



Mining Operations Plan

Mandalong Mine

December 2016 to November 2023

~~Amendment A – April 2017~~

~~Amendment B – March 2018~~

~~Amendment C – November 2020~~

Amendment D – April 2021

Mandalong Mine	
Mining Operations Plan	
Name of Mine	Mandalong Mine
MOP Commencement Date	1 December 2016
MOP Completion Date	30 November 2023
Mining Authorisations (Lease / Licence No.)	ML 1431 , ML 1443, ML 1543, ML 1553, ML 1722, ML 1744, ML 1793 , CCL 746 (sublease), CCL 762, MPL 191, MPL 329 , EL 4443, EL 4968 , EL 4969, EL 5892, EL 6317, AUTH 404.
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Title	Mine Manager
Signature	
Date	2/5/21
Version	Final Amendment A Amendment B Amendment C Amendment D

Table of Contents

1	INTRODUCTION	1
1.1	HISTORY OF OPERATIONS	4
1.2	CURRENT CONSENTS, AUTHORISATIONS AND LICENCES	8
1.2.1	<i>State Significant Development</i>	8
1.2.2	<i>Development Consents</i>	8
1.2.3	<i>Licences and Authorisations</i>	13
1.2.4	<i>Occupation Permit</i>	19
1.3	MOP/REHABILITATION MANAGEMENT PLAN REQUIREMENTS.....	19
1.4	LAND OWNERSHIP AND LAND USE	23
1.4.1	<i>Land Ownership</i>	23
1.4.2	<i>Historic, Current and Proposed Land Use</i>	24
1.4.3	<i>Natural Features and Topography</i>	25
1.5	STAKEHOLDER CONSULTATION	25
1.5.1	<i>Community Consultation</i>	26
1.5.2	<i>Community Consultation Committee</i>	26
1.5.3	<i>Statutory Authorities</i>	26
1.5.4	<i>Cultural Heritage</i>	27
2	PROPOSED MINING ACTIVITIES	28
2.1	PROJECT DESCRIPTION	28
2.1.1	<i>Mandalong Mine</i>	28
2.1.2	<i>Cooranbong Entry Site</i>	29
2.1.3	<i>Delta Entry Site</i>	29
2.2	ACTIVITIES OVER THE MOP TERM	30
2.2.1	<i>Exploration</i>	30
2.2.2	<i>Construction</i>	31
2.2.3	<i>Mining Operations</i>	34
2.2.4	<i>Rock/overburden Emplacement</i>	39
2.2.5	<i>Processing Residues and Tailings</i>	39
2.2.6	<i>Waste Management</i>	40
2.2.7	<i>Decommissioning and Demolition Activities</i>	41
2.2.8	<i>Temporary Stabilisation</i>	41
2.2.9	<i>Progressive Rehabilitation and Completion</i>	41
2.2.10	<i>Material Production Schedule during MOP Term</i>	42
2.3	PRIMARY DOMAINS	43
2.4	ASSET REGISTER	44
2.5	REHABILITATION COST ESTIMATE.....	50
3	ENVIRONMENTAL ISSUES MANAGEMENT	51
3.1	ENVIRONMENTAL RISK ASSESSMENT	51
3.2	ENVIRONMENTAL RISK MANAGEMENT	51
3.3	ENVIRONMENTAL ISSUES MANAGEMENT	52
3.3.1	<i>Air Quality</i>	52
3.3.2	<i>Erosion and Sedimentation</i>	53
3.3.3	<i>Surface Water</i>	54
3.3.4	<i>Groundwater</i>	54
3.3.5	<i>Contaminated Land</i>	55
3.3.6	<i>Flora and Fauna</i>	55
3.3.7	<i>Weeds and Pests</i>	57
3.3.8	<i>Blasting</i>	57
3.3.9	<i>Noise</i>	58
3.3.10	<i>Visual and Lighting</i>	58
3.3.11	<i>Cultural Heritage</i>	58

3.3.12	<i>Spontaneous Combustion</i>	59
3.3.13	<i>Bushfire</i>	60
3.3.14	<i>Mine Subsidence</i>	61
3.4	OPERATIONAL RISKS RELATING TO REHABILITATION	62
3.4.1	<i>Geology and Geochemistry</i>	63
3.4.2	<i>Material Prone to Spontaneous Combustion</i>	63
3.4.3	<i>Material Prone to Generating Acid Mine Drainage</i>	64
3.4.4	<i>Mine Subsidence</i>	64
3.4.5	<i>Erosion and Sediment Control</i>	64
3.4.6	<i>Soil Type(s) and Suitability</i>	64
3.4.7	<i>Flora and Fauna</i>	66
3.4.8	<i>Weed and Pest Management</i>	66
3.4.9	<i>Overburden Characterisation</i>	66
3.4.10	<i>Slopes and Slope Management</i>	67
3.4.11	<i>Visual and Lighting</i>	67
3.4.12	<i>Noise</i>	67
3.4.13	<i>Blasting</i>	67
3.4.14	<i>Surface Water</i>	67
3.4.15	<i>Groundwater</i>	67
3.4.16	<i>Contaminated Land</i>	67
3.4.17	<i>Air Quality</i>	68
3.4.18	<i>Greenhouse Gas</i>	68
3.4.19	<i>Cultural Heritage</i>	68
3.4.20	<i>Bushfire</i>	68
3.4.21	<i>Drought</i>	69
3.4.22	<i>Social Impacts</i>	69
3.5	ADDITIONAL STUDIES	69
4	POST MINING LAND USE	70
4.1	REGULATORY REQUIREMENTS.....	70
4.2	POST MINING LAND USE GOAL.....	73
4.3	REHABILITATION OBJECTIVES.....	74
4.4	DETAILED MINE CLOSURE PLANNING	76
5	REHABILITATION PLANNING AND MANAGEMENT	77
5.1	DOMAIN SELECTION	77
5.2	DOMAIN REHABILITATION OBJECTIVES	78
5.3	REHABILITATION PHASES	80
6	PERFORMANCE INDICATORS AND COMPLETION/RELINQUISHMENT CRITERIA	82
7	REHABILITATION IMPLEMENTATION	97
7.1	STATUS AT MOP COMMENCEMENT.....	97
7.2	PROPOSED REHABILITATION ACTIVITIES DURING THE MOP TERM.....	97
7.3	REHABILITATION METHODOLOGIES FOR ACTIVITIES IN THE MOP TERM	98
7.3.1	<i>Domain 1 – Infrastructure Area</i>	98
7.3.2	<i>Domain 3 – Water Management Area</i>	99
7.3.3	<i>Domain 5 – Stockpiled Material</i>	99
7.3.4	<i>Domain 8 – Underground Mining Area</i>	99
7.3.5	<i>Domain 9 – Conservation and Biodiversity Offset Area</i>	101
7.3.6	<i>Domain A – Retained Infrastructure</i>	102
7.3.7	<i>Domain B – Retained Water Management Area</i>	102
7.3.8	<i>Domain E – Rehabilitation Area – Woodland</i>	102
7.3.9	<i>Domain F – Rehabilitation Area – Forest</i>	102
7.3.10	<i>Domain G – Rehabilitation Area – Rural Land</i>	102
7.3.11	<i>Domain J – Conservation and Biodiversity Offset Area</i>	102

7.4	SUMMARY OF REHABILITATION AREAS DURING THE MOP TERM	103
7.5	RELINQUISHMENT PHASE ACHIEVED DURING THE MOP TERM	106
8	REHABILITATION MONITORING AND RESEARCH	106
8.1	REHABILITATION MONITORING	106
8.1.1	<i>Proposed Monitoring Methodology</i>	106
8.2	RESEARCH AND REHABILITATION TRIALS AND USE OF ANALOGUE SITES	107
8.2.1	<i>Use of Analogue Sites</i>	107
8.2.2	<i>Mandalong Mine and VAM-RAB Offset Area</i>	107
8.2.3	<i>Land Management Strategy for the MSSS and TL24 Offset Areas</i>	108
8.2.4	<i>Moran's Creek Rehabilitation Trials</i>	109
9	INTERVENTION AND ADAPTIVE MANAGEMENT	110
9.1	THREATS TO REHABILITATION	110
9.2	TRIGGER ACTION RESPONSE PLAN	110
10	REPORTING	116
11	PLANS	116
12	REVIEW AND IMPLEMENTATION OF THE MOP	118
12.1	REVIEW OF THE MOP / REHABILITATION MANAGEMENT PLAN	118
12.2	IMPLEMENTATION	118
13	BIBLIOGRAPHY	119

List of Figures

FIGURE 1	REGIONAL LOCALITY	3
FIGURE 2	MINING AREAS	5
FIGURE 3	MINING AUTHORITIES AND BOUNDARIES	6
FIGURE 4 - AREA 2	MINING SCHEDULE	37

List of Tables

TABLE 1 – MOP HISTORY	7
TABLE 2 – DEVELOPMENT CONSENTS	11
TABLE 3 – SUMMARY OF MINING AUTHORITIES, AGREEMENTS AND LICENCES	13
TABLE 4 – SMP AND EXTRACTION APPROVALS	16
TABLE 5 – SUMMARY OF WATER LICENCES	18
TABLE 6 – RELEVANT DEVELOPMENT CONSENT AND MINING TENEMENT REQUIREMENTS FOR THE PREPARATION OF A MOP / REHABILITATION MANAGEMENT PLAN	19
TABLE 7 – PROPOSED MANDALONG SOUTH SURFACE SITE CONSTRUCTION PHASES	32
TABLE 8 – PROPOSED MINING SCHEDULE DURING THE MOP TERM	35
TABLE 9 – DEVELOPMENT EQUIPMENT	38
TABLE 10 – LONGWALL EQUIPMENT	38
TABLE 11 – MEN AND MATERIALS TRANSPORT SYSTEM	39
TABLE 12 – PRODUCTION SCHEDULE	43
TABLE 13 – PRIMARY DOMAINS	43
TABLE 14 – ASSET REGISTER	45
TABLE 15 – EMS MANAGEMENT PLANS	52
TABLE 15 – FURTHER STUDIES REQUIRED TO INFORM CLOSURE ACTIVITIES	69
TABLE 16 – REGULATORY REQUIREMENTS	70

TABLE 17 – SSD-5144 REHABILITATION OBJECTIVES	75
TABLE 18 – SSD-5145 REHABILITATION OBJECTIVES (AS APPLICABLE TO THE CES)	75
TABLE 19 – MOP DOMAINS	77
TABLE 20 – DOMAIN REHABILITATION OBJECTIVES	79
TABLE 21 – SUMMARY OF REHABILITATION PHASES FOR EACH DOMAIN AT THE END OF MOP TERM	81
TABLE 22 – PHASE 1 – DECOMMISSIONING PHASE	83
TABLE 23 – PHASE 2 – LANDFORM ESTABLISHMENT	88
TABLE 24 – PHASE 3 – GROWTH MEDIUM DEVELOPMENT	90
TABLE 25 – PHASE 4 – ECOSYSTEM AND LAND USE ESTABLISHMENT	92
TABLE 26 – PHASE 5 – ECOSYSTEM SUSTAINABILITY	95
TABLE 27 – REHABILITATION STATUS AT MOP COMMENCEMENT	97
TABLE 28 – REHABILITATION AND DISTURBANCE RATES DURING THE MOP TERM	98
TABLE 29 – SUMMARY OF REHABILITATION PROPOSED DURING THE MOP TERM	103
TABLE 30 – REHABILITATION TRIGGER ACTION RESPONSE PLAN	111
TABLE 31 – LIST OF MOP PLANS	117
TABLE 32 – MOP RESPONSIBILITIES	118

List of Appendices

APPENDIX 1A – DEVELOPMENT CONSENT SSD-5144
APPENDIX 1B – DEVELOPMENT CONSENT SSD-5145
APPENDIX 2 – DP&E DPIE EXTENSION FOR SUBMISSION OF REHABILITATION MANAGEMENT PLAN
APPENDIX 3 – FEEDBACK FROM STAKEHOLDER CONSULTATION
APPENDIX 4 – SCHEDULE OF LANDS
APPENDIX 5 – RISK ASSESSMENT
APPENDIX 6 – SUMMARY OF REMNANT PONDING REMEDIATION
APPENDIX 7 6 – MOP PLANS

DOCUMENT CONTROL

DOCUMENT DETAILS	Name:	Mandalong Mine
		Mining Operations Plan Amendment A Amendment B Amendment C Amendment D
	Author:	Nathan Archer (SLR)
	Number:	MEMS-RMP-8080
	Revision No.:	7 8 9
	Document Status	Final Draft Amendment A Final Amendment B Draft Amendment C Draft Amendment D

APPROVAL DETAILS	Revision No.	Date Sent	Details of Approval	Approved By	Approval Date
	0	3/6/16	Final for Consultation	Jeffrey Dunwoodie	3/6/16
	1	29/6/16	Final to satisfy consent condition	Jeffrey Dunwoodie	29/6/16
	2	4/11/16	Final addressing Department Comments	Jeffrey Dunwoodie	4/11/16
	3	28/3/17	Draft Amendment A for DRE review	Jeffrey Dunwoodie	28/3/17
	4	4/4/17	Final Amendment A	Jeffrey Dunwoodie	4/4/17
	5	15/12/17	Draft Amendment B for DRE review	Jeffrey Dunwoodie	15/12/17
	6	9/2/2018	Final Amendment B	Jeffrey Dunwoodie	9/2/2018
	7	5/3/2018	Final Amendment B rev 1	Jeffrey Dunwoodie	5/3/2018
	8	12/11/20	Amendment C	Jeffrey Dunwoodie	
	9	18/1/21	Amendment C – final addressing Department Comments	Jeffrey Dunwoodie	05/02/2021
	10	12/5/21	Amendment D	Jeffrey Dunwoodie	

CIRCULATION DETAILS	Name	Department	Circulation Date
		DPIE	
		RR	
		DPE	16/2/2018
		DRG	16/2/2018

	DRG	15/12/17
	DRE	28/3/2017
	DP&E	4/11/16
	DRE	4/11/16
	DP&E	30/6/2016
	DRE	6/6/16
	OEH	6/6/16
	DPI-Water	6/6/16
	LMCC	6/6/16
	CCC	6/6/16
	DP&E	6/6/16

1 Introduction

Mandalong Mine is an existing underground coal mine operation located in the Lake Macquarie Local Government Area (LGA) approximately 130 kilometres (km) north of Sydney and 35 km south-west of Newcastle near Morisset in New South Wales (NSW) (refer **Figure 1**). The Mine supplies coal both to the domestic and export markets.

Mandalong Mine is owned and operated by Centennial Mandalong Pty Ltd (Centennial Mandalong), a subsidiary of Centennial Coal Company Limited (Centennial). Centennial Coal was purchased by Banpu Public Company Limited (Banpu) in October 2010.

Mandalong utilise a combination of longwall and continuous mining methods to extract coal from the West Wallarah Seam. The Mandalong South Mine Plan allows for a combination of longwall and continuous mining methods to extract coal from the West Wallarah Seam.

This Mining Operations Plan (MOP) outlines the proposed operations at the Mandalong Mine, including the Mandalong Mine Access Site (MMAS) and ~~proposed~~ Mandalong South Surface Site (MSSS), as approved by Development Consent SSD-5144 under the *NSW Environmental Planning and Assessment Act 1979* (EP&A Act). The MOP also incorporates the operations at the Cooranbong Entry Site (CES) as approved by Development Consent SSD-5145 and the Delta Entry Site (DES) as approved by Development Consent DA 35-2-2004.

Whilst operations associated with the CES have been included in this MOP, other components of the Northern Coal Logistics Project, located within the Mandalong Mine Project Application Area including the Cooranbong Haul Road have been excluded from this MOP.

The area covered by the operations at the Mandalong Mine (including the MMAS, ~~proposed~~ MSSS, Mandalong Mine Underground Mining Area and associated offset areas), the CES and the DES is here after referred to as the MOP Area.

This MOP has been prepared in accordance with the ~~Department of Industry – Division of Resources and Energy (DRE) Department of Planning and Environment – Division of Resources and Geoscience (DRG) (formerly DRE) Department of Planning, Infrastructure and Environment (DPIE) – Resources Regulator (RR) (formerly DRG)~~ publication titled *ESG3: Mining Operations Plan (MOP) Guidelines* (RR, 2013). This MOP has also been prepared to satisfy the requirements of a Rehabilitation Management Plan (required by Schedule 3, Condition 33 of Development Consent SSD-5144 and Schedule 3 Condition 29 of Development Consent SSD-5145).

The MOP has been prepared for the seven year period from 1 December 2016 to 30 November 2023, herein referred to as the MOP Term.

MOP Amendment C ~~has been~~ was prepared to address a new area of bord and pillar mining to be undertaken in the approved Mining Area 2 within the development footprint of SSD-5144.

In addition, MOP Amendment C has incorporated three modifications to SSD-5144; regarding water management at the MSSS (MOD6), the construction of a 33kV powerline to the MSSS (MOD 7); and the upgrade of a substation, car park and increase in workforce at MMAS (MOD 8).

MOP Amendment D has been prepared to address SSD 5144 MOD 9 which includes the deletion of Longwalls 30, 31, 36 and 37 as well as the reorientation of Longwalls 32 to 35. Longwalls 32 to 35 have been renamed as Longwalls 30 to 33.

Following approval of the MOP by ~~DRE DRG~~ RR, this document ~~will be~~ was submitted for consultation with the ~~Department of Planning and Environment (DP&E), Department of Primary Industries Water (DPI Water), NSW Office of Environment and Heritage (OEH)~~ the DPIE Division of Water (DPIE-Water), Biodiversity and Conservation Division (BCD), Lake Macquarie City Council (LMCC) and the Community Consultative Committee (CCC) before being re-submitted to Secretary and ~~DRE DRG~~ RR for approval as satisfying the requirements of a Rehabilitation Management Plan in accordance with Development Consents SSD-5144 and SSD-5145.

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1.1 History of Operations

Mandalong Mine, which is an extension of the old Cooranbong Colliery, was originally granted Development Consent DA 97/800 by the then Minister for Urban Affairs and Planning on 14 October 1998 under Part 4 of the EP&A Act following the submission of the *Cooranbong Colliery Life Extension Project Environmental Impact Statement* (Umwelt (Australia) 1997) and a Commission of Inquiry. Development Consent DA 97/800 and its subsequent modifications permitted the construction and operation of an underground coal mine to extract up to 6 million tonnes per annum (Mtpa) of run of mine (ROM) coal, along with an overland conveyor system and a coal preparation plant (CPP). The CES, also approved under DA 97/800 as part of the Mandalong Mine, encompassed a coal delivery system and surface infrastructure (coal handling and processing) near Dora Creek. DA 97/800 was modified on ten separate occasions, with the final modification (MOD 10) being approved on 26 November 2014.

Development Consent DA 35-2-2004, granted in July 2004 by the former Department of Planning and Infrastructure (now **DP&E DPIE**), approved the construction and operation of the coal handling and clearance system at the DES. Construction of the Delta Coal Clearance System was completed in 2006.

On 12 October 2015, Development Consent SSD-5144 for the Mandalong Southern Extension Project was approved by the Planning Assessment Commission (PAC) of NSW (under delegation from the Minister for Planning) pursuant to Part 4 of the EP&A Act. Development Consent SSD-5144 allows for the continued underground mining operations using a combination of longwall and continuous mining methods until 31 December 2040. Mandalong will undertake underground mining operations in the existing northern lease areas and the extension of underground mining operations into the area covered by Mining Lease (ML) 1722 and ML 1744 (refer **Figure 2** and **Figure 3**).

Continued operations at the CES were approved as part of the Northern Coal Logistics Project (SSD-5145) on 29 September 2015 by the Minister for Planning. The Northern Coal Logistics Project is largely a continuation of existing surface activities associated with the approved Newstan Colliery and Cooranbong Entry Site operations. These activities are integral to the on-going handling, processing and transportation of coal from the underground workings of Newstan Colliery and Mandalong Mine.

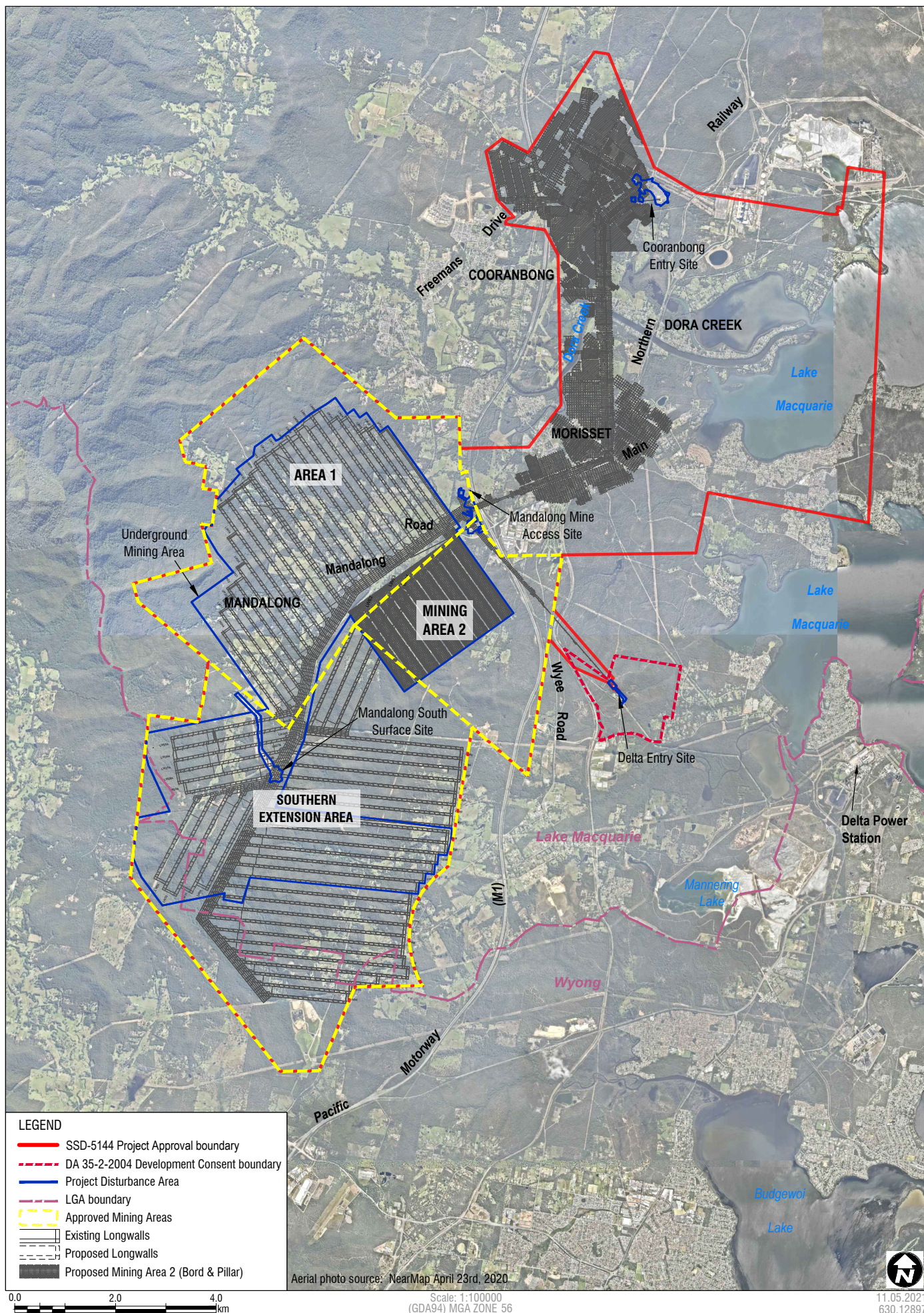
Following the approval of the SSD-5145 the CES and Cooranbong Haul Road were transferred from Mandalong Mine to Northern Coal Logistics; however, since operations at the CES continue to be managed by Centennial Mandalong they have been included in this MOP.

Operations at Mandalong Mine have been undertaken in accordance with the MOPs outlined in **Table 1**. ~~This document replaces Amendment B of the Mandalong Mine MOP which was approved on 19 January 2016 Amendment A of the Mandalong Mine Mining Operations Plan December 2016 to November 2023 which was approved on 29 November 2016 12 April 2017.~~

~~This document replaces Amendment B of the Mandalong Mine MOP December 2016 to November 2023 which was approved on 6 March 2018. There is no change to the MOP Term.~~

This document replaces Amendment C of the Mandalong Mine MOP December 2016 to November 2023 which was approved on 5 February 2021. There is no change to the MOP Term.

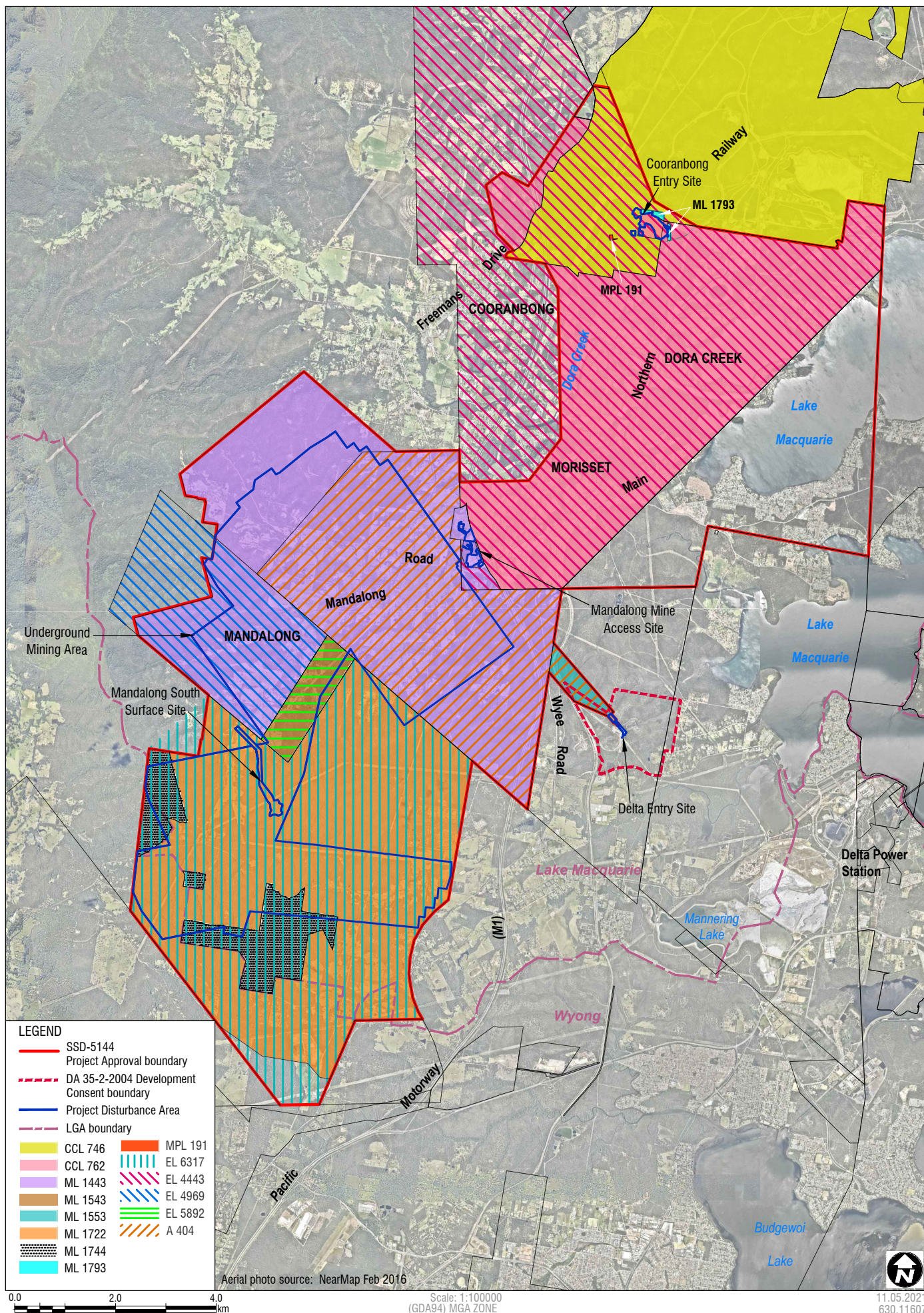
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MINING AREAS

FIGURE 2

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MINING AUTHORISATION BOUNDARIES

FIGURE 3

Table 1 – MOP History

MOP Name	Amendment	Status	Approval Date	Expiry Date	Comment
Mining Operations Plan Mandalong Mine December 2016 to November 2023	Amendment C	Current	5/2/2021	23/11/2023	New area of bord and pillar mining in the approved Mining Area 2.
Mining Operations Plan Mandalong Mine December 2016 to November 2023	Amendment B	Current Superseded	6/3/2018	23/11/2023	Extension of LW24 and the addition of LW24A.
Mining Operations Plan Mandalong Mine December 2016 to November 2023	Amendment A	Current Superseded	12/4/2017	23/11/2023	Extension and extraction of Longwall 22 and 23.
Mining Operations Plan Mandalong Mine December 2016 to November 2023	Original MOP	Current Superseded	29/11/2016	30/11/2023	Original MOP including the Mandalong Southern Extension Project.
Mining Operations Plan Mandalong Mine January 2014 to November 2016 Amendment B	Amendment B	Current Superseded	19/01/2016	30/11/2016	Extension of the MOP Area to allow the development of the Main Headings into a small section of ML 1722.
Mining Operations Plan Mandalong Mine January 2014 to November 2016 Amendment A	Amendment A	Superseded	13/10/2015	30/11/2016	The delay in securing the development consent for the Mandalong Southern Extension Project required an extension of MOP period for a further 12 months to 30 November 2016
Mining Operations Plan Mandalong Mine January 2014 to November 2015	Original MOP	Superseded	23/12/2013	30/11/2015	MOP approved for a two year period to coincide with the anticipated approval of the Mandalong Southern Extension Project.
Mining Operations Plan Mandalong Mine January 2012 to December 2013 - Amendment	Amendment A	Superseded	16/10/2013	31/12/2013	Three month extension to allow preparation of a new MOP for the period December 2013 to November 2015. No operational changes in the extension period.
Mining Operations Plan Mandalong Mine January 2012 to December 2013	Original MOP	Superseded	30/11/2011	31/12/2013	MOP for two year period agreed in recognition of the transition process to the Rehabilitation and Environmental Management Plan under the <i>Mining Amendment Act 2008</i> . Approved for two year period November 2011 to December 2013
Mining Operations Plan Mandalong Mine January 2005 to December 2011 – Amendment	Amendment	Superseded	22/06/2010	31/12/2011	Amendment to increase production from 3.5 Mtpa to 5Mtpa and increase MOP Area to included mining up to Longwall 14 to align with SMP for Longwalls 11-14.

MOP Name	Amendment	Status	Approval Date	Expiry Date	Comment
Mining Operations Plan Delta Project September 2004 to September 2011	Original MOP	Superseded	No record	31/09/2011	MOP for activities associated with the construction of the proposed surface facilities of the Delta Decline Site and proposed underground mining works within ML 1553.
Mining Operations Plan Mandalong Mine January 2005 to December 2011	Original MOP	Superseded	Letter not dated	31/12/2011	Original MOP for longwall mining.

1.2 Current Consents, Authorisations and Licences

1.2.1 State Significant Development

Mandalong Mine is State Significant Development (SSD) in accordance with Clause 8 and Schedule 1 (Item 5) of State Environmental Planning Policy (State and Regional Development) 2011, subsequently it is considered to be a Level 1 Mine as specified in *ESG3: Mining Operations Plan (MOP) Guidelines* (DRG 2013).

1.2.2 Development Consents

1.2.2.1 Mandalong Southern Extension Project

Development Consent SSD-5144 was granted on 12 October 2015. This consent replaces the former Development Consent DA 97/800 which will be surrendered by 30 April 2017 (in accordance with Schedule 2, Condition 13 of SSD-5144 **or as otherwise agreed with the Secretary**). ~~A copy of SSD-5144 has been attached as Appendix 1A.~~ SSD-5144 ~~approves~~ approved the following activities:

- Continuation of the currently approved operations at the Mandalong Mine, with the exception of the infrastructure and operations at the surface of the CES (which are approved under SSD-5145 - refer **Section 1.2.2.2**);
- Extension of Mandalong Mine's underground mining operations into the area covered by ML 1722 and ML 1744 (Southern Extension Area) using a combination of continuous miner and longwall mining methods;
- Extraction of up to 6.5 Mtpa of ROM coal from the West Wallarah and Wallarah-Great Northern Seams within the current mining lease areas and the area covered by ML 1722 and ML 1744;
- An increase in the delivery of ROM coal from the underground workings to the CES and DES from 4 Mtpa to 6 Mtpa;
- Continued utilisation of the existing surface infrastructure of the Mandalong Mine Access Site (MMAS);
- Installation and operation of surface infrastructure at the ~~proposed~~ Mandalong South Surface Site (MSSS) to service the extended underground mining operation;
- Increasing the manning to 420 full-time employees and up to 50 contractors during longwall relocations;
- On-going exploration drilling and/or groundwater monitoring activities within the bounds of Centennial Mandalong's exploration licences;
- Increasing the life of mine to 25 years from the granting of a mining lease(s) over EL 6317 (ML 1722 was granted on 17 December 2015 **and ML 1744 was granted on 6 October 2016¹**); and
- Continuing to operate 24 hours per day, seven days per week.

¹ It is noted that whilst SSD-5144 approves mining until 17 December 2040, ML 1722 only approves mining until 17 December 2036 **and ML 1744 approves mining until 6 October 2037**.

Approval to modify SSD-5144 (MOD 1) to allow for the relocation of Transgrid's 330 kV Transmission Line TL24 was granted by the ~~DP&E DPIE~~ on 14 June 2016.

In August 2016, Centennial Mandalong submitted a second application to modify Development Consent SSD-5144 (MOD 2) to the ~~DP&E DPIE~~. The modification was seeking to extend development of first workings associated with maingates for longwall panels 22 and 23 ~~beyond the current approved mine plan~~. This modification was approved on 22 September 2016. ~~A further modification (proposed MOD 3) is currently on exhibition to increase annual tonnage to 6.5 Mtpa.~~

~~On 29 November 2016, a third modification (MOD 3) was approved to increase the annual extraction rate of ROM coal from 6 Mtpa to 6.5 Mtpa.~~

~~Centennial Mandalong are also seeking a further modification to SSD-5144 (proposed MOD 4) to allow for the secondary extraction of Longwalls 22 and 23 as follows:~~

~~On 28 March 2017, SSD 5144 MOD 4 was approved by the DP&E DPIE which allowed for the secondary extraction of Longwalls 22 and 23 as extended within the Project Application Area as follows:~~

- ~~• Extension of Longwall 22 from 1,630 m to 2,212 m. This yields 617,381 additional tonnes beyond the 1,793,842 tonnes already approved; and~~
- ~~• Extension of Longwall 23 from 1,631 m to 2,392 m. This yields 799,933 additional tonnes beyond the 1,799,425 tonnes already approved.~~

~~An additional modification (proposed MOD 5) will also be required to allow for the extension of first workings and secondary extraction associated with the Longwalls 24 and 24A.~~

~~Proposed MOD3, MOD 4 and MOD 5 is are not included in this MOP.~~

~~A copy of SSD-5144 MOD 4 has been attached as Appendix 1A.~~

On 1 August 2017, SSD 5144 MOD 5 was approved by the ~~DP&E DPIE~~ which allowed for the secondary extraction of Longwalls 24 and 24A within the Project Application Area as follows:

- ~~• Extension of longwall panel 24 from 1,631 m to 2,570 m. This would yield an additional 1,030,813 tonnes beyond 1,766,912 tonnes already approved.~~
- ~~• Addition of longwall panel 24A. Longwall panel 24A is proposed to be 2,470 m in length and would yield an additional 2,679,560 tonnes of coal.~~

~~A copy of SSD-5144 MOD5 has been attached as Appendix 1A.~~

SSD 5144 MOD 6 was approved by DPIE on 15 April 2019. SSD 5144 MOD 6 allows for the temporary controlled release of stored water from the MSSS Sediment Dam following significant rainfall events and the ability to transport the sediment and material collected at the MSSS to the CES.

SSD 5144 MOD 7, for the construction of a new 7.7 km-long 33-kV overland powerline from the MMAS to the MSSS, was approved on 25 July 2019.

SSD 5144 MOD 8 was approved by DPIE on 17 January 2020 and allows Mandalong to:

- increase the number of full-time equivalent (FTE) personnel operating at MMAS from 470 to 815 (increase of 345 FTE personnel);
- increase on-site car parking capacity at the MMAS from the existing 228 spaces to a total of approximately 460 spaces; and

- allow the necessary expansion of electrical infrastructure at the MMAS via an upgrade of the existing substation.

SSD 5144 MOD 9 was approved by DPIE on 1 April 2021 and provides for:

- deletion of approved longwalls 30, 31, 36 and 37;
- reorientation of approved longwalls 32 to 35;
- renaming of approved longwalls 32 to 35 to longwalls 30 to 33; and
- increasing the chain pillar widths between the reorientated longwalls to be consistent with the pillar factor of safety and predicted subsidence assessed for the approved mining layout.

A copy of the consolidated consent SSD 5144 is attached as **Appendix 1A**.

1.2.2.2 Northern Coal Logistics Project

The CES is approved under Development Consent SSD-5145 which was granted for the Northern Coal Logistics Project on 29 September 2015. The Northern Coal Logistics Project is largely a continuation of existing surface activities associated with the approved Newstan Colliery and CES operations and encompasses the ongoing handling, processing and transportation of coal from the underground workings of Mandalong Mine and the Newstan Colliery. The Northern Coal Logistics Project provides flexibility to supply varying quantities of coal into domestic and export markets.

On 25 January 2018, the Centennial Northern Coal Services modification (SSD-5145 Mod 1) was approved by the Department of Planning & Environment. The modification allows Northern Coal Services to:

- Increase the number of full-time equivalent employees based at the CES from 14 to 60; and
- Amend the operational noise criteria specified by Condition 2 of Schedule 3 for the privately-owned residences in the vicinity of the CES.

A copy of SSD-5145 Mod 1 has been attached as **Appendix 1B**.

The surface infrastructure and operations at the CES are part of the Northern Coal Logistics Project, however, continue to be managed by Centennial Mandalong. Subsequently, the CES has been included in this MOP. However, it is noted that other components of the Northern Coal Logistics Project, located within the Mandalong Mine Project Application Area including the Cooranbong Haul Road have been excluded from this MOP. The Cooranbong Haul Road will be captured within the Northern Coal Logistics MOP.

1.2.2.3 Delta Link Project

The DES is approved under Development Consent DA 35-2-2004 which was granted for the Delta Link Project – Mandalong Coal Delivery System on 4 July 2004. DA 35-2-2004 approves the transportation of coal to the DES via the underground Mandalong Coal Delivery System, as described in the *Delta Link Project – Statement of Environmental Effects* (Umwelt 2004).

On 17 October 2017, DA 35-2-2004 (MOD 1) was approved by the DP&E DPIE allowing the operation of the Mandalong Coal Delivery System until 31 December 2040.

Additional detail pertaining to the Mandalong Development Consents has been provided in **Table 2**.

Table 2 – Development Consents

Development Consent	Details	Date of Issue	Expiry
SSD-5144	Mandalong South Extension Project (refer Section 1.2.2.1)	12 October 2015	31 December 2040
	MOD 1 – relocation of transmission line TL24	14 June 2016	
	MOD 2 – approval for the extension of first workings in Longwalls 22 and 23	22 September 2016	
	MOD 3 – approval for an increase to the annual production limit from 6 million tonnes per annum to 6.5 million tonnes per annum in addition to correcting administrative errors currently attached to the SSD-5144 development consent.	16 November 2016	
	MOD 4 – approval for an extension of existing longwall panels 22 and 23 within the current SSD-5144 consent boundary.	28 March 2017	
	MOD 5 – approval for an extension of an existing longwall panel (LW 24) and the addition of a new longwall panel (LW 24A) within the current SSD-5144 consent boundary.	1 August 2017	
	MOD 6 – approval for the temporary controlled release of stored water from the MSSS Sediment Dam following significant rainfall events and the ability to transport the sediment and material collected at the MSSS to the CES	15 April 2019	
	MOD 7 – approval for the construction of a new 7.7 km 33-kV overland powerline from the MMAS to the MSSS	25 July 2019	
	MOD 8 – approval to increase personnel from 470 to 815 full-time equivalent (FTE) employees, upgrade existing electrical substation and expansion of car park at the MMAS	17 January 2020	
	MOD 9 – deletion of longwalls 30, 31, 36 and 37. Reorientating and renaming longwalls 32 to 35 to longwalls 30 to 33.	1 April 2021	
DA 97/800	Development consent for the extension to underground mining activities for Cooranbong Colliery, establishment of Mine Access Site, modification to Coal Preparation and Transportation System and establishment of a Coarse Reject Area.	14 October 2008	30 April 2017 30 April 2018 30 October 2020
	MOD 1 - minor changes to the conditions of consent relating to the preparation of subsidence management plans and notification of landholder requirements, as described in the modification application, dated 29 March 2001.	August 2001	
	MOD 2 - installation of methane drainage plant and the transport of 1,000 tonnes of mined coal by road, as described in <i>Mandalong Mine Methane Drainage Plant and Coal Haulage, Statement of Environmental Effects</i> , dated 28 October 2004.	February 2005	
	MOD 3 - installation and operation of enclosed methane gas flare units for high purity methane drainage gas. This was undertaken in response to condition 60a(iii) imposed as part of MOD 2, which required Centennial Mandalong to submit a report on the progress towards implementing greenhouse gas abatement measures. This modification is as described in the <i>Statement of Environmental Effects for the Installation and Operation of Enclosed Methane Gas Flare Units</i> , dated February 2006.	March 2006	
	MOD 4 - installation and operation of gas engines (yet to be constructed) to produce up to 12 megawatts of electricity using high purity methane drainage gas, increase the coal production rate from 4 Mtpa to 6 Mtpa, relocate a ballast borehole and update subsidence conditions. This modification is as described in the <i>Environmental Assessment entitled Mandalong Mine Modification to Development Consent Environmental Assessment</i> , dated September 2008.	July 2009	

Development Consent	Details	Date of Issue	Expiry
	MOD 5 - coal from Mandalong Mine (Cooranbong Entry Site) permitted to be washed at Newstan Colliery and a temporary increase in the volume of coal transported by conveyor from the Cooranbong Entry Site to the Eraring Power Station stockpiles for subsequent road haulage to Newstan Colliery (until construction of the Cooranbong Private Haul Road was complete). This modification is as described in the Statement of Environmental Effects entitled <i>Washing of Mandalong Coal at Newstan Section 96(A) Application Statement of Environmental Effects</i> , dated October 2009.	27 November 2009	
	MOD 6 - changes to the locations and heights of approved coal handling infrastructure at the Cooranbong Entry Site. This modification is as described in the Statement of Environmental Effects entitled <i>Relocation of Infrastructure within the Mandalong Services Site Section 96(1A) Application Statement of Environmental Effects</i> , dated November 2009.	30 November 2009	
	MOD 7 - installation and operation of a new technology known as a ventilation air methane regenerative after burner (VAM-RAB) as a trial unit to demonstrate the ability of the technology to capture and abate ventilation air methane from the underground mine. This modification is as described in the <i>Environmental Assessment: Ventilation Air Methane Abatement Demonstration Project, Mandalong Mine – Section 75W Modification</i> , dated June 2011 and additional information provided in the document entitled <i>Mandalong Mine Ventilation Air Methane Abatement Demonstration Project – Response to Submissions</i> dated September 2011.	October 2011	
	MOD 8 - increase in the volume of coal permitted to be transported from the Cooranbong Entry Site to both Newstan Colliery and Eraring Power Station from 2 Mtpa to up to 4 Mtpa and back haulage of middlings (middle quality coal product) from Newstan Colliery to Cooranbong Entry Site for subsequent supply to the Eraring Power Station. This modification is as described in the <i>Environmental Assessment: Mandalong Mine – Cooranbong Entry Site – Cooranbong Distribution Project – Section 75W Modification to Development Consent DA 97/800</i> , dated May 2012 and additional Noise Mitigation Assessment, dated 31 May 2012.	August 2012	
	MOD 9 - administrative amendment to conditions 1A(c) and (d) to allow the coal delivery limits approved as part of MOD 8 (i.e. up to 4 Mtpa from Cooranbong Entry Site to both Newstan Colliery and Eraring Power Station).	February 2013	
	MOD 10 – Modification to allow for an additional 100,000 tpa of ROM coal to be handled and transported from the Cooranbong Entry Site above the approved 4 Mtpa for the calendar year of 2014 only.	November 2014	
SSD-5145	Northern Coal Logistics Project (refer Section 1.2.2.2)	29 September 2015	31 December 2045
	MOD1 – Modification to increase the number of employees based at the CES and make administrative changes to the operational noise and air quality criteria.	25 January 2018	
DA 35-2-2004	Development consent for the transportation of coal to the Delta Entry Site via the underground Mandalong Coal Delivery System.	July 2004	July 2021
	MOD 1 – modification to increase the life of the Mandalong Coal Delivery System until 31 December 2040.	17 October 2017.	31 December 2040.

1.2.3 Licences and Authorisations

1.2.3.1 Environmental Protection Licence

Mandalong Mine 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 Licence (EPL) administered by the Environment Protection Authority (EPA) under Section 43(b) of the POEO Act.

The surface holdings at Mandalong Mine, [MSSS](#), CES and DES are licenced under EPL 365, which covers coal mining to a scale of greater than 5 million tonnes produced per annum and coal works to a scale of greater than 5 million tonnes handled per annum.

EPL 365 permits the discharge of water from the CES via two licensed discharge points (LDP001 and LDP002) into an unnamed drainage path that reports to Muddy Lake on the western side of Lake Macquarie; [from the MMAS via one LDP \(LDP003\) and from the MSSS from one LDP \(LDP004\)](#).

EPL 365 was issued on 30 May 2000.

1.2.3.2 Mining Authorities

The Mandalong Mine Colliery Holding undertakes mining operations in accordance with numerous mining authorities issued under the *Mining Act 1992*. The location of mining authorities and the MLA are shown on **Figure 3** and detailed in **Table 3**.

1.2.3.3 Sub-Lease and Agreements

One sub-lease agreement exists for the Mandalong Mine Colliery Holding. The sub-lease agreement benefits Mandalong Mine over part of Newstan Colliery CCL 746. The sub-lease is between companies within the Centennial group. The location of sub-leases and agreements are shown on **Figure 3** and detailed in **Table 3**.

1.2.3.4 Authorisations and Exploration Licences

Mandalong Mine Colliery Holding is subject to six authorities under the *Mining Act 1992* that provide for exploration activities to be carried out on the surface. Details of the authorisations and exploration licences are shown on **Figure 3** and detailed in **Table 3**.

Table 3 – Summary of Mining Authorities, Agreements and Licences

Name	Description	Issued by	Grant Date	Expiry Date	Renewal Procedure
Mining Lease 1431	Title to surface land for proposed shaft at the back of Morisset	Dept. Primary Industry (Mineral Resources)	27/05/1998	27/5/2019 Cancelled effective 15 May 2019.	Group Manager Property, Titles and Survey Manager Title and Property North

Name	Description	Issued by	Grant Date	Expiry Date	Renewal Procedure
Mining Lease 1443	Mandalong Project Mining Lease – includes some surface land	Dept. Primary Industry (Minerals Resources)	01/03/1999	1/03/2020 ²	Group Manager Property, Titles and Survey Manager Title and Property North
Mining Lease 1543	Mining Lease – Mandalong Mine Project	Dept. Primary Industry (Mineral Resources)	25/11/2003	25/11/2024	Group Manager Property, Titles and Survey Manager Title and Property North
Mining Lease 1553	Mining Lease Delta Link Project – includes surface land	Dept. Primary Industry (Mineral Resources)	07/09/2004	07/09/2025	Group Manager Property, Titles and Survey Manager Title and Property North
Mining Lease 1722	Mining Lease – Southern Extension Area	Dept. Industry Resources and Energy	17/12/2015	17/12/2036	Group Manager Property, Titles and Survey Manager Title and Property North
Mining Lease 1744	Mining lease associated with proposed mining operations in the Olney State Forest areas within the Southern Extension Area	Dept. Industry Resources and Energy	6/10/2016	6/10/2037	Group Manager Property, Titles and Survey Manager Title and Property North
Mining Lease 1793	Ancillary mining activities at the Cooranbong Entry Site	Minister for Regional New South Wales, Industry and Trade	16/07/2019	16/07/2040	Group Manager Property, Titles and Survey
Mining Purposes Lease 191	Title to surface land for water tanks at Cooranbong – requires annual environmental management report on anniversary	Dept. Primary Industry (Mineral Resources)	25/02/1981	24/2/2023	Group Manager Property, Titles and Survey Manager Title and Property North

Name	Description	Issued by	Grant Date	Expiry Date	Renewal Procedure
Mining Purposes Lease 329	Title to surface land for old water supply line from Eraring Power Station – requires annual environmental management report on anniversary	Dept. Primary Industry (Mineral Resources)	5/8/1994	5/8/2015	Manager Title and Property North. This MPL has expired and is in the process of being relinquished
Consolidated Coal Lease 762	Title to Cooranbong Workings includes some surface land – some environmental conditions	Dept. Primary Industry (Mineral Resources)	16/09/1991	13/10/2022	Group Manager Property, Titles and Survey Manager Title and Property North
Consolidated Coal Lease 746 (sublease)	Title for Cooranbong Workings includes some surface land – some environmental conditions	Dept. Primary Industry (Mineral Resources)	16/05/1990	31/12/2028	Group Manager Property, Titles and Survey Manager Title and Property North This lease is managed by Centennial Newstan
Exploration Licence 4443	Exploration Licence ¹	Dept. Primary Industry (Mineral Resources)	23/10/1192	23/10/2017 ²	Group Manager Property, Titles and Survey Manager Title and Property North
Exploration Licence 4968	Exploration Licence ¹	Dept. Primary Industry (Mineral Resources)	25/03/1996	31/07/2017	Manager Title and Property North
Exploration Licence 4969	Exploration Licence ¹	Dept. Primary Industry (Mineral Resources)	25/03/1996	31/07/2017 ²	Group Manager Property, Titles and Survey Manager Title and Property North

Name	Description	Issued by	Grant Date	Expiry Date	Renewal Procedure
Exploration Licence 5892	Exploration Licence ¹	Dept. Primary Industry (Mineral Resources)	15/03/2002	31/07/2017 ²	Group Manager Property, Titles and Survey Manager Title and Property North
Exploration Licence 6317	Exploration Licence ¹ (renewed 27 March 2015)	Dept. Primary Industry (Mineral Resources)	17/03/2005	08/08/2019 ²	Group Manager Property, Titles and Survey Manager Title and Property North
Authorisation (AUTH) 404	Exploration Licence ¹	Dept. Primary Industry (Mineral Resources)	18/03/1988	31/07/2017 ²	Group Manager Property, Titles and Survey Manager Title and Property North

Note 1 - The Improved Management of Exploration Regulation (IMER) is a reform of NSW exploration regulation implemented from 1 July 2015. On renewal, the Mandalong exploration licences will become IMER titles and will become subject to IMER licence conditions. Until they are renewed under the IMER, the exploration licences are called non-IMER titles and will continue with their current licence conditions until their next renewal. Mining authorities are not covered by IMER and therefore are non-IMER titles.

Note 2 – [Renewal applications have been lodged and acknowledged for these titles however, no renewal offers have been received at the time of writing of this MOP.](#)

1.2.3.5 Subsidence Management Plan and Extraction Plan Approvals

Underground mining at Mandalong Mine is undertaken in accordance with approved Subsidence Management Plans (SMPs) which were prepared to satisfy the requirements of relevant mining authorities. Details pertaining to the SMP approvals at Mandalong have been provided in **Table 4**.

[In accordance with the requirements of SSD-5144, an Extraction Plan is currently being prepared for the secondary extraction of Longwalls 22 and 23.](#)

Table 4 – SMP and Extraction Plan Approvals

Approval	Location Description	Issued by	Expiry Date	Status
Section 138 Extraction Approval	Approval to develop and extract Longwalls 1 and 2	DMR 4/1/2005	1 July 2007	Completed
SMP Longwalls 3-5	Subsidence Management Plan approval for Longwalls 3 to 5	DPI-MR 10/4/2006	1 June 2013	Completed
Section 138 Extraction Approval	Approval to extract Longwalls 3, 4 & 5	DPI-MR 10/4/2006	1 June 2010	Completed
SMP Longwalls 6-7	Subsidence Management Plan approval for Longwalls 6 and 7	DPI-MR 8/2/2008	1 February 2014	Completed

Approval	Location Description	Issued by	Expiry Date	Status
Clause 88(1) Extraction Approval Longwalls 6-7	Approval to extract Longwalls 6 and 7	DPI-MR 14/2/2007	1 February 2012	Completed
SMP Longwalls 8-10	Subsidence Management Plan approval for Longwalls 8 to 10	DPI-MR 26/8/2008	1 July 2015	Completed
Clause 88(1) Extraction Approval 8-10	Approval to extract Longwalls 8 to 10	DPI-MR 23/1/2009	1 February 2012	Completed
SMP Longwalls 11-14	Subsidence Management Plan approval for Longwalls 11 to 14	DII 1/12/2009	1 November 2016	Completed
Clause 88(1) Extraction Approval 11-14	Approval to extract Longwalls 11 to 14	DII 14/2/2013	No expiry date	Completed
SMP Longwalls 15-17	Subsidence Management Plan approval for Longwalls 15 to 17	DRE DRG RR 23/7/2012	31 July 2019	Active
Clause 88(1) Extraction Approval 15-17	Approval to extract Longwalls 15 to 17	DRE DRG RR 25/3/2013	No expiry date	Completed
SMP Longwalls 18-21	Subsidence Management Plan approval for Longwalls 18 to 21	DRE DRG RR 30/7/2014	31 July 2021	Active
Clause 88(1) Extraction Approval 18-21	Approval to extract Longwalls 18 to 21	DRE DRG RR 25/3/2013	No expiry date	Active Completed
Extraction Plan Longwalls 22 and 23	Conditional Approval to extract Longwalls 22 and 23 ¹	DP&E DPIE 4/4/2017	No expiry date	Active
Extraction Plan Longwalls 24 and 24A	Approval to extract Longwalls 24 and 24A	DP&E DPIE 6/2/2017	No expiry date	Active
Extraction Plan Longwalls 25 to 31	Approval to extract Longwalls 25 to 31	DPIE 15/1/2019	No expiry date	Active
Extraction Plan Longwalls 30 and 31	Approval to extract Longwalls 30 and 31	Submitted to DPIE for approval on 9/4/2021	Not yet approved	Not yet approved

Note 1 – On 4 April 2017, ~~DP&E~~ DPIE granted approval for secondary extraction to commence within Longwalls 22 and 23 under the Extraction Plan as drafted. This Conditional Approval was granted to avoid delays to the commencement of secondary extraction; however, ~~DP&E~~ DPIE identified a number of minor issues to be addressed in various parts of the Extraction Plan prior to granting of final approval.

1.2.3.6 Water Licences

Centennial Mandalong currently holds several groundwater monitoring licences under the provisions of the *Water Act 1912* for the purposes of monitoring groundwater levels in the Mandalong Mine lease area.

A groundwater dewatering licence (licence number WAL39767) is also held by Centennial Mandalong under the *Water Act 1912* permitting the extraction of up to 1,825 megalitres (ML) per year of groundwater from the coal seam as part of the process of mining (dewatering).

A summary of water licences relevant to Mandalong Mine operations is presented in **Table 5**.

Table 5 – Summary of Water Licences

Bore Name	Bore No.	Licence No.	Purpose	Expiry Date
Cooranbong Borehole		WAL39767	Dewatering of Mine Workings	Renewed annually
BH1	GW078136	20BL166760	Monitoring	Perpetuity
BH2 BH2A BH2B BH2C	GW078137	20BL166761	Monitoring	Perpetuity
BH3 BH3A BH3B	GW078114	20BL166765	Monitoring	Perpetuity
BH4	GW078115	20BL166766	Monitoring	Perpetuity
BH5	GW078116	20BL166767	Monitoring	Perpetuity
BH6 BH6A BH6B	GW078139	20BL166762	Monitoring	Perpetuity
BH7 BH7A BH7B	GW078117	20BL166768	Monitoring	Perpetuity
BH8	GW078118	20BL166769	Monitoring	Perpetuity
BH9 BH09A BH09B	GW078119	20BL166770 20BL172480 20BL172480	Monitoring	Perpetuity
BH10 BH10A BH10B	GW078113	20BL166764 20BL172479 20BL172479	Monitoring	Perpetuity
BH11	GW078131	20BL166771	Monitoring	Perpetuity
BH12	GW078132	20BL166772	Monitoring	Perpetuity
BH13	GW078110	20BL166773	Monitoring	Perpetuity
BH14	GW078111	20BL166774	Monitoring	Perpetuity
BH15	GW079772	20BL166740	Monitoring	Perpetuity
BH16	GW078140	20BL166740	Monitoring	Perpetuity
BH17 (CM01) BH17A1		20BL169546	Monitoring	Perpetuity
BH18 (CM02)		20BL169547	Monitoring	Perpetuity
BH19 (CM03)		20BL169548	Monitoring	Perpetuity
BH20 BH20A		20BL169549 20BL169549	Monitoring	Perpetuity
BH20B		20BL169549	Monitoring	Perpetuity
BH21		20BL169549	Monitoring	Perpetuity
BH21A		20BL169549	Monitoring	Perpetuity
BH24A BH24B BH24C		20BL172481 20BL172481 20BL172481	Monitoring	Perpetuity
BH25A BH25B BH25C		20BL172477 20BL172477 20BL172477	Monitoring	Perpetuity
BH26A BH26B BH26C		20BL172873 20BL172873 20BL172873	Monitoring	Perpetuity
BH27A BH27B BH27C		20BL172872 20BL172872 20BL172872	Monitoring	Perpetuity

1.2.4 Occupation Permit

The Olney State Forest is located above the proposed mine workings within parts of the Mandalong Southern Extension Area (refer **Plan 1C**). Centennial Mandalong has established an Occupation Permit (HW50477 valid until ~~31 June 2016~~ **30 June 2018**) with the FCNSW for drilling activities within the State Forest in the Mandalong Southern Extension Area.

