018. These investigations have only recently commenced and if proven feasible will form part of a separate application to the DP&I under the EP&A Act. The Extension of Mine Project detailed within this EA will enable access to improved quality coal that is economical for mining while the investigations into future mine extensions are undertaken.

1.6 Project Approval Pathway

Project Approval PA 06_0311 was granted to Manning Colliery by the Minister for Planning on the 12 March 2008 under Part 3A of the EP&A Act. Centennial Manning now seeks a modification to PA 06_0311 pursuant to the provisions of Section 75W of the EP&A Act to allow for the extension of underground mining operations at Manning.

It is noted that Part 3A of the EP&A Act was repealed and a new assessment system for projects of State significance commenced in NSW on the 1 October 2011. However, pursuant to Schedule 6A of the EP&A Act, the project comprises a 'transitional Part 3A project' to which the provisions of Part 3A continue to apply.

1.7 Environmental Assessment Structure

The purpose of this EA is to enable consideration of the implications of proceeding with the Extension of Mine Project at Manning Colliery. It has been prepared in accordance with the applicable legislative framework and industry standards, and in consultation with relevant government agencies and stakeholders. In summary, the EA is structured as follows:

- Section 1:** outlines the Project background, introduces the Proponent and Project Team, provides a summary of the primary Project components and nominates the approval pathway.
- Section 2:** outlines the process used to identify and prioritise the issues to be addressed within the EA, including stakeholder consultation activities and project risk assessment.
- Section 3:** provides an overview of the Project Site in terms of locality, land ownership and surrounding land uses.
- Section 4:** provides a description of the existing approved operations.
- Section 5:** provides a detailed description of the proposed Project.
- Section 6:** describes the approval pathway and environmental legislative framework for the Project.

- Section 7:** contains a description of the existing environment and an assessment of the potential implications of the Project, including cumulative impacts.
- Section 8:** lists the Statement of Commitments proposed to be adopted for the Project in order to mitigate potential adverse impacts and ensure appropriate management and monitoring.
- Section 9:** outlines the justification for the Project and contains the conclusion to the EA.
- Section 10:** lists the reference documents referred to within the EA.
- Section 11:** lists the abbreviations used within the EA.

2.0 CONSULTATION AND ISSUE IDENTIFICATION

2.1 Identification of Issues

The key project-related issues warranting detailed investigation and discussion were identified through:

- The existing environmental context of the Project Site and surrounding locality (see **Sections 3.0 and 7.0**);
- The legislative framework applicable to the Project (see **Section 6.0**);
- A broad brush pre-project risk assessment (see **Section 2.2**);
- The outcomes of consultation undertaken with government agencies and other relevant stakeholders (see **Section 2.3**); and
- Specialist studies completed as part of the preparation of the EA (see **Section 7.0**).

2.2 Pre-Project Risk Assessment

A pre-project scoping and broad brush risk assessment workshop was conducted in March 2011 by GSSE and Centennial Manning personnel in order to:

- Identify those issues relating to the Extension of Mine Project that represent the greatest risk to the local environment and surrounding populace; and
- Assist in setting (and justifying) priorities for the level of assessment required to address each identified risk in the EA.

A qualitative risk assessment methodology (using the Dyadem Stature Risk Management software) was adopted in general compliance with the requirements of the *Australian Standard AS/NZS ISO 31000:2009 – Risk Management – Principles and Guidelines* and in order to provide a consistent and reliable approach.

The various identified project-related issues were assessed in light of the mitigation measures and management strategies already in place at Manning Colliery. Where an individual risk was considered unacceptable, or where a knowledge gap was identified, a specialist study was commissioned and additional mitigation measures and/or management responses nominated.

The Risk Assessment Report, including a Risk Register, prepared as part of this process to document the findings and outcomes is contained within **Appendix C**. The report was also appended to the Briefing Paper issued to the DP&I seeking the DGRs for the Project. The key issues that were specifically addressed in the risk assessment include, but are not limited to, the following:

- Subsidence;
- Flora and Fauna;
- Aboriginal/Cultural Heritage;
- European Heritage;
- Groundwater;
- Surface Water;
- Greenhouse Gas;
- Air Quality;
- Noise;
- Traffic and Transport; and
- Social.

The Centennial Risk Matrix adopted and the management requirements in accordance with the Centennial Risk Standard and Risk Matrix is summarised in **Table 1**.

Table 1 – Requirements for Risk Management

Risk Ranking	Risk Category	Generic Management Actions
1 to 4	Extreme	Immediate intervention required from senior management to eliminate or reduce this risk.
5 to 9	High	Imperative to eliminate or reduce risk to lower level by the introduction of control measures. Management planning required at senior level.
10 to 15	Significant	Corrective action required. Senior management attention needed to eliminate or reduce risk.
16 to 19	Moderate	Corrective action to be determined, management responsibility must be specified.
20 to 25	Low	Monitor and manage by corrective action where practicable.

While the risk assessment did not identify any ‘extreme’, ‘high’ or ‘significant’ risks associated with the Manning Colliery Extension of Mine Project, three ‘moderate’ risks were identified. These being:

- Subsidence being greater than the existing approved 20 millimetres vertical subsidence limit;
- Discharge water not meeting the requirements of the Environmental Protection Licence or applicable water quality criteria; and
- Community action or objection.

The ‘low’ ranking environmental issues identified by the risk assessment for consideration in the EA are:

- Impacts for Aboriginal and European heritage sites from subsidence;
- Impacts to endangered ecological communities, fauna habitat or threatened species from subsidence;
- Impacts to aquatic fauna and seagrass beds from subsidence;
- Impacts to surface waters from subsidence;
- Discharge impacts on creek geomorphology or ecological receptors;
- Impacts to groundwater dependent ecosystems or other groundwater users;
- Impacts to traffic on the local road network;
- Exceedance of air quality and noise criteria from surface operations; and
- Impacts from increased greenhouse gas emissions.

Section 7.0 contains a comprehensive and relevant assessment of all environmental issues to a level commensurate with their risk.

2.3 Consultation

2.3.1 Overview

Consultation has been undertaken with local and state government agencies and other relevant stakeholders during the preparation of this EA. **Table 2** provides a summary of the consultation.

Table 2 – Stakeholder Consultation

Date	Stakeholder	Purpose
10 Jun 2011	Department of Planning and Infrastructure	Provision of Project Briefing Paper and Project Application form.
15 Aug 2011	Manning Community Consultative Committee	Preliminary outline of the proposed modification at CCC meeting.
31 Aug 2011	Department of Planning and Infrastructure	Provision of revised Project Briefing Paper.
31 Aug 2011	Department of Planning and Infrastructure	Discussion regarding revised Briefing Paper, DGRs and approval pathway.
29 Sep 2011	Dams Safety Committee	Application lodged seeking approval to conduct first workings within Manning Creek Ash Dam Notification Area.
10 Oct 2011	Manning Community Consultative Committee Representative	Project overview.
17 Oct 2011	Manning Community Consultative Committee Representative	Project overview.
17 Oct 2011	Manning Park Precinct Committee	Project overview and discussion regarding the social impact assessment.
19 Oct 2011	Manning Community Consultative Committee Representative (Wyong Shire Councillor)	Project overview.
20 Oct 2011	Manning Community Consultative Committee Chair (Mining Related Councils representative)	Project overview.
24 Oct 2011	Manning Community Consultative Committee Representative (Lake Macquarie City Council Senior Ecologist)	Project overview.
24 Oct 2011 (et al.)	NSW Office of Water	Discussion regarding water licensing for Manning Colliery
8 Oct 2011	Dams Safety Committee	Submission of plan showing location of subsidence monitoring points.
14 Nov 2011	Manning Community Consultative Committee	Project update and discussion regarding the social impact assessment.
15 Nov 2011	Wyong Shire Council and community	Presentation to Council and community members on Centennial operations within the Wyong Shire Local Government Area.
24 Nov 2011	Department of Planning and Infrastructure	Project update and discussion regarding application lodgement.
7 Dec 2011	Manning Park Resident	Email regarding Manning Colliery operations and proposed future mining.

2.3.2 Department of Infrastructure and Planning

Centennial Manning submitted a Project Briefing Paper, together with a covering letter, project application form and political donations disclosure statement, to the DP&I on the 10 June 2011 seeking the DGRs as to the form and content of the required environmental impact assessment. Following further consultations, a revised Project Briefing Paper was submitted on the 31 August 2011.

The DP&I responded via email on the 15 September 2011 advising the following:

The Department has reviewed the briefing paper supplied with your email and covering letter, dated 31 August 2011, and considers that the company has correctly identified the issues to be addressed in an Environmental Assessment (EA) to support the company's proposed modification of the Manning Colliery project approval to allow coal extraction from an expanded area (255.6 ha) of the Colliery's Mining Leases.

Accordingly, the company should prepare the EA in the manner proposed in the briefing paper, and also ensure that any cumulative effects from other mining and industrial operations in the vicinity of the colliery are assessed.....

The Department has decided not to issue Director-General's requirement for the EA and expects the matters identified in the briefing paper and above to be assessed in the EA. Once received and considered adequate, the Department will place the EA on public exhibition.

A copy of the email response from the DP&I is contained within **Appendix D**.

The DP&I did not forward the Briefing Paper to any other government agencies for comments, nor indicated that additional government consultation regarding the Project was considered necessary.

2.3.3 Dams Safety Committee

Centennial Manning has been engaging in on-going consultation with the Dams Safety Committee (DSC) regarding the proposed extension of mining areas within both the Fassifern and Great Northern coal seams directly beneath the embankment of the Manning Creek Ash Dam (associated with the Vales Point Power Station). On the 11 November 2011, the DSC wrote to the Chief Inspector of Coal Mines (Department of Primary Industries) recommending conditional approval to the proposed mining within the Notification Area. A copy of this correspondence, including recommended mining conditions, is contained within **Appendix E**.

If the Extension of Mine Project is granted approval by the DP&I, Centennial Manning will lodge an application with the Chief Inspection of Coal Mines seeking approval to conduct the proposed first workings within the Manning Creek Ash Dam Notification Area.

2.3.4 Community Consultation

Land uses at the surface above and adjacent to the underground mining areas include power generation, residential and recreational use (see **Section 3.4**). Centennial Manning undertook community consultation with regard to the Extension of Mine Project as outlined below.

Manning Community Consultative Committee

The Manning Community Consultative Committee (CCC) comprises representatives from local government and the community, and is independently chaired by a representative from the Mine Subsidence Board and Ministers Arbitration Panel. As listed in **Table 2**, the Manning CCC was provided with briefings regarding the Extension of Mine Project on the 15 August 2011 and the 14 November 2011. During the latter meeting, the findings of the *Social Impact Assessment* (Lantz Marshall 2011) prepared for the Project were raised and addressed.

Furthermore, as listed in **Table 2**, several of the CCC representatives have been consulted individually regarding the Project.

Manning Park Precinct Committee

Wyong Shire Council established the Manning Park Precinct Committee in 2009 to encourage the involvement of residents in decision making and improve communication between the Council and residents. As listed in **Table 2**, the Precinct Committee was provided with a briefing regarding the Manning Colliery Extension of Mine Project on the 17 October 2011. Issues raised during this meeting were identified and addressed during the Manning CCC meeting held on the 14 November 2011.

Wyong Shire Council Presentation

At a meeting organised by Wyong Shire Council on the 15 November 2011, Centennial delivered a presentation covering all Centennial operations and proposed projects within the Wyong LGA. This meeting was attended by Centennial personnel, Council staff members, Councillors and approximately 50 community members.

Public Notice

Following lodgement of this EA with the DP&I for Adequacy Review, and in accordance with Clause 8F(3) of the EP&A Regulation, a public notice is scheduled to appear in the Lakes Mail in January 2012 notifying that an application has been lodged seeking consent to modify the Project Approval 06_0311 pertaining to the Manning Colliery.

2.3.5 Aboriginal Community Consultation

Consultation with Aboriginal stakeholders was undertaken by Centennial and RPS, who was engaged to assess cultural heritage issues associated with the Manning Colliery Extension of Mining Project, in accordance with the guideline document titled *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (ACHCRs) (DECCW 2010). The ACHCRs include a four stage Aboriginal consultation process and stipulates specific timeframes for each stage.

Stage 1 involved writing to the OEH Environment Protection and Regulation Group (EPRG), Bahtabah Local Aboriginal Land Council, Darkinjung Local Aboriginal Land Council, Registrar of Aboriginal owners, Native Title Tribunal, Native Title Services Corporation Limited, Lake Macquarie and Wyong Councils and Hunter Central Rivers Catchment Management Authority. This process identified eight groups as potentially having an interest on the project. As a result of invitations sent to these groups inviting them to participate in the consultation process and an advertisement in the Lakes Mail, the following Aboriginal stakeholders registered an interest:

- Awabakal Descendants Traditional Owners Aboriginal Corporation;
- Awabakal Traditional Owners Aboriginal Corporation;
- Cacatua Culture Consultants;
- Daniella Chedzey;
- Darkinjung Local Aboriginal Land Council (LALC); and
- Guringai Tribal Link Aboriginal Corporation.

Information regarding the Manning Colliery Extension of Mine Project and proposed heritage assessment methodology for collecting information on cultural heritage significance was provided in writing to the Aboriginal stakeholders. Four groups returned comments by the closing date.

According to the ACHCR process a site survey should be undertaken with reference to the nature, scale and complexity of the project. With these factors considered, RPS invited the following five stakeholders to participate in the survey which was undertaken on 7 and 8 September 2011:

- Awabakal Descendants Traditional Owners Aboriginal Corporation;
- Awabakal Traditional Owners Aboriginal Corporation;
- Awabakal LALC;
- Bahtabah LALC; and
- Darkinjung LALC.

The Awabakal LALC, Bahtabah LALC and Darkinjung LALC were invited as the lead organisation representing Aboriginal people in their respective area. The Darkinjung LALC declined the offer advising that a minimum notice of six weeks is required.

Following the field survey, the draft Cultural Heritage Assessment report was prepared and provided to the following stakeholders for comment prior to finalisation:

- Awabakal Descendants Traditional Owners Aboriginal Corporation;
- Awabakal Traditional Owners Aboriginal Corporation;
- Awabakal LALC;
- Daniella Chedzev;
- Bahtabah LALC;
- Cacatua Culture Consultants;
- Guringai Tribal Link Aboriginal Corporation; and
- Darkinjung LALC.

Review comments on the draft report were received from Awabakal Descendants Traditional Owners Aboriginal Corporation, Awabakal Traditional Owners Aboriginal Corporation, Awabakal LALC, Cacatua Culture Consultants and Darkinjung LALC.

The Aboriginal Consultation Log and responses received from the Aboriginal community stakeholders are appended to RPS's *Cultural Heritage Assessment* (2011b) in **Appendix F**.

2.3.6 Neighbouring Operations Consultation

Centennial Manning has provided briefings regarding the Extension of Mine Project to the nearby operators of Chain Valley Colliery (LakeCoal Pty Limited) and Vales Point Power Station (Delta Electricity). Centennial Manning and Delta Electricity engage on monthly meetings during which project updates are provided.

As advised in **Section 2.3.3**, the DSC wrote to the Chief Inspector of Coal Mines recommending conditional approval to the proposed mining within the Notification Area for the Manning Creek Ash Dam (associated with Vales Point Power Station). If the Extension of Mine Project is granted approval by the DP&I, Centennial Manning will lodge an application with the Chief Inspection seeking approval to conduct the proposed first workings within the Notification Area.

3.0 SITE DESCRIPTION

3.1 Site Locality

Manning Colliery is an existing underground coal mine located on the southern side of Lake Macquarie, approximately 40 kilometres south of Newcastle in the locality known as Doyalson NSW. **Figure 1** positions Manning Colliery in its regional setting on Rutleys Road off the Pacific Highway.

Manning Colliery's surface facilities (including administration, workshops and the Manning Colliery Coal Crushing Facility) are located adjacent to the Vales Point Power Station approximately 3 kilometres south of the Manning Park residential area.

3.2 Project Site

The Project Site is defined on **Figure 2** and encompasses the areas within which mining and mining related activities are currently approved under PA 06_0311 and those additional areas that are subject to the Section 75 modification proposal. Mining and related operations at Manning Colliery are undertaken within CCL 721 and CCL 719 held by Centennial Manning (see **Section 4.2.3**), with the additional areas of coal mining proposed under the Extension of Mine Project to remain within the bounds of CCL 721.

The Project Site covers an area of approximately 1,420 hectares and is situated within both the Lake Macquarie and Wyong Local Government Areas (LGAs), and within the West Lake Macquarie and Swansea-North Entrance Mine Subsidence Districts.

A schedule of land parcels/titles within the Project Site is contained in **Appendix G**.

3.3 Land Ownership

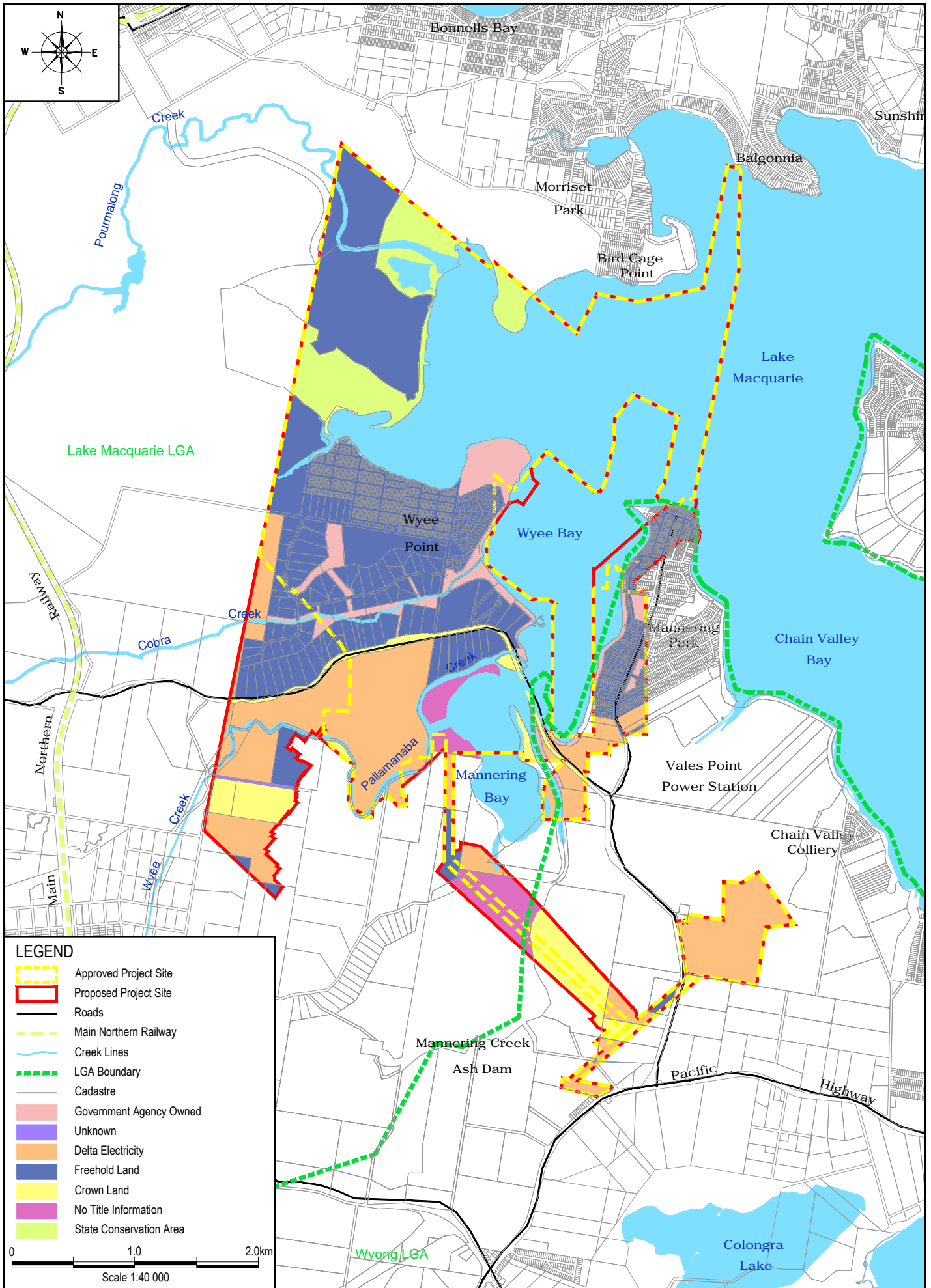
Land ownership within the bounds of the Project Site is shown on **Figure 3**. As evident, the site covers both Crown land and freehold land (including residential areas), with some of the existing and proposed mining areas underlying Lake Macquarie. Delta Electricity owns the land upon which Manning's surface facilities are located. Use of this land is included in the conditions contained with the mining authorities and via an agreement between the two parties.

Part of the land within the Project Site is gazetted as State Conservation Area (SCA). This reservation is restricted to a depth of 40 meters below the surface and is removed from the proposed extension of mining areas at Manning Colliery.

3.4 Existing Land Use

Development of Manning Colliery (formerly Wyee State Mine) commenced in 1960 in conjunction with the construction of Vales Point Power Station. Manning Colliery has mined coal resources in the Fassifern and Great Northern coal seams using both longwall and bord-and-pillar mining methods for close to 50 years.

There are also other underground mining operations surrounding Manning, including Mandalong and Cooranbong Collieries to the north, Myuna Colliery to the north-east, Chain Valley Colliery and Newvale Colliery (now closed) to the east and Munmorah Colliery to the south. Land uses at the surface above and adjacent to the mine include power generation at the Vales Point Power Station, residential and recreational use.



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Mannerling Colliery - Extension of Mine Project Land Ownership

FIGURE 3

Some of the existing and proposed mine workings underlie sensitive surface features including Lake Macquarie, Lake Macquarie SCA, High Water Level Subsidence Control Zone (HWLSCZ), the Notification Area for Manning Creek Ash Dam (associated with Vales Point Power Station) and Morisset Hospital.

3.5 Surrounding Residences

As advised above, land uses at the surface above and adjacent to the underground mining areas include power generation, residential and recreational use. The nearest residences and residential areas to the Manning surface facilities are:

- Rural-residential dwellings approximately 750 to 950 metres to the south adjacent to the Pacific Highway;
- Macquarie Shores Home Village approximately 700 metres to the east of Tall Timbers Road;
- Rural-residential dwellings on Tall Timbers Road and the nearby Chain Valley Bay suburban area over one kilometre to the north-east; and
- Residences over two kilometres to the north at Manning Park and to the west at Wyee Point.

The nearest identified residences are shown on **Figure 4**.

3.6 Natural Features and Topography

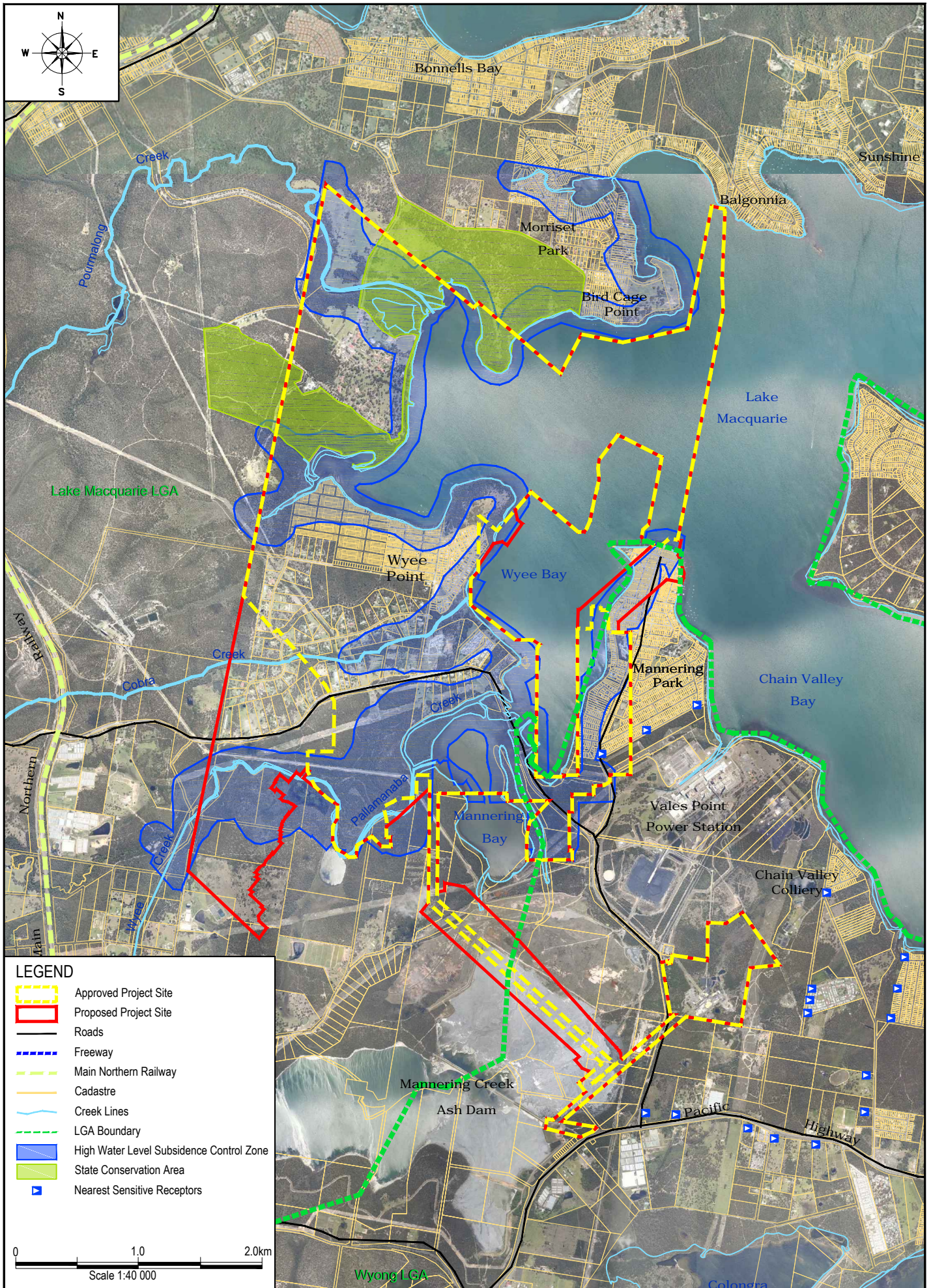
Some of the existing and proposed mine workings underlie a portion of Lake Macquarie, including parts of Wyee Bay and Manning Bay. Lake Macquarie is the largest coastal lake in NSW, with a perimeter of 196.15 kilometres and an open water area of 115.1 square kilometres (OzCoasts 2010, cited in Cardno 2011). The overall condition of the lake is scored as 'very good' according to the NSW State of the Catchments Draft Technical Report (Department of Planning 2008, cited in Cardno 2011) and it is used for a wide range of recreational activities. Lake Macquarie is connected to the South Pacific Ocean via Swansea Channel.

In addition to Lake Macquarie, the Project Site encompasses low rolling rises and crests of the peninsulas associated with the land and foreshores surrounding the lake (RPS 2011a). Elevations within the Project Site range from sea level to approximately 50 metres Australian Height Datum (AHD).

Within the vicinity of the Project Site, drainage is typically to the north and east towards Lake Macquarie where four main creeks feed into the lake. As identified as **Figure 4**, these are Wyee Creek and Pallamanaba Creek to the south, and Cobra Creek and Pourmalong Creek to the north. As with Lake Macquarie, these creeks are tidal. Various unnamed gullies and small catchment areas also drain into the lake and creek systems.

3.7 Geology

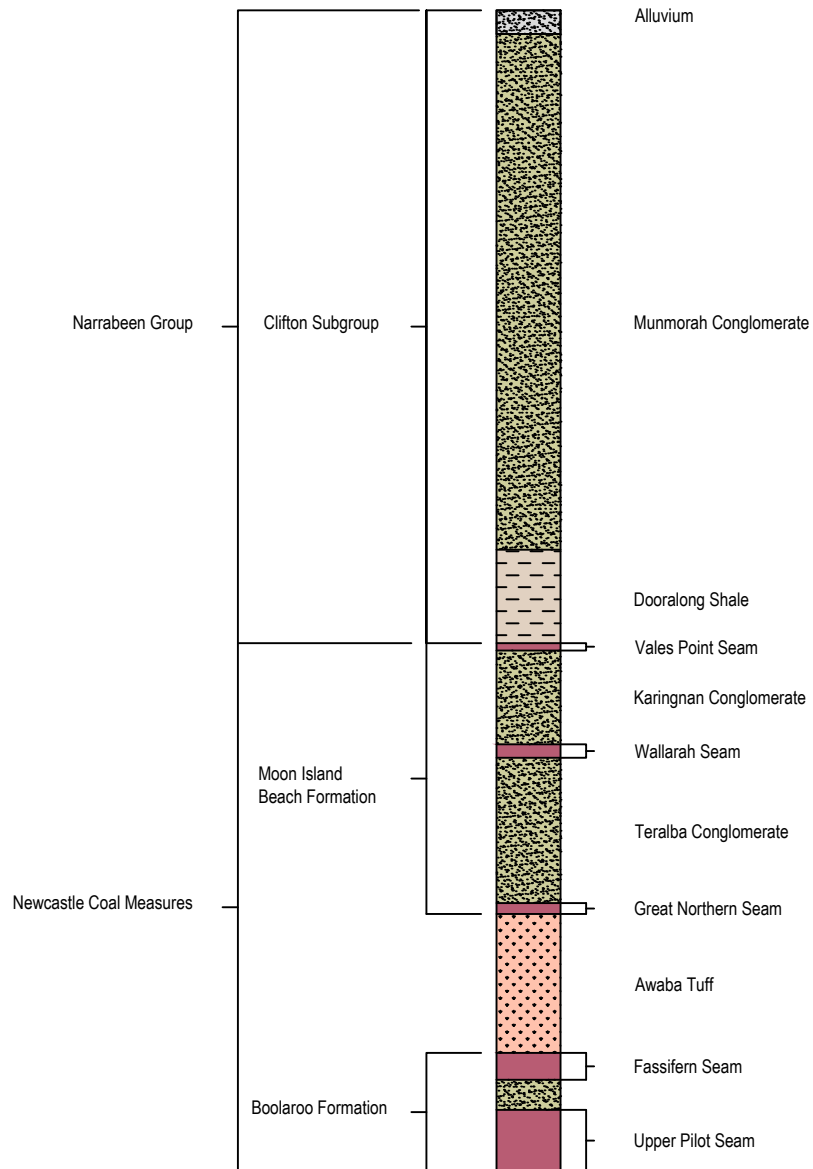
Manning Colliery's current mining operations are located within the Fassifern Seam, which is part of the Boolaroo Formation within the Newcastle Coal Measures (see **Figure 5**). Overlying the Fassifern Seam are the Great Northern, Wallarah and Vales Point Seams (and their associated conglomerates and tuffs), which are part of the Moon Island Beach Formation within the Newcastle Coal Measures. The Wallarah Seam is mined at Myuna Colliery to the north-east, while both the Fassifern and Great Northern seams are mined at Chain Valley Colliery to the east.








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Manning Colliery - Extension of Mine Project
Surrounding Land Use

FIGURE 4



LEGEND

-  Coal
-  Tuff
-  Conglomerate
-  Shale
-  Alluvium

Base Plan Data Source: Hansen Bailey (2007)

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Manning Colliery - Extension of Mine Project
Typical Stratigraphic Column

FIGURE 5

The coal resource within the Fassifern and Great Northern seams has a low sulphur content, which makes it a preferable supply for power generation. Within the Project Site, the Fassifern Seam lies at around 150 to 205 metres deep and mining is based on a three metre section of coal (approximate) beneath the B ply, which comprises approximately 1.0 to 1.2 metres of inferior coal left on the roof (Seedsman 2011). The depth of cover to the Great Northern Seam is between approximately 140 and 155 metres and the typical seam thickness is 2.5 metres (Seedsman 2011).

Previous workings within both of these seams are extensive. 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 Project Site is dissected by a number of north-west striking faults and dyke zones at a regional spacing of up to two kilometres, with drilling and surface magnetometer surveys confirming the locality of these structural features (Hansen Bailey 2007).

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

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

The Great Northern Seam is separated from the Fassifern Seam within the Newcastle Coal Measure by approximately 25 to 30 metres. The strata directly below the Fassifern Seam are high strength sandstone formations, interbedded with thinner strata of other units such as shale, mudstone and coal (Hansen Bailey 2007). This interval between the Fassifern Seam and the Great Northern Seam 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 (Hansen Bailey 2007). The roof of the Great Northern Seam is Teralba Conglomerate (Seedsman 2001).

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

4.0 CURRENT APPROVED OPERATIONS

4.1 Background

Development of Manning Colliery (formerly Wyee State Mine) commenced in 1960 in conjunction with the construction of Vales Point Power Station. Manning Colliery has mined coal resources in the Fassifern and Great Northern coal seams using both longwall and bord-and-pillar mining methods for close to 50 years.



Plate 1 – Manning Colliery Surface Facilities

Following the introduction of Part 3A to the EP&A Act in 2005 and the related passing of the former *State Environmental Planning Policy (Major Projects) 2005*, Manning Colliery was required to obtain planning approval for continued operations of its underground mining activities and surface facilities. On the 12 March 2008, and following submission of *Manning Colliery Continuation of Mining Environmental Assessment* (Hansen Bailey 2007), Manning Colliery was granted Project Approval PA 06_0311 under Part 3A of the EP&A Act for on-going underground mining activities and the continued operation of surface facilities. A copy of the Project Approval is contained within **Appendix A**.

In summary, the approved operations at Manning Colliery include:

- Mining of coal from the Fassifern Seam using bord-and-pillar underground mining method;
- Coal recovery at a variable rate of up to 1.1 Mtpa over a period of 10 years within the conceptual mine plan;
- Continuing use of surface facilities, including administration, workshops and the Manning Colliery Coal Crushing Facility (CCF);
- Transportation of coal via conveyor to the Vales Point Power Station; and
- Construction and use of additional minor infrastructure that may be required to service the underground mine workings.

Manning Colliery has an approved mine life of 10 years with the current Project Approval PA 06_0311 expiring on the 31 March 2018.

4.2 Existing Approvals, Licences and Authorities

4.2.1 Project Approval

As advised in **Section 4.1**, on the 12 March 2008 Manning Colliery was granted Project Approval PA 06_0311 under Part 3A of the EP&A Act for on-going underground mining activities and the continued operation of surface facilities. Manning has an approved mine life of 10 years with the current Project Approval expiring on the 31 March 2018. A copy of the Project Approval is contained within **Appendix A**.

4.2.2 Environmental Protection Licence

Manning Colliery is a premises-based activity under Schedule 1 of the *Protection of the Environment Operations Act 1997* (POEO Act). On this basis, the occupier of the premises must hold an Environmental Protection License (EPL) administered by the OEH under Section 43(b) of the Act.

Manning Colliery operates under EPL 191, which covers mining for coal to a scale of up to 2 million tonnes produced per annum and coal works up to a scale of 2 million tonnes loaded per annum. A copy of the EPL is contained within **Appendix H**.

4.2.3 Mineral Authorities

As shown on **Figure 6**, mining and related operations at Manning Colliery occur within CCL 721 and CCL 719, which are held by Centennial Manning. Other mining leases registered within the current colliery holding include parts of CCL 720 and CCL 722, which are held by Munmorah Colliery, and CCL 707, which is held by Lake Coal. Collectively, these titles provide mining rights for Manning Colliery.

Table 3 lists the mineral authorities currently in place at Manning Colliery.

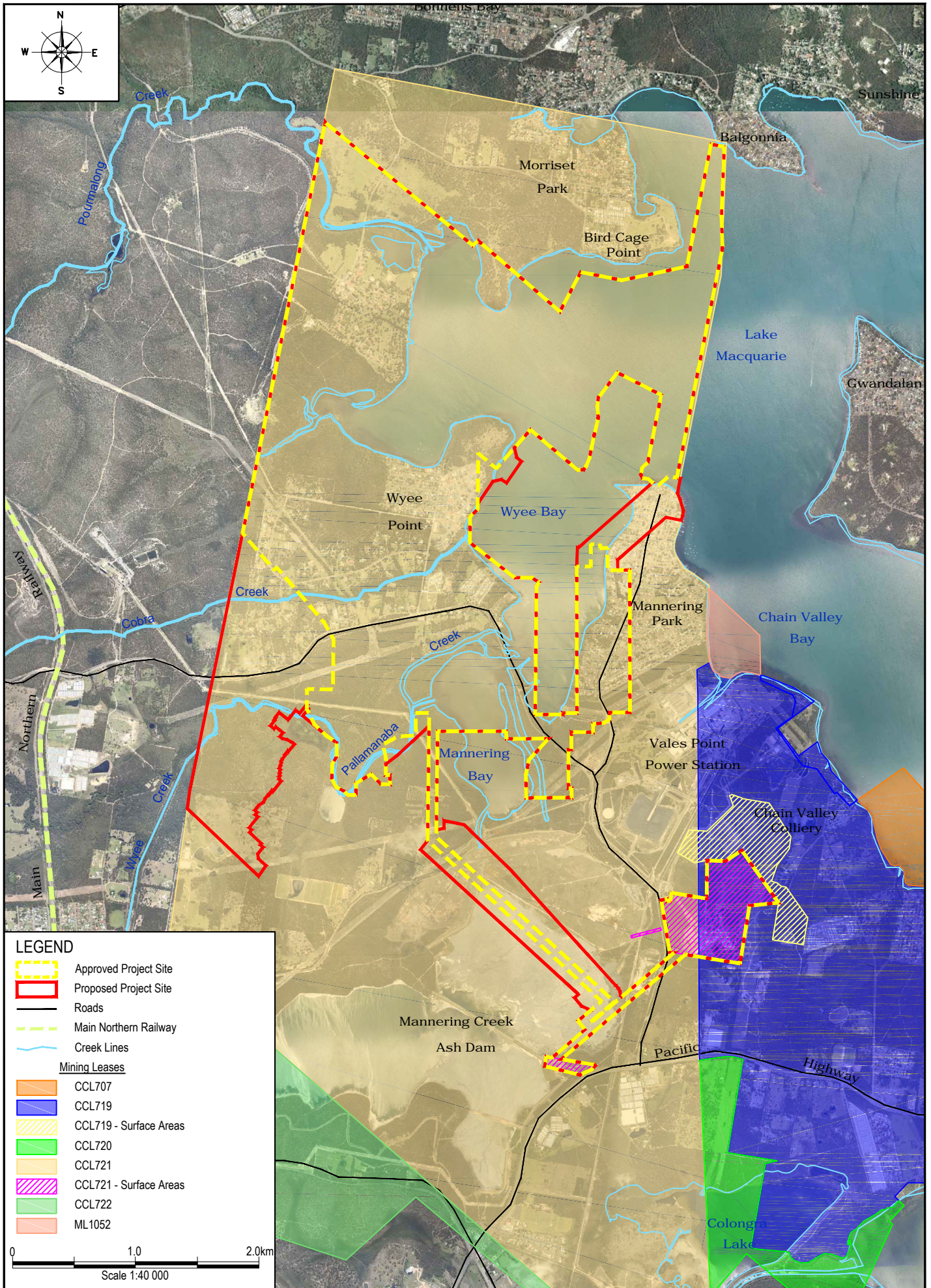
Table 3 – Manning Colliery Mineral Authorisations

Reference	Title	Expiry Date
CCL 719	Consolidated Coal Lease 719	21 Sep 2009*
Part CCL 720	Part Consolidated Coal Lease 720	22 Apr 2006*
CCL 721	Consolidated Coal Lease 721 (including Manning's surface facilities)	29 Jul 2026
Part CCL 722	Part Consolidated Coal Lease 722	05 May 2019
Part CCL 707	Part Consolidated Coal Lease 707	30 Dec 2023
EL 6639	Exploration licence 6639	31 Jul 2012
A441	Authorisation 441	02 Jun 2011*
A383	Authorisation 383	02 Jun 2011*
A384	Authorisation 384	02 Jun 2011*
Part A372	Part Authorisation 372	02 Jun 2011*

* Applications for renewal of these leases and authorisations have been submitted to the Department of Trade and Investment, Regional Infrastructure and Services. These titles continue to have effect even though they are past their expiry date as long as a valid application for renewal has been made.

4.3 Life of Mine

Manning Colliery has an approved mine life of 10 years with the current Project Approval PA 06_0311 expiring on the 31 March 2018.



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Mannerling Colliery - Extension of Mine Project
Mineral Authorities

FIGURE 6

4.4 Operational Hours

Manning Colliery operates up to 24 hours per day, seven days per week. Coal mining and processing generally occurs five days per week from Monday to Friday, with maintenance activities carried out over the weekend.

4.5 Operational Employment

While the *Manning Colliery Continuation of Mining Environmental Assessment* (Hansen Bailey 2007) advised that the operation would maintain a workforce of around 90 full-time employees, Manning currently employs approximately 130 full-time employees.

A variable number of additional contractors are engaged from time to time as required.

4.6 Underground Mining

4.6.1 Mine Plan

Manning Colliery is approved to mine a known accessible resource of approximately 11.6 Mt of coal from the Fassifern Seam within the approved area shown on **Figure 7**. The progression of underground mining is regularly reviewed dependant on on-going monitoring and geological conditions within the mine plan.

As previously advised, mining operations at Manning are undertaken within CCL 721 held by Centennial Manning (see **Section 4.2.3**) and within the West Lake Macquarie and Swansea-North Entrance Mine Subsidence Districts.

4.6.2 Annual Production

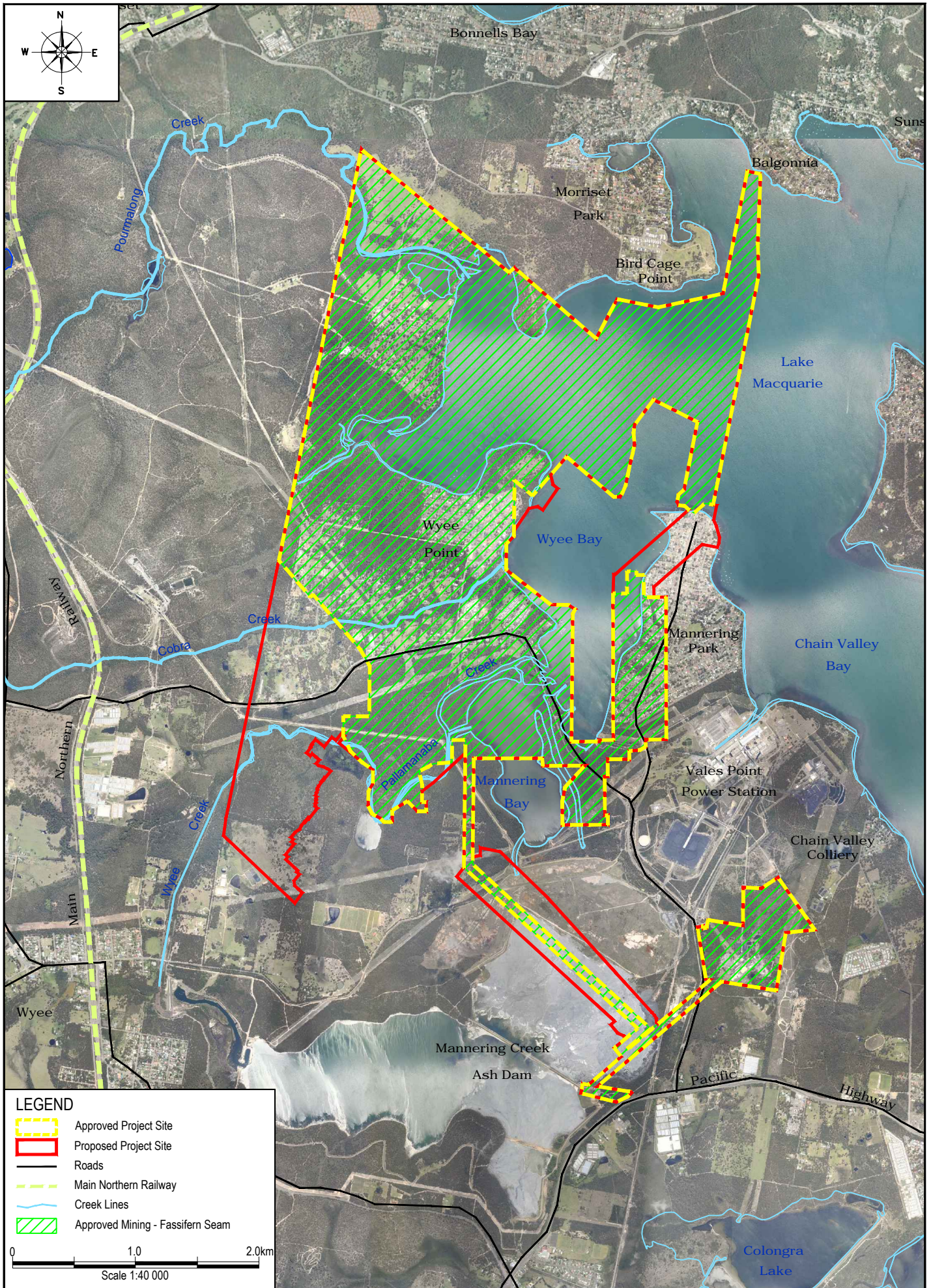
Project Approval PA 06_0311 permits that mining of coal from the Fassifern Seam at a variable rate of up to 1.1 Mtpa over a period of 10 years within the approved area shown on **Figure 7**.

4.6.3 Mining Method

The approved method of mining in the Fassifern Seam is a form of bord-and-pillar mining where coal recovery is limited to first workings only. The bord-and-pillar method uses a regular grid of mining tunnels and involves progressively cutting panels into the coal seam whilst leaving behind pillars of coal to support the mine.

At Manning, roadways are driven and pillars created, with mining limited to the coal cut from the first workings roadways. While the quantity of coal recovered using this mining method is less than that achieved with other methods, it has the advantage of long-term pillar stability and ensures no noticeable surface subsidence impacts. Centennial has successfully mined under portions of Manning Park residential area, Vales Point Power Station and Lake Macquarie using this method.

The mining method utilises a continuous miner system to develop panels with five to seven headings and associated cut-throughs, resulting in long-term stable pillars on 30 metre centres (24.5 metres coal), with width to height ratios in excess of 8:1. The panels are separated by substantial barrier pillars that are approximately 54 metres wide. The roadways are generally maintained at 5.5 metres wide and 2.9 metres high. Mined coal is transported via a drift conveyor system to the surface and onto the on-site coal crushing facility.



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Mannerling Colliery - Extension of Mine Project
Approved Mine Plan

FIGURE 7

4.6.4 Mining Equipment

Manning Colliery utilises a range of mining equipment to carry out the bord-and-pillar mining operations, facilitate men and materials access from the surface to the underground workings and undertake coal handling operations at the surface facilities area. Primary equipment items include continuous miners, roof bolters, shuttle cars, and drift conveyor systems.

4.7 Subsidence Monitoring

Subsidence management at Manning Colliery is by mine design, which has been developed by geotechnical experts employing geological data and geotechnical modelling. The formation of pillars is effectively managed, via an inspection/audit system, to ensure headings and cut-through are formed to design dimensions. The geotechnical modelling is calibrated 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 identify any unexpected impacts.

Subsidence monitoring of surface features and infrastructure above active mining areas is undertaken via longitudinal survey lines along existing clear corridors, including the coal conveyor, Vales Road, Rutleys Road and some transmission towers, and within the HWLSCZ. The maximum vertical subsidence measured in these areas to date has been less than 20 millimetres. The results of this monitoring are reported within the Annual Environmental Management Report (AEMR).

Given that coal mining at Manning Colliery is limited to first workings only and the vertical subsidence is less than 20 millimetres, a Subsidence Management Plan (SMP) is not required. It is generally accepted that subsidence of less than 20 millimetres will have a negligible effect on surface features and infrastructure.

4.8 Surface Infrastructure

4.8.1 Overview

As shown on **Figure 8**, the existing approved surface infrastructure at Manning Colliery includes, but is not limited to, the following primary items:

- Pit-top facilities, including administration offices, bathhouse, workshops, stores, lamp room, diesel and oil storage, fire fighting equipment and water tanks;
- Bitumen-sealed access roads and car parking facilities;
- A 25,000 tonne coal stockpile area, with a disturbance footprint of approximately 5,000 square metres (0.5 hectares);
- The CCF, with a capacity of 800 tonnes per hour;
- Conveyors for ROM coal and product coal;
- Men and materials drift conveyor;
- Mine ventilation shafts; and
- Water management infrastructure.



Plate 2 – Manning Colliery Workshop



Plate 3 – Men and Material Drift Conveyor

4.8.2 Mine Ventilation

The mine ventilation system at Manning Colliery is managed by the statutory mine ventilation engineer. There is no dedicated methane drainage conducted at Manning Colliery.

A downcast shaft is located off the Pacific Highway to the south-west of the main surface facilities. A 5.5 metre diameter shaft allows fresh air ingress to the underground workings. This shaft has been designed to minimise visual impact and is fenced for security purposes. Fresh air ingress into the underground workings is also achieved via the two incline drifts (coal conveyor and men and materials conveyor).

The upcast shaft is located on the western side of the surface facilities.



Plate 4 – Upcast Shaft

4.8.3 Diesel and Oil Storage

Diesel fuel is stored at Manning in two 14,000 litre above-ground tanks. These diesel tanks and small volumes of oils and greases (used only for lubrication of plant and equipment) are contained within an enclosed building bunded to contain 110 percent of the largest storage container should any spill occur.

Centennial Manning advises that the quantities of hydrocarbons stored are below the manifest quantities requiring notification to Workcover as listed in the *Occupation Health and Safety Act 2000*.

4.9 Coal Handling and Transport

Mined coal is transported from the underground workings via a drift conveyor to the surface and onto the on-site CCF. The CCF is a hammer roll design crushing facility with a capacity of 800 tonnes per hour. 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 millimetres. This coal is then conveyed to a 1,000 tonne product bin for subsequent transport to Delta Electricity's Vales Point Power Station.



Plate 5 – Rotary Breaker at CCF



Plate 6 – Product Coal Stockpile Bin

All of the coal produced at Manning Colliery is supplied directly to Vales Point Power Station by a dedicated overland conveyor, which is operated, maintained and located on land owned by Delta Electricity. In periods when the Vales Point Power Station is unable to accept coal deliveries due to scheduled maintenance or conveyor break-downs, a small ROM coal stockpile with a capacity to hold up to 25,000 tonnes is available on-site. Reclamation from the stockpile is undertaken using an excavator or front end loader to load the ROM hopper.

No coal is transported from Manning Colliery via road.

4.10 Water Management

4.10.1 Overview

Sources of water at Manning Colliery include potable water supply by Wyong Shire Council, rainfall runoff from the surface facilities and groundwater inflow to the underground mine workings. The primary water demands at Manning are for underground operations, dust suppression, machinery wash-down, fire fighting storage and staff amenities. No coal washing is undertaken at Manning.

The primary objective of the Manning Colliery water management system is primarily related to the separation of clean and dirty water. Surface water management at the colliery is based on the following key water management strategies:

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

The key features of Manning Colliery's surface water management system, as shown on **Figure 8**, are:

- Settlement Pond A, with a storage capacity of 5.4 megalitres;
- Settlement Pond B system (comprising Ponds 1, 2 and 3 and Pond B), with a combined capacity of 8.4 megalitres; and
- Licensed Discharge Points LDP001 (overflow from Pond B) and LDP002 (overflow from Pond A).

Manning Colliery's EPL 191, which includes both volumetric and concentration limits, permits the discharge of water from the site via two licensed discharge points (LDP001 and LDP002) into an unnamed creek and subsequently Lake Macquarie. LDP001 is licensed to discharge a maximum of 4,000 kilolitres per day. This is no volumetric limit placed LDP002, which typically only overflows with heavy prolonged rainfall.

All mine water and runoff from the south and east of the surface facilities, with the exception of runoff from the car park area, is directed via drive-in sediment sumps to the Settlement Pond B system. This system comprises four in-series sediment control ponds, being Ponds 1, 2 and 3 and Pond B, and facilitates retention and settlement. The water that passes through this system is discharged off-site via LDP001.

Surface water runoff from the western side of the surface facilities, which is relatively clean, is directed to Settlement Pond A for retention and settlement prior to being discharged off-site via LDP002. Pond A typically only receives water during rainfall events and only overflows with heavy prolonged rainfall.

Wetlands between the LDPs and Lake Macquarie are designed to slow the flow of the discharge water to facilitate further removal/filtration of fine sediment and other materials and the uptake of nutrients before entering the lake.

Centennial Manning undertakes water quality monitoring at the two LDPs and a location downstream of LDP001 (see **Figure 8**). Monitoring of conductivity, oil and grease, total suspended solids and pH is undertaken daily at the two LPDs, with additional monthly monitoring of a broad range of parameters undertaken at the two LDPs and the downstream monitoring location. Results are reported internally on a monthly basis and externally on a quarterly basis on Centennial's website and on an annual basis in the AEMR.

4.10.2 Mine Dewatering

During mining operations, a relatively small volume of water is released from the coal seams and collects in the underground workings. Additional run off from water used in the mining process also collects in the underground workings. The process whereby collected water is pumped out of the mining area is called mine dewatering.

Manning collects water at low points in the mine workings and passes it through an extensive goaf system that allows filtration and settlement prior to pumping it to the surface for transfer into the Settlement Pond B system (see **Section 4.10.1**). The groundwater is highly saline and as such is unsuitable for reuse in the mine water management system due to its corrosive nature.

4.11 Waste Management

4.11.1 Production Waste

There is no mineral processing undertaken at Manning Colliery, with ROM coal being sized at the CCF and transported directly to Vales Point Power Station. On this basis, there is no production waste or reject material generated at Manning Colliery.

4.11.2 General Waste

Management systems are in place at Manning Colliery for the various non-production waste streams generated by the operation in accordance with the requirements of PA 06_0311 and EPL 191. In summary:

General Waste and Routine Maintenance Consumables

All general wastes and routine maintenance consumables from the daily servicing of equipment (for example, air filters) are collected on a regular basis by an appropriately licensed contractor for off-site disposal within a waste facility approved to accept such waste. Recyclable material is also collected by a licensed contractor for recycling on an irregular (as needs) basis.