1.3 MOP/Rehabilitation Management Plan Requirements

Development Consents SSD-5144 and SSD-5145 contain conditions relevant to the preparation of this MOP/Rehabilitation Management Plan. These have been summarised in **Table 6** along with where each condition has been addressed within this document. This table also outlines the relevant conditions from other leases and authorisations with regard to the preparation of the MOP/Rehabilitation Management Plan and provides guidance on where each condition has been addressed within this document.

Detailed objectives and regulatory requirements relating to rehabilitation and post mining land use are outlined in **Section 4.3**.

Table 6 – Relevant Development Consent and Mining Tenement Requirements for the Preparation of a MOP / Rehabilitation Management Plan

Condition	Requirement	Section Addressed
SSD-5144 MOD 8 Schedule 3 Condition 33	Rehabilitation Management Plan The Applicant must prepare and implement a Rehabilitation Management Plan for the development, to the satisfaction of the Secretary and DRE. This plan must:	This document
	(a) Be prepared in consultation with DRE RR , OEH BCD , DPI DPIE Water, LMCC and the CCC;	Section 1.5
	(b) Be submitted to the Secretary and DRE RR for approval by 31 March 2016, or as otherwise agreed by the Secretary; Note – approval was received from the DP&E on 22 January 2016 for the extension of the submission to 30 June 2016 in order to allow the incorporation of the MOP and rehabilitation management plan into a single document. A copy of this approval is included in Appendix 2.	Section 1.5 Appendix 2.
	(c) Be prepared in accordance with the relevant guidelines and consistent with the rehabilitation objectives in the EIS and in Table 5;	Section 6
	(d) Describe how the performance of the rehabilitation would be monitored and assessed against the objectives in Table 5;	Section 8
	(e) Provide for detailed mine closure planning, including measures to minimise socio-economic effects associated with mine closure, to be developed prior to the site being placed on care and maintenance; and	Section 4.4
	(f) Be integrated with the other management plans required under this consent. The Applicant must implement the approved management plan as approved from time to time by the Secretary. <i>Note: The Rehabilitation Management Plan must address all land impacted by the mine, whether prior to or following the date of this consent.</i>	Section 3
SSD-5145 MOD 1 Schedule 3 Condition 29 (as relevant to the Cooranbong Entry Site)	Rehabilitation Management Plan The Applicant shall must prepare and implement a Rehabilitation Management Plan for the development, to the satisfaction of the Secretary and DRE. This plan must:	This document
	(a) Be prepared in consultation with DRE DRG , OEH , CLWD , DPI Water , LMCC and the CCC;	Section 1.5
	(b) Be submitted to the Secretary and DRE DRG for approval prior to clearing any native vegetation, or as otherwise agreed by the Secretary;	N/A (no clearing at CES)
	(c) Be prepared in accordance with the relevant guidelines and consistent with the rehabilitation objectives in the EIS and in Table 6;	Section 6

Condition	Requirement	Section Addressed
	(d) Describe how the performance of the rehabilitation would be monitored and assessed against the objectives in Table 5;	Section 8
	(e) Provide for detailed mine closure planning, including measures to minimise socio-economic effects associated with mine closure, to be developed prior to the site being placed on care and maintenance; and	Section 4.4
	(f) Be integrated with the other management plans required under this consent. The Applicant must implement the approved management plan as approved from time to time by the Secretary. <i>Note: The Rehabilitation Management Plan must address all land impacted by the mine, whether prior to or following the date of this consent.</i>	Section 3
MPL 191 Condition 2 ML 1543 Condition 2 ML 1553 Condition 2	Mining Operations Plan (MOP) (1) Mining operations, including mining purposes, must be conducted in accordance with a Mining Operations Plan (the Plan) to the satisfaction of the Director-General. The Plan together with environmental conditions of development consent and other approvals will form the basis for: (a) ongoing mining operations and environmental management; and (b) ongoing monitoring of the project.	This document
	(2) The Plan must be prepared in accordance with the Director-General's guidelines current at the time of lodgement.	Section 1.2 Section 4.1
	(3) A Plan must be lodged with the Director-General: (a) Prior to the commencement of operations; (b) Subsequently as appropriate prior to the expiry of any current Plan; and (c) In accordance with any direction issued by the Director-General.	This document
	(4) The Plan must present a schedule of proposed mine development for a period of up to seven (7) years and contain diagrams and documentation which identify: (a) Area(s) proposed to be disturbed under the Plan; (b) Mining and rehabilitation method(s) to be used and their sequence; (c) Areas to be used for disposal of tailings/waste; (d) Existing and proposed surface infrastructure; (e) Proposed rehabilitation schedules; (f) Areas of particular environmental sensitivity; (g) Water management systems (including erosion and sediment controls); (h) Proposed resource recovery; and (i) Where the mine will cease extraction during the term of the Plan, a closure plan including final rehabilitation objectives/methods and post mining land use/vegetation.	Section 2.2 Section 2.2 Section 2.2 Section 2.2 Section 7 Section 3.4 Section 3.3.3-3.3.4 Section 2.2.10 Section 4.4
	(5) The Plan when lodged will be reviewed by the Department of Mineral Resources.	Section 1.5.3
	(6) The Director-General may within two (2) months of the lodgement of a Plan, require modification and relodgement.	Noted
	(7) If a requirement in accordance with clause (6) is not issued within two months of the lodgement of a Plan, lease holder may proceed with implementation of the Plan submitted subject to the lodgement of the required security deposit within the specified time.	Noted
	(8) During the life of the MOP, proposed modifications to the plan must be lodged with the Director-General and will be subject to the review process outlined in clauses (5) to (7) above.	Noted
ML 1443 Condition 2	Mining Operations Plan (MOP) (a) Mining operations, including mining purposes, must be conducted in accordance with a Mining Operations Plan (the Plan) approved by the Director-General. The Plan together with environmental conditions of development consent and other approvals will form the basis for: (i) ongoing mining operations and environmental management; and (ii) ongoing monitoring of the project	This document
	(b) The Plan must be prepared in accordance with the Director-General's guidelines current at the time of lodgement.	Section 1.2 Section 4.1

Condition	Requirement	Section Addressed
	(c) An application for approval of a proposed Plan must be accompanied by a copy of the Plan and must be lodged with the Director-General: (i) Prior to the commencement of operations; and (ii) Subsequently as appropriate.	Noted
	(d) The Plan must present a schedule of proposed mine development for a period of up to seven (7) years and contain diagrams and documentation which identify: (i) Area(s) proposed to be disturbed under the Plan; (ii) Mining and rehabilitation method(s) to be used and their sequence; (iii) Existing and proposed surface infrastructure; (iv) Progressive rehabilitation schedules; (v) Areas of particular environmental sensitivity; (vi) Water management systems; and (vii) Proposed resource recovery.	Section 2.2 Section 2.2 Section 2.2 Section 7 Section 3.4 Section 3.3.3-3.3.4 Section 2.2.10
	(e) Where the leaseholder and/or the Director-General is of the opinion that a Plan shall be amended, the leaseholder shall submit an amended Plan for approval.	Noted
ML 1722 Condition 3 ML 1744 Condition 3 ML 1793 Condition 3	Mining Operations Plan and Annual Rehabilitation Report (a) The lease holder must comply with an approved Mining Operations Plan (MOP) in carrying out any significant surface disturbing activities, including mining operations, mining purposes and prospecting. The lease holder must apply to the Minister for approval of a MOP. An approved MOP must be in place prior to commencing any significant surface disturbing activities, including mining operations, mining purposes and prospecting.	This document
	(b) The MOP must identify the post mining land use and set out a detailed rehabilitation strategy which: (i) identifies areas that will be disturbed; (ii) details the staging of specific mining operations, mining purposes and prospecting; (iii) identifies how the mine will be managed and rehabilitated to achieve the post mining land use; (iv) identifies how mining operations, mining purposes and prospecting will be carried out in order to prevent and or minimise harm to the environment; and (v) reflects the conditions of approval under: <ul style="list-style-type: none"> the <i>Environmental Planning and Assessment Act 1979</i>; the <i>Protection of the Environment Operations Act 1997</i>; and any other approvals relevant to the development including the conditions of this mining lease. 	Section 2.2 Section 2.2 This document Section 3.3 Section 1.2
	(c) The MOP must be prepared in accordance with the <i>ESG3: Mining Operations Plan (MOP) Guidelines September 2013</i> published on the Department's website at www.resources.nsw.gov.au/environment	Section 1
	(d) The lease holder may apply to the Minister to amend an approved MOP at any time.	Noted
	(e) It is not a breach of this condition if: (i) the operations which, but for this condition 3(e) would be a breach of condition 3(a), were necessary to comply with a lawful order or direction given under the <i>Environmental Planning and Assessment Act 1979</i> , the <i>Protection of the Environment Operations Act 1997</i> , the <i>Mine Health and Safety Act 2004 / Coal Mine Health and Safety Act 2002</i> and <i>Mine Health and Safety Regulation 2007 / Coal Mine Health and Safety Regulation 2006</i> or the <i>Work Health and Safety Act 2011</i> ; and (ii) the Minister had been notified in writing of the terms of the order or direction prior to the operations constituting the breach being carried out.	Noted

Condition	Requirement	Section Addressed
	<p>(f) The lease holder must prepare a Rehabilitation Report to the satisfaction of the Minister. The report must:</p> <ul style="list-style-type: none"> (i) provide a detailed review of the progress of rehabilitation against the performance measures and criteria established in the approved MOP; (ii) be submitted annually on the grant anniversary date (or at such other times as agreed by the Minister); and (iii) be prepared in accordance with any relevant annual reporting guidelines published on the Department's website at www.resources.nsw.gov.au/environment <p>Note: The Rehabilitation Report replaces the Annual Environmental Management Report.</p>	Section 10
CCL 746 Condition 3	<p>Mining Operations Plan</p> <p>(a) Mining operations must not be carried out otherwise than in accordance with a Mining Operations Plan (MOP) which has been approved by the Director-General.</p>	This document
	<p>(b) The MOP must:</p> <ul style="list-style-type: none"> (i) Identify areas that will be disturbed by mining operations; (ii) Detail the staging of specific mining operations; (iii) Identify how the mine will be managed to allow mine closure; (iv) Identify how mining operations will be carried out in order to prevent and/or minimise harm to the environment; (v) reflects the conditions of approval under: <ul style="list-style-type: none"> • the <i>Environmental Planning and Assessment Act 1979</i>; • the <i>Protection of the Environment Operations Act 1997</i>; • any other approvals relevant to the development including the conditions of this lease; and • have regard to any relevant guidelines adopted by the Director-General. 	<p>Section 2.2 Section 2.2 Section 4 Section 3.3</p> <p>Section 1.2</p>
	(c) The titleholder may apply to the Director-General to amend an approved MOP at any time.	Noted
	<p>(d) It is not a breach of this condition if:</p> <ul style="list-style-type: none"> (i) the operations constituting the breach were necessary to comply with a lawful order or direction given under the <i>Environmental Planning and Assessment Act 1979</i>, the <i>Protection of the Environment Operations Act 1997</i>, the <i>Mine Health and Safety Act 2004 / Coal Mine Health and Safety Act 2002</i> and <i>Mine Health and Safety Regulation 2007 / Coal Mine Health and Safety Regulation 2006</i> or the <i>Occupational Health and Safety Act 2000</i>; and (ii) the Director-General had been notified in writing of the terms of the order or direction prior to the operations constituting the breach being carried out. 	Noted
	(e) A MOP ceases to have effect 7 years after the date of approval or other such period as identified by the Director-General. An approved amendment to the MOP under condition 5 does not constitute an approval for the purpose of this paragraph unless otherwise identified by the Director-General.	Noted
CCL 762 Condition 3	<p>Mining Operations Plan</p> <p>(a) Mining operations must not be carried out otherwise than in accordance with a Mining Operations Plan (MOP) which has been approved by the Director-General.</p>	This document

Condition	Requirement	Section Addressed
	(b) The MOP must: <ul style="list-style-type: none"> (i) Identify areas that will be disturbed by mining operations; (ii) Detail the staging of specific mining operations; (iii) Identify how the mine will be managed to allow mine closure; (iv) Identify how mining operations will be carried out in order to prevent and/or minimise harm to the environment; (v) reflects the conditions of approval under: <ul style="list-style-type: none"> • the <i>Environmental Planning and Assessment Act 1979</i>; • the <i>Protection of the Environment Operations Act 1997</i>; • any other approvals relevant to the development including the conditions of this lease; and • have regard to any relevant guidelines adopted by the Director-General. 	Section 2.2 Section 2.2 Section 4 Section 3.3 Section 1.2
	(c) The leaseholder may apply to the Director-General to amend an approved MOP at any time.	Noted
	(d) It is not a breach of this condition if: <ul style="list-style-type: none"> (i) the operations constituting the breach were necessary to comply with a lawful order or direction given under the <i>Environmental Planning and Assessment Act 1979</i>, the <i>Protection of the Environment Operations Act 1997</i>, the <i>Mine Health and Safety Act 2004 / Coal Mine Health and Safety Act 2002</i> and <i>Mine Health and Safety Regulation 2007 / Coal Mine Health and Safety Regulation 2006</i> or the <i>Occupational Health and Safety Act 2000</i>; and (ii) the Director-General had been notified in writing of the terms of the order or direction prior to the operations constituting the breach being carried out. 	Noted
	(e) A MOP ceases to have effect 7 years after the date of approval or other such period as identified by the Director-General.	Noted

1.4 Land Ownership and Land Use

The MOP Area is within the Parish of Mandalong and the County of Northumberland. The area is also within the City of Lake Macquarie Local Government Area (LGA) and the Land District of Newcastle. The MOP Area is covered by both the West Lake Mine Subsidence District (MSD) and the Mandalong MSD. The majority of the mining area is covered by the Mandalong MSD.

The topography of the MOP Area ranges from the broad flat floodplain of Stockton Creek, Moran's Creek and Tobins Creek to the foothills of the Watagan Mountain range. The land affected by longwall mining is mainly natural bushland of the Watagan Ranges together with cleared areas of the floodplain.

Plan 1B and **Plan 1C** present the pre-mining natural and built environments, respectively.

1.4.1 Land Ownership

Land ownership within the bounds of the MOP Area is shown on **Plan 1C** with a schedule of lands provided in **Appendix 4**. The MOP Area comprises both privately-owned freehold land (including residential and commercial areas) and land owned by the NSW State Government, as listed below:

- Centennial Fassifern Pty Limited (subsidiary company of Centennial Coal);
- The Crown, including:
 - Olney State Forest, under the care and control of the Forestry Corporation of NSW (FCNSW);
 - M1 Pacific Motorway corridor, under the care and control of the NSW Roads and Maritime Service (RMS); and

- Great Northern Railway Line corridor, under the care and control of the Rail Corporation of NSW (RailCorp).
- Lake Macquarie City Council (LMCC), including various public road reserves;
- ~~Wyong Shire Council~~ Central Coast Council, including various public road reserves and the Buttonderry Waste Management Facility; and
- Origin Energy.

The remaining properties are privately-owned freehold land.

1.4.2 Historic, Current and Proposed Land Use

1.4.2.1 Mandalong Historical Overview

Historic land use at Mandalong is described in the Northern Region Historic Heritage Management Plan and is summarised below.

The earliest European occupants around Lake Macquarie were most likely timber getters targeting the cedar of the Watagan Mountains to the west and the stands of timber around the lake foreshore.

Mandalong, part of the original 2,000 acre grant of John Simpson, was settled as a result of Simpsons Track. The Track followed the main valley which later intersected Stockton Creek, which drained the hill country west of Cooranbong. The earliest settlement in the Mandalong area is documented with the purchase of blocks by Henry Osborne and Thomas Walker sometime between 1838 and 1840. In the 1840s a new route for the Old Maitland Road was surveyed through the district but, with a severe economic depression, the project was shelved.

In 1852 Carl F. Solling purchased the first block in Mandalong but he had probably occupied the area from an earlier date. It would appear there were few permanent residents with Osborne, Walkers and Capes referred to as running cattle in the area, but not as residents. From 1861 onward, farmers were moving to the area with family names of Bonnell, Kelly, Frost, Moran, Booth, Tobin, Durrington, Carroll and Kennedy recorded. The main industries appeared to be timber extraction, dairying, raising horses and cattle.

The local population was mainly Roman Catholic with the first church built in 1876 also serving as a private school. In 1878 'Mandelong' Provisional School was first opened. Mandalong's prosperity depended on the timber trade, as the availability and need for timber dwindled so did the village. By 1953 the school and church had permanently closed. With poor soil quality and a decline in the timber industry, Mandalong remained a quiet rural area for much of the twentieth century.

1.4.2.2 Current and Proposed Land Use

The predominate land uses within the MOP Area include residential and rural-residential, industrial and commercial, utility easements, underground mining and surface operations associated with the Mandalong Mine, power generation, cattle grazing and production, poultry production, transport corridors and recreational use, including holiday accommodation.

As shown on **Plan 1C**, parts of the Olney State Forest are located within the MOP. The Olney State Forest is popular for recreational activities, including hiking, camping and four-wheel driving. FCNSW advises that the forests in this area have been harvested for timber for many decades and today comprise regrowth forests. Additional notable land uses are the Buttonderry Waste Management Facility, owned and operated by ~~Central Coast Council~~ ~~Wyong Shire Council~~, in the southern extent of the MOP Area, and several major service infrastructure lines, including TransGrid's 330 kilovolt power lines.

The proposed post mining land use for the area is described in **Section 4.2** and is intended to be commensurate with the surrounding area.

1.4.3 Natural Features and Topography

Lake Macquarie, being the dominant natural feature in the area, extends into the north-eastern extent of the MOP Area. Dora Creek, which is a major tributary of Lake Macquarie, also flows into the north-eastern extent of the MOP Area.

The MOP Area is located in the Mandalong Valley. Diverse landforms are present, including broad flat floodplains of the Stockton Creek and Morans Creek catchments, and undulating hills and rugged ridgelines associated with the surrounding Watagan Mountain range. Parts of the Olney State Forest and Jilliby SCA are located within the Southern Extension Area.

The Southern Extension Area is dominated by two densely timbered ridgelines which trend generally north-west to south-east and from the south to the north-east corner. Elevations on these ridgelines can exceed 200 metres Australian Height Datum (AHD). Spurs from these ridgelines descend toward drainage lines in relatively flat areas to the north, east and south of the ridgelines, some of which have been cleared or partially cleared. These valleys are relatively low lying with surface elevations generally less than 50 metres AHD.

1.5 Stakeholder Consultation

Mandalong Mine conducts communication and consultation processes which will continue for the duration of mining activities. The Stakeholder Engagement Strategy (SES) has been developed to provide a consistent management framework to identify, inform, consult and involve landowners with an interest in the activities associated with the Mandalong Mine.

The SES includes details of communication and consultation with all landowners and in particular those located in mining and exploration areas proposed over the life of the mine, in accordance with the requirements of the Development Consents and mining authority conditions.

The objectives of the SES are to:

- Understand the characteristics of the local community and the impact of its operations (current and proposed);
- Set a process for consultation and engagement with stakeholders of interest;
- To openly communicate with stakeholders about Mandalong Mine regarding current and potential future activities; and
- To provide a means of ongoing reporting and monitoring of activities.

Established communication and consultation methods utilised by Centennial Mandalong include:

- Participation on the Mandalong Mine Community Consultative Committee (CCC);
- Notifications and meetings with individual landowners;
- Notifications and meetings with individual stakeholders including community infrastructure providers and utilities;
- “Mandalong Mailbox” community newsletters;
- Publications in the local newspaper (the “Lakes Mail”);
- Community information sheets dealing with specific Mine development issues;
- Community Open Days and Mine visits (surface and underground);
- Mandalong Community Information and Complaints Line (1800 730 919); and
- Centennial Coal website – Mandalong Mine community information page.

1.5.1 Community Consultation

The Mandalong Community Information and Complaints Line (1800 730 919) is available on the Centennial Coal website. All complaints will be maintained in a register and reported internally to the Environment and Community Coordinator for appropriate action. Any complaints will be reported externally in the Annual Review.

Following approval this MOP will be made publicly available on the Centennial website.

1.5.2 Community Consultation Committee

In accordance with the requirements of Schedule 6, Condition 9 of SSD-5144, a Community Consultation Committee (CCC) has been established to provide a forum whereby the community can communicate with the Centennial Mandalong and be kept up to date with the progress of the mine.

The CCC has representatives from the Mandalong Community Association, LMCC, and community representatives from Mandalong, Morisset and Dora Creek. The CCC is operated in accordance with the ~~Guidelines for Establishing and Operating Community Consultative Committees for Mining Developments (Department of Planning 2007)~~ *Community Consultative Committee (CCC) Guidelines for State Significant Projects (Department of Planning, 2016)*, or its latest version, and typically meets three times per year.

1.5.3 Statutory Authorities

To satisfy the requirements of Schedule 3, Condition 33 of SSD-5144 and Schedule 3, Condition 29 of SSD-5145 this document was submitted for consultation with the ~~DRE DRG RR~~, OEHL, DPI Water, LMCC and the CCC on 6 June 2016. Feedback received from stakeholders has been appropriately considered prior to submitting a copy of the final MOP/Rehabilitation Management Plan for approval. As agreed with the ~~DP&E DPIE~~ this document was re-submitted to the ~~DRE DRG RR~~ and the Secretary of the ~~DP&E DPIE~~ for approval prior to 30 June 2016 to satisfy the requirements of a Rehabilitation Management Plan (refer **Appendix 2**).

Feedback received from ~~DP&E DPIE~~, DPI Water, ~~DRE DRG RR~~ and the CCC is attached as **Appendix 3** and has been addressed in this version of the MOP/Rehabilitation Management Plan. It is noted that no feedback was received from OEHL or LMCC.

During the preparation of the Longwall 24 and 24A Extraction Plan, Centennial received feedback from ~~DRG RR~~ with regard to additional information to be included in MOP Amendment B. This feedback is included in **Appendix 3** and has been addressed in this MOP Amendment.

Mandalong regularly engages with various government and other agencies to report on its environmental performance. This is facilitated through a number of means including:

- LMCC representation on the CCC;
- Annual Review to the ~~DP&E DPIE~~ and CCC;
- Liaison with the NSW EPA regarding EPL conditions;
- Provision of the Annual Review to ~~DRE DRG RR~~ and other relevant Government agencies;
- Provision of the Annual Licence Return to EPA; and
- Provision of the National Pollution Inventory (NPI) to the Commonwealth Department of the Environment via OEHL.

Consultation will continue to be undertaken with relevant stakeholders as required under relevant approval conditions and other regulatory requirements relevant to the mine.

1.5.4 Cultural Heritage

Centennial Mandalong works closely with local Aboriginal people regarding cultural heritage management. Consultation between Centennial and the Aboriginal community is undertaken in accordance with the approved *Northern Operations Aboriginal Cultural Heritage Management Plan* (ACHMP) (RPS 2015).

The Registered Aboriginal Parties (RAPs) for Mandalong are:

- Awabakal Descendants Traditional Owners Aboriginal Corporation;
- Awabakal Traditional Owners Aboriginal Corporation;
- Bahtabah Local Aboriginal Land Council;
- Biraban Local Aboriginal Land Council;
- Cacatua Culture Consultants;
- Darkinjung Local Aboriginal Land Council;
- Guringal Tribal Link;
- Kauwal (trading as Wonn 1); and
- Yula-Punaal Education and Healing Aboriginal Corporation.

The ACHMP has been prepared to provide Centennial with a consistent approach to their consultation with the local Aboriginal communities regarding Aboriginal cultural heritage matters as well as identifying consistent minimum standards and processes for Aboriginal cultural heritage identification, monitoring and management across Centennials northern operations.

2 Proposed Mining Activities

2.1 Project Description

2.1.1 Mandalong Mine

The approval of SSD-5144 provided Mandalong with a single new development consent for the Mandalong Southern Extension Project to regulate its approved existing mining operations, extend existing underground mining operations into the Southern Extension Area and utilise existing and proposed new surface infrastructure integral to the mining operation. The primary components approved under SSD-5144 (as modified) are:

- Continuation of the currently approved operations at the Mandalong Mine, with the exception of the infrastructure and operations at the surface of the CES now approved under SSD-5145 (however, the surface infrastructure and operations at the CES continue to be managed by Centennial Mandalong and are included in this MOP);
- Extend the Mandalong Mine's underground mining operations into the area covered by ML 1772 and ML 1744 (Southern Extension Area) using a combination of continuous miner and longwall mining methods;
- Extract up to ~~6~~ 6.5 Mtpa of ROM coal from the West Wallarah and Wallarah-Great Northern Seams within the current mining lease areas and the area covered by ML 1772 and ML 1744;
- Deliver ROM coal from the underground workings to the CES at a rate of up to 6 Mtpa and to the DES at a rate of up to 6 Mtpa;
- Continue to utilise the existing surface infrastructure of the MMAS;
- Install and operate surface infrastructure at the proposed MSSS to service the extended underground mining operation;
- Increase manning to 420 full-time employees and up to 50 contractors during longwall relocations;
- Undertake on-going exploration drilling and/or groundwater monitoring activities within the bounds of Centennial Mandalong's exploration licences;
- Increase the life of mine to 25 years from the granting of ML 1722²; and
- Continue to operate 24 hours per day, seven days per week.

As detailed in **Section 1.2.2**, SSD-5144 has been modified on ~~eight~~ nine occasions, which includes:

- Transmission line TL24 relocation project (MOD 1);
- Longwall 22/23 first workings (MOD 2);
- Increase to the annual production limit from 6 Mtpa to 6.5 Mtpa (MOD 3);
- Extraction of extended longwalls 22 and 23 (MOD 4);
- Extended development of Maingate 24 and extended extraction of longwall panel 24 in addition to the development of Maingate 24A and extraction of longwall panel 24A (MOD 5);
- The temporary controlled release of stored water from the MSSS Sediment Dam following significant rainfall events and the ability to transport the sediment and material collected at the MSSS to the CES (MOD 6)
- The construction of a new 7.7 km 33-kV overland powerline from the MMAS to the MSSS (MOD 7); and
- Increase personnel from 470 to 815 full-time equivalent (FTE) employees, upgrade existing electrical substation and expansion of car park at the MMAS (MOD 8); and
- Deletion of Longwalls 30,31 36 and 37, reorientation of approved Longwalls 32 to 35 and renaming longwalls 32 to 35 to longwalls 30 to 33 MOD 9.

² It is noted that whilst SSD-5144 approves mining until 17 December 2040, ML 1722 only approves mining until 17 December 2036.

2.1.2 Cooranbong Entry Site

The CES is approved under the Northern Coal Logistics Project Development Consent (SSD-5145) which approves the continued operation of the existing surface infrastructure at Newstan Colliery and CES, along with existing private haul roads and rail loading infrastructure. These facilities are integral to the on-going handling, processing and transport of coal from the underground workings of Newstan Colliery and Mandalong Mine into domestic and export markets. The operations associated with the CES which are pertinent to this MOP are as follows:

- Continued use of the existing coal handling infrastructure at the CES to enable the receipt, handling and processing of up to 6 Mtpa of ROM coal from Mandalong Mine;
- Increase the volume of coal transported from the CES to the Newstan Colliery Surface Site, via truck using existing private haul roads, from 4 Mtpa to 6 Mtpa;
- Increase the volume of coal transported from the CES to Eraring Power Station, using the existing dedicated overland conveyor from 4 Mtpa to 6 Mtpa;
- Continued transport of up to 0.5 Mtpa of middlings by truck from the Newstan Colliery Surface Site to the CES for subsequent supply to the Eraring Power Station via a dedicated overland conveyor;
- Increase the volume of water discharged via licenced discharge points (LDPs) at the CES;
- Approval to operate until 31 December 2045; and
- Continue to operate 24 hours per day, seven days per week.

The CES is the only component of the Northern Coal Logistics Project Development Consent which is included within this MOP. Operations at the Newstan Colliery are covered by the Newstan Colliery MOP and the Cooranbong Haul Road will be included in the development of the Northern Coal Logistics MOP.

SSD-5145 has been modified once (MOD 1) to increase the number of FTE employees at the CES from 14 to 60 to make use of the available office space and to amend the noise criteria in the vicinity of the CES.

2.1.3 Delta Entry Site and Wyee Rail Unloader

The ROM coal delivered from the Mandalong Mine underground workings to the surface at the Delta Entry Site is handled by two separate (but related) components of the Delta Link Project, comprising:

- The transportation of coal to the Delta Entry Site via the underground Mandalong Coal Delivery System approved by Development Consent DA 35-2-2004 (held by Centennial Mandalong) and described in the Delta Link Project – Statement of Environmental Effects (Umwelt, 2004); and DA 35-2-2004 MOD1, described in the [Mandalong Coal Delivery System, Development Consent DA 35-2-2004 Proposed 75W Modification – Environmental Assessment \(SLR, 2017\)](#); and
- The receipt and handling of coal at the Wyee Coal Handling Plant at the Delta Entry Site approved by Development Consent DA-2501/2004 (held by Delta Electricity and therefore not captured within this MOP) and described in the Delta Link Project – Statement of Environmental Effects (Umwelt, 2004) and revised information letter dated 27 April 2004.

In short, these development consents permit the construction and use of the Mandalong Coal Delivery System, which links the Mandalong Mine to the Wyee coal unloader by an underground tunnel, and construction and use of infrastructure at the Wyee coal unloader to enable it to receive and size coal from the Mandalong Mine before transporting it to the Vales Point Power Station by the Delta Electricity overland conveyor.

In addition, development consent for the Wyee Rail Unloader was granted to Elcom (now Delta Electricity) by the (then) Lake Macquarie Municipal Council on 25 November 1979. In summary, this consent allowed:

- A 3 kilometre rail balloon loop;
- A rail facility capable of handling trains up to 3,200 tonnes, with associated infrastructure and water management system; and
- An overland conveyor for 6 kilometres from the Wyee Rail Unloader to Vales Point Power Station.

On 25 September 2017, Lake Macquarie City Council approved DA/110/1974/A, as a modification to the original Wyee Rail Unloader Consent, permitting the construction and operation of a screening plant and associated site buildings and infrastructure at the Wyee Coal Handling Plant at the Delta Entry Site. This is described in the Delta Screening Project – Statement of Environmental Effects (Umwelt, 2017).

The operations at the Delta Entry Site have been captured within this MOP; however the components of the Wyee Coal Handling Plant ~~Delta Link Project~~ approved by Development Consent DA-2501/2004 and Wyee Rail Unloader (including the recently approved Delta Screening Project approved by DA/110/1974/A) have been excluded from this MOP as these operations are under the care and control of Delta Electricity and separate to the operations of Mandalong Mine.

2.2 Activities over the MOP Term

2.2.1 Exploration

Surface exploration activities, predominately borehole drilling to refine the geological model, will continue to be undertaken to obtain specific geological information to assist with detailed mine planning. The exploration programme also allows the installation of piezometers in the aquifers of interest for ongoing groundwater monitoring.

During the MOP Term exploration activities will be located within EL 4443, ~~EL 4968~~, EL 4969, EL 5892, EL 6317 and AUTH 404, and will generally focus on future mining areas (refer **Figure 2** and **Figure 3**).

In accordance with the requirements of Schedule 3, Condition 36 of Development Consent SSD-5144 Centennial Mandalong has prepared an *Exploration Activities Management Plan* (EAMP) to outline measures that will be implemented to mitigate potential environmental impacts during the approved exploration and/or groundwater monitoring activities. All exploration activities within the Project Application Area will be undertaken in accordance with the EAMP. This will include details of the process undertaken by Centennial Mandalong prior to commencement of exploration and/or groundwater monitoring activities, including due diligence assessment for ecology, Aboriginal heritage and noise (if required). Copies of due diligence assessments will be provided to the ~~DRE DRG RR~~, ~~DP&E~~ ~~DPIE~~ and FCNSW (where relevant).

Following the completion of drilling and associated activities, all exploration drill holes will be sealed in accordance with relevant ~~DRE DRG RR~~ guidelines at the time. Completed and proposed exploration and/or groundwater monitoring activities will be reported in the Annual Review.

Following the completion of rehabilitation and prior to lease relinquishment by ~~DRE DRG RR~~, Mandalong will seek confirmation that the landowner is satisfied with the standard of rehabilitation activities. To achieve this, Mandalong will provide the landowner with a copy of the ~~DRE DRG RR~~ (2012) form titled *Landowner/Occupier Rehabilitation Statement (ESB-F06)*. Completed forms will be forwarded to ~~DRE DRG RR~~ as part of an Exploration Rehabilitation and Relinquishment Report.

2.2.2 Construction

During the MOP Term, a construction program will be developed covering the two separate construction sites as approved under SSD-5144; namely, surface facility upgrades at the existing MMAS and new surface facilities at the ~~proposed~~ MSSS. In addition, Centennial Mandalong ~~are currently seeking approval for the relocation of~~ will relocate a 2.4 km section of TransGrid's Transmission Line TL24 ~~as approved by SSD-5144 MOD 1~~.

The Transmission Line TL24 relocation was completed in May 2018.

2.2.2.1 Existing Mandalong Mine Access Site

Construction at the MMAS may consist of the installation of gas engines (pending feasibility). The gas engines will be constructed off-site prior to being transported to the MMAS for installation and commissioning.

As approved by SSD-5144 MOD 8, construction of additional car parking facilities and an upgrade to the existing substation will be undertaken at the MMAS during the MOP term.

An area of 0.18 ha of vegetation will be cleared within the subject land to facilitate the construction of the additional car parking facilities and the proposed substation upgrade. No major excavation will be required and cleared vegetation will be mulched and kept on-site, where practicable. Following vegetation clearance, the subject land will undergo site establishment works to provide a secure and stable surface. Following site establishment, approximately 120 cubic metres (m³) of road base and asphalt will be imported and used within the subject land to prepare the additional car parking area.

To facilitate the operation of the approved gas engines an upgrade to the existing on-site substation is required to convert the 11 kV power generated from the gas engines to 33 kV so that it can be fed back into the electricity distribution network for use by Mandalong Mine or supplied back into the grid. The substation upgrade will involve the construction and installation of a portable switch room and a transformer mounted on a skid-base that will be constructed off-site. The equipment will be mounted directly under, and will be interfaced with, the current 33 kV power lines coming into the existing electrical substation.

The construction hours will be consistent with the NSW EPA's Interim Construction Noise Guideline (ICNG) (DECC 2009) recommended standard construction hours:

- Monday to Friday: 7 am to 6 pm;
- Saturday: 8 am to 1 pm; and
- no work on Sundays or public holidays.

Clearing, site preparation and construction timeframes will be:

- Vegetation clearing – approximately two days;
- Site preparation – approximately two months; and
- Construction – approximately three months.

2.2.2.2 Mandalong South Surface Site

A construction program will be developed for the MSSS to cover the required civil, mechanical, structural, electrical and building works. Construction will involve the erection of temporary buildings and facilities, including light and heavy vehicle access and parking areas, equipment storage compounds, diesel generators, diesel compressors, security facilities, services and amenities. Larger construction equipment (dozers, excavators, rollers and shaft drilling equipment) will be delivered to

the site on trucks at stages across the construction period. Delivery of materials and other equipment will occur during site establishment and then throughout the construction period.

These works will be completed in phases, with additional details regarding the construction program provided in **Table 7**. Activities will include the construction of the Mandalong Road intersection and site access road, ventilation shafts and additional site infrastructure and servicing. The maximum number of personnel likely to be on site during the construction phase is 70 persons. It is anticipated that the combined construction phases will span approximately 2.5 years, commencing in January 2017. However, there may be periods of inactivity where surface works cannot commence until the underground workings are suitably advanced.

Table 7 – Proposed Mandalong South Surface Site Construction Phases

Phase	Description	Estimated Duration
General	Site establishment, disestablishments and site facilities. Construct hard stand, place site sheds, create stockpile areas	3 weeks
Civil works	Access intersection off Mandalong Road	10 weeks
Access road	Access road between Mandalong Road and new surface facilities site	12 weeks
Bulk earthworks and pavement	Clearing and grubbing	4 weeks
	Excavation, including topsoil and stockpile	15 weeks
	Trim sub grade	Time included in excavation stage
	Engineered fill to pad	6 weeks concurrent with excavation stage
	Removal and replacement of unsuitable material	Time included in excavation stage
	Pavements	Time included in excavation stage
	Stormwater discharge	Time included in excavation stage
	Sedimentation dam	6 weeks concurrent with excavation stage
Rehabilitation	Site rehabilitation and stabilisation works	6 weeks
Ventilation shafts	Sinking of ventilation shafts	70 weeks
Final infrastructure	Final infrastructure	12 weeks

All construction activity will occur between the standard hours of 7.00 am to 6.00 pm Monday to Friday and 8.00 am to 1.00 pm on Saturday (no construction on Sundays or public holidays), with the exception of the ventilation shafts. The sinking of the ventilation shafts will be required to be undertaken 24 hours a day, seven days a week

In accordance with the Statement of Commitments contained in Appendix 8 of SSD-5144, a Construction Management Plan will be developed and implemented and will include procedures for the management of surface water, topsoil, erosion and sedimentation, flora and fauna, heritage, air quality, noise, traffic and waste. Soil stripping and stockpiling activities at the construction site, along with rehabilitation activities, will be undertaken in accordance with the methodologies and management strategies recommended in the *Soils and Land Capability Assessment* (GSSE, 2013a) and the *Decommissioning and Rehabilitation Strategy* (GSSE, 2013b) prepared to support the Mandalong Southern Extension Project EIS (GSSE, 2013c).

It is anticipated that there will be more “cut” material than “fill” material during the construction earthworks, however the volumes will not be known until after detailed design is completed. Any excess material that cannot be used on site for bunding and rehabilitation purposes will be transported by trucks to the Newstan Colliery Surface Site for use as a capping material for the reject emplacement areas and for rehabilitation activities.

2.2.2.3 TransGrid’s 330 kV Transmission Line TL24

~~During the MOP Term, Centennial Mandalong is seeking approval to will relocate a 2.4 km section of TL24. It is proposed to remove 12 existing steel lattice towers and establish eight new towers.~~

~~Clearing of 8.5 ha of native vegetation is required for the new section of TL24 including a 60 m wide easement entirely on freehold land owned by Centennial Fassifern. Following the establishment of the eight new towers and relocation of the transmission line, the redundant 12 towers will be demolished and removed in consultation with key stakeholders. Upon completion of the line, the easement for the redundant section of TL24 will be relinquished and a new easement will be created over the new section of TL24 by TransGrid.~~

~~All clearing activities will be undertaken in accordance with TransGrid’s policies and procedures. These clearing procedures outline the preferred method for vegetation control, which is to remove rather than lop vegetation that will eventually infringe the ‘absolute limit’ clearances required for the relocated TL24.~~

~~Once construction of the relocated transmission line and removal of the redundant transmission line has been completed, TransGrid will be responsible for the ongoing maintenance and operation of the transmission line and its easement.~~

~~Prior to construction, a A Construction Environmental Management Plan (CEMP) will be has been prepared outlining how the construction and demolition activities will be managed.~~

The TL24 relocation project was completed in May 2018.

2.2.2.4 Delta Screening Project

~~As approved by DA/110/1974/A, the coal handling infrastructure located at the Delta Entry Site will be upgraded and expanded during the MOP term.~~

~~The upgrades will include the expansion of the existing coal sizing building (Drift Driving Station) to include new screens. The new screens will minimise the level of contamination contained in the coal by removing non-ferrous scrap material (such as fibre glass bolts). The installation of the new screens will result in modifications to the existing drift drive station and crusher building.~~

~~The project will also allow for ancillary facilities (office and toilet), the construction of a concrete crane pad and additional concreting works. All works associated with the proposed modification will be undertaken in an existing operational area that has previously been approved for disturbance and will not result in any impact to vegetation or heritage items.~~

~~The construction of the Delta Screening Project will be completed in 2018.~~

The construction of the Delta Screening Project was completed in February 2018.

2.2.2.5 Mandalong 33 kV Power line

As approved by SSD-5144 MOD7, a new 7.7 km-long 33 kV power line will be constructed from the MMAS to the MSSS using overhead cables on timber or steel poles. The power line will involve the following general components:

- Vegetation and land preparation required to create the power line easement and necessary access tracks;
- Importing of gravel, VENM and road base for upgrade and construction of access tracks;
- Relocation and/or installation of fencing and gates;
- Creation of temporary construction pads at each pole location;
- Installation of approximately 73 poles of heights ranging from approximately 16 m to 30 m;
- Stringing of the conductors between poles in addition to installation of insulators; and
- Rehabilitation of disturbed areas on completion of construction works.

A temporary lay down area for the Project will be established within the existing approved disturbance footprint for the MSSS and associated MSSS Access Road.

It is estimated that approximately 6.81 ha of native vegetation clearing will be required to establish the power line easement. Existing access tracks to the current easements will be used. Upgrades to these tracks will be undertaken as required. An allowance of 3 ha has been made for any clearing along existing tracks, which is comprised of approximately 1.84 ha of native vegetation clearing and 1.16 ha of exotic vegetation. Any additional vegetation clearing of access tracks will be kept to a minimum to allow construction vehicles to access the work areas.

Construction is anticipated to commence in June/July 2020 and is expected to take approximately nine months to complete. The construction will be undertaken by an Ausgrid authorised contractor. Once the line is energised the infrastructure and easements will be handed over to Ausgrid to own and operate as part of their electrical distribution network.

Ausgrid will be responsible for the final decommissioning and rehabilitation of the powerline, which will be after mine closure in 2040, unless otherwise determined by Ausgrid.

A Construction Environmental Management Plan (CEMP) has been prepared outlining how the construction activities will be managed.

The 33 kV powerline project was completed in May 2021.

2.2.3 Mining Operations

2.2.3.1 Mine Design and Mining Method

Centennial Mandalong has approval to use longwall mining and bord-and-pillar mining methods to extract up to ~~6~~ 6.5 Mtpa of ROM coal from the West Wallarah and Wallarah-Great Northern Seams (Figure 2).

Figure 2 illustrates the proposed mine plan for coal extraction within the Southern Extension Area, along with the approved mining areas Area 1 and Area 2. The progression of underground mining will be regularly reviewed dependent on on-going monitoring and geological conditions.

The proposed mine plan within the Southern Extension Area encompasses a total of 40 longwall panels ranging in length between approximately 1,000 and 3,500 metres, depending on seam conditions and site constraints, and ranging in width between 160 and 200 metres.

During the MOP Term Mandalong will develop and extract Longwall 21 to 24A and complete extractions of longwalls from within ML 1433 and ML 1543 by late 2018. Following the completion of mining in ML 1433 and ML 1543, secondary extraction will commence in the Southern Extension Area (i.e. within ML 1722 and ML 1744).

An indicative mining schedule for the MOP Term has been illustrated on Plan 3A to Plan 3H and details provided in Table 8. The proposed mining schedule is shown on Figure 4.

Table 8 – Proposed Mining Schedule during the MOP Term

Longwall Panel	Scheduled Commencement	Scheduled Completion Date
Mining Area 1		
Longwall 21	08/11/2016 (Actual) 01-11-2016	27/03/2017 (Actual) 25-02-2017
Longwall 22	15/04/2017 (Actual) 14-4-2017 15-04-2017	22/09/2017 (Actual) 4-9-2017 31-08-2017
Longwall 23	13/10/2017 (Actual) 22-9-2017 18-09-2017	24/03/2018 (Actual) 5-2-2018 03-02-2018
Longwall 24	16/04/2018 (Actual) 28-2-2018 21-02-2018	11/09/2018 (Actual) 21-7-2018 30-05-2018
Longwall 24A	02/10/2018 (Actual) 8-8-2018	20/01/2019 (Actual) 16-12-2018
Southern Extension Area		
Longwall 25	10/03/2019 (Actual) 6-1-2019 14-08-2018	17/09/2019 (Actual) 18-5-2019 23-01-2019
Longwall 26	11/10/2019 (Actual) 5-6-2019 27-02-2019	16/03/2020 (Actual) 12-10-2019 31-07-2019
Longwall 27	25/03/2020 (Actual) 30-10-2019 18-08-2019	13/08/2020 (Actual) 28-08-2020 4-3-2020 09-01-2020
Longwall 28	1/09/2020 (Actual) 14/09/2020 22-3-2020 27-01-2020	12/01/2021 (Actual) 16/03/2021 18-7-2020 07-06-2020
Longwall 29	03/02/2021 (Actual) 07/04/2021 5-8-2020 25-06-2020	05/06/2021 15/08/2021 14-11-2020 22-10-2020
Longwall 30	16/07/2021 03/09/2021 2-12-2020 09-11-2020	20/11/2021 15/10/2021 17-2-2021 27-01-2021
Longwall 31	04/02/2022 03/11/2021 7-3-2021 27-02-2021	10/06/2022 08/12/2021 14-5-2021 08-05-2021
Longwall 32	03/07/2022 28/12/2021 28-6-2021 10-08-2021	01/12/2022 09/02/2022 30-9-2021 31-12-2021
Longwall 33	04/02/2023 01/03/2022 10-11-2021 18-01-2022	17/05/2023 22/03/2022 5-3-2022 10-06-2022

Longwall Panel	Scheduled Commencement	Scheduled Completion Date
Longwall 34	20/05/2022 20-4-2022 28-06-2022	20/07/2022 3-8-2022 07-11-2022
Longwall 35	02/08/2022 21-8-2022 15-01-2023	23/09/2022 6-12-2022 15-05-2023
Longwall 36	22/11/2022 24-12-2022 02-06-2023	08/01/2023 26-3-2023 13-09-2023
Longwall 37	28/01/2023 12-6-2023 28-11-2023	15/03/2023 24-8-2023 01-03-2024
Longwall 38	17/05/2023 05/03/2023	02/10/2023 03/08/2023
Longwall 39	21/10/2023 25/10/2023	03/03/2024 13/03/2024

~~Note — there is no mining proposed in Mining Area 2 during the MOP Term.~~

In accordance with Schedule 4 Condition 12 of SSD 5144, Mandalong is permitted to carry out first workings on site, other than in accordance with an approved Extraction Plan, provided that RR is satisfied that the first workings are designed to remain stable and non-subsiding, except insofar as they may be impacted by approved second workings.

Mandalong propose to undertake first workings within 'Area 2' of the Approved Mine Plan as shown in **Figure 2**. The workings will be within the Wallarah Seam which is less than 1.8 m in thickness and the depth of mining will be between 150m and 200m.

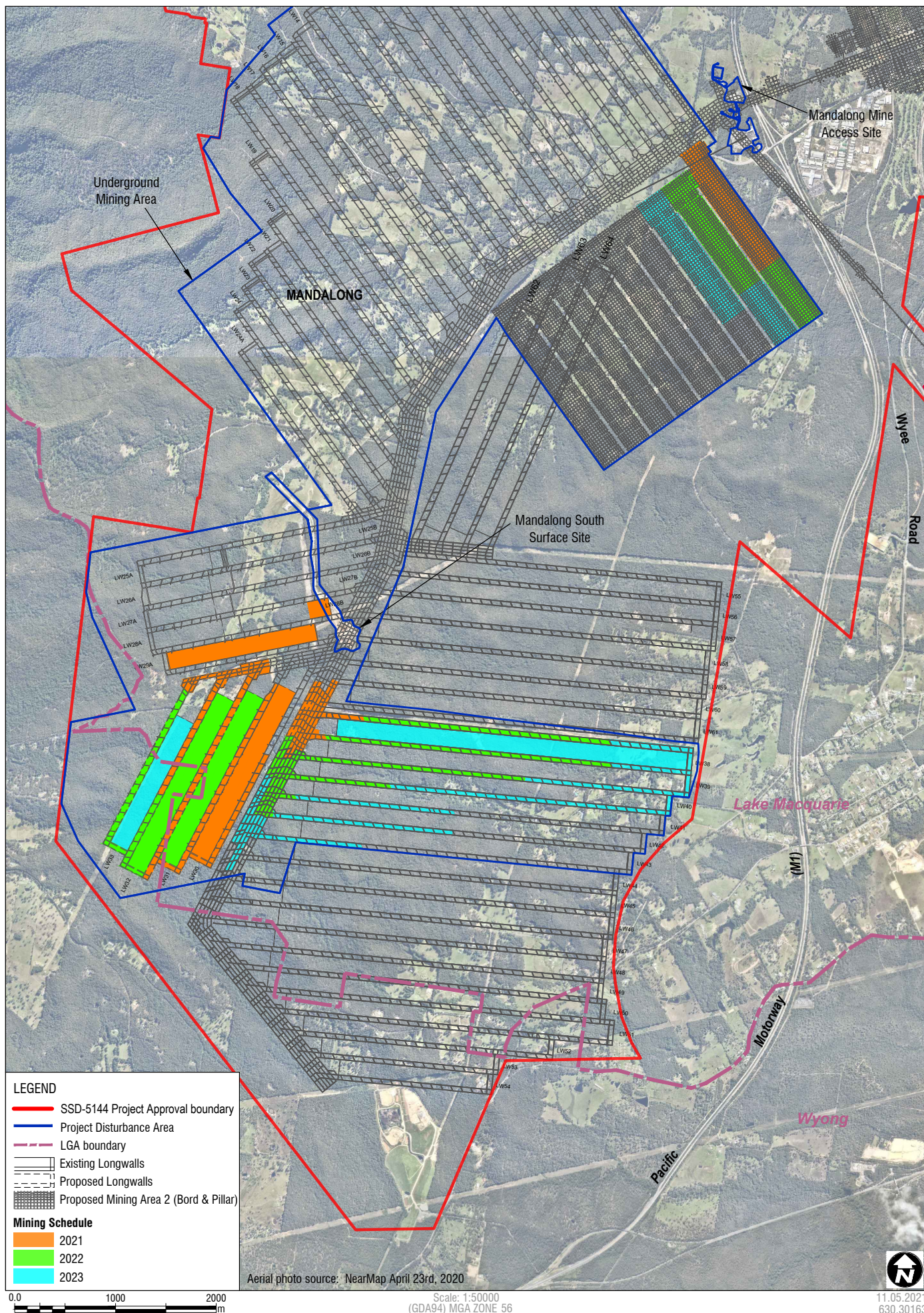
To satisfy RR that the first workings have been designed to remain stable and non-subsiding, a geotechnical assessment was prepared by Byrnes Geotechnical (March 2020) to review the first workings layout for pillar stability and ground support options. The geotechnical assessment was provided to RR for review in April 2020.

First workings in Area 2 ~~are proposed to~~ commenced in ~~July 2020~~ March 2020. The proposed Area 2 mining schedule is shown in **Figure 4**.

2.2.3.2 Mining Equipment

Mandalong Mine operates a fleet of modern longwall and development equipment, enabling productive and efficient longwall development and extraction. A summary of the major longwall, development and transport equipment operated at the mine is detailed in **Tables 9 - 11**. Other support activities are carried out using hired machinery or the use of specialised contractors supplying their own equipment.

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MINING SCHEDULE

FIGURE 4

Table 9 – Development Equipment

Development		
Equipment	Type	Number
Continuous Miners	ABM25	4- 1
	MB650 Sandvik	2 3
Shuttle Cars	Joy 10SC32	6
Shuttle Cars	Joy 15SC	3
Breaker Feeders	Stamler	5

Table 10 – Longwall Equipment

Longwall		
Equipment	Type	Number
Shearer	Joy 7LS6	1 + 1 2 spare
Roof Supports	Joy 1053 tonne 2 leg	82 standard and 7 gate supports
AFC (MG)	Joy 1000mm wide 1000kW TTT drive Spare 855kW and 1000kW motors	1 + 1 2 spare motors
AFC (TG)	Joy 1000mm wide 1000kW TTT drive Spare 855kW	1 + 1 spare
BSL	Joy 375 kW drive + 375kW crusher	2 1 BSL 1 Crusher
Transformer	Amp Control 5.2 MVA on cat tracks	2
Pump Station	RMI on cat tracks	3 x 34.5 Mpa emulsion pumps + 1 x 40 Mpa Positive Set Pump
Monorail	Macquarie Manufacturing	3 x 105m system + 105m material handling system
Shearer Water Pump	RMI LW Hydraulics	2 x 423 litres/min located on monorail

Table 11 – Men and Materials Transport System

Men and Materials Transport System		
<i>Equipment</i>	<i>Type</i>	<i>Number</i>
Loaders (LHD)	ED7	3
	ED10	7
Loaders	EDW (Hire)	3
Man Transports	PJB Mine Cruiser	3 2 Hired
Man Transports	SMV Drift Runner	9
Mine Dozer	Domino	1 hired

2.2.4 Rock/overburden Emplacement

Mandalong is an underground coal mine, subsequently there is no overburden generated at the site.

2.2.5 Processing Residues and Tailings

All ROM coal from Mandalong Mine is delivered via underground and surface conveyor systems to either the CES or the Delta Entry Site for coal crushing and sizing.

2.2.5.1 Cooranbong Entry Site

Coal from the underground operation is sized underground by a 4,000 tonnes per hour (tph) sizer and fed to an underground surge bin. Coal from the bin is delivered to either the Cooranbong or Delta coal clearance systems. The Cooranbong clearance system transfers coal underground by 1,200 mm conveyor belts to a 2,000 t capacity ROM bin on the surface. The Coal Handling Plant (CHP) processes up to 700 tph.

Coal from the ROM bin enters the CHP and is then discharged via a syntron feeder onto a conveyor belt where a magnet removes metal prior to being discharged into a rotary breaker at the CHP to reduce the size of coal to less than 200 mm. Large pieces of stone are separated in the breaker and discharged into a separate stone bin with a 50 t capacity. The coal is then conveyed into an intermediate 400 t capacity storage bin where it is fed via syntron feeders through a crushing and screening plant to reduce the size of the coal to less than 31 mm.

Final product is then conveyed to a 2,000 t product bin, from where it is drawn off by Eraring Power Station as required. Transfer to Eraring Power Station is via the Eraring Energy Overland Conveyor which is owned and operated by Eraring Energy (and has been excluded from this MOP).

The CHP upgrades completed in 2010 utilise a changeover gate and chute arrangement to supply either the existing ROM bin or 2,000 tph aerial conveyor. This conveyor transfers coal to either 100,000 t ROM stockpile or dual truck loading bin. ROM coal transferred into the truck loading bin is loaded onto haulage trucks at the base of the bin by a telescopic chute fitted with automated loading and override safety controls. When coal levels in the truck loading bin are near to full, coal is directed by the changeover gate arrangement onto a 2,000 tph aerial conveyor, which discharges coal onto the 100,000 t coal stockpile.

Coal is loaded from the 100,000 t stockpile by front end loader onto coal haulage trucks. The loaded trucks use the truck weighbridge on the haul road to determine the load weight and then transport coal via the haulage road to Newstan Colliery for washing and export. Management of the Cooranbong Haul Road will be addressed in the future development of the Northern Coal Logistics MOP.

A small amount of coal reject is generated from the processing of coal at the CES CHP. This coal reject is periodically transported to the Newstan Colliery Reject Emplacement Area (REA). Management of the REA is covered in the Newstan Colliery MOP.

Residue coal material cleaned out from surface drains, washdown bays, gross pollutant traps and the settlement ponds is transferred to the 100,000 t ROM stockpile and entrained into product coal.

2.2.5.2 Delta Entry Site

Coal supply to Vales Point Power Station commenced in April 2006 following commissioning of the Delta coal clearance system. The Delta coal clearance system is designed to transport up to 1,600 tph of coal by the Delta underground conveyor where it exits to the surface through the decline tunnel at the Wyee Rail Unloader. The Delta conveyor then feeds coal to the transfer tower which, is directed via a conveyor to the secondary coal sizing units. The two secondary sizing units crush coal to less than 50 mm diameter. A conveyor feeds coal to the existing truck haulage bin at Wyee Coal Unloader. Coal is then transferred onto the Delta operated overland conveyor to Vales Point Power Station.

2.2.6 Waste Management

2.2.6.1 Production Waste

As detailed in **Section 2.2.5**, the small amount of coal reject produced from the processing of coal at the CES is periodically transported by truck, via the private haul roads, to Newstan Colliery for use in rehabilitation or emplacement within the Newstan Colliery REA.