Waste Oil and Grease

The generation of waste oils and grease is currently limited to the routine maintenance of plant and equipment. Waste oils and greases stored at the workshop area, along with parts and packaging (for example, cartridges, filters and waste oil drums), are collected by a licensed waste contractor on a regular basis for recycling and/or off-site disposal.

Oily water is contained within drive-in-sumps and treated by oil-water separators located on the mine surface. Licensed contractors regularly service and maintain the separators and remove all waste hydrocarbons from the site for recycling.

Sewage

Sewage generated by on-site staff amenities is pumped directly from Manning Colliery to Manning Park Waste Water Treatment Works via a dedicated pipeline under a Trade Waste Agreement with Wyong Shire Council.

4.12 Progressive Rehabilitation

Due to the underground nature of operations at Manning Colliery, surface disturbance and the need for progressive rehabilitation, particularly revegetation, is relatively minor compared to open cut mining operations. However Centennial Manning does adopt a progressive approach to rehabilitation as mining progresses, including on-going maintenance of previously rehabilitated areas.

4.13 Post Mining Closure and Rehabilitation

Centennial Manning has prepared a Decommissioning Plan for Manning Colliery, which is appended to the approved Mining Operations Plan (MOP). As required by Condition 15 of Schedule 3 of PA 06_0311, it is intended that the Decommissioning Plan will be further developed into a detailed Mine Closure Plan by the end of March 2013 (i.e. five years prior to the planned mine closure).

4.14 Environmental Management and Monitoring

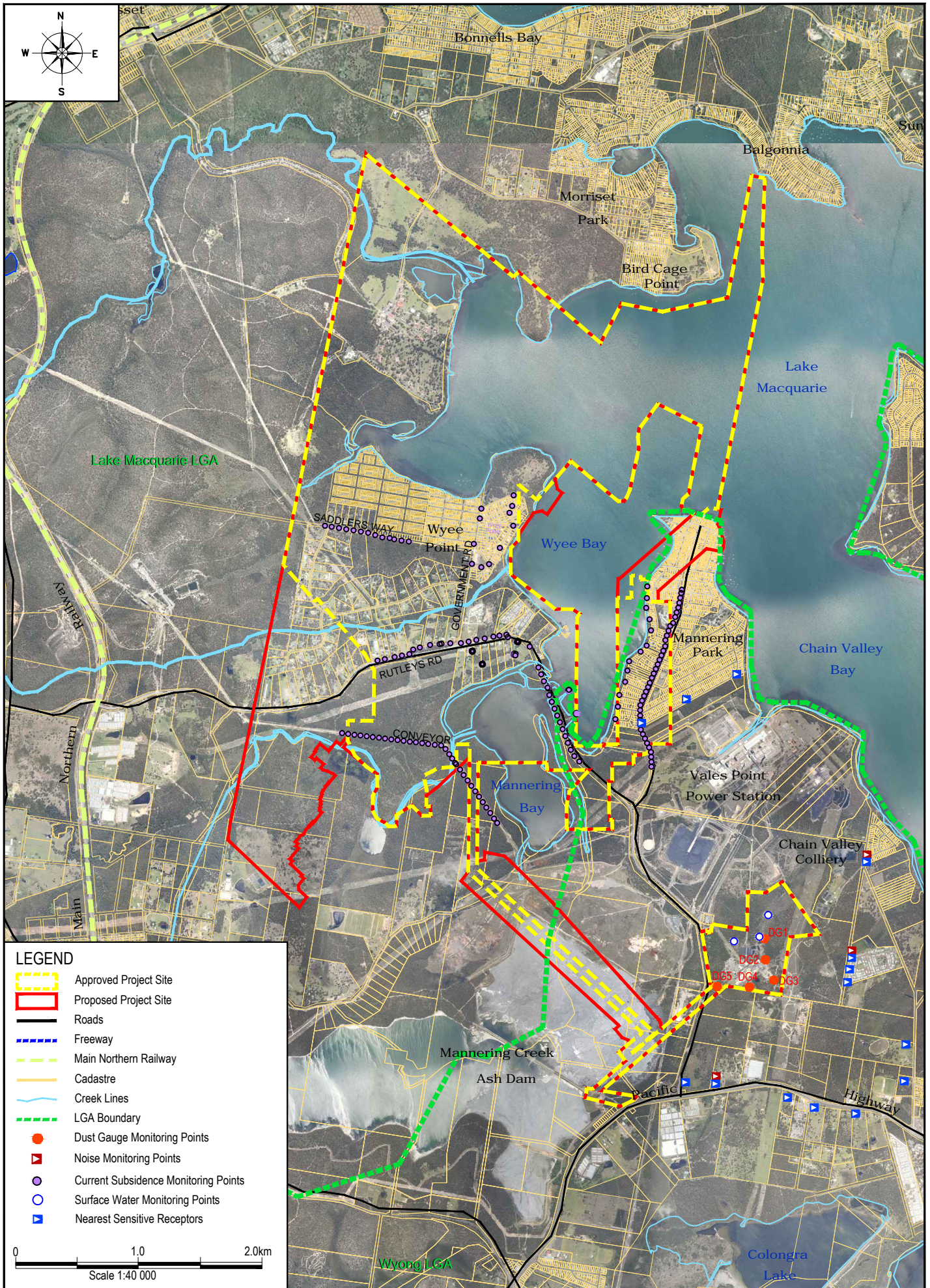
Manning Colliery has an established Environmental Management System (EMS) that has been developed in accordance with the Centennial Coal Environmental Management System Framework (August 2011). The EMS, which has been developed to be generally consistent with the elements of ISO 14001, provides an environmental management framework for all activities and areas managed by Centennial Manning.

As part of this EMS, a comprehensive set of environmental management plans have been developed and implemented at Manning Colliery in accordance with the relevant conditions of PA 06_0311, EPL 191 and mining authorities. The implementation of these plans and the integration of Centennial Coal's Environmental Management System Framework (April 2009) is a strong focus at Manning and demonstrates environmental due diligence. These plans are reviewed and updated, as necessary, to reflect operational changes and incorporate requirements, with actions from internal audits being carried out as required.

The environmental management plans are backed by an environmental monitoring network, which includes monitoring of dust, noise, surface water and subsidence. The various monitoring sites are identified on **Figure 9**. Results are reported internally on a monthly basis and externally on a quarterly basis on Centennial's website and on an annual basis in the AEMR.

The existing environmental management plans and monitoring programs include:

- *Environmental Management Strategy* (October 2008);
- *Environmental Monitoring Program* (July 2011);
- *Water Management Plan* (June 2011);
- *Land Management Plan* (October 2008);
- *Air Quality Management Plan* (July 2011);
- *Noise Monitoring Program* (July 2011); and
- *Energy Savings Action Plan* (September 2008).



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Manning Colliery - Extension of Mine Project
Monitoring Locations

FIGURE 9

4.15 Environmental Compliance

URS Australia Pty Ltd (URS) was engaged by Centennial Coal to carry out an Independent Environmental Audit of Manning Colliery earlier this year to satisfy Condition 5 of Schedule 5 of the Project Approval PA 06_0311. This is the first independent audit to be carried out at Manning, with the audit assessing compliance and environmental performance of operational activities between 12 March 2008 and 11 May 2011.

The independent environmental audit assessed compliance with relevant approvals, licences and other management plans applicable to Manning Colliery. The following dot points summarise URS's (2011) findings and conclusions:

- Environmental incidents reported during the audit period, include a minor oil spill and two exceedances of water quality criteria at one of the EPL discharge points. In both cases, Manning implemented appropriate measures to promptly respond to, investigate and rectify these incidents. In the case of the water quality exceedances, on-going water quality monitoring has demonstrated compliance to discharge limits.
- Environmental performance of the Manning operations is supported by apparently good relationships with both regulatory agencies and the local community.
- A summary of the statutory compliance status of Manning Colliery is provided in **Table 4**.

Table 4 – Summary of Independent Audit Compliance

Relevant Approval	Total Number of Conditions	Number of Conditions Non-Compliance or Indeterminate	Percent Compliant (%)
PA 06_0311	55	7	87
PA 06_0311 Statement of Commitments	25	1	96
EPL 191	39	3	92
CCL 721	37	2	95

- As a result of identified non-compliances and an adequacy review of management plans, the audit process has identified a number of opportunities for improvement. These improvement opportunities relate to general environmental management at Manning, as well as the management system documentation and implementation.

Overall, Manning Colliery exhibited a relatively high degree of compliance and performance. Centennial Manning has advised that it is investigating the improvement opportunities identified by URS (2011) and will implement where practical and possible.

In addition, the 2010 AEMR prepared for Manning Colliery reported no community or environmental complaints received between January 2010 and December 2010 and no operational or environmental incidents over this time. There was one administrative issue reported in relation to having the wrong street address listed on the site's EPL. This issue is subject to an EPL variation application submitted to then DECCW (now OEH/EPA) in November 2009.

5.0 PROPOSED MODIFICATION

5.1 Overview and Objectives

Mining at Manning Colliery is currently approved to be undertaken only within the Fassifern Seam and within the 2008 Project Approval PA 06_0311 boundary. As a result of the life of mine planning and review process at Manning, Centennial Manning is seeking a modification to PA 06_0311 to allow for the Extension of Mine Project. In summary, the primary components of this Project are:

- An extension of underground mining operations within the Fassifern Seam beyond the 2008 Project Approval boundary using bord-and-pillar mining methods to recover approximately 3.2 million tonnes of ROM coal;
- An extension of underground mining operations into the Great Northern Seam using bord-and-pillar mining methods to recover approximately 1.4 million tonnes of ROM coal; and
- The provision of an additional 40 full-time employment positions.

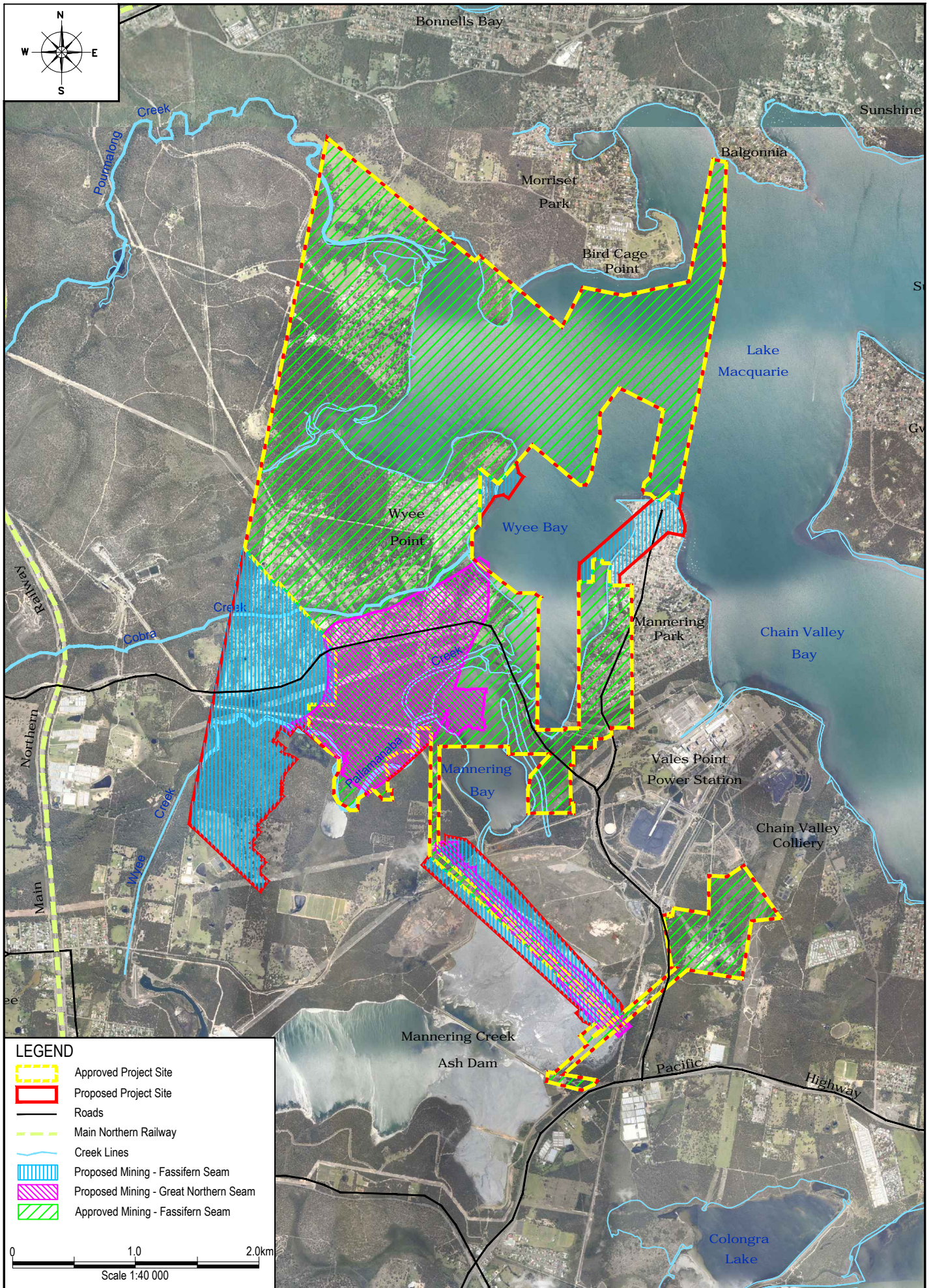
Figure 10 illustrates the 2008 Project Approval boundary and the proposed extension of mining areas within the Fassifern and Great Northern coal seams.

The proposed combination of mining in the Fassifern and Great Northern seams will not exceed the 1.1 Mtpa of coal recovery previously assessed and approved under PA 06_0311. No changes to the current approved hours of operation, methods of coal mining, handling and transport, surface infrastructure, site servicing or waste management are required. Furthermore, the proposal will not extend the life of Manning Colliery beyond the existing approved 2018 life of the mine.

The primary objectives of the Extension of Mine Project at Manning Colliery are:

- Develop the on-going underground operations with a focus on maximising resource recovery and improving the efficiency in which coal recovery is achieved;
- Provide access to improved coal quality suitable for the continuation of coal supply to Vales Point Power Station for electricity generation, while allowing coal from other Centennial operations to be directed to alternative export markets;
- Maintain continuity of coal production from the existing Manning operation within the currently approved life of mine;
- Secure on-going employment opportunities and socio-economic flow-on benefits; and
- Continue to conduct mining in an environmentally responsible manner to ensure the potential for adverse impact is minimised.

The 4.6 Mt of coal resource within the proposed mining extension areas will be mined as a priority over coal within the current approved mine plan that has been identified as less economical for mining at this point due to higher ash content and geological constraints. Centennial Manning is currently investigating future extensions of mining operations at the Manning Colliery both within the Fassifern and Great Northern coal seams. It is anticipated that the potential future mine extensions currently being investigated will provide a long term and secure supply of coal to the domestic electricity generation market and extend the mine life beyond 2018. These investigations have only recently commenced and if proven feasible will form part of a separate application to the DP&I under the EP&A Act. The Extension of Mine Project detailed within this EA will enable access to improved quality coal that is economical for mining while the investigations into future mine extensions are undertaken.



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Manning Colliery - Extension of Mine Project
Proposed Mine Plan

FIGURE 10

Table 5 summarises and compares the major components of the existing Manning Colliery operation approved under PA 06_0311 and the proposal to modify PA 06_0311 for the Extension of Mine Project.

Table 5– Comparison of Approved Operation and Proposed Modification

Aspect	Approved Manning Colliery Operation	Proposed Extension of Mine Project
Project Site Area	Approximately 1,164 hectares.	Approximately 1,420 hectares (an increase of 256 hectares or 22 percent).
Life of Mine	31 March 2018.	No change.
Operational Hours	24 hours a day, 7 days per week.	No change.
Operational Employment	While the <i>Manning Colliery Continuation of Mining Environmental Assessment</i> (Hansen Bailey 2007) advised that the operation would maintain a workforce of around 90 full-time employees, Manning currently employs approximately 130 full-time employees.	170 full-time employees (an additional 40 full-time positions).
Coal Seams	Fassifern Seam.	Fassifern Seam and Great Northern Seam.
Mine Plan	<u>Fassifern Seam</u> – as approved under PA 06_0311.	<u>Fassifern Seam</u> - modified mine plan comprising five additional mining areas beyond the approved project boundary. <u>Great Northern Seam</u> – mine plan comprising two mining areas extending beyond the approved project boundary.
Annual Production	Mining and processing of up to 1.1 Mtpa of ROM coal.	No change.
Coal Mining Method	Bord-and-pillar mining method where coal recovery is limited to first workings only.	No change.
Mining Equipment	A range of equipment is utilised to carry out mining operations, facilitate men and materials access from the surface to the underground workings and undertake coal handling operations. Primary equipment items include continuous miners, roof bolters, shuttle cars and drift conveyor systems.	Additional items of equipment, including continuous miners, shuttle cars and roof bolters, will be required to facilitate coal mining operations.
Surface Infrastructure	Primary infrastructure includes, but is not limited to, the following: <ul style="list-style-type: none"> - Pit-top facilities, including offices, workshops, bathhouse, stores, lamp room, diesel and oil storage, fire fighting equipment and water tanks; - Access roads and car parking facilities; - A 25,000 tonne coal stock pile area; - The CCF, with a capacity of 800 tonnes per hour; - Conveyors for ROM and product coal - Mine ventilation shafts; and - Water management infrastructure. 	No Change

Aspect	Approved Manning Colliery Operation	Proposed Extension of Mine Project
Coal Handling and Transport	Coal is transported from the underground workings via a drift conveyor to the on-site CCF for screening and crushing. All of the coal produced at Manning is supplied directly to Vales Point Power Station via a dedicated overland conveyor. In periods when the power station is unable to accept coal deliveries, a small ROM coal stockpile area with a capacity of 25,000 tonnes is available on-site. No coal is transported from site via road.	No change.
Servicing	Systems in place for potable water, operational water, power, communications and fuel.	No change.
Water Management	On-site surface water management system comprising: <ul style="list-style-type: none"> • Settlement Pond A; • Settlement Pond B system, comprising Ponds 1, 2 and 3 and Pond B; and • Licensed Discharge Points LDP001 and LDP002. EPL 191 permits the discharge of up to 4000 kilolitres per day from site.	No change.
Production Waste Management	No production waste or reject material generated.	No change.
General Waste Management	Management systems in place for the various non-production waste streams generated by the mining operation, including general waste, maintenance consumables, waste oils and grease and sewage.	No change.
Progressive rehabilitation	Manning adopts a progressive approach to the rehabilitation of disturbed land as mining progresses.	No change.
Post Mining Closure and Rehabilitation	As required by Condition 15 of Schedule 3 of PA 06_0311, it is intended that the current Mine Decommissioning Plan will be further developed into a detailed Mine Closure Plan by the end of March 2013 (i.e. five years prior to the planned mine closure).	No change. Decommissioning of the extended underground mining operations will be considered and addressed during the preparation of the Mine Closure Plan.
Environmental Management and Monitoring	As part of Manning's EMS, a comprehensive set of environmental management plans have been developed and implemented. These plans are backed by an environmental monitoring network including metrological, air quality, noise, surface water, groundwater and subsidence monitoring.	No change. Current environmental management plans and monitoring program to be reviewed and updated as required to incorporate the proposed modification.

The modification is described in the below sub-sections to provide an overall understanding of the nature and extent of the works proposed over and above what is currently approved at Manning Colliery under Project Approval PA 06_0311.

Detail has not been provided in this section with regards to a number of aspects relating to the existing mining operation, including life of mine, hours of operation, coal production rate, methods of coal mining, handling and transport, surface infrastructure, site servicing and waste management, given that these will continue to be undertaken as currently approved under PA 06_0311.

5.2 Operational Employment

The Extension of Mine Project will require an additional 40 full-time employees to operate the production unit in the Great Northern Seam, which will increase the workforce at Manning Colliery from the current 130 full-time employees to a total of 170 full-time employees.

As is currently the case, a variable number of additional contractors will be engaged from time to time as required.

5.3 Mine Plan

To maximise resource recovery and improve the efficiency of coal recovery, an opportunity to extend the underground mining footprint at Manning Colliery has been identified. As evident on **Figure 10**, modification of the approved mine plan is proposed to achieve the following:

- An extension of underground mining operations within the Fassifern Seam beyond the 2008 Project Approval boundary using bord-and-pillar mining methods to recover an additional 3.2 million tonnes of ROM coal; and
- An extension of underground mining operations into the Great Northern Seam using bord-and-pillar mining methods to recover an additional 1.4 million tonnes of ROM coal.

The modified mine plan for the Fassifern Seam will comprise an additional five mining areas extending beyond both the current approved mine plan and Project Approval boundary. The mine plan for the Great Northern Seam, which is currently not approved for coal recovery at Manning Colliery, will comprise two mining areas extending beyond the current Project Approval boundary.

The proposed combination of mining in the Fassifern and Great Northern seams will not exceed the 1.1 Mtpa of coal recovery previously assessed and approved under PA 06_0311, nor will it extend the life of Manning Colliery beyond the existing approved 2018 life of the mine. As previously outlined, the 4.6 Mt of coal resource within the proposed mining extension areas will be mined as a priority over coal within the current approved mine plan that has been identified as less economical for recovery at this point due to higher ash content and geological constraints.

The approved method for coal mining, being a form of bord-and-pillar mining where coal recovery is limited to first workings only, will continue to be implemented. This mining method, combined with the mine design, will achieve long-term stable pillars resulting in less than 20 millimetres of cumulative subsidence on the surface.

The proposed additional areas of coal mining within the Fassifern and Great Northern seams will remain within the bounds of CCL 721, which is held by Centennial Manning, and will be within the West Lake Macquarie and Swansea-North Entrance Mine Subsidence Districts.

The progression of underground mining within the Fassifern and Great Northern seams will be regularly reviewed dependant on on-going monitoring and geological conditions.

5.4 Mining Equipment

As advised in **Section 4.6.4**, Manning Colliery utilises a range of mining equipment to carry out the bord-and-pillar mining operations, facilitate men and materials access from the surface to the underground workings and undertake coal handling operations at the surface facilities area. Primary equipment items include continuous miners, roof bolters, shuttle cars, and drift conveyor systems.

The Extension of Mine Project will require some additional items of equipment, including continuous miners, shuttle cars and roof bolters, to facilitate mining operations.

5.5 Post Mining Closure and Rehabilitation

As advised in **Section 4.13**, Centennial Manning has prepared a Decommissioning Plan for Manning Colliery, which is appended to the approved MOP. As required by Condition 15 of Schedule 3 of PA 06_0311, it is intended that the Decommissioning Plan will be further developed into a detailed Mine Closure Plan by the end of March 2013 (i.e. five years prior to the planned mine closure).

Decommissioning of the extended underground mining operations will be considered and addressed during the preparation of the Mine Closure Plan.

5.6 Environmental Management and Monitoring

The environmental management plans and monitoring program (see **Section 4.14**) currently employed at Manning Colliery will continue to be implemented. These management plans and monitoring programs are designed to demonstrate environmental due diligence and to implement procedures that provide on-going management and monitoring of the mine operation in-line with the objectives of ecologically sustainable development (ESD).

The environmental management plans and monitoring programs will be reviewed and updated, as required, to incorporate the proposed Extension of Mine Project, commitments made in this EA and any additional consent conditions.

The results of the various environmental monitoring activities will continue to be reported internally on a monthly basis and externally on a quarterly basis on Centennial's website and on an annual basis in the AEMR.

6.0 PLANNING CONSIDERATIONS

The Manning Colliery Extension of Mine Project has been assessed in full consideration of the applicable statutory planning instruments of the Commonwealth and State. The following sub-sections provide a summary of the relevant key pieces of legislation and outline the application of these to the Project.

6.1 Approval Pathway

Project Approval PA 06_0311 was granted to Manning Colliery by the Minister for Planning on the 12 March 2008 under Part 3A of the EP&A Act. A copy of the Project Approval is contained within **Appendix A**.

Centennial Manning now seeks a modification to PA 06_0311 pursuant to the provisions of Section 75W of the EP&A Act to allow for the Extension of Mine Project. It is noted that Part 3A of the EP&A Act was repealed and a new assessment system for projects of State significance commenced in NSW on the 1 October 2011. However Schedule 6A of the EP&A Act contains savings and transitional arrangements. Specifically, Clauses 2(1) and 3(1) of Schedule 6A advise the following:

2 Transitional Part 3A projects

(1) The following are, subject to this Schedule, transitional Part 3A projects:

(a) an approved project (whether approved before or after the repeal of Part 3A),

(b) a project for which environmental assessment requirements for approval to carry out the project, or for approval of a concept plan for the project, were notified or adopted before the relevant Part 3A repeal date.

3 Continuation of Part 3A – transitional Part 3A projects

(1) Part 3A of this Act (as in force immediately before the repeal of that Part and as modified under this Schedule after that repeal) continues to apply to and in respect of a transitional Part 3A project.

On this basis, pursuant to Schedule 6A of the EP&A Act, the project comprises a 'transitional Part 3A project' to which the provisions of Part 3A continue to apply.

As outlined in **Section 2.3.2**, the DP&I advised that it has decided not to issue DGRs for the Project and the EA should be prepared in accordance with the manner proposed in the Project Briefing Paper. A copy of the advice issued by the DP&I is contained within **Appendix D**.

6.2 Commonwealth Legislation

6.2.1 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is administered by the Commonwealth Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) and provides a legal framework to protect and manage nationally important flora, fauna, ecological communities and heritage places defined as matters of national environmental significance (NES). An action that "has, will have or is likely to have a significant impact on a matter of National Environmental Significance" may not be undertaken without prior approval from the Commonwealth Minister, as provided under Part 9 of the EPBC Act.

An assessment of whether the Manning Colliery Extension of Mine Project may have a significant impact on any matters of NES or on the environment of Commonwealth land was undertaken during the EA investigations and preparation. Specifically, RPS, who prepared the appended *Terrestrial Flora and Fauna Impact Assessment (2011a)* and *Cultural Heritage Assessment (2011b)*, conducted an on-line search of the EPBC Act Protected Matters Search Database (accessed on the 27 June 2011) to generate a list of those matters of NES within a 10 kilometre radius of the Project Site.

Of the eight matters of NES prescribed under the EPBC Act, and in relation to the Manning Colliery Extension of Mine Project, it is advised:

World Heritage Properties

There are no World Heritage Properties identified within or surrounding the Project Site.

National Heritage Places

There are no National Heritage Places identified within or surrounding the Project Site. A search of the *Australian Heritage Database*, which incorporates the *National Heritage List*, the *Register of National Estate* and the *Commonwealth Heritage List*, found no references within the vicinity of the Project Site (RPS 2011b).

Wetlands of International Significance (RAMSAR Wetlands)

There are no wetlands protected by international treaty (the RAMSAR Convention) within or surrounding the Project Site. The nearest RAMSAR wetland is identified as the Hunter Estuary Wetlands at Shortland approximately 30 kilometres to the north of Manning Colliery.

Great Barrier Reef Marine Park

The Great Barrier Reef Marine Park in Queensland is significantly removed from the Manning Colliery Project Site.

Commonwealth Marine Areas

There are no Commonwealth marine areas identified within or surrounding the Project Site.

Nationally Listed Threatened Species and Ecological Communities

Given that the Extension of Mine Project at Manning Colliery is expected to have negligible surface impacts, it is unlikely to impact upon any nationally listed threatened species or ecological communities or migratory species. Please refer to **Sections 7.3** and **7.4** for further details.

Nationally Listed Migratory Species

The Project is unlikely to substantially modify, destroy or isolate an area of important habitat, result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat or seriously disrupt the lifecycle of an ecologically significant proportion of the population of a migratory species. Please refer to **Section 7.3** and **7.4** for further details.

All Nuclear Actions

No type of nuclear activity is proposed at Manning Colliery.

In conclusion, the proposed development modification is not anticipated to have a significant impact upon any matters of NES and referral to the SEWPaC is not considered necessary.

6.2.2 Native Title Act 1993

The *Native Title Act 1993* recognises that Aboriginal people have rights and interests to land and waters which derives from their traditional laws and customs. Native title may be recognised in places where Indigenous people continue to follow their traditional laws and customs and have maintained a link with their traditional country. It can be negotiated through a Native Title Claim, an Indigenous Land Use Agreement (ILUA) or future act agreements.

The National Native Title Tribunal was consulted as part of the consultation process undertaken by Centennial and RPS to assist in the preparation of the *Cultural Heritage Assessment (2011b)* for the Extension of Mine Project (see **Section 7.5**). A search of the National Native Title Register undertaken by the Tribunal for the Lake Macquarie and Wyong LGAs returned one result within the Lake Macquarie LGA for ILUA (NIA2000/001) entered into on 28 May 1999 by Wonnarua Nation Aboriginal Corporation and Powercoal Pty Ltd (since acquired by Centennial). The Manning Colliery Project Site does not include any land subject to this ILUA. Further details are provided in RPS's *Cultural heritage Assessment (2011b)* in **Appendix F**.

6.2.3 National Greenhouse and Energy Reporting Act 2007

The *National Greenhouse and Energy Reporting Act 2007* (NGER Act) provides a single national framework for the reporting and dissemination of information about the greenhouse gas emissions, greenhouse gas projects, and energy use and production of corporations. It makes registration and reporting mandatory for corporations whose energy production, energy use or greenhouse gas emissions meet specified thresholds. Centennial reports emissions from the corporation on an annual basis, including those from Manning Colliery, in accordance with the NGER Act.

6.3 NSW State Legislation

6.3.1 Environmental Planning and Assessment Act 1979

The EP&A Act is the principal piece of legislation overseeing the assessment and determination of development proposals in NSW. It aims to encourage the proper management, development and conservation of resources, environmental protection and ESD.

As advised in **Section 6.1**, Centennial Manning seeks to modify Project Approval PA 06_0311 pertaining to Manning Colliery under Section 75W of the EP&A Act to permit the Extension of Mine Project. While it is noted that Part 3A of the EP&A Act has been repealed, pursuant to the transitional arrangements in Schedule 6A of the Act, the Project comprises a 'transitional Part 3A project' to which the provisions of Part 3A continue to apply.

6.3.2 Other Key NSW State Legislation

Protection of the Environment Operations Act 1997

The POEO Act establishes the State's environmental regulatory framework and includes licensing requirements for certain activities. Manning Colliery is a premises-based activity under Schedule 1 of the POEO Act. As such, Manning Colliery operates under EPL 191, which covers mining for coal to a scale of up to 2 million tonnes produced per annum and coal works up to a scale of 2 million tonnes loaded per annum. A copy of the EPL is contained within **Appendix H**.

With the proposed additional areas of mining to remain within the bounds CCL 721 held by Centennial Manning, the Extension of Mine Project will not necessitate a variation to Manning Colliery's EPL.

Mining Act 1992

Manning Colliery operates under the authorities summarised in **Table 3** and illustrated on **Figure 6**. The Extension of Mine Project will not extend mining-related activities outside the bounds of the current authorities, with the additional areas of coal mining within the Fassifern and Great Northern seams to remain within the bounds of CCL 721 currently held by Centennial Manning. On this basis the proposal should not necessitate any variation to existing authorities or new authorities under the *Mining Act 1992*.

Manning Colliery's MOP will need to be revised (as necessary) to incorporate the Extension of Mine Project, commitments made in this EA and any additional consent conditions.

Mine Subsidence Compensation Act 1961

Manning Colliery is located within the West Lake Macquarie and Swansea-North Entrance Mine Subsidence Districts. It is a requirement of the *Mine Subsidence Compensation Act 1961* that all surface improvements are approved by the Mine Subsidence Board prior to construction commencing. However, given that the Extension of Mine Project at Manning Colliery is expected to have negligible surface impacts, with subsidence to be limited to a maximum of 20 millimetres and no additional surface infrastructure, there is no requirement for approval under the Act.

Coal Mine Health and Safety Act 2002

Manning Colliery currently holds all necessary approvals under the *Coal Mine Health and Safety Act 2002*. Centennial Manning will ensure that any further approvals required for the Extension of Mining Project are obtained in consultation with the Minerals Resources Division of the Department of Trade and Investment, Regional Infrastructure and Services (DTIRIS Minerals Division).

Dam Safety Act 1978

A portion of the Manning Colliery Project Site falls within the Notification Area for Manning Creek Ash Dam. The DSC regulates mining within the Notification Area under the *Dams Safety Act 1978* and the *Mining Act 1992*. As outlined in **Section 2.3.3**, the DSC wrote to the Chief Inspector of Coal Mines recommending conditional approval to the proposed mining within the Notification Area. A copy of this correspondence, including recommended mining conditions, is contained within **Appendix E**.

Water Act 1912 and Water Management Act 2000

The *Water Management Act 2000* and the *Water Act 1912* contain provisions for the licensing, allocation, capture and use of water resources. The extraction of underground water from the mine workings at Manning Colliery requires an extraction licence issued under the *Water Act 1912*. Centennial Manning is currently waiting for the determination of an application lodged with the NOW for such a licence. Once issued, the extraction of underground water from the mine workings will be undertaken in accordance with the licence conditions.

In terms of the *Water Management Act 2000*, the *Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources* commenced in August 2009 and regulates the interception and extraction of surface water and alluvium within the Project Site (South Lake Macquarie water source). Since no removal of water from this source is proposed, the rules of this Water Sharing Plan are not triggered by the Extension of Mine Project at Manning Colliery.

National Parks and Wildlife Act 1994

The *National Parks and Wildlife Act 1974* (NP&W Act) contains provisions for the protection and management of national parks, historic sites, nature reserves and Aboriginal heritage throughout NSW. The *Cultural Heritage Assessment* (RPS 2011b) prepared for the Extension of Mine Project (see **Section 7.5** and **Appendix F**) identified five Aboriginal heritage sites within the proposed mining extension areas.

RPS (2011b) concludes that the proposal is unlikely to have an impact on these sites and management will be undertaken in consultation with the Aboriginal community stakeholders and the OEH under the provisions of the NP&W Act

Part of the land within the Project Site is the Lake Macquarie SCA, which is listed under the NP&W Act. Due to the negligible surface impacts associated with the Extension of Mine Project, RPS (2011a) advises that the proposal is unlikely to significantly impact on any Government conservation estates.

Heritage Act 1977

Historical archaeological relics, buildings, structures, archaeological deposits and features are protected under the *Heritage Act 1977*. RPS (2011b) undertook a search of the *NSW Heritage Database*, which found no references to items of heritage significance within the Project Site. Please refer to **Section 7.6** for further details.

Threatened Species Conservation Act 1995

The *Threatened Species Conservation Act 1995* (TSC Act) is administered by the OEH and includes provisions to declare and protect threatened species, population and ecological communities. Due to the negligible surface impacts anticipated, RPS (2011a) concludes that the Extension of Mine Project is unlikely to significantly impact on any species, population or ecological community listed under the TSC Act. In its assessment of aquatic ecology, Cardno (2011) concludes that the proposal is not considered to affect any of the listed species such that a species impact statement is considered necessary.

Fisheries Management Act 1994

Provisions for the protection of fish and marine plants are administered through the NSW Department of Primary Industries (DPI) under the *Fisheries Management Act 1994* (FM Act). Threatened species populations and communities identified as 'endangered' 'critically endangered' and 'vulnerable' are listed in Act, as are 'key threatening processes'. Cardno (2011) advises that although sensitive habitats are known to occur within the study area, the direct impacts to these habitats as a result of the Extension of Mine Project at Manning Colliery is considered to be negligible. Any indirect impacts on fisheries resources and threatened species, populations and ecological communities would also be unlikely.

6.4 State Environmental Planning Policies

State Environmental Planning Policies (SEPPs) are legal Environmental Planning Instruments (EPIs) prepared by the Minister to address issues significant to NSW. The SEPPs outlined in the below sub-sections are relevant considerations for the Extension of Mine Project at Manning Colliery.

6.4.1 SEPP No. 14 – Coastal Wetlands

SEPP No. 14 – Coastal Wetlands ensures coastal wetlands are preserved and protected for environmental and economic reasons. Coastal wetlands mapped under SEPP No. 14 do occur in patches within the Manning Colliery Project Site. As negligible surface impacts are expected to occur, RPS (2011a) concludes that the proposed Extension of Mine Project is unlikely to impact upon any SEPP No. 14 coastal wetlands.

6.4.2 SEPP No. 33 – Hazardous and Offensive Development

SEPP No. 33 - Hazardous and Offensive Development links the permissibility of industrial development proposals to their individual safety and environmental performance. Certain activities may involve handling, storing or processing a range of materials which, in the absence of location, technical and/or operational controls, may create an off-site risk or offence to people, property or the environment. Such activities would be defined as 'potentially hazardous industry' or 'potential offensive industry'.

The Extension of Mine Project is a modification of the existing approved Manning Colliery operation involving an extension of underground mining, some additional items of mining equipment to facilitate coal mining within the proposed new workings and additional employment. Based on the following two points, we do not believe that the proposal warrants any further consideration under SEPP No. 33:

- Hazardous industry is limited to industrial developments which after all measures proposed to reduce or minimise its impact have been employed, the industry would still pose a significant risk to the surrounding populace and/or biophysical environment. With the continued implementation of best management practices for hydrocarbons used on-site, as well as effective implementation of the approved EMS and occupation health and safety management systems, the proposed modification should not pose any significant risk to the health of the people, property or the environment over or above the currently approved Manning Colliery operation; and
- In determining whether an industrial development proposal has the potential to be offensive, the level of offence would not be considered significant if the relevant authority is willing to issue a licence under its environment and/or pollution control legislation. In this case, if the OEH considers that the conditions of Manning Colliery's EPL (191) can be met (see **Section 6.3.2**), then the proposal is highly unlikely to be offensive.

6.4.3 SEPP No. 44 – Koala Habitat Protection

SEPP No. 44 – Koala Habitat Protection provides for the protection of koala habitat by ensuring that areas subject to development proposals are considered for their value as habitat or potential habitat for koalas. Lake Macquarie and Wyong LGAs are listed under Schedule 1 of SEPP No. 44 as local government areas to which the SEPP applies.

The *Terrestrial Flora and Fauna Impact Assessment* prepared by RPS (2011a) for the Manning Colliery Extension of Mine Project concludes the following in relation to SEPP No. 44:

'Core' or 'potential' koala habitat may occur throughout the proposed project area especially within the Swamp Sclerophyll Forest of the Floodplain of the North coast, Sydney basin and south east corner bioregions. However, as negligible surface impacts (subsidence is predicted to be less than 20 millimetres and no surface cracking is expected) are expected, the proposed project is unlikely to impact on any 'potential' or 'core' koala habitat areas that may occur within the proposed project area.

6.4.4 SEPP No. 55 – Remediation of Land

SEPP No. 55 – Remediation of Land provides for a state-wide planning approach to the remediation of contaminated land in order to reduce the risk to human health or any other aspect of the environment. Under the SEPP, a consent authority must not consent to the carrying out of development on land unless it has considered any potential contamination issues.

The Extension of Mine Project is a modification of the existing approved Manning Colliery operation, involving an extension of the underground mining, some additional items of mining equipment to facilitate coal mining within the proposed new workings and additional employment. With the continued implementation of best management practices for hydrocarbons, as well as effective implementation of the approved EMS and occupation health and safety management systems, the potential for contamination and associated issues is considered relatively low. The proposal should not pose any significant risk to the health of the people, property or the environment over or above the currently approved Manning Colliery operation.

Land contamination will be considered and addressed during the preparation of the next MOP or MOP variation, as well as during preparation of the detailed Mine Closure Plan (see **Section 5.5**).

6.4.5 SEPP (Mining, Petroleum Production and Extractive Industries) 2007

SEPP (Mining, Petroleum Production and Extractive Industries) 2007 (Mining SEPP) aims to provide for the proper management and development of mineral, petroleum and extractive material resources for the social and economic welfare of NSW. The SEPP provides that development for the purpose of mining may be carried out with development consent, and defines mining developments that are prohibited, exempt or complying development.

The provisions of the SEPP requiring specified matters to be taken into account have been drafted using the language of Part 4 of the EP&A Act and do not expressly apply to Part 3A. However, given that the matters to be considered for Major Projects (now State Significant Development) remain largely at the discretion of the Director-General, the Mining SEPP has been considered for completeness.

Part 3, specifically Clauses 12 and 13, of the Mining SEPP requires that consideration be given to the compatibility of projects with other surrounding land uses. There is no land use within or surrounding the Project Site that is considered to be incompatible with the Extension of Mine Project. This is supported by the fact that the Project is a modification of the existing approved Manning Colliery operation and is relatively benign in nature.

Part 3 of the Mining SEPP also requires the consideration of natural resource management and environmental management, efficiency of resource recovery, transportation and rehabilitation. The information presented in this EA addresses each of these matters and indicates that the proposed modification will not have any significant impacts over or above the currently approved Manning Colliery operation. The environmental management plans and monitoring programs currently implemented at Manning will be reviewed and updated, as required, to incorporate the proposed Extension of Mine Project, commitments made in this EA and any additional consent conditions.

6.5 Local Environmental Plans

Local Environmental Plans (LEPs) are legal EPIs that guide planning decisions for LGAs and allow Councils to supervise the ways in which land is used through zoning and development consents. In deciding whether to approve a Part 3A project (including a transitional Part 3A project, see **Section 6.1**) the Minister is not bound by the provisions of any LEPs.

As previously advised, the Project Site is situated within both the Lake Macquarie and Wyong LGAs. The LEPs of these two Councils are addressed below.

6.5.1 Lake Macquarie Local Environmental Plan 2004

Under the provisions of the *Lake Macquarie Local Environmental Plan 2004* (Lake Macquarie LEP), the Manning Colliery Project Site falls within the following 16 land use zones:

- 1(1) Rural (Production);
- 1(2) Rural (Living);
- 2(1) Residential;
- 3(1) Urban Centre (Core);
- 4(1) Industrial (Core);
- 5 Infrastructure;
- 6(1) Open Space;
- 6(2) Tourism and Recreation;
- 7(1) Conservation (Primary);
- 7(2) Conservation (Secondary);
- 7(3) Environmental (General);
- 7(5) Environmental (Living);
- 8 National Park;
- 9 Natural Resources;
- 10 Investigation; and
- 11 Lakes and Waterways.

Please note that the proposed extension of mining areas fall within only nine of these zones, being:

- 1(1) Rural (Production);
- 1(2) Rural (Living);
- 2(1) Residential;
- 4(1) Industrial (Core);
- 6(2) Tourism and Recreation;
- 7(1) Conservation (Primary);
- 7(2) Conservation (Secondary);
- 9 Natural Resources; and
- 11 Lakes and Waterways.

Within these nine zones, development for the purpose of mining is permissible with development consent under the Lake Macquarie LEP only within zones 1(1), 4(1) and 9. While mining is a prohibited land use within the remaining six zones, sub-clause 7(1) of the Mining SEPP (see **Section 6.4.5**) states that development for the purpose of underground mining may be carried out on any land with development consent. In relation to any inconsistency between the SEPP and an LEP, sub-clause 5(3) of the SEPP states that if the SEPP is inconsistent with any other EPI, whether made before or after the SEPP, the SEPP prevails to the extent of the inconsistency. On this basis, any provision within the Lake Macquarie LEP that would otherwise operate to prohibit the Manning Colliery Extension of Mine Project has no effect.

6.5.2 Wyong Local Environmental Plan 1991

Under the provisions of the *Wyong Local Environmental Plan 1991* (Wyong LEP), the Manning Colliery Project Site falls within the following six land use zones:

- 2(a) Residential;
- 2(b) Multiple Dwelling Residential;
- 3(a) Business Centre;
- 5(a) Special Uses;
- 6(a) Open Space and Recreation; and
- 7(g) Wetlands Management.

Please note that the proposed extension of mining areas fall within only five of these zones, being:

- 2(a) Residential;
- 2(b) Multiple Dwelling Residential;
- 3(a) Business Centre;
- 5(a) Special Uses; and
- 6(a) Open Space and Recreation.

Within these five zones, development for the purpose of mining is permissible with development consent under the Wyong LEP only within zones 5(a) and 6(a). While mining is a prohibited land use within the remaining four zones, sub-clause 7(1) of the Mining SEPP (see **Section 6.4.5**) states that development for the purpose of underground mining may be carried out on any land with development consent. In relation to any inconsistency between the SEPP and an LEP, sub-clause 5(3) of the SEPP states that if the SEPP is inconsistent with any other EPI, whether made before or after the SEPP, the SEPP prevails to the extent of the inconsistency. On this basis, any provision within the Wyong LEP that would otherwise operate to prohibit the Manning Colliery Extension of Mine Project has no effect.

7.0 ENVIRONMENTAL ASSESSMENT

This section contains a description of the existing environment and a comprehensive and relevant assessment of the potential environmental impacts associated with the proposed Extension of Mine Project at Manning Colliery. As facilitated by the pre-project risk assessment outlined in **Section 2.2**, where a specific environmental impact/risk was considered unacceptable, or where a knowledge gap was identified, a specialist study was commissioned and additional mitigation measures and/or management responses nominated. As also outlined in **Section 2.2**, the risk assessment did not identify any 'extreme', 'high' or 'significant' ranking environmental risks relating to the Project. Three 'moderate' risks relating to subsidence, water discharge and community action were identified.

In terms of potential cumulative impacts, it is worth reiterating that the proposed project modification does not involve any change to the current approved life of mine, hours of operation, coal production rate or mining intensity, methods of coal mining, handling and transport, surface infrastructure, site servicing or waste management. The proposal is anticipated to pose negligible additional environmental impacts beyond those previously assessed and approved under Project Approval PA 06_0311.

7.1 Subsidence

The current approved method of mining at Manning Colliery is a form of bord-and-pillar mining where coal recovery is limited to first workings only. The bord-and-pillar method uses a regular grid of mining tunnels and involves progressively cutting panels into the coal seam whilst leaving behind pillars of coal to support the mine.

This mining method, which will continue to be employed at Manning Colliery, utilises a continuous miner system to develop panels with five to seven headings and associated cut-throughs, resulting in long-term stable pillars on 30 metre centres (24.5 metres coal) with width to height ratios in excess of 8:1. The panels are separated by substantial barrier pillars that are approximately 54 metres wide, and the roadways are generally maintained at 5.5 metres wide and 2.9 metres high.

Seedsman was engaged to assess the cumulative subsidence deformations that are predicted to develop above the first workings in the Fassifern and Great Northern seams as a result of the proposed Extension of Mine Project. The full assessment report is contained within **Appendix I**, with significant findings and recommendations summarised below.

7.1.1 Seam Geometry

The depth of cover to the Great Northern Seam is between approximately 140 and 155 metres and the typical seam thickness is 2.5 metres (Seedsman 2011). The Fassifern Seam is approximately 25 to 30 metres below the Great Northern Seam and in some locations has already been mined in the area of interest. Only two of the proposed panels in the Great Northern Seam lie fully above the unmined Fassifern Seam. Mining in the Fassifern Seam is based on a three metre section of coal (approximate) beneath the B ply, which comprises approximately 1.0 to 1.2 metres of inferior coal left on the roof.

The roof of the Great Northern Seam is a conglomerate and the floor consists of either conglomerates/sandstones or tuff.

Additional overview information regarding local geology of the Fassifern and Great Northern seams is provided in **Section 3.7**.

7.1.2 Impact Assessment

Subsidence Induced by Recent Mining in Fassifern Seam

Since mining recommenced in the Fassifern Seam in 2004 there has been no failure of pillars. Seedsman (2011) advises that there is some slowly developing outbye floor heave, however this is not associated with damage to the pillar ribs and hence does not impact on pillar stability.

Subsidence surveys have been conducted along the coal conveyor, Vales Road, Rutleys Road and some transmission towers. These surveys indicate that the maximum subsidence induced by the recent Fassifern Seam first workings is between 8 and 15 millimetres, with an average of 11 millimetres (Seedsman 2011). From what is known of the Fassifern Seam, there is no reason to indicate that these subsidence levels will not continue, with similar depths, seam geology and pillar and roadway dimensions. On this precedent, Seedsman (2011) concludes that subsidence associated with the proposed additional areas of mining within the Fassifern Seam will be 12 millimetres.

Prediction of Great Northern Seam Subsidence

The width to height ratios of pillars in the Great Northern Seam (typical seam thickness of 2.5 metres) on 30 metre centres will be 9.8, which is well in excess of the width to height ratios of any failed pillar in the international pillar performance data bases where failure is known to have developed within the coal pillar itself (Seedsman 2011). The proposed Great Northern Seam pillars have the same plan dimensions as those used in the deeper Fassifern Seam with a lower height. On this basis, Seedsman (2011) concludes they must be more stable than those approved previously which have not failed.

In terms of possible bearing capacity failure of the thin low strength layer at the interface with the Great Northern Seam, Seedsman (2011) advises that safety factors are adequately high to indicate that pillar collapse due to the failure of the floor is unlikely for pillars on 30 metre centres.

Subsidence above the Great Northern Seam pillars has been analysed for two general areas (western area and eastern area), as well as the Manninging Creek Ash Dam. To the west, the subsidence is predicted to be 8 millimetres, while to the east the subsidence may be greater due to the increased thickness of low strength floor (Seedsman 2011).

Conclusion

The Fassifern Seam has induced an average of 11 millimetres of maximum subsidence and it is predicted by Seedsman (2011) that this level will continue. In areas where the low strength floor is less than 0.5 metres thick, Seedsman (2011) predicts that the proposed workings in the Great Northern Seam will induce an additional 8 millimetres of subsidence.

On this basis, for the proposed pillars on 30 metre centres, Seedsman (2011) concludes that the proposed mine plan can be adopted with a high level of confidence that vertical subsidence will not exceed 20 millimetres for the combined Fassifern and Great Northern Seams, and maximum tilts and strains should be less than 0.5 millimetres per metre. The predicted subsidence movements are well within the usual shrink/swell range for the district (Seedsman 2011).

7.1.3 Management and Monitoring

Given that coal mining at Manninging Colliery is limited to first workings only and the cumulative predicted vertical subsidence is less than 20 millimetres, an SMP is not required. It is generally accepted that subsidence of less than 20 millimetres will have a negligible effect on surface features and surface infrastructure.

Subsidence management at Manning Colliery will continue to be by mine design, which has been developed by geotechnical experts employing geological data and geotechnical modelling. The formation of pillars is effectively managed, via an inspection/audit system, to ensure headings and cut-through are formed to design dimensions. The geotechnical modelling is calibrated 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 identify any unexpected impacts.

As recommended by Seedsman (2011), if the Extension of Mine Project is approved, Centennial Manning will extend the current subsidence monitoring program into the Great Northern Seam. This would include coring under the pillars, geotechnical logging and geotechnical assessment of the results in terms of bearing capacity and deformation.

Monitoring of surface features and infrastructure above active mining areas will continue to be undertaken via longitudinal survey lines along existing clear corridors, including the coal conveyor, Vales Road, Rutleys Road and some transmission towers, and within the HWLSCZ (see **Figure 9**). The results of this monitoring will continue to be reported within the AEMR. If it is identified that subsidence levels are greater than the predicted maximum of 20 millimetres, the DTIRIS Minerals Division will be consulted to determine appropriate management and mitigation actions.

7.2 Water Management

A comprehensive water management assessment has been prepared by GHD to assess the potential impacts of the proposed Extension of Mine Project on water management and site water balance at Manning Colliery. A copy of GHD's *Water Management Assessment* (2011a), including Water Balance Assessment, is contained within **Appendix J**, respectively, with significant findings and recommendations summarised below.

7.2.1 Surface Water Management

The Manning Colliery surface facilities are located within, and contribute to the Lake Macquarie Catchment. Manning Colliery's EPL 191, which includes both volumetric and concentration limits, permits the discharge of water from the site via two licensed discharge points (LDP001 and LDP002) into an unnamed creek and subsequently Lake Macquarie. Wetlands between the LDPs and Lake Macquarie are designed to slow the flow of the discharge water to facilitate further removal/filtration of fine sediment and other materials and the uptake of nutrients before entering the lake.

The primary objective of the Manning Colliery surface water management system is related to the separation of clean and dirty water. Surface water management at the Colliery is based on the following key water management strategies:

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

Centennial Manning undertakes water quality monitoring at the two LDPs and a location downstream of LDP001 (see **Figure 9**). Monitoring of conductivity, oil and grease, total suspended solids and pH is undertaken daily at the two LDPs (LDP only when discharging), with additional monthly monitoring of a broad range of parameters undertaken at the two LDPs and the downstream monitoring location. Results are reported internally on a monthly basis and externally on a quarterly basis on Centennial's website and on an annual basis in the AEMR.

The key features of Manning Colliery's surface water management system, as described by GHD (2011a), are identified on **Figure 8** and outlined below.

Clean Water Management

Clean water diversions are installed around the outskirts to limit the amount of water requiring management within the surface facilities area. These diversions, which are maintained and kept well vegetated to limit erosion and downstream sedimentation, direct relatively clean surface water runoff to Sediment Pond A (see below).

External Catchment Runoff

The external natural catchment to the south-west of Manning Colliery is diverted around the surface facilities area to Sediment Pond A.

Dirty Water Management

The dirty water management system present at Manning Colliery includes:

- Sediment Pond B system, comprising Sediment Ponds 1, 2 and 3 and Sediment Pond B;
- Oil and water separators; and
- Drive in sumps.

Pond A

Sediment Pond A receives surface water runoff from the western side of the surface facilities, which is relatively clean. Clean water diversions along the western boundary direct water to this pond, and sheet flow from some clean hardstand areas is also directed to this pond. Sediment Pond A has a storage capacity of approximately 5.4 megalitres and overflows discharge off-site via LDP002. It typically only receives water during rainfall events and only overflows with heavy prolonged rainfall.

Sediment Pond B System (Sediment Ponds 1, 2 and 3 and Sediment Pond B)

Sediment Ponds 1, 2 and 3 and Sediment Pond B make up a cascading system of ponds. All underground mine water and runoff from the south and east of the surface facilities, with the exception of runoff from the car park area, is directed via drive-in sediment sumps to this pond system for retention and settlement.



Plate 7 – Sediment Pond B System

The four ponds have a combined capacity of around 8.4 megalitres, and the water that passes through this system is discharged off-site via LDP001. Sediment Ponds 1, 2 and 3 and Sediment Pond B each have a floating boom and over/under weirs to capture any oil residue on the surface of the ponds.