2.2.6.2 General Waste

Management systems are in place for the various non-production waste streams generated by the Mandalong Mine. In summary:

General Waste and Routine Maintenance Consumables

All general wastes and routine maintenance consumables from the daily servicing of equipment are and will be collected on a regular basis from the MMAS DES, CES and **proposed** MSSS by a 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 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 MMAS, DES, CES and **proposed** MSSS, along with parts and packaging (for example, cartridges, filters and waste oil drums), will be collected by a licensed waste contractor on a regular basis for recycling and/or off-site disposal within a waste facility approved to accept such waste.

Oily water from the workshop, equipment storage and washdown bay areas at MMAS and CES is drained to the existing on-site oil-water separators. Licensed contractors regularly service and maintain these separators and remove all waste hydrocarbons for recycling. The same management process will apply to MSSS.

Sewage

Sewage generated by on-site staff amenities at the MMAS is serviced by the site's existing connection to Hunter Water Corporation's reticulated sewer system. Sewage generated by on-site staff amenities at the CES is collected (pump-out systems) on a regular basis by a licensed contractor for off-site disposal. There is no sewage disposal in the Centennial Mandalong leased area from the DES; this is managed by Delta for their operations.

Sewage effluent generated by on-site staff amenities (associated with the small administrative office) at the ~~proposed~~ MSSS will be collected (pump-out systems) on a regular basis by a licensed contractor for off-site disposal. There will be no bathhouse facilities at this surface site.

2.2.7 Decommissioning and Demolition Activities

During the MOP Term decommissioning of exploration boreholes will be undertaken where they are not required for long term groundwater monitoring. All other facilities that are no longer required will be progressively removed and the area rehabilitated.

~~Decommissioning and demolition of the TL24 transmission line will involve the removal of 12 steel lattice towers consisting of five tension (approximately 20 m tall) and seven suspension (approximately 25 to 36 metres tall) structures. As part of the demolition work, it is proposed to excavate around each leg to at least 1.0 m below ground and remove the remaining steel to that depth and back filling with the same soil and additional fill material to achieve flat ground.~~

~~The redundant material will be removed from site and recycled where possible or disposed of to landfill by a licenced waste contractor.~~

~~The decommissioned tower sites will be rehabilitated in accordance with TransGrid's rehabilitation objectives and in consultation with landholders. TransGrid will be responsible for extinguishing the redundant easement in consultation with relevant stakeholders.~~

~~Decommissioning and demolition of the TL24 transmission line was completed in May 2018.~~

There is no other proposed decommissioning or demolition of infrastructure at the Mandalong Mine during the MOP Term.

2.2.8 Temporary Stabilisation

Temporary stabilisation will be required at construction areas during the MOP Term. Prior to the re-establishment of vegetation cover, temporary control measures will be utilised for erosion and sediment control. These measures may include the use of sediment fences for non-channelised flow over disturbed areas, sand bags, rip rap, or any combination of those materials. Consideration will be given to erosion and sediment control procedures for activities undertaken during the construction phase. These procedures may include restricted access during wet weather or to areas under rehabilitation, reporting of erosion and sediment hazards or incidents and regular checking and maintenance of structures.

The temporary control measures utilised are selected dependent on the site constraints (dispersive soils, slope), time of year, type of flow (concentrated or sheet flow) and the duration of disturbance.

2.2.9 Progressive Rehabilitation and Completion

Since the Mandalong Mine is an underground mine, the relatively small disturbance footprint associated with surface infrastructure means that there are limited opportunities for progressive

rehabilitation. To what extent is appropriate, rehabilitation will be undertaken progressively on areas that cease to be used for mining or mining related activities as soon as is reasonably practicable.

Rehabilitation activities forecast for the current MOP Term include:

- Rehabilitation of areas disturbed during the construction of the MSSS and access road;
- Rehabilitation of temporary construction areas required for the construction of the 33kV power line (MOD7) in consultation with Ausgrid and directly affected landholders, leaving pads where required for ongoing maintenance;
- Progressive rehabilitation of exploration and/or groundwater monitoring sites (refer **Section 2.2.1**);
- Rehabilitation of areas affected by subsidence, as required, in accordance with an approved SMP;
- Maintenance and monitoring of the VAM-RAB offset area which was established in 2012 at the Mandalong Mine;
- Maintenance and monitoring of the MSSS and TL24 offset areas; and
- Maintenance and monitoring of areas of existing rehabilitation.

Following the construction of the relocated TL24 transmission line and demolition of the redundant section in 2019, disturbance around the new and redundant tower sites and any temporary access tracks established to the redundant tower sites ~~will be~~ was rehabilitated in accordance with TransGrid's rehabilitation objectives and in consultation with landholders. The new towers, easement and access tracks will remain in place to allow TransGrid to operate and maintain the transmission line.

TransGrid will be responsible for extinguishing the redundant easement in consultation with relevant stakeholders. As such, rehabilitation of the TL24 sites does not form part of this MOP/Rehabilitation Management Plan.

Rehabilitation activities over the MOP Term are shown on **Plans 3A to Plan 3H**.

Further details of rehabilitation activities to be undertaken during the MOP Term are provided in **Section 7**.

2.2.10 Material Production Schedule during MOP Term

The proposed production schedule for Mandalong Mine over the period covered by this MOP is shown in

Table 12. Coarse reject material is emplaced in the Newstan Reject Emplacement Area as outlined in **Section 2.2.5** and **Section 2.2.6**.

Table 12 – Production Schedule

Material	Unit	2016 ¹ (Actual)	2017 (Actual)	2018 (Actual)	2019 (Actual)	2020 (Actual)	2021	2022	2023 ²
Stripped topsoil	m ³	0	6,045	3,233	0	0	0	0	0
Rock / Overburden Rock	m ³	0	44,588	36,739	0	0	0	0	0
Ore (ROM coal)	T	5,700,000 6,000,000	5,800,000 5,700,000	5,245,292 5,600,000 5,700,000	3,856,216 5,900,000 6,000,000	5,218,463 4,780,767 5,200,000 5,050,000	5,311,389 5,019,475 4,900,000 3,000,000	5,013,804 5,137,620 4,300,000	4,217,059 4,371,942 2,800,000
Coarse Reject	T	22,000 20,000	44,000 20,000	26,156 48,000 17,000	34,174 52,000 39,000	43,754 16,323 41,000 11,500	68,192 50,500 35,000 0	38,400 51,700 0	23,200 34,400 0
Product Coal	T	5,678,000 5,980,000	5,756,000 5,680,000	5,219,136 5,552,000 5,683,000	3,822,042 5,848,000 5,961,000	5,174,709 4,764,444 5,159,000 5,038,500	5,243,197 4,968,975 4,865,000 3,000,000	4,975,404 5,085,920 4,300,000	4,193,859 4,337,542 2,800,000

Note 1 – Projected values cover the period from 1 December 2016 to 31 December 2016

Note 2 – Projected values cover the period from 1 January 2023 to 30 November 2023.

2.3 Primary Domains

For the purpose of this MOP, primary (operational) domains have been defined as the set of discrete areas that have a particular operational or functional purpose. All areas previously disturbed by mining, or proposed to be subject to the activities described in **Section 2.1** and **Section 2.2**, have been assigned to an appropriate primary domain. Primary domains at Mandalong are defined in **Table 13**. The footprint of each primary domain at the commencement of the MOP Term is depicted on **Plan 2**.

Table 13 – Primary Domains

Domain	Description	Code
Infrastructure	Includes existing and proposed infrastructure and facilities at the MMAS, MSSS, CES and DES including workshops, administration buildings, pipelines (trenched), substations, car parks, access roads, hardstand/laydown areas, underground infrastructure including mine access, ventilation shafts and dewatering bore facilities and associated water management structures.	1
Water Management Area	Includes the network of dams and associated water management infrastructure at MMAS and CES. The ROM Stockpile Dam, Sediment Dams, 5 ML Dam and Construction Dam at CES and the Sediment Dam at the MMAS will not be decommissioned at the end of mine life but will be maintained for future use. All other dams at MMAS and CES will be decommissioned and rehabilitated to either an industrial land use or woodland.	3
Stockpiled Material	Includes the current stockpiles at the CES.	5
Underground Mining Area (SMP)	Areas to be actively managed for potential subsidence related impacts during the MOP Term. The domain area is defined by the combination of the subsidence	8

Domain	Description	Code
	areas (as defined by the greatest extents of the 26.5° angle of draw and 20mm subsidence contour).	
Conservation and Biodiversity Offset Area	Includes the Biodiversity Offset Area to the north and east of the Mandalong Mine Access Site ventilation and gas management facilities and the MSSS and TL24 offset areas.	9

2.4 Asset Register

The asset register included as **Table 14** provides a summary of the key features of each primary domain at MOP commencement (refer to **Section 2.3**), and principal activities required for rehabilitation. This asset register is intended to provide a suitable level of context for the Rehabilitation Cost Estimate (RCE) (refer to **Section 2.4.1**).

The areas for each primary domain represent the total disturbance footprint for each domain at the commencement of the MOP Term, as depicted on **Plan 2**. Domain selection is described further in **Section 5.1**.

Table 14 – Asset Register

Major Assets	Use	Demolition / Rehabilitation Activities	Approvals Required	Quantity	Unit
Domain 1 – Infrastructure: 27.1 ha 47.51 ha					
Mandalong Mine Access Site 8.6 ha 9.1 ha					
Decline tunnel	Materials and personnel access to underground workings – currently utilised	Disconnect services; backfill and seal decline tunnel with non-contaminated materials against an engineered bulk head; install appropriate drainage infrastructure.	DRE DRG RR approval for sealing	1	Item
Ventilation Shaft Facilities	Mine air ventilation – currently utilised	Remove ventilation fans and equipment; backfill and seal shafts; construct engineered plug; disconnect services; demolish and remove infrastructure; and remove concrete pads.	DRE DRG RR approval for sealing	2	item
Gas management system including: - Methane gas drainage plant; - VAM-RAB demonstration plant; - Gas engines; and - Flares.	Mine gas management – currently utilised	Remove gas drainage plant and equipment; disconnect services; demolish and remove infrastructure; seal and remove concrete pads.	DRE DRG RR approval for sealing	1	Item
Administration buildings, bathhouse and portable offices	Administration and staff facilities – currently utilised	Disconnect services; demolish and remove infrastructure; and remove concrete pads.	None	1,874	m ²
Car parking areas	Car parking facilities for existing mine personnel and visitors – currently utilised.	Demolish and remove infrastructure; and remove concrete pads.	None	4,638 7,940	m ²
Mechanical workshop, store and sheds.	Workshops, service buildings and storage of materials/equipment – currently utilised	Disconnect services; demolish and remove small buildings; remove concrete pads; remove potentially contaminated material; on site remediation of contaminated soil.	None	2,994	m ²
Hardstand/Laydown Areas	Storage of equipment – currently utilised.	Remove plant and material; and remove concrete pads.	None	7,821	m ²

Major Assets	Use	Demolition / Rehabilitation Activities	Approvals Required	Quantity	Unit
Services including connections to Hunter Water Corporation's reticulated potable water and sewage systems, Energy Australia's reticulated electricity and natural gas network and Telstra telecommunications	Water, electricity and gas supply and services – currently utilised	Disconnect services.	None	1	Unit
Cooranbong Entry Site 17.4 ha					
Coal handling plant including:					
- Aerial conveyor systems	Transporting coal – currently utilised	Demolish and remove conveyors and gantries.	None	599	m
- Rotary breaker and sizer	Coal processing and sizing – currently utilised	Disconnect and terminate all services; demolish and remove plant; remove carbonaceous material.	None	1	item
- Crushing plant	Crushing of coal – currently utilised	Disconnect and terminate all services; demolish and remove coal crushing plant; remove carbonaceous material.	None	1	item
- Coal bins	Storage, transfer and loading of product coal – currently utilised	Disconnect and terminate all services; demolish and remove coal bins; remove carbonaceous material.	None	2	item
- Southern drift conveyor	Transport of coal from the underground workings to the surface – currently utilised	Demolish and remove conveyors and gantries and seal portal.	DRE DRG RR approval for sealing	1	item
Ventilation Shaft Facilities	Mine air ventilation – currently utilised	Remove ventilation fans and equipment; backfill and seal shafts; construct engineered plug; disconnect services; demolish and remove infrastructure; and remove concrete pads.	DRE DRG RR approval for sealing	1	item
Administration buildings, bathhouse and portable offices	Administration and staff facilities/workshops – currently utilised	Disconnect services; demolish and remove infrastructure; and remove concrete pads.	None	779	m ²
Car parking areas	Car parking facilities for existing mine personnel and visitors – currently utilised.	Demolish and remove infrastructure; and remove concrete pads.	None	18,150	m ²

Major Assets	Use	Demolition / Rehabilitation Activities	Approvals Required	Quantity	Unit
Hardstand/Laydown Areas	Storage of equipment – currently utilised.	Remove plant and material; and remove concrete pads.	None		m ²
Mechanical workshop, store and service buildings	Workshop and storage of materials/equipment for day to day maintenance– currently utilised	Disconnect services; demolish and remove infrastructure and small buildings; remove concrete pads; remove potentially contaminated material; on site remediation of contaminated soil.	None	1,266	m ²
Delta Entry Site 3.0 ha					
Coal clearance system including transfer tower, conveyor and crusher building	Coal transfer and crushing – currently utilised	Disconnect and terminate all services; demolish and remove plant; remove carbonaceous material.	None	1	Item
Decline tunnel	Materials and personnel access to underground workings – currently utilised	Disconnect services; backfill and seal decline tunnel with non-contaminated materials against an engineered bulk head; install appropriate drainage infrastructure.	DRE DRG RR approval for sealing	1	Item
Fire-fighting tanks	Water storage for fire-fighting – currently utilised	Remove plant and material; and remove concrete pads	None	4	Item
Hardstand/Laydown Areas	Storage of equipment – currently utilised.	Remove plant and material; and remove concrete pads.	None	2.67	ha
Mandalong South Surface Site 19.9 ha					
Construction site - buildings, portable offices and laydown areas	Administration, construction and staff facilities, storage of equipment – currently utilised	Disconnect services; remove infrastructure; and remove stabilised material.	None	5.9	ha
Access road	MSSS access – currently utilised	Demolish and remove infrastructure; and remove seal.	None	1.04	ha
Ventilation Shaft Facilities	Mine air ventilation – currently utilised	Remove ventilation fans and equipment; backfill and seal shafts; construct engineered plug; disconnect services; demolish and remove infrastructure; and remove concrete pads.	RR approval for sealing	1	item

Major Assets	Use	Demolition / Rehabilitation Activities	Approvals Required	Quantity	Unit
Service borehole	Delivery of bulk materials, including stone dust, concrete and ballast, to the underground mine workings – currently utilised	Remove equipment; backfill and seal boreholes; construct engineered plug; demolish and remove infrastructure; and remove concrete pads.	RR approval for sealing	1	Item
Domain 3 – Water Management Area: 1.5 ha 1.63 ha					
Mandalong Mine Access Site					
Dams including the Clean Water Dam, Sediment Dam and Macrophyte Pond	Water storage, treatment and management – currently utilised	Drain and remove contaminated sediments from the floor of the dams to enable it to be converted into a clean water structure.	None	2,029	m ²
Cooranbong Entry Site					
Dams including the SML Dam, Sediment Dam 1 & 2, CHP settlement dam, construction dam, ROM Stockpile Dam and Borehole Dam	Water storage, treatment and management – currently utilised	Drain and remove contaminated sediments from the floor of the dams to enable it to be converted into a clean water structure.	None	12,899	m ²
Mandalong South Surface Site					
Dams including the Sediment Dam and Gross Pollutant Trap Sump	Water storage, treatment and management – currently utilised	Drain and remove contaminated sediments from the floor of the dams to enable it to be converted into a clean water structure.	None	1,355	m ²
Domain 5 – Stockpile Material: 2.1 ha					
Cooranbong Entry Site					
ROM Stockpile	Storage of ROM coal – currently utilised	Remove carbonaceous material.	None	14,900	m ²
Product coal stockpile	Storage of ROM coal – currently utilised	Remove carbonaceous material.	None	3,375	m ²
1500 t emergency stockpile	Storage of ROM coal – currently utilised	Remove carbonaceous material.	None	3,346	m ²

Major Assets	Use	Demolition / Rehabilitation Activities	Approvals Required	Quantity	Unit
Domain 8 – Underground Mining Area: 2,691.5 ha 2,950.8 ha 3,577.5 ha					
No building or plant located within this domain	N/A	N/A	N/A	N/A	N/A
Domain 9 – Conservation and Biodiversity Offset Area: 200.9 ha					
No building or plant located within this domain	N/A	N/A	N/A	N/A	N/A

2.5 Rehabilitation Cost Estimate

The RCE prepared for this MOP submission has been calculated to undertake the necessary works to achieve the desired final land use (refer to **Section 4** and **Plan 4**). In accordance with *the ESG1: Rehabilitation Cost Estimate Guidelines* (Department of Industry and Investment 2010), the RCE has been prepared based upon a “snapshot” of disturbance at the end of 2016. The RCE provides for:

- Decommissioning and demolition of all surface infrastructure;
- Rehabilitation of all areas disturbed by mining as depicted in Plan 2, with the exception of dams to be retained for post mining use; and
- Mobilisation costs, project management and contingencies.

A copy of the RCE was submitted to ~~DRE DRG~~ RR with this MOP for approval in June 2016 and an updated RCE was submitted with the Annual Review in March 2018.

A revised RCE has been prepared and will be submitted with this MOP Amendment D.

3 Environmental Issues Management

3.1 Environmental Risk Assessment

A risk assessment was undertaken for this MOP which addressed all risks to rehabilitation at Mandalong Mine. This included key operational and rehabilitation risks for Centennial Mandalong. The risk assessment was facilitated by SLR on 14 December 2015 and included key Centennial Mandalong personnel.

Centennial Coal's Risk Management Standard Risk Matrix was used to calculate the consequence and likelihood of an event to evaluate the subsequent risk level (risk rank). Risks are ranked as Low, Moderate, Significant, High or Extreme. The risk assessment was undertaken in accordance with the AS/NZS ISO 3100:2009 *Risk Management – Principles and Guidelines*.

The risk assessment identified 38 key rehabilitation risks which are summarised as follows:

- 20 risks were ranked as low;
- 15 risks were ranked as moderate;
- 3 risks were ranked as significant;
- No risks were ranked as high; and
- No risks were ranked as extreme.

The complete risk assessment, including the Centennial Coal Risk Management Standard is attached as **Appendix 5**.

3.2 Environmental Risk Management

Mandalong Mine has developed an Environmental Management Strategy (EMS) to adhere to Centennial Coal's Environmental Policy. The EMS provides the management framework to identify and control potential environmental impacts to achieve compliance with environmental legislation and regulatory requirements applicable to Centennial Mandalong under SSD-5144.

The EMS has been developed and implemented to ensure the effective management of environmental issues and compliance with all regulatory requirements while providing a means for continued improvement in the environmental performance of Centennial Mandalong. The EMS incorporates a number of environmental management plans which are designed to assist in meeting community and regulatory expectations. In accordance with the requirements of SSD-5144, Centennial Mandalong has (or is preparing) the following management plans as outlined in **Table 15**.

Table 15 – EMS Management Plans

Management Plan	SSD-5144 Condition	Status
Noise Management Plan	Schedule 3 Condition 4	Submitted to DP&E for approval Approved
Air Quality & Greenhouse Gas Management Plan	Schedule 3 Condition 10	Submitted to DP&E for approval Approved
Mine Water Discharges Management Plan	Schedule 3 Condition 15	Submitted to DP&E for approval Approved
Water Management Plan	Schedule 3 Condition 17	Submitted to DP&E for approval Approved
- Site Water Balance		
- Surface Water Management Plan		
- Erosion and Sediment Control Management Plan		
Biodiversity Management Plan	Schedule 3 Condition 19	Submitted to DP&E for approval Approved
Centennial Northern Holdings Aboriginal Cultural Heritage Management Plan	Schedule 3 Condition 22	Submitted to DP&E for approval Approved
Construction Traffic Management Plan	Schedule 3 Condition 27	Submitted to DP&E for approval Approved
Rehabilitation Management Plan	Schedule 3 Condition 33	This document
Surface Infrastructure Management Plan	Schedule 3 Condition 35	To be prepared prior to the construction of relevant infrastructure Services Boreholes Management Plan approved.
- Gas Drainage Management Plan		
- Service Boreholes Management Plan		
- PED Management Plan		
Exploration Activities Management Plan	Schedule 3 Condition 36	Approved
Extraction Plan and associated management plans	Schedule 4 Condition 6	To be prepared for future second workings

In accordance with Schedule 6, Condition 3 of SSD-5144, prior to the approval of the above management plans required under SSD-5144, Mandalong will continue to manage the development in accordance with the equivalent or similar management plans prepared under DA 97/800 (as modified). Further, as required by the MOP Guidelines, should the management plans be amended during the MOP term then this will be reported in the Annual Review.

The environmental management plans are backed by an environmental monitoring network. Monitoring results are reported monthly on Centennial's website and on an annual basis in the Annual Review.

3.3 Environmental Issues Management

3.3.1 Air Quality

Air quality at Centennial Mandalong operation is currently managed in accordance with the Northern Region Air Quality and Greenhouse Gas Management Plan (AQGHGMP) which was prepared to fulfil the requirements of Schedule 3 Condition 10 of SSD-5144 and relevant conditions of EPL 365.

The Northern Region AQGHGMP has been prepared to manage air quality impacts to private receivers and the wider environment from mining operations and associated mining related activities within

Centennial's northern region. The aims of adopting a regional approach to the management and monitoring of air and greenhouse gas emissions include the following:

- Provide a consistent and consolidated management measures and procedures across all sites;
- management of 'airshed' emissions, rather than focusing on individual operations; and
- rationalise monitoring procedures and locations with consideration of 'airshed' emissions.

THE AQGHGMP includes a number of emissions controls and standard work procedures which are implemented across all sites to manage and minimise emissions of dust and particulate matter. These work procedures are current best practice standards for the underground coal mining industry and include:

- The use of water sprays/carts to dampen exposed surfaces and trafficable areas;
- The use of water cannons/water sprays on coal stockpiles;
- A combination of partial and fully enclosed conveyors and conveyor transfer points.
- Maintaining plant and equipment to ensure optimal operating conditions;
- Use of low sulphur diesel;
- Use of diesel engines which conform to the United States EPA Tier 3 standards for exhaust emissions;
- Underground dust suppression system (water strays on coal cutting machinery and running conveyor belts); and
- All haulage trucks entering and leaving the sites have their loads covered.

Centennial Mandalong currently operates the following dust monitoring program in the vicinity of the MMAS, CES and ~~DES~~ MSSS:

- ~~Three dust gauges around the DES;~~
- ~~Seven~~ Four dust gauges around the MMAS;
- ~~Two~~ One dust gauge at the CES;
- ~~Three~~ Two dust gauges around the MSSS ~~which will commence when construction begins.~~
- Two high volume air samplers (HVAS) to monitor PM₁₀ and PM_{2.5} at the MMAS; and
- Two Tapered Element Oscillating Microbalance (TEOM) units to monitor PM₁₀ and Total Suspended Particles (TSP) at the CES.

3.3.2 Erosion and Sedimentation

Erosion and sedimentation at Mandalong will be managed in accordance with the approved Erosion and Sediment Control Plan which is incorporated in the Northern Region Regional Water Management Plan (RWMP).

The erosion and sediment control structures at Centennial Mandalong operations have been designed to be consistent with the specifications contained in *Managing Urban Stormwater – Soils and Construction, Volume 1, 4th edition* (Landcom, 2004) and particularly *Volume 2E Mines and Quarries*.

Erosion and sediment controls are implemented for all phases of operation including construction/maintenance activities, operational activities and during rehabilitation to mitigate the impacts of the operations on watercourses and the surrounding environment.

Erosion and sediment control measures are focused on prevention of erosion through development of erosion and sediment control plans (ESCPs) that:

- Identify activities with the potential to cause erosion and generate sediment.
- Plan activities to minimise the area of disturbance.
- Install erosion and sediment controls prior to commencement of disturbance activities.

- Maintain erosion and sediment control structures.
- Design erosion and sediment control structures with the capacity to handle the critical 20 year ARI rainfall event.
- A range of erosion and sediment control measures are employed including:
 - Erosion matting.
 - Clean and dirty water diversion.
 - Sediment filters fences.
 - Rock check dams.
 - Sandbag weirs.
 - Temporary drains.

Inspections of all water management and sediment control structures are undertaken following heavy rainfall events.

3.3.3 Surface Water

Surface water at Mandalong Mine will be managed in accordance with the Northern Operations Regional Water Management Plan (RWMP). The RWMP has been developed to provide an overview of the water management requirements across Centennial's northern operations and to standardise the management of water. The Mandalong Mine Water Management Plan (WMP) forms part of the RWMP and provides water management measures specific to the Mandalong Mine including the MMAS, MSSS and DES. The Mandalong Mine WMP has been prepared in consultation with DPI-Water.

There is an extensive monitoring program at Mandalong with sampling undertaken on a monthly basis and results reported in the Annual Review. The surface water monitoring program includes monitoring of the following:

- Water quality and flow;
- tunnel erosion; and
- Watercourse stability; and
- Flooding.

Regular inspections of all water management structures at Mandalong are also undertaken to assess capacity, structural integrity and effectiveness.

Trigger action response plans (TARPs) have been prepared for each site, which outline the triggers and appropriate responses to manage any potentially adverse impacts on surface water due to operational activities.

The Mandalong Mine WMP was updated in 2019 to incorporate MOD 6 to development consent SSD-5144 allowing for controlled discharges from the Sediment Dam at the MSSS and to account for changes in water management activities at MMAS and MSSS.

3.3.4 Groundwater

Groundwater at Mandalong Mine will also be managed in accordance with the Northern Operations RWMP and the Mandalong Mine WMP.

Monitoring of groundwater levels and quality is undertaken at Centennial sites in the northern region including deep and shallow piezometers and sampling of groundwater bores. Groundwater monitoring is undertaken on a monthly basis and results reported in the Annual Review.

In accordance with SSD-5144 MOD5, a review of the Mandalong groundwater model has been undertaken. As required by Schedule 3 Condition 6A, the review includes:

- (a) a review of all available monitoring data;
- (b) a comparison of predicted and actual groundwater impacts; and
- (c) a review of the effectiveness of the groundwater model.

3.3.5 Contaminated Land

Centennial Mandalong completed a Phase 1 desktop contaminated land assessment for the Mandalong Mine, including the MMAS, CES and DES in December 2010. Based on the results of the Phase 1 assessment, potential contamination at the three sites was identified to be generally associated with fuel storage and handling and equipment storage and maintenance. The risk associated with potential contamination at the MMAS and CES was considered to be moderate, with the risk associated with potential contamination at the DES considered to be low given the limited stored volumes of oil and fuel and the controls in place.

In February 2012, as an outcome of the Phase 1 assessment, Centennial Mandalong submitted Contamination Notifications to the EPA in accordance with Section 60 of the *Contaminated Land Management Act 1997*. In accordance with commitments made to the EPA in the Notifications, Centennial Mandalong has commenced undertaking Phase 2 assessments at both the MMAS and CES; these ~~will be~~ **were** completed in ~~2016~~ **2017**. Following the completion of the Phase 2 assessments, remediation plans will be developed and implemented in consultation with the EPA and an accredited contaminated land auditor to address any contamination issues identified. In a letter dated 6 July 2012, the EPA confirmed acceptance of the approach proposed by Centennial Mandalong.

Centennial Mandalong will continue to implement best management practices for hydrocarbons, along with the approved EMS and workplace health and safety management systems, at the MSSS to ensure the potential for contamination and associated issues remains low.

Hazardous Materials Surveys and Registers were developed in 2012 for the MMAS, CES and DES. The Hazardous Materials Surveys and Registers are available to all personnel on each site. The majority of hazardous materials (such as asbestos) are located within the CES Administration Building.

3.3.6 Flora and Fauna

Flora and fauna at the Centennial Mandalong operations is currently managed in accordance with the Flora and Fauna Management Plan.

A detailed assessment of the vegetation systems and fauna habitat areas within the Mandalong valley was conducted by Gunninah Environmental Consultants as part of the Cooranbong Colliery Life Extension Project EIS (Umwelt 1997). This assessment involved detailed survey and records of flora and fauna, with emphasis placed on species of conservation significance. The results of these surveys have formed the basis of the Flora and Fauna Management Plan.

In line with State and Commonwealth planning policies, Centennial Mandalong's flora and fauna management objectives include:

- Ensuring that the impact of subsidence on all flora and fauna, including those species or habitats listed as endangered or threatened, is minimised;
- Habitat areas across the mining area of impact are identified, and monitoring is established prior to disturbance where appropriate (during the SMP process and due diligence assessments for exploration activities);

- Ensure endangered or threatened flora and fauna, not identified during the EIS are identified prior to extraction activities that may lead to damage by subsidence;
- To ensure procedures are in place and appropriate training provided for personnel involved in subsidence repair works.; and
- That the re-vegetation process involves the collection of provenance seed from sites close to any proposed rehabilitation.

Assessment of the flora and fauna issues associated with the Southern Extension Area was undertaken by RPS (2013). The activities associated with the Mandalong Southern Extension Project that were identified by RPS (2013) to represent a potential impact to flora and fauna include the construction of the MSSS, subsidence and the increased discharge of mine water (from the underground workings of Mandalong Mine) into Muddy Lake at the CES via LDP001. RPS (2013) concluded that the Project will not significantly impact upon occurring or potentially occurring threatened flora, fauna and/or ecological communities within the Mandalong Southern Extension Area.

Furthermore, an assessment of the subsidence related impacts from the extension of Longwalls 22 and 23 upon terrestrial biodiversity, including threatened flora and fauna, endangered ecological communities (EECs) and groundwater depended ecosystems (GDEs), concluded that no significant impacts are expected to occur.

As reported in the MOD 5 SEE (Centennial Mandalong Pty Limited, 2017), the extension of LW24 and addition of LW24A poses no significant impacts to biodiversity or ecological matters beyond those approved by SSD 5144.

As detailed in the MOD 7 SEE, the 33 kV powerline project was designed to avoid and minimise impacts on biodiversity values. This included shifting the alignment to avoid high quality bushland, as well as maintain connectivity by retaining a vegetation buffer and retain habitat values where possible, including hollow bearing trees and threatened flora. The Project will involve clearing of 8.83 ha of native vegetation from seven plant community types (PCTs) with conditions ranging from moderate to poor. Ecosystem and species credit requirements of the Project will be satisfied in accordance with the NSW Biodiversity Offset Scheme. The Project is not likely to cause a serious and irreversible impact (SAII) on any species or ecological community.

MOD 8 will result in the clearance of approximately 0.18 ha of native vegetation. Biodiversity offsets are proposed to compensate for unavoidable disturbance of native vegetation within the subject land. No additional mitigation measures for potential impacts to biodiversity are considered warranted for vegetation clearance and construction activities.

MOD 9 does not involve the clearing of any native vegetation.

In accordance with the requirements of DA97/800 a 1.25 hectare rehabilitation off-set area was established on cleared land adjoining the VAM-RAB construction site. Including the official 1.25 ha off-set area, a total of 2.7 ha has been fenced off to prevent wallaby access and is set aside for rehabilitation (and potential future off-sets).

In addition, the Mandalong Southern Extension Project committed to the development of a Land Management Strategy to conserve and enhance the vegetation communities on three parcels of land to compensate for the loss of 15.6 hectares of vegetation as part of the Mandalong Southern Extension Project. The ~~proposed~~ relocation of TL24 will also result in 8.5 ha of vegetation clearing for the establishment of the new easement. Centennial Mandalong proposed to include in the Land

Management Strategy an additional area of 73.6 ha in order to compensate for the loss of vegetation communities.

In accordance with the requirements of SSD-5144 and the statement of commitments, Mandalong ~~will~~ **has** prepared a Biodiversity Management Plan during the MOP term. This document ~~will~~ **has** incorporated the recommended management measures and monitoring programs outlined within the Mandalong Southern Extension Project EIS and the supporting specialist assessments.

3.3.7 Weeds and Pests

A Weed Action Plan (WAP) has been designed for Centennial Mandalong to guide the management of weeds at the MMAS, CES and DES. The WAP is only a guide to weed control as the composition and spread of weeds will most certainly vary over a 12 month period, due to seasonal conditions and other factors which may bring new weeds to site. This may occur via vehicle movements, fluvial and aeolian transport. The WAP is reviewed on an annual basis.

The main focus of the WAP is to manage noxious weeds as a priority, followed by environmental weeds which are posing a threat to the operation of the site including regeneration and rehabilitation areas. Consideration of environmental impacts is also high, with the plan guiding weed control in a manner which will enhance the natural vegetation at the site. All weed control success is subject to the resources available to manage them. Resource input will be initially high with new or large weed infestations however with regular follow up control works after the primary treatment there should be a reduced amount of resources required to maintain a low presence of weeds on site.

Through careful planning many weed issues can be avoided or minimised. This WAP will highlight these and actions which can be taken in the long term planning of the operations of the site in order to reduce the potential for new weed incursions.

Centennial Mandalong and the Biraban Aboriginal Land Council (BALC) have developed a partnership with BALC personnel performing land management works including weed removal on Centennial Mandalong's properties within the Mandalong Valley.

Vertebrate pest control programs are undertaken at Centennial Mandalong operations by a qualified contractor. Baiting completed to date has focused on feral dogs and foxes. A series of bait stations were used to present the 1080 baits with the ground baiting method aligning with the Standard Operating Procedures – Ground Baiting for Wild Dogs with 1080 – produced by NSW DPI. Additional pest control for rabbits and also deer will be considered for rehabilitation areas if these vertebrate pests are identified.

In accordance with the requirements of SSD-5144 and the statement of commitments, the Biodiversity Management Plan ~~to be~~ prepared during the MOP Term ~~has~~ **will** included controls for weeds and feral pests.

3.3.8 Blasting

An existing blast monitoring program is in place at Centennial Mandalong as required by Condition 49 of DA 97/800. Monitoring of ground vibration and over pressure levels is conducted during underground shot firing used to remove stone and dyke materials. An annual blast monitoring report is included in the Annual Review if any blasting was undertaken.

3.3.9 Noise

Noise emissions from the Centennial Mandalong operations will be managed in accordance with the Northern Region Noise Management Plan (RNMP). The RNMP has been prepared to adopt a regional approach to the management and monitoring of noise emissions including the following:

- Provision of consistent and consolidated management measures and procedures across all sites;
- management of cumulative impacts, rather than focusing on individual operations, and
- rationalisation of monitoring procedures and locations with consideration of cumulative impacts.

The RNMP outlines noise management and monitoring measures that will be implemented at all Centennial's Northern operations to measure compliance with statutory requirements.

In accordance with the requirements of SSD-5144, site specific NMPs are appended to the RNMP. The site specific NMPs outline specific requirements for each operation including the MMAS, CES and ~~proposed~~ MSSS.

Noise emissions from DES are managed by Delta for their operations.

3.3.10 Visual and Lighting

The MMAS and CES operations are located in undulating terrain, with elevated terrain located to the south and west of the MMAS site, and to the north, south and west of the CES site.

The MMAS site is bounded by the M1 Motorway to the east and Mandalong Road to the south, with existing visual barriers in place to the east and west of the Pit Top. The CES site is bounded by native vegetation in all directions with the site entry from Gradwell's Road to the east.

The DES is bounded by native vegetation in all directions with the site entry from Rutleys Road to the south.

The proposed surface infrastructure at the MSSS will not be visible from any populated urban centres, or from the M1 Motorway, which is located approximately 4.5 km to the east of the proposed surface site. In addition, there are no formal public lookouts identified within the local landscape surrounding the ~~proposed~~ MSSS.

3.3.11 Cultural Heritage

3.3.11.1 Aboriginal Cultural Heritage

The ACHMP aims to provide a consistent approach to consultation between Centennial and the Aboriginal community as well as identify standard Aboriginal cultural heritage monitoring and management requirements. This ACHMP should be used by Centennial personnel to ensure that the appropriate protocols are adopted for the identification, monitoring and management of Aboriginal material culture. The structure of the management plan has been designed as an over-arching document which must be followed in conjunction with specific development consent requirements for each operation within the Northern Holdings.

Mandalong Mine works closely with local Aboriginal people through professional engagement and Cultural Heritage assessment for Aboriginal heritage. Cultural and Heritage assessments are undertaken during activities including the SMP application process and due diligence surveys are

undertaken by appropriately qualified heritage specialists prior to exploration activities to ensure the potential for localised impacts and risks are minimised and where necessary, appropriately managed.

The Aboriginal Heritage Impact Assessment undertaken for the Mandalong Southern Extension Project EIS identified an addition 150 registered sites of Aboriginal cultural heritage significant within the Southern Extension Area. The Aboriginal Heritage Impact Assessment carried out for the SSD-5144 MOD 4 application concluded that there is no change in the level of impact as a result of the extended longwalls 22 and 23. Likewise, the Aboriginal Heritage Impact Assessment carried out for the SSD-5144 MOD 5 application concluded that there is no change in the level of impact to that approved under SSD-5144.

The Aboriginal Cultural Heritage Assessment Report undertaken for the MOD 7 identified a total of 3 new sites and 3 previously recorded sites, all of which are located outside the Project Area. These sites consisted of three isolated artefacts and three sets of previously recorded grinding grooves. The Project will not involve direct or indirect impacts to these sites. Two areas of low-moderate archaeological potential have been identified within the Project Area and will be subject to direct and indirect impact. Mitigation measures will be implemented to minimise impacts to Aboriginal Heritage.

No previously registered or new Aboriginal archaeological sites were identified within or in proximity to the land associated with MOD 8. The proposed works within the subject land will have no direct or indirect impacts to Aboriginal objects or cultural significance.

Aboriginal cultural heritage will continue to be managed in accordance with the ACHMP.

3.3.11.2 Non-Indigenous Heritage

The Mandalong Southern Extension Heritage Impact Assessment (RPS 2013b) identified a number of non-Indigenous heritage sites within the Project Application Area. These identified sites included landing skids (also known as log landings), a former residence and gardens, Olney Roding Camp and Shield Tree, and the Frog Hollow Board Tree. Additionally, the possible location of Simpsons Track and the Brisbane Water to Wallis Plains Roads were identified.

All non-indigenous heritage items identified in the Southern Extension Area are of low heritage significance (RPS, 2013).

Non-indigenous heritage management is detailed in the Northern Region Historic Heritage Management Plan (HHMP) which has been prepared to provide Centennial with a consistent approach to Centennial's consultation with historic heritage identification, recording and management. The HHMP covers historic heritage protected under the NSW Heritage Act 1977. It does not cover Aboriginal heritage which is addressed in Centennial's Northern Holdings ACHMP.

3.3.12 Spontaneous Combustion

Small scale spontaneous combustion testing completed in 2010 supports the original large scale testing conducted by Sitmars in 2003 that indicated a low inherent spontaneous combustibility for the West Wallarah Seam. This is in agreement with the local history of mining in the Wallarah and Great Northern Seams, including the connected Cooranbong Colliery, where various ventilation layouts were used without a spontaneous heating incident since operations commenced in the early 1980's.

Spontaneous combustion at Mandalong Mine is managed by the Spontaneous Combustion Management Plan. The management plan is based on the risks identified in an external risk assessment in 2004 that was subsequently reviewed in 2014.

The mine is designed and developed with due regard to the prevention of spontaneous combustion. Design principles adopted include:

- Working section is from the top of the coal seam down, with limited broken coal existing in the goaf where the seam is not fully extracted;
- Installation of high quality ventilation control devices to minimise leakage;
- Operate at lowest possible fan speeds to adequately ventilate the mine;
- Constructing roadways as large as possible and maintaining them free of obstructions considering operating equipment, strata conditions and support requirements to minimise the mine resistance;
- Minimising pressures across the longwall goaf, using the “U-type” system;
- Marking in-seam methane drainage holes in chain pillars on the Longwall Hazard Plan and sealing them before the longwall face passes each hole to prevent air ingress into the goaf or goaf gases escaping;
- Sealing of surface boreholes over longwall panels to prevent air ingress into the goaf or goaf gases escaping; and
- Minimising coal stowage in roadways particularly against stoppings.

The potential for spontaneous combustion on the coal stockpile areas at CES is managed by the Cooranbong Stockpile Management Plan.

3.3.13 Bushfire

Bushfire risk for Centennial Mandalong’s operations will be managed through a Bushfire Management Plan which includes a number of preventative management actions including the following:

- Managing potential sources of ignition via a “Hot Works Permit”;
- Maintaining firebreaks surrounding Centennial Mandalong operations;
- Providing firefighting equipment at Centennial Mandalong operations;
- Trained and competent personnel on-site who can conduct fire-fighting if required; and
- Regular dialogue with the local Rural Fire Service (RFS) in relation to Bushfire Management Practices.

In accordance with the approved Exploration Activities Management Plan, specific risk management actions will also be implemented for exploration drilling and/or groundwater monitoring activities include:

- No drilling will be conducted on total fire ban days;
- Firefighting equipment will be kept on all active sites at all times;
- Mandalong has a hot work management system that needs to be followed to prevent any fires resulting from hot works outside of designated areas.
- Fire trails and access tracks are maintained to a suitable standard to allow water tanker access;
- Mandalong will not burn off any grass, foliage or herbage;
- Operational procedures and evacuation planning will be prepared prior to the commencement of site preparation works to identify site specific emergency access/egress; and
- Evacuation plans and emergency contacts are provided on site and will be included in the staff inductions, as will the significance of working in bushfire prone land.

Furthermore, any specific or additional bushfire risk management requirements of the landholder (i.e. FCNSW) will be complied with during project planning and prior to site establishment.

3.3.14 Mine Subsidence

Centennial Mandalong undertakes management and monitoring of subsidence resulting from secondary extraction ~~within Longwalls 18 to 21~~ in accordance with an approved SMP or Extraction Plan. Subsidence management at Mandalong Mine follows the risk hierarchy approach of risk elimination (impact avoidance), substitution and mitigation, engineering controls, management and monitoring.

~~The SMP provides the framework for subsidence management, with the specific technical details provided in a series of associated operational management plans as follows:~~

- ~~• Environmental Management Plan;~~
- ~~• Property Subsidence Management Plans (for each property within the predicted area of impact);~~
- ~~• Public Safety Management Plan;~~
- ~~• Public Roads Management Plan;~~
- ~~• Telstra Management Plan;~~
- ~~• TransGrid Management Plan; and~~
- ~~• Powerline Management Plan.~~

~~These plans are based on the following key elements:~~

- ~~• Subsidence prediction data specific to the particular item of infrastructure or feature;~~
- ~~• Risk assessment—damage impacts, likelihood and consequences;~~
- ~~• Subsidence monitoring to assess performance against predictions and action triggers; and~~
- ~~• Trigger Action Response Plans (TARPs) for each element of interest.~~

Comprehensive subsidence monitoring has been carried out since commencement of mining along longwall panel centrelines, numerous crosslines and at specific infrastructure items and natural features. The monitoring program is set out in the Subsidence Monitoring Program, which is approved by the Principal Subsidence Engineer, and managed through the Centennial Compliance Database. Subsidence performance is reported in annual reporting.

Subsidence predictions have been prepared for Mandalong Mine based on an analytical model that includes consideration of the spanning of massive conglomerates and the compression of the rock mass around chain pillars. Since the commencement of longwall mining in 2005, Centennial Mandalong has continued to develop and refine the model through the ongoing collection of subsidence data and recalibration of the model.

The approach requires that subsidence and stability be considered as two components:

- The sag that develops above the longwall panels; and
- The subsidence that develops above the chain pillars adjacent to the longwall panel due to the compression of the rock mass.

This allows the application of a number of analytical tools to assess not only deflections (subsidence) but also stability (factors of safety). Typically, 0.5 m of maximum vertical subsidence is experienced over the lower cover areas (180 m to 260 m) of the floodplain, while the higher cover areas (260 m to 370 m) at the foothills of the Watagan Mountains measure subsidence in the range of 0.5 m to 1.0 m.

In accordance with the requirements of Schedule 4, Condition 6 of SSD-5144 and the *Draft Guidelines for the Preparation of Extraction Plans* (DPIE and RR, 2015), Centennial Mandalong ~~will prepare~~ have prepared an Extraction Plan for the secondary extraction of Longwalls 22 and 23 (Centennial Coal, 2016) and Longwalls 24 and 24A ~~all future secondary workings on the site~~. The Extraction Plans include: ~~Plan s will include:~~

- Built Features Management Plan;
- Property Subsidence Management Plan;
- Water Management Plan;
- Biodiversity Management Plan;
- Land Management Plan;
- Heritage Management Plan;
- Public Safety Management Plan; and
- Subsidence Monitoring Program.

Subsidence management and mitigation strategies for each relevant natural and built feature are described within the relevant management plans developed in support of the Extraction Plan.

The Extraction Plan for Longwalls 22 and 23 was conditionally approved by DP&E DPIE on 4 April 2017. While DP&E DPIE identified a number of minor issues in various parts of the Extraction Plan they were satisfied that there is no substantial reason to delay secondary extraction. Therefore conditional approval was granted to avoid delays in the commencement of secondary extraction in Longwalls 22 and 23. Centennial Mandalong will address the identified issues as required by the conditional approval.

The Extraction Plan for Longwalls 24 and 24A was approved by DP&E DPIE on 6 February 2018.

The Extraction Plan for Longwalls 25 to 31 received approval from the DPE on 15 January 2019. A variation to the Extraction Plan was approved by DPIE on 28 March 2019 to modify Longwall 25 to relocate around a complex fault zone within the longwall block to ensure the safe operation of the longwall panel. The relocation around the fault zone will result in Longwall 25 being separated in two longwall blocks, Longwall 25A and Longwall 25B, leaving 111m of coal within the longwall block around the fault zone.

A second variation to the Extraction Plan was sought and approved by DPIE in October 2019 to also relocate both Longwalls 26 and 27 around the same fault zone, leaving coal within the longwall blocks and around fault zone.

The first workings associated with the bord and pillar mining in Area 2 have been designed to remain stable and non-subsiding. A geotechnical assessment (Byrnes Geotechnical 2020) reviewing the first workings layout for pillar stability and ground support options was submitted to RR in April 2020.

The Extraction Plan for Longwalls 30 and 31 was prepared in March 2021 for secondary workings and was submitted to RR for approval on 9 April 2021. At the time of writing approval for the Longwalls 30 and 31 Extraction Plan has not been received.

3.4 Operational Risks relating to Rehabilitation

Operational issues which could potentially affect rehabilitation at the Mandalong Mine were assessed in the MOP risk assessment.

The following sections outline the risks to relating to Mandalong during the MOP Term and the rehabilitation of the site.

The three significant risks identified in the risk assessment are as follows:

- Contaminated land occurring on the site at closure or contamination due to past poor practices or leaks/spills resulting in constraints to future land use, impacts on the environment, inability to reach closure or unplanned remediation costs;
- Changes to the riparian vegetation community at Muddy Lake caused by cessation of pumping from the Cooranbong workings resulting in impacts on the environment or complaints; and
- Changes in community expectations due to the significant time until closure resulting in complaints or additional costs for unplanned works.

Accordingly, additional controls have been assigned in the risk assessment and their implementation is assigned to be completed by responsible site personnel as per the Mine's internal Occupational Health and Safety (OHS) action system.

3.4.1 Geology and Geochemistry

Geologically the MOP Area is located in the south-west of the Newcastle Coalfield, a geological subdivision of the north-eastern Sydney Basin. The coal deposits of this area are contained within sedimentary rocks of the Late Permian Age Newcastle Coal Measures, which are characterised by complex patterns of splitting and coalescence of the various coal seams.

The significant coal seams within the MOP Area are the Wallarah, West Wallarah, Great Northern and Fassifern Seams. The term "West Wallarah Coal Seam" was introduced by Centennial Mandalong and has been used at Mandalong Mine to define the coal seam formed by the westerly convergence of the Wallarah and Great Northern Seams.

Other significant units, which lie within the stratigraphic section, are the Awaba Tuff Formation, which lies between the West Wallarah and Fassifern Seams, and the Munmorah Conglomerate, which sits within the Triassic Age Narrabeen Group sediments between 80 m to 110 m above the West Wallarah Seam and Wallarah-Great Northern Seams. This conglomerate beam has a significant impact on the subsidence profile for the Mandalong Mine due to its spanning potential.

The risk to rehabilitation for Mandalong related to geology and geochemistry was ranked as a moderate risk due to the risk of uncontrolled seepage of water from sealed workings caused by mine workings filling up and passing through different geological strata (low pH, metals etc.) resulting in impacts on the environment, inability to reach closure and relinquishment of the lease or the requirement to treat water long term.

Centennial Mandalong propose to investigate seam and surface contours during the MOP Term to determine potential seepage location(s).

There is also a risk to rehabilitation due to the lack of understanding of the material historically used as fill on the site or the inappropriate placement of shaft excavation materials and the geochemistry of these materials. However, this was ranked as a low risk in the risk assessment and no actions were proposed.

3.4.2 Material Prone to Spontaneous Combustion

As outlined in **Section 3.3.13**, the West Wallarah Seam has a low inherent spontaneous combustibility and there have been no spontaneous heating incidents since operations commenced in the early 1980's. Consequently spontaneous combustion was considered a low risk to rehabilitation in the risk assessment.

3.4.3 Material Prone to Generating Acid Mine Drainage

As outlined in **Section 3.3.6**, there have been no acid mine drainage issues identified at Mandalong Mine since the commencement of operations.

3.4.4 Mine Subsidence

The risk assessment identified that there is a risk to Centennial Mandalong if subsidence impacts are greater than predicted due to changes to the flood path which may result in a failure to achieve the rehabilitation outcomes prescribed in this MOP, property acquisition triggers or safety concerns. This was ranked as a moderate risk in the risk assessment.

Should subsidence impacts occur to surface features, remediation and rehabilitation will be undertaken in accordance with the ~~existing Longwall 18 to 21 SMP~~, ~~Longwalls 22 to 23 Extraction Plan~~, ~~Longwalls 24 to 24A Extraction Plan~~, ~~Longwalls 25 to 31 Extraction Plan~~, ~~Longwall 30 and 31 Extraction Plan~~ and future approved Extraction Plans that will be developed. Subsidence remediation and rehabilitation will be on-going throughout the life of the mine. Any rehabilitation is undertaken in consultation with the affected landowner and relevant government agencies.

As outlined in **Section 2.2.3**, Mandalong will undertake first workings in Area 2 of the approved mining area. The development of the first working roadways, using the Herringbone System has been designed to be long term stable and therefore provide no measurable subsidence or surface impacts. The first workings will be developed, managed and monitored in accordance with the Mandalong Mine Strata Management Plan.

Predicted subsidence effects for the proposed modification and potential increases in subsidence due to geological disturbance of the overburden above LW30–33 are similar to the predicted subsidence effects assessed and approved as part of the Mandalong Southern Extension Project.

3.4.5 Erosion and Sediment Control

The risk to rehabilitation from erosion and sediment control was ranked moderate due to the potential for erosion and sedimentation on pit top areas during construction and/or demolition of infrastructure caused by less than adequate management system design or naturally dispersive soils.

Erosion and sediment control is outlined in **Section 3.3.2**. The main operational erosion and sediment controls used in rehabilitation areas include:

- Clean water diversion drains and banks;
- Temporary drains;
- Sediment fences and other temporary controls;
- Sediment dams; and
- Inspections and monitoring.

Triggers for erosion and sediment control management in rehabilitation are outlined in the TARP (refer to **Section 9.2**).

3.4.6 Soil Type(s) and Suitability

Determination of suitable soil to conserve for later use in mine rehabilitation was conducted by GSS Environmental as part of the Soil and Land Capability Assessment (GSSE, 2013a) for the Mandalong Southern Extension Project EIS.

Seven soil landscape units were identified within the MOP Area, these being:

- Mandalong;
- Gorokan;
- Woodbury's Bridge;
- Watagan;
- Wyong;
- Yarramalong; and
- Doyalson.

The soils associated with the Southern Extension Area are largely consistent texture contrast soils with high acidity and often sodic characteristics in the subsoil (GSSE, 2013a). These soils will be stripped prior to any significant surface disturbance, specifically construction of the MSSS and access road; the soils will later be re-spread in focussed rehabilitation efforts.

The topsoils are generally suitable to facilitate germination and appropriate management of this soil through amelioration (such as treatment with gypsum or lime) will provide an acceptable and stable medium for revegetation (GSSE, 2013a). Whilst topsoil structure is generally poor, the material may be stripped and reused in rehabilitation provided appropriate erosion and sediment controls are in place.

Stripping and stockpiling of topsoils followed by re-spreading for revegetation is regarded as best practice rehabilitation in the mining industry. The use of topsoil in this regard has three main advantages: as a source of seeds (seed bank), soil microbial organisms, and as a physical covering for dispersive subsoils. Biologically, the value of stockpiled topsoil is largely determined by the length of time that soil will be stockpiled and the physical shape of the stockpile.

Where soil stripping and transportation is required, the following management techniques will be adopted to prevent excessive soil deterioration:

- Where possible, topsoil will be maintained in a slightly moist condition during stripping, and material will not be stripped in either an excessively dry or wet condition;
- Stripping will be timed to take place in unison with any vegetation clearing activity. If planning to mix groundcover/grass with the soil (i.e. not removing groundcover prior to soil stripping), a weed assessment will be undertaken prior to stripping;
- Where possible, grading or pushing soil into windrows for later collection will be undertaken as a preferential less aggressive soil handling system;
- The surface of soil stockpiles will be left coarsely structured (as much as possible) in order to promote infiltration and minimise erosion until vegetation is established, and to prevent anaerobic zones forming;
- Topsoil stockpiles will be no higher than 3 m;
- If long-term stockpiling is planned (i.e. greater than three months), the stockpiles will be seeded and fertilised as soon as possible. An annual cover crop species that produces sterile florets or seeds will be sown. A rapid growing and healthy annual pasture sward will provide sufficient competition to minimise the emergence of undesirable weed species. The annual pasture species will not persist in the rehabilitation areas, however will provide sufficient competition for emerging weed species and enhance the desirable micro-organism activity in the soil;
- Erosion control structures have been installed prior to soil spreading;
- Prior to re-spreading stockpiled topsoil, an assessment of weed infestation on stockpiles will be undertaken to determine if individual stockpiles require herbicide application and / or 'scalping' of weed species prior to topsoil spreading; and
- An inventory of available soil will be maintained to keep track of topsoil materials available for planned rehabilitation activities.

Soil will be re-spread directly onto stripped areas where practical. Topsoil will be spread, treated with fertiliser and seeded in one consecutive operation, where possible, to reduce the potential for topsoil loss to wind and water erosion. Soil will be re-spread to the approximate depth from which it was stripped.

All topsoiled areas will be lightly contour ripped (after topsoil spreading) and, where possible, will be ripped when the soil is moist and immediately prior to sowing. If required, the re-spread topsoil surface will be scarified prior to, or during seeding, to reduce run-off and increase infiltration.

The risk to rehabilitation from soil types and suitability was ranked moderate due to the possibility of failure to achieve the rehabilitation outcomes prescribed in the MOP caused by the failure to recover adequate topsoil material, a lack of available topsoil material or naturally dispersive soils.

In accordance with the Statement of Commitments contained in Appendix 8 of Development Consent SSD-5144, six months prior to the commencement of construction at the MSSS, Mandalong will prepare Construction Environmental Management Plan (CEMP). The CEMP will incorporate the recommended topsoil stripping and stockpiling requirements and will be included in the contract for construction. In addition, the Mandalong Exploration Activities Management Plan prepared in accordance with Schedule 3 Condition 36 of SSD-5144 details topsoil management procedures for exploration drilling and groundwater monitoring sites.

3.4.7 Flora and Fauna

The risk to rehabilitation relating to fauna was ranked as a low risk in the risk assessment.

The risk to rehabilitation relating to flora was ranked as a significant in the risk assessment due to the risk of changes to the existing riparian vegetation community at Muddy Lake caused by the cessation of pumping/dewatering activities from the Cooranbong workings resulting in environmental impacts.

Prior to mine closure, Mandalong will investigate the potential impacts of ceasing water discharges from the Cooranbong workings into Muddy Lake.

3.4.8 Weed and Pest Management

The risk to rehabilitation from weeds and pests was ranked as a moderate due to the possibility of failure to achieve the rehabilitation outcomes prescribed in the MOP caused by the failure to manage weeds, not considering requirements in rehabilitation planning or unapproved grazing pressures from kangaroos, deer, rabbits etc.

Management of weeds and feral animals will be undertaken as outlined in **Section 3.3.8**. No additional weed or pest related risks to rehabilitation have been identified.

3.4.9 Overburden Characterisation

Since Mandalong is an underground mine, there is no overburden generated at the site. There will be some excavated material stockpiled from the construction of the MSSS. In accordance with the Statement of Commitments contained in Appendix 8 of Development Consent SSD-5144, six months prior to the commencement of construction at the MSSS, Mandalong will prepare CEMP. The CEMP will incorporate measures for the management of excavated material.

Overburden characterisation is a low risk to rehabilitation for Mandalong.