Oil and Water Separator

Runoff from the surface facilities area is directed to one of a number of oil and water separators. Treated water from the separators is directed through the Sediment Pond B system before being discharged through LDP001.

Drive-In Sumps

There are a number of drive-in sumps strategically located around the surface facilities area, with several surrounding the coal stockpile and CCF areas. The purpose of the sumps is to capture large sediment particles and a percentage of smaller sediment particles in the event of site runoff. They either overflow or are manually pumped out to one the sediment ponds. The sumps are maintained on a quarterly basis using excavators with the captured material stockpiled and appropriately managed.



Plate 8 – Drive-In Sump at Manning Colliery

Water Recirculation

Water recirculation does not currently occur at Manning Colliery. Water required for dust suppression, equipment wash down and other operation requirements is serviced via a potable water supply from Wyong Shire Council.

7.2.2 Mine Water Management

During the mining operations, water is released from the underground coal seam aquifers that lie within or near the mined coal seam and this water collects in the underground mining area. Additional run off from water used in the mining process also collects in the mining area. Manning Colliery collects water at low points in the mine workings and passes it through an extensive goaf system that allows filtration and settlement prior to pumping it to the surface for transfer into the Sediment Pond B system (see **Section 7.2.1**). The groundwater is highly saline and as such is unsuitable for reuse in the mine water management system due to its corrosive nature.

A preliminary hydrogeological model has been developed for Manning Colliery to estimate the groundwater inflow into the mine. This model estimates a groundwater inflow for 2011 at Manning Colliery under existing conditions of approximately 1.1 megalitres per day (GHD 2011a).

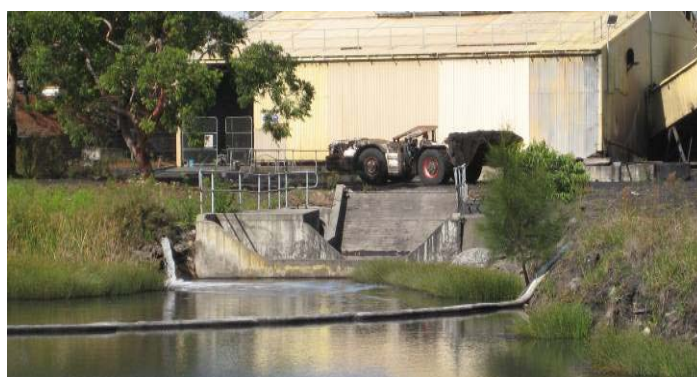


Plate 9 – Mine Water Discharge to Settlement Pond B System

7.2.3 Water Balance

A detailed operational water balance for both the existing and proposed conditions at Manning Colliery was undertaken by GHD (2011b), with consideration given to a broad range of data including rainfall, evaporation and water transfer rates. The results of the existing conditions were calibrated against data for discharges through LDP001. For the proposed conditions, the calibrated model was adjusted to reflect the increase in mining extent and the installation of minor additional clean water diversions.

Table 6 summarises the inputs and outputs for existing and proposed operations for an average (2002), dry (2009) and wet (2007) rainfall year. The results are specific to those actual years and not an average over the complete assessment period.

Table 6 – Water Balance Results

Inputs and Outputs (ML/year)	Average Rainfall Year (2002)		Dry Rainfall Year (2009)		Wet Rainfall Year (2007)	
	Existing	Proposed	Existing	Proposed	Existing	Proposed
Inputs - Total Rainfall/Runoff	70.4	70.4	37.5	37.5	86.0	86.0
Outputs – Evaporation	8.24	8.24	8.24	8.24	8.24	8.24
Underground Inflows	450.78	669.78	450.78	669.78	450.78	669.78
Underground Outflow	300.26	670.6	314.88	670.6	351.76	670.6
Discharge through LDP001	361.47	732.08	344.94	700.64	427.99	746.77
Discharge through LDP002	19.14	19.14	4.14	4.14	19.26	19.26

For the existing conditions, it was determined that the average annual discharges over the 10 years modelled from Manning Colliery through LDP001 and LDP002 were 371.02 megalitres per year and 11.54 megalitres per year, respectively (GHD 2011a). On average, rainfall accounted for approximately 10 percent of the discharges through LDP001 in a dry year and approximately 20 percent in a wet year (GHD 2011a).

For the proposed conditions, it was determined that the average annual discharges over the 10 years modelled from Manning Colliery through LDP001 and LDP002 were 722.09 megalitres per year and 11.54 megalitres per year, respectively (GHD 2011a). The increase in discharges through LDP001 is due to the combination of an increased groundwater make into the underground mine workings and more regular and significant dewatering of the underground works to the surface. It should be noted that the increase in groundwater make is a worst case prediction based upon a series of assumptions adopting worst case operational conditions and climatic conditions. Regardless of this, the volume and pollution load of the discharge is predicted to remain within the current EPL limits.

Discharges through LDP002 will remain constant with no changes proposed for the surface facilities.

7.2.4 Impact Assessment

Based on the water balance assessment and hydrogeological modelling, GHD (2011a and 2011b) concludes the following in terms of potential impacts to the local surface water and groundwater environments as a result of the Manning Colliery Extension of Mine Project.

Hydrologic Impacts on Watercourses

The most significant existing impact on waterways as a result of Manning Colliery is the discharge of water into the unnamed creek of Lake Macquarie. These discharges are in excess of the flows that would occur as a result of runoff generated from the contributing catchment, however these flows have been occurring for the life of the mine and, as such, the existing environment within the unnamed creek has adapted to these flows (GHD 2011a).

As the Extension of Mine Project will not result in a significant change to the water management system at Manning Colliery, the hydrologic impact on the watercourses is limited to the increase in discharge of mine water to the unnamed creek of Lake Macquarie via LDP001. As a result of the Project the average daily discharges to the unnamed creek will increase from the current volume of 1.05 megalitres to 2.0 megalitres, with a maximum daily discharge predicted to increase from 1.3 megalitres to 2.1 megalitres (GHD 2011a). As advised above, this increase is a worst case prediction based upon a series of assumptions adopting worst case operational conditions and climatic conditions. Regardless of this, the increase in discharge will occur over time and is expected to meet current volumetric limits for discharge (GHD 2011a).

Geomorphic Impacts on Watercourses

Mine-induced subsidence typically has the potential to impact on the geomorphology of surface waterways as a result of changes to longitudinal gradients and through the localised cracking of stream beds (GHD 2011a). As previously outlined, the mining method and mine design at Manning Colliery will achieve long-term stable pillars resulting in less than 20 millimetres of cumulative subsidence. On this basis, impact on the geomorphology of surface waterways as a result of the Extension to Mine Project is expected to be negligible (GHD 2011a).

NSW Groundwater Bore Database

A search of the NSW Groundwater Bore Database was undertaken by GHD (2011a) to identify licensed groundwater bores located within a three kilometre radius of the workings at Manning Colliery. A total of eight bores were identified within the search area. These bores are predominantly used for domestic and stock purposes and most draw groundwater from the fractures and joints within underlying sandstone/conglomerate at depths of between 7 and 30 metres below ground level. No alluvial bores were identified, although it is possible that one of the shallow stock bores is situated within alluvium. Furthermore, no bores are situated directly above the proposed extension of mining areas, although two bores are situated within one kilometre of the underground workings.

On the basis of the groundwater bore search, GHD (2011a) concludes that existing groundwater use in the vicinity of Manning Colliery appears to be low.

Alluvial and Shallow Sandstone Aquifers

There are two main mechanisms by which mining may impact shallow aquifers:

- Loss of groundwater via drainage through underlying fractures caused by mining activities; and
- Reduction in groundwater levels caused by ground surface subsidence.

Based on the mining method and mine design at Manning Colliery, which is aimed at achieving long-term stable pillars resulting in less than 20 millimetres of cumulative subsidence, it is very unlikely that such fractures will develop and a loss of groundwater from the alluvium or shallow sandstone aquifers will be observed (GHD 2011a). GHD's (2011a) hydrogeological modelling assessed changes in alluvial groundwater levels as a result of the proposed Extension of Mine Project, with negligible change in groundwater levels predicted.

On this basis, it is not anticipated that the Project will impact local users of shallow groundwater or groundwater dependant ecosystems (GDEs) (GHD 2011a).

Coal Seams

Under proposed conditions, additional first workings will be developed in both the Fassifern and Great Northern seams. Depending upon the length of time to complete these additional areas, GHD's (2011a) hydrogeological modelling suggests that total groundwater inflow is predicted to rise from 1.1 megalitres per day to between 1.6 and 1.8 megalitres per day. Under the current underground water extraction scheme it is likely that the additional groundwater seepage will be discharged as additional volume through LDP001 (GHD 2011a).

The additional groundwater flow into the mine is not expected to impact adjacent groundwater users since there are no registered bores in the coal seams (GHD 2011a).

Water Quality

GHD's (2011a) assessment of water leaving Manning Colliery via LDP001 and LDP002 indicates that the quality of water is generally below ANZECC/ARMCANZ (2000) trigger values and/or better than the water quality within Lake Macquarie.

As the proposed Extension of Mine Project is primarily an extension of existing underground operations, with no additional surface disturbances, the impact on water quality as a result of the Project is considered negligible (GHD 2011a).

7.2.5 Cumulative Impact Assessment

The cumulative impacts of the proposed Extension of Mine Project at Manning Colliery were assessed by GHD (2011a) as outlined below.

Impacts on the Unnamed Creek

Manning Colliery has an external catchment of approximately 132 hectares, which is diverted around the surface facilities area via a series of clean water diversions. The total contribution to the unnamed creek from Manning Colliery is predicted by GHD (2011a) to increase from approximately 1.39 megalitres per day to approximately 2.35 megalitres per day as a result of the Extension of Mine Project. Again, this increase is a worst case prediction based upon a series of assumptions adopting worst case operational conditions and climatic conditions.

The adjacent Chain Valley Mine discharges to the same unnamed creek. GHD (2011a) advises that the mine, historically, has discharged an average of 8.06 megalitres per day. Taking this into consideration in conjunction with the Manning Colliery Extension of Mine Project, the total discharge to the unnamed creek and to Lake Macquarie is predicted to be on average 10.41 megalitres per day.

Since the Extension of Mine Project is expected to increase discharges into the unnamed creek as part of the proposed work (under worst case scenario conditions), it is anticipated that the total cumulative discharge to the unnamed creek will also increase, particularly in significant rainfall events (GHD 2011a).

Regional Hydrogeological Impacts

The regional hydrogeological model developed by GHD (2011a) includes the majority of old and current workings within the Fassifern and Great Northern seams throughout the Newcastle Coalfields (where data exists), as well as the overlying strata, to allow for the consideration of cumulative impacts. The predicted depressurisation of the coal seam and predicted groundwater levels within shallow aquifers take into account other mines in the vicinity of Manning Colliery (GHD 2011a).

7.2.6 Management and Monitoring

Centennial Manning will continue to employ the management strategies and mitigation measures that are currently in place to prevent or minimise impact to local surface water and groundwater environments. In addition, as recommended by GHD (2011a), the following measures will be implemented at Manning Colliery.

Sediment Pond B

The predicted increase in groundwater make will increase the potential for Sediment Pond B to discharge. On this basis the water level within Pond B will be monitored and kept at a relatively low operating level, such that the pond can provide a detention function in the event of significant rainfall (in excess of 10 millimetres over a 24 hour period).

Unnamed Creek

To monitor for geomorphological impact of the unnamed creek, a program of monitoring the stability of the creek at least once every 6 months or after heavy rainfall events will be undertaken. GHD (2011a) advises that a visual assessment of the creek will be adequate for the monitoring stability and erosion.

Underground Water

While it is not anticipated that there will be any direct impact on groundwater users as a result of the additional mine water make associated with the Project, on-going recording of underground water levels will be undertaken, where practicable, to monitor changes in the level of water stored in underground depressions and to verify that the rate of extraction is sufficient.

The extraction of underground water from the mine workings at Manning Colliery requires an extraction licence issued under the *Water Act 1912*. Centennial Manning is currently waiting for the determination of an application lodged with the NOW for such a license. Once issued, the extraction of underground water from the mine workings will be undertaken in accordance with the licence conditions.

Water Quality

As advised above, Centennial Manning undertakes water quality monitoring at the two LDPs and a location downstream of LDP001 (see **Figure 9**). Monitoring of conductivity, oil and grease, total suspended solids and pH is undertaken daily at the two LPDs, with additional monthly monitoring of a broad range of parameters undertaken at the two LDPs and the downstream monitoring location.

To enable on-going assessment of water quality discharged from Manning Colliery, the existing monitoring program will be maintained for the life of the Project with the following enhancements:

- (i) An assessment of the surrounding catchments near Manning Colliery summarising land uses and other background information to characterise an appropriate water quality; and
- (ii) Annual monitoring of heavy metals at the monitoring location identified as 'Downstream'.

Monitoring results will continue to be reported internally on a monthly basis and externally on a quarterly basis on Centennial's website and on an annual basis in the AEMR.

7.3 Terrestrial Ecology

A comprehensive terrestrial ecology assessment has been undertaken by RPS to assess the potential for the Manning Colliery Extension of Mine Project to impact upon terrestrial flora and fauna. The study area that RPS focussed the assessment within is shown on **Figure 11**. While the study area includes areas of Lake Macquarie, the assessment is limited to terrestrial flora and fauna species, with aquatic ecology assessed by Cardno (see **Section 7.4**).

Given that the proposal is expected to have negligible surface impacts, with subsidence to be limited to a maximum of 20 millimetres and no additional surface infrastructure, a field survey of the study area was not considered necessary and RPS adopted a desktop approach.

A copy of the *Terrestrial Flora and Fauna Impact Assessment* (RPS 2011a) is contained within **Appendix K**, with significant findings and recommendations summarised below.

7.3.1 Existing Environment

RPS (2011a) undertook a literature review to identify potential threatened species, endangered populations and threatened ecological communities (TECs) that may occur within the study area. The following sub-sections outline RPS's findings.

Atlas of NSW Wildlife

A search of the OEH's Atlas of NSW Wildlife (accessed June 2011) within a 10 kilometre radius of the study area identified the following as having the potential to occur within the study area:

- 17 threatened flora species, with five of these listed as 'endangered' and 12 listed as 'vulnerable' under the TSC Act;
- One flora population (*Eucalyptus parramattensis subsp. Parramattensis*) listed as 'endangered' under the TSC Act; and
- 55 threatened fauna species (including one threatened invertebrate species), with one of these listed as 'critically endangered', seven as 'endangered' and 47 as 'vulnerable' under the TSC Act.

EPBC Act Protected Matters Database

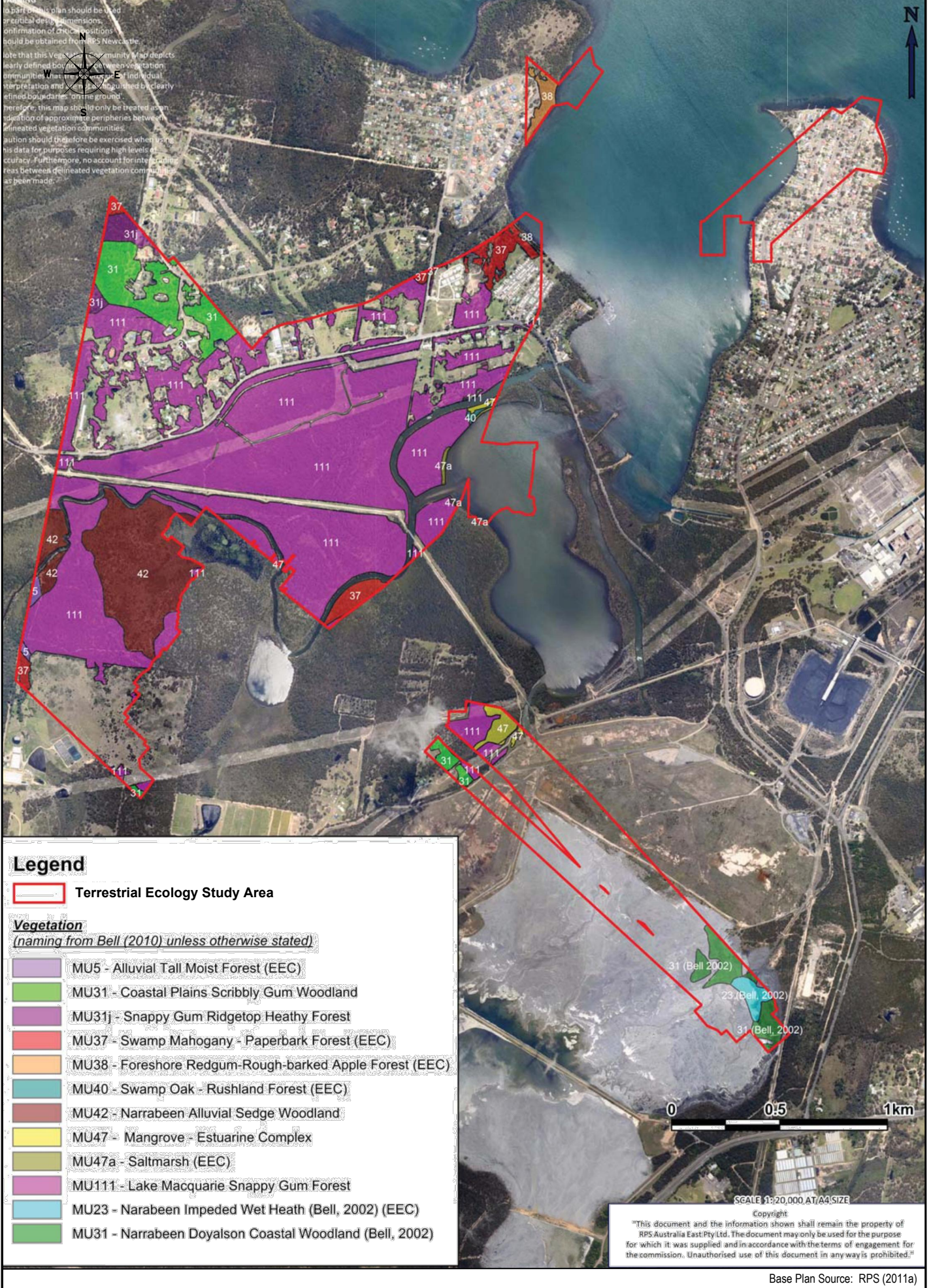
A search of the SEWPaC's EPBC Act Protected Matters Database (accessed June 2011) within a 10 kilometre radius of the study area identified 47 threatened species and 57 migratory species. Based on habitat assessment and the results of surveys conducted within the regional, RPS (2011a) narrowed the list down to the following species considered likely to occur within the study area:

- 10 threatened flora species, all of which are listed as 'vulnerable' under the EPBC Act;
- 15 threatened fauna species, with 11 of these listed as 'vulnerable' and four listed as 'endangered' under the EPBC Act; and
- 38 migratory species.

Vegetation Mapping

Vegetation mapping from three different sources has been considered by RPS (2011a). These are:

- *Lower Hunter Central Coast Regional Biodiversity Conservation Strategy* (LHCCREMS) (House 2003);
- *Natural Vegetation of the Wyong Local Government Area* (Bell 2002); and
- *Draft Vegetation Mapping of Lake Macquarie LGA: Stages 1 and 2* (Bell 2010).



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Mannering Colliery - Extension of Mine Project
 Terrestrial Ecology

FIGURE 11

While the LHCCREMS mapping has been considered for regional context purposes, the Wyong and Lake Macquarie mapping is considered to be more accurate. On this basis, the mapping prepared by Bell (2002 and 2010) has been used by RPS (2011a) when assessing likely impacts to vegetation communities and threatened species.

As shown on **Figure 11**, Bell's mapping (2002 and 2010) delineates 12 vegetation communities (map units, MU) occurring in the study area, seven of which are commensurate with five endangered ecological communities (EECs) listed under TSC Act. These are:

- MU 5 - Alluvial Tall Moist Forest (Bell 2010). Commensurate with EEC known as River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions.
- MU 31 - Coastal Plains Scribbly Gum Woodland (Bell 2010).
- MU 31j - Snappy Gum Ridgetop Heathy Forest (Bell 2010).
- MU 37 - Swamp Mahogany - Paperbark Forest (Bell 2010). Commensurate with EEC known as Swamp Sclerophyll Forest of the Floodplains of the North Coast, Sydney Basin and Southeast Corner Bioregions.
- MU 38 - Foreshore Redgum - Rough-barked Apple Forest (Bell 2010). Commensurate with EEC known as River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and Southeast Corner Bioregions.
- MU 40 - Swamp Oak - Rushland Forest (Bell 2010). Commensurate with EEC known as Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and Southeast Corner Bioregions.
- MU 42 - Narrabeen Alluvial Sedge Woodland (Bell 2010). Commensurate with EEC known as Swamp Sclerophyll Forest of the Floodplains of the North Coast, Sydney Basin and Southeast Corner Bioregions.
- MU 47 - Mangrove Estuarine Complex (Bell 2010).
- MU 47a – Saltmarsh (Bell 2010). Commensurate with EEC known as Coastal Saltmarsh in the NSW North Coast, Sydney Basin and Southeast Corner Bioregion.
- MU 111 - Lake Macquarie Snappy Gum Forest (Bell 2010).
- MU 23 - Narrabeen Impeded Wet Heath (Bell 2002). Commensurate with EEC known as Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions.
- MU 31 - Narrabeen Doyalson Coastal Woodland (Bell 2002).

The remainder of the study area is occupied by cleared areas, Lake Macquarie, the Manning Creek Ash Dam or existing development.

7.3.2 Key Threatening Processes

A total of 34 key threatening processes (KTPs) are listed under Schedule 3 of the TSC Act. The only one RPS (2011a) considers relevant to the proposed Extension of Mine Project at Manning Colliery is 'anthropogenic climate change'.

The Project is unlikely to contribute to this KTP, with no change to the currently approved coal production rate, coal handling and transport methods, along with no increase to the life of mine. Any additional mining equipment required to support the proposal is unlikely to result in a significant increase to greenhouse gas emissions.

7.3.3 Impact Assessment

The following sub-sections summarise RPS's (2011a) conclusions in relation to the potential for the Manning Colliery Extension of Mine Project to impact upon terrestrial flora and fauna.

Flora and Fauna

The Extension of Mine Project at Manning Colliery is expected to have negligible surface impacts, with subsidence to be limited to a maximum of 20 millimetres and no additional surface infrastructure. Furthermore no changes to sub-surface hydrology are expected. On this basis, RPS (2011a) concludes that no impacts to threatened species, populations or communities within or adjacent to the study area are expected.

Vegetation Corridors

With subsidence to be limited to a maximum of 20 millimetres and no clearing of native vegetation, RPS (2011a) concludes that the proposal is unlikely to affect or fragment any existing native vegetation corridors within or adjacent to the study area.

Groundwater Dependant Ecosystems (GDEs)

While there is currently no mapping of GDEs that covers the Manning Colliery study area, five vegetation units mapped within the study area are likely to be influenced by groundwater or be partially groundwater dependant. These units are:

- Riparian Melaleuca Swamp Woodland (NPWS 2000);
- Swamp Oak Rushland Forest (NPWS 2000, Bell 2010);
- Narrabeen Alluvial Sedge Woodland (Bell 2010) (EEC);
- Swamp Mahogany – Paperbark Forest (NPWS 2000, Bell 2010); and
- Narrabeen Impeded Wet Heath (Bell 2002) (EEC).

However, RPS (2011a) concludes that any GDEs present within the study area are unlikely to be impacted by the Extension of Mine Project.

Riparian Areas

With subsidence to be limited to a maximum of 20 millimetres under terrestrial habitat areas, including all land-based riparian areas and watercourses, RPS (2011a) concludes that riparian ecology within terrestrial watercourses is unlikely to be significantly impacted by the Extension of Mine Project.

Manning Colliery discharges water that has passed through the site's surface water management system into an unnamed creek and onto Lake Macquarie. This discharge is predicted to remain largely the same as has been taking place for the past 45 to 50 years and is predicted to remain within the limitations of the site's EPL. The continuation of water discharge is not expected to result in any adverse impacts upon any EECs.

Government Conservation Estates

With subsidence to be limited to a maximum of 20 millimetres and no land clearing, RPS (2011a) concludes that the Extension of Mine Project is unlikely to significantly impact on any Government conservation estates, including the Lake Macquarie SCA.

7.3.4 Key Thresholds Assessment

As required by the *Draft Guidelines for Threatened Species Assessment for Part 3A Applications* (DEC/DPI 2005), RPS (2011a) has provided the following assessment of Key Thresholds for the Manning Colliery Extension of Mine Project.

1. Whether or not the proposed Project, including actions to avoid or mitigate impacts or compensate to prevent unavoidable impacts will maintain or improve biodiversity values.

Negligible terrestrial surface impacts are expected to occur as a result of the Project. Surface subsidence will be limited to a maximum of 20 millimetres, no changes to sub-surface hydrology are expected and no additional infrastructure is required. On this basis, the proposal is expected to maintain biodiversity values within the study area.

2. Whether or not the proposed Project is likely to reduce the long-term viability of a local population of the species, population or ecological community.

As outlined above, negligible terrestrial surface impacts are expected to occur as a result of the Project. On this basis, the proposal is unlikely to reduce the long-term viability of a local population of any species, population or ecological community.

3. Whether or not the proposed Project is likely to accelerate the extinction of the species, population or ecological community or place it at risk of extinction.

Again, negligible terrestrial surface impacts are expected to occur as a result of the Project. On this basis, the proposal is unlikely to accelerate the extinction of any species, population or ecological community or place them at risk of extinction.

4. Whether or not the proposed Project will adversely affect critical habitat.

There is no declared 'critical habitat' within the study area, and as such the proposal will not adversely affect any such habitat.

7.3.5 Other Legislative Considerations

The provisions of the EPBC Act, *SEPP No. 44 – Koala habitat Protection* and *SEPP No. 14 – Coastal Wetlands* have been considered by RPS (2011a). As detailed in **Section 6.0**, no limiting issues or impacts have been identified under these key pieces of legislation.

7.3.6 Management and Mitigation

Centennial Manning will continue to employ the management strategies and mitigation measures that are currently in place to prevent or minimise impact to local flora and fauna.

With no land clearing or operational changes proposed, the primary consideration for impact to terrestrial ecology is subsidence. As outlined in **Section 7.1**, subsidence management at Manning Colliery will continue to be by mining method and mine design to achieve long-term stable pillars resulting in less than 20 millimetres of cumulative subsidence. Subsidence monitoring activities will continue to be undertaken as mining progresses.

As recommended by RPS (2011a), in the event that monitoring indicates increased subsidence levels, a review will be undertaken to identify any potential ecological impacts. Due to the negligible terrestrial impacts anticipated, no further mitigation measures and monitoring activities are considered necessary.

7.4 Aquatic Ecology

A comprehensive aquatic ecology assessment has been undertaken by Cardno to assess the potential impacts associated with the proposed extension of mining in the Fassifern and Great Northern seams at Manning Colliery beneath the southern section of Lake Macquarie. The main issue considered in the assessment is the potential for subsidence of the bed of Lake Macquarie affecting estuarine ecosystems. Several important and sensitive habitats, including seagrasses, mangroves and saltmarsh, were identified by Cardno (2011) to occur within the Manning Colliery study area. These habitats support a broad assemblage of marine invertebrates and fish typical to those found in NSW estuaries.

A copy of the *Aquatic Ecology Assessment* (Cardno 2011) is contained within **Appendix L**, with significant findings and recommendations summarised below.

7.4.1 Existing Environment

7.4.1.1 Estuarine Vegetation

Estuarine vegetation potentially affected by the proposed extension of mining at Manning Colliery includes seagrasses (*Zostera capricorni* and *Halophila ovalis*), mangrove, saltmarsh and macroalgae. As described by Cardno (2011), an overview of these vegetation types is provided below.

Seagrasses

Seagrass beds often support a rich variety of animals and algae, act as sources of food and provide shelter for numerous species. Loss of seagrass can result in the destabilisation of sediments, removal of potential nursery habitats for fishes and a decrease in primary productivity of estuaries. Seagrass beds fringe the majority of Lake Macquarie. As shown on **Figure 12**, *Zostera* fringes the majority of the study area, with the exception of Manning Bay and the southern part of Wyee Bay where *Halophila ovalis* is dominant. Fringing sections of Wyee Bay and shallow inlets in the western part of the study are mixed beds of *Zostera* and *Halophila*. The distribution of seagrass beds within the study area is generally limited to within the two metre depth contours.

Seagrasses are protected in NSW under FM Act and a permit is required from the NSW Department of Primary Industries (DPI) to undertake works or activities that may harm them.

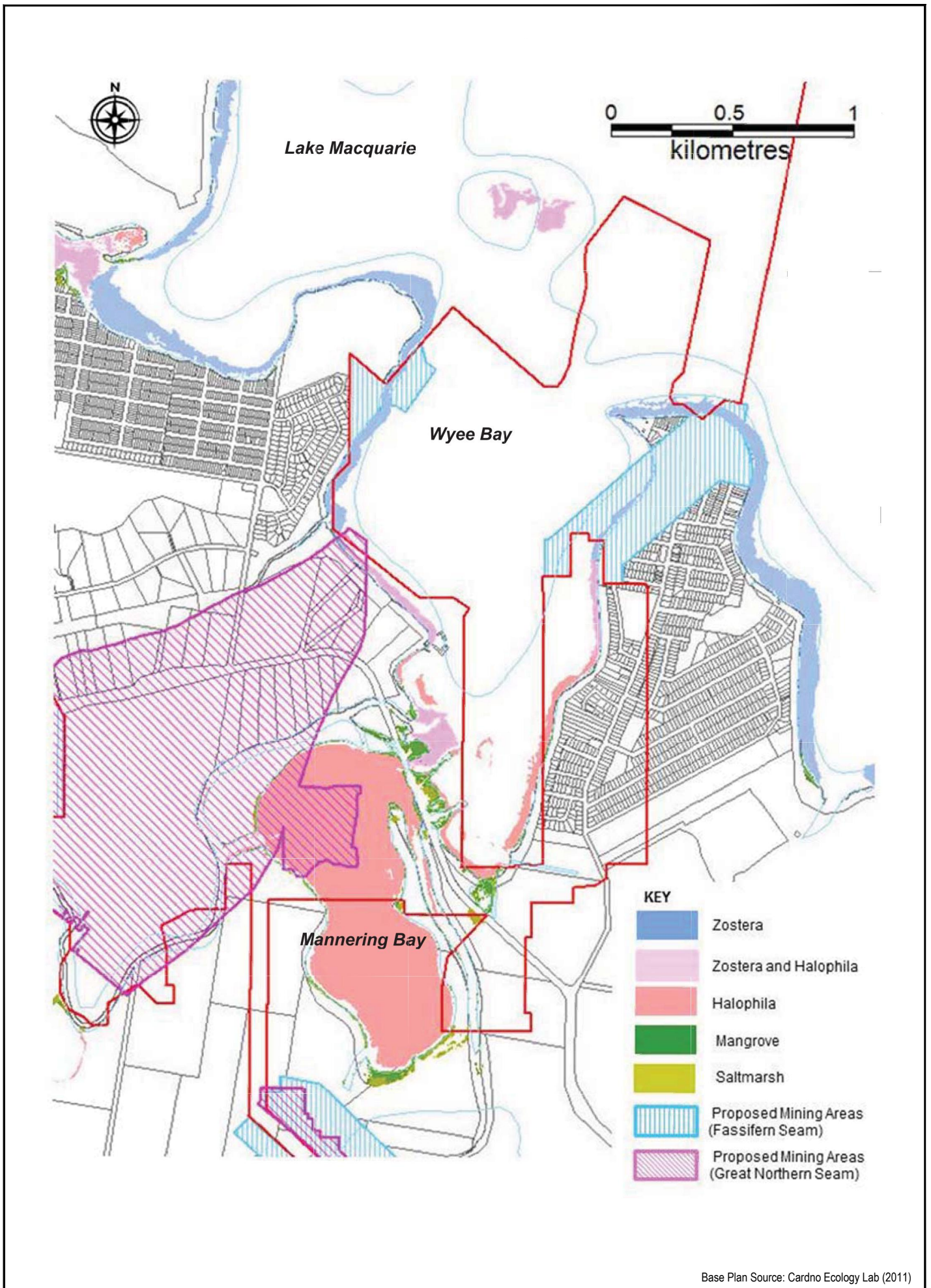
Mangroves

Mangroves grow along the shores of most NSW estuaries and are subject to regular tidal inundation. As well as stabilising shorelines, mangroves are thought to contribute significantly to estuarine productivity, trap sediment and pollutants, provide important habitat for many species of invertebrates and juvenile fish, and provide shelter and roosting habitat for birds, some small mammals and reptiles. NSW mangrove forests consist of only two species, river mangrove (*Aegiceras corniculatum*) and grey mangrove (*Avicennia marina*), with grey mangrove most commonly found in Lake Macquarie (Cardno 2011). As shown on **Figure 12**, Cardno (2011) has identified mangroves fringing the shallow inlets in the western part of the Manning Colliery study area, the southernmost part of Chain Valley Bay, around Manning Bay and within the south western part of Wyee Bay.

Like seagrasses, mangroves are also protected under the FM Act.

Saltmarsh

Saltmarshes are estuarine habitats that occur high on the shore, typically just above the mean high water mark. Saltmarsh habitats consist of small succulent plants, grasses, rushes, sedges and herbaceous plants. Like mangroves, saltmarshes are believed to have important physical and biological functions in estuarine ecosystems.



Base Plan Source: Cardno Ecology Lab (2011)

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Mannering Colliery - Extension of Mine Project
Aquatic Ecology

FIGURE 12

Saltmarsh cover within the Manning Colliery study area, as shown on **Figure 12**, is fragmented and limited to the southern part of Chain Valley Bay, the southern shore of Manning Bay and the southern part of Wyee Bay.

Coastal saltmarsh has recently been declared as an EEC under the TSC Act.

Macroalgae

Macroalgae are true photosynthetic organisms which grow in the photic zone of coastal regions where light penetrates sufficiently for photosynthesis to occur. Macroalgae are an important resource as food and/or shelter for a large range of fish and invertebrates and may act as a nursery habitat for juvenile fish. Based on previous studies carried out in Lake Macquarie, green, red and brown macroalgae is likely to occur along rocky foreshores and among seagrasses within the study area.

Macroalgae is protected under the FM Act

7.4.1.2 Benthic Assemblages

Microalgae

Microalgae are the main primary producers in most intertidal or shallow subtidal soft sediments. They can act as a sink for nitrogen, stabilise sediments by exuding extra polymeric substances and are an important source of food for other organisms such as molluscs, worms and small crustaceans, with the latter being an important food source for fish and larger mobile invertebrates. Microalgae require light to grow and reproduce, and therefore reduced light penetration associated with increased water depth may affect distribution and primary production and have implications for consumers higher up the food chain.

Macrobenthos

Macrobenthos is a term used to collectively describe macroinvertebrates and the benthic sediments in which they live. The Ecology Lab (2008, cited in Cardno 2011) undertook a baseline survey of benthic assemblages at Bardens Bay (north-eastern area of Lake Macquarie). A relatively diverse assemblage of invertebrates were recorded, including 17 different families of polychaete worms, nine families of crustaceans and 14 families of gastropod and bivalve molluscs. The diversity and abundance of species found in these surveys would be fairly typical of that expected in a temperate NSW estuary.

7.4.1.3 Fisheries Resources

Approximately 232 species of fish have been recorded in Lake Macquarie (Lake Macquarie City Council 2006a, cited in Cardno 2011). Abundant fish populations were observed in the vicinity of seagrass beds during baseline investigations conducted near Bardens Bay (The Ecology Lab 2008, cited in Cardno 2011), with species of fish observed including yellowfin bream (*Acanthopagrus australis*), luderick (*Girella tricuspidata*), whiting (*Sillago sp.*) and mullet (Family Mugilidae).

Syngnathids (i.e. pipefish and seahorses) commonly occur within seagrass beds and may be permanent residents all year round whereas many fish species only spend a small part of their life-history.

7.4.2 Threatened Species, Populations and Ecology Communities

For the purposes of this assessment, Cardno (2011) defines 'threatened species' as any estuarine or coastal species, populations or ecological communities and their habitats as defined and listed under Schedules 4 or 5 of the FM Act, Schedules 1 or 2 of the TSC Act, or Subdivisions C or D of the EPBC Act. It also includes any species of fish listed as protected under the FM Act.

Threatened or protected species listed under relevant schedules of these Acts were identified by Cardno (2011) using the following online database search tools:

- EPBC Environmental Reporting Tool;
- Atlas of NSW Wildlife; and
- NSW Threatened Species Database.

Searches were carried out in July 2011 and the resultant search reports are appended to the *Aquatic Ecology Assessment* (Cardno 2011) in **Appendix L**. The searches identified the following number of scheduled threatened species, populations and communities known or predicted to occur within the Lake Macquarie and/or Wyong LGAs:

- 15 species of marine mammals;
- 29 species of fish (including 22 species of seahorses and pipefish);
- Six species of marine reptiles;
- 40 species of birds (estuarine shorebirds only);
- One endangered population (the seagrass, *Posidonia australis*); and
- One endangered ecological community (Coastal saltmarsh in the NSW North Coast, Sydney Basin and South East corner bioregions).

Assessments of significance under State and Commonwealth legislation were carried out by Cardno (2011) for species that may occur within the study area and could potentially be affected by the proposed Extension of Mine Project. These assessments are appended to the *Aquatic Ecology Assessment* (Cardno 2011) in **Appendix L**. No KTPs were identified in relation to the proposal that could potentially affect a threatened species.

7.4.3 Areas of Conservation Significance

State Conservation Areas

State Conservation Areas (SCAs) are reserved under the NP&W Act to protect and conserve areas that contain significant or representative ecosystems, landforms or natural phenomena or places of cultural significance, that are capable of providing opportunities for sustainable visitor use and enjoyment, the sustainable use of buildings and structures or research and that are capable of providing opportunities for uses permitted under other provisions of the Act.

The bushland and open space of Lake Macquarie SCA, which was established in 1996, comprises 16 kilometres of foreshore in six different sections around the lake (DECCW 2008, cited in Cardno 2011). As shown on **Figure 4**, the Manning Colliery study area includes the Morisset portion of the SCA, which conserves 174 hectares and four kilometres of foreshore around the Morisset Hospital complex, and the Chain Valley Bay portion of the SCA, which conserves 272 hectares of bushland behind 600 metres of foreshore on the south eastern side of the lake (Cardno 2011).

Wetlands

Wetlands cover a wide range of habitats, including lakes, lagoons, estuaries, rivers, floodplains, swamps, bogs, billabongs, marshes and coral reefs. Wetlands can be fresh, brackish or saline and include seagrass beds, mangroves and saltmarshes as described above (Cardno 2011).

7.4.4 Impact Assessment

The principal physical impact resulting from underground coal mining is subsidence. Subsidence may result in areas of foreshore above the mean high water mark, previously unexposed to tidal inundation, becoming wetted at high tides and areas below this level becoming inundated for a longer period of time. Subtidally the seabed may become deeper in affected areas. Cardno (2011) advises that it is likely that any impacts of subsidence from the Manning Colliery Extension of Mine Project will be localised and potentially limited to five distinct regions where the proposed extension of mining areas overlap with foreshore areas. These regions include:

1. Western shore of Wyee Point (Fassifern Seam) - approximately 330 metres of foreshore, 5,919 square metres of seagrass habitat and a total of 30,970 square metres of subtidal seabed;
2. Western shore of Wyee Bay (Great Northern Seam) - approximately 235 metres of foreshore, 3,901 square metres of seagrass habitat and a total of 11,130 square metres of subtidal habitat;
3. Manning Bay (Great Northern Seam) - approximately 950 metres of foreshore, 2,874 square metres of seagrass within the Bay and a total of 148,600 square metres of subtidal seabed. Approximately 2,200 square metres of saltmarsh also falls within this area along the western shore of the Bay;
4. Eastern Shore of Wyee Bay (Fassifern Seam) - approximately 455 metres of foreshore, 7,500 square metres of seagrass habitat and a total of 76,660 square metres of subtidal seabed; and
5. Vales Point (Fassifern Seam) - approximately 505 metres of foreshore, 5,959 square metres of seagrass habitat and a total of 10,670 square metres of subtidal seabed.

Although sensitive habitats are known to occur within the study area, including seagrasses, mangroves, saltmarsh and the SCA, the direct impacts to these habitats from the Extension of Mine Project is anticipated to be negligible (Cardno 2011). Any indirect impacts on fisheries resources and threatened species, populations and ecological communities (including matters of NES) would also be unlikely (Cardno 2011). The following sub-sections provide further detail of the impact assessment findings, as reported by Cardno (2011).

7.4.4.1 Flora and Fauna

Estuarine Vegetation

Estuarine vegetation potentially affected by the proposed extension of mining at Manning Colliery includes seagrasses (*Zostera* and *Halophila*), mangrove, saltmarsh and macroalgae. Given that subsidence is predicted to be less than 20 millimetres (see **Section 7.1**), Cardno (2011) concludes that it is unlikely that species assemblages associated with seagrasses, mangroves, saltmarsh and/or macroalgae would be lost as a result of a minimal increase in depth. Cardno (2011) further concludes that while it is possible that species composition of these assemblages could be altered, this would be unlikely to result in any detectable impact within the study area.

Benthic Assemblages

Increased depth in subtidal areas affected by the proposed extension of mining could potentially affect microalgae density by reducing light penetration, which could indirectly affect higher trophic levels, alter the sediment composition and affect nutrient cycling (Cardno 2011). However, given the area of subtidal seabed potentially affected by the proposal is small in comparison with the amount of similar habitat within the study area, it is unlikely that a decrease in density of microalgae would have a significant impact on other ecosystem components (Cardno 2011).

Fisheries Resources

Cardno (2011) concludes that fish would not be directly impacted by the Extension of Mine Project at Manning Colliery. Cardno (2011) further concludes that as the impacts on important habitats such as mangroves, saltmarsh, macroalgae and benthic ecosystem components are considered to be negligible (see above), significant impacts on fisheries resources within the study area would not be expected.

7.4.4.2 Threatened and Protected Species

Assessments of Significance (State Legislation)

Assessments of significance were undertaken by Cardno (2011) for the following species scheduled under the TSC Act or the FM Act that have potential to be affected by the proposal:

- Dugong (*Dugong dugon*);
- Loggerhead turtle (*Caretta caretta*);
- Green turtle (*Chelonia mydas*); and
- Estuarine shorebirds (assessed as a group).

Given that dugongs rarely occur within Lake Macquarie (there are only two records within Swansea Channel) and that no measurable effect on seagrass distribution is expected, Cardno (2011) concludes that the proposed Extension of Mine Project should not impact upon a viable population. Furthermore, any individual dugongs that could occur as far south as Lake Macquarie are likely to be vagrants and not part of a resident population (Cardno 2011).

Marine turtles, particularly green turtles, are not uncommon within Lake Macquarie and are likely to feed on seagrass within the study area. Loggerhead turtles do not feed on seagrass but forage within seagrass habitat for other prey species. This area of habitat is not, however, critical to the species survival and any potential impacts on seagrass habitat would not limit the availability of seagrass as a food source for these species (Cardno 2011).

There are 39 species of estuarine shorebird that have been recorded within the study area that could potentially be affected by alteration of habitat as a result of subsidence. The predicted level of subsidence, being a maximum of 20 millimetres, is not considered likely to have an effect on the habitat utilised by these species, such that it would cause any observable alteration to their behaviour or habitat requirements (Cardno 2011).

On this basis, the Extension of Mine Project at Manning Colliery is not anticipated to impact any of these species and a species impact statement is not considered necessary.

Assessment of Significance (Commonwealth Legislation)

The dugong is listed under the EPBC Act as 'migratory' and the loggerhead turtle as both 'migratory' and 'endangered'. Five species of estuarine bird are also listed under the EPBC Act and international agreements for the protection of migratory birds. Based on the assessments of significance, Cardno (2011) concludes that the proposal is considered unlikely to have a significant impact on matters of NES.

Other Listed and Protected Species

Seahorses, pipefish and sea dragons are listed under the EPBC Act and protected under the FM Act. Although these species are not subject to assessments of significance, they require consideration in relation to the Extension of Mine Project. Cardno (2011) concludes that it is unlikely that the potential minor impacts to seagrass would impact populations of these species, with extensive seagrass and soft sediment habitats for these species to assimilate into if there were any minor alteration of immediate habitat.

7.4.4.3 Areas of Conservation Significance

There have been documented events where unplanned subsidence of up to one metre have occurred in parts of Lake Macquarie resulting in the inundation of foreshores by salt water and loss of riparian vegetation. These events occurred over 10 years ago and mining methods have since been largely modified to ensure minimal subsidence levels (Cardno 2011). Furthermore, no areas of conservation significance occur within or near to the additional areas of mining proposed under the Extension of Mine Project and no impacts to areas of conservation significance are expected.

7.4.5 Cumulative Impact Assessment

Cardno (2011) advises that while the predicted impact of a maximum of 20 millimetres of subsidence on aquatic components within the area is likely to be negligible in isolation, when coupled with other anthropogenic stressors has potential to cause a measurable impact. Potential stressors likely to exacerbate the effects of subsidence include increasing urban/industrial development, climate change, surface run-off, point source pollution and other mining activities (Cardno 2011).

Centennial Coal operates Myuna Colliery to the north of Manning Colliery. A separate EA has been prepared to manage the predicted subsidence impacts associated with Myuna Colliery, including a *Seagrass Management Plan*. Other companies also operate within the Great Northern and Fassifern seams beneath Chain Valley Bay. The total area of Lake Macquarie potentially affected by mining activity alone is therefore substantially more than that addressed in Cardno's (2011) assessment for the Manning Colliery Extension of Mine Project.

Provided that appropriate mitigation and management of seagrass beds and other subtidal habitats is implemented for individual project application areas, any cumulative impacts outside of the management of Centennial Manning would be limited. At most, Cardno (2011) believe that cumulative impacts might result in minor and undetectable changes associated with the maximum 20 millimetre subsidence predictions. It is likely that the diffuse and less predictable impacts occurring at a catchment scale (for example, from surface run-off and increased development) would have a greater overall impact on aquatic ecosystem health rather than potential cumulative impacts of mining activity (Cardno 2011).

7.4.6 Management and Monitoring

While direct impacts to aquatic ecology are considered to be negligible, Cardno (2011) has identified several impacts that may cumulatively affect the ecological values of the aquatic environment. This includes other existing mining activities within Lake Macquarie, climate change and sea level rise as well as increasing urban development. The impacts of these broader issues are difficult to predict, however, Centennial Manning currently manages and monitors for potential impacts in relation to the existing Manning Colliery operations within Lake Macquarie. Any cumulative impacts outside of the management of Centennial Manning would require management at the catchment level. On this basis, no specific mitigation or monitoring of the aquatic environment is recommended by Cardno (2011) as necessary for the proposed extension of mining at Manning Colliery.

Centennial Manning will continue to employ the management strategies and mitigation measures that are currently in place to prevent or minimise impacts to aquatic ecology. The primary consideration is the potential for subsidence of the bed of Lake Macquarie. As outlined in **Section 7.1**, subsidence management at Manning Colliery will continue to be by mining method and mine design to achieve long-term stable pillars resulting in less than 20 millimetres of cumulative subsidence on the surface. Subsidence monitoring, including within the HWLSCZ (see **Figure 9**), will continue to be undertaken as mining progresses.

In the event that monitoring indicates increased subsidence levels, a review will be undertaken to identify any potential impacts to aquatic ecology. Due to the negligible aquatic impacts anticipated, no further mitigation measures and monitoring activities are considered necessary.

7.5 Aboriginal Heritage

A comprehensive assessment has been undertaken by RPS to assess the potential for impact upon Aboriginal cultural heritage as a result of the Manning Colliery Extension of Mine Project.

RPS (2011b) advises that their assessment of Aboriginal cultural heritage is compliant with Part 6 of the NP&W Act and the attendant relevant guides including the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW 2010), *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011) and the ACHCRs (DECCW 2010). A copy of the *Cultural Heritage Assessment* (2011b) is contained within **Appendix F**, with significant findings and recommendations summarised below.

7.5.1 Aboriginal Community Consultation

As outlined in **Section 2.3.5**, consultation with Aboriginal stakeholders was undertaken by RPS in accordance with the ACHCRs (DECCW 2010). The Aboriginal Consultation Log and responses received from the Aboriginal stakeholders are appended to RPS's *Cultural Heritage Assessment* (2011b) in **Appendix F**.

7.5.2 Aboriginal Heritage Context

RPS (2011b) utilised a heritage register, previous archaeological work in the wider area and predictive modelling to gain an understanding of local Aboriginal heritage within and around the Manning Colliery Project Site and identify any previously recorded items of cultural heritage significance within the area.

A search of the OEH's AHIMS, which was conducted on the 20 July 2011 encompassing a 10 square kilometre area centred on the Manning Colliery Project Site, identified 53 Aboriginal cultural heritage sites. As shown on **Figure 13** and listed in **Table 7**, three of these sites are located within the proposed area of extended mining.

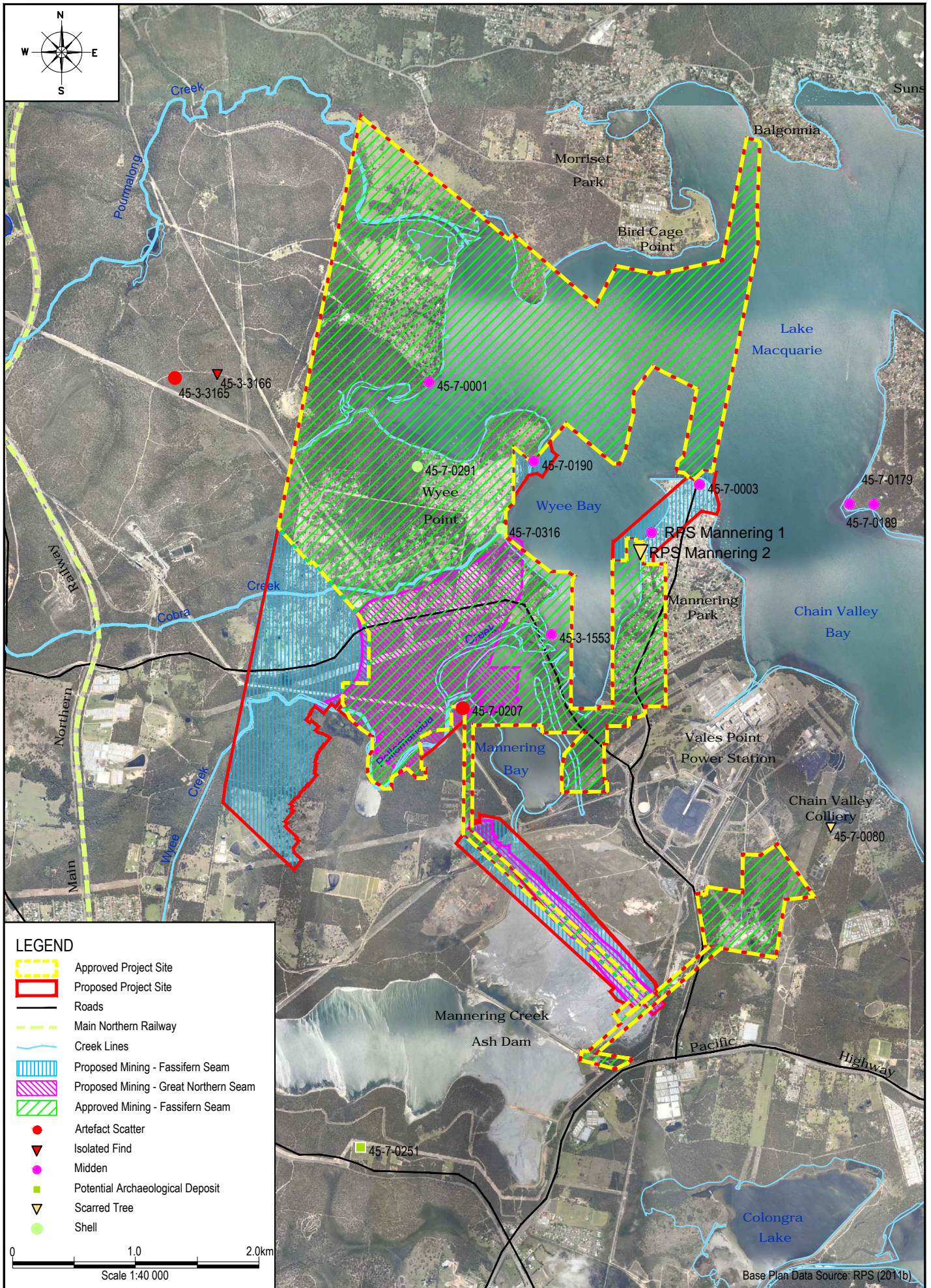
Table 7 – Previously Recorded Aboriginal Sites within Project Site

Site Name	Site Number	Site Type
Wyee Point	45-7-0190	Midden
The Hole 1 Manning Bay	45-7-0207	Open camp site
Vales Point	45-7-0003	Midden

A copy of the AHIMS search report is appended to the *Cultural Heritage Assessment* (RPS 2011b) in **Appendix F**.

7.5.3 Field Survey

The study area was surveyed by RPS (2011b) in accordance with the requirements set out in the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010). RPS (2011b) advised that the survey area was limited to publicly accessible areas. A large proportion of the Project Site is owned by Delta Energy and at the time of survey permission had not been granted to access their lands.



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Mannerling Colliery - Extension of Mine Project
Aboriginal Heritage Sites

FIGURE 13

The pedestrian survey was undertaken on the 7 and 8 September 2011 by RPS’s archaeologist Laraine Nelson, together with members of the five Aboriginal stakeholder groups invited to participate in the survey (see **Section 2.3.5**). As shown on **Figure 13** and listed in **Table 8**, the survey identified two additional Aboriginal cultural heritages sites located within the proposed area of extended mining.

Table 8 – Aboriginal Sites Recorded During Field Survey within Project Site

No.	Site Name	Location (MGA Zone 56)	Site Type
1	RPS Manninging 1	363449E 6331411N	Midden
2	RPS Manninging 2	363401E 6331331N	Culturally Modified Tree

The midden (RPS Manninging 1), visible around the base of trees and in a foreshore embankment, exhibits the common characteristics of Lake middens, that is a predominance of *Anadara trapezia* (cockle) and a small number of *Ostrea angasi* (oyster).