3.4.10 Slopes and Slope Management

The risk to rehabilitation from slopes and slope management was ranked as moderate in the Risk Assessment. There is a risk to Mandalong from the long term stability failure of slopes caused by geotechnical failure or poor design and construction. This may result in additional costs for rework, inability to reach closure or safety concerns. There is also a risk to Mandalong from the slippage of natural slopes caused by the failure to remediate subsidence cracks appropriately. This may result in additional costs for rework, impact on Aboriginal sites, inability to reach closure or safety concerns.

Potential subsidence related impacts on slopes will be managed in accordance with the existing SMP and future approved Extraction Plans (refer **Section 3.3.15**). Steep slopes will be visibly monitored in accordance with the Subsidence Monitoring Program.

3.4.11 Visual and Lighting

Visual and lighting was ranked as a low risk to rehabilitation in the risk assessment.

3.4.12 Noise

The risk to rehabilitation from noise was ranked as a moderate due to increased noise during decommissioning caused by demolition activities, earthworks or increased truck movements during demobilisation resulting in complaints or exceedances of noise limits.

Management of noise will be undertaken as outlined in **Section 3.3.10**. No additional noise related risks to rehabilitation have been identified.

3.4.13 Blasting

There are no identified blasting risks to rehabilitation at Mandalong Mine.

3.4.14 Surface Water

Surface water was ranked as a low risk to rehabilitation in the risk assessment.

3.4.15 Groundwater

The risk assessment identified groundwater as a moderate risk to rehabilitation at Mandalong Mine due to the risk of underground mine workings filling with water during closure and/or operations and the uncontrolled seepage and discharge of groundwater to the environment.

Mandalong propose to investigate seam and surface contours during the MOP Term to determine potential seepage location(s). Findings of the investigations will be considered and used to update the Mandalong Mine WMP, when available and will be used to inform future mine planning.

3.4.16 Contaminated Land

The risk to rehabilitation from contaminated land was ranked as significant in the risk assessment resulting in constraints to future land use, impacts on the environment, inability to reach closure or unplanned remediation costs.

During the MOP Term, Centennial Mandalong will complete the Phase 2 assessments at the MMAS and CES to allow for the development of appropriate remediation plans to be implemented prior to mine closure.

3.4.17 Air Quality

The risk to rehabilitation relating to air quality was ranked as a moderate due to the possibility of increased airborne dust caused by the inability to rehabilitate disturbed areas or rehabilitation activities resulting in complaints or exceedances of the Development Consent or EPL limits.

Management of air quality will continue to be undertaken as outlined in **Section 3.3.1**. No additional air quality related risks to rehabilitation have been identified.

3.4.18 Greenhouse Gas

The risk to rehabilitation relating to greenhouse gas was ranked as a moderate due to the failure to achieve the rehabilitation outcomes as prescribed in the MOP caused by failure to seal mine entries, or bores (monitoring, service and exploration) or surface to seam cracking providing a gas pathway to the surface. This could result in safety concerns, impacts on the environment or the inability to reach closure and relinquishment.

Centennial Mandalong is currently implementing a number of measures to minimise, to the greatest extent practicable, greenhouse gas emissions from the Mandalong Mine and associated operations within EPL 365. Relevant measures are described below:

- Construction of the gas management system including the VAM-RAB demonstration plant, gas engines and flares which utilise drainage gas and significantly reduce greenhouse gas emissions.
- The Project Site has developed and implemented an Energy and Greenhouse Management System and monitors and reports energy usage at the Mandalong Mine. Key Performance Indicators (KPIs) including energy demand and greenhouse gas emissions per tonne of ROM coal produced are tracked.

Additional measures that Centennial Coal are striving to achieve include:

- Identify and implement cost effective measures to improve energy efficiency;
- Regular maintenance of plant and equipment to minimise fuel consumption; and
- Consideration of energy efficiency in plant and equipment selection/phase.

3.4.19 Cultural Heritage

Disturbance of known Aboriginal cultural heritage site was ranked as a moderate risk to rehabilitation during the risk assessment due to the unintended interaction with sites due to a lack of awareness which may result in the loss of a cultural heritage site or prosecution.

Non-indigenous cultural heritage was ranked a low risk to rehabilitation during the risk assessment.

Management of cultural heritage impacts will continue to be undertaken as outlined in **Section 3.3.12**. No additional cultural heritage related risks to rehabilitation have been identified.

3.4.20 Bushfire

The risk to rehabilitation relating to bushfire was ranked as a moderate due to the loss of established rehabilitation caused by bushfires originating offsite or from rehabilitation/demolition activities. This could result in damage to rehabilitation, additional costs to rework rehabilitated areas or development of exposed areas for erosion, sedimentation and dust generation.

Bushfire risk will continue to be managed in accordance with Centennial's Bushfire Management Plan.

3.4.21 Drought

Drought was considered a low risk to rehabilitation during the Risk Assessment given the climate and annual rainfall amounts in the MOP Area. Further, native species will be used in rehabilitation. No additional management measures are warranted for this aspect.

3.4.22 Social Impacts

The risk to rehabilitation for Mandalong related to social impacts was ranked as a significant risk due to potential change in community expectations for closure due to the significant time until closure. This could result in community complaints or additional costs for unplanned works.

Extensive communication and consultation processes will continue on an ongoing basis for the duration of mining activities and through detailed mine closure planning (refer **Section 4.4**).

3.5 Additional Studies

Based on the outcomes of the risk assessment, Centennial Mandalong commit to undertaking the additional studies outlined in **Table 15**.

Table 16 – Further Studies Required to Inform Closure Activities

Aspect	Study	Objective	Proposed Timing
Geology and geochemistry	Cessation of water discharge investigation	To assess the potential impacts of ceasing water discharges from the Cooranbong underground workings into Muddy Lake on existing riparian communities.	Prior to mine closure
Contaminated land	Phase 2 Contamination Assessments at MMAS, CES and MSSS	To complete the Phase 2 assessments at MMAS, CES and MSSS to ascertain all contamination or constraints and, where necessary, develop appropriate remediation action plans.	During the MOP Term
Social impacts	Social Impact Assessment	Undertake stakeholder consultation regarding mine closure five years prior to planned closure of the mine to assist in minimise long term impacts associated with mine closure, including socio-economic impacts.	5 years prior to mine closure

4 Post Mining Land Use

4.1 Regulatory Requirements

The regulatory requirements specific to post mining land-use and rehabilitation outcomes at Centennial Mandalong are summarised in **Table 17**.

Table 17 – Regulatory Requirements

Condition	Requirement	Applicable areas	Status																		
SSD-5144 Schedule 3 Condition 32	Progressive Rehabilitation The Applicant must rehabilitate the site progressively, that is, as soon as practicable following disturbance, to the satisfaction of DRE RR .	SSD-5144 Project Application Area	In progress																		
SSD-5144 Schedule 3 Condition 31	Rehabilitation Objectives The Applicant must rehabilitate the MMAS and MSSS to the satisfaction of DRE RR . This rehabilitation must be generally consistent with the proposed rehabilitation strategy described in the EIS, and comply with the objectives in Table 5. Table 5: Rehabilitation Objectives <table><tr><th>Feature</th><th>Objective</th></tr><tr><td>Mine Site (as a whole)</td><td><ul style="list-style-type: none">Safe, stable and non- polluting.</td></tr><tr><td>Surface infrastructure</td><td><ul style="list-style-type: none">To be decommissioned and removed, unless the DRE agrees otherwise.MMAS and MSSS sites to be made safe, and hydraulically and geotechnically stable.MMAS site to be appropriately prepared for industrial land-use where SP1 zoning applies, while ecological values to be maintained and enhanced where E2 zoning applies.MSSS site to be revegetated with suitable local native plant species, and to a landform consistent with the surrounding environment.</td></tr><tr><td>Revegetated final landforms</td><td><ul style="list-style-type: none">Stable and sustain the intended land use.Consistent with surrounding topography to minimise visual impacts.Incorporate relief patterns and design principles consistent with natural drainage</td></tr><tr><td>Native flora and fauna</td><td><ul style="list-style-type: none">Flora species used in rehabilitation selected to re-establish and complement local and regional biodiversity.Rehabilitated areas contribute to achieving self-sustaining biodiversity habitats.</td></tr><tr><td>All watercourses subject to mine-water discharges and/or subsidence impacts</td><td><ul style="list-style-type: none">Hydraulically and geomorphologically stable, with aquatic ecology and riparian vegetation that is the same, or better than, prior to mining.</td></tr><tr><td>Steel slopes</td><td><ul style="list-style-type: none">No additional risk to public safety compared to prior to mining</td></tr><tr><td>Built features damaged by mining operations</td><td><ul style="list-style-type: none">Repair to pre- mining condition or equivalent unless:<ul style="list-style-type: none">owner agrees otherwise; ordamage is fully restored, repaired or compensated under the <i>Mine Subsidence Compensation Act 1961</i>.</td></tr><tr><td>Community</td><td><ul style="list-style-type: none">Ensure public safety.Minimise the adverse socio- economic effects associated with mine closure.</td></tr></table>	Feature	Objective	Mine Site (as a whole)	<ul style="list-style-type: none">Safe, stable and non- polluting.	Surface infrastructure	<ul style="list-style-type: none">To be decommissioned and removed, unless the DRE agrees otherwise.MMAS and MSSS sites to be made safe, and hydraulically and geotechnically stable.MMAS site to be appropriately prepared for industrial land-use where SP1 zoning applies, while ecological values to be maintained and enhanced where E2 zoning applies.MSSS site to be revegetated with suitable local native plant species, and to a landform consistent with the surrounding environment.	Revegetated final landforms	<ul style="list-style-type: none">Stable and sustain the intended land use.Consistent with surrounding topography to minimise visual impacts.Incorporate relief patterns and design principles consistent with natural drainage	Native flora and fauna	<ul style="list-style-type: none">Flora species used in rehabilitation selected to re-establish and complement local and regional biodiversity.Rehabilitated areas contribute to achieving self-sustaining biodiversity habitats.	All watercourses subject to mine-water discharges and/or subsidence impacts	<ul style="list-style-type: none">Hydraulically and geomorphologically stable, with aquatic ecology and riparian vegetation that is the same, or better than, prior to mining.	Steel slopes	<ul style="list-style-type: none">No additional risk to public safety compared to prior to mining	Built features damaged by mining operations	<ul style="list-style-type: none">Repair to pre- mining condition or equivalent unless:<ul style="list-style-type: none">owner agrees otherwise; ordamage is fully restored, repaired or compensated under the <i>Mine Subsidence Compensation Act 1961</i>.	Community	<ul style="list-style-type: none">Ensure public safety.Minimise the adverse socio- economic effects associated with mine closure.	SSD-5144 Project Application Area	In progress
Feature	Objective																				
Mine Site (as a whole)	<ul style="list-style-type: none">Safe, stable and non- polluting.																				
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All watercourses subject to mine-water discharges and/or subsidence impacts	<ul style="list-style-type: none">Hydraulically and geomorphologically stable, with aquatic ecology and riparian vegetation that is the same, or better than, prior to mining.																				
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Community	<ul style="list-style-type: none">Ensure public safety.Minimise the adverse socio- economic effects associated with mine closure.																				
SSD-5145 Schedule 3 Condition 28	Progressive Rehabilitation The Applicant shall rehabilitate the site progressively, that is, as soon as practicable following disturbance, to the satisfaction of DRE-RR .	Cooranbong Entry Site	In progress																		

Condition	Requirement	Applicable areas	Status																				
Mandalong Southern Extension Project EIS Statement of Commitments (SSD-5144 Appendix 8)	<p>Post Mining Closure and Rehabilitation</p> <p>Within five years of mine closure, Centennial Mandalong will prepare a detailed Mine Closure Management Plan with the aim of creating a land use capability compatible with the pre-mining land use (unless other beneficial uses are pre-determined and agreed). In addition to addressing the removal of surface infrastructure, the Plan will include:</p> <ul style="list-style-type: none">Rehabilitation of disturbed areas including spreading of stockpiled topsoil in accordance with commitments in this EIS, revegetation using locally occurring native plant species, and rehabilitation of disturbed land to a condition that is self-sustaining or where maintenance requirements are consistent with an agreed post-mining land use; andFinal rehabilitation success criteria.	SSD-5144 Project Application Area	To be prepared within 5 years of mine closure																				
SSD-5145 Schedule 3 Condition 27	<p>Rehabilitation Objectives</p> <p>The Applicant shall must rehabilitate the site to the satisfaction of DRE DRG. This rehabilitation must be generally consistent with the proposed rehabilitation strategy described in the EIS, and comply with the objectives in Table 6.</p> <p>Table 6: Rehabilitation Objectives</p> <table><tr><th>Feature</th><th>Objective</th></tr><tr><td>Mine Site (as a whole)</td><td><ul style="list-style-type: none">Safe, stable and non- polluting.</td></tr><tr><td>Surface infrastructure</td><td><ul style="list-style-type: none">To be decommissioned and removed, unless the DRE DRG agrees otherwise.NCSS, CES, Hawkmount Quarry and Reject Emplacement Areas to be made safe and hydraulically and geotechnically stable.NCSS and CES to be rehabilitated for use as light industrial areas; or revegetated with suitable local native plant species to a landform consistent with the surrounding local environment.</td></tr><tr><td>Rehabilitation materials</td><td><ul style="list-style-type: none">Materials from areas disturbed under this consent (including topsoils, substrates and seeds) are to be recovered, managed and used as rehabilitation resources.</td></tr><tr><td>Reject Emplacement Areas</td><td><ul style="list-style-type: none">Hawkmount Quarry and Reject Emplacement Area sites to be revegetated with suitable local native plant species, and to a landform consistent with the surrounding environment.Capped materials (including depth of application) to be approved by DRE DRG prior to capping.</td></tr><tr><td>Revegetated final landforms</td><td><ul style="list-style-type: none">Stable and sustain the intended land use.Consistent with surrounding topography to minimise visual impacts.Incorporate relief patterns and design principles consistent with natural drainage</td></tr><tr><td>Native flora and fauna</td><td><ul style="list-style-type: none">Flora species used in rehabilitation selected to re-establish and complement local and regional biodiversity.Rehabilitated areas contribute to achieving self-sustaining biodiversity habitats.</td></tr><tr><td>All watercourses subject to mine-water discharges</td><td><ul style="list-style-type: none">Hydraulically and geomorphologically stable, with aquatic ecology and riparian vegetation that is the same, or better than, prior to mining.</td></tr><tr><td>Water quality</td><td><ul style="list-style-type: none">Water retained on site is fit for the intended post mining land use(s).Water management is consistent with the regional catchment management strategy.</td></tr><tr><td>Community</td><td><ul style="list-style-type: none">Ensure public safety.Minimise the adverse socio- economic effects associated with mine closure.</td></tr></table>	Feature	Objective	Mine Site (as a whole)	<ul style="list-style-type: none">Safe, stable and non- polluting.	Surface infrastructure	<ul style="list-style-type: none">To be decommissioned and removed, unless the DRE DRG agrees otherwise.NCSS, CES, Hawkmount Quarry and Reject Emplacement Areas to be made safe and hydraulically and geotechnically stable.NCSS and CES to be rehabilitated for use as light industrial areas; or revegetated with suitable local native plant species to a landform consistent with the surrounding local environment.	Rehabilitation materials	<ul style="list-style-type: none">Materials from areas disturbed under this consent (including topsoils, substrates and seeds) are to be recovered, managed and used as rehabilitation resources.	Reject Emplacement Areas	<ul style="list-style-type: none">Hawkmount Quarry and Reject Emplacement Area sites to be revegetated with suitable local native plant species, and to a landform consistent with the surrounding environment.Capped materials (including depth of application) to be approved by DRE DRG prior to capping.	Revegetated final landforms	<ul style="list-style-type: none">Stable and sustain the intended land use.Consistent with surrounding topography to minimise visual impacts.Incorporate relief patterns and design principles consistent with natural drainage	Native flora and fauna	<ul style="list-style-type: none">Flora species used in rehabilitation selected to re-establish and complement local and regional biodiversity.Rehabilitated areas contribute to achieving self-sustaining biodiversity habitats.	All watercourses subject to mine-water discharges	<ul style="list-style-type: none">Hydraulically and geomorphologically stable, with aquatic ecology and riparian vegetation that is the same, or better than, prior to mining.	Water quality	<ul style="list-style-type: none">Water retained on site is fit for the intended post mining land use(s).Water management is consistent with the regional catchment management strategy.	Community	<ul style="list-style-type: none">Ensure public safety.Minimise the adverse socio- economic effects associated with mine closure.	Cooranbong Entry Site	In progress
Feature	Objective																						
Mine Site (as a whole)	<ul style="list-style-type: none">Safe, stable and non- polluting.																						
Surface infrastructure	<ul style="list-style-type: none">To be decommissioned and removed, unless the DRE DRG agrees otherwise.NCSS, CES, Hawkmount Quarry and Reject Emplacement Areas to be made safe and hydraulically and geotechnically stable.NCSS and CES to be rehabilitated for use as light industrial areas; or revegetated with suitable local native plant species to a landform consistent with the surrounding local environment.																						
Rehabilitation materials	<ul style="list-style-type: none">Materials from areas disturbed under this consent (including topsoils, substrates and seeds) are to be recovered, managed and used as rehabilitation resources.																						
Reject Emplacement Areas	<ul style="list-style-type: none">Hawkmount Quarry and Reject Emplacement Area sites to be revegetated with suitable local native plant species, and to a landform consistent with the surrounding environment.Capped materials (including depth of application) to be approved by DRE DRG prior to capping.																						
Revegetated final landforms	<ul style="list-style-type: none">Stable and sustain the intended land use.Consistent with surrounding topography to minimise visual impacts.Incorporate relief patterns and design principles consistent with natural drainage																						
Native flora and fauna	<ul style="list-style-type: none">Flora species used in rehabilitation selected to re-establish and complement local and regional biodiversity.Rehabilitated areas contribute to achieving self-sustaining biodiversity habitats.																						
All watercourses subject to mine-water discharges	<ul style="list-style-type: none">Hydraulically and geomorphologically stable, with aquatic ecology and riparian vegetation that is the same, or better than, prior to mining.																						
Water quality	<ul style="list-style-type: none">Water retained on site is fit for the intended post mining land use(s).Water management is consistent with the regional catchment management strategy.																						
Community	<ul style="list-style-type: none">Ensure public safety.Minimise the adverse socio- economic effects associated with mine closure.																						

Condition	Requirement	Applicable areas	Status
Northern Coal Logistics EIS Statement of Commitments (SSD-5145 Appendix 6)	Post Mining Closure and Rehabilitation Within five years of Project completion, Northern Coal Services will prepare a detailed Closure Management Plan with the aim of rehabilitating the Project Application Area to create a land use capability compatible with the surrounding land use and/or the pre-determined and agreed beneficial land use(s). In addition to addressing the removal of surface infrastructure, the Closure Management Plan will include: <ul style="list-style-type: none"> Rehabilitation of disturbed areas to a condition that is self-sustaining or where maintenance requirements are consistent with an agreed post-mining land use; and Final rehabilitation success criteria. 	Cooranbong Entry Site	To be prepared within 5 years of mine closure
ML 1553 Condition 13	Rehabilitation (a) Land disturbed must be rehabilitated to a stable and permanent form suitable for a subsequent land use acceptable to the Director-General and in accordance with the Mining Operations Plan so that:- <ul style="list-style-type: none"> there is no adverse environmental effect outside the disturbed area and that the land is properly drained and protected from soil erosion. the state of the land is compatible with the surrounding land and land use requirements. the landforms, soils, hydrology and flora require no greater maintenance than that in the surrounding land. in cases where revegetation is required and native vegetation has been removed or damaged, the original species must be re-established with dose reference to the flora survey included in the Mining Operations Plan. If the original vegetation was not native, any re-established vegetation must be appropriate to the area and at an acceptable density. the land does not pose a threat to public safety. (b) Any topsoil that is removed must be stored and maintained in a manner acceptable to the Director-General.	Lease Area	In progress
ML 1443 Condition 15	The lease holder shall comply with any direction, given or which may be given by the Inspector regarding the dumping, depositing or removal of material extracted as well as the stabilisation and revegetation of any dumps of coal, minerals, mine residues, tailings or overburden situated on the subject area or the associated colliery holding.	Lease Area	In progress
ML 1443 Condition 21	If so directed by the Minister the lease holder shall rehabilitate to the satisfaction of the Minister any lands within the subject area which may have been disturbed by the lease holder.	Lease Area	In progress
ML 1443, ML 1543 Condition 22	Upon completion of operations on the surface of the subject area or upon the expiry or sooner determination of this authority or any renewal thereof, the lease holder shall remove from such surface such buildings, machinery, plant, equipment, constructions and works as may be directed by the Minister and such surface shall be rehabilitated and left in a clean, tidy and safe condition to the satisfaction of the Minister.	Lease Area	In progress
ML 1443, ML 1543 Condition 23	If so directed by the Minister the lease holder shall rehabilitate to the satisfaction of the Minister and within such time as may be allowed by the Minister any lands within the subject area which may have been disturbed by mining or prospecting operations whether such operations were or were not carried out by the lease holder.	Lease Area	In progress
ML 1722, ML1744 Condition 2	Any disturbance resulting from the activities carried out under this mining lease must be rehabilitated to the satisfaction of the Minister.	Lease Area	In progress
CCL746 Condition 7	Disturbed land must be rehabilitated to a sustainable/agreed end land use to the satisfaction of the Director-General.	Lease Area	In progress

Condition	Requirement	Applicable areas	Status
CCL762 Condition 7	Any disturbance as a result of activities under this lease must be rehabilitated to the satisfaction of the Director-General.	Lease Area	In progress
AUTH 404, EL6317, EL4443, EL4968 , EL4969, EL5892 Condition 37	All disturbances resulting from prospecting operations carried out under this exploration licence must be rehabilitated by the licence holder to the satisfaction of the Minister.	Lease Area	In progress
AUTH 404, EL6317, EL4443, EL4968 , EL4969, EL5892 Condition 38	In rehabilitating the disturbance resulting from prospecting operations, the licence holder must ensure that: <ol style="list-style-type: none"> all machinery, buildings and other infrastructure is removed from the area; the area is left in a clean, tidy and stable condition there is no adverse environmental effect outside the disturbed area; the land is properly drained and protected from soil erosion; the land is not a potential source of pollution; the land is compatible with the surrounding land and land use requirements; the landforms, soils, hydrology and flora require no greater maintenance than that in, or on, the surrounding land; the land does not pose a threat to public safety; and in cases where vegetation has been removed or damaged: <ol style="list-style-type: none"> where the previous vegetation was native, species used for revegetation are endemic to the area; or where the previous vegetation was not native, species used for revegetation are appropriate to the area; and any revegetation is of an appropriate density and diversity. 	Lease Area	In progress
AUTH 404, EL6317, EL4443, EL4968 , EL4969, EL5892 Condition 39	The licence holder must ensure that all water land and wetland crossings that are disturbed during prospecting operations are rehabilitated such that the natural flow of water is unimpeded and bank stability is maintained to prevent erosion.	Lease Area	In progress
AUTH 404, EL6317, EL4443, EL4968 , EL4969, EL5892 Condition 40	The licence holder must comply with any relevant guidelines issued by the Secretary in the rehabilitation of disturbance resulting from prospecting operations under this exploration licence.	Lease Area	In progress
AUTH 404, EL6317, EL4443, EL4968 , EL4969, EL5892 Condition 41	All rehabilitation of disturbance resulting from prospecting operations under this exploration licence must be completed before the expiry of this exploration licence or as soon as practicable following cancellation of this exploration licence, unless otherwise approved by the Minister.	Lease Area	In progress
AUTH 404, EL6317, EL4443, EL4968 , EL4969, EL5892 Condition 42	Boreholes that have been abandoned as a result of previous mining or prospecting operations, and which have been opened up or used by the licence holder are subject to the conditions of this exploration licence as if the boreholes were constructed by the holder of this exploration licence.	Lease Area	In progress

4.2 Post Mining Land Use Goal

The conceptual long term mine rehabilitation objective is to provide a low maintenance, geotechnically stable and safe landform. Specific conceptual long-term objectives include:

- Prevent public access to former underground workings;

- Re-establishing land disturbed by the operations of Centennial Mandalong to an appropriate final land use;
- Provide habitat for fauna and corridors for fauna movement within the final landform;
- Monitor rehabilitation success in terms of physical and biological parameters;
- Relinquishment of the surface leases as rehabilitation objectives are achieved; and
- Compliance with appropriate Company and regulatory policies and guidelines.

Post mining land use options for the Mandalong Mine (MMAS and MSSS) were assessed in the *Mandalong Southern Extension Project Decommissioning and Rehabilitation Strategy* (GSSE, 2013b) which was prepared for the Mandalong Southern Extension Project EIS. Post mining land use options for the CES were assessed in the *Northern Coal Logistics Project Decommissioning and Rehabilitation* (SLR, 2014) which was prepared for the Northern Coal Logistics Project EIS.

It is intended to re-develop the MMAS and CES for an industrial based land use(s). The option of leaving this infrastructure in the final landform will be discussed in consultation with ~~DRE~~ ~~DRG~~ ~~RR~~ and after discussions with potential buyers have been held.

The intended post-mining land use for the MSSS is native bushland commensurate with the pre-mining conditions.

Post-mining land use for the DES will be addressed in consultation with Delta Electricity with the intended post-mining land use being native bushland commensurate with the pre-mining conditions.

As Mandalong is an underground mine, the majority of the MOP Area will not be disturbed. The exception to this might be areas impacted by subsidence which will be addressed and managed on an ongoing basis through the approved SMP or Extraction Plan. As there will be limited disturbance, the pre-mining land use(s) will not be significantly impacted and therefore the post-mining land use(s) will be consistent with pre-mining conditions.

A conceptual final landform rehabilitation plan which details the proposed post-mining land use(s) is provided on **Plan 4**.

4.3 Rehabilitation Objectives

Rehabilitation objectives for Mandalong (MMAS and MSSS) are outlined in Schedule 3, Condition 31 of Development Consent SSD-5144 and rehabilitation objectives for the CES are outlined in Schedule 3 Condition 27 of SSD-5145 and have been provided in **Table 18** and **Table 19** respectively.

Table 18 – SSD-5144 Rehabilitation Objectives

Feature	Objective
Mine Site (as a whole)	<ul style="list-style-type: none"> Safe, stable and non- polluting.
Surface infrastructure	<ul style="list-style-type: none"> To be decommissioned and removed, unless the DRE DRG RR agrees otherwise. MMAS and MSSS sites to be made safe, and hydraulically and geotechnically stable. MMAS site to be appropriately prepared for industrial land-use where SP1 zoning applies, while ecological values to be maintained and enhanced where E2 zoning applies. MSSS site to be revegetated with suitable local native plant species, and to a landform consistent with the surrounding environment.
Revegetated final landforms	<ul style="list-style-type: none"> Stable and sustain the intended land use. Consistent with surrounding topography to minimise visual impacts. Incorporate relief patterns and design principles consistent with natural drainage
Native flora and fauna	<ul style="list-style-type: none"> Flora species used in rehabilitation selected to re-establish and complement local and regional biodiversity. Rehabilitated areas contribute to achieving self-sustaining biodiversity habitats.
All watercourses subject to mine-water discharges and/or subsidence impacts	<ul style="list-style-type: none"> Hydraulically and geomorphologically stable, with aquatic ecology and riparian vegetation that is the same, or better than, prior to mining.
Steep slopes	<ul style="list-style-type: none"> No additional risk to public safety compared to prior to mining
Built features damaged by mining operations	<ul style="list-style-type: none"> Repair to pre- mining condition or equivalent unless: <ul style="list-style-type: none"> - owner agrees otherwise; or - damage is fully restored, repaired or compensated under the <i>Mine Subsidence Compensation Act 1961</i>.
Community	<ul style="list-style-type: none"> Ensure public safety. Minimise the adverse socio- economic effects associated with mine closure.

Table 19 – SSD-5145 Rehabilitation Objectives (as applicable to the CES)

Feature	Objective
Mine Site (as a whole)	<ul style="list-style-type: none"> Safe, stable and non- polluting.
Surface infrastructure	<ul style="list-style-type: none"> To be decommissioned and removed, unless the DRE DRG RR agrees otherwise. CES to be made safe and hydraulically and geotechnically stable. CES to be rehabilitated for use as light industrial areas; or revegetated with suitable local native plant species to a landform consistent with the surrounding local environment.
Rehabilitation materials	<ul style="list-style-type: none"> Materials from areas disturbed under this consent (including topsoils, substrates and seeds) are to be recovered, managed and used as rehabilitation resources.
Reject Emplacement Areas	Not applicable to CES.
Revegetated final landforms	<ul style="list-style-type: none"> Stable and sustain the intended land use. Consistent with surrounding topography to minimise visual impacts. Incorporate relief patterns and design principles consistent with natural drainage
Native flora and fauna	<ul style="list-style-type: none"> Flora species used in rehabilitation selected to re-establish and complement local and regional biodiversity. Rehabilitated areas contribute to achieving self-sustaining biodiversity habitats.
All watercourses subject to mine-water discharges	<ul style="list-style-type: none"> Hydraulically and geomorphologically stable, with aquatic ecology and riparian vegetation that is the same, or better than, prior to mining.
Water quality	<ul style="list-style-type: none"> Water retained on site is fit for the intended post mining land use(s). Water management is consistent with the regional catchment management strategy.
Community	<ul style="list-style-type: none"> Ensure public safety. Minimise the adverse socio- economic effects associated with mine closure.

4.4 Detailed Mine Closure Planning

In accordance with the *Mandalong Southern Extension Project Decommissioning and Rehabilitation Strategy* (GSS 2013) and the *Strategic Framework for Mine Closure* (Minerals Council of Australia 2004) Mandalong will commence the detailed mine closure planning process at least five years prior to the anticipated mine closure date (i.e. the planned cessation of mining). Based upon current approvals, mining operations at Mandalong will cease in 2040. Detailed mine closure planning will include the following:

- Stakeholder consultation regarding mine closure will commence five years prior to planned closure of the mine to assist in minimise long term impacts associated with mine closure, including socio-economic impacts;
- An agreed detailed mine closure plan will be developed at least two years prior to the anticipated mine closure date;
- An infrastructure demolition plan will be developed two years prior to mine closure; and
- The final closure plan will be submitted to the appropriate regulatory agencies for approval two years prior to cessation of mining.

5 Rehabilitation Planning and Management

5.1 Domain Selection

Primary and secondary domains have been defined in accordance with the methodology prescribed in *ESG3: Mining Operations Plan (MOP) Guidelines* (RR 2013). As such, the following applies:

- **Primary domains** are defined as the set of discrete areas that have a particular operational or functional purpose. Land management units with similar operational function are likely to have similar geophysical features and constraints/opportunities for rehabilitation.
- **Secondary domains** are land management units with similar post mining land use objectives, such as woodland communities and native grasslands.

Accordingly, domains have been defined considering the operational function and specific final land use objectives. Domains at the commencement of the MOP period are shown in **Plan 2**, and listed in **Table 20**. Domains applicable to this MOP are highlighted in **green**.

Table 20 – MOP Domains

Code	Primary Domain (Operational)	Code	Secondary Domain (Post Mining Land Use)
1	Infrastructure Area – the infrastructure in Domain 1 includes the existing mining infrastructure at the MMAS, CES and DES, as well as the proposed infrastructure at the Mandalong South Surface Site.	A	Retained Infrastructure – includes infrastructure that can be retained for beneficial post mining industrial land use. It is intended to redevelop the MMAS and CES for an industrial based land use(s). With the exception of the Sediment Dam, the water management structures at MMAS will not be retained in the final landform and will be rehabilitated to be suitable for industrial based land use.
2	Tailings Storage Facility – Not applicable to this MOP	B	Retained Water Management Area – comprises the footprint of the water management structures retained in the final land use for on-going water management (i.e. erosion and sediment control). This includes the ROM Stockpile Dam, Sediment Dams, 5 ML Dam and Construction Dam at CES and the Sediment Dam at MMAS.
3	Water Management Area – includes the network of dams and associated water management infrastructure at the Mandalong Mine Access Site, Cooranbong Entry Site and proposed Mandalong South Surface Site.	C	Rehabilitation Area – Grassland - Not applicable to this MOP
4	Reject Emplacement Area – Not applicable to this MOP	D	Rehabilitation Area – Pasture - Not applicable to this MOP
5	Stockpiled Material – this area includes the current stockpiles at the Cooranbong Entry Site.	E	Rehabilitation Area – Woodland - Woodland areas that have been impacted by mining, such as subsidence areas and some infrastructure, stockpile and water management areas surrounding MMAS will be rehabilitated to woodland. The MSSS and access road are intended to be rehabilitated to woodland. It is intended to be rehabilitated the Delta Entry Site to woodland (subject to consultation with Delta Electricity).
6	Void (Open Cut Void) – Not applicable to this MOP	F	Rehabilitation Area – Forest – The areas of the Olney State Forest which have been impacted by

Code	Primary Domain (Operational)	Code	Secondary Domain (Post Mining Land Use)
			mining, such as subsidence areas will be rehabilitated to forest.
7	Rehabilitation Area – Pasture – Not applicable to this MOP	G	Rehabilitation Area – Rural Land - Landholdings that were previously used for agriculture and have been impacted by mining, such as subsidence areas, and some infrastructure areas (i.e. Mandalong South access road) will be rehabilitated to rural land commensurate with pre-mining conditions.
8	Underground Mining Area – the areas to be actively managed for potential subsidence related impacts during the MOP Term. The domain area is defined by the combination of the subsidence areas (as defined by the greatest extents of the 26.5° angle of draw and 20mm subsidence contour). This domain also includes the area above the Area 2 first workings mining area.	H	Relinquished Lands – Not applicable to this MOP
9	Conservation and Biodiversity Offset Area - includes the Biodiversity Offset Area to the north and east of the Mandalong Mine Access Site ventilation and gas management facilities and the MSSS and TL24 offset areas.	I	Final Void – not applicable to this MOP.
-	-	J	Conservation & Biodiversity Offset Area - includes the Biodiversity Offset Area to the north and east of the Mandalong Mine Access Site ventilation and gas management facilities and the MSSS and TL24 offset areas.

5.2 Domain Rehabilitation Objectives

General rehabilitation objectives for Mandalong are outlined in **Section 4.3**. Rehabilitation domains require specific management objectives to realise the desired final land use outcome due to the distinct features associated with the current land function.

Key rehabilitation objectives for the Domains identified in **Section 5.1** are defined in **Table 20**.

Table 21 – Domain Rehabilitation Objectives

Code	Domain	Rehabilitation Objective
Primary Domains		
1	Infrastructure Area	<ul style="list-style-type: none"> Where there is no beneficial post mining use, the mining infrastructure will be decommissioned and removed progressively; Infrastructure areas to remain for post mining use will be made safe and hydrologically and geotechnically stable; Drainage structures will be designed and constructed where required in accordance with Blue Book requirements; All land contamination / hazardous materials will be identified and appropriately remediated; and All mine openings including boreholes, shafts and declines will be backfilled, sealed and rehabilitated in accordance with the relevant DRE DRG RR requirements.
3	Water Management Area	<ul style="list-style-type: none"> Water quality leaving site to be in accordance with the EPL water quality criteria; Quality of water should not cause significant deterioration of water quality for the downstream beneficial users or water quality objectives declared under Section 73 of the <i>Water Act 1912</i>; and Drainage structures will be designed and constructed where required in accordance with Blue Book requirements.
5	Stockpiled Material	<ul style="list-style-type: none"> Final landforms are stable and free draining; All carbonaceous material will be removed; and All land contamination / hazardous materials will be identified and appropriately removed or remediated.
8	Underground Mining Area	<ul style="list-style-type: none"> Stable landform that is non-polluting; Drainage structures will be designed and constructed where required in accordance with Blue Book; Areas affected by mine induced subsidence will generally have gradients that are consistent with the pre-mining and/or the surrounding topography and which are geotechnically stable (i.e. no increased risk of landslip or mass slope failure); and Areas of surface ponding will be either remediated to enable drainage to occur (where there is a salinity risk) or retained in accordance with the requirements of the Land Management Plan.
9	Conservation and Biodiversity Offset Area	<ul style="list-style-type: none"> Stable and non-eroding landform; Post mining land use to be self-sustaining natural ecosystem comprising native trees and shrubs representative of vegetation in comparable local areas; Drainage structures will be designed and constructed where required in accordance with Blue Book requirements; and Revegetation self-sustaining and free of declared weed species.
Secondary Domains		
A	Retained Infrastructure	<ul style="list-style-type: none"> All land contamination / hazardous materials have been identified and appropriately remediated; All mine openings including boreholes, shafts and declines will be backfilled, sealed and rehabilitated in accordance with the relevant DRE DRG RR requirements; Drainage structures will be designed and constructed where required in accordance with Blue Book requirements; and Stable landform that is non-polluting.
B	Retained Water Management Area	<ul style="list-style-type: none"> Water quality leaving site to be in accordance with the EPL water quality criteria; Quality of water should not cause significant deterioration of water quality for the downstream beneficial users or water quality objectives declared under Section 73 of the <i>Water Act 1912</i>; Retained dams on minor water courses to be in accordance with the Maximum Harvestable Rights Dam Capacity of the property; and

Code	Domain	Rehabilitation Objective
		<ul style="list-style-type: none"> Drainage structures will be designed and constructed where required in accordance with Blue Book requirements.
E	Rehabilitation Area – Woodland	<ul style="list-style-type: none"> Areas affected by mine induced subsidence will have gradients that are consistent with the pre-mining and/or the surrounding topography and which are geotechnically stable (i.e. no increased risk of landslip or mass slope failure; Drainage structures will be designed and constructed where required in accordance with Blue Book requirements; and Post mining land use to be self-sustaining natural ecosystem comprising native trees and shrubs representative of vegetation in comparable local areas;
F	Rehabilitation Area – Forest	<ul style="list-style-type: none"> Areas affected by mine induced subsidence will have gradients that are consistent with the pre-mining and/or the surrounding topography and which are geotechnically stable (i.e. no increased risk of landslip or mass slope failure; Drainage structures will be designed and constructed where required in accordance with Blue Book requirements; and Post mining land use to be self-sustaining natural ecosystem comprising trees and shrubs representative of vegetation in comparable local areas.
G	Rehabilitation Area – Rural Land	<ul style="list-style-type: none"> Areas affected by mine induced subsidence will have gradients that are consistent with the pre-mining and/or the surrounding topography and which are geotechnically stable (i.e. no increased risk of landslip or mass slope failure; Drainage structures will be designed and constructed where required in accordance with Blue Book requirements; and Post mining land use to be self-sustaining grassland ecosystem comprising grasses and legumes.
J	Conservation and Biodiversity Offset Area.	<ul style="list-style-type: none"> Stable and non-eroding landform; Post mining land use to be self-sustaining natural ecosystem comprising native trees and shrubs representative of vegetation in comparable local areas; Revegetation self-sustaining and free of declared weed species; and Drainage structures will be designed and constructed where required in accordance with Blue Book requirements.

5.3 Rehabilitation Phases

Achievement of the agreed post mining land use will be reached through a series of conceptual rehabilitation phases which are described as:

- **Phase 1: Decommissioning** – removal of hardstand areas, plant, equipment, buildings and other structures, and all contaminated materials and hazardous materials.
- **Phase 2: Landform Establishment** – incorporates gradient, slope aspect, drainage, substrate material characterisation and morphology.
- **Phase 3: Growth Medium Development** – incorporates physical structure, chemical properties and biological properties of a soil stratum suitable for plant growth,
- **Phase 4: Ecosystem and Land Use Establishment** – incorporates revegetated lands and habitat augmentation; species selection, species presence and growth. Incorporates management activities such as weed and feral pest control to achieve species establishment and growth to juvenile communities and habitat augmentation.
- **Phase 5: Ecosystem and Land Use Sustainability** – Incorporates features including species reproduction, nutrient recycling and community structure which are the key elements of a sustainable landscape.
- **Phase 6: Land Relinquishment** – Completion criteria for rehabilitation are met and the land is determined to be suitable to be relinquished from the mine lease.

Table 22 – Summary of Rehabilitation Phases for each Domain at the End of MOP Term

Rehabilitation Phase \ Domain	Infrastructure – Retained Infrastructure (1A)	Infrastructure – Rehabilitation Area Woodland (1E)	Infrastructure – Rehabilitation Area Rural land (1G)	Water Management Area – Retained Infrastructure Area (3A)	Water Management Area – Retained Water Management Area (3B)	Water Management Area – Rehabilitation Area Woodland (3E)	Stockpiled Material – Retained Infrastructure (5A)	Stockpiled Material – Rehabilitation Area Woodland (5E)	Underground Mining Area – Rehabilitation Area Woodland (8E)	Underground Mining Area – Rehabilitation Area Forest (8E)	Underground Mining Area – Rehabilitation Area Rural Land (8G)	Conservation and Biodiversity Area - Conservation and Biodiversity Area (9I)
Active	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	x
Phase 1 Decommissioning	x	x	x	x	x	x	x	x	x	x	x	✓
Phase 2 Landform Establishment	x	x	x	x	x	x	x	x	x	x	x	✓
Phase 3 Growth Medium Development	x	x	x	x	x	x	x	x	x	x	x	✓
Phase 4 Ecosystem and Land Use Establishment	x	x	x	x	x	x	x	x	x	x	x	✓
Phase 5 Ecosystem and Land Use Sustainability	x	x	x	x	x	x	x	x	x	x	x	✓
Phase 6 Relinquished Lands	x	x	x	x	x	x	x	x	x	x	x	x

✓ = Areas of this domain are subject to this rehabilitation phase during MOP Term.

x = Domain not expected to enter this rehabilitation phase during the MOP Term.

6 Performance Indicators and Completion/Relinquishment Criteria

The completion criteria are objective target levels or values assigned to a variety of indicators (e.g. slope, species diversity, percent groundcover), which can be measured to demonstrate progress and ultimate success of rehabilitation. As such, they provide a defined end point, at which point in time rehabilitation can be deemed successful and the lease relinquishment process can proceed. The rehabilitation completion criteria for each of the rehabilitation phases at Mandalong Mine are listed in **Table 23** to **Table 27**.

These completion criteria will be utilised to demonstrate achievement of rehabilitation objectives. It is noted that the completion criteria may be subject to refinement as the operation progresses, including as a result of consultation with the relevant stakeholders. The achievement (or otherwise) of the completion criteria will be monitored and reported within the annual reports to be submitted to relevant government agencies.

Table 23 – Phase 1 – Decommissioning Phase

Domain Objective	Performance Indicator	Completion Criteria	Justification/Source	Complete (Yes/No)	Link to TARP	Progress at start of MOP
All Domains						
Hazardous and contaminated materials removed; remediation of land as required.	Removal of hazardous materials	A hazardous materials assessment has been undertaken and any hazardous and contaminated materials are identified and removed from site by a licenced contractor (verified by Certificates of disposal).	Section 6.6 of the <i>MSEP Decommissioning and Rehabilitation Strategy</i> (GSSE, 2013b) and Section 8.1.1.5 of the <i>NCLP Decommissioning and Rehabilitation Strategy</i> (SLR, 2014)	No	No	Not commenced
	Remediation of contaminated land as required	A contamination assessment has been undertaken and any contaminated areas have been remediated so that appropriate guidelines for land use are satisfied.	Section 6.5 of the <i>MSEP Decommissioning and Rehabilitation Strategy</i> (GSSE, 2013b) and Section 8.1.1.4 of the <i>NCLP Decommissioning and Rehabilitation Strategy</i> (SLR, 2014)	No	No	Ongoing
	Carbonaceous material	Remove remaining carbonaceous material.	Section 8.1.1.12 of the <i>NCLP Decommissioning and Rehabilitation Strategy</i> (SLR, 2014)	No	No	Not commenced

Domain Objective	Performance Indicator	Completion Criteria	Justification/Source	Complete (Yes/No)	Link to TARP	Progress at start of MOP
Safety	No public safety risk	Excavations have been rendered safe; all holes/pits and other openings are securely capped, filled or otherwise made safe; access to members of the public and livestock is restricted as appropriate to site conditions; no rubbish remains at the surface, or at risk of being exposed through erosion.	Section 9 of the <i>MSEP Decommissioning and Rehabilitation Strategy</i> (GSSE, 2013b) and Section 9 of the <i>NCLP Decommissioning and Rehabilitation Strategy</i> (SLR, 2014) SSD-5144 Schedule 3 Condition 31	No	No	Not commenced
Domain 1 – Infrastructure						
Infrastructure (other than that remaining in the final landform) will be decommissioned progressively and rehabilitated when no longer required.	Removal of infrastructure	All buildings, water storage, roads and other infrastructure not required as part of the post-closure land use have been removed unless agreed with stakeholders for their retention.	Section 9 of the <i>MSEP Decommissioning and Rehabilitation Strategy</i> (GSSE, 2013b)	No	No	Not commenced
	Demolition of infrastructure	All demolition work has been carried out in accordance with <i>AS2601-2001: Demolition of Structures</i> or its latest version.	AS2604-2001	No	No	Not commenced
	Removal of underground infrastructure	All underground infrastructure has been removed where required. The length of services to be dismantled will be determined by the regulatory requirements at the time of decommissioning.	Section 9 of the <i>MSEP Decommissioning and Rehabilitation Strategy</i> (GSSE, 2013b)	No	No	Not commenced
	Disconnect / remove services	All services, including power, water, data and telephone, that are not required for demolition activities have been safely isolated, disconnected and terminated. Generally all underground services will be made safe and left buried in-situ.	Section 7.2.1 of the <i>MSEP Decommissioning and Rehabilitation Strategy</i> (GSSE, 2013b)	No	No	Not commenced
		Overhead powerline connections to the infrastructure sites have been isolated and removed.	Section 7.2.1 of the <i>MSEP Decommissioning and Rehabilitation Strategy</i> (GSSE, 2013b)	No	No	Not commenced

Domain Objective	Performance Indicator	Completion Criteria	Justification/Source	Complete (Yes/No)	Link to TARP	Progress at start of MOP
	Exploration and groundwater monitoring boreholes decommissioned and sealed	Exploration and groundwater monitoring wells have been decommissioned and sealed in accordance with DRE DRG RR requirements, excluding those being retained for monitoring purposes.	Section 7.3.2 of the <i>MSEP Decommissioning and Rehabilitation Strategy</i> (GSSE, 2013b)	No	No	Ongoing
	Ventilation shafts and service bore holes decommissioned and sealed	Sites have been decommissioned and sealed in accordance with DRE DRG RR guidelines.	Section 7.1.6 of the <i>MSEP Decommissioning and Rehabilitation Strategy</i> (GSSE, 2013b)	No	No	Not commenced
	Mandalong mine decline tunnel	The decline tunnel has been backfilled against an engineered concrete bulkhead in accordance with DRE DRG RR guidelines and best practice at the time of closure.	Section 7.1.4 of the <i>MSEP Decommissioning and Rehabilitation Strategy</i> (GSSE, 2013b)	No	No	Not commenced
	Removal of machinery	All mobile machinery has been removed from the site.	Section 7.1.2 of the <i>MSEP Decommissioning and Rehabilitation Strategy</i> (GSSE, 2013b)	No	No	Not commenced
	No petroleum, chemicals and explosive products on site	All petroleum, chemicals and explosive products have been removed from the site.	Section 7.1.5 of the <i>MSEP Decommissioning and Rehabilitation Strategy</i> (GSSE, 2013b)	No	No	Not commenced
	Footings and pads	Where not retained, all concrete footings, foundation pads and pavements have been broken up and either removed, beneficially reused across the site or sold for some other beneficial reuse.	Section 7.1.2 of the <i>MSEP Decommissioning and Rehabilitation Strategy</i> (GSSE, 2013b)	No	No	Not commenced

Domain Objective	Performance Indicator	Completion Criteria	Justification/Source	Complete (Yes/No)	Link to TARP	Progress at start of MOP
	Bitumen roads, tracks, car parks and hard stand areas	All roads, tracks, car parks and hard stand areas not required for future land use (or agreed for retention with stakeholders) have been scalped to remove stabilised and compacted material. Inert waste has either been disposed of in a suitable location onsite or at an approved waste management facility offsite. Material assessed as non-hazardous or contaminated can be crushed and disposed of in associated mine portals or as fill in the shafts.	Section 7.1.3 of the <i>MSEP Decommissioning and Rehabilitation Strategy</i> (GSSE, 2013b)	No	No	Not commenced
Retained infrastructure	Ownership and responsibility	Where infrastructure is retained post mining for an alternate use, an owner is identified and responsibility for the maintenance, up-keep and future closure of the infrastructure is documented as part of a formal agreement with the land owner.	Section 4.2 of this MOP	No	No	Not commenced
Domain 3 – Water Management Area						
Mine water dams and sediment dams are decontaminated prior to removal or re-use as retained clean water dams in the final landform.	Removal of all water management structures not required in the final landform	All water management structures that are not required as part of the post-closure land use have been removed.	Section 7.2.2 of the <i>MSEP Decommissioning and Rehabilitation Strategy</i> (GSSE, 2013b)	No	No	No commenced
	Hazardous materials	Sediments accumulated in dams are removed from the floor of the dam prior to removal or converting to clean water structure.		No	No	No commenced
	Erosion control	Presence of sediment and erosion controls for the minimisation of discharge of dirty water off site.		No	No	Ongoing
		Presence of water management structures (e.g. contour banks and diversion drains) to direct water into the retained dams or other into stable areas.		No	No	Ongoing
	Pumping Infrastructure	All ancillary equipment including pumps and pipelines has been removed and services terminated.		No	No	No commenced

Domain Objective	Performance Indicator	Completion Criteria	Justification/Source	Complete (Yes/No)	Link to TARP	Progress at start of MOP
Domain 5 – Stockpiled Material						
All coal stockpiles will be excavated with all carbonaceous materials removed	Carbonaceous material	All carbonaceous material has been stripped and removed from the Cooranbong Entry Site stockpiles. This material has either been reprocessed for sale, used to backfill portals and shafts or placed against earthworks cuttings and highwalls and used as a buttress	Section 8.1.1.12 of the <i>NCLP Decommissioning and Rehabilitation Strategy</i> (GSSE, 2013b)	No	No	Not Commenced
Domain 8 – Underground Mining Area						
Infrastructure (other than that remaining in the final landform) will be decommissioned progressively and rehabilitated when no longer required.	Subsidence Pegs	All subsidence pegs removed in consultation with DRE DRG RR.	Section 7.3.1 of this MOP	No	No	Ongoing
Domain 9 – Conservation and Biodiversity Offset Area						
No decommissioning activities in this domain.						