The culturally modified tree (RPS Manninging 2) is close to the waterline and likely escaped felling through firstly not being of a type preferred by timber getters and later by being within the lake foreshore reserve. The tree appeared to be in good condition.



Plate 10 – Midden Recorded as RPS Manninging 1



Plate 11 – Culturally Modified Tree Recorded as RPS Manninging 2

In addition, while no stone artefacts were found at Wyee Creek it is considered that the type of landscape bears a resemblance to the site known as ‘The Hole 1 Manning Bay’ (AHIMS 45-7-0207). This previously recorded site is described as being a spurline crest with the artefacts located down slope from that landscape. Taking into consideration the excavation at ‘The Hole 1 Manning Bay’ it is considered that Wyee Creek and associated swamp have potential for subsurface cultural material to occur.

The cultural significance of the two new sites identified during the field survey was assessed by RPS (2011b) in accordance with the scientific criteria and methodology outlined in *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011). The significance criteria used by RPS (2011b) are: rarity, representativeness, integrity, connectedness, complexity and research potential. The significance criteria are usually assessed using a scoring system on local and regional scales, and, in exceptional circumstances, state significance may also be identified. A combination of the scores enables an overall significance ranking of the site to be determined:

- Low significance (score of 6 to 10);
- Moderate significance (score of 11 to 14); and
- High significance (score of 15 to 18).

The archaeological significance of the Aboriginal sites identified during the field survey, as determined by RPS (2011b), is outlined below and summarised in **Table 9**.

Table 9 – Assessed Significance of Aboriginal Site

Site	Significance Scale	Rarity	Representativeness	Integrity	Connectedness	Complexity	Research Potential	Rank (Total Score)	Overall Significance
RPS Manning 1	Local	1	1	1	1	1	1	6	Low
	Regional	1	1	1	1	1	1	6	Low
RPS Manning 2	Local	2	1	2	1	1	1	8	Low
	Regional	1	1	1	1	1	1	6	Low

RPS Manning 1

Middens are a common feature of the Lake Macquarie foreshore with thirteen middens and cultural shell deposits within ten square kilometres of the study area. The integrity of this midden has been compromised by the removal of groundcover and understorey and the subsequent introduction of lawn grasses. The research potential of the site has been adversely affected by such disturbances. In addition, the midden presented the same profile as other lake middens, with a predominance of cockle. A positive feature is the presence of the scarred tree (RPS Manning 2) within the midden area. Overall this site was assessed to have both low local and regional significance.

RPS Manning 2

This type of modified tree is not rare in the local or regional landscape with five examples recorded within 10 square kilometres. The integrity of the tree within the landscape has been adversely affected by the removal of most of the original vegetation, though the presence of the midden in the area is a positive attribute. The research potential of the tree is limited other than providing evidence of resource use. Overall this site was assessed to have both low local and regional significance.

7.5.4 Impact Assessment

The Manning Colliery Extension of Mining Project will involve mining beneath five identified Aboriginal heritage sites (AHIMS 45-7-0190, 45-7-0003 and 45-7-0207, RPS Manning 1 and RPS Manning 2).

The Project is expected to have negligible surface impacts, with subsidence to be limited to a maximum of 20 millimetres and no additional surface infrastructure. The predicted subsidence movements are well within the usual shrink/swell range for the district (Seedsman 2011). On this basis, RPS (2011b) concludes that no impacts to the identified Aboriginal cultural heritage sites or any potential Aboriginal cultural heritage sites are anticipated.

7.5.5 Management and Monitoring

With no land clearing proposed, the primary consideration for impact to Aboriginal heritage is subsidence. As outlined in **Section 7.1**, subsidence management at Manning Colliery will continue to be by mining method and mine design to achieve long-term stable pillars resulting in less than 20 millimetres of cumulative subsidence on the surface. Appropriate subsidence monitoring activities will continue to be undertaken as mining progresses.

Furthermore, and as recommended by RPS (2011b), the following mitigation measures will be implemented at Manning Colliery:

- If monitoring indicates that mine-induced subsidence levels exceed 20 millimetres, work in that area will cease immediately and an assessment of potential impacts to cultural heritage will be undertaken.
- All relevant Centennial Manning staff and contractors will be made aware of their statutory obligations for Aboriginal cultural heritage under the NP&W Act. This is already part of the existing mine induction process.
- Centennial Manning will develop an *Aboriginal Cultural Heritage Management Plan* (ACHMP) for the identified Aboriginal heritage items within the Project Site in consultation with the relevant Aboriginal stakeholders. If additional sites are identified they will be assessed for cultural significance in line with the requirements outlined above and be incorporated into the ACHMP.
- In the unlikely event that skeletal remains are identified, Centennial Manning will contact the NSW Police Coroner to determine if the material is of Aboriginal origin. If determined to be Aboriginal, contact will be made with the OEH, a suitably qualified archaeologist and representatives of the relevant Aboriginal stakeholder groups to determine an action plan for the management of the skeletal remains and formulate management recommendations if required.

7.6 European Heritage

European (non-indigenous) heritage was assessed by RPS as a component of their cultural heritage assessment undertaken for the Manning Colliery Extension of Mine Project in accordance with the *NSW Heritage Manual* (NSW Heritage Branch 1994). A copy of the *Cultural Heritage Assessment* (2011b) is contained within **Appendix F**, with significant findings and recommendations summarised below.

7.6.1 Historic Heritage Context

RPS (2011b) utilised historic registers, historical research and predictive modelling to gain an understanding of non-indigenous heritage within and around the Manning Colliery Project Site and identify any previously recorded items of heritage significance at a national, state and/or local government level within the area.

A search of the *Australian Heritage Database*, which incorporates the *National Heritage List*, the *Register of the National Estate* and the *Commonwealth Heritage List*, found no references for the Manning Park, Wye Point or Wye area. A further search of the *NSW Heritage Database*, which lists items of heritage significance at the State and local levels, found no references to items of State Significance in the area. This database did, however, identify the Wye Coal Conveyor to Vales Point and the Wye Channel as items of heritage significance at a local level.

As recorded in the *NSW Heritage Database*, and listed in **Table 10**, two items are listed within the Lake Macquarie LEP as having local heritage significance within the LGA.

Table 10 – Local Heritage Items

Item Name	Address	Heritage Listing
Wyee Coal Conveyor Railway Loop	North of Wyee to Vales Point Power Station	Local Government
Wyee Channel	From Wyee Dam under Summerhill Road	Local Government

While the database searches found no items of heritage significance within or in the vicinity of the Manning Colliery Project Site, RPS (2011b) advises that there is potential for survey to locate items of heritage significance not recorded within these databases. Historical research has provided a concept of the types of sites and activities that could have been carried out in the area. On this basis, RPS (2011b) believes that timber industry relic, agricultural yards and structures and built structures from the early years of settlement may occur in the landscape.

7.6.2 Field Survey

As outlined above in **Section 7.5.3**, a pedestrian survey was undertaken by RPS’s archaeologist Laraine Nelson on the 7 and 8 September 2011. This survey did not identify any non-indigenous cultural heritage items within the search area (RPS 2011b).

7.6.3 Impact Assessment

The Extension of Mine Project at Manning Colliery is expected to have negligible surface impacts, with subsidence to be limited to a maximum of 20 millimetres and no additional surface infrastructure. On this basis, along with the fact that no items or works of non-indigenous heritage significance have been identified within the Project Site, RPS (2011b) concludes that no impacts to non-indigenous heritage are anticipated.

7.6.4 Management and Monitoring

The primary consideration for impact to non-indigenous heritage is subsidence. As outlined in **Section 7.1**, subsidence management at Manning Colliery will continue to be by mining method and mine design to achieve long-term stable pillars resulting in less than 20 millimetres of cumulative subsidence on the surface. Appropriate subsidence monitoring activities will continue to be undertaken as mining progresses.

Furthermore, and as recommended by RPS (2011b), the following mitigation measures will be implemented at Manning Colliery:

- If monitoring indicates that mine-induced subsidence levels exceed 20 millimetres, work in that area will cease immediately and an assessment of potential impacts to non-indigenous heritage will be undertaken.
- All relevant Centennial Manning staff and contractors will be made aware of their statutory obligations for European cultural heritage under the *Heritage Act 1977*. This is already part of the existing mine induction process.
- If, during the course of development works, significant non-indigenous cultural heritage material is uncovered within the Project Site, the Heritage Branch of OEH will be notified and any required monitoring or management strategies instigated.

7.7 Air Quality

The Manning Colliery Extension of Mine Project will not exceed the currently approved coal recovery rate of 1.1 Mtpa and it will not extend the life of the Colliery beyond the currently approved 2018 life of mine. Furthermore, it will not change the methods of coal mining, handing and transport, mine ventilation and gas management, or involve any additional surface infrastructure. On this basis, air quality emissions are not expected to increase or alter noticeably from those previously assessed and approved under PA 06_0311.

The activities at Manning Colliery with the potential to give rise to air emissions are identified as:

- Drift conveyor;
- Mine ventilation shafts;
- CCF, including rotary breaker, screens and crusher;
- Enclosed conveyor systems for the transfer of coal within the Project Site and transfer of coal to the Vales Point Power Station (operates under a separate approval held by the Power Station);
- Final product bin;
- ROM stockpile (only used for short-term periods when the Power Station cannot accept coal); and
- Mobile plant, including an excavator, dozer, forklift and front end loader.

In addition to these project-related emissions, the quality of the air shed in which Manning Colliery is located is also impacted by emissions from the Vales Point Power Station, Munmorah Power Station and traffic on the local road network (including the Pacific Highway).

Condition 16 of Schedule 3 of the Project Approval PA 06-0311 specifies the air quality assessment criteria applicable to the operation of Manning Colliery.

Table 2: Long term impact assessment criteria for deposited dust

Pollutant	Averaging period	Maximum increase in deposited dust level	Maximum total deposited dust level
Deposited dust	Annual	2 g/m ² /month	4 g/m ² /month

Note: Deposited dust is assessed as insoluble solids as defined by Standards Australia, 1991, AS/NZS 3580.10.1-2003: Methods for Sampling and Analysis of Ambient Air - Determination of Particulates - Deposited Matter - Gravimetric Method.

Plate 12 – Manning Colliery Dust Deposition Assessment Criteria

While Condition 16 only relates to dust deposition, the additional air quality criteria listed in **Table 11** are applicable to the operation of Manning Colliery in accordance with the *Manning Colliery Continuation of Mining Environmental Assessment* (Hansen Bailey 2007).

Table 11 – Manning Colliery TSP and PM₁₀ Criteria

Pollutant	Averaging Period	Goal
TSP	Annual	90 µg/m ³
PM ₁₀	24 Hours	50 µg/m ³
	Annual	30 µg/m ³

TSP – total suspended particulate matter

PM10 – particulate matter less than 10 micrometres

Holmes Air Sciences (now PAEHolmes) undertook the air quality impact assessment for the *Manning Colliery Continuation of Mining Environmental Assessment* (Hansen Bailey 2007). In summary, this assessment concluded the following:

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 PM₁₀, TSP or deposition levels significantly at the closest residential location...

Currently, annual average TSP concentrations, inferred annual average PM₁₀ and annual average deposition levels comply with the DEC assessment criteria. The 24-hour PM₁₀ concentrations will exceed the 50 µg/m₃ 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.

Manning Colliery operates a network of five dust deposition gauges within the Project Site (see **Figure 9**) in accordance with the approved *Air Quality Management Plan* (2008) prepared to satisfy Condition 17 of Schedule 3 of Project Approval PA 03_0611. An independent consultant collects the samples every 28 days and forwards them to a NATA-accredited laboratory for analyses. The annual average dust deposition (insoluble solids) monitoring results for the period from 2005 to 2010, as reported in the 2010 AEMR for Manning Colliery (December 2010), are summarised in **Table 12**.

Table 12 – Dust Depositional Monitoring Results Summary

Gauge No.	Dust Deposition (insoluble solids) (g/m ² /month)					
	2005	2006	2007	2008	2009	2010
DG1	1.0	0.8	0.9	1.0	1.9	2.7
DG2	0.8	1.0	0.7	0.8	1.3	0.7
DG3	1.0	1.0	1.2	0.9	1.4	2.0
DG4	0.7	0.7	1.1	1.0	1.4	0.8
DG5	1.0	0.9	0.9	0.6	1.2	0.5

The annual average monitoring results in **Table 12** indicate that dust deposition (insoluble solids) at Manning Colliery has remained well below the OEH's air quality goal of 4 g/m²/month (grams per square metre per month) over the period from 2005 to 2010.

While no monitoring of TSP or PM₁₀ is undertaken at Manning Colliery, we are unaware of any previous significant issues in this regard.

7.7.1 Management and Mitigation

Centennial Manning will continue to employ the management strategies and mitigation measures that are currently in place to minimise air quality emissions. Centennial Manning will also continue to monitor dust deposition in accordance with the approved *Air Quality Management Plan* (2008) and report results internally on a monthly basis and externally on a quarterly basis on Centennial's website and on an annual basis in the AEMR

Additionally, a review of current strategies and measures will be undertaken against the best practice dust mitigation measures identified in the *NSW Coal Mining Benchmarking Study: International Best Practice Measures to Prevent and/or Minimise Emissions of Particulate Matter from Coal Mining* (Katestone Environmental Pty Ltd 2011), which was prepared for OEH. The review will identify any additional dust management practices that are reasonable and feasible for implementation at Manning and will be undertaken in accordance with the requirements of a pollution reduction program imposed by the OEH on the Manning Colliery EPL.

7.8 Noise

The Manning Colliery Extension of Mine Project will not exceed the currently approved coal recovery rate of 1.1 Mtpa and it will not extend the life of the Colliery beyond the currently approved 2018 life of mine. Furthermore, it will not change the methods of coal mining, handing and transport, mine ventilation and gas management, or involve any additional surface infrastructure. On this basis, noise emissions are not expected to increase or alter noticeably from those previously assessed and approved under PA 06_0311. The additional mining equipment required to support the Extension of Mine Project and additional staff traffic movements is unlikely to noticeably increase noise emissions.

Potential noise sources at Manning Colliery include:

- Drift conveyor;
- Mine ventilation fans;
- CCF, including rotary breaker;
- Enclosed conveyor systems for the transfer of coal within the Project Site and transfer of coal to the Vales Point Power Station (operates under a separate approval held by the Power Station);
- Filling of the final product bin; and
- Mobile plant, including an excavator, dozer, forklift and front end loader.

In addition to these project-related sources, noise amenity within the locality is also likely to be impacted upon by Vales Point Power Station and traffic on the local road network (including the Pacific Highway).

Condition 1 of Schedule 3 of the Project Approval PA 06-0311 specifies the noise assessment criteria applicable to the operation of Manning Colliery.

Table 1: Noise limits dB(A)

Day <i>L_{Aeq}(15 min)</i>	Evening <i>L_{Aeq}(15 min)</i>	Night		Location (as listed in Appendix 4)
		<i>L_{Aeq}(15 min)</i>	<i>L_{A1}(1 min)</i>	
49	49	35	49	4 – di Rocco
47	47	35	49	5 – Keighran
44	44	35	49	6 – Swan
43	43	43	50	7 – Druitt
46	46	46	50	8 – May
45	45	45	52	9 – Jeans
40	40	40	52	11 – Jeans
43	43	43	52	18 – Jeans
44	44	44	52	20 – Knight and all other Chain Valley Bay residences

Plate 13 – Manning Colliery Noise Assessment Criteria

Bridges Acoustics undertook the noise impact assessment for the *Manning Colliery Continuation of Mining Environmental Assessment* (Hansen Bailey 2007), which included modelling the operational noise levels under both neutral and prevailing weather conditions for day, evening and night-time periods. While several potential exceedances of the intrusive noise criteria for operation noise levels were identified at surrounding residential receivers, the assessment concluded:

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

No sleep disturbance impacts were predicted as a result of the surface facilities at Manning Colliery, and calculated traffic noise levels from Rutleys Road were predicted to be acceptable.

Centennial Manning engages SLR to conduct quarterly noise monitoring for Manning Colliery in accordance with the approved *Noise Monitoring Plan* (2008) prepared in consultation with relevant government agencies to satisfy Condition 3 of Schedule 3 of Project Approval PA 03_0611. Operator attended surveys are conducted at the three monitoring locations shown on **Figure 9** for day, evening and night-time periods to determine noise levels generated by Manning Colliery. For each of the quarterly monitoring events undertaken during 2009 and 2010, SLR concludes:

Noise emissions from colliery operation were considered to be in compliance with the noise criteria set out by the Department of Planning at all receiver locations.

7.8.1 Management and Mitigation

Centennial Manning will continue to employ the management strategies and mitigation measures that are currently in place to minimise noise emissions. Centennial Manning will also continue to undertake quarterly noise monitoring in accordance with the approved *Noise Monitoring Plan* (2008) and report results on a quarterly basis on Centennial's website and on an annual basis in the AEMR.

7.9 Blasting and Vibration

No surface blasting activities are undertaken at Manning Colliery and the proposed Extension of Mine Project will not involve any surface blasting activities. On this basis, there is no potential for blast overpressure and ground vibration impacts.

7.10 Visual Amenity

The landscape setting of the locality in which the surface facilities of Manning Colliery are situated is highly modify and dominated by development, including Vales Point Power Station to the north, Manning Creek Ash Dam to the west and the Pacific Highway to the south. The Colliery's surface facilities have been part of the local environment for close to 50 years.

The *Manning Colliery Continuation of Mining Environmental Assessment* (Hansen Bailey 2007) determined the visual impact of Manning Colliery from residential and public viewing locations to the north-east, east and south to be very low. The combination of the Colliery's surface facilities being situated at an elevation of approximately 22 metres AHD, which is slightly higher than potential sensitive viewing locations (from 12 to 20 metres AHD) and the screening effects of the surrounding topography and vegetation, restrict views to the site. Hansen Bailey (2007) advised that the views of the Colliery's surface facilities, at that time, were limited to a small section off Rutleys Road immediate adjacent to the Colliery's main access at which no sensitive receptors are located.

The Manning Colliery Extension of Mine Project will not involve any changes to the current approved hours of operation, methods of coal handling and transport, surface infrastructure, site servicing or waste management. On this basis, the Project will not adversely impact upon the visual amenity of the site or alter the current landscape setting from that previously assessed and approved under PA 06_0311.

Centennial Manning will continue to adopt a progressive approach to rehabilitation as mining progresses and mine closure and final rehabilitation will be undertaken in accordance with the detailed Mine Closure Plan to be developed by the end of March 2013 (i.e. five years prior to the planned mine closure).

7.11 Greenhouse Gas Emissions

The main sources of greenhouse gas from Manning Colliery are identified as mine ventilation air (carbon dioxide and methane), on-site electricity consumption and diesel consumption. These sources are both direct and indirect sources of greenhouse gas emissions. The direct emissions (Scope 1) are from the dilute gas emissions from the mine ventilation system and the indirect emissions (Scope 2) are from the life cycle of the on-site electricity and diesel consumption.

Centennial Manning monitors greenhouse gas emissions in accordance with the approved *Energy Savings Action Plan* (2008) and reports on them under the provisions of the NGER Act. **Table 13** summarise the Scope 1 and Scope 2 emissions reported for Manning Colliery during the 2009-2010 and 2010-2011 reporting periods.

Table 13 – Summary of Annual Greenhouse Gas Emissions

Fugitive and Energy Emissions	2009-2010 (Tonnes of CO₂ Equivalent)	2010-2011 (Tonnes of CO₂ Equivalent)
Methane emissions	144,056	112,106
Carbon dioxide emissions	25,949	26,702
Electricity consumption	16,408	14,268
Diesel consumption	651	605
Coal stockpile emissions	10,206	6,646
Total	197,270	160,327

With the annual greenhouse emissions for NSW in 2009 being approximately 160.6 million tonnes, the Scope 1 and Scope 2 emissions from Manning Colliery represents approximately 0.1 percent of the NSW 2009 total.

The downstream use of the coal to produce electricity is also an indirect emission known as a Scope 3 emission. In the *Manning Colliery Continuation of Mining Environmental Assessment* (2007), and at a production rate of 1.1 Mtpa, Hansen Bailey estimated that the end of use of coal mined at Manning is likely generated approximately 2.2 million tonnes of greenhouse emissions (CO₂ equivalent). This represents approximately 1.37 percent of the NSW 2009 total.

The Manning Colliery Extension of Mine Project will not exceed the currently approved coal recovery rate of 1.1 Mtpa and it will not extend the life of the Colliery beyond the currently approved 2018 life of mine. Furthermore, it will not change the methods of coal mining, handing and transport, mine ventilation and gas management, or involve any additional surface infrastructure. On this basis, greenhouse gas emissions are not expected to increase or alter noticeably from those previously assessed and approved under PA 06_0311. The additional mining equipment required to support the Extension of Mine Project is unlikely to have any significant impact upon greenhouse gas emissions.

7.11.1 Management and Monitoring

To satisfy Condition 22 of Schedule 3 of Project Approval PA 03_0611, Centennial Manning developed an *Energy Savings Action Plan* in 2008 in consultation with relevant government agencies. This Plan includes a program to monitor greenhouse gas emissions from Manning Colliery and a framework for investigating and implementing measures to reduce energy consumption and greenhouse gas emissions.

Centennial Manning will continue to monitor greenhouse gas emissions in accordance with the approved *Energy Savings Action Plan* (2008) and report on energy use and greenhouse gas emissions under the provisions of the NGER Act.

7.12 Traffic and Transport

PB was engaged to investigate and prepare a traffic impact assessment for the intersection of Rutleys Road and the Manning Colliery Access Road to evaluate the traffic implications of the increase in employment proposed as part of the Extension of Mine Project. A copy of PB's *Traffic Impact Assessment* (2011) is contained within **Appendix M**, with significant findings and recommendations summarised below.

7.12.1 Existing Environment

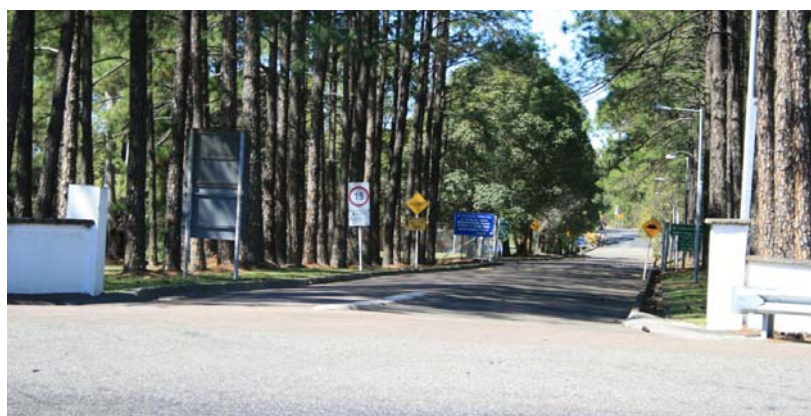
Rutleys Road is a two-lane two-way undivided rural road approximately 10 metres wide at the entrance to Manning Colliery. It is a collector road with a posted speed limit of 80 kilometres per hour.



Source: PB 2011

Plate 14 – Rutleys Road Looking Southbound from Manning Colliery Access Road

Manning Colliery Access Road is a two-way two-lane sealed access road to the Manning Colliery. It is approximately 7.5 metres wide, with a posted speed limit of 15 kilometres per hour. There is a raised 0.3 metre wide concrete median located on the road's approach to the intersection.



Source: PB 2011

Plate 15 – Manning Colliery Access Road Looking Toward Colliery

The existing traffic volumes and peak hour turning movements were calculated from a survey undertaken on the 19 September 2011 between 5.00 am and 8.00 pm at the intersection of Rutleys Road and Manning Colliery Access Road. From the survey, PB (2011) identified the AM peak hour between 6.00 am and 7.00 am, and the PM peak hour between 4.15 pm and 5.15 pm.

There are three separate shift times at Manning Colliery over the five day production week, with the day shift starting at 7.00 am, afternoon shift at 3.00 pm and night shift at 11.00 pm. Employee ingress and egress trips appear to occur over a two hour period. The actual peak traffic volumes along Rutleys Road would not necessarily occur at the same time as the site's peak traffic volumes. On this basis, PB (2011) identified four separate one hour peak periods:

- AM peak hours – 6.00 am to 7.00 am; and 7.00 am to 8.00 am.
- PM peak hours - 2.00 pm to 3.00 pm; and 3.00 pm to 4.00 pm.

With minimal change in activity levels in the surrounding areas along Rutleys Road, PB (2011) applied a future traffic growth of one percent per annum for this road.

7.12.2 Traffic Generation

As advised by **Section 5.2**, the Extension of Mine Project will require an additional 40 full-time employees to operate the additional production unit in the Great Northern Seam, which will increase the workforce at Manning Colliery from the current 130 full-time employees to a total of 170 full-time employees.

Given that the *Manning Colliery Continuation of Mining Environmental Assessment* (Hansen Bailey 2007) advised that the operation would maintain a workforce of around 90 full-time employees (as opposed to the current employment level of 130), the traffic impact assessment has been undertaken on the basis of increasing full-time employment from the approved 90 to the proposed 170.

It is anticipated that shift times at Manning will remain unchanged and the additional personnel will be spread across the three shifts starting at 7.00 am, 3.00 pm and 11.00 pm. Assuming light vehicles have an occupancy rate of one person per vehicle, there would be up to 27 additional inbound light vehicle trips before each shift and 27 outbound light vehicles after each shift. Given the current patterns of travel through the intersection, PB (2011) anticipates that the only peak period where additional traffic will be experienced is the morning peak hour with the additional 27 inbound movements. PB (2011) also anticipates that the additional workers will live in similar areas to the current workforce and, as such, the split will remain 65 percent travelling to/from the north and 35 percent travelling to/from the south.

7.12.3 Intersection Upgrade

In September 2010, PB was engaged by Centennial Manning to undertake the design of a proposed upgrade to the intersection of Rutleys Road and the Manning Colliery Access Road in order to address safety issues identified by a Stage 5 Road Safety Audit conducted in 2008 in accordance with Condition 21 of Project Approval PA 06_0311. Further to this audit, internal consultation with Centennial Coal staff revealed a concern with the right turn movement into the Colliery. Although this was not identified as a safety concern during the audit, Centennial Manning decided to address staff concerns in the intended upgrade of the intersection by including a channelised right turn bay. An application, accompanied by final intersection design and construction drawings, was submitted to the Wyong Shire Council in May 2011. Centennial Manning are currently waiting approval of this application in order to commence the works and, hopefully, complete the upgrade by the end of 2012.

As summarised by PB (2011) and illustrated on **Plate 16**, the proposed upgrade consists of:

- Widening the northbound side of Rutleys Road to accommodate a channelised right turn at the intersection (type CHR);
- Widening the return profiles on the entry of the Access Road to accommodate the turning path of a 19 metre semi-trailer;
- Construction of subsoil drainage at the interface of the existing and proposed pavement;

- Signage, guideposts, line marking and retro-reflective pavement markers; and
- Removal, replacement and extension of an existing 450 diameter culvert and headwall.