Table 24 – Phase 2 – Landform Establishment

Domain Objective	Performance Indicator	Completion Criteria	Justification/Source	Complete (Yes/No)	Link to TARP	Progress at start of MOP
All Domains						
Final landforms are safe, stable, non-polluting and free-draining.	Stable final land form	Geotechnical report completed by qualified person at mine closure shows landform is stable and suitable for post mining land use.	SSD-5144 Schedule 3 Condition 31	No	1	Not Commenced
	Slopes	Rehabilitated slopes are generally less than 10 degrees unless otherwise agreed with the DRE DRG RR (or contemporary equivalent)	SSD-5144 Schedule 3 Condition 31	No	1	Not Commenced
	Surface layer is free of any hazardous materials	Inspection conducted by a suitably qualified person confirms that the surface layer is free of any hazardous materials	SSD-5144 Schedule 3 Condition 31	No	No	Not Commenced
	Erosion control	Erosion control structures have been installed at intervals commensurate with the slope of the landform.	Section 9 of the <i>MSEP Decommissioning and Rehabilitation Strategy</i> (GSSE, 2013b)	No	2, 4	Not Commenced
Domain 1 – Infrastructure						
Final landforms are safe, stable, non-polluting and free-draining and compatible with the surrounding landscape.	Surface water drainage	The land form is stable and contour banks and diversion drains are installed to direct water into stable areas or sediment control basins.	Section 9 of the <i>MSEP Decommissioning and Rehabilitation Strategy</i> (GSSE, 2013b)	No	3, 4	Not Commenced
Domain 3 – Water Management Area						
Final landform drainage will integrate with surrounding	Stable landform	Water storages to remain in the final landform have been rehabilitated to a stable non-polluting condition.	Section 9 of the <i>MSEP Decommissioning and Rehabilitation Strategy</i> (GSSE, 2013b)	No	No	Not Commenced

Domain Objective	Performance Indicator	Completion Criteria	Justification/Source	Complete (Yes/No)	Link to TARP	Progress at start of MOP
catchments, achieve long term geomorphic stability and minimise erosion.	Landform drainage design	Landform drainage structures including drains and retained dams have been designed and constructed in accordance with <i>Managing Urban Stormwater: Soils and Construction, Volume 1 and Volume 2E</i> , Mines and Quarries (the Blue Book) (Landcom, 2004) requirements.	Section 5.2 of this MOP	No	4	Not complete - all water management structures will be designed in accordance with Blue Book
	Geomorphic stability	Drainage structures are assessed to be stable with no active gully heads, tunnel erosion or bank failure.		No	3, 4	Not Commenced
Domain 8 – Underground Mining Area						
Final landforms are safe, stable, non-polluting, free-draining and consistent with the surrounding landform.	Surface water drainage	The land form is stable and contour banks and diversion drains are installed to direct water into stable areas or sediment control basins.	Section 9 of the <i>MSEP Decommissioning and Rehabilitation Strategy</i> (GSSE, 2013b)	No	3, 4	Not Commenced
	Subsidence	Any subsidence is within the maximum predicted limits outlined in the SMP/Extraction Plan and any impacts associated with the operations have been appropriately remediated as per the management procedures outlined in the SMP/Extraction Plan during operation of the Mine. Areas of high risk will be monitored in accordance with the SMP/Extraction Plan.	Section 7.3.1 of the <i>MSEP Decommissioning and Rehabilitation Strategy</i> (GSSE, 2013b) and SMP/Extraction Plan	No	No 12 - 16	Ongoing
	Slope gradient	Areas affected by mine induced subsidence will generally have gradients that are consistent with the pre-mining and/or the surrounding topography and which are geotechnically stable (i.e. no increased risk of landslip or mass slope failure).	SSD-5144 Schedule 3 Condition 31 Section 5.2 of this MOP Previous MOP	No	1	Ongoing

Table 25 – Phase 3 – Growth Medium Development

Domain Objective	Performance Indicator	Completion Criteria	Justification/Source	Complete (Yes/No)	Link to TARP	Progress at start of MOP
All Secondary Domains except Domain A Retained Infrastructure						
Growth medium has suitable physical and chemical parameters	Topsoil	Where practicable, previously stockpiled topsoil has been used in the rehabilitation activities. Where it is assessed as not being suitable an alternative topsoil substitute will be considered (for example bio-solids, organics etc)	Section 9 of the <i>MSEP Decommissioning and Rehabilitation Strategy</i> (GSSE, 2013b)	No	No	Not Commenced
	Compacted land	Compacted land ripped to a depth of 300 mm.	Previous MOP	No	No	Not Commenced
	Topsoil spreading	Soil is spread to a depth of 0.2 m over surface (if available)	Previous MOP	No	No	Not Commenced
	Soil fertility	Topsoil's and topsoil substitutes have been tested to assess suitability for post mining land use. Properties of soil are within 20 % from relevant analogue site after 5 years of rehabilitation.	Based on criteria for similar sites.	No	6	Not Commenced
	Amelioration	Suitable and alternative topsoil substitute (for example bio-solids, organics, etc.) have been used at the site to make up any short-fall in the topsoil required for complete rehabilitation.	Section 9 of the <i>MSEP Decommissioning and Rehabilitation Strategy</i> (GSSE, 2013b)	No	No	Not Commenced
Erosion is minimised	Soil protective cover	A minimum soil protective cover (vegetation or rock) of 70% has been achieved over vegetated areas.	Based on criteria for similar sites.	No	7	Not Commenced
	Erosion controls	Erosion control structures have been installed prior to soil spreading.	Section 3.4.6 of this MOP	No	No	Not Commenced
Domain E – Rehabilitation Area Woodland and Domain F – Rehabilitation Area Forest						
Land capability commensurate with pre-mining land capability	Habitat features	Habitat features are salvaged during clearing and where assessed as being of use, incorporated into wooded/forested rehabilitation areas.	This MOP	No	No	Not Commenced
Domain G – Rehabilitation Area – Rural Land						

Domain Objective	Performance Indicator	Completion Criteria	Justification/Source	Complete (Yes/No)	Link to TARP	Progress at start of MOP
Land capability commensurate with pre-mining land capability	Surface rock density	Where necessary, surface soils are rock raked to remove rocks and produce a friable surface.	This MOP	No	No	Not Commenced

Table 26 – Phase 4 – Ecosystem and Land Use Establishment

Domain Objective	Performance Indicator	Completion Criteria	Justification/Source	Complete (Yes/No)	Link to TARP	Progress at start of MOP
All Secondary Domains excluding Domain A – Retained Infrastructure						
Weeds and feral animal species do not present a risk to rehabilitation.	Weed presence	Weeds do not dominate native species after disturbance or after rain (<10 % weeds present in monitoring sites).	Based on criteria for similar sites.	No	8	Ongoing
	Feral animal presence	Pests do not occur in substantial numbers or visibly affect the development of planted species.	Based on criteria for similar sites.	No	9	Ongoing
Water quality from rehabilitation area meets relevant water quality standards	Runoff water quality from rehabilitation areas	Water quality monitoring data provides evidence that runoff water quality from rehabilitation areas is within the range of baseline surface water from nearby creeks.	Based on criteria for similar sites.	No	4	Not Commenced
Erosion does not present a safety hazard or compromise the post mining land capability.	Erosion and Sediment Control	Visual monitoring indicates there is no significant erosion that compromises land capability or the intended final land use.	This MOP	No	3	Not Commenced
Soil fertility and soil structure is comparable between rehabilitation areas and analogue sites	pH	Testing verifies that pH is within 0.5 of analogue sites or between 6 and 8 at Year 5.	Based on criteria for similar sites.	No	6	Not Commenced
	EC	Testing verifies that EC of surface soils is comparable with analogue site at Year 5.	Based on criteria for similar sites.	No	6	Not Commenced
	Nutrients	Nitrogen, potassium and phosphorus are within 20% of analogue sites at Year 5.	Tongway & Hindley 1996	No	6	Not Commenced
	Soil Carbon	Testing indicates that organic carbon levels are broadly trending toward 20% of levels at reference sites at Year 5.	Tongway & Hindley 1996	No	6	Not Commenced
	Surface Cover	Rehabilitation monitoring verifies that ground cover (vegetation, leaf litter, mulch) is greater than 70% at Year 5.	Tongway & Hindley 1996	No	7	Not Commenced
Domain C – Retained Water Management Area						

Domain Objective	Performance Indicator	Completion Criteria	Justification/Source	Complete (Yes/No)	Link to TARP	Progress at start of MOP
Final landform drainage will integrate with surrounding catchments, achieve long term geomorphic stability and minimise erosion.	Discharge water quality	Discharge water quality meets the EPL criteria.	EPL 365	No	5	Ongoing Water generally meets criteria.
	Geomorphic stability	Drainage structures are assessed to be stable at Year 10.	This MOP	No	4	Not Commenced
Domain E – Rehabilitation Area Woodland and Domain F – Rehabilitation Area - Forest						
Woodland rehabilitation areas species diversity is comparable to analogue native vegetation community	Species Selection	A mixture of native trees, shrubs and grasses representative of regionally occurring woodland in analogue sites is present.	Based on criteria for similar sites.	No	10	Not Commenced
	Vegetation health	Rehabilitation monitoring verifies more than 75% of trees are healthy and growing as indicated by rehabilitation monitoring.	Tongway & Hindley 1996	No	10	Not Commenced
	Species composition	Rehabilitation monitoring verifies species diversity for each stratum (canopy, mid storey and ground cover) is comparable to analogue sites for regionally occurring woodland at Year 5.	Previous MOP	No	10	Not Commenced
	Weed presence	Rehabilitation monitoring verifies weed presence is comparable to analogue sites for regionally occurring woodland at Year 5	Based on criteria for similar sites.	No	8	Not Commenced
Domain G – Rehabilitation Area – Rural Land						
Land capability of rural areas will be comparable to pre-mining land capability.	Species composition	At least 75% of species surveyed are representatives of the grassland species in analogue sites	Based on criteria for similar sites.	No	10	Not Commenced
		Two years following revegetation to grassland, species composition consist of grasses and legumes appropriate to the district and recognised as suitable for post mining land use.	Based on criteria for similar sites.	No	10	Not Commenced
	Ground cover	Twelve months following revegetation to grassland, vegetative cover is at least 70% over a minimum of 95% of areas treated.	Based on criteria for similar sites.	No	7	Not Commenced
Domain J – Conservation and Biodiversity Offset Area						
	Offset	Approximately 1.25 ha of the VAM-RAB offset area will be rehabilitated with the required vegetation communities.	Previous MOP	No	No	Ongoing

Domain Objective	Performance Indicator	Completion Criteria	Justification/Source	Complete (Yes/No)	Link to TARP	Progress at start of MOP
Revegetation and establish the following vegetation communities: MU37 Swamp Mahogany Paperbark Forest MU38 Redgum – Rough-barked Apple Swamp Forest	Species Selection	A mixture of native trees and shrubs and grasses representative of vegetation in comparative local areas is present including the required vegetation communities.	Previous MOP	No	10	Ongoing
	Weed presence	Revegetated areas are free from declared weed species	Previous MOP	No	8	Ongoing

Table 27 – Phase 5 – Ecosystem Sustainability

Domain Objective	Performance Indicator	Completion Criteria	Justification/Source	Complete (Yes/No)	Link to TARP	Progress at end of MOP
All Domains						
Final landform is appropriate for the intended final land use.	Community structure	The community structure is commensurate with pre-mining conditions and/or nearby analogue sites.	Section 9 of the <i>MSEP Decommissioning and Rehabilitation Strategy</i> (GSSE, 2013b)	No	10	Not commenced
	Habitat	Typical food and water sources required by the majority of vertebrate and invertebrate inhabitants of that ecosystem type are present.	Section 9 of the <i>MSEP Decommissioning and Rehabilitation Strategy</i> (GSSE, 2013b)	No	No	Not commenced
	Land Use	The rehabilitated sites can be managed for the designated land uses without any greater management inputs than other land in the area being used for a similar purpose.	Section 9 of the <i>MSEP Decommissioning and Rehabilitation Strategy</i> (GSSE, 2013b)	No	No	Not commenced
Weeds are controlled on Mandalong lands	Weed presence	Rehabilitation monitoring verifies weed presence is broadly comparable to analogue sites and does not present a risk to rehabilitation.	Previous MOP	No	8	Not commenced
Feral animals and pests are controlled on Mandalong lands	Feral animal density	Records indicate that feral animal pests are controlled in accordance with legislation and the MOP.	This MOP	No	9	Not commenced
Domain C – Retained Water Management Area						
Final landform drainage will integrate with surrounding catchments, achieve long term geomorphic stability and minimise erosion.	Discharge water quality	Discharge water quality meets the EPL requirements.	EPL 365	No	5	Ongoing - Water generally meets criteria.
	Discharge water quality	Water quality of the receiving waters is not affected by surface water runoff from the site, discharge water meets the contaminant limits (EC, pH, TSS and oil and grease) of the EPL criteria.	EPL 365	No	5	Ongoing - Water generally meets criteria.
Domain E – Rehabilitation Area Woodland and Domain F – Rehabilitation Area - Forest						

Domain Objective	Performance Indicator	Completion Criteria	Justification/Source	Complete (Yes/No)	Link to TARP	Progress at end of MOP
Woodland rehabilitation areas species diversity and structure is comparable to analogue native vegetation community.	Reproduction and Sustainability	Species are capable of setting viable seed, flowering or otherwise reproducing. Evidence of second generation of tree/shrub species.	Section 9 of the <i>MSEP Decommissioning and Rehabilitation Strategy</i> (GSSE, 2013b)	No	No	Not commenced
	Projected foliage cover	Projected foliage cover for each stratum is comparable to analogue sites.	(Tongway & Hindley, 1996)	No	No	Not commenced
	Vertebrate Species	The number of vertebrate species does not decrease by more than 25% in the successive seasons prior to mine lease relinquishment or by more than 40% over the two successive seasons prior to mine lease relinquishment	Section 9 of the <i>MSEP Decommissioning and Rehabilitation Strategy</i> (GSSE, 2013b)	No	No	Not commenced
	Invertebrate Species	Presence of species representative of a broad range of functional indicator groups involved in different ecological processes.	Section 9 of the <i>MSEP Decommissioning and Rehabilitation Strategy</i> (GSSE, 2013b)	No	No	Not commenced
	Vegetation health	More than 75 per cent of trees are healthy and growing as indicated by long term rehabilitation monitoring.	(Tongway & Hindley, 1996)	No	No	Not commenced
	Vegetation Structure	Rehabilitation monitoring confirms woodland rehabilitation areas provide a range of structural habitats (e.g. eucalypts, shrubs, ground cover, developing litter layer etc.).	Based on criteria for similar sites.	No	No	Not commenced
Domain G – Rehabilitation Area – Rural Land						
Land capability of rural areas will be comparable to pre-mining land capability.	Erosion and sediment control	No significant erosion is present that constitutes a safety hazard or compromises the capability of the supporting the end land use.	Based on criteria for similar sites.	No	3	Not commenced
	Species composition	Vegetation composition is assessed to consist of grasses and legumes representative of the district and recognised as suitable for post mining land use or as agreed with the landowner.	Based on criteria for similar sites.	No	No	Not commenced
		Rehabilitation monitoring verifies there is evidence of second generation plants.	Based on criteria for similar sites.	No	No	Not commenced

7 Rehabilitation Implementation

7.1 Status at MOP Commencement

The status of each Primary and Secondary Domain at the commencement of this MOP Term has been shown on **Plan 2**. The status of operations and rehabilitation relevant to each domain at the commencement of the MOP Term is summarised in **Table 28**.

Table 28 – Rehabilitation Status at MOP Commencement

Code	Domain	Status at MOP Commencement
Primary Domains		
1	Infrastructure Area	This domain occupies 27.1 ha and is currently active and subject to ongoing operations
3	Water Management Area	This domain occupies 1.5 ha and is currently active and subject to ongoing operations
5	Stockpiled Material	This domain occupies 2.1 ha and is currently active and subject to ongoing operations
8	Underground Mining Area	This domain occupies 2,691.5 ha 3,557.5 ha and is currently active and subject to ongoing operations
9	Conservation and Biodiversity Offset Area	This domain occupies 200.9 ha and is under rehabilitation maintenance
Secondary Domains		
A	Retained Infrastructure	This domain is currently active and subject to ongoing operations
B	Retained Water Management Area	This domain includes those dams which will be retained in the final landform. This domain is currently active and subject to ongoing operations
E	Rehabilitation Area – Woodland	This domain is currently active and subject to ongoing operations
F	Rehabilitation Area – Forest	This domain is currently active and subject to ongoing operations
G	Rehabilitation Area – Rural Land	This domain is currently active and subject to ongoing operations
J	Conservation and Biodiversity Offset Area.	This domain is under rehabilitation maintenance

7.2 Proposed Rehabilitation Activities during the MOP Term

Disturbance and rehabilitation activities during the MOP Term are shown on **Plans 3A to 3H**. Rehabilitation activities to be completed during the term of this MOP will largely be confined to stabilisation, erosion control and revegetation of disturbed areas and maintenance and monitoring of areas of rehabilitation including:

- Progressive rehabilitation of exploration and/or groundwater monitoring sites (refer **Section 2.2.1**);
- Rehabilitation of areas affected by subsidence, as required, in accordance with an approved SMP or Extraction Plan;
- Maintenance and monitoring of the VAM-RAB offset area which was established in 2012 at the Mandalong Mine;
- Maintenance and monitoring of the MSSS and TL24 offset areas; and

- Maintenance and monitoring of areas of existing rehabilitation.

Table 29 summarises the forecast total disturbance and rehabilitation areas for each year of the MOP Term.

Table 29 – Rehabilitation and Disturbance Rates during the MOP Term

Year	Total Disturbance Area (ha)	Total Rehabilitation Area (ha)	Cumulative Rehabilitation Area (ha)	Comments
Start of MOP*	33.4	2.7	200.9	See Plan 2
2017	13.2	0	200.9	See Plan 3A - Increase to disturbance area associated with construction of MSSS access road.
2018	6.8	0	200.9	See Plan 3B - Increase to disturbance area associated with construction of MSSS.
2019	0	0	200.9	See Plan 3C
2020	0 0.4	0	200.9	See Plan 3D
2021	0	0	200.9	See Plan 3E
2022	0	0	200.9	See Plan 3F
2023	0	0	200.9	See Plan 3G
End of MOP*	53.4 53.9	2.7	200.9	See Plan 3H

Note: Start of MOP is 1 December 2016 and end of MOP is 30 November 2023.

1 – Actual disturbance at commencement of MOP Amendment C as detailed in the 2019 Annual Review

7.3 Rehabilitation Methodologies for Activities in the MOP Term

The following sections outline the proposed rehabilitation activities for each of the relevant domains throughout the MOP period.

7.3.1 Domain 1 – Infrastructure Area

During the MOP Term decommissioning of exploration boreholes will be undertaken where they are not required for long term groundwater monitoring. All other facilities that are no longer required will be progressively removed and the area rehabilitated.

Following the completion of drilling and associated activities, all exploration drill holes will be sealed in accordance with relevant ~~DRE DRG~~ RR guidelines at the time. Records will be kept to demonstrate the method used to seal each drill hole, volume and types of materials used and information on the drillhole such as depth, diameter and casing string(s) left in the hole. Where non-grouted casing cannot be removed, grouting methods will be undertaken in accordance with ~~DRE DRG~~ RR guidelines. All records relating to the sealing of drill holes will be provided to the ~~DRE DRG~~ RR together with a declaration confirming that the work was carried out according to the guidelines.

Exploration drill holes that are consistent with the requirements of the Centennial Coal groundwater plan/model will be used for groundwater monitoring. These exploration boreholes will be approved

to remain open or be partially grouted to allow access to install groundwater monitoring equipment to subsequently satisfy the commitments as outlined within the Mandalong Southern Extension Project EIS (SLR, 2013).

Following grouting or the installation of piezometers, all boreholes will be surveyed in accordance with ~~DRE DRG RR~~ requirements to determine their horizontal and vertical positions and a permanent steel identification plate or reference mark will be placed at the location of each borehole for re-identification purposes.

Rehabilitation of the drill site will commence as soon as practical after completion of drilling activities and follows on from demobilisation of equipment and removal of waste materials. Following re-profiling to near the original landform within the disturbed areas, the stockpiled topsoil will be re-spread onto areas requiring rehabilitation. The disturbed areas will be seeded using species consistent with the surrounding vegetation.

Exploration bore sites which have groundwater piezometers installed will have surrounding surface disturbance rehabilitated, where practical. The groundwater monitoring equipment may be in used for the remaining Life of Mine (LOM). When the groundwater monitoring equipment is no longer required, the infrastructure will be cut off below ground level, grouted and sealed in accordance with ~~DRE DRG RR~~ requirements. The remaining area will be rehabilitated. The success of rehabilitation will be checked within 12 months of drilling being completed.

Following the completion of rehabilitation and prior to lease relinquishment by ~~DRE DRG RR~~, Mandalong will seek confirmation that the landowner is satisfied with the standard of rehabilitation activities. To achieve this, Mandalong will provide the landowner with a copy of the ~~DRE DRG RR~~ (2012) form titled *Landowner/Occupier Rehabilitation Statement (ESB-F06)*. Completed forms will be forwarded to ~~DRE DRG RR~~ as part of an Exploration Rehabilitation and Relinquishment Report.

Unless required for future access to groundwater monitoring site or manage subsidence-related impacts, access tracks constructed to access each site will be progressively closed and rehabilitated. The tracks will be ripped using the tynes of a bulldozer (or similar) and previously cleared topsoil and vegetation (if any) will be pushed over the ripped surface.

7.3.2 Domain 3 – Water Management Area

This domain will remain active in the MOP Term. There is no proposed rehabilitation within this domain.

7.3.3 Domain 5 – Stockpiled Material

This domain will remain active in the MOP Term. There is no proposed rehabilitation within this domain.

7.3.4 Domain 8 – Underground Mining Area

Should subsidence impacts occur to surface features, remediation and rehabilitation will be undertaken in accordance with the existing SMP for Longwalls 18 to 21, Longwalls 22 to 23 Extraction Plan, Longwall 24 and 24A Extraction Plan, Longwall 25 to 31 Extraction Plan, Longwall 30 to 31 Extraction Plan (when approved) and future approved Extraction Plans that will be developed.

Specific subsidence remediation measures are/will be outlined in the relevant SMP, Extraction Plan and future Extraction Plans along with appropriate trigger action response plans (TARPs).

Centennial Mandalong has developed Trigger Action Response Plans (TARPs) for the relevant Management Plans prepared to support the ~~LW24-24A Extraction Plan~~ relevant Extraction Plans.

These TARPs are developed in consultation with stakeholders as required and use escalating triggers and responses to meet the relevant performance measures applicable under SSD-5144 for each aspect/feature. The TARPs build upon the well-established TARPs and management plans previously developed for prior SMP/EP areas. Triggers described in the TARPs are typically monitored by the Subsidence Monitoring Program (document MEMS-EP-9000-SMP-9080), ~~as described in the LW24-24A Extraction Plan.~~

Twenty-two (22) TARPS have been developed to implement relevant management plans in support of the LW24-24A and LW25-31 Extraction Plans.

Subsidence remediation will be undertaken in accordance with the relevant TARP where impacts are identified. Relevant aspects of the Extraction Plan TARPs have been included in the TARP accompanying this MOP (Section 9).

~~A summary of current subsidence impacts is presented in the Six Monthly Report – Extraction Plan LW22-23 (Centennial Mandalong, 2017), available on the Centennial Coal website. The Six Monthly Report states that generally subsidence impacts are within predicted levels. Subsidence remediation has predominantly been required to rectify remnant ponding on both private and Centennial-owned property. A summary of the status of remediation of remnant ponding remediation is included in Appendix 6 of this MOP.~~

Subsidence remediation measures relating to surface and groundwater impacts, as detailed in the existing SMP Environmental Management Plan for Longwalls 18 to 21 may include the following:

7.3.4.1 – Surface Cracking

~~In the unlikely event that subsidence causes significant surface cracks, these will be in filled as required to prevent the loss of surface water. Surface cracks are typically remediated by backfilling these with surrounding surface material then re-grading to create a level surface. Disturbed areas will then rehabilitated by planting native endemic species to prevent soil erosion.~~

7.3.4.2 – Steep Slopes

~~In the unlikely event that subsidence causes significant surface cracks on steep slopes, they will be in filled to remove the hazard to ensure public safety. Surface cracks are typically remediated by backfilling with surrounding surface material then re-grading to match the surrounding surface grades. Disturbed areas are then rehabilitated by planting native endemic species to prevent soil erosion.~~

~~Where subsidence has impacted on the stability of rock masses a geotechnical / subsidence engineer will be engaged to assess its stability and provide any proposed remediation that may be necessary. Prior to remediation or rehabilitation being undertaken, relevant government departments and the landowner will be consulted.~~

7.3.4.3 – Surface and Groundwater Remediation Measures

Ponding

~~Where subsidence has resulted in a significant increase in remnant ponding, surface or sub-surface water drains will be constructed to improve water carriage on a property. These drains will be designed so they have sufficient capacity to drain areas affected by ponding. These drains are typically of a shallow design depending on existing surface gradients and direct surface water to established~~

drainage lines. Any drainage works on private property are undertaken in consultation with the landowner and facilitated by an access agreement.

Creek Realignment

If sections of the creek bed become hydrologically isolated or have significant areas of additional pooling caused by changes in bed gradients, then these bed sections may need to be realigned to improve flows. Realignments need to be designed based on surveyed long sections to best suit existing creek grades. This remediation measure typically involves excavating to regrade a creek bed section or removing elevated sections causing a constriction to flow. Upstream water would need to be contained to allow excavation and following realignment similar soil material would be re-instated to stabilise the creek bed. Permits to work within a waterway would need to be obtained from the relevant government department prior to commencing works. Where remediation is required on private property, any remediation will be undertaken in consultation with the landowner and facilitated by an access agreement.

Creek Bed Stabilisation

Where creek gradient changes result in a significant increase in erosion, it may be necessary to reduce flow velocities in the creek bed to prevent further scouring and the resultant erosion. This can be achieved by a number of methods ranging from constructing bends in the creek line to establishing weir pools. These methods would require specific design to quantify the amount of flow reduction to stabilise the creek. It may also be necessary to stabilise banks. This may be done by re-grading bank areas to reduce incised sections and stabilising the soil by re-vegetating banks.

Out-of-Channel Erosion

Contour bunds can be used to redirect surface flows from areas at risk of increased erosion particularly, where exposed soils are subject to out of channel flood flows. These contour bunds act to reduce the flow path and redirect water away from areas of erosion. The contour bunds are typically constructed on a low gradient following an existing contour level redirecting surface water into existing drainage channels or water structures. Areas at risk of erosion can then be rehabilitated by establishing vegetation cover using native endemic species.

Groundwater Flows

If near surface cracking results in drainage of groundwater from the alluvial creek system, this may be remediated by constructing bentonite filled cut-off trenches. These trenches can be constructed to prevent lateral drainage of the groundwater and redirect this back into the existing groundwater dependent system. The trenches need to be positioned and design based on site specific information however, they generally consist of subsurface trench excavations filled with bentonite at the limit of a groundwater system to redirect lateral groundwater flows back into an existing groundwater system.

Rock Bars

If rock bars are present in creek beds and these are affected by subsidence cracking this may lead to a loss of surface water from a creek. Ongoing monitoring of water loss should be undertaken to determine if long-term effects are evident. Where it is possible, grouting of cracks in rock bars may be effective in reducing water loss and returning surface water flows.

7.3.5 Domain 9 – Conservation and Biodiversity Offset Area

This domain will remain active in the MOP Term and will remain under rehabilitation maintenance during the MOP Term. Maintenance and management of the Conservation and Biodiversity Offset

Area domain will be undertaken in accordance with the Land Management Strategy and will include the continuation of the following land management activities:

- Management of weeds and feral animals;
- Establishment and maintenance of suitable fencing for the exclusion of stock from riparian areas;
- Bushfire management;
- A rehabilitation program for riparian areas where an assessment has determined that rehabilitation activities will improve water quality in the creek systems;
- Provision of a nominal funding value towards research over the life of the Project into the habitat values of species likely to be impacted by the Project; and
- Provision of a nominal dollar amount for future maintenance of the land. This is to provide incentive to any future purchaser of the land to continue the land management activities.

Centennial Mandalong will report on the progress of works associated with the Land Management Strategy annually in the Annual Review.

Rehabilitation monitoring for the MOP Term is discussed in **Section 8.1**.

7.3.6 Domain A – Retained Infrastructure

This domain refers to the infrastructure areas that will be retained in the final landform as well as the water management structures and stockpiles that will be rehabilitated for an industrial use. This domain will remain active during the MOP Term and is subject to ongoing operations. The locations of the infrastructure areas that will be retained in the final landform are shown in **Plan 4**.

7.3.7 Domain B – Retained Water Management Area

This domain refers to the surface water management structures (dams) that will be retained in the final landform following mine closure. The water management domain is active and subject to ongoing operations. The location of the water management structures that will be retained in the final landform are shown in **Plan 4**.

7.3.8 Domain E – Rehabilitation Area – Woodland

This domain will remain active during the MOP Term. Subsidence remediation will be undertaken as required throughout the MOP Term (refer **Section 7.3.4**).

7.3.9 Domain F – Rehabilitation Area – Forest

This domain will remain active during the MOP Term. Subsidence remediation will be undertaken as required throughout the MOP Term (refer **Section 7.3.4**).

7.3.10 Domain G – Rehabilitation Area – Rural Land

This domain will remain active during the MOP Term. Subsidence remediation will be undertaken as required throughout the MOP Term (refer **Section 7.3.4**).

7.3.11 Domain J – Conservation and Biodiversity Offset Area

This domain will remain active in the MOP Term and will remain under rehabilitation maintenance during the MOP Term. Maintenance will be undertaken as outlined in **Section 7.3.5**.

7.4 Summary of Rehabilitation Areas during the MOP Term

A summary of the rehabilitation in each primary and secondary domain during the MOP Term is outlined in **Table 30**.

Table 30 – Summary of Rehabilitation Proposed during the MOP Term

Primary Domain	Secondary Domain	Code	Rehabilitation Phase	Area at start of MOP (ha)	Area at end of MOP (ha)	Comment
Infrastructure Area (1)	Infrastructure Area (A)	1A	Active	23.2	23.2 23.7	There is no proposed rehabilitation to this domain during the MOP Term There is a slight increase in disturbance in this domain due to the upgrades to the car parking at the MMAS as part of MOD 8.
			Decommissioning	0	0	
			Landform Establishment	0	0	
			Growth Medium Development	0	0	
			Ecosystem & Land Use Establishment	0	0	
			Ecosystem Sustainability	0	0	
			Relinquished Lands	0	0	
	Rehabilitation Area - Woodland (E)	1E	Active	3.9	20.2	There will be an increase in the active area of this domain resulting from the construction of the Mandalong South Surface Site and access road.
			Decommissioning	0	0	
			Landform Establishment	0	0	
			Growth Medium Development	0	0	
			Ecosystem & Land Use Establishment	0	0	
			Ecosystem Sustainability	0	0	
			Relinquished Lands	0	0	
	Rehabilitation Area - Rural lands (G)	1G	Active	0	3.7	There will be an increase in the active area of this domain resulting from the construction of the Mandalong South access road.
			Decommissioning	0	0	
			Landform Establishment	0	0	
			Growth Medium Development	0	0	
			Ecosystem & Land Use Establishment	0	0	
			Ecosystem Sustainability	0	0	
			Relinquished Lands	0	0	
Total for Domain 1				27.1	47.1 47.5	
Water Management Area (3)	Infrastructure (A)	3A	Active	0.1	0.1	There are no proposed water management structures being constructed during the MOP Term. There will be an increase in the area of this domain due to the construction of water management structures at the MSSS during the MOP Term.
			Decommissioning	0	0	
			Landform Establishment	0	0	
			Growth Medium Development	0	0	
			Ecosystem & Land Use Establishment	0	0	
			Ecosystem Sustainability	0	0	
			Relinquished Lands	0	0	
	Retained Water Management Area	3B	Active	1.2	1.2	
			Decommissioning	0	0	

Primary Domain	Secondary Domain	Code	Rehabilitation Phase	Area at start of MOP (ha)	Area at end of MOP (ha)	Comment
	(B)		Landform Establishment	0	0	Additionally there is no proposed rehabilitation to this domain during the MOP Term
			Growth Medium Development	0	0	
			Ecosystem & Land Use Establishment	0	0	
			Ecosystem Sustainability	0	0	
			Relinquished Lands	0	0	
	Rehabilitation Area - Woodland (E)	3E	Active	0.2	0.2-0.4	
			Decommissioning	0	0	
			Landform Establishment	0	0	
			Growth Medium Development	0	0	
			Ecosystem & Land Use Establishment	0	0	
			Ecosystem Sustainability	0	0	
			Relinquished Lands	0	0	
Total for Domain 3				1.5	1.5 1.6	
Stockpiled Material (5)	Infrastructure (A)	5A	Active	1.6	1.6	There is no proposed rehabilitation to this domain during the MOP Term
			Decommissioning	0	0	
			Landform Establishment	0	0	
			Growth Medium Development	0	0	
			Ecosystem & Land Use Establishment	0	0	
			Ecosystem Sustainability	0	0	
			Relinquished Lands	0	0	
	Rehabilitation Area - Woodland (E)	5E	Active	0.5	0.5	
			Decommissioning	0	0	
			Landform Establishment	0	0	
			Growth Medium Development	0	0	
			Ecosystem & Land Use Establishment	0	0	
			Ecosystem Sustainability	0	0	
			Relinquished Lands	0	0	
Total for Domain 5				2.1	2.1	
Underground Mining Area (8)	Rehabilitation Area - Woodland (E)	8E	Active	1461.4	1445.0 1579.8 2,102.4	There is the potential for minor subsidence remediation works to be undertaken in this domain during the MOP Term. Any remediation and rehabilitation will be undertaken in accordance with the existing SMP and future approved Extraction Plans. There is a reduction in this domain resulting from the construction of the Mandalong South
			Decommissioning	0	0	
			Landform Establishment	0	0	
			Growth Medium Development	0	0	
			Ecosystem & Land Use Establishment	0	0	
			Ecosystem Development	0	0	
			Relinquished Lands	0	0	
		8F	Active	286.4	286.4	

Primary Domain	Secondary Domain	Code	Rehabilitation Phase	Area at start of MOP (ha)	Area at end of MOP (ha)	Comment
	Rehabilitation Area - Forest (F)		Decommissioning	0	0	Surface Site and access road over the underground mining area. There is an increase in the area of this domain due to the inclusion of Mining Area 2. There is an increase in the area of this domain due to the inclusion of Longwall 38 and first workings in the eastern part of the Southern Extension Area in MOP Amendment D.
			Landform Establishment	0	0	
			Growth Medium Development	0	0	
			Ecosystem & Land Use Establishment	0	0	
			Ecosystem Development	0	0	
			Relinquished Lands	0	0	
	Rehabilitation Area - Rural lands (G)	8G	Active	888.8	888.8 1084.7 1,188.8	
			Decommissioning	0	0	
			Landform Establishment	0	0	
			Growth Medium Development	0	0	
			Ecosystem & Land Use Establishment	0	0	
			Ecosystem Sustainability	0	0	
	Relinquished Lands	0	0			
Total for Domain 8				2,636.6	2,620.2 2,950.8 3,577.6	
Conservation and Biodiversity Area (9)	Conservation and Biodiversity Area (J)	9J	Active	0	0	This domain includes the Biodiversity Offset Area to the north and east of the Mandalong Mine Access Site ventilation and gas management facilities and the MSSS and TL24 offset areas.
			Decommissioning	0	0	
			Landform Establishment	0	0	
			Growth Medium Development	0	0	
			Ecosystem & Land Use Establishment	0	0	
			Ecosystem Sustainability	200.9	200.9	
			Relinquished Lands	0	0	
Total for Domain 9				200.9	200.9	
Overall Total				2,868.2	2,888.2 3202.9 3,829.6	

7.5 Relinquishment Phase Achieved during the MOP Term

As mining activities at Mandalong are planned to continue past the MOP Term, no areas are anticipated to meet the required rehabilitation obligations for lease relinquishment.

8 Rehabilitation Monitoring and Research

8.1 Rehabilitation Monitoring

8.1.1 Proposed Monitoring Methodology

A commitment to effective rehabilitation involves an on-going monitoring program (with concurrent maintenance as required) that will be developed for the Mandalong Mine during the MOP Term. Areas of completed rehabilitation will be regularly inspected and assessed against the rehabilitation objectives and relevant completion criteria outlined in **Section 6**.

Centennial Mandalong are committed to establishing a dedicated monitoring system during the MOP Term to assess effectiveness of implementation of the rehabilitation measures and to identify the need for corrective action as soon as required. The initial scale of the monitoring program will reflect the nature of current disturbance/rehabilitation at Mandalong and will increase commensurately during the MOP term to incorporate new areas of rehabilitation.

The monitoring program will be developed for relevant domains, incorporating the most appropriate indicators and methods that:

- Provide a measure of completion criteria to be assessed in accordance with the defined rehabilitation objectives;
- Are reproducible;
- Utilise scientific recognised techniques; and
- Are cost-effective.

Monitoring of the rehabilitation areas will be undertaken using the Biobanking Assessment Methodology and the Ecosystem Function Analysis technique. Rehabilitation monitoring will include analysis of the following:

- Rehabilitation age and technique used;
- Slope and general soil description;
- Vegetation characteristics, which includes species, count and diversity results;
- Erosion observations, which will include type and severity of erosion along a 50 m transect;
- Sustainability assessment with regards to safety, landform stability and land use; and
- Limitations to future success of rehabilitation.

The detailed monitoring program and methodology will be developed during the MOP term with monitoring to commence in 2020. Rehabilitation monitoring commenced at the MSSS in 2020.

Monitoring will be conducted annually by independent, suitably skilled and qualified persons at locations which will be representative of the range of conditions on the rehabilitating areas. In addition to the rehabilitated areas, at least two reference/analogue sites will be monitored to allow a comparison of the development and success of the rehabilitation against a control. The selection of analogue sites is discussed further in **Section 8.2.1**.

Monitoring results, any required maintenance activities and any refinements of rehabilitation techniques will be reported in the site's Annual Review.

8.2 Research and Rehabilitation Trials and Use of Analogue Sites

8.2.1 Use of Analogue Sites

Data from analogue rehabilitation sites is an integral part of the monitoring procedure throughout the monitoring process. The purpose of analogue sites is to provide a reference against which to document the progress of rehabilitation towards reaching ecosystem health, structure and composition consistent with undisturbed areas.

During the MOP term, Centennial Mandalong will engage a suitably qualified person to select and monitor analogue sites to assess whether they are suitable in the context of the proposed final land use and to suggest the species that will be appropriate for revegetation.

Analogue sites are proposed with undisturbed areas in the vicinity of the MSSS ~~and the DES~~ corresponding with the intended post mining land use of native bushland, commensurate with pre-mining conditions.

The majority of the MMAS and CES are proposed to be retained as infrastructure and therefore no reference monitoring in the vicinity is deemed necessary.

Specific analogue sites will be selected based on the following general criteria:

- Contain vegetation types similar to the rehabilitation sites;
- Secure from future mining related disturbance; and
- Contain vegetation and conditions suitable as a basis for rehabilitation performance criteria.

The monitoring results from analogue sites will provide the basis for comparison to measure the success of the rehabilitation against the relevant closure criteria. Results of analogue site monitoring will be reported in the Annual Review.

8.2.2 Mandalong Mine and VAM-RAB Offset Area

Water drainage from the car park and demountable buildings has been connected into the existing surface water drains. The surface water structures at the Mandalong Mine have previously been rehabilitated to prevent erosion and are stable.

Centennial Mandalong received approval in 2011 (DA97/800 Modification 8) for the trial installation of a ventilation air methane regenerative afterburner unit (VAM-RAB) that would remove and breakdown the exhaust methane.

Installation of the VAM-RAM unit and associated gas engines necessitated clearing of some native vegetation. Two endangered ecological communities (EEC) listed in Schedule 3 of the *Threatened Species Conservation Act 1995* were included in the areas to be cleared. These were: Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions; and River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions

Development consent condition 76A included a requirement for a 1.25 hectare rehabilitation off-set area to be established on cleared land adjoining the VAM-RAB construction site. These EEC were

represented by communities described in the regional vegetation mapping and classification (NPWS 2000) as MU37 Swamp Mahogany Paperbark Forest and MU38 Redgum – Rough-barked Apple Swamp Forest.

An ecology survey (Hunter Eco, 2011) prepared for the VAM-RAB project application described the proposed rehabilitation area to be mostly dominated by weeds. This being the case, active regeneration was required and this was commenced in January 2012. Further to the requirement to rehabilitate, the consent condition 76A also requires that the progress of the rehabilitation be monitored annually for five years. This monitoring was first conducted by Hunter Eco in October and November of 2012 and will continue on an annual basis with a summary provided in the Annual Review.

As reported in the 2015 Annual Review, Hunter Eco have found that rehabilitation areas remain substantially different to that in the reference areas. However, as time goes by the cover contribution of the planted species will increase and should contribute to improved similarity. Hunter Eco have recommended that *Kunzea ambigua* and Blackberry regrowth are controlled and that the annual planting program is maintained, particularly replacing any losses. This will ensure canopy density is maintained and will result in a spread of age classes.

Overall Hunter Eco have concluded that the results to date are encouraging suggesting that the measures taken should result in successful rehabilitation, although over a longer period than the required five year monitoring program which is scheduled to cease in 2017.

8.2.3 Land Management Strategy for the MSSS and TL24 Offset Areas

The construction of the MSSS and access road proposes to clear approximately 15.6 ha of MU 15: Coastal Foothills Spotted Gum – Ironbark Forest, which is not commensurate with any threatened ecological community listed under the Threatened Species Conservation Act (TSC Act 1995) or Environmental Protection and Biodiversity Conservation Act (EPBC Act 1999) (RPS, 2013). MU 15 is very common and widespread in the locality, occupying approximately 2,502 hectares within the Study Area and approximately 21,094 hectares between Ourimbah and Beresfield (NPWS 2003, cited in (RPS, 2013)). The proposed clearing, therefore, amounts to approximately 0.6 percent of the total available vegetation community within the immediate area and approximately 0.07 percent of the total available vegetation community within the region. None of the land proposed to be cleared contains threatened flora species or endangered ecological communities.

For these reasons, Centennial Mandalong is not proposing to provide a direct offset strategy. Rather, as a substantial landholder in the Mandalong Valley, Centennial Mandalong will develop a Land Management Strategy for land owned by Centennial in the Valley. As required by Schedule 3 Condition 18 of SSD-5144, the Land Management Strategy will be finalised and implemented by 3 December 2016 and will:

- Be finalised in consultation with the Office of Environment and Heritage (OEH);
- define conservation areas, habitat restoration areas and riparian protection areas; and
- make arrangements to manage, protect and provide long-term security for the Land Management Strategy areas.

In addition, the proposed relocation of TL24 will also result in 8.5 ha of vegetation clearing for the establishment of the new easement. Centennial Mandalong proposed to include in the Land Management Strategy an additional area of 73.6 ha in order to compensate for the loss of vegetation communities.

This strategy will include the continuation of the following land management activities:

- Management of weeds and feral animals;
- Establishment and maintenance of suitable fencing for the exclusion of stock from riparian areas;
- Bushfire management;
- A rehabilitation program for riparian areas where an assessment has determined that rehabilitation activities will improve water quality in the creek systems;
- Provision of a nominal funding value towards research over the life of the Project into the habitat values of species likely to be impacted by the Project; and
- Provision of a nominal dollar amount for future maintenance of the land. This is to provide incentive to any future purchaser of the land to continue the land management activities.

Centennial Mandalong will inspect, monitor and report on the progress of works associated with the Land Management Strategy annually in the Annual Review.

8.2.4 Moran's Creek Rehabilitation Trials

During consultation with local landowners, concerns were raised regarding historical land management practices which have resulted in extensive clearing of native vegetation and severe erosion of creek banks and drainage lines across the Mandalong Valley. The Moran's Creek rehabilitation trial was initiated in 2007 to respond to local landowner concerns in particular the historical erosion on Moran's Creek caused by flood flows and stock accessing creek areas. Local landowner's sited evidence that excavation of the creek in the 1950's caused the creek to widen as a result of the creek banks eroding. In November 2007 a trial commenced to rehabilitate a section of Moran's Creek on a Centennial owned property. The objective of the trial is to assess the effectiveness of direct seeding and tube stock planting to re-establish a native vegetation community on a degraded section of Moran's Creek.

Direct seeding of the trial area commenced in January 2008 with inspections in 2011, 2012, 2013, 2014 and 2015 concluding that the direct seeding method has been successful in establishing tree cover over the majority of the area. Juvenile species including *Eucalyptus Tereticornis*, *E. robusta* and *Casuarina Glauca* have successfully established on the trial area. The trial direct seeding area has been largely successful in re-establishing the native vegetation found along Moran's Creek. Further weed spraying was conducted in 2015 to control Tobacco weed (*Elephantopus mollis*), Scotch Thistle (*Onopordum acanthium*) and Blackberry (*Rubus fruticosus*).

The 2,000 tube stock planted in November 2008 along the fenced Moran's Creek rehabilitation corridor are now established along Moran's Creek with trees heights of up to 3 to 4 m. The rehabilitation site is a reference site for the Catchment Management Authority (CMA) vegetation monitoring report. The monitoring has recorded the baseline vegetation conditions and will evaluate the rehabilitation measures implemented at Moran's Creek.

A Macquarie University Research Project was completed in November 2013 titled "*How has the Water Quality of Morans Creek Changed Since Rehabilitation?*" A variety of methods were employed in order to answer the questions regarding the health of Morans Creek, including water quality sampling and counting of macroinvertebrates. The study concluded that:

- Riparian vegetation and bank stability had increased at the rehabilitation site; and
- Banks remain unstable and riparian zones small if they exist at all within the fences area beyond the rehabilitation site.

9 Intervention and Adaptive Management

9.1 Threats to Rehabilitation

Where rehabilitation performance is not trending to the nominated completion criteria this may indicate that there is a threat to long term rehabilitation success. Threats to rehabilitation may include events such as periods of drought, bushfire events, or pressures from weeds and feral animals.

Section 3.4 provides examples of key threats to rehabilitation. Where rehabilitation monitoring indicates that there is a significant threat to rehabilitation, Mandalong Mine will undertake adaptive management in accordance with the TARP (refer **Section 9.2**).

9.2 Trigger Action Response Plan

The following TARP for rehabilitation has been developed to identify required management actions in the event of impacts specifically to rehabilitation areas, or where rehabilitation outcomes are not achieved in an acceptable timeframe. Where necessary, rehabilitation procedures will be amended accordingly with the aim of continually improving rehabilitation standards.

The TARP is provided as **Table 31** and will be reviewed and may be revised as conditions at Mandalong change or new risks to rehabilitation are identified.

Table 31 – Rehabilitation Trigger Action Response Plan

Aspect/ Category	Key Element	Element Number	Trigger Response	Condition Green	Condition Amber	Condition Red
Landform stability	Slope gradient	1	Trigger	Rehabilitated areas have slopes that are generally <10°.	Rehabilitated areas have slopes >10°, but <14° unless otherwise agreed with the DRE DRG RR (or contemporary equivalent).	Rehabilitated areas have slopes >15°, unless otherwise agreed with the DRE DRG RR (or contemporary equivalent)
			Response	No response required. Continue monitoring program.	Undertake regrading and revegetation of the area.	Undertake a review of the landform design, including survey if required. Undertake regrading and revegetation of the area.
	Erosion control	2	Trigger	No gully or tunnel erosion. No rilling present.	Minor gully or tunnel erosion present and/or rilling <200 mm deep.	Significant gully or tunnel erosion present and/or rilling >200 mm deep.
			Response	No response required. Continue monitoring program.	A suitably trained person to inspect the site. Investigate opportunities to install water management infrastructure to address erosion. Remediate as appropriate.	Undertake a review of the drainage of the area and provide recommendations to appropriately remediate the erosion. Remediate as soon as practicable.
	Free draining landforms	3	Trigger	No ponding or drainage issues present in landform	Landforms exhibiting minor ponding	Landforms exhibiting significant drainage issues, threatening or causing rehabilitation failure.
			Response	No response required. Continue monitoring program.	An inspection of the site will be undertaken by a suitably trained person. Investigate opportunities to address issues. Remediate as appropriate or as required by the landowner.	Undertake a review of the drainage design and provide recommendations to appropriately remediate the area. Remediate as soon as practicable or as required by the landowner. Liaison with DRE DRG RR regarding landform.
	Water management structures	4	Trigger	Water management structures have been designed and constructed in accordance with Blue Book requirements and maintained in good condition with no erosion and/or scouring.	Water management structures (sediment dams, channels, contour banks) display minor erosion and/or scouring	Water management structures fail or display significant scouring / erosion
			Response	No response required. Continue monitoring program.	An inspection of the site will be undertaken by a suitably trained person. Identify remedial actions such as amelioration, re-vegetation or alternative scour protection	Engage suitable person to develop a site specific remediation plan and review water management structure design criteria
Water Quality	Monitoring parameters	5	Trigger	Surface water quality of runoff from rehabilitation areas is within EPL criteria and rehabilitation performance criteria established within this document.	Water quality exceeds EPL or performance criteria but does <u>not</u> indicate a long-term rehabilitation issue. Monitoring does not illustrate impact to rehabilitation.	Water quality exceeds criteria, indicating a long term rehabilitation liability. Monitoring illustrates impact to rehabilitation.
			Response	No response required. Continue monitoring program.	Review and investigation of water quality monitoring and management where appropriate. Implement relevant remedial measures where required.	Reporting as per statutory reporting requirements. Implement relevant responses and undertake immediate review to determine source of issues and implement remediation measures identified as soon as practicable. Liaison with relevant regulatory authorities.
Soil quality	Monitoring parameters	6	Trigger	Properties of soil are within 20 % from relevant analogue site after 5 years of rehabilitation.	Properties of soil are > 20 % from results at relevant analogue site after 5 years of rehabilitation; however area is able to sustain selected vegetation species.	Properties of soil are > 20 % from results at relevant analogue site after 5 years; the area is <u>not</u> able to sustain selected vegetation species.
			Response	No response required. Continue monitoring program.	Investigate application of additional soil, and/or use of appropriate soil ameliorants or management options to address soil quality if deemed necessary.	Consultant to be engaged to assist with recommendations to appropriately remediate soil quality and depth. Remediate as soon as practicable.

Aspect/ Category	Key Element	Element Number	Trigger Response	Condition Green	Condition Amber	Condition Red
Vegetation	Ground cover	7	Trigger	Five years following rehabilitation to woodland, $\geq 70\%$ total ground cover (vegetation, leaf litter, mulch) is present within rehabilitated areas.	Five years following rehabilitation to woodland, total ground cover (vegetation, leaf litter, mulch) of between 55 – 70 % in rehabilitated areas.	Five years following rehabilitation to woodland, total ground cover (vegetation, leaf litter, mulch) is $< 55\%$ within rehabilitated areas.
			Response	No response required. Continue monitoring program.	Review procedures where required to increase vegetation cover.	A suitably trained person to inspect the site. Investigate use of appropriate management options to remediate. Remediate as appropriate.
	Weed presence	8	Trigger	Twelve months following rehabilitation, no significant weed infestations present.	Twelve months following rehabilitation, $>10\%$ but $<25\%$ cover of undesirable species present.	Twelve months following rehabilitation, $>25\%$ cover of undesirable species present.
			Response	No response required. Continue monitoring program.	Engage weed management contractor to remove introduced species from the site.	Engage weed management contractor to remove introduced species from the site as soon as practicable. Investigate management measures to assist native plant establishment including use of ameliorants and implement as appropriate.
	Pest animal species presence	9	Trigger	No significant pest animal species present.	Significant pest animal species present but do <u>not</u> threaten to cause rehabilitation failure.	Significant numbers of pest animals causing widespread damage to rehabilitation.
			Response	No response required. Continue monitoring program.	Consult with relevant authorities regarding appropriate pest animal control campaign.	Consult with relevant authorities regarding appropriate pest animal control campaign. Engage a suitably qualified specialist to prepare a site management plan and implement recommendations such as augmenting pest animal exclusion fencing and re-vegetation.
	Species composition	10	Trigger	Five years following rehabilitation species composition comprises a mixture of native trees, shrubs and/or grasses representative of vegetation in comparable analogue sites.	Five years following rehabilitation vegetation composition comprises $<75\%$ species consistent with analogue site.	Five years following vegetation composition comprises $<60\%$ species consistent with analogue site.

Aspect/ Category	Key Element	Element Number	Trigger Response	Condition Green	Condition Amber	Condition Red
			Response	No response required. Continue monitoring program.	Review native seed mix and amend accordingly. Consider remedial actions such as tubestock planting or re-seeding to achieve required species composition.	An inspection of the site will be undertaken by a suitably trained person. Investigate remedial options to achieve required species composition and implement recommendations.
Bushfire	Fuel load	11	Trigger	Asset Protection Zones (APZs) are maintained around assets and residential areas. Fuel loads are assessed and managed as required (including maintaining fire-breaks) and there is firefighting access across rehabilitation areas and water resources available for fighting fires.	Monitoring indicates APZ is not maintained, fuel loads have not been managed and fire breaks have not been maintained. In the event of a fire, this would result in firefighters not being able to access the site or water resources.	A fire on site damages rehabilitated areas.
			Response	No response required. Continue monitoring program.	Reduce fuel loads and ensure access tracks are cleared by slashing and undertaking bushfire reduction burns if required in accordance with <i>Bushfire Management Plan</i> . Inspect water sources are and ensure sufficient water is available.	Review and update (if required) the <i>Bushfire Management Plan</i> to ensure monitoring and maintenance is completed for fuel loads, access tracks, and water bodies.
Subsidence	Sensitive biodiversity features: EEC / GDE Threatened Species, populations and their habitats Aquatic Biodiversity	12	Trigger	<ul style="list-style-type: none"> - Mining induced impacts to creeks and alluvial groundwater <u>not identified</u> by environmental monitoring (including surface flow gauging, water quality, related groundwater levels) and/or routine monitoring (as per Extraction Plan). - Monitoring indicates all parameters are within design criteria/Level Green trigger levels. 	<ul style="list-style-type: none"> - Subsidence monitoring program identifies potential for impact at surface in the vicinity of sensitive vegetation/habitat areas; <u>however</u> - Mining induced impacts to creeks and alluvial groundwater is <u>not identified / not confirmed</u> by routine environmental monitoring (including surface flow gauging, water quality, related groundwater levels) and/or routine monitoring (as per Extraction Plan). And/or - Amber Level triggers for surface water/groundwater (including alluvium) are triggered (potential for riparian vegetation impact requiring further investigation/assessment). 	<ul style="list-style-type: none"> - Mining induced impacts (beyond negligible approved levels compared to baseline) identified by: <ul style="list-style-type: none"> o Environmental monitoring (including flow gauging, water quality and biodiversity); and/or o Monitoring as per Extraction Plan; and/or o By investigations and actions arising from Condition Amber o Subsidence monitoring program identifies potential for impact at surface in the vicinity - Red Level triggers for surface water/groundwater (including alluvium and biodiversity) are triggered.
			Response	<ul style="list-style-type: none"> - No response required. - Continue subsidence monitoring program - Continue biodiversity monitoring program 	<ul style="list-style-type: none"> - Review and confirm monitoring data, cross check Biodiversity monitoring data against other related environmental data (eg control sites and benchmark data) and subsidence monitoring upon identification of the potential trigger - Notify NPWS/QEH BCD and relevant stakeholders of current findings and proposed approach for investigation upon identification of the potential trigger - Where review of subsidence monitoring data indicates <i>potential for mining-induced impact</i>, or there is insufficient data to quantify the above, undertake targeted monitoring inspection over the relevant surface area to confirm and quantify the scale/extent/nature of potential surface impacts. - Undertake further investigations as appropriate to confirm the potential issue and analyse data with the aim of determining whether the exceedance is likely to be mining related. - Assess need for any increase in monitoring frequency or additional monitoring where relevant - Continue monitoring programs. 	<ul style="list-style-type: none"> - Implement Adaptive Management process as detailed within the Extraction Plan and in accordance with Condition 8 Schedule 6 of SSD-5144 immediately - Take all necessary steps to ensure that the exceedance ceases and does not recur - Targeted field investigation by a qualified ecologist and the Mandalong Environment and Community Coordinator with invitation to relevant stakeholders as soon as practicable after the trigger is confirmed to be mining induced - Monitor impact for affected species/ecological communities using relevant methods outlined in baseline dataset - Investigate exceedance of subsidence prediction model - Notify DPE DPIE and QEH BCD as per Condition 2 of Schedule 4 of SSD-5144 and consult with the relevant stakeholders as per Consent / related approvals - Explore all remediation options and submit a report to DPE DPIE and QEH BCD outlining them. - Implement remediation measures to the satisfaction of the Secretary. - Review of mining design/ predictions against mine design criteria. - Written reporting as per Consent/relevant approvals. - Implement agreed ponding remediation in consultation with the landowner, using the most applicable options and best practice at the time (such as installing drains, subsurface drains etc)

Aspect/ Category	Key Element	Element Number	Trigger Response	Condition Green	Condition Amber	Condition Red
	Creeks and Watercourses	13	Trigger	<ul style="list-style-type: none"> - Development of subsidence and impact as predicted. - Negligible change to creek line gradients, with maximum grade change in the order of 4% and not affecting flows. - Negligible change to channel alignment. - Negligible change to existing ponding within creek channel. 	<ul style="list-style-type: none"> - Development of subsidence exceeding prediction. - Vertical subsidence results are greater than predicted. - Change in creekline grades in excess of 4% from pre-mining grades. - Increase or decrease in ponding within predicted or approved impact. - One or more areas of instabilities in watercourses. 	<ul style="list-style-type: none"> - Development of subsidence and impact greater than expected. - Vertical subsidence results are greater than two times predicted or collapse of conglomerate beam. - Change in creekline grades resulting in; - Observable change in channel alignment. - Observable erosion along creekline. - Observable cracking on stream bed or banks. - Increase or decrease in ponding above predicted or approved impact. - One or more areas of instabilities in watercourses causing sediment loads to migrate and impact riparian vegetation. - Trend in declining biodiversity from mining related impacts.
			Response	<ul style="list-style-type: none"> - Centennial to conduct post mining inspection and subsidence monitoring and provide results to the Landowner and DRE RR. - Centennial to assess subsidence impact against Flood Modelling Assessment LW24-24A. - Centennial to continue to monitor as per Water Management Plan LW24-24A. 	<ul style="list-style-type: none"> - Centennial to conduct post mining inspection and subsidence monitoring and provide results to the Landowner and DRE RR. - Centennial to monitor and investigate as per Water Management Plan LW24-24A. - Centennial to assess subsidence impact against Flood Modelling Assessment LW24-24A. - Centennial to investigate and assess if remediation measures are necessary in consultation with geomorphic specialist and Landowner. - Report investigations, monitoring and any remediation measures in Annual Review. 	<ul style="list-style-type: none"> - Centennial to conduct post mining inspection and subsidence monitoring and provide results to the Landowner and DRE RR. - Centennial to monitor and investigate as per Water Management Plan LW24-24A and Extraction Plan. - Centennial to investigate and assess possible remediation measures in consultation with geomorphic specialist, DPI- Water and Landowner. - Centennial to undertake remediation where it is determined the appropriate option in consultation with Landowner and DPI-Water. - Centennial to notify DPE DPIE as per S4 Condition 2 SSD-5144. - Centennial to notify external stakeholders including government agencies in accordance with Incident Reporting S6 Condition 10 - Centennial to report investigations, monitoring and any remediation measures in Annual Review. - Centennial to review results and predictions as per Extraction Plan.
	Farm Dams	14	Trigger	<ul style="list-style-type: none"> - Operation within prediction and approved impact - Development of subsidence and impact as predicted. - Tensile Strain < 4mm/m - Not likely to impact dam seal. - Drainage paths may need to be regraded. - Possible minor reduction in dam capacity from tilting. 	<ul style="list-style-type: none"> - Development of subsidence greater than predicted, but impact as predicted. - Tensile Strain 4 mm/m to 10 mm/m. - Possible minor leakage to dam structure, requiring resealing of dam. - Reduction of storage capacity from tilting requiring reshaping of dam to restore capacity; and / or - drainage paths to be regraded. 	<ul style="list-style-type: none"> - Development of subsidence or impact greater than predicted - Tensile Strain >10 mm/m - Loss of freeboard or cracking causing dam failure.
			Response	<ul style="list-style-type: none"> - Centennial to conduct subsidence monitoring on dam and provide results to the Landowner, DRE RR and SA NSW. - Centennial to assist landowner with any claim for damage to property. - SA NSW to conduct post mining inspections and arrange any necessary repairs to dam and drainage paths in consultation with Landowner. - 	<ul style="list-style-type: none"> - Centennial to conduct subsidence monitoring on dam and provide results to the Landowner, DRE RR and SA NSW. - Centennial to assist landowner with any SA NSW claim for damage to property. - SA NSW to conduct post mining inspections and arrange any necessary repairs to dam and drainage paths in consultation with the Landowner. - Centennial to provide alternate water supply if required. - Centennial to arrange structural inspection by structural / civil engineer to provide assessment of the dam's integrity and safety if the size or the location of the dam causes a risk to the occupants, public or property. 	<ul style="list-style-type: none"> - Centennial to conduct subsidence monitoring on dam and provide results to the Landowner, DRE RR and SA NSW. - Centennial to arrange structural inspection by structural / civil engineer to provide assessment of the dam's integrity and safety if the size or the location of the dam causes a risk to the occupants, public or property. - SA NSW to conduct post mining inspections and arrange any necessary repairs to dam and drainage paths in consultation with the Landowner. - Centennial to notify external stakeholders including government agencies in accordance with Incident Reporting S6 Condition 10. - Centennial to provide alternate water supply. - Centennial to review results and predictions as per Extraction Plan.

Aspect/ Category	Key Element	Element Number	Trigger Response	Condition Green	Condition Amber	Condition Red
	Steep Slopes	15	Trigger	<ul style="list-style-type: none"> - Development of subsidence and impact as predicted - Vertical subsidence within predicted range - Tilts and strains within predicted range - Negligible visible impact on gravel access roads - Negligible impact to steep slopes - Negligible indications downslope rock or boulder movements - Negligible rock mass instability - Negligible opening of rock joints that does not cause dislodgement of rocks 	<ul style="list-style-type: none"> - Development of subsidence exceeding prediction. - Vertical subsidence greater than predicted. - Tilts and Strains greater than predicted. - Cracking to gravel access roads, but remain within SSR. - Cracking to surface not requiring repairs or posing further risk to public safety. - Opening of rock joints that may cause dislodgement of rocks. 	<ul style="list-style-type: none"> - Development of subsidence and impact greater than predicted. - Vertical subsidence greater than predicted. - Tilts and Strains greater than predicted. - Tensile cracks and/or compression humps develop on access roads that need repairing to ensure public safety. - Surface cracking visible that may be dangerous to the public. - Repairs required, reshaping road and restore drainage. - Opening of rock joints that may cause dislodgement of rocks.
			Response	<ul style="list-style-type: none"> - Centennial to conduct weekly visual inspections of land within steep slope zones - Centennial to conduct post mining inspection and subsidence monitoring and provide results to the DRE RR and Landowner. 	<ul style="list-style-type: none"> - Centennial to conduct post mining inspection and subsidence monitoring and provide results to the DRE RR and Landowner. - Centennial to inspect and erect warnings signs or barricades as per Public Safety Management Plan. - Centennial to notify Landowner - Centennial to arrange repairs to access roads or areas of rock instability in consultation with landowner. - Centennial to notify Principal Subsidence Engineer of higher than expected subsidence and impact. - Centennial to arrange a Geotechnical Engineer to inspect any areas of suspected rock mass instability in consultation with Landowner. - Centennial to review results and predictions as per Extraction Plan. 	<ul style="list-style-type: none"> - Centennial to conduct post mining inspection and subsidence monitoring and provide results to the DRE and Landowner. - Centennial to inspect and erect warnings signs or barricades as per Public Safety Management Plan. - Centennial to notify Landowner. - Centennial to notify Principal Subsidence Engineer of higher than expected subsidence and impact. - Centennial to notify DPE DPIE as per S4 Condition 2 SSD-5144. - Centennial to arrange immediate repairs to dangerous surface cracking (eg backfilling) any necessary repairs in consultation with the Landowner and DRE RR. - Centennial to arrange a Geotechnical Engineer to inspect any areas of suspected rock mass instability. - Centennial to notify external stakeholders including government agencies in accordance with Incident Reporting S6 Condition 10. - Centennial to review results and predictions as per Extraction Plan.
	Land Use Impacts	16	Trigger	<ul style="list-style-type: none"> - Development of subsidence and impact as predicted. - Vertical subsidence within predicted range. - Negligible change to flood free agricultural land for stock storage or stock access. - Negligible impact to agricultural productivity or use of the land or an enterprise. - Negligible change to remnant ponding. - Negligible change to buildings or improvements. - Negligible increase in soil or tunnel erosion. 	<ul style="list-style-type: none"> - Development of subsidence exceeding prediction. - Impact to land use from subsidence or increased flooding or ponding within predicted or approved impacts. 	<ul style="list-style-type: none"> - Development of subsidence and impact greater than predicted. - Impact and change to property functionality or agricultural productivity greater than predicted or approved. - Change to flood free land for stock storage or stock access greater than predicted or approved.
			Response	<ul style="list-style-type: none"> - Centennial to conduct post mining inspection and subsidence monitoring and provide results to the Landowner, DRE RR and SA NSW. - Review subsidence results and observed impacts against Land and Agricultural Resource Assessment and Land Management Plan. - Centennial to assist landowner with any claim for damage to property. - SA NSW to conduct post mining inspections and arrange any necessary repairs in consultation with Landowner. 	<ul style="list-style-type: none"> - Centennial to conduct post mining inspection and subsidence monitoring and provide results to the Landowner, DRE RR and SA NSW. - Review subsidence results and observed impacts against Land and Agricultural Resource Assessment and Land Management Plan. - Centennial to assist landowner with any claim for damage to property. - SA NSW to conduct post mining inspections and arrange any necessary repairs in consultation with Landowner. - Centennial to ensure adequate water supply is available. 	<ul style="list-style-type: none"> - Centennial to conduct post mining inspection and subsidence monitoring to determine the subsided floor level and provide results to the Landowner, DRE RR and SA NSW. - Review subsidence results and observed impacts against pre- mining agricultural assessment and Land Management Plan. - Centennial to commence negotiations with Landowner as per the Land Acquisition process (S5-Condition 3 & 4). - Centennial to notify DPE DPIE as per S4 Condition 2 SSD-5144. - Centennial to notify external stakeholders including government agencies in accordance with Incident Reporting S6 Condition 10 - Centennial to review results and predictions as per Extraction Plan.

10 Reporting

As is currently undertaken, during the MOP Term a summary of rehabilitation monitoring will be included in each Annual Review. This summary will include:

- Results of rehabilitation monitoring against key performance measures/indicators;
- Comparison of rehabilitation results against predictions presented in this MOP;
- Key trends in monitoring results and progression towards performance indicators and achievement of rehabilitation objectives;
- Reporting on discrepancies between the predicted and actual results;
- Reporting of where a TARP has been implemented to counter poor/unpredicted rehabilitation results or environmental impacts;
- Results of trials;
- Non-compliances;
- Incidents/near misses; and
- Any other requirements from the [DRE DRG RR](#).

The Annual Review will also be prepared to fulfil the requirements of a Rehabilitation Report as required by ML 1722.

In accordance with the requirements of the Condition 18 of the Subsidence Management Plan Approval for Longwalls 18 to 21, Mandalong ~~will also submit~~ [has completed](#) Subsidence Management Status Reports and an End of Panel Reports to [DRE DRG RR](#) for [mining up to](#) Longwall 21. Following the commencement of operations in accordance with the [current and](#) future Extraction Plans for Longwalls 22 to 37, Mandalong will also report the effectiveness of rehabilitation strategies as required to [DRE DRG RR](#) and [DP&E DPIE in six-monthly reports and the Annual Review](#).

11 Plans

Mandalong is classified as a Level 1 Mine, and therefore the following Plans have been prepared for this MOP:

- Plans 1A – 1C show the location and pre mining natural and physical environment at Mandalong;
- Plan 2 shows the mine domains at commencement the MOP;
- Plans 3A – 3G are a series of Plans which show the annual sequence of mining and rehabilitation activities over the MOP Term;
- Plan 4 shows the proposed post mining land use and landform at the end of mine life; and
- Plan 5 shows vertical and longitudinal cross sections.

Table 32 provides a list of the MOP Plans which are included in **Appendix 7 5**.

Table 32 – List of MOP Plans

MOP Plan	Title	Description
Plan 1A	Pre-mining Environment – Project Locality	MOP Area
Plan 1B	Pre-mining Environment – Natural Environment	MOP Area
Plan 1C	Pre-mining Environment – Built Environment	MOP Area
Plan 2	Mine Domains at Commencement of MOP	MOP Area
Plan 2-1		Mandalong South Surface Site
Plan 2-2		Mandalong Mine Access Site
Plan 2-3		Delta Entry Site
Plan 2-4		Cooranbong Entry Site
Plan 3A	Mining and Rehabilitation Year 1 (Dec 1 2016 – Dec 31 2017)	MOP Area
Plan 3A-1		Mandalong South Surface Site
Plan 3A-2		Mandalong Mine Access Site
Plan 3A-3		Delta Entry Site
Plan 3A-4		Cooranbong Entry Site
Plan 3B	Mining and Rehabilitation Year 2 (Jan 1 – Dec 31 2018)	MOP Area
Plan 3B-1		Mandalong South Surface Site
Plan 3B-2		Mandalong Mine Access Site
Plan 3B-3		Delta Entry Site
Plan 3B-4		Cooranbong Entry Site
Plan 3C	Mining and Rehabilitation Year 3 (Jan 1 – Dec 31 2019)	MOP Area
Plan 3C-1		Mandalong South Surface Site
Plan 3C-2		Mandalong Mine Access Site
Plan 3C-3		Delta Entry Site
Plan 3C-4		Cooranbong Entry Site
Plan 3D	Mining and Rehabilitation Year 4 (Jan 1 – Dec 31 2020)	MOP Area
Plan 3D-1		Mandalong South Surface Site
Plan 3D-2		Mandalong Mine Access Site
Plan 3D-3		Delta Entry Site
Plan 3D-4		Cooranbong Entry Site
Plan 3E	Mining and Rehabilitation Year 5 (Jan 1 – Dec 31 2021)	MOP Area
Plan 3E-1		Mandalong South Surface Site
Plan 3E-2		Mandalong Mine Access Site
Plan 3E-3		Delta Entry Site
Plan 3E-4		Cooranbong Entry Site
Plan 3F	Mining and Rehabilitation Year 6 (Jan 1 – Dec 31 2022)	MOP Area
Plan 3F-1		Mandalong South Surface Site
Plan 3F-2		Mandalong Mine Access Site
Plan 3F-3		Delta Entry Site
Plan 3F-4		Cooranbong Entry Site
Plan 3G	Mining and Rehabilitation Year 7 (Jan 1 – Nov 30 2023)	MOP Area
Plan 3G-1		Mandalong South Surface Site
Plan 3G-2		Mandalong Mine Access Site
Plan 3G-3		Delta Entry Site
Plan 3G-4		Cooranbong Entry Site
Plan 4	Final Rehabilitation and Post-Mining Land Use	MOP Area
Plan 4-1		Mandalong South Surface Site
Plan 4-2		Mandalong Mine Access Site
Plan 4-3		Delta Entry Site
Plan 4-4		Cooranbong Entry Site
Plan 5	Cross Sections	MOP Area

Note – Plans 3A to 3G display activities as of 31 Dec of Year 1 to Year 7 rather than during the entire year.

~~Plans 3A to 3C 3D excluded as complete at MOP Amendment E D~~

12 Review and Implementation of the MOP

12.1 Review of the MOP / Rehabilitation Management Plan

In accordance with the requirements of Schedule 6, Condition 7 of Development Consent SSD-5144, Mandalong will review and if necessary revise this document within three months of the following:

- a) Submission of an incident report;
- b) Submission of an Annual Review;
- c) Submission of an Independent Environmental Audit; or
- d) ~~The approval of a~~Any modification to ~~the conditions of~~ SSD-5144.

Additional triggers for a review of this document will include:

- Deficiencies identified during implementation of the MOP;
- Recommendations and results from rehabilitation monitoring; and
- Substantial changes to the mine plan.

If required, the proposed management strategies and control measures will be modified to address evolving site conditions, latent conditions and/or changes to the proposed exploration sequence. Any changes to the MOP will then be communicated to the relevant site personnel via daily “toolbox talk” training and weekly project meetings.

This management plan is a controlled document and will be reviewed on an as needs basis.

Following amendments, a copy of the revised Plan will be provided to the ~~DP&E~~ DP&E DP&E and ~~DRE~~ DRE DP&E for approval.

12.2 Implementation

Table 33 lists the Centennial Mandalong personnel who are responsible for the monitoring, review and implementation of this MOP.

Table 33 – MOP Responsibilities

Position	Responsibility
Mine Manager	<ul style="list-style-type: none"> • Authorisation of the MOP. • Delegation of resources to implement the MOP requirements. • Ensure all personnel undertaking works in relation to this MOP are trained and competent.
Mining Approvals Coordinator	<ul style="list-style-type: none"> • Implementation of the procedures listed in the MOP. • Ensure mine planning is consistent with the MOP. • Plan and coordinate future reviews of the MOP.
Environment and Community Coordinator	<ul style="list-style-type: none"> • Implement the MOP requirements and procedures. • Undertake rehabilitation monitoring and maintenance as required. • Commence detailed rehabilitation planning for Centennial Mandalong operations in accordance with this MOP. • Report on the progress of any rehabilitation and monitoring of rehabilitation success in the Annual Review. • Consult with regulatory authorities as required.

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APPENDICES



Centennial Coal

Appendix 1A SSD-5144

Development Consent

Section 89E of the *Environmental Planning and Assessment Act 1979*

As delegate of the Minister for Planning, the Planning Assessment Commission of New South Wales (the Commission) approves the development application referred to in Schedule 1, subject to the conditions in Schedules 2 to 6.

These conditions are required to:

- prevent, minimise, and/or offset adverse environmental impacts;
- set standards and performance measures for acceptable environmental performance;
- require regular monitoring and reporting; and
- provide for the ongoing environmental management of the development.

Member of the Commission

Member of the Commission

Member of the Commission

Sydney

2015

SCHEDULE 1

Application Number:

SSD-5144

Applicant:

Centennial Mandalong Pty Limited

Consent Authority:

Minister for Planning

Land:

See Appendix 1

Development:

Mandalong Southern Extension Project

TABLE OF CONTENTS

DEFINITIONS	1
ADMINISTRATIVE CONDITIONS	4
OBLIGATION TO MINIMISE HARM TO THE ENVIRONMENT	4
TERMS OF CONSENT	4
LIMITS ON CONSENT	4
STRUCTURAL ADEQUACY	5
DEMOLITION	5
OPERATION OF PLANT AND EQUIPMENT	5
COMMENCEMENT OF DEVELOPMENT UNDER THIS CONSENT	5
SURRENDER OF EXISTING DEVELOPMENT CONSENT	5
ENVIRONMENTAL CONDITIONS – GENERAL	6
NOISE	6
BLASTING	7
AIR QUALITY AND GREENHOUSE GAS	7
METEOROLOGICAL MONITORING	8
WATER	8
BIODIVERSITY	10
HERITAGE	11
TRAFFIC & TRANSPORT	12
VISUAL	13
WASTE	13
BUSHFIRE MANAGEMENT	13
REHABILITATION	13
SURFACE INFRASTRUCTURE MANAGEMENT	14
ENVIRONMENTAL CONDITIONS – UNDERGROUND MINING	16
SUBSIDENCE	16
ADDITIONAL PROCEDURES	21
NOTIFICATION OF LANDOWNERS	21
INDEPENDENT REVIEW	21
LAND ACQUISITION	21
ENVIRONMENTAL MANAGEMENT, REPORTING AND AUDITING	23
ENVIRONMENTAL MANAGEMENT	23
REPORTING	25
ANNUAL REVIEW	25
INDEPENDENT ENVIRONMENTAL AUDIT	25
ACCESS TO INFORMATION	26
APPENDIX 1: SCHEDULE OF LAND	27
APPENDIX 2: DEVELOPMENT LAYOUT	47
APPENDIX 3: NOISE ASSESSMENT PARAMETERS	54
APPENDIX 4: NOISE RECEIVERS	55
APPENDIX 5: BUILT FEATURES	56
APPENDIX 6: ABORIGINAL CULTURAL HERITAGE	59
APPENDIX 7: LAND MANAGEMENT STRATEGY	62
APPENDIX 8: APPLICANT'S STATEMENT OF COMMITMENTS	64

Blue Type represents

Orange Type represents

Green Type represents

Red Type represents

Purple Type represents

Navy Blue Type represents

Olive Type represents

Yellow Type in grey background represents

Pink Type represents

June 2016 modification

September 2016 modification

November 2016 modification

March 2017 modification

August 2017 modification

April 2019 modification

July 2019 modification

January 2020 modification

April 2021 modification

DEFINITIONS

Adaptive management	Adaptive management includes monitoring subsidence effects and impacts and, based on the results, modifying the mine plan (including potentially modifying mining height, longwall width or any other element of the mine plan) as mining proceeds to ensure that the effects, impacts and/or associated environmental consequences remain within the predicted and/or designated ranges and in compliance with the conditions of this consent
Annual review	The review of operations required by Condition 12 of Schedule 6
Approved mine plan	The approved mine plan for the development, as shown in Figure 2 of Appendix 2
Applicant	Centennial Mandalong Pty Limited, or any other person or persons who rely on this consent to carry out the development that is subject to this consent
ARI	Average recurrence interval
BC Act	<i>Biodiversity Conservation Act 2016</i>
BCA	Building Code of Australia
BCD	<i>Biodiversity Conservation Division within the Department</i>
Built features	Includes any building or work erected or constructed on land, including dwellings, outbuildings and infrastructure such as any formed road, street, path, walk, or driveway and any pipeline, water, sewer, telephone, gas or other service main
CCC	Community Consultative Committee
CES	Cooranbong Entry Site, as shown in Figure 6 of Appendix 2
Conditions of this consent	Conditions contained in Schedules 2 to 6 inclusive
Construction activities	Construction activities at the MSSS, TL24 relocation area , MMAS and the expansion of the Borehole Dam at the CES as described in the EIS, together with the construction of gas engines as described in EA (MOD 4)
CPI	Consumer Price Index, as published by the Australian Bureau of Statistics
Day	The period from 7.00 am to 6.00 pm on Monday to Saturday, and 8.00 am to 6.00 pm on Sundays and Public Holidays
Department	<i>Department of Planning, Industry and Environment</i>
DES	Delta Entry Site
Development	The development described in the EIS and EA MOD 4, as subsequently modified
DPI Fisheries	Department of Primary Industries - Fisheries
DPIE Water	Water Division within the Department
EA (MOD 4)	The modification application DA 97/800 - MOD 4 and accompanying Environmental Assessment entitled <i>Mandalong Mine Modification to Development Consent Environmental Assessment</i> , dated September 2008
EEC	<i>Endangered ecological community, as defined under the BC Act</i>
EIS	Environmental Impact Statement titled <i>Mandalong Southern Extension Project Environmental Impact Statement</i> , dated September 2013; associated response to issues raised in submissions, titled <i>Mandalong Southern Extension Project Response to Submissions</i> , dated March 2014; and additional information regarding residual concerns, titled <i>Mandalong Southern Extension Project Response to RTS submissions</i> , dated July 2014
Environmental consequences	The environmental consequences of subsidence impacts, including: damage to built features; loss of surface water flows to the subsurface; loss of standing pools; slope changes to streams; adverse water quality impacts; development of iron bacterial mats; rock falls; landslides; damage to Aboriginal heritage sites; impacts on aquatic ecology; and ponding.
EPA	Environment Protection Authority
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
EP&A Regulation	<i>Environmental Planning and Assessment Regulation 2000</i>
EPL	Environment Protection Licence issued under the POEO Act
Evening	The period from 6.00 pm to 10.00 pm
Exploration activities	Prospecting operations, as defined under the <i>Mining Act 1992</i>
Feasible	Feasible relates to engineering considerations and what is practical to build or to implement
First workings	Development of main headings, longwall gate roads, related cut throughs and the like

Ha	Hectare
Heritage NSW	Heritage NSW within Department of Premier and Cabinet
Heritage item	An item as defined under the <i>Heritage Act 1977</i> and/or an Aboriginal object or Aboriginal place as defined under the <i>National Parks and Wildlife Act 1974</i>
HLLS	Hunter Local Land Services
Incident	An occurrence or set of circumstances that causes or threatens to cause material harm and which may or may not be or cause a non-compliance
Land	As defined in the EP&A Act, except for where the term is used in the noise and air quality conditions in Schedules 3 and 5 of this consent where it is defined to mean the whole of a lot, or contiguous lots owned by the same landowner, in a current plan registered at the Land Titles Office at the date of this consent
LMCC	Lake Macquarie City Council
Mandalong Coal Delivery System	The underground conveyor which delivers coal from the project's underground workings to the Wyee Coal Unloader, as regulated under DA 35-4-2004
Material harm to the environment	Actual or potential harm to the health or safety of human beings or to ecosystems that is not trivial
Mining operations	Includes the extraction, processing, handling, storage and transportation of coal carried out on the site
Minister	Minister for Planning, or delegate
Minor	Not very large, important or serious
Mitigation	Activities associated with reducing the impacts of the development prior to or during those impacts occurring
MMAS	Mandalong Mine Access Site, as shown in Figure 4 of Appendix 2
Modification 7	The modification to the development, as described in SEE (Mod 7)
Modification 8	The modification to the development, as described in SEE (Mod 8)
Modification 9	The modification to the development as described in MR (Mod 9)
MR (Mod 9)	Modification Report titled 'Mandalong Mine – Modification Report for modification to development consent SSD-5144', dated 14 May 2020, prepared by EMM Consulting, 'Submissions Report – SSD-5144 Modification 9 Mandalong Mine', dated August 2020, prepared by Centennial Coal, letter titled 'Centennial Mandalong SSD-5144 Modification 9 AHIMS Sites', dated 14 October 2020, 'Revised Mandalong Modification 9 Aboriginal cultural heritage sites inventory' and accompanying figure 'PC 7443 R4', dated 22 October 2020, letter titled 'Property MS0127 Flood Assessment (2 nd Order Stream)', dated 23 February 2021, letter titled 'Impact Assessment for three Grinding Groove Sites identified following the EIS Report for the Mandalong Southern Extension Project (approved LW32-37) – Addendum to the Proposed LW30 – 33 Modification (Mod 9) Application', dated 25 March 2021, prepared by Ditton Geotechnical Services and letter titled 'RE: Centennial Mandalong SSD-5144 Mod 9 ROM Tonnes', prepared by Centennial, dated 1 April 2021
MSSS	Mandalong South Surface Site, as shown in Figure 5 of Appendix 2
Negligible	Small and unimportant, such as to be not worth considering
Night	The period from 10pm to 7am on Monday to Saturday, and 10.00 pm to 8.00 am on Sundays and Public Holidays
Non-compliance	An occurrence, set of circumstances or development that is a breach of this consent
POEO Act	<i>Protection of the Environment Operations Act 1997</i>
Privately-owned land	Land that is not owned by a public agency, or a mining company (or its subsidiary)
Public infrastructure	Linear and related infrastructure and the like that provides services to the general public, such as roads, railways, water supply, drainage, sewerage, gas supply, electricity, telephone, telecommunications, etc
Reasonable	Reasonable relates to the application of judgement in arriving at a decision, taking into account: mitigation benefits, cost of mitigation versus benefits provided, community views and the nature and extent of potential improvements
Reasonable Costs	The costs agreed between the Department and the Applicant for obtaining independent experts to review the adequacy of any aspects of an Extraction Plan
Registered Aboriginal Parties	Aboriginal community stakeholders listed in Table 1 of Appendix 6
Rehabilitation	The restoration of land disturbed by the development to a good condition to ensure it is safe, stable and non-polluting

Remediation	Activities associated with partially or fully repairing or rehabilitating the impacts of the development or controlling the environmental consequences of this impact
ROM coal	Run-of-mine coal
RR	NSW Resources Regulator
Safe, serviceable & repairable	Safe means no danger to users who are present, serviceable means available for its intended use, and repairable means damaged components can be repaired economically
SANSW	Subsidence Advisory NSW
Second workings	Extraction of coal from longwall panels, mini-wall panels or pillar extraction
Secretary	Planning Secretary under the EP&A Act, or nominee
SEE (Mod 1)	Statement of Environmental Effects titled, 'Mandalong Mine Transmission Line TL24 Relocation Project' dated March 2016 and prepared by Centennial Coal Company Limited, and the Response to Submissions document dated May 2016
SEE (Mod 2)	Statement of Environmental Effects titled 'Mandalong Mine Longwall 22 & 23 First Workings Modification' dated August 2016 and prepared by Centennial Coal Company Limited
SEE (Mod 3)	Statement of Environmental Effects titled 'Mandalong Mine State Significant Development 5144 – Modification 3' dated September 2016 and prepared by Centennial Coal Company Limited
SEE (Mod 4)	Statement of Environmental Effects titled 'Mandalong Mine State Significant Development 5144 – Modification 4' dated November 2016 and prepared by Centennial Coal Company Limited
SEE (Mod 5)	Statement of Environmental Effects titled 'Mandalong Mine State Significant Development 5144 – Modification 5' dated May 2017 and prepared by GHD Pty Ltd, including the Response to Submissions document dated 19 June 2017 and additional information dated 14 July 2017 and 18 July 2017 prepared by Centennial Coal Company Ltd
SEE (Mod 6)	Statement of Environmental Effects titled 'Mandalong Mine: Mandalong South Surface Site Water Management' dated October 2018 and prepared by Centennial Mandalong Pty Ltd, including the Response to Submissions document dated 1 March 2019 prepared by Centennial Mandalong Pty Ltd
SEE (Mod 7)	Statement of Environmental Effects titled 'Mandalong 33 kV power line' dated February 2019 and prepared by Centennial Mandalong Pty Ltd
SEE (Mod 8)	Statement of Environmental Effects titled 'Mandalong Mine Modification to SSD-5144 Statement of Environmental Effects' dated April 2019 and prepared by EMM Consulting, including the Response to Submissions document dated 23 August 2019 prepared by Centennial Mandalong Pty Ltd
Site	All land to which the development application applies, including the longwall mining domains and the surface facilities sites, as listed in Appendix 1 and shown in Appendix 2
Statement of commitments	The Applicant's commitments, as set out in the EIS, and shown in Appendix 8
Steep slopes	An area of land having a gradient greater than 1 in 3 (33% or 18.3°)
Subsidence	The totality of subsidence effects, subsidence impacts and environmental consequences of subsidence impacts
Subsidence effects	Deformation of the ground mass due to mining, including all mining-induced ground movements, such as vertical and horizontal displacement, tilt, strain and curvature
Subsidence impacts	Physical changes to the ground and its surface caused by subsidence effects, including tensile and shear cracking of the rock mass, localised buckling of strata caused by valley closure, upsidence and surface depressions or troughs
Surface facilities sites	The MMAS, the CES and the MSSS, as shown in the relevant Figures in Appendix 2
TL24 relocation area	Transmission Line 24, as shown in Figure 7 of Appendix 2

SCHEDULE 2 ADMINISTRATIVE CONDITIONS

OBLIGATION TO MINIMISE HARM TO THE ENVIRONMENT

1. In addition to meeting the specific performance measures and criteria established under this consent, **the Applicant must** implement all reasonable and feasible measures to prevent and/or minimise any harm to the environment that may result from the construction, operation, or rehabilitation of the development.

TERMS OF CONSENT

2. **The Applicant must** carry out the development:
 - (a) generally in accordance with the EA (MOD 4);
 - (b) generally in accordance with the EIS, SEE (Mod 1), SEE (Mod 2), SEE (Mod 3), SEE (Mod 4), SEE (Mod 5), SEE (Mod 6), SEE (Mod 7), SEE (Mod 8) and MR (Mod 9);
 - (c) generally in accordance with the Development Layout;
 - (d) in accordance with the Statement of Commitments; and
 - (e) in accordance with the conditions of this consent.

Note: The Development Layout is shown in Appendix 2.

3. If there is any inconsistency between the documents identified in condition 2(a) and (b), the more recent document shall prevail to the extent of the inconsistency. The conditions of this consent shall prevail to the extent of any inconsistency with the documents identified in condition 2(a) and (b) or the Statement of Commitments.
4. **The Applicant must** comply with any reasonable requirement/s of the Secretary arising from the Department's assessment of:
 - (a) any strategies, plans, programs, reviews, audits, reports or correspondence that are submitted in accordance with this consent (including any stages of these documents);
 - (b) any reviews, reports or audits commissioned by the Department regarding compliance with this consent; and
 - (c) the implementation of any actions or measures contained in these documents.

LIMITS ON CONSENT

Mining Operations

5. The Applicant may carry out mining operations on the site until 31 December 2040.

Note: Under this consent, the Applicant is required to rehabilitate the site and perform additional undertakings to the satisfaction of either the Secretary or RR. Consequently, this consent will continue to apply in all other respects other than the right to conduct mining operations until the rehabilitation of the site and these additional undertakings have been carried out satisfactorily.

6. The Applicant may only carry out **second workings** within the area covered by the approved mine plan.

Coal Extraction and Delivery

7. In any calendar year, **the Applicant must** not:
 - (a) extract more than 6.5 million tonnes of ROM coal from the site;
 - (b) deliver more than 6 million tonnes of ROM coal to the CES; and/or
 - (c) deliver more than 6 million tonnes of ROM coal to the Mandalong Coal Delivery System.

Hours of Operation

8. **The Applicant must** comply with the operating hours in Table 1.

Table 1: Operating hours

Activity	Operating Hours
Mining operations, maintenance activities and shaft construction	24 hours a day, 7 days per week
Construction activities (except shaft construction)	7.00 am to 6.00 pm on Monday to Friday, and 8.00 am to 1.00 pm on Saturday, with no construction activities on Sunday or on public holidays, except where carried out underground

Note: This condition does not apply in the event of a direction from police or other relevant authority for safety or emergency reasons regarding works which may need to be undertaken to avoid loss of life, property loss and/or to prevent environmental harm.

STRUCTURAL ADEQUACY

9. **The Applicant must** ensure that all new buildings and structures, and any alterations or additions to existing buildings and structures that are part of the development, are constructed in accordance with:
- (a) the relevant requirements of the BCA; and
 - (b) any additional requirements of the **SANSW**, where the building or structure is located on land within a declared Mine Subsidence District.

Notes:

- *Under Part 4A of the EP&A Act, the Applicant is required to obtain construction and occupation certificates for the proposed building works.*
- *Part 8 of the EP&A Regulation sets out the requirements for the certification of the development.*
- *Under Section 15 of the Mine Subsidence Compensation Act 1961, the Applicant is required to obtain the **SANSW's** approval before subdivision or constructing any improvements in a Mine Subsidence District.*

DEMOLITION

10. **The Applicant must** ensure that all demolition work is carried out in accordance with *Australian Standard AS 2601-2001: The Demolition of Structures*, or its latest version.

OPERATION OF PLANT AND EQUIPMENT

11. **The Applicant must** ensure that all plant and equipment used at the site is:
- (a) maintained in a proper and efficient condition; and
 - (b) operated in a proper and efficient manner.

COMMENCEMENT OF DEVELOPMENT UNDER THIS CONSENT

12. **The Applicant:**
- (a) **must** notify the Secretary in writing of the proposed date of commencement of development under this consent; and
 - (b) may only commence development under this consent once the Secretary has agreed in writing that all prerequisites to the commencement of that development have been met.

SURRENDER OF EXISTING DEVELOPMENT CONSENT

13. By 30 April 2017, or as otherwise agreed by the Secretary, **the Applicant must** surrender the development consent DA 97/800 in accordance with Section 104A of the EP&A Act.

Note: This requirement does not extend to the surrender of construction and occupation certificates for existing and proposed building works under Part 4A of the EP&A Act. Surrender of a consent or approval should not be understood as implying that works legally constructed under a valid consent or approval can no longer be legally maintained or used.

SCHEDULE 3 ENVIRONMENTAL CONDITIONS – GENERAL

NOISE

Construction Noise

1. **The Applicant must** ensure that the noise generated by construction activities (excluding shaft construction), including activities undertaken for Modification 7, is managed in accordance with the requirements of the *Interim Construction Noise Guideline* (DECC, 2009), as may be updated from time to time.

Operational Noise Criteria

2. **The Applicant must** ensure that the operational noise generated by the development (including maintenance activities, shaft construction and exploration drilling) does not exceed the criteria in Table 2 at any residence on privately-owned land.

Table 2: Operational Noise Criteria

Receiver	Noise Limit (dB(A))			
	Day ($L_{Aeq}(15\ min)$)	Evening ($L_{Aeq}(15\ min)$)	Night ($L_{Aeq}(15\ min)$)	Night ($L_{A1}(1\ min)$)
R2	40	40	40	52
R3	42	42	42	52
R4	39	39	39	52
R5	41	41	41	61
R6	40	40	40	61
R7 & R8	43	43	43	61
R9	42	42	42	61
R10	39	39	39	61
All other residences on privately-owned land	35	35	35	45

Note: The receiver locations in Table 2 are shown in Figure 1 of Appendix 4.

Noise generated by the development is to be measured in accordance with the relevant requirements and exemptions (including certain meteorological conditions) of the [NSW Industrial Noise Policy](#). Appendix 3 sets out the meteorological conditions under which these criteria apply, and the requirements for evaluating compliance with these criteria.

However, these criteria do not apply if the Applicant has an agreement with the relevant landowner to exceed the noise criteria in Table 2, and the Applicant has advised the Department in writing of the terms of this agreement.

Operating Conditions

3. **The Applicant must:**
 - (a) implement best management practice to minimise the construction, operational and road noise of the development;
 - (b) use its best endeavours to facilitate the connection to, and use of, a permanent electricity source to undertake ventilation shaft sinking activities at the MSSS;
 - (c) operate an on-site noise management system that uses a combination of predictions, forecasting, and attended and unattended monitoring of all noise associated with the development, to ensure compliance with the relevant conditions of this consent, including noise during construction and operations;
 - (d) minimise the noise impacts of the development during meteorological conditions under which the noise limits in this consent do not apply (see Appendix 3); and
 - (e) regularly assess noise monitoring data to determine whether the development is complying with the relevant conditions of consent,

to the satisfaction of the Secretary.

Noise Management Plan

4. **The Applicant must** prepare a Noise Management Plan for the development to the satisfaction of the Secretary. This plan must:
 - (a) be prepared in consultation with the EPA, by suitably qualified and experienced persons whose appointment has been approved by the Secretary;
 - (b) be submitted to the Secretary for approval prior to the commencement of construction of the MSSS, or by 31 March 2016, whichever is sooner;

- (c) describe the measures that would be implemented to ensure compliance with the noise criteria and operating conditions of this consent, including management of out-of-hours noise associated with shaft construction;
- (d) describe the proposed noise management system in detail;
- (e) include a monitoring program that evaluates and reports on:
 - the effectiveness of the noise management system;
 - compliance against the noise criteria in this consent; and
 - compliance against the noise operating conditions in condition 3 above;
- (f) defines what constitutes a noise incident, and includes a protocol for identifying and notifying the Department and relevant stakeholders of any noise incidents; and
- (g) outlines procedures to manage responses to any complaints or issues raised by the owners of affected residences.

The Applicant must implement the approved management plan as approved from time to time by the Secretary.

BLASTING

Blasting Restriction

5. The Applicant must carry out blasting on the surface of the site only between 9.00 am and 5.00 pm Monday to Saturday inclusive. No blasting is allowed on Sundays, Public Holidays, or at any other time, without the written approval of the Secretary.

Operating Conditions

6. The Applicant must implement best blasting management practice to:
 - (a) protect the safety of people in the surrounding area;
 - (b) protect public infrastructure and private property in the surrounding area from any damage; and
 - (c) minimise the dust and fume emissions of any blasting,
 to the satisfaction of the Secretary.

AIR QUALITY & GREENHOUSE GAS

Odour

7. The Applicant must ensure that no offensive odours are emitted from the site, as defined under the POEO Act.

Air Quality Criteria

8. The Applicant must ensure that all reasonable and feasible avoidance and mitigation measures are employed so that the particulate matter emissions generated by the development do not cause exceedances of the criteria in Table 3 at any residence on privately-owned land.

Table 3: Air quality criteria

Pollutant	Averaging Period	Criterion
Particulate matter < 10 µm (PM ₁₀)	Annual	a,d 25 µg/m ³
Particulate matter < 10 µm (PM ₁₀)	24 hour	b 50 µg/m ³
Total suspended particulates (TSP)	Annual	a,d 90 µg/m ³
^c Deposited dust	Annual	b 2 g/m ² /month a,d 4 g/m ² /month

Notes to Table 3:

a Cumulative impact (ie increase in concentrations due to the development plus background concentrations due to all other sources).

b Incremental impact (ie increase in concentrations due to the development alone, with zero allowable exceedances of the criteria over the life of the development).

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

d Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents or any other activity agreed by the Secretary.

e "Reasonable and feasible avoidance and mitigation measures" includes, but is not limited to, the operational requirements in conditions 9 and 10 to develop and implement an air quality management system that ensures operational responses to the risks of exceedance of the criteria.

Operating Conditions

9. **The Applicant must:**
- (a) implement best practice air quality management at the site to minimise the
 - off-site odour, fume and dust emissions of the development; and
 - release of greenhouse gas emissions from the development;
 - (b) minimise any visible off-site air pollution generated by the development;
 - (c) minimise the surface disturbance of the site;
 - (d) operate a comprehensive air quality management system to ensure compliance with the relevant conditions of this consent;
 - (e) minimise the air quality impacts of the development during adverse meteorological conditions and extraordinary events (see note *d* to Table 3), to the satisfaction of the Secretary.

Air Quality & Greenhouse Gas Management Plan

10. **The Applicant must** prepare an Air Quality & Greenhouse Gas Management Plan for the development, to the satisfaction of the Secretary. This plan must:
- (a) be prepared in consultation with EPA, by suitably qualified and experienced persons whose appointment has been approved by the Secretary;
 - (b) be submitted to the Secretary for approval prior to the commencement of construction of the MSSS, or by 31 March 2016, whichever is sooner;
 - (c) describe the measures that would be implemented to ensure compliance with the relevant air quality criteria and operating conditions of this consent;
 - (d) describe the on-site air quality management system; and
 - (e) include an air quality monitoring program that:
 - adequately supports the air quality management system;
 - evaluates and reports on:
 - compliance with the air quality criteria;
 - the effectiveness of the air quality management system; and
 - compliance against the air quality operating conditions in condition 9 above; and
 - defines what constitutes an air quality incident, and includes a protocol for identifying and notifying the Department and relevant stakeholders of any air quality incidents.

The Applicant must implement the approved management plan as approved from time to time by the Secretary.

METEOROLOGICAL MONITORING

11. During the life of the development, **the Applicant must** ensure that there is a suitable meteorological station operating in the vicinity of the site that:
- (a) complies with the requirements in the *Approved Methods for Sampling of Air Pollutants in New South Wales* guideline; and
 - (b) is capable of continuous real-time measurement of temperature lapse rate in accordance with the *NSW Industrial Noise Policy*.

WATER

Water Supply

12. **The Applicant must** ensure that it has sufficient water for all stages of the development, and if necessary, adjust the scale of mining operations to match its available water supply.

Note: Under the Water Act 1912 and/or the Water Management Act 2000, the Applicant is required to obtain the necessary water licences for the development.

Water Pollution

13. Unless an EPL authorises otherwise, **the Applicant must** comply with Section 120 of the POEO Act.
14. **The Applicant must** implement all reasonable and feasible measures to reduce water pollution associated with the discharge of **surface water or** mine-water (particularly salinity and dissolved or suspended metals associated with groundwater pumped from underground mine workings) required to comply with any EPL applying to the development.

Mine-Water Discharges Management Plan

15. **The Applicant must** prepare a Mine-Water Discharges Management Plan for the development to the satisfaction of the Secretary. This plan must:

- (a) be prepared by suitably qualified and experienced persons whose appointment has been approved by the Secretary;
- (b) be submitted to the Secretary for approval by 30 June 2016 unless otherwise agreed by the Secretary;
- (c) describe the measures that would be implemented to ensure compliance with conditions 13 and 14 and relevant performance measures in Table 4;
- (d) include targets, developed in co-operation with the EPA, to reduce acute and chronic toxicity from mine-water discharges from the CES to achieve the in-stream water quality and aquatic ecology objectives and criteria required by condition 16 below;
- (e) include measures, developed in co-operation with the EPA to be implemented over 2-year, 10-year and life-of-project timeframes to reduce the salinity and metals toxicity in mine-water discharged from the CES to achieve these targets; and
- (f) take into account relevant requirements of the Water Management Plan required by condition 17 below.

The Applicant must implement the approved management plan as approved from time to time by the Secretary.

Water Management Performance Measures

16. The Applicant must comply with the performance measures in Table 4, to the satisfaction of the Secretary.

Table 4: Water Management Performance Measures

Feature	Performance Measure
Potable Water	<ul style="list-style-type: none"> Minimise the use of potable water from the public supply for purposes where non-potable water is acceptable.
MMAS MSSS	<ul style="list-style-type: none"> Design, install and maintain erosion and sediment controls generally in accordance with the series <i>Managing Urban Stormwater: Soils and Construction</i> including <i>Volume 1</i>, <i>Volume 2A – Installation of Services</i> and <i>Volume 2C – Unsealed Roads</i>. Design, install and maintain any infrastructure within 40 m of watercourses generally in accordance with the <i>Guidelines for Controlled Activities on Waterfront Land</i> (DPI 2007), or the latest version. Design, install and maintain creek crossings generally in accordance with the <i>Policy and Guidelines for Fish Friendly Waterway Crossings</i> (DPI Fisheries 2003) and <i>Why Do Fish Need To Cross The Road? Fish Passage Requirements for Waterway Crossings</i> (DPI Fisheries 2003), or the latest versions.
Sediment Dams	<ul style="list-style-type: none"> Maintain dams generally in accordance with the series <i>Managing Urban Stormwater: Soils and Construction – Volume 1 and Volume 2E Mines and Quarries</i>.
Clean water diversions	<ul style="list-style-type: none"> Design, install and maintain new clean water diversion structures to convey the 100 year ARI flood. Maximise as far as reasonable and feasible the diversion of clean water around disturbed areas on site.
Mine water storages	<ul style="list-style-type: none"> Design, install and maintain mine water storage infrastructure to ensure no unlicensed or uncontrolled discharge of mine water off-site.
Aquatic and riparian ecosystems (including affected sections of unnamed watercourses receiving discharges from the CES, Muddy Creek and Muddy Lake)	<ul style="list-style-type: none"> Maintain or improve baseline channel stability Develop site-specific in-stream water quality and aquatic ecology (macroinvertebrate health and ecotoxicity assessment) objectives and criteria in consultation with the EPA and in accordance with any EPL applying to the CES.
Chemical and hydrocarbon storage	<ul style="list-style-type: none"> Chemical and hydrocarbon products to be stored in bunded areas in accordance with the relevant Australian Standards.

Water Management Plan

17. The Applicant must prepare a Water Management Plan for the development to the satisfaction of the Secretary. This plan must:
 - (a) be prepared in consultation with [DPIE Water](#) and the EPA, by suitably qualified and experienced persons whose appointment has been approved by the Secretary;
 - (b) be submitted to the Secretary for approval prior to commencement of construction of the MSSS, or by 31 March 2016, whichever is sooner;
 - (c) include detailed performance criteria and describes measures to ensure that the Applicant complies with the Water Management Performance Measures in Table 4;
 - (d) include the following, in addition to the standard requirements for management plans (see condition 2 of Schedule 6):

- (i) a Site Water Balance, that includes details of:
 - water use and management on site;
 - any off-site water discharges; and
 - reporting procedures, including the preparation of a site water balance for each calendar year of the development; and
 - investigates and implements all reasonable and feasible measures to minimise potable water use and to recycle water;
- (ii) a Surface Water Management Plan, that includes:
 - detailed baseline data on water flows and quality in the watercourses that could be affected by the development;
 - a detailed description of the development's water management systems, including the:
 - clean water diversion systems;
 - erosion and sediment controls;
 - measures applying reasonable endeavours to reuse water held in the MSSS Sediment Dam, such as through the use of irrigation and/or evaporation, prior to discharge under condition 17A of this Schedule; and
 - minewater management systems;
 - detailed performance criteria, including trigger levels, for investigating any potentially adverse impacts associated with:
 - the water management systems;
 - downstream surface water quality;
 - downstream watercourse channel stability;
 - stream and riparian vegetation health; and
 - downstream flooding impacts;
 - a program to monitor and report on:
 - the effectiveness of the water management systems;
 - surface water flows and water quality, and the condition of stream and riparian vegetation in the watercourses on site and downstream of the site;
 - macroinvertebrate health and ecotoxicity parameters downstream of mine-water discharges; and
 - downstream flooding impacts;
 - reporting procedures for the results of the monitoring program; and
 - a plan to respond to any exceedances of the performance criteria, and mitigate any adverse surface water impacts of the development.

The Applicant must implement the approved management plan as approved from time to time by the Secretary.

Temporary Discharge of Water at MSSS

- 17A. The Applicant may discharge collected surface water from the MSSS Sediment Dam via Licenced Discharge Point LDP004 (EPL 365) until 30 June 2021. Any such discharge must be in accordance with conditions 14 and 17 of this Schedule.

BIODIVERSITY

Land Management Strategy

18. By 30 December 2016, the Applicant must finalise and implement a Land Management Strategy, to compensate for the clearing of 15.6 hectares of *Coastal Foothills Spotted Gum – Ironbark Forest*. The Land Management Strategy must:
- (a) be finalised in consultation with BCD;
 - (b) define conservation areas, habitat restoration areas and riparian protection areas within the parcels of land shown in red outline in Figures 1 and 2 of Appendix 7;
 - (c) make arrangements to manage, protect and provide long-term security for the Land Management Strategy areas;
- to the satisfaction of the Secretary.

Biodiversity Management Plan

19. The Applicant must prepare a Biodiversity Management Plan for the development to the satisfaction of the Secretary. This plan must:
- (a) be prepared in consultation with BCD and HLLS, and submitted to the Secretary for approval by 31 December 2016;
 - (b) describe the short-term, medium-term, and long-term measures that would be implemented to:
 - manage remnant vegetation and habitat at the surface facilities sites; and
 - implement the Land Management Strategy;
 - (c) include detailed performance and completion criteria for the Land Management Strategy;
 - (d) include a detailed description of the measures that would be implemented over the next 3 years (to be

- updated for each 3-year period following initial preparation of the plan) to:
 - enhance the quality of existing vegetation and fauna habitat;
 - minimise the impacts to fauna, including undertaking pre-clearance surveys;
 - replace cleared hollow-bearing trees with appropriate nest boxes at a ratio of at least 2:1;
 - manage salinity;
 - control erosion, weeds, feral pests and unauthorised access; and
 - manage bushfire risk; and
- (e) include a program to monitor and report on these measures, and progress against the performance and completion criteria.

The Applicant must implement the approved management plan as approved from time to time by the Secretary.

Conservation Bond

20. Within 6 months of the approval of the Biodiversity Management Plan, unless the Secretary agrees otherwise, the Applicant must lodge a Conservation Bond with the Department, to ensure that the Land Management Strategy is implemented in accordance with the performance and completion criteria of the Biodiversity Management Plan.

The sum of the bond must be determined by:

- (a) calculating the full cost of implementing the Land Management Strategy (other than land acquisition costs); and
- (b) employing a suitably qualified quantity surveyor to verify the calculated costs.

The Secretary will release the bond if the Land Management Strategy is completed generally in accordance with the completion criteria in the Biodiversity Management Plan. If the Land Management Strategy is not completed generally in accordance with the completion criteria in the Biodiversity Management Plan, the Secretary will call in all, or part of, the Conservation Bond, and arrange for the satisfactory completion of the relevant works.

Notes:

- Alternative funding arrangements for long-term management of the Land Management Strategy, such as provision of capital and management funding as agreed by BCD as part of a Biobanking Agreement or transfer to the conservation reserve estate can be used to reduce the liability of the Conservation Bond.
- The sum of the bond may be reviewed in conjunction with any revision to the Biodiversity Management Plan.

Biodiversity Offset Credits Required

- 20A. Within 12 months of the commencement of construction activities for Modification 7, unless otherwise agreed by the Secretary, the Applicant must retire biodiversity credits as set out in Table 5 below. Retirement of these credits must be carried out in accordance with the NSW Biodiversity Offsets Policy for Major Projects (OEH, 2014), to the satisfaction of BCD.

Table 5: Biodiversity credit requirements

Credit Type	Credits Required
Ecosystem Credits	
PCT 1568 – Blackbutt – Turpentine – Sydney Blue Gum mesic tall open forest	1
PCT 1573 – Sydney Blue Gum – Lilly Pilly mesic tall open forest	9
PCT 1588 – Grey Ironbark – Broad-leaved Mahogany – Forest Red Gum shrubby open forest	147
PCT 1619 – Smooth-barked Apple – Red Bloodwood – Brown Stringybark – Hairpin Banksia heathy open forest	36
PCT 1638 – Smooth-barked Apple – Red Bloodwood – Scribbly Gum grass – shrub woodland	4
Species Credits	
Glossy-Black Cockatoo (<i>Calyptorhynchus lathami</i>)	229
Green-Thighed Frog (<i>Litoria brevipalmata</i>)	9

20B. Within 12 months of the commencement of construction activities for Modification 8, unless otherwise agreed by the Secretary, the Applicant must retire four (4) PCT 1649 – *Smooth-barked Apple – Red Mahogany – Melaleuca sieberi* heathy swamp woodland of the coastal lowlands biodiversity credits. Retirement of these credits must be carried out in accordance with the NSW Biodiversity Offset Scheme, to the satisfaction of the BCD.

HERITAGE

Archaeological Surveys

21. The Applicant must:
- (a) engage a suitably qualified archaeologist, whose appointment has been approved by the Secretary, to undertake sub-surface archaeological testing in areas A, B and C within the MSSS as shown on Figure 2 of Appendix 6;
 - (b) undertake the surveys prior to the commencement of construction of the MSSS, in consultation with Heritage NSW and Registered Aboriginal Parties;
 - (c) provide the results of these surveys to the Department, Heritage NSW and the Registered Aboriginal Parties;
 - (d) analyse the significance of any heritage sites/items identified during the surveys; and
 - (e) detail appropriate measures to avoid, minimise and/or mitigate impacts to these sites/items in the Heritage Management Plan required under condition 22 below for surface disturbance impacts, and under condition 6(l) of Schedule 4 for subsidence impacts,
- to the satisfaction of the Secretary.

Heritage Management Plan

22. The Applicant must prepare a Heritage Management Plan for the development to the satisfaction of the Secretary. This plan must:
- (a) be prepared in consultation with Heritage NSW and Registered Aboriginal Parties;
 - (b) be submitted to the Secretary for approval, prior to commencement of construction of the MSSS, or by 31 March 2016, whichever is sooner; and
 - (c) include:
 - a description of the measures that would be implemented to:
 - protect, monitor and/or manage Aboriginal Cultural Heritage sites/items (including any proposed archaeological investigations and/or salvage measures);
 - manage the discovery of previously unidentified Aboriginal items;
 - maintaining and managing reasonable access for Aboriginal stakeholders to heritage items on the Applicant's land;
 - ongoing consultation with Aboriginal stakeholders in the conservation and management of Aboriginal cultural heritage;
 - a short-term and long-term strategy for the storage of any Aboriginal Cultural Heritage items salvaged on site; and
 - a protocol for the management of impacts to Historic Heritage sites/items, including previously unidentified sites/items, including archival recording where impacts to Historic Heritage sites/items cannot be avoided.

The Applicant must implement the approved management plan as approved from time to time by the Secretary.

Note: This plan can be incorporated with any Heritage Management Plan for Centennial's other mines and/or mine infrastructure on the Central Coast/Lake Macquarie areas.

TRAFFIC AND TRANSPORT

Mandalong South Surface Site

23. The Applicant must, at its own cost, prior to construction of the MSSS access road:
- (a) construct, a BAR/CHL intersection off Mandalong Road to provide safe access to the MSSS, in accordance with *Guide to Road Design* (Austroads 2009); and
 - (b) install appropriate advance warning signs on both approaches to the intersection, to the satisfaction of LMCC.
24. The Applicant must design and construct the MSSS access road to:
- (a) avoid impacting *Melaleuca Biconvexa* trees; and
 - (b) not cause greater than minor increases to existing flood impacts at properties adjoining the access road.
25. Prior to the commencement of construction of the MSSS, and again within 3 months of the completion of construction, the Applicant must commission a suitably qualified independent expert, whose appointment has

been approved by the Secretary, to undertake a pavement condition report for the section of Mandalong Road that will be used by construction traffic associated with the project. This report must:

- (a) be submitted to the Secretary for approval;
- (b) include a review of the pavement condition of the road identifying any deficiencies;
- (c) recommend appropriate pavement repairs taking into consideration the axle loads and quantity of construction traffic associated with the project; and
- (d) ensure the recommended repairs are in accordance with the *Guide to Road Design* (Austroads).

26. Within 3 months of the submission of the pavement condition reports required under condition 25, unless otherwise agreed or required by the Secretary, [the Applicant must](#), in consultation with Council, and to the satisfaction of the Secretary, repair damaged sections of Mandalong Road in accordance with the recommendations of the pavement condition reports.

Construction Traffic Management Plan

27. [The Applicant must](#) prepare a Construction Traffic Management Plan for the construction of the MSSS, to the satisfaction of the Secretary. This plan must:
- (a) be prepared in consultation with LMCC and any Mandalong residents likely to be affected by construction traffic;
 - (b) be approved by the Secretary prior to the commencement of construction of the MSSS; and
 - (c) include a drivers' code of conduct for the construction of the MSSS;
 - (d) detail the measures that would be applied to:
 - limit the noise and dust impacts of construction traffic;
 - monitor and repair any damage to the section of Mandalong Road that will be used by construction traffic associated with the project; and
 - avoid and/or limit potential road safety and amenity conflicts between construction traffic and other road users (including pedestrians, cyclists and horse riders) on Mandalong Road, including:
 - hours during which heavy vehicle movements will be avoided (including during school bus hours) and/or minimised; and
 - other measures (such as voluntary speed limits, avoidance of convoying, separation distances, and driver safety signage) to avoid and/or limit such impacts.

[The Applicant must implement the approved management plan as approved from time to time by the Secretary.](#)

- 27A. The Applicant must prepare a Construction Traffic Management Plan for management of construction activities for Modification 7, to the satisfaction of the Secretary. This plan must:
- (a) be prepared in consultation with LMCC and residents likely to be affected by construction traffic;
 - (b) be approved by the Secretary prior to the commencement of construction activities associated with Modification 7;
 - (c) include details of all transport routes and traffic types to be used by construction-related traffic;
 - (d) include details of the measures to be implemented to minimise traffic safety issues and disruption to local road users during construction activities, including:
 - (i) employee / contractor parking;
 - (ii) notifying the local community about construction-related traffic impacts;
 - (iii) responding to any emergency repair requirements or maintenance during construction activities; and
 - (iv) a traffic management system for managing over-dimensional vehicles; and
 - (e) include a drivers' code of conduct that addresses:
 - (i) travelling speeds; and
 - (ii) procedures to ensure that drivers implement safe driving practices.

The Applicant must implement the management plan as approved by the Secretary.

- 27B. The Applicant must prepare a Construction Traffic Management Plan for management of construction activities for Modification 8, to the satisfaction of the Secretary. This plan must:
- (a) be prepared in consultation with RMS and LMCC;
 - (b) be approved by the Secretary prior to the commencement of construction activities associated with Modification 8;
 - (c) include details of all transport routes and traffic types to be used by construction-related traffic;
 - (d) include details of the measures to be implemented to minimise traffic safety issues and disruption to local road users during construction activities, including:
 - (i) employee / contractor parking;
 - (ii) notifying the local community about construction-related traffic impacts;
 - (iii) responding to any emergency repair requirements or maintenance during construction activities; and
 - (iv) a traffic management system for managing over-dimensional vehicles; and
 - (e) include a drivers' code of conduct that addresses:
 - (i) travelling speeds; and
 - (ii) procedures to ensure that drivers implement safe driving practices.

The Applicant must implement the management plan as approved by the Secretary

27C. The Applicant must ensure that the car park approved under Modification 8 is constructed in accordance with Australian Standard AS 2890.

VISUAL

Visual Amenity and Lighting

28. The Applicant must:
- implement all reasonable and feasible measures to minimise the visual and off-site lighting impacts of the development;
 - take all practicable measures to further reduce visual impacts from the development, including:
 - screen planting along Mandalong Road on the approaches to the MSSS (insofar as this does not affect sightlines for traffic using the MSSS intersection);
 - other appropriate visual impact mitigation measures for residences with direct views of the MSSS (such as landscaping treatments or vegetation screens); and
 - ensure that all external lighting associated with the development complies with *Australian Standard AS4282 (INT) 1995 - Control of Obtrusive Effects of Outdoor Lighting*; and
 - take all practical measures to shield views of mining operations from users of public roads and privately-owned residences,
- to the satisfaction of the Secretary.

28A. The Applicant must implement all reasonable and feasible measures to minimise the visual impacts of the car park approved under Modification 8. No visual screening measures are permitted on LMCC-owned or managed land without the written permission of LMCC.

WASTE

29. The Applicant must
- minimise and monitor the waste generated by the development;
 - ensure that the waste generated by the development is appropriately stored, handled and disposed of;
 - manage on-site sewage treatment and disposal in accordance with the requirements of LMCC and EPA; and
 - report on waste management and minimisation in the Annual Review,
- to the satisfaction of the Secretary.

BUSHFIRE MANAGEMENT

30. The Applicant must:
- ensure appropriate Asset Protection Zones are maintained at the surface facilities sites, to the satisfaction of LMCC;
 - ensure that the surface facilities sites are suitably equipped to respond to fires; and
 - assist the Rural Fire Service and emergency services as much as possible if there is a fire in the vicinity of the site.

REHABILITATION

Rehabilitation Objectives

31. The Applicant must rehabilitate the MMAS and MSSS to the satisfaction of RR. This rehabilitation must be generally consistent with the proposed rehabilitation strategy described in the EIS and comply with the objectives in Table 5.

Table 5: Rehabilitation Objectives

Feature	Objective
Mine site (as a whole)	<ul style="list-style-type: none">Safe, stable & non-polluting
Surface infrastructure	<ul style="list-style-type: none">To be decommissioned and removed, unless RR agrees otherwise.MMAS and MSSS sites to be made safe, and hydraulically and geotechnically stable.MMAS site to be appropriately prepared for industrial land-use where SP1 zoning applies, while ecological values to be maintained and enhanced where E2 zoning applies

	<ul style="list-style-type: none"> • MSSS site to be revegetated with suitable local native plant species, and to a landform consistent with the surrounding environment.
Revegetated final landforms	<ul style="list-style-type: none"> • Stable and sustain the intended land use • Consistent with surrounding topography to minimise visual impacts • Incorporate relief patterns and design principles consistent with natural drainage
Native flora and fauna	<ul style="list-style-type: none"> • Flora species used in rehabilitation selected to re-establish and complement local and regional biodiversity • Rehabilitated areas contribute to achieving self-sustaining biodiversity habitats
All watercourses subject to mine-water discharges and/or subsidence impacts	<ul style="list-style-type: none"> • Hydraulically and geomorphologically stable, with aquatic ecology and riparian vegetation that is the same, or better than prior to mining
Steep slopes	<ul style="list-style-type: none"> • No additional risk to public safety compared to prior to mining
Built features damaged by mining operations	<ul style="list-style-type: none"> • Repair to pre-mining condition or equivalent unless the: <ul style="list-style-type: none"> - owner agrees otherwise; or - damage is fully restored, repaired or compensated for under the <i>Mine Subsidence Compensation Act 1961</i>
Community	<ul style="list-style-type: none"> • Ensure public safety. • Minimise the adverse socio-economic effects of mine closure.

Progressive Rehabilitation

32. **The Applicant must** rehabilitate the site progressively, that is, as soon as is practicable following disturbance, to the satisfaction of **RR**.

Rehabilitation Management Plan

33. **The Applicant must** prepare a Rehabilitation Management Plan for the development, to the satisfaction of the Secretary and **RR**. This plan must:
- be prepared consultation with **RR**, **BCD**, **DPIE Water**, **LMCC** and the **CCC**;
 - be submitted to the Secretary and **RR** for approval by 31 March 2016, or as otherwise agreed by the Secretary;
 - be prepared in accordance with relevant guidelines and consistent with the rehabilitation objectives in the EIS and in Table 5;
 - describe how the performance of the rehabilitation would be monitored and assessed against the objectives in Table 5;
 - provide for detailed mine closure planning, including measures to minimise socio-economic effects associated with mine closure, to be developed prior to the site being placed on care and maintenance; and
 - be integrated with the other management plans required under this consent.

The Applicant must implement the approved management plan as approved from time to time by the Secretary.

Note: The Rehabilitation Management Plan must address all land impacted by the mine, whether prior to or following the date of this consent.

SURFACE INFRASTRUCTURE MANAGEMENT

Gas Drainage

34. **The Applicant must** ensure that all gas drainage pipelines (other than connection points, monitoring points, dewatering facilities, regulation points or isolation points) between gas drainage plants are buried, unless otherwise agreed with the relevant landowner, or unless burial is inappropriate for safety or other reasons, to the satisfaction of the Secretary.

Surface Infrastructure Management Plans

35. **The Applicant must** prepare a Gas Drainage Management Plan, a Service Boreholes Management Plan and a PED Communications Management Plan in respect of construction and use of future surface gas drainage and management infrastructure, future service boreholes and future PED communications infrastructure, respectively, to the satisfaction of the Secretary. Each of these plans must be submitted to the Secretary for approval prior to the construction of the relevant infrastructure and must include the Applicant's commitments regarding:
- community consultation;

- (b) landholder agreements;
- (c) assessment of noise, air quality, traffic, biodiversity, heritage, public safety and other impacts in accordance with approved methods;
- (d) avoidance of significant impacts and minimisation of impacts generally;
- (e) beneficial re-use or flaring of drained hydrocarbon gases, wherever practicable (in the case of the Gas Drainage Management Plan);
- (f) achievement of applicable standards and goals;
- (g) mitigation and/or compensation for significant noise, air quality and visual impacts; and
- (h) rehabilitation of disturbed sites.

The Applicant must implement the approved management plan as approved from time to time by the Secretary.

Exploration Activities Management Plan

36. The Applicant must prepare an Exploration Activities Management Plan for the development to the satisfaction of the Secretary. This Plan must:
- (a) be prepared by suitably qualified and experienced person/s whose appointment has been approved by the Secretary;
 - (b) be prepared in consultation with RR;
 - (c) be submitted to the Secretary for approval within 6 months of the date of this consent or prior to carrying out exploration activities causing surface disturbance (whichever is the earlier), unless the Secretary agrees otherwise;
 - (d) include a description of the measures that would be implemented for:
 - managing exploration activities;
 - consulting with and compensating affected landowners;
 - avoiding threatened species, populations or their habitats and EECs;
 - minimising clearance and disturbance of native vegetation;
 - minimising erosion and sedimentation;
 - achieving applicable standards and goals; and
 - rehabilitating disturbed areas.

The Applicant must implement the approved management plan as approved from time to time by the Secretary.

SCHEDULE 4 ENVIRONMENTAL CONDITIONS – UNDERGROUND MINING

SUBSIDENCE

Performance Measures – Natural and Heritage Features

1. The Applicant must ensure that the development complies with the performance measures in Table 6, to the satisfaction of the Secretary.

Table 6: Subsidence Impact Performance Measures

Watercourses	
3 rd Order and above streams	<ul style="list-style-type: none"> No connective cracking between the surface, or the base of the alluvium, and the underground workings.
Groundwater-dependent Ecosystems	<ul style="list-style-type: none"> No subsidence impact or environmental consequence greater than minor.
1 st and 2 nd Order streams	<ul style="list-style-type: none"> No subsidence impact or environmental consequences greater than predicted in the documents listed in condition 2(b) of Schedule 2. No connective cracking between the surface and the underground workings.
Aquatic and riparian ecosystems, including affected sections of Morans Creek, Wyee Creek, Tobins Creek and Mannering Creek	<ul style="list-style-type: none"> Maintain or improve baseline channel stability. Develop site-specific in-stream water quality objectives in accordance with ANZECC 2000 and <i>Using the ANZECC Guidelines and Water Quality Objectives in NSW</i> procedures (DECC 2006), or their latest versions.
Land	
Steep slopes and rock outcrops	<ul style="list-style-type: none"> No subsidence impact or environmental consequence greater than predicted in the documents listed in condition 2(b) of Schedule 2.
Agriculture	<ul style="list-style-type: none"> No loss of agricultural productivity greater than minor.
Biodiversity	
Threatened species, threatened populations and endangered ecological communities	<ul style="list-style-type: none"> Negligible environmental consequences.
Heritage sites	
Stone Arrangement RPS TBM 32	<ul style="list-style-type: none"> Negligible subsidence impacts or environmental consequences
All other Aboriginal Cultural Heritage sites/items at the site	<ul style="list-style-type: none"> No subsidence impact or environmental consequence greater than predicted in the documents listed in condition 2(b) of Schedule 2.
Mine workings	
First workings under an approved Extraction Plan beneath any feature where performance measures in this table require negligible subsidence impacts or negligible environmental consequences	<ul style="list-style-type: none"> To remain long-term stable and non-subsiding.
Second workings	<ul style="list-style-type: none"> To be carried out only within the approved mine plan, in accordance only with an approved Extraction Plan.

Notes:

- Classification of streams in accordance with Strahler stream order system.
- Detailed performance indicators (including impact assessment criteria) for each of these performance measures will be detailed in the various management plans that are required under this consent.
- Measurement and/or monitoring of compliance with performance measures and performance indicators is to be undertaken using generally accepted methods that are appropriate to the environment and circumstances in which the feature or characteristic is located. These methods are to be fully described in the relevant management plans. In the event of a dispute over the appropriateness of proposed methods, the Secretary will be the final arbiter.

2. The Applicant must assess and manage development-related risks to ensure that there are no exceedances of the performance measures in Table 6. Any exceedance of these performance measures constitutes a breach of this consent and may be subject to penalty or offence provisions under the EP&A Act or EP&A Regulation, notwithstanding actions taken pursuant to condition 3 below. Where any exceedance of these performance measures has occurred, the Applicant must, at the earliest opportunity:
 - (a) take all reasonable and feasible steps to ensure that the exceedance ceases and does not recur;

- (b) consider all reasonable and feasible options for remediation and submit a report to the Department describing those options and any preferred remediation measures or other course of action; and
- (c) implement remediation measures as directed by the Secretary, to the satisfaction of the Secretary.

Offsets

3. If the Applicant exceeds the performance measures in Table 6 and the Secretary determines that:
 - (a) it is not reasonable or feasible to remediate the impact or environmental consequences; or
 - (b) remediation measures implemented by the Applicant have failed to satisfactorily remediate the impact or environmental consequence,
 then **the Applicant must** provide a suitable offset to compensate for the impact or environmental consequence, to the satisfaction of the Secretary.

Note: An offset required under this condition must be proportionate with the significance of the impact or environmental consequence.

Performance Measures – Built Features

4. **The Applicant must** ensure that the development does not cause any exceedances of the performance measures in Table 7, to the satisfaction of the Secretary.

Table 7: Subsidence Impact Performance Measures

Key Public Infrastructure	
M1 Motorway	Always safe and serviceable.
Main Northern Railway	
330 kV power supply infrastructure	Damage that does not affect safety or serviceability must be fully repairable, and must be fully repaired.
Other Built Infrastructure	
Power lines and power poles	Always safe.
Telecommunications infrastructure	Serviceability should be maintained wherever practicable.
Privately-owned residences	
Local Roads	Loss of serviceability must be fully compensated.
Other built features and improvements, (including access roads, farm dams, swimming pools, tracks and fences)	Damage must be fully repairable, and must be fully repaired or else replaced or fully compensated.
Public Safety	
Public Safety	Negligible additional risk.

Notes:

- Key public infrastructure is shown in Figure 2 of Appendix 2 and in Figure 1 of Appendix 5
- Other built infrastructure is shown in Figure 1 of Appendix 5.
- The Applicant will be required to define more detailed performance indicators for each of these performance measures in the Built Features Management Plan, Property Subsidence Management Plans and Public Safety Management Plan (see condition 6 below).
- Measurement and/or monitoring of compliance with performance measures and performance indicators is to be undertaken using generally accepted methods that are appropriate to the environment and circumstances in which the feature or characteristic is located. These methods are to be fully described in the relevant management plans. In the event of a dispute over the appropriateness of proposed methods, the Secretary will be the final arbiter.
- Requirements regarding safety or serviceability do not preclude preventative or mitigatory actions being taken prior to or during mining in order to achieve or maintain these outcomes.
- Requirements under this condition may be met by measures undertaken in accordance with the Mine Subsidence Compensation Act 1961.

5. Any dispute between the Applicant and the owner of any built feature over the interpretation, application or implementation of the performance measures in Table 7 is to be settled by the Secretary, following consultation with RR. Any decision by the Secretary shall be final and not subject to further dispute resolution under this consent.

Extraction Plan

6. **The Applicant must** prepare an Extraction Plan for all second workings on site, to the satisfaction of the Secretary. Each Extraction Plan must:
 - (a) be prepared by suitably qualified and experienced persons whose appointment has been approved by the Secretary;
 - (b) be approved by the Secretary before the Applicant carries out any of the second workings covered by the plan;

- (c) include detailed plans of existing and proposed first and second workings and any associated surface development;
- (d) include detailed performance indicators for each of the performance measures in Tables 6 and 7;
- (e) provide revised predictions of the potential subsidence effects, subsidence impacts and environmental consequences of the proposed second workings, incorporating any relevant information obtained since the commencement date of this consent;
- (f) describe the measures that would be implemented to ensure compliance with the performance measures in Tables 6 and 7, and manage or remediate any impacts and/or environmental consequences;
- (g) include a Built Features Management Plan, which has been prepared in consultation with [RR](#) and the owners of affected built features, to manage the potential subsidence impacts and/or environmental consequences of the proposed second workings, and which:
 - addresses in appropriate detail all items of key public infrastructure (with particular consideration to tension/angle/suspension towers on transmission lines), and other public infrastructure;
 - has been prepared following appropriate consultation with the owner/s of potentially affected feature/s;
 - recommends appropriate remedial measures and includes commitments to mitigate, repair, replace or compensate all predicted impacts on potentially affected built features in a timely manner; and
 - in the case of all key public infrastructure, and other public infrastructure except roads, trails and associated structures, reports external auditing for compliance with ISO 31000 (or alternative standard agreed with the infrastructure owner), and provides for annual auditing of compliance and effectiveness during extraction which may impact the infrastructure;
- (h) include a Property Subsidence Management Plan for each privately-owned property affected by the proposed second workings, prepared in consultation with the landowner, which includes:
 - a detailed structural inspection of residences and all other structures on the property;
 - a detailed subsidence impact assessment for the property, including (where relevant):
 - a flood impact assessment, including a prediction of the minimum freeboard of the residence in a 1 in 100 year ARI flood event, and, where this prediction shows the minimum freeboard at the residence to be less than 0.5 m in a 1 in 100 year ARI flood event:
 - recommends such works to raise, remediate or relocate the residence and/or provide suitable access to the property, prior to undermining the residence; or
 - where these works are unable to be undertaken, offers to acquire the whole of the property, or such part of the property requested by the landowner where subdivision is approved, in accordance with conditions 3 and 4 of Schedule 5;
 - slope stability assessments at the properties shown in Figure 2 of Appendix 5, or at any other property as nominated by the Secretary, which must:
 - be undertaken at least 12 months prior to undermining the property;
 - be undertaken in consultation with [RR](#), by a suitably qualified geotechnical expert;
 - recommend measures to manage and/or mitigate the risks and impacts associated with slope instability and rock roll-out at the residence, and the risk to the safety of persons; and
 - include a timeframe for the implementation of the recommended measures;
 - soil erosion assessment, which recommends measures to avoid, mitigate and otherwise respond to increased soil erosion (including tunnel erosion) impacts; and
 - appropriate measures, commitments and timeframes to mitigate, repair, replace or otherwise compensate the impacts to the property;
- (i) include a Water Management Plan, which has been prepared in consultation with EPA and [DPIE Water](#), which provides for the management of the potential impacts and/or environmental consequences of the proposed second workings on watercourses and aquifers, including:
 - detailed baseline data on groundwater levels, yield and quality in the region, and in privately-owned groundwater bores that could be affected by the second workings;
 - surface water and groundwater impact assessment criteria, including trigger levels for investigating any potentially adverse impacts on water resources or water quality;
 - a program to monitor and report on stream morphology and stream flows, and assessment of any changes resulting from subsidence impacts, including scouring and ponding;
 - a program to monitor flooding (including updated flood modelling); with recommendations to minimise, manage and mitigate (whether prospectively or retrospectively) flood impacts on residences, private properties, roads, other infrastructure and other built features;
 - a groundwater monitoring program which:
 - includes a comprehensive monitoring bore network, ensuring all bore casings are above ground level and are purged before sampling;
 - samples on a monthly basis for the first two years of the development, and quarterly thereafter, unless directed by the Secretary;
 - monitors and reports on:
 - groundwater inflows to the mine;

- background changes in groundwater yield/quality against mine-induced changes; and
- impacts to:
 - regional and local (including alluvial) aquifers;
 - groundwater supply to private bores; and
 - groundwater dependent ecosystems and riparian vegetation;
- a program to validate the groundwater model for the development, and compare monitoring results with modelled predictions; and
- a plan to respond to any exceedances of the groundwater assessment criteria;
- (j) include a Biodiversity Management Plan, which has been prepared in consultation with [BCD](#), which establishes baseline data for existing habitat, including water table depth, vegetation condition, stream morphology and threatened species habitat, and provides for the management of the potential impacts and/or environmental consequences of the proposed second workings on aquatic and terrestrial flora and fauna, with a specific focus on threatened species, populations and their habitats; endangered ecological communities; and water dependent ecosystems;
- (k) include a Land Management Plan, which has been prepared in consultation with any affected public authorities, to manage the potential impacts and/or environmental consequences of the proposed second workings on land in general;
- (l) include a Heritage Management Plan, which has been prepared in consultation with [Heritage NSW and Registered Aboriginal Parties](#), to manage the potential environmental consequences of the proposed second workings on both Aboriginal and non-Aboriginal heritage items, and reflects the requirements of [condition 22](#) of Schedule 3;
- (m) include a Public Safety Management Plan, which has been prepared in consultation with [RR](#), to ensure that the proposed second workings do not impact on public safety;
- (n) include a Subsidence Monitoring Program, which has been prepared in consultation with [RR](#) to:
 - provide data to assist with the management of the risks associated with conventional and non-conventional subsidence;
 - validate the subsidence predictions;
 - analyse the relationship between the predicted and resulting subsidence effects and predicted and resulting impacts under the plan and any ensuing environmental consequences; and
 - inform the Contingency Plan and adaptive management process;
- (o) Trigger Action Response Plans addressing all features in Tables 6 and 7, which contain:
 - appropriate triggers to warn of the development of an increasing risk of exceedance of any performance measure;
 - specific actions to respond to high risk exceedance of any performance measure to ensure that the measure is not exceeded; and
 - an assessment of remediation measures that may be required if exceedances occur and the capacity to implement the measures;
- (p) include a Contingency Plan that expressly provides for:
 - adaptive management where monitoring indicates that there has been an exceedance of any performance measure in Tables 6 and 7, or where any such exceedance appears likely; and
 - an assessment of the remediation measures that may be required if exceedances occur and the capacity to implement the measures;
- (q) proposes appropriate revisions to the Rehabilitation Management Plan required under [condition 33](#) of Schedule 3; and
- (r) include a program to collect sufficient baseline data for future Extraction Plans.

The Applicant must implement the approved Extraction Plan as approved from time to time by the Secretary.

Notes:

- *This condition does not apply to mining operations covered by an approved Subsidence Management Plan in place at the date of commencement of this consent.*
- *In accordance with condition 5 of Schedule 6, the preparation and implementation of Extraction Plans may be staged, with each plan covering a defined area of underground workings. In addition, these plans are only required to contain management plans that are relevant to the specific underground workings that are being carried out.*

- 6A. The Applicant must commission an independent expert whose appointment has been endorsed by the Secretary, to carry out a review of the groundwater model for the development. This review must include a:
- (a) review of all available monitoring data;
 - (b) comparison of predicted and actual groundwater impacts; and
 - (c) review of the effectiveness of the groundwater model.

The review must be undertaken and reported to the satisfaction of the Secretary. The report must be submitted to the Secretary and [DPIE Water](#) prior to the approval of any Extraction Plan relating to Longwalls 24 and/or 24A.

7. The Applicant must ensure that the management plans required under [conditions 6\(g\)-\(q\)](#) above include:
- (a) an assessment of the potential environmental consequences of the Extraction Plan, incorporating any relevant information that has been obtained since the date of commencement of this consent; and

- (b) a detailed description of the measures that would be implemented to remediate predicted impacts.

Archaeological Surveys

- 8. **The Applicant must:**
 - (a) use its best endeavours to undertake archaeological surveys of privately-owned land which was not surveyed in the documents listed in condition 2(b) of Schedule 2, prior to subsidence impacts occurring on that land;
 - (b) analyse the significance of any heritage sites/items identified during the surveys; and
 - (c) include appropriate measures to avoid, minimise and/or mitigate impacts to the identified sites/items in the Heritage Management Plan required under condition 6(l) above,to the satisfaction of the Secretary.

Grinding Groove Trial Mitigation

- 9. Prior to the extraction of Longwall 25, **the Applicant must** undertake trial mitigation works at grinding groove sites RPS DF04 and RPS PS11, in consultation with Forestry Corporation of NSW, **Heritage NSW** and Registered Aboriginal Parties, and to the satisfaction of the Secretary.
- 10. **The Applicant must:**
 - (a) monitor the effectiveness of the trial mitigation works during and following the extraction of Longwall 25;
 - (b) provide a report on the monitoring to the Secretary, **Heritage NSW** and Registered Aboriginal Parties; and
 - (c) use the report to inform the impact avoidance, management and mitigation strategies in future Extraction Plans covering other grinding groove sites,to the satisfaction of the Secretary.

Rock Shelter Monitoring

- 11. **The Applicant must** implement a monitoring program of subsidence effects at rock shelter sites 45-3-1228 and 45-3-1233 in the Extraction Plan for **Longwalls 30-33** or, if access to these sites is not granted by the landowner, other rock shelter sites as agreed to in writing with the Secretary. This monitoring **must** be:
 - (a) undertaken by a suitably qualified archaeologist, whose appointment has been approved by the Secretary,
 - (b) undertaken in consultation with **Heritage NSW** and Registered Aboriginal Parties; and
 - (c) used to inform impact management of rock shelter sites under future Extraction Plans required under this consent,to the satisfaction of the Secretary.

First Workings

- 12. The Applicant may carry out first workings on site, other than in accordance with an approved Extraction Plan, provided that **RR** is satisfied that the first workings are designed to remain stable and non-subsiding, except insofar as they may be impacted by approved second workings.

Payment of Reasonable Costs

- 13. **The Applicant must** pay all reasonable costs:
 - (a) incurred by the Department to engage suitably qualified, experienced and independent experts to review the adequacy of any aspect of an Extraction Plan; and
 - (b) to the owner of privately-owned land subject to a Property Subsidence Management Plan under condition 6(h) above, to obtain legal and/or other advice on the Property Subsidence Management Plan.
-

SCHEDULE 5 ADDITIONAL PROCEDURES

NOTIFICATION OF LANDOWNERS

1. As soon as practicable after obtaining monitoring results showing:
 - (a) an exceedance of any relevant criteria in Schedule 3, **the Applicant must** notify affected landowners in writing of the exceedance, and provide regular monitoring results to each affected landowner until the development is again complying with the relevant criteria; and
 - (b) an exceedance of any relevant air quality criteria in Schedule 3, **the Applicant must** send a copy of the NSW Health fact sheet entitled "Mine Dust and You" (as may be updated from time to time) to the affected landowners and/or existing tenants of the land (including the tenants of any mine-owned land).

INDEPENDENT REVIEW

2. If an owner of privately-owned land considers the development to be exceeding the relevant criteria in Schedule 3, then he/she may ask the Secretary in writing for an independent review of the impacts of the development on his/her land.

If the Secretary is satisfied that an independent review is warranted, then within 2 months of the Secretary's decision **the Applicant must**:

- (a) commission a suitably qualified, experienced and independent person, whose appointment has been approved by the Secretary, to:
 - consult with the landowner to determine his/her concerns;
 - conduct monitoring to determine whether the development is complying with the relevant criteria in Schedule 3; and
 - if the development is not complying with these criteria, identify and implement measures to ensure compliance with the relevant criteria; and
- (b) give the Secretary and landowner a copy of the independent review.

LAND ACQUISITION

3. Within 3 months of receiving a written request from a landowner with acquisition rights, **the Applicant must** make a binding written offer to the landowner based on:
 - (a) the current market value of the landowner's interest in the land at the date of this written request, as if the land was unaffected by the project, having regard to the:
 - existing and permissible use of the land, in accordance with the applicable planning instruments at the date of the written request; and
 - presence of improvements on the land and/or any approved building or structure which has been physically commenced at the date of the landowner's written request, and is due to be completed subsequent to that date;
 - (b) the reasonable costs associated with:
 - relocating within the Lake Macquarie City Council or **Central Coast** Council local government areas, or to any other local government area determined by the Secretary; and
 - obtaining legal advice and expert advice for determining the acquisition price of the land, and the terms upon which it is to be acquired; and
 - (c) reasonable compensation for any disturbance caused by the land acquisition process.

However, if at the end of this period, the Applicant and landowner cannot agree on the acquisition price of the land and/or the terms upon which the land is to be acquired, then either party may refer the matter to the Secretary for resolution.

Upon receiving such a request, the Secretary will request the President of the NSW Division of the Australian Property Institute to appoint a qualified independent valuer to:

- consider submissions from both parties;
- determine a fair and reasonable acquisition price for the land and/or the terms upon which the land is to be acquired, having regard to the matters referred to in paragraphs (a)-(c) above;
- prepare a detailed report setting out the reasons for any determination; and
- provide a copy of the report to both parties.

Within 14 days of receiving the independent valuer's report, **the Applicant must** make a binding written offer to the landowner to purchase the land at a price not less than the independent valuer's determination.

However, if either party disputes the independent valuer's determination, then within 14 days of receiving the independent valuer's report, they may refer the matter to the Secretary for review. Any request for a review must be accompanied by a detailed report setting out the reasons why the party disputes the independent valuer's determination. Following consultation with the independent valuer and both parties, the Secretary will determine a fair and reasonable acquisition price for the land, having regard to the matters referred to in

paragraphs (a)-(c) above, the independent valuer's report, the detailed report of the party that disputes the independent valuer's determination and any other relevant submissions.

Within 14 days of this determination, **the Applicant must** make a binding written offer to the landowner to purchase the land at a price not less than the Secretary's determination.

If the landowner refuses to accept the Applicant's binding written offer under this condition within 6 months of the offer being made, then the Applicant's obligations to acquire the land shall cease, unless the Secretary determines otherwise.

4. **The Applicant must** pay all reasonable costs associated with the land acquisition process described in condition 3 above, including the costs associated with obtaining Council approval for any plan of subdivision (where permissible), and registration of this plan at the Office of the Registrar-General.
-

SCHEDULE 6 ENVIRONMENTAL MANAGEMENT, REPORTING AND AUDITING

ENVIRONMENTAL MANAGEMENT

Environmental Management Strategy

1. **The Applicant must** prepare an Environmental Management Strategy for the development to the satisfaction of the Secretary. This strategy must:
 - (a) be submitted to the Secretary for approval prior to the commencement of construction of the MSSS, or by 31 March 2016, whichever is sooner;
 - (b) provide the strategic framework for environmental management of the development;
 - (c) identify the statutory approvals that apply to the development;
 - (d) describe the role, responsibility, authority and accountability of all key personnel involved in the environmental management of the development;
 - (e) describe the procedures that would be implemented to:
 - keep the local community and relevant agencies informed about the operation and environmental performance of the development;
 - receive, handle, respond to, and record complaints;
 - resolve any disputes that may arise during the course of the development;
 - respond to any non-compliance; and
 - respond to emergencies; and
 - (f) include:
 - copies of any strategies, plans and programs approved under the conditions of this consent; and
 - a clear plan depicting all the monitoring required to be carried out under the conditions of this consent.

The Applicant must implement the approved strategy as approved from time to time by the Secretary.

Management Plan Requirements

2. **The Applicant must** ensure that the management plans required under this consent are prepared in accordance with any relevant guidelines, and include:
 - (a) detailed baseline data;
 - (b) a description of:
 - the relevant statutory requirements (including any relevant approval, licence or lease conditions);
 - any relevant limits or performance measures/criteria; and
 - the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures;
 - (c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;
 - (d) a program to monitor and report on the:
 - impacts and environmental performance of the development; and
 - effectiveness of any management measures;
 - (e) a contingency plan to manage any unpredicted impacts and their consequences and to ensure that ongoing impacts reduce to levels below relevant impact assessment criteria as quickly as possible;
 - (f) a program to investigate and implement ways to improve the environmental performance of the development over time;
 - (g) a protocol for managing and reporting any:
 - incidents;
 - complaints;
 - non-compliances with statutory requirements; and
 - exceedances of the impact assessment criteria and/or performance criteria; and
 - (h) a protocol for periodic review of the plan.

Note: The Secretary may waive some of these requirements if they are unnecessary or unwarranted for particular management plans.

Application of Existing Management Plans

3. Prior to the approval of management plans under this consent, **the Applicant must** manage development undertaken pursuant to this consent in accordance with any equivalent or similar management plan/s required under development consent DA 97/800.

Relationships between Management Plans

4. The Water, Biodiversity and Heritage Management Plans required by [conditions 17, 19 and 22](#) of Schedule 3, respectively, are to be prepared in respect of all parts of the development that are not covered by an Extraction Plan or Subsidence Management Plan. In particular, the Water, Biodiversity and Heritage Management Plans should address all areas subject to existing or proposed surface disturbance associated with the development.

Staged Submission of Strategies, Plans or Programs

5. With the approval of the Secretary, the Applicant may submit any strategies, plans or programs required by this consent on a progressive basis.

Note: If the submission of any strategy, plan or program is to be staged, then the Applicant must ensure that existing strategy, plan or program must clearly describe the specific stage to which the strategy, plan or program applies, the relationship of this stage to any future stages, and the trigger for updating the strategy, plan or program.

Consolidation of Strategies, Plans or Programs

6. With the approval of the Secretary, the Applicant may incorporate any strategies, plans or programs required by this consent (except those required under condition 6 of Schedule 4) with the strategies, plans and programs required for Centennial's mining operations within the general vicinity of the development.

Revision of Strategies, Plans and Programs

7. Within 3 months of:
 - (a) the submission of an incident report under condition 10 below;
 - (b) the submission of an annual review under condition 12 below;
 - (c) the submission of an audit report under condition 13 below; or
 - (d) [the approval of a modification to this consent](#),[the Applicant must](#) review, and if necessary revise, the strategies, plans, and programs required under this consent to the satisfaction of the Secretary.

[Within 4 weeks of conducting any such review, the Applicant must advise the Secretary of the outcomes of the review, and provide any revised documents to the Secretary for review and approval.](#)

Note: This condition ensures that strategies, plans and programs are updated on a regular basis, and incorporate any recommended measures to improve the environmental performance of the development.

Adaptive Management

8. The Applicant must assess and manage development-related risks to ensure that there are no exceedances of the criteria and/or performance measures in Schedules 3 and 4. Any exceedance of these criteria and/or performance measures constitutes a breach of this consent and may be subject to penalty or offence provisions under the EP&A Act or EP&A Regulation.

Where any exceedance of these criteria and/or performance measures has occurred, the Applicant must, at the earliest opportunity:

- (a) take all reasonable and feasible steps to ensure that the exceedance ceases and does not reoccur;
 - (b) consider all reasonable and feasible options for remediation (where relevant) and submit a report to the Department describing those options and any preferred remediation measures or other course of action; and
 - (c) implement remediation measures as directed by the Secretary,
- to the satisfaction of the Secretary.

Community Consultative Committee

9. The Applicant must establish a Community Consultative Committee (CCC) for the development to the satisfaction of the Secretary. This CCC must be operated in general accordance with the [Community Consultative Committee \(CCC\) Guidelines for State Significant Projects](#) (Department of Planning, 2016) or its latest version.

Notes:

- *The CCC is an advisory committee. The Department and other relevant agencies are responsible for ensuring that the Applicant complies with this consent.*
- *In accordance with the Guidelines, the CCC must include an independent chair and appropriate representation from the Applicant, Council, recognised environmental groups and the local community.*
- *This condition may be satisfied by a CCC for the Mandalong Mine already in place as at the date of this consent, and the Secretary will accept continued representation from existing CCC members.*

- The requirement for this CCC may be fulfilled by a regional CCC for Centennial's mines and mine infrastructure in the Central Coast/Lake Macquarie areas.

REPORTING

Incident Reporting

10. The Applicant must immediately notify the Department and any other relevant agencies immediately after it becomes aware of an incident. The notification must be in writing via the Major Projects Website and identify the development (including the development application number and name) and set out the location and nature of the incident. Within 7 days of the date of the incident, the Applicant must provide the Secretary and any relevant agencies with a detailed report on the incident, and such further reports as may be requested.

Non-Compliance Notification

- 10A. Within seven days of becoming aware of a non-compliance, the Applicant must notify the Department of the non-compliance. The notification must be in writing via the Major Projects Website and identify the development (including the development application number and name), set out the condition of this consent that the development is non-compliant with, the way in which it does not comply and the reasons for the non-compliance (if known) and what actions have been, or will be, undertaken to address the non-compliance.

Note: A non-compliance which has been notified as an incident does not also need to be notified as a non-compliance.

Regular Reporting

11. The Applicant must regularly report the environmental performance of the development on its website, in accordance with the reporting arrangements in any plans or programs approved under the conditions of this consent.

ANNUAL REVIEW

12. By the end of March each year, or as otherwise agreed by the Secretary, the Applicant must submit a report to the Department reviewing the environmental performance of the development to the satisfaction of the Secretary. This review must:
 - (a) describe the development (including any rehabilitation) that was carried out in the past calendar year, and the development that is proposed to be carried out over the current calendar year;
 - (b) include a comprehensive review of the monitoring results and complaints records of the development over the past calendar year, which includes a comparison of these results against the:
 - (i) relevant statutory requirements, limits or performance measures/criteria;
 - (ii) requirements of any plan or program required under this consent;
 - (iii) monitoring results of previous years; and
 - (iv) relevant predictions in the documents identified in condition 2(a) and (b) of Schedule 2;
 - (c) identify any non-compliance over the past calendar year, and describe what actions were (or are being) taken to ensure compliance;
 - (d) identify any trends in the monitoring data over the life of the development;
 - (e) identify any discrepancies between the predicted and actual impacts of the development, and analyse the potential cause of any significant discrepancies; and
 - (f) describe what measures will be implemented over the current calendar year to improve the environmental performance of the development.

INDEPENDENT ENVIRONMENTAL AUDIT

13. By 31 March 2016, and every 3 years thereafter, unless the Secretary directs otherwise, the Applicant must commission, commence and pay the full cost of an Independent Environmental Audit of the development. This audit must:
 - (a) be conducted by a suitably qualified, experienced and independent team of experts whose appointment has been endorsed by the Secretary;
 - (b) include consultation with the relevant agencies;
 - (c) assess the environmental performance of the development and assess whether it is complying with the requirements in this consent and any relevant EPL or Mining Lease (including any assessment, plan or program required under these approvals);
 - (d) review the adequacy of strategies, plans or programs required under the abovementioned approvals;
 - (e) recommend appropriate measures or actions to improve the environmental performance of the development, and/or any assessment, plan or program required under the abovementioned approvals; and
 - (f) be conducted and reported to the satisfaction of the Secretary.

Note: This audit team must be led by a suitably qualified auditor and include experts in any field specified by the Secretary.

14. Within 12 weeks of commencing this audit, or as otherwise agreed by the Secretary, the Applicant must submit a copy of the audit report to the Secretary, together with its response to any recommendations contained in the audit report, and a timetable for the implementation of any measures proposed to address the recommendations.

ACCESS TO INFORMATION

15. Within 3 months of the date of this consent, the Applicant must:
- (a) make copies of the following publicly available on its website:
 - (i) the documents referred to in condition 2(a) and (b) of Schedule 2;
 - (ii) all current statutory approvals for the development;
 - (iii) all approved strategies, plans and programs required under the conditions of this consent;
 - (iv) a comprehensive summary of the monitoring results of the development, reported in accordance with the specifications in any conditions of this consent, or any approved plans and programs;
 - (v) a complaints register, updated monthly;
 - (vi) minutes of CCC meetings for the last 2 years;
 - (vii) the annual reviews of the development;
 - (viii) any independent environmental audit of the development, and the Applicant's response to the recommendations in any audit;
 - (ix) any other matter required by the Secretary; and
 - (b) keep this information up-to-date,
- to the satisfaction of the Secretary.
-

LEGEND

- Project Application
- Mandalong South Surface Site
- Mandalong Mine Access Site
- Cooranbong Entry Site
- LGA boundary
- Existing rail

LOCATION

MANDALONG

SEAM: WEST WALLARAH

DRAWN: K.S.

CHECKED: APPROVED

SCALE: 1:100,000

Centennial Coal

Mandalong

MANDALONG PRODUCTION TONNAGE PROJECT APPLICATION AREA

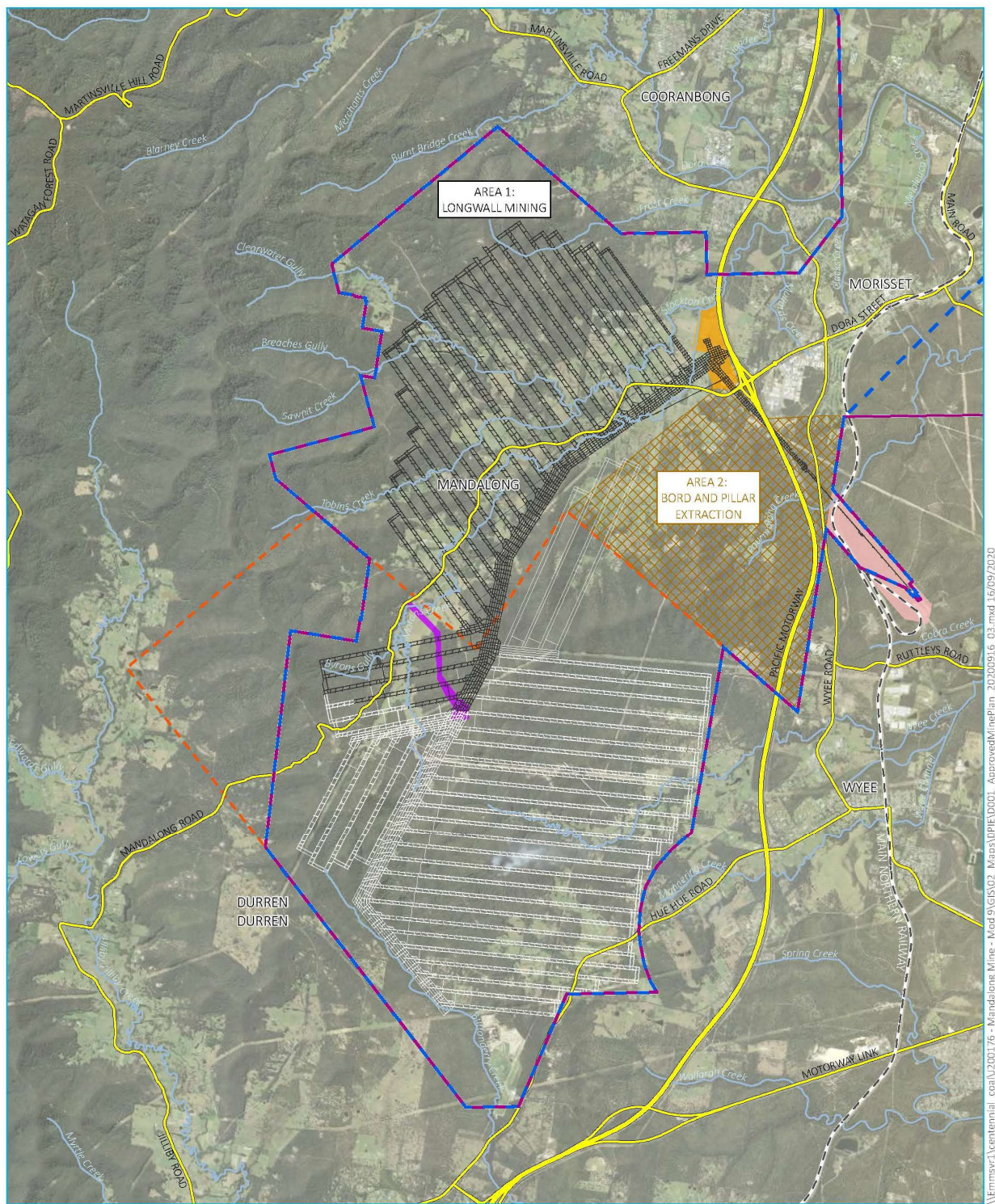
CONTRACT

PROFILE

A3 FIGURE 2

DRAWING REVISION: 01 Sep 2015

74



Source: EMM (2020); Centennial (2020); Umwelt (2020); DFSI (2017)

KEY

- Development consent boundary
- EL6317 (southern extraction area)
- Area 2: Bord and Pillar Extraction
- Mandalong south PDC boundary
- Mandalong South surface site
- Delta entry site
- Mandalong mine access site

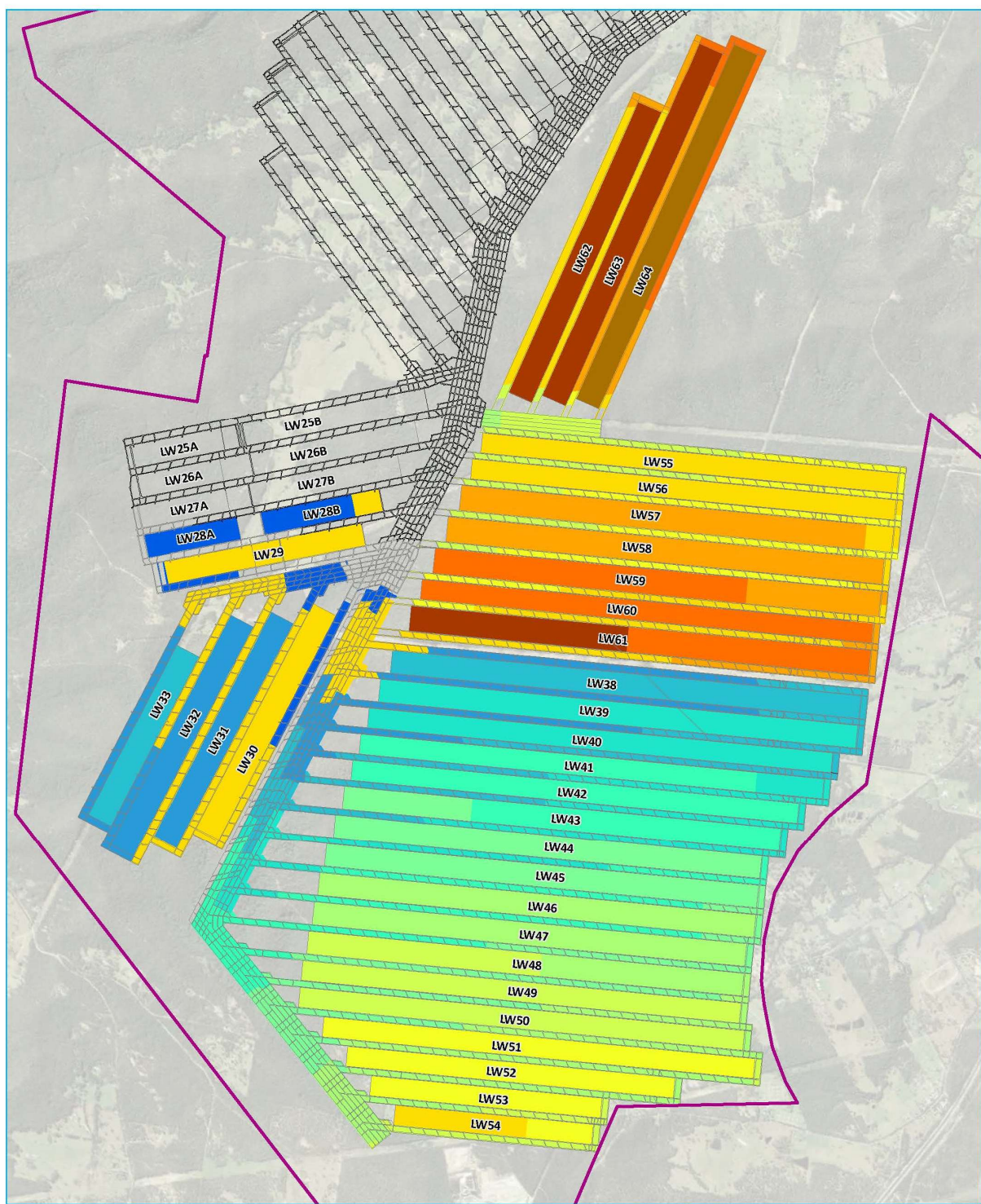
- Rail line
- Main road
- Named watercourse
- Underground mine layout
- Completed mine workings
- Approved longwall

Approved mine plan

Figure 2
Appendix 2



Figure 2: Approved Mine Plan



Source: EMM (2020); Centennial (2020); DFSI (2017)

KEY

 Development consent boundary	Indicative extraction (year)	 2027
 Underground mine layout	 2020	 2028
 Completed mine workings	 2021	 2029
 Approved longwall	 2022	 2030
	 2023	 2031
	 2024	 2032
	 2025	 2033
	 2026	 2034

Indicative extraction schedule
(not binding)

Figure 3
Appendix 2



Figure 3: Centennial's Indicative Extraction Schedule (not binding)

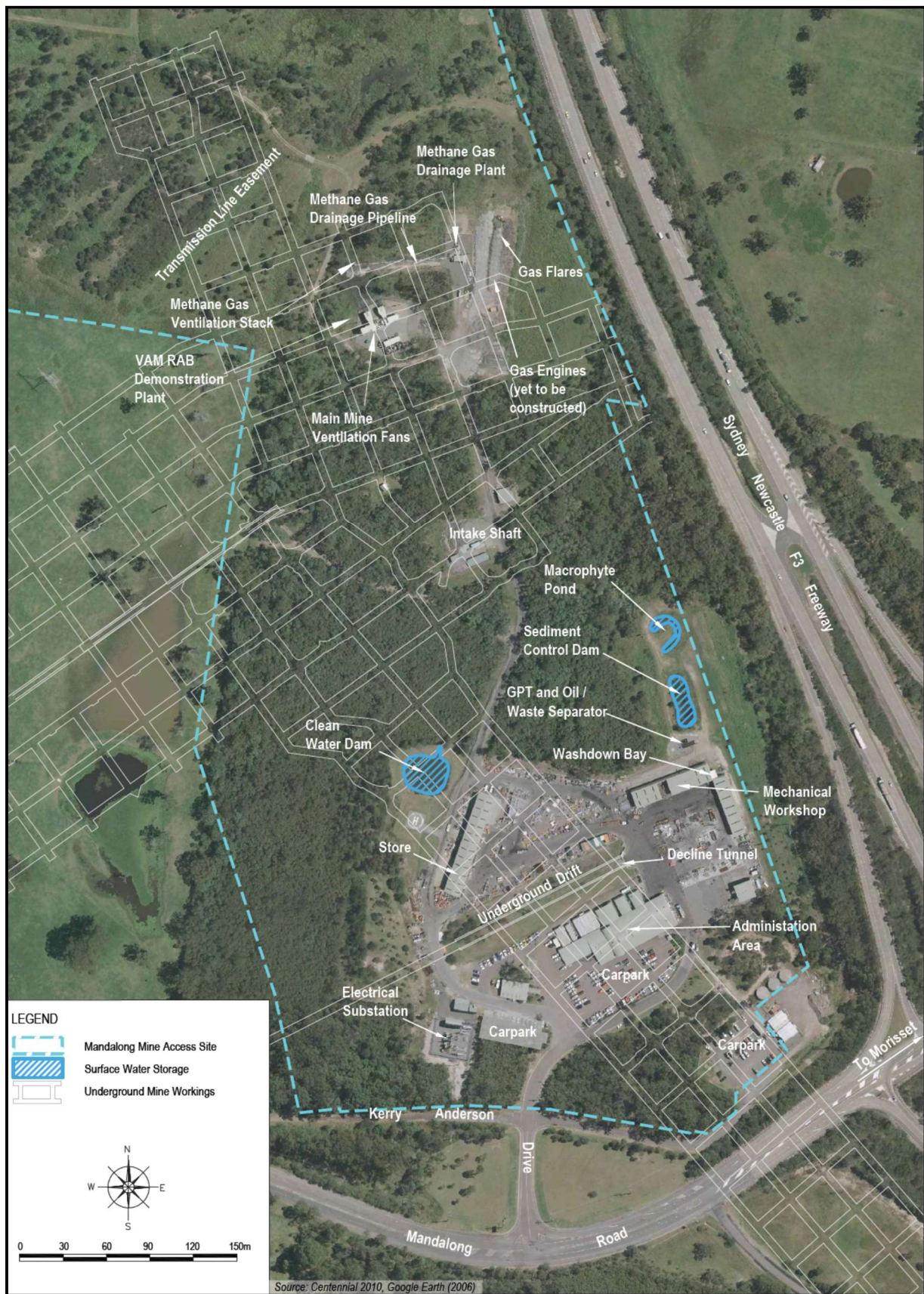
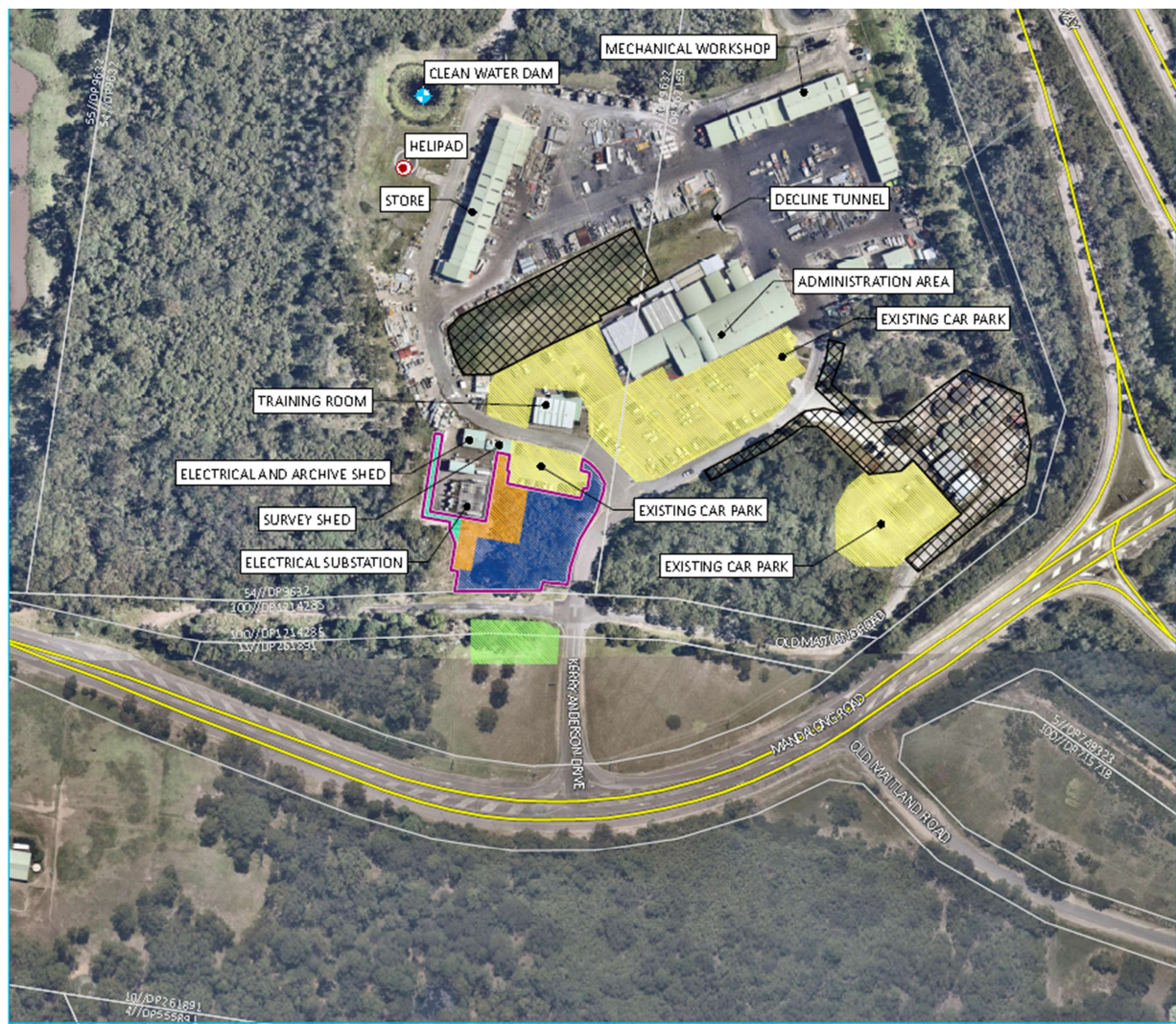


Figure 4: Mandalong Mine Access Site



Source: EMM (2019); Centennial (2019) OFS; (2017); NearMap (2018)

KEY

- Subject land (vegetation clearing required)
- Additional car park
- Substation upgrades
- Services corridor
- New screening vegetation
- ◆ Clean water dam
- Helipad
- Proposed and potential additional carparking and support infrastructure areas (no vegetation clearing required)
- Existing car park
- Main road
- Cadastral boundary

Existing site layout and proposed modification

Mandalong Mine
Mod 8
Statement of environmental effects
Figure 1.3



Figure 4A: Mandalong Mine Access Site Layout Following Modification 8

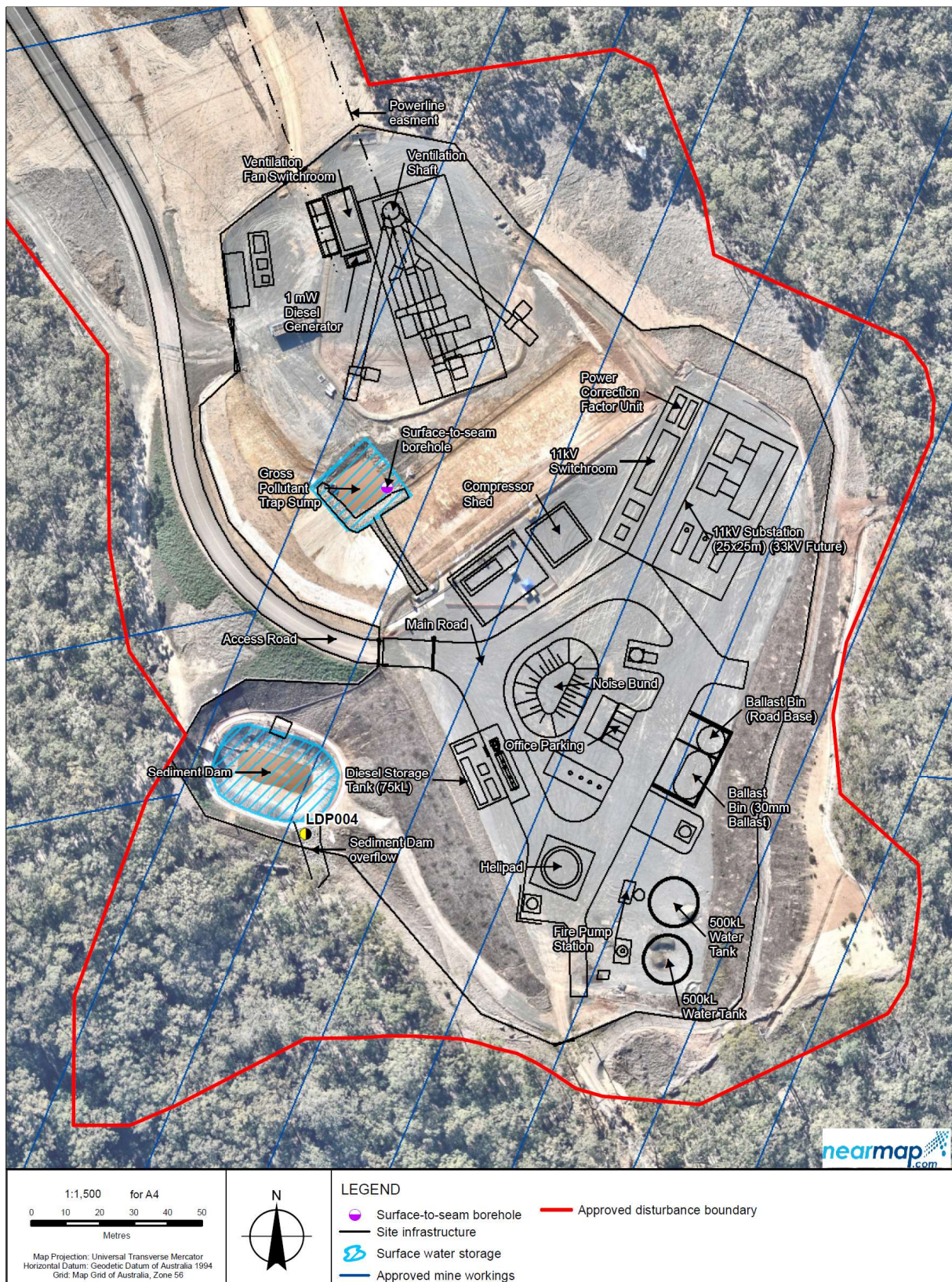
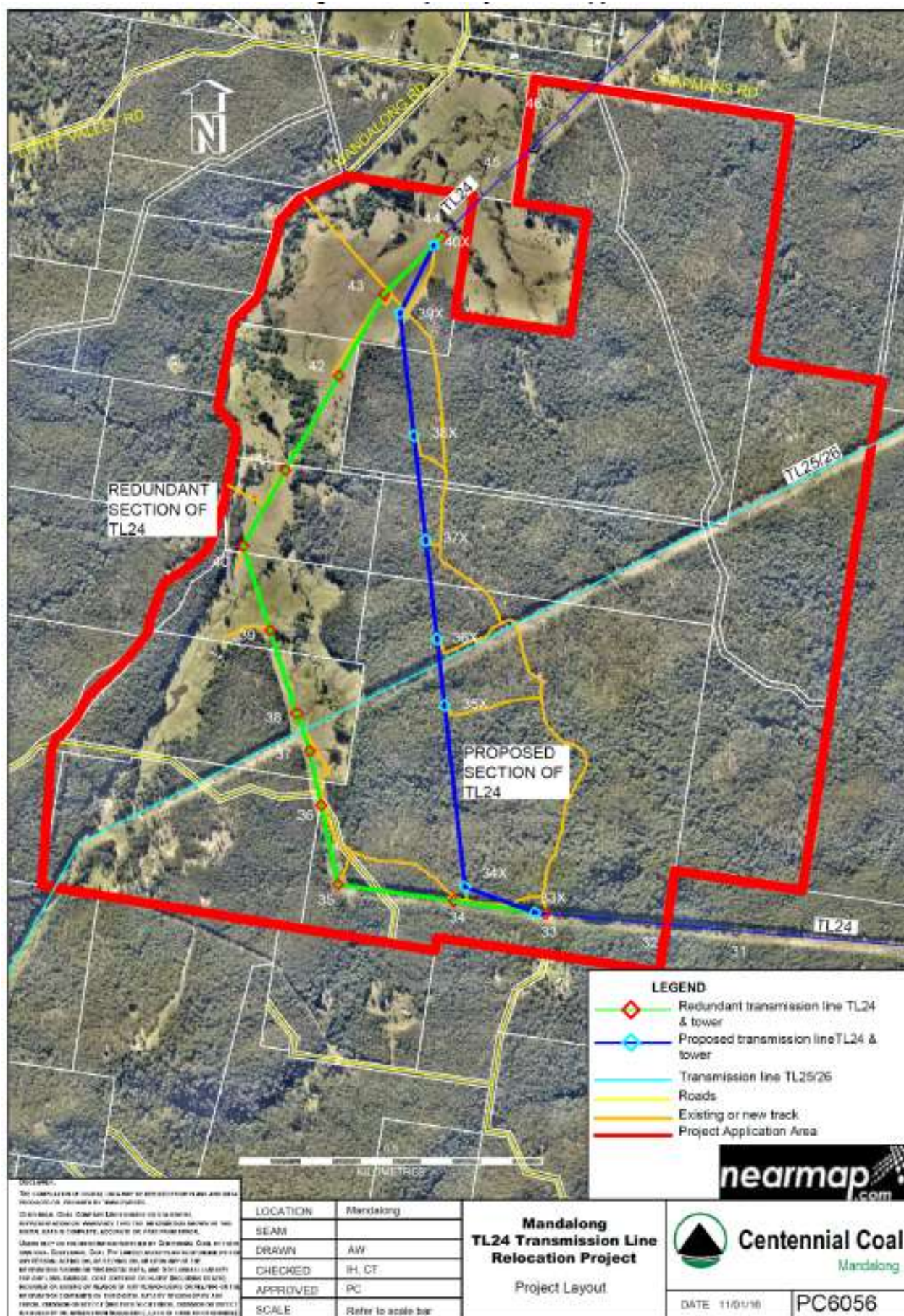


Figure 5: Mandalong South Surface Site



Figure 6: Cooranbong Entry Site



APPENDIX 3: NOISE ASSESSMENT

Applicable Meteorological Conditions

1. The noise criteria in Table 2 of the conditions are to apply under all meteorological conditions except the following:
 - (a) Wind speeds greater than 3 m/s at 10 m above ground level; or
 - (b) Temperature inversion conditions between 1.5 °C and 3°C/100m and wind speeds greater than 2 m/s at 10 m above ground level; or
 - (c) Temperature inversion conditions greater than 3°C/100m.

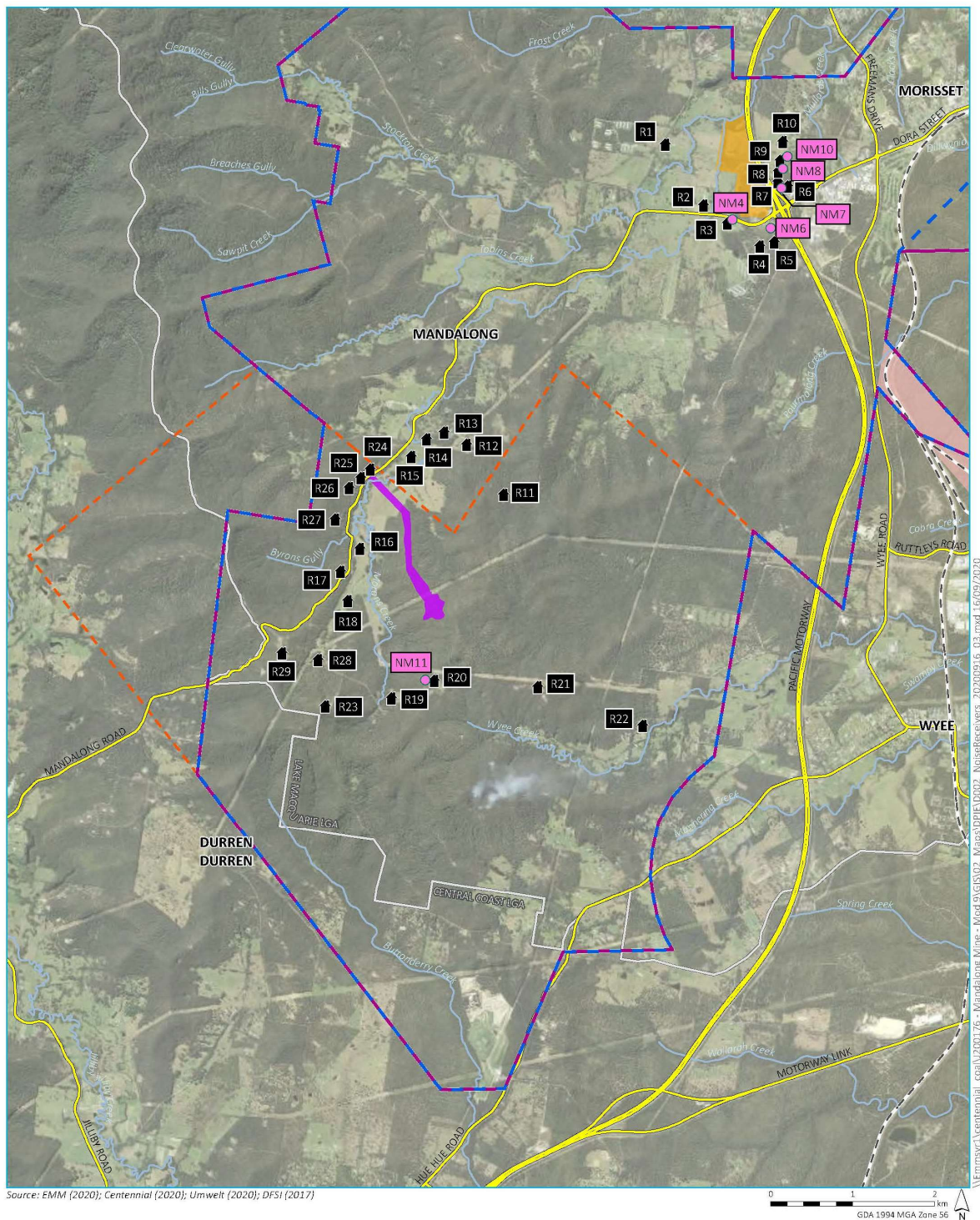
Determination of Meteorological Conditions

2. Except for wind speed at microphone height, the data to be used for determining meteorological conditions **must** be that recorded by the meteorological station located **in the vicinity of** the site.

Compliance Monitoring

3. Attended monitoring is to be used to evaluate compliance with the relevant conditions of this consent.
4. Unless the Secretary agrees otherwise, this monitoring is to be carried out in accordance with the relevant requirements for reviewing performance set out in the *NSW Industrial Noise Policy* (as amended from time to time), in particular the requirements relating to:
 - (a) monitoring locations for the collection of representative noise data;
 - (b) meteorological conditions during which collection of noise data is not appropriate;
 - (c) equipment used to collect noise data, and conformity with Australian Standards relevant to such equipment; and
 - (d) modifications to noise data collected, including for the exclusion of extraneous noise and/or penalties for modifying factors apart from adjustments for duration.

APPENDIX 4: NOISE RECEIVER LOCATIONS



KEY

- | | |
|--|---|
| Development consent boundary | Rail line |
| EL6317 (southern extraction area) | Main road |
| Mandalong south PDC boundary | Named watercourse |
| Delta entry site | Local government area |
| Mandalong mine access site | Sensitive receiver |
| Mandalong South surface site | Noise monitoring location |

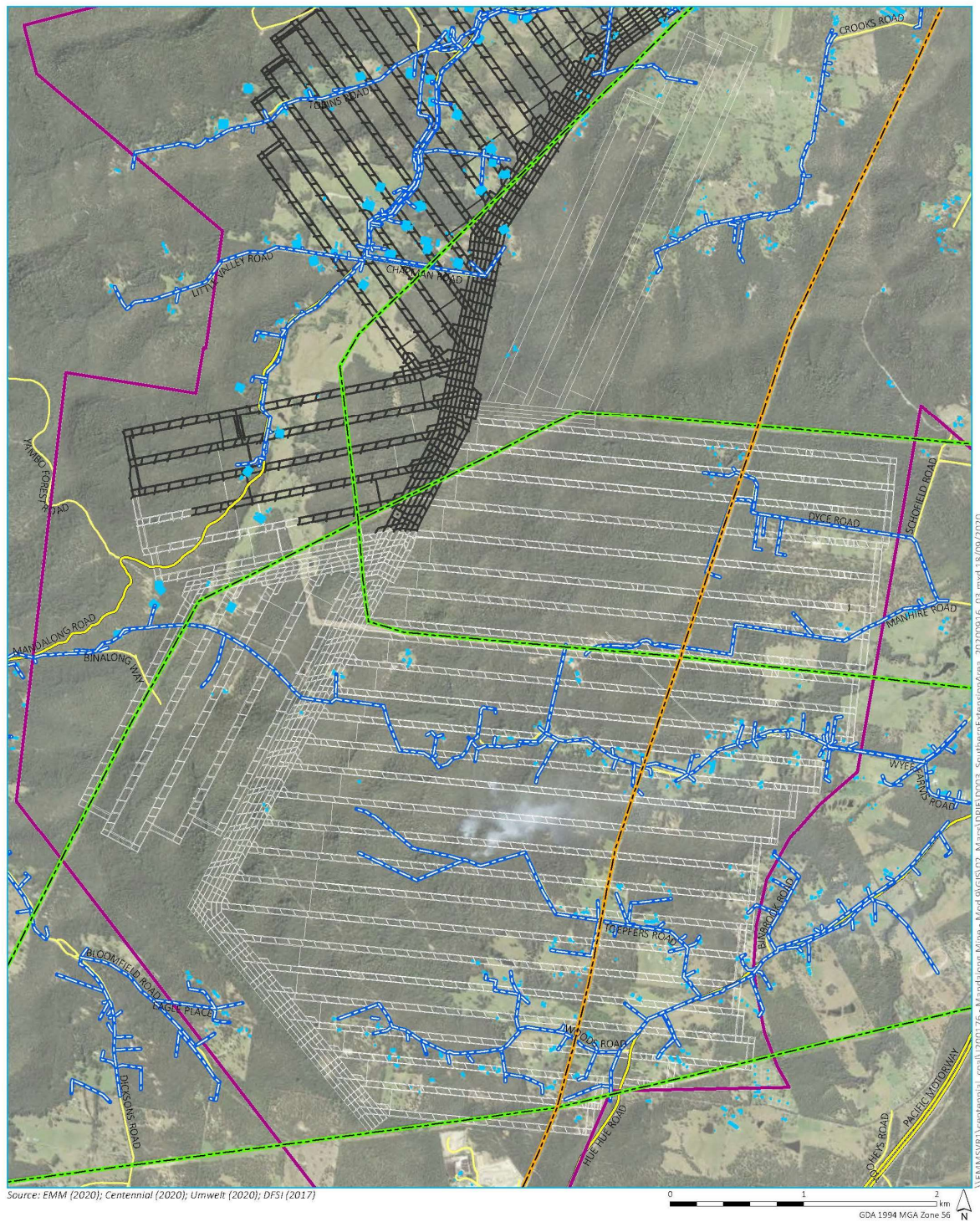
Representative noise receivers

Figure 1
Appendix 4



Figure 1: Representative noise receivers

APPENDIX 5: BUILT FEATURES

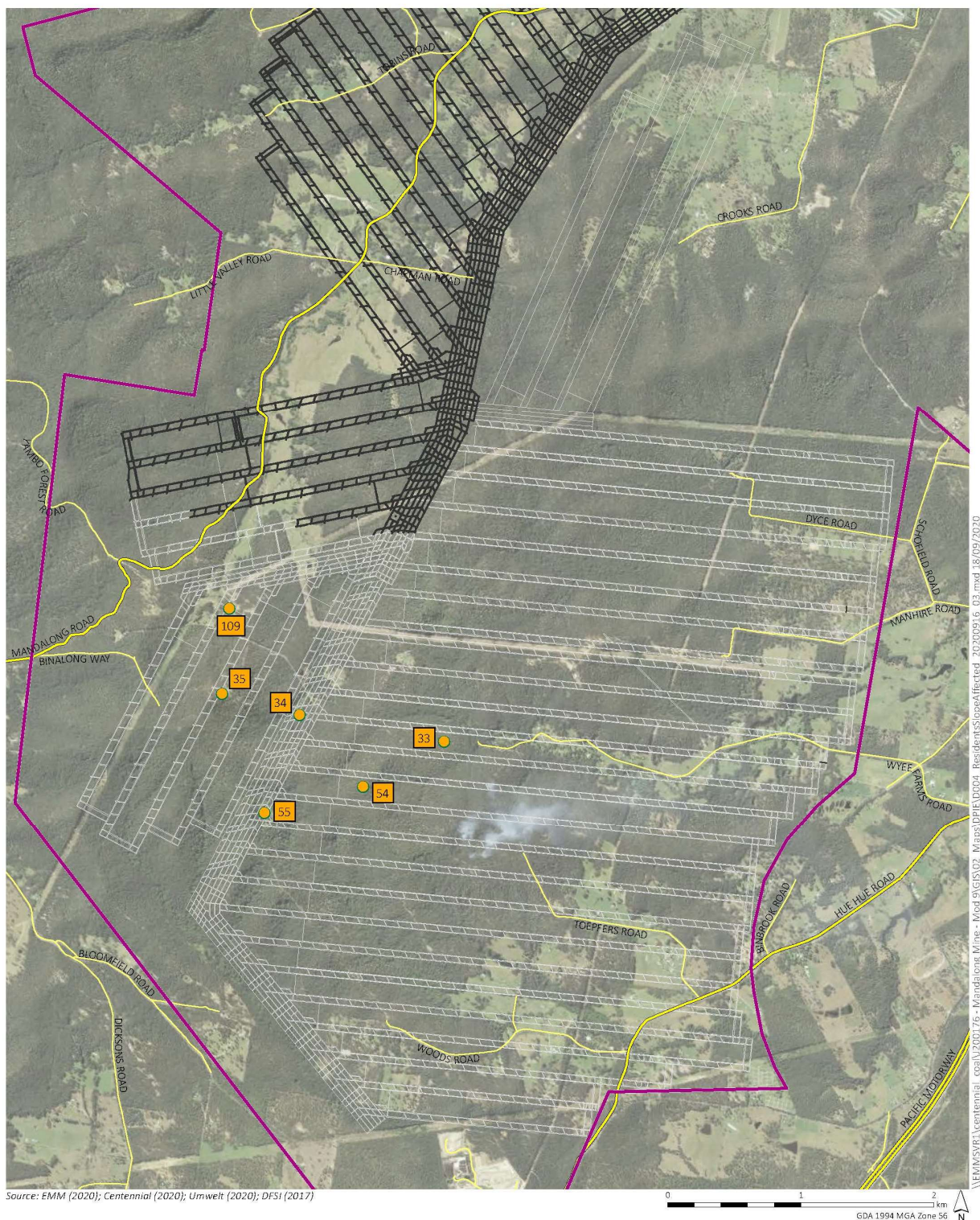


Built features in the Southern Extension Area

Figure 1
Appendix 5



Figure 1: Built features in the Southern Extension Area



KEY

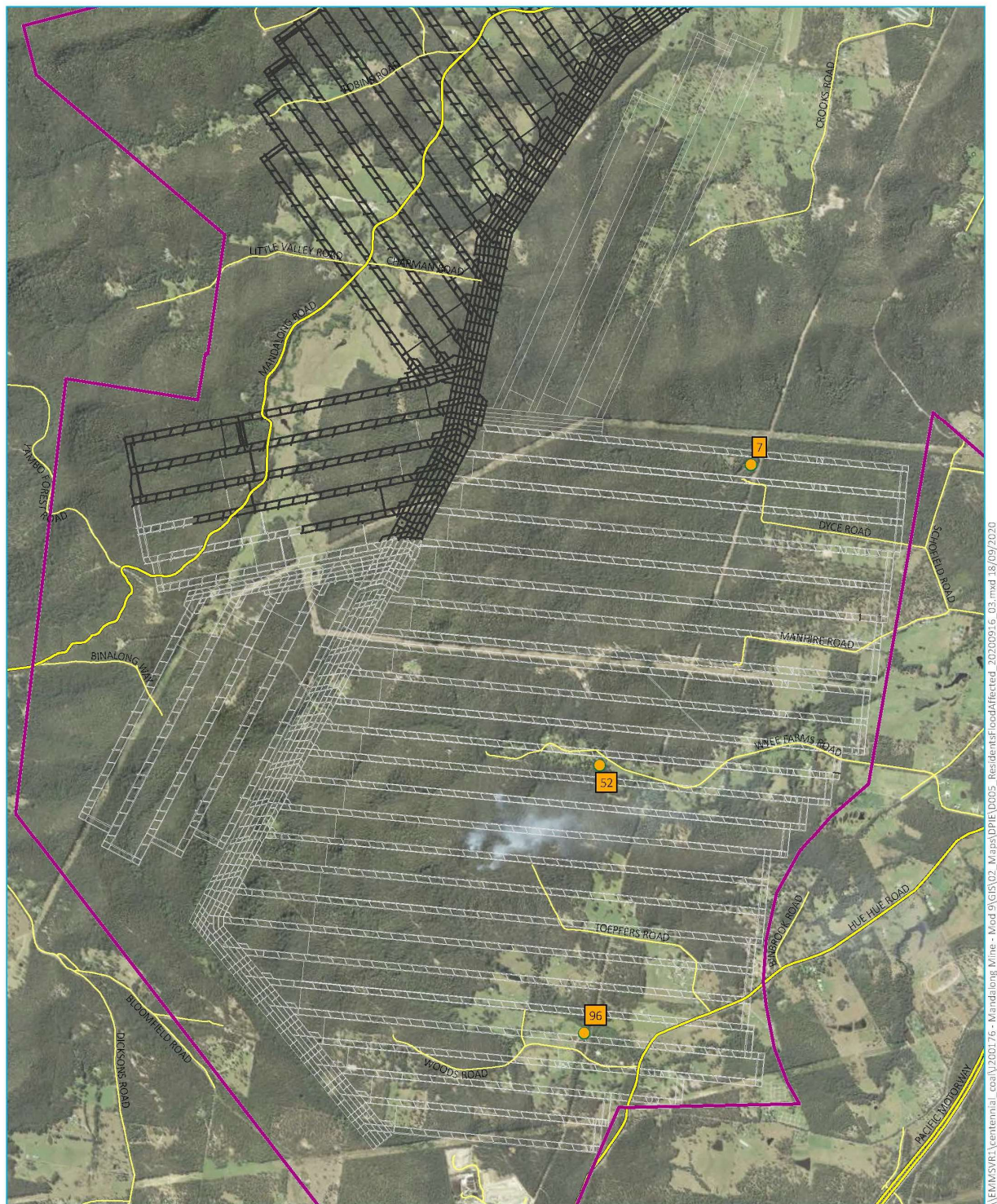
- ▬ Development consent boundary
- Building/structure (including EIS reference)
- ▬ Main road
- ▬ Local road
- Underground mine layout
- ▬ Completed mine workings
- ▬ Approved longwall

Residences potentially affected by
slope instability or rock rollout

Figure 2
Appendix 5



Figure 2: Residences potentially affected by slope instability or rock rollout



Source: EMM (2020); Centennial (2020); Umwelt (2020); DFSI (2017)

KEY

- ▬ Development consent boundary
- Building/structure (including EIS reference)
- ▬ Main road
- ▬ Local road
- Underground mine layout
- ▬ Completed mine workings
- ▬ Approved longwall

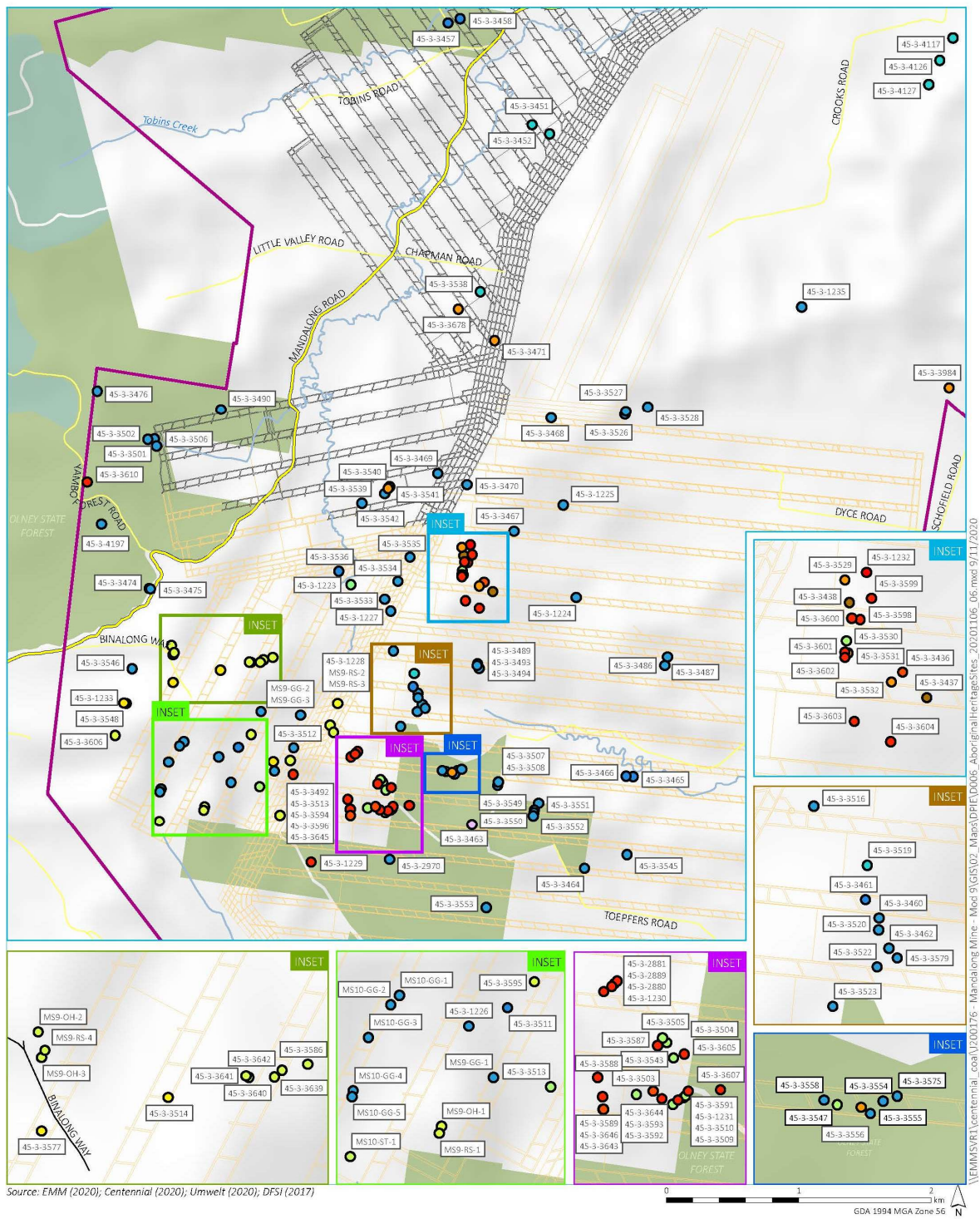
Properties potentially affected by a
1 in 100 year ARI flood event

Figure 3
Appendix 5



Figure 3: Properties potentially affected by a 1 in 100 year ARI flood event

APPENDIX 6: ABORIGINAL CULTURAL HERITAGE



KEY

- | | | | |
|--|---|--|--|
|  Development consent boundary |  Underground mine layout |  Open Camp Site |  Shelter |
|  Main road |  Completed mine workings |  PAD |  Shelter with Art |
|  Local Road |  Approved mine workings |  Potentially Scarred Tree |  Shelter with Art and Deposit |
|  Named watercourse |  AHIMS (site type) |  Rock Shelter |  Shelter with Deposit |
|  NPWS reserve |  Artefact Scatter |  Rock Shelter with Art |  Stone Arrangement |
|  State forest |  Grinding Groove |  Rock Shelter with PAD |  Water Hole |
| |  Isolated Find |  Scarred Tree | |

Aboriginal cultural heritage sites

Figure 1
Appendix 6

Figure 1: Aboriginal Cultural Heritage Sites

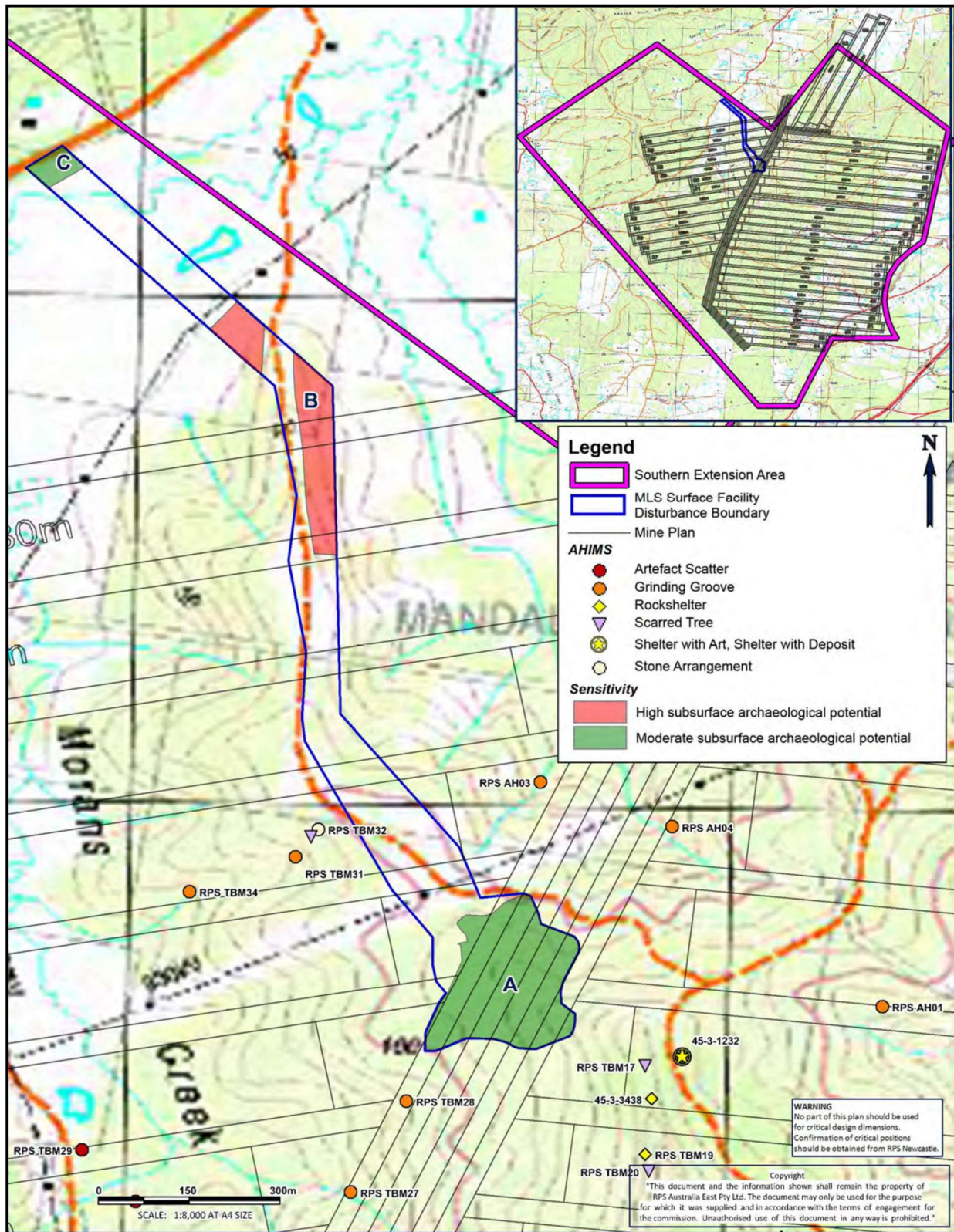


Figure 2: Areas of the MSHA subject to additional archaeological survey

Table 1: Registered Aboriginal Parties

Awakabal Descendants Traditional Owners Aboriginal Corporation
Awakabal Traditional Owners Aboriginal Corporation
Bahtabah Local Aboriginal Land Council
Biraban Local Aboriginal Land Council
Cacatua Culture Consultants
Darkinjung Local Aboriginal Land Council
Guringai Tribal Link
Wonn 1
Yula-Punaal Education and Healing Aboriginal Corporation

APPENDIX 7: LAND MANAGEMENT STRATEGY

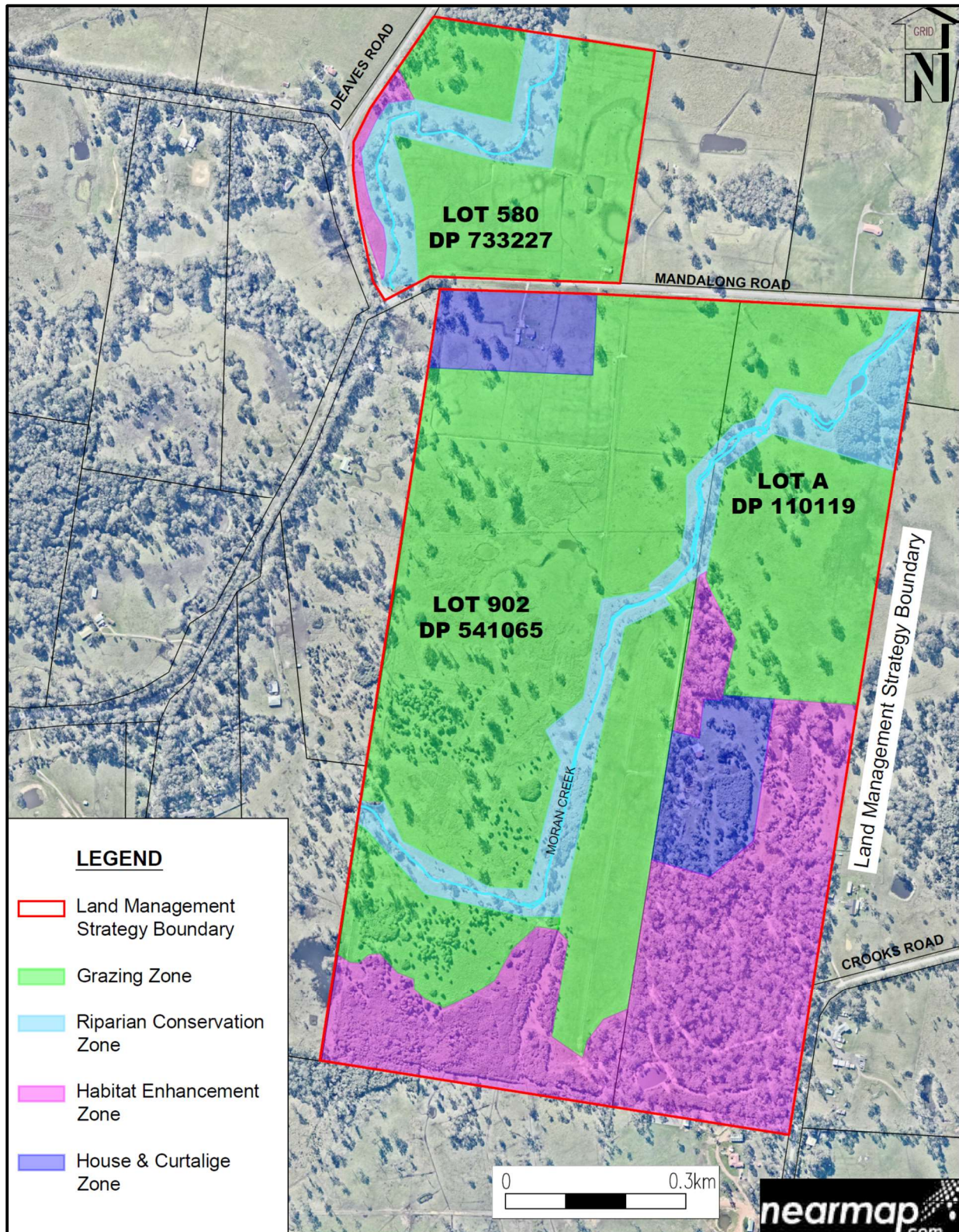


Figure 1: Land Management Strategy

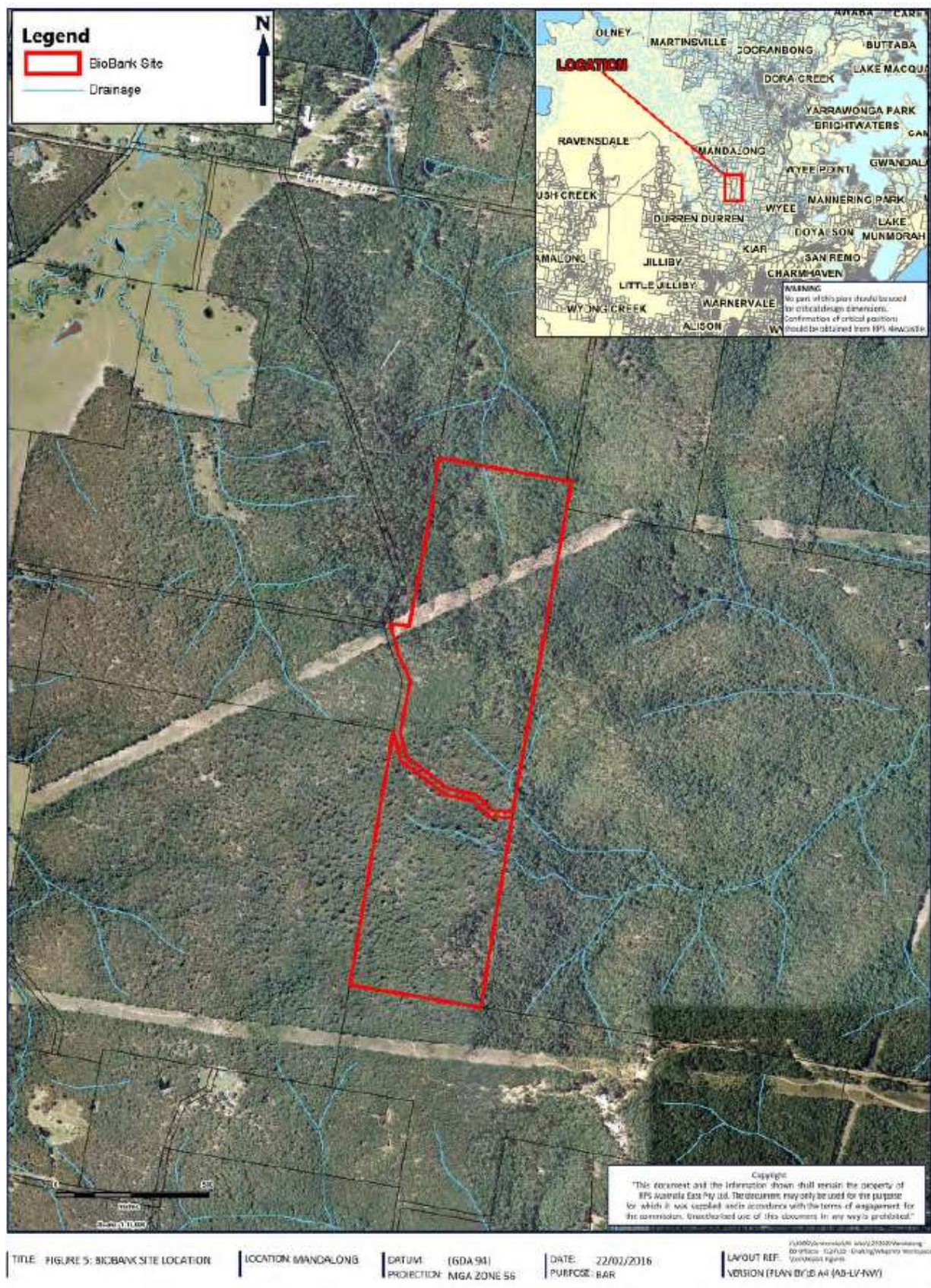


Figure 2: Land Management Strategy

APPENDIX 8: APPLICANT'S STATEMENT OF COMMITMENTS

Desired Outcome	Commitment/Action
Construction Management	
<p>Minimise impacts from construction activities from the Mandalong South Surface Site on the environment and sensitive receivers.</p>	<p>Six months prior to the commencement of construction activities at the Mandalong South Surface Site (MSSS), Centennial Mandalong will develop a Construction Environmental Management Plan for the construction phase of the Mandalong South Surface Site and access road. The Construction Environmental Management Plan will ensure:</p> <ul style="list-style-type: none"> • That vegetation to be removed is clearly marked using temporary fencing (flagging tape or similar) to delineate boundaries and minimise the potential for equipment to accidentally enter areas to be retained. • That vegetation adjacent to the disturbance footprint of the proposed Mandalong South Surface Site and access road is fenced (fauna friendly fencing) prior to construction activities to reduce damage from uncontrolled or accidental access. • That material stockpiles are established within already disturbed areas and not within areas of retained vegetation. • Appropriate topsoil management including: <ul style="list-style-type: none"> – Topsoil will be maintained in a slightly moist condition during stripping, and material will not be stripped in either an excessively dry or wet condition. – Stripping will be timed to take place in unison with any vegetation clearing activity. If planning to mix groundcover/grass with the soil (i.e. not removing groundcover prior to soil stripping), a weed assessment will be undertaken prior to stripping. – Where possible, grading or pushing soil into windrows with graders or dozers for later collection will be undertaken as a preferential less aggressive soil handling systems. – The surface of soil stockpiles will be left coarsely structured (as much as possible) in order to promote infiltration and minimise erosion until vegetation is established, and to prevent anaerobic zones forming. – Topsoil stockpiles will generally be maintained no higher than three metres. – If long-term stockpiling is planned (i.e. greater than three months), the stockpiles will be seeded and fertilised as soon as possible. An annual cover crop species that produces sterile florets or seeds will be sown. A rapid growing and healthy annual pasture sward will provide sufficient competition to minimise the emergence of undesirable weed species. The annual pasture species will not persist in the rehabilitation areas, however will provide sufficient competition for emerging weed species and enhance the desirable micro-organism activity in the soil. – Prior to re-spreading stockpiled topsoil, an assessment of weed infestation on stockpiles will be undertaken to determine if individual stockpiles require herbicide application and / or 'scalping' of weed species prior to topsoil spreading. • That clearing activities are timed, where possible, to avoid removal of hollow-bearing trees during breeding season of threatened species. • That a specialist ecologist is engaged to supervise vegetation clearing and ensure vegetation clearing, particularly the removal of hollow-bearing trees, is undertaken as outlined in this EIS. • Noise impacts are minimised with mitigation measures included in the Noise Management Plan. • Air quality impacts are minimised with mitigation measures included in the Air Quality and Greenhouse Gas Management Plan. • Traffic impacts are minimised by covering loads of bulk material haulage trucks travelling to and from the proposed MSSS and included in the Construction Traffic Management Plan.

Desired Outcome	Commitment/Action
	A copy of the Construction Traffic Management Plan will be provided to Lake Macquarie City Council for review and comment on construction traffic management prior to the commencement of construction activities.
	Rock hammering activities will be undertaken in areas that are away from the majority of residences and limited to between 8.00 am and 4.00 pm Monday to Friday and between 9.00 am and 1.00 pm on Saturdays (no rock hammering on Sundays or public holidays).
	Where necessary, and in consultation with potentially affected residents, temporary noise barriers will be established and maintained.
	To provide acoustic shielding for the shaft sinking activity at the Mandalong South Surface Site, a temporary barrier measuring seven metres high and 20 metres long will be installed at a distance of 20 metres from the drill rig at the intake shaft site (see Figure 54 of the EIS).
	In exceptional circumstances, Centennial Mandalong will include in the Construction Environmental Management Plan the consideration of (a) installing double glazing, (b) subsidising residents to relocate during noisy periods and (c) residents with existing medical conditions.
Exploration Drilling	
Enable Centennial Mandalong to conduct exploration activities in an environmentally responsible manner with due consideration to the community	Due-diligence field inspections and targeted surveys of proposed drill sites and access tracks will be undertaken by a qualified ecologist prior to commencement of works to ensure the potential for localised issues are minimised and, where necessary, appropriately managed.
	Prior to the commencement of works, Centennial Mandalong will ensure that the <i>Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales</i> (DECCW 2010) is followed prior to the commencement of works. Proposed drill sites and access tracks will be inspected according to the protocols in the approved ACHMP.
	Consultation with potentially noise affected landholders will be undertaken in accordance with a Stakeholder Engagement Strategy in which all neighbouring landholders and any residents within 450 metres of a drill rig are notified of the timing, location and anticipated duration of the exploration drilling activities. Where drilling is to be undertaken in close proximity of residents, noise mitigation measures will be implemented.
	Specific bushfire risk treatment actions will be implemented, including: <ul style="list-style-type: none"> No drilling will be conducted on total fire ban days; Firefighting equipment will be kept on active sites at all times; and Hot work activities will be required to obtain internal work permits. Access provisions to each drill site will be identified prior to commencement of works.
	Upon completion of exploration activities, all boreholes and surface disturbance will be sealed and rehabilitated in accordance with the appropriate guidelines at the time.
Mining Operation	
Continue mining operations of the Mandalong Mine	Centennial Mandalong will continue to extract ROM coal at a rate of up to 6 Mtpa.
	Centennial Mandalong will continue to operate Mandalong Mine 24 hours a day, seven days per week.
Environmental Management and Reporting	
Enable Centennial Mandalong to manage its operations in an environmentally appropriate manner	Centennial Mandalong will review and update the Mandalong Mine Environmental Management Strategy (EMS), including issue-specific environmental management plans and monitoring programs. The review will take into consideration the environmental assessments undertaken as part of this EIS, the commitments made in this EIS and all relevant consent conditions.
	Centennial Mandalong will include a process to review the groundwater, surface water and flood models as part of the Water Management Plan.
	Centennial will consult with NSW Fisheries in the development of the Water Management Plan.
Enable Centennial Mandalong to	Centennial Mandalong will continue to report environmental monitoring results on Centennial's website in accordance with the POEO Act requirements.

Desired Outcome	Commitment/Action
meet its statutory reporting obligations	Each year, Centennial Mandalong will prepare an Annual Review, which will report environmental monitoring results and evaluate performance for the previous 12 month period, to be distributed to the relevant government agencies and the Mandalong Mine Community Consultative Committee.
Subsidence Monitoring and Management	
Manage subsidence associated with coal extraction from Mandalong Mine	Six months prior to the development of longwall 25, Centennial Mandalong will prepare the first Extraction Plan to manage subsidence associated with the proposed mining in the Southern Extension Area.
	As part of the development of each Extraction Plan, Centennial Mandalong will update the Public Safety Management Plan and Built Features Management Plans in consultation with the relevant infrastructure owners.
Soil and Land Capability	
Appropriate management of topsoil during construction activities	Centennial Mandalong will incorporate soil stripping, handling, stockpiling and transportation management activities into the Construction Environmental Management Plan for the Mandalong South Surface Site.
	Centennial Mandalong will ensure that soils in the Wyong Soil Landscape Unit are not disturbed as a result of construction activities so that they do not pose a risk to Acid Sulphate Soil mobilisation.
Managing topsoil resources for future rehabilitation uses	During construction of the Mandalong South Surface Site, Centennial Mandalong will develop and maintain a soil inventory to keep track of topsoil materials available for planned rehabilitation activities.
Groundwater	
Minimise and monitor groundwater impacts on the environment and registered water users	For each Extraction Plan, Centennial Mandalong will include in the Water Management Plan (Condition 6 of Schedule 4) the following: <ul style="list-style-type: none"> Proposed locations of nested monitoring bores at locations where the depth of cover is less than 250 metres. This is primarily throughout the north-eastern extent within the Wyee Creek and Mannering Creek catchments. It is intended to install three monitoring bores (nested) above each of the proposed longwall panels (2 years prior to mining and pending landholder granting access) where the depth of cover is less than 250 metres to monitored groundwater levels, pH and electrical conductivity. Monitoring will continue for a period of 2 years following the completion of mining in the subsequent adjacent panel. Groundwater monitoring bores and/or vibrating wire piezometers within the Southern Extension Area to monitor the height of groundwater depressurisation prior to extraction of longwalls with lower depth of cover. An adaptive management approach will be adopted to ensure that if there is a risk of fracturing extending up to alluvial aquifers (based on monitoring data) actions will be taken to mitigate these impacts. Installation of groundwater monitoring bores within areas of groundwater dependant ecosystems. Monitoring of bore GW078601, which is the only registered water supply bore within the Southern Extension Area, subject to landowner approval.
	Centennial Mandalong will commit to implement "make good provisions" to any water supply work where the drawdown impacts exceed the 2 metre criteria as specified in the NSW Aquifer Interference Policy.
	Each year, Centennial Mandalong will engage a specialist to undertake an analysis of alluvial groundwater levels to identify non-rainfall related trends.
	During construction of the shafts at the Mandalong South Surface Site and where blind boring techniques are employed, Centennial Mandalong will ensure groundwater loss is limited by minimising the construction time and the time that the shafts are unlined. Centennial Mandalong will also use non-hazardous polymer drilling muds during boring to reduce the flow of groundwater into the hole.
Surface Water	

Desired Outcome	Commitment/Action
Monitor surface water impacts on the environment	<p>For each Extraction Plan, Centennial Mandalong will include in the Water Management Plan (Condition 6 of Schedule 4) the following:</p> <ul style="list-style-type: none"> Monitoring of the watercourses within the Southern Extension Area to be undermined, particularly in locations identified as potential scouring points, to evaluate watercourse stability. Monitoring will be undertaken before and after undermining of the areas, with additional inspection of these locations following significant rainfall events. Surface water quality monitoring at the same locations within the Southern Extension Area used to gather background information. Continuous stream flow monitoring on Morans Creek, Mannering Creek, and Wyee Creek will be undertaken 2 years prior to mining and for 2 years after the completion of mining the adjacent longwall panel. TARPs for the management of subsidence impacts on watercourses in consultation with relevant government agencies.
Manage impacts to waterways as a result of ongoing operations within the Project Application Area	Centennial Mandalong will undertake any works within watercourses and on the floodplain in accordance with the <i>Guidelines for Controlled Activities on Waterfront Land (2012)</i> .
Water Management	
Appropriate management and discharge of mine water at Cooranbong Entry Site	<p>If the quality of mine water collected in the Borehole Dam is not suitable for discharge from the Cooranbong Entry Site, the water will be pumped back underground for recirculation (additional filtration and sediment settlement) through the Cooranbong Colliery goaf storage area before returning to the Borehole Dam.</p> <p>The storage volume of the Borehole Dam at the Cooranbong Entry Site will be increased to increase the settling capacity. In addition baffles will be retrofitted in the Borehole Dam to provide increased residence time and a flocculent will be introduced. Aquatic macroinvertebrate monitoring and sediment sampling will be undertaken every six months (spring and autumn).</p>
Flora and Fauna	
Minimise impacts to ecology within the Southern Extension Area	As part of the detailed design phase for the Mandalong South Surface Site, Centennial Mandalong will ensure that that proposed access road is aligned to minimise disturbance and avoid removal of any <i>M. biconvexa</i> specimens.
	Centennial Mandalong will implement a vegetation condition monitoring programme 2 years before, during and 2 years after completion of mining in the adjacent longwall panel in sensitive environments (which will include floodplains and groundwater dependant ecosystems).
	As part of the construction activities at the Mandalong South Surface Site, a wheel wash will be installed to help prevent soil-borne disease (Phytophthora), pathogenic fungus (Myrtle Rust) transmission and weed seed dispersal.
	<p>Centennial Mandalong will develop a Biodiversity Management Plan that includes:</p> <ul style="list-style-type: none"> Identification of weed management, monitoring and control practices to minimise the spread of exotic species. Incorporation of the existing Wetland Management Plan. Trigger Action Response Plan.
Offset the ecological impacts of the Project	<p>Centennial Mandalong will install nest boxes to compensate for the loss of 9 hollow bearing trees containing 18 habitat hollows as a result of the construction of the MSSS.</p> <ul style="list-style-type: none"> Nest boxes will be installed at a ratio of 1:1 (i.e. one nest box for every habitat hollow removed). A mixture of nest box types are used to compensate for the variety of hollows being removed. Nest box sizes will target microbats, gliders and possums. All nest boxes will be rear entry.

Desired Outcome	Commitment/Action
	<ul style="list-style-type: none"> The majority of nest boxes will be placed at a westerly aspect to maximize chances of colonization. Standard nest box design (i.e. single walled nest boxes) will be used rather than double walled nest boxes as previous monitoring has identified a sharper uptake of animals in single-walled nest boxes.
Aboriginal Heritage	
Monitor, mitigate and manage impacts to Aboriginal heritage sites	Centennial Mandalong will update the Centennial Northern Holding's ACHMP (in consultation with the relevant government agencies and registered Aboriginal parties) to take into consideration the commitments made in the EIS and any relevant consent conditions.
	Immediately prior to and during construction of the Mandalong South Surface Site, Centennial Mandalong will ensure that a combination of silt and protective fencing is installed to ensure that run-off does not impact Aboriginal sites down slope of this area and that Aboriginal sites upslope are not inadvertently impacted by construction activities.
	Centennial Mandalong will develop a cultural heritage awareness component of the induction for contractors involved in the construction activities in consultation with the Aboriginal community.
	Centennial Mandalong will ensure all employees and contractors working within the Southern Extension Area are made aware of their statutory obligations for Aboriginal heritage under the NPW Act 1974 as part of the site induction process.
Offset the Aboriginal heritage impacts of the Project	Within 12 months following development consent, Centennial Mandalong will formalise an agreement to authorise the local Aboriginal community access to suitable areas within its land holdings in the Southern Extension Area that contain Aboriginal cultural heritage sites.
Non-Indigenous Heritage	
Minimise impacts to items of European heritage	Six months prior to the commencement of construction activities associated with the Mandalong South Surface Site, Centennial Mandalong will ensure that the Landing Skid 2 is recorded by a qualified historical archaeologist.
	In the event that any additional non-Indigenous cultural heritage material is identified or uncovered during construction and/or exploration works, Centennial Mandalong will ensure that any surface works in the area ceases and will contact a heritage consultant to assess the condition of the item. Centennial Mandalong will adopt the appropriate mitigation measures, as provided by the heritage consultant, before recommencement of work.
	Centennial Mandalong will ensure that all employees and contractors working within the Southern Extension Area will be made aware of their statutory obligations for non-Indigenous heritage under the <i>NSW Heritage Act 1977</i> as part of the site induction process.
Air Quality	
Monitor air quality impacts	<p>Centennial Mandalong will update the Air Quality and Greenhouse Gas Management Plan to include the following:</p> <ul style="list-style-type: none"> Additional deposited dust gauges around the proposed Mandalong South Surface Site for both the construction and operational phases. A PM10 and PM2.5 monitoring system, which will be used for model verification purposes and particulate management at the Mandalong Mine Access Site. <p>The optimal location for these additional monitoring activities, along with the method and frequency of the monitoring activities, will be determined in consultation with a suitably qualified consultant.</p>
Mitigate air quality impacts	The fan evasée at the Mandalong South Surface Site will be designed and constructed to face away from nearby surrounding residential receivers.

Desired Outcome	Commitment/Action
	The proposed MSSS access road will be sealed.
	All trucks carrying bulk materials (gravel, sand etc.) to the MSSS will have their loads covered.
Understand the source of particulate matter	Within six months following development consent, Centennial Mandalong will commission additional studies to establish the source of the particulate matter entering the mine and the contribution of this to the total emissions from the ventilation's fans at the Mandalong Mine Access Site. These studies will inform the need for and scope of mitigation measures and management strategies considered necessary to address particulate matter emission from the ventilation fans.
Greenhouse Gas	
Reduce energy and diesel usage	Centennial Mandalong will update the existing Energy Savings Action Plan to include: <ul style="list-style-type: none"> • Use of power factor correction units at the Mandalong South Surface Site, which will improve the efficiency of the electrical power used in the underground workings and hence reduce the overall power consumption. • Underground storage/goaf areas will be used in the management of mine water to enable filtration and sediment settlement prior to the water being pumped to the surface. This will reduce energy losses through the ability to pump cleaner water with the use of high efficiency positive displacement pumps. • Bulk storage tanks/silos and boreholes will be installed at the Mandalong South Surface Site for the delivery of stone dust, concrete and ballast direct to the underground mine workings. This will result in significant diesel fuel savings by avoiding the transport of such materials via the decline tunnel.
Mitigate greenhouse gas emissions from the Project	Centennial Mandalong will progress the construction and commissioning of the gas flares, along with evaluating the electricity potential and capacity of the gas engines, at the Mandalong Mine Access Site to reduce greenhouse gas emissions.
	Centennial Mandalong will continue the trial of the VAM-RAB unit currently being constructed at the Mandalong Mine Access Site in order to determine whether it is a viable strategy for VAM abatement in the future.
	Centennial Mandalong will pay the relevant price per tonne of CO ₂ -e (carbon tax), depending on the year the liability is incurred, or purchase offsets. Where offsets are available and considered cost-effective, Centennial Mandalong will purchase only from registered suppliers under the relevant domestic or international certification scheme (the latter from July 2015 onwards).
Noise	
Monitor noise impacts from the Project	Centennial Mandalong will update the existing Noise Management Plan to include quarterly operator-attended noise monitoring at and around the Mandalong South Surface Site.
Traffic	
Provide suitable and safe vehicle access to the Mandalong South Surface Site from Mandalong Road	As part of the detailed design phase for the Mandalong South Surface Site, Centennial Mandalong will ensure: <ul style="list-style-type: none"> • The access intersection from Mandalong Road to the proposed Mandalong South Surface Site is designed to be constructed as an at-grade (two roadways joining at the same level) BAR/CHL intersection (basic right turn treatment / channelised left turn) providing a left turn turning lane into the site. • The intersection is designed in accordance with Guide to Road Design Part 4A – Design of Unsignalised and Signalised Intersections (Austroads 2009). • That LMCC are consulted regarding the final location of the intersection. Appropriate sight distances along Mandalong Road and appropriate turning templates for heavy vehicles are achieved.
Identify and address any impact on road pavements as a	Within 3 months of completion of construction activities at the Mandalong South Surface Site, Centennial Mandalong, in consultation with LMCC, will undertake a road dilapidation review to identify areas of road pavement deterioration requiring maintenance treatment that could be directly attributed to the construction activities. These areas will be rehabilitated to Council's satisfaction by Centennial Mandalong.

Desired Outcome	Commitment/Action
result of construction	
Visual Amenity	
Minimising visual impacts from the Mandalong South Surface Site	During construction of the Mandalong South Surface Site, Centennial Mandalong will ensure that, wherever possible, infrastructure items are dark in tone and constructed of non-reflective materials.
	Within six months of construction activities at the Mandalong South Surface Site being completed, Centennial Mandalong will undertake landscape works, including along the proposed MSSS access road, such as shrub and tree planting, to increase the level of existing screening.
Bushfire	
Provide safe egress in the event of a bushfire	During construction of the Mandalong South Surface Site, Centennial Mandalong will establish an alternative egress route from the Mandalong South Surface Site and ensure it has a carrying capacity exceeding 15 tonnes.
Reduce risk of injury to personnel at the Mandalong South Surface Site in the event of a bushfire	<p>Prior to commissioning the operation of the Mandalong South Surface Site, Centennial Mandalong will provide a safe place or fire bunker at the Mandalong South Surface Site to</p> <p>address the potential for an employee/contractor/visitor to be trapped at the surface site and</p> <p>unable to evacuate via the access road or alternate egress route.</p>
Reduce risk to Centennial Mandalong infrastructure and local landholders' properties from bushfire	Within six months following development consent, Centennial Mandalong will review and update the existing Emergency Management System to incorporate the findings and conclusions of the bushfire risk assessment (Ecobiological 2013), the commitments made in the EIS and all relevant consent conditions.
	Subject to approval from the NSW Rural Fire Service, Centennial Mandalong will engage a specialist to undertake mosaic burns of forest vegetation outside of the designated APZ on a cyclic basis to reduce overall fuel loads approaching the APZ.
	<p>Within three months of the completion of construction activities, Centennial Mandalong will establish the following Asset Protection Zones (APZs) in order provide a defendable space around infrastructure and avoiding flame contact and radiant heat exceeding 40 kilowatts per square metre:</p> <p>Mandalong Mine Access Site – an APZ will be established around the gas drainage and ventilation management infrastructure to the following distances - 20 metres to the north, south and west; and 10 metres to the east.</p> <p>Mandalong South Surface Site – an APZ will be established around the infrastructure to the following distances – 45 metres to the north and south; 20 metres to the east; and 30 metres to the west.</p> <p>Fuel reduction will be undertaken within these APZs by regular grass slashing, weed control, reducing tree canopy cover to less than 30 percent, lopping tree branches within three metres of ground fuels, reducing the shrub layer density to less than 20 percent, and removing timber piles and combustible materials.</p>
	Within six months following development consent, Centennial Mandalong will extend the water supply system at the Mandalong Mine Access Site to include reticulated water supply and hydrant access in the area containing the gas drainage and ventilation infrastructure.
	Prior to commissioning the operation of the Mandalong South Surface Site, Centennial Mandalong will ensure the Mandalong South Surface Site has a dedicated water supply of greater than 20,000 litres for bushfire protection. This supply will be connected to a hydrant system or a stand pipe with suitable truck access.
	Centennial Mandalong will ensure buildings that contain combustible infrastructure include ember protection similar to the relevant standards in the <i>Australian Standard AS3959-2009 – Construction of Buildings in Bushfire-Prone Areas</i> . This will generally involve sealing or screening areas with gaps greater than 3 millimetres.
Dangerous Goods	

Desired Outcome	Commitment/Action
Provide safe storage, handling and disposal of dangerous goods	Within six months following development consent, Centennial Mandalong will review and update the existing Emergency Management System and Pollution Incident Response Management Plan to incorporate the Project, the commitments made in this EIS and all relevant consent conditions.
Social	
Continue to engage with stakeholders	Within six months following development consent, Centennial Mandalong will update the existing Stakeholder Engagement Strategy to provide a consistent management framework for the identification and consultation with stakeholders that have an interest in the mine.
Meet Centennial's corporate social responsibility objectives	<p>Centennial Coal has established, in consultation with LMCC, a Morisset / Mandalong Community Fund with The Lake Macquarie Foundation.</p> <p>Centennial Coal has committed the following:</p> <ul style="list-style-type: none"> (a) \$50,000 upon the granting of the Development Consent; and (b) \$50,000 on each anniversary of the granting of the Development Consent until the total amount given by the Donor is \$500,000. <p>The above payments are subject to the Mandalong Mine operating and any annual payment otherwise