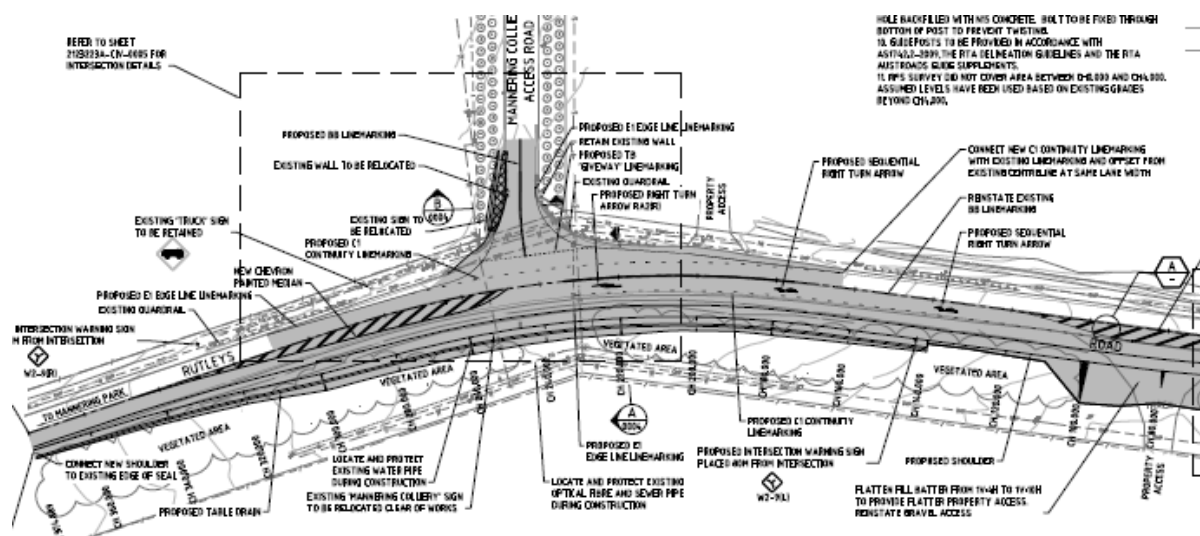


Plate 16 – Detailed Design of Proposed Intersection Upgrade

PB (2011) advise that the proposed intersection upgrade on Rutleys Roads would allow for through traffic on the southern approach to be unimpeded by right turning traffic into Manning Colliery. A right turn bay of adequate length is provided for these movements, which would further increase safety and operation of this intersection.

7.12.4 Impact Assessment

The ability of the Rutleys Road – Manning Colliery Access Road intersection to cater for existing and future traffic forecasts was investigated by PB (2011) using the SIDRA intersection software package. The following four performance indicators were used in the assessment:

1. **Level of Service (LoS)** – basic performance parameter used to describe the operation of an intersection. LoS ranges from A (indicating good intersection operation) to F (indicating over saturated conditions with long delays and queues).
2. **Degree of saturation (DoS)** – the ratio of demand flow to capacity. For a satisfactory situation, the DoS should be less than the nominated practical degree of saturation, usually 0.9. As the DoS approaches 1.0, extensive queues and delays could be expected.
3. **Delay** - the difference between interrupted and uninterrupted travel times through the intersection and is measured in seconds per vehicle.
4. **Queue Length** - the number of vehicles measured in metres waiting at the stop or yield line and is usually quoted as the 95th percentile back of queue, which is the value below which 95 percent of all observed queue lengths fall.

Current Intersection Performance

The current 2011 performance of the Rutleys Road – Manning Colliery Access Road intersection, as assessed by PB (2011) is summarised in **Table 14**. The analysis indicates that the intersection operates within its design capacity, with enough spare capacity and with a satisfactory Level of Service. The longest queue of 17 metres occurred on the southern approach of Rutleys Road waiting for the through/right turn movements (due to this approach having a single lane with shared movements).

Table 14 – Current Intersection Performance

Peak Hour	DoS	Average Delay (sec/vehicle)	LoS	95 th Percentile Queue (metres)
6 am to 7 am	0.30	31	C	17
7 am to 8 am	0.19	32	C	8
2 pm to 3 pm	0.18	30	C	9
3 pm to 4 pm	0.26	31	C	12

Future Intersection Performance – 2012 Operational Traffic and Current Intersection Layout

The sub-section assesses the performance of the Rutleys Road – Manning Colliery Access Road intersection with operational traffic in 2012, including the proposed workforce of 170, and the current intersection layout. As previously advised, PB (2011) applied an increase of one percent per annum to background 2011 traffic volumes on Rutleys Road to account for future traffic growth. The 2012 operational intersection performance forecasts for the current intersection layout are summarised in **Table 15**. The analysis indicates that the intersection would operate within its design limits, with enough spare capacity to maintain a satisfactory Level of Service, similar to existing conditions. The longest queue of 18 metres occurred on the southern approach of Rutleys Road waiting for the through/right turn movements (due to this approach having a single lane with shared movements).

Table 15 – Current Intersection Performance with 2012 Operational Traffic

Peak Hour	DoS	Average Delay (sec/vehicle)	LoS	95 th Percentile Queue (m)
6 am to 7 am	0.32	31	C	18
7 am to 8 am	0.19	32	C	8
2 pm to 3 pm	0.20	30	C	10
3 pm to 4 pm	0.26	32	C	12

Future Intersection Performance – 2012 Operational Traffic and Upgraded Intersection Layout

The sub-section assesses the performance of the Rutleys Road – Manning Colliery Access Road intersection with operational traffic in 2012, including the proposed workforce of 170, and the upgraded intersection layout as outlined in **Section 7.12.3**. Again, PB (2011) applied an increase of one percent per annum to background 2011 traffic volumes on Rutleys Road to account for future traffic growth. The 2012 operational intersection performance forecasts for the upgraded intersection layout are summarised in **Table 16**. The analysis indicates that the intersection as proposed to be upgraded will operate within its design capacity, with enough spare capacity to maintain a satisfactory Level of Service. The proposed intersection layout will remove delays to through movements on the southern approach on Rutleys Road, with the road widening and a right turn bay of adequate length for storage.

Table 16 – Upgraded Intersection Performance with 2012 Operational Traffic

Peak Hour	DoS	Average Delay (sec/vehicle)	LoS	95 th Percentile Queue (m)
6 am to 7 am	0.28	30	C	1
7 am to 8 am	0.19	30	C	2
2 pm to 3 pm	0.17	30	C	1
3 pm to 4 pm	0.26	31	C	2

Conclusion

PB's (2011) traffic impact assessment has identified that impacts associated with the additional employment proposed as part of the Extension of Mine Project at Manning Colliery will be negligible. The additional employees will have minimal to no impact on performance of the existing road network and intersection in terms of capacity and operation.

The proposed upgrade of the Rutleys Road - Manning Colliery Access Road intersection will reduce through traffic delays and increase safety for right turning movements.

7.12.5 Management and Mitigation

Centennial Manning will continue to employ the traffic management strategies and mitigation measures that are currently in place to prevent or minimise the potential for traffic conflict and safety issues.

In addition, and following receipt of approval from Wyong Shire Council, Centennial Manning will upgrade the Rutleys Road - Manning Colliery Access Road intersection as outlined in **Section 7.12.3** to improve safety and operational efficiency. It is anticipated that this intersection upgrade will be undertaken by the end of 2012.

7.13 Waste Management

The Manning Colliery Extension of Mine Project will not generate any new waste materials or additional waste volumes.

Management of the non-production waste streams generated at Manning Colliery, including general waste, routine maintenance consumables, waste oil and grease, and sewage, will continue to be via the systems currently in place (see **Section 4.11**) in accordance with the requirements of PA 06_0311 and EPL 191. There is no production waste or reject material generated at Manning Colliery.

7.14 Socio-Economic Considerations

Given the relatively minor nature of the Manning Colliery Extension of Mine Project and the limited environmental impacts predicted, it is not anticipated to have any adverse impacts upon the social and/or economic fabric of the local area or the wider region, nor have an adverse impact upon existing surrounding land users.

While the Extension of Mine Project does not involve any increase to the coal production rate or life of mine, it will secure on-going and increased employment opportunities and socio-economic flow-on benefits. Notable positive socio-economic benefits include, but are not limited to, the following:

- Maintenance of current direct employment levels (130 full-time positions) and indirect employment levels;
- Generation of an additional 40 full-time employment positions, which translate to possibly 40 families receiving a benefit that would otherwise not be available. The actual multiplier effect of this employment is not known, however it is felt that a factor of four would be a conservative estimate;
- Training opportunities for local people in a growth industry (mining);
- Stimulus to local businesses through consumable goods and services;
- Significant contribution to the local and regional economies through wages, payments to contracting companies and expenditure of other local goods and services;

- Significant contribution to the NSW, Australian and global economies through income tax, royalties, payroll tax and expenditure of other goods and services; and
- Community-based and charitable contributions ensuring that the economic benefits of Manning Colliery are not restricted to the company, employees and various levels of government.

The Project does not pose any notable social impacts over and above those previously assessed and approved under Project Approval PA 06_0311. Potential social issues primarily relate to subsidence, water management, heritage, dust emissions, noise emissions and traffic generation, all of which have been appropriately addressed within this EA, with no significant or limiting factors identified.

In compliance with Condition 12 of Schedule 2 of the Project Approval PA 06_0311, Manning Colliery operates under a Community Enhancement Program, whereby Centennial Manning pays the affected local councils \$0.02 (subject to Consumer Price Index) for each tonne of ROM coal produced for the purpose of improving water quality in the Lake Macquarie catchment. This contribution is shared equally between Lake Macquarie City Council and Wyong Shire Council.

In addition, and in compliance with Condition 8 of Schedule 5 of the Project Approval PA 06_0311, the Manning CCC has been established and typically meets on a quarterly basis. It comprises representatives from local government and the community, and is independently chaired by a representative from the Mine Subsidence Board and Ministers Arbitration Panel. The CCC operates in general accordance with *Guidelines for Establishing and Operating Community Consultative Committees for Mining Projects* (Department of Planning 2007).

Lantz Marshall was engaged to investigate and prepare a social impact assessment to gain an understanding of the potential impacts associated with the Manning Colliery Extension of Mine Project. This assessment builds on a previously completed community profile and addresses not only the proposed Project but also mining in the Lake Macquarie area in a broader sense. In summary, this assessment concludes:

In closing, the SIA has found that proposed modification to Manning Colliery results in little or no impacts to the community over and above what is currently experienced; however the management of community concerns is the priority issue that has been identified.

A copy of the *Social Impact Assessment* (2011) is contained within **Appendix N**.

7.14.1 Management and Mitigation

Centennial Manning will continue to employ the management strategies currently in place to minimise adverse socio-economic impacts and engage with community stakeholders. This will include continuation of the Community Enhancement Program and Manning CCC.

Centennial Manning is committed to on-going community consultation and will continue to engage the community for the purposes of providing information relating to on-going operations and the Extension of Mine Project. This will also enable the community to provide feedback regarding any issues or concerns.

8.0 STATEMENT OF COMMITMENTS

As advised in **Section 4.14**, a comprehensive set of environmental management plans have been developed and implemented at Manning Colliery in accordance with the relevant conditions of PA 06_0311, EPL 191 and mining authorities. The implementation of these plans and the integration of Centennial Coal's Environmental Management System Framework (April 2009) is a strong focus at Manning and demonstrates environmental due diligence. The environmental management plans are backed by an environmental monitoring network (see **Figure 9**), which includes monitoring of subsidence, air quality, noise and surface water.

The environmental management plans and monitoring program will be reviewed and updated, as required, to incorporate the Extension of Mine Project, commitments made in this EA and any additional consent conditions.

Table 17 presents a compilation of the actions identified in **Section 7.0** that will be implemented at Manning Colliery, in addition to those already in place, in order to effectively monitor, mitigate and/or manage the potential environmental and socio-economic impacts of the Extension of Mine Project should it be approved.

Table 17 – Statement of Commitments

Subsidence
Mining to be limited to the approved bord-and-pillar method where coal recovery is limited to first workings only.
Subsidence monitoring will commence within the Great Northern Seam and include coring under the pillars, geotechnical logging and geotechnical assessment of the results in terms of bearing capacity and deformation.
If it is identified that subsidence levels are greater than the predicted maximum of 20 millimetres, the DTIRIS Minerals Division will be consulted to determine appropriate management and mitigation actions.
Water Management
The water level within Sediment Pond B will be monitored and kept at a relatively low operating level, such that the pond can provide a detention function in the event of significant rainfall (in excess of 10 millimetres over a 24 hour period).
A visual assessment of the unnamed creek will be undertaken every 6 months and after heavy rainfall to monitoring stability and erosion.
Where practicable, underground water levels will be recorded to monitor changes in the level of water stored in underground depressions and to verify that the rate of extraction is sufficient.
Centennial Manning is currently waiting for the determination of an application lodged with the NOW for a water extraction licence under the <i>Water Act 1912</i> . Once issued, the extraction of underground water from the mine workings will be undertaken in accordance with the licence conditions.
To enable on-going assessment of the quality of water discharged, the existing monitoring program will be maintained for the life of the Project with the following enhancements: <ul style="list-style-type: none"> • An assessment of the surrounding catchments summarising land uses and other background information to characterise an appropriate water quality; and • Annual monitoring of heavy metals at the monitoring location identified as 'Downstream'.
Terrestrial Ecology
If monitoring indicates that mine-induced subsidence levels exceed 20 millimetres, a review will be undertaken to identify any potential impacts to terrestrial ecology.
Aquatic Ecology
If monitoring indicates that mine-induced subsidence levels exceed 20 millimetres, a review will be undertaken to identify any potential impacts to aquatic ecology.

Aboriginal Heritage
If monitoring indicates that mine-induced subsidence levels exceed 20 millimetres, work in that area will cease immediately and an assessment of potential impacts to cultural heritage will be undertaken.
All relevant Centennial Manning staff and contractors will be made aware of their statutory obligations for Aboriginal cultural heritage under the NP&W Act as part of the existing mine induction process.
An <i>Aboriginal Cultural Heritage Management Plan</i> (ACHMP) will be developed for the identified Aboriginal heritage items within the Project Site in consultation with the relevant Aboriginal stakeholders. If additional sites are identified they will be assessed for cultural significance and be incorporated into the ACHMP.
In the unlikely event that skeletal remains are identified, the NSW Police Coroner will be contacted to determine if the material is of Aboriginal origin. If determined to be Aboriginal, contact will be made with the OEH, a suitably qualified archaeologist and representatives of the relevant Aboriginal stakeholder groups to determine an action plan for the management of the skeletal remains and formulate management recommendations if required.
European Heritage
If monitoring indicates that mine-induced subsidence levels exceed 20 millimetres, work in that area will cease immediately and an assessment of potential impacts to non-indigenous heritage will be undertaken.
All relevant Centennial Manning staff and contractors will be made aware of their statutory obligations for European cultural heritage under the <i>Heritage Act 1977</i> as part of the existing mine induction process.
If, during the course of development works, significant non-indigenous cultural heritage material is uncovered within the Project Site, the Heritage Branch of OEH will be notified and any required monitoring or management strategies instigated.
Air Quality
A review of dust management strategies and mitigation measures will be undertaken against the best practice dust mitigation measures identified in the <i>NSW Coal Mining Benchmarking Study: International Best Practice Measures to Prevent and/or Minimise Emissions of Particulate Matter from Coal Mining</i> (Katestone Environmental Pty Ltd 2011), which was prepared for OEH. The review will identify any additional dust management practices that are reasonable and feasible for implementation at Manning Colliery and will be undertaken generally in accordance with any requirements of a pollution reduction program that may be imposed by the OEH on the Manning Colliery EPL in the future.
Traffic
Following receipt of approval from Wyong Shire Council, Centennial Manning will upgrade the Rutleys Road - Manning Colliery Access Road intersection to improve safety and operational efficiency.
Socio-Economic
Centennial Manning is committed to on-going community consultation and will continue to engage the community for the purposes of providing information relating to on-going operations and the Extension of Mine Project.

9.0 JUSTIFICATION AND CONCLUSION

9.1 Project Justification

To maximise resource recovery and improve the efficiency of coal recovery, an opportunity to extend the underground mining footprint at Manning Colliery has been identified. The proposed combination of mining from the Fassifern and Great Northern seams will not exceed the 1.1 Mtpa of coal recovery previously assessed and approved under PA 06_0311. No changes to the current approved hours of operation, methods of coal mining, handling and transport, surface infrastructure, site servicing or waste management are required. Furthermore, the proposal will not extend the life of Manning Colliery beyond the existing approved 2018 life of the mine.

Manning Colliery is strategically located in close proximity to the Vales Point Power Station. The Extension of Mine Project will provide access to improved coal quality suitable for the continuation of coal supply to the power station for electricity generation. The proximity and existence of established coal delivery infrastructure provides for on-going reliable coal supply conditions, which, in turn, reduces the energy demands and potential environmental impacts otherwise required to source coal from other NSW mining operations.

Additional objectives of the Extension of Mine Project at Manning Colliery are:

- Develop the on-going underground operations with a focus on maximising resource recovery and improving the efficiency in which coal recovery is achieved;
- Allow coal from other Centennial operations to be directed to alternative export markets;
- Maintain continuity of coal production from the existing Manning operation within the currently approved life of mine;
- Secure on-going employment opportunities and socio-economic flow-on benefits; and
- Continue to conduct mining in an environmentally responsible manner to ensure the potential for adverse impact is minimised.

The 4.6 Mt of coal resource within the proposed mining extension areas will be mined as a priority over coal within the current approved mine plan that has been identified as less economical for mining at this point due to higher ash content and geological constraints. Centennial Manning is currently investigating future extensions of mining operations at the Manning Colliery both within the Fassifern and Great Northern coal seams. It is anticipated that the potential future mine extensions currently being investigated will provide a long term and secure supply of coal to the domestic electricity generation market and extend the mine life beyond 2018. These investigations have only recently commenced and if proven feasible will form part of a separate application to the DP&I under the EP&A Act. The Extension of Mine Project detailed within this EA will enable access to improved quality coal that is economical for mining while the investigations into future mine extensions are undertaken.

The approved method of mining, being a form of bord-and-pillar mining where coal recovery is limited to first workings only, will continue to be implemented. This mining method, combined with the mine design, will achieve long-term stable pillars resulting in less than 20 millimetres of cumulative subsidence on the surface.

The potential environmental impacts of the Extension of Mine Project have been identified and assessed within **Section 7.0**. The key issues identified were the subject of comprehensive specialist assessments, which are appended to this EA. Potential impacts have been kept to a minimum through:

- Obtaining a detailed understanding of the issues and potential impacts via consultation and assessment to a level of detail commensurate with the scale of the Project, industry standards and the legislative framework under which the Project is permitted;
- The continued implementation of the existing strategies employed at Manning Colliery to avoid, minimise, mitigate, offset or manage potential impacts;
- A commitment to review and update the suite of environmental management plans and monitoring programs already implemented at Manning Colliery; and
- A thorough Statement of Commitments.

In summary, the proposal is anticipated to pose negligible additional environmental impacts beyond those already approved under PA 06_0311.

Furthermore, the Extension of Mine Project at Manning Colliery is justified in socio-economic terms as a catalyst for significant and sustained economic activity within the Lake Macquarie and Wyong local government areas, including positive employment and flow-on benefits.

9.2 Ecologically Sustainable Development

ESD has emerged as a primary objective of environmental protection in NSW. ESD is an objective of the EP&A Act under Section 5(a)(vii) and is defined under Section 6(2) of the *Protection of the Environment Administration Act 1991* as:

6(2) For the purposes of subsection (1)(a), ecologically sustainable development requires the effective integration of economic and environmental considerations in decision-making processes. Ecologically sustainable development can be achieved through the implementation of the following principles and programs:

- (a) the precautionary principle—namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation...*
- (b) inter-generational equity—namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations,*
- (c) conservation of biological diversity and ecological integrity—namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration,*
- (d) improved valuation, pricing and incentive mechanisms—namely, that environmental factors should be included in the valuation of assets and services....*

The overall objectives of ESD are to use, conserve and enhance natural resources. This ensures that ecological processes are maintained facilitating improved quality of life, now and into the future.

Centennial Manning has shown a commitment to the principles of ESD and acknowledges that a well designed and effectively managed operation will avoid significant and/or costly environmental impact or degradation. The suite of environmental management plans and monitoring programs are designed to demonstrate environmental due diligence and to implement procedures that provide on-going management and monitoring of the Manning Colliery operation in-line with the objectives of ESD.

9.2.1 The Precautionary Principle

The Precautionary Principle, in summary, holds that where there are threats of serious or irreversible environmental damage, the lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

A thorough understanding of the issues and potential impacts associated with the Manning Colliery Extension of Mine Project has been obtained via consultation and assessment to a level of detail commensurate with the scale of the development modification, industry standards and the legislative framework under which it is permitted. Specialist assessments have been undertaken for the design of the mine expansion and for impacts relating to subsidence, terrestrial ecology, aquatic ecology, cultural heritage, surface water, groundwater and traffic. To this end, there has been careful evaluation undertaken in order to avoid, where possible, serious or irreversible damage to the environment.

The various consultation activities that have been undertaken (see **Section 2.0**) and the engagement of suitably qualified and experienced consultants have ensured that the planning, design and assessment phases of the Project have been transparent. The contents of this EA report (including appendices), combined with the consultation activities, has enabled Centennial Manning to understand the potential implications of the Extension of Mine Project, and therefore identify the required management strategies, mitigation measures and monitoring activities.

9.2.2 Intergenerational Equity

Intergenerational Equity is centred on the concept that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations. There is a moral obligation to ensure that today's economic progress, which will benefit both current and future generations, is not offset by environmental deterioration.

The primary objectives of the Extension of Mine Project at Manning Colliery are:

- Develop the on-going underground operations with a focus on maximising resource recovery and improving the efficiency in which coal recovery is achieved;
- Provide access to improved coal quality suitable for the continuation of coal supply to Vales Point Power Station for electricity generation, while allowing coal from other Centennial operations to be directed to alternative export markets;
- Maintain continuity of coal production from the existing Manning operation within the currently approved life of mine;
- Secure on-going employment opportunities and socio-economic flow-on benefits; and
- Continue to conduct mining in an environmentally responsible manner to ensure the potential for adverse impact is minimised.

Emphasis has been placed on anticipation and prevention of potential adverse impacts upon the local environmental and surrounding populace, as opposed to undertaking later remedial action, through the mitigation measures, management strategies and monitoring activities discussed in **Section 7.0** and summarised in **Section 8.0**. These initiatives, along with various environmental reporting, auditing and consultation activities will assist in ensuring that current and future generations can enjoy equal and equitable access to social, environmental and economic resources.

9.2.3 Conservation of Biological Diversity and Ecological Integrity

The principle of Conservation of Biological Diversity and Ecological Integrity holds that the conservation of biological diversity and ecological integrity should be a fundamental consideration for development proposals. The potential for environmental impacts, including upon ecological communities and habitat values, has been assessed within this EA and measures to ameliorate any such impacts have been identified. The Extension of Mine Project at Manning Colliery is expected to have negligible surface impacts, with subsidence to be limited to a maximum of 20 millimetres and no additional surface infrastructure.

9.2.4 Improved Valuation, Pricing and Incentive Mechanisms

The principle of Improved Valuation, Pricing and Incentive Mechanisms deems that environmental factors should be included in the valuation of assets and services. The cost associated with using or impacting upon an environmental resource is seen as a cost incurred to protect that resource.

The application of this principle remains in its infancy and, to date, there are few widely accepted methods by which monetary values are attributed to environmental factors. However the Extension of Mine Project at Manning Colliery optimises the valuation and pricing of the coal resources by optimising the use of an existing operation, including existing coal handling, processing and transportation facilities, to provide coal resources to Vales Point Power Station for domestic electricity generation.

Centennial Manning will accept the full costs associated with the avoidance, minimisation, mitigation, offsetting and management of potential environmental and social impacts.

9.3 Conclusion

This EA has been prepared to support an application by Centennial Manning seeking a modification to the Project Approval 06_0311 pursuant to Section 75W of the EP&A Act to allow for the extension of underground mining operations at Manning Colliery (Extension of Mine Project). In summary, the Project will enable an extension of its underground mining operations within both the Fassifern and Great Northern coal seams, along with additional employment.

The primary objectives of the Extension of Mine Project at Manning Colliery are:

- Develop the on-going underground operations with a focus on maximising resource recovery and improving the efficiency in which coal recovery is achieved;
- Provide access to improved coal quality suitable for the continuation of coal supply to Vales Point Power Station for electricity generation, while allowing coal from other Centennial operations to be directed to alternative export markets;
- Maintain continuity of coal production from the existing Manning operation within the currently approved life of mine;
- Secure on-going employment opportunities and socio-economic flow-on benefits; and
- Continue to conduct mining in an environmentally responsible manner to ensure the potential for adverse impact is minimised.

The proposed combination of mining in the Fassifern and Great Northern seams will not exceed the 1.1 Mtpa of coal recovery previously assessed and approved under PA 06_0311. No changes to the current approved hours of operation, methods of coal mining, handling and transport, surface infrastructure, site servicing or waste management are required. Furthermore, the proposal will not extend the life of Manning Colliery beyond the existing approved 2018 life of the mine.

The approved method of mining, being a form of bord-and-pillar mining where coal recovery is limited to first workings only, will continue to be implemented. This mining method, combined with the mine design, will achieve long-term stable pillars resulting in less than 20 millimetres of cumulative subsidence on the surface.

Based on the assessment of environmental and socio-economic considerations in **Section 7.0**, which has been multi-disciplinary and involved consultation with the DP&I and other relevant stakeholders, the Manning Colliery Extension of Mine Project is anticipated to pose negligible additional environmental impacts beyond those already approved under PA 06_0311.

The Extension of Mine Project is justified in socio-economic terms as a catalyst for significant and sustained economic activity within the Lake Macquarie and Wyong LGAs, including positive employment and flow-on benefits.

10.0 REFERENCES

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11.0 ABBREVIATIONS

ACHCR	Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010
ACHMP	Aboriginal Cultural Heritage Management Plan
AEMR	Annual Environmental Management Report
AHD	Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
CCC	Community Consultative Committee
CCF	Coal Crushing Facility
DGRs	Director-General's Requirements
DP&I	NSW Department of Planning and Infrastructure
DTIRIS	NSW Department of Trade and Investment, Regional Infrastructure and Services
EA	Environmental Assessment
EEC	Endangered Ecological Communities
EMS	Environmental Management Strategy
EP&A Act	NSW Environmental Planning and Assessment Act 1979
EPBC Act	Commonwealth Environment Protection and Biodiversity Conservation Act 1999
EPI	Environmental Planning Instrument
EPL	Environmental Protection Licence
ESD	Ecologically Sustainable Development
GHG	Greenhouse Gas
GSSE	GSS Environmental
LALC	Local Aboriginal Lands Council
LDP	Licensed Discharge Point
LEP	Local Environment Plan
LGA	Local Government Area
MOP	Mining Operations Plan
Mtpa	Million tonnes per annum
NOW	NSW Office of Water
NP&W Act	National Parks and Wildlife Act 1974
OEH	NSW Office of Environment and Heritage
PA	Project Approval
POEO Act	NSW Protection of the Environment Operations Act 1999
ROM	Run of Mine
SCA	State Conservation Area
SEPP	State Environmental Planning Policy
SEWPaC	Commonwealth Department of Sustainability, Environment, Water, Population and Community
TSC Act	NSW Threatened Species Conservation Act 1995



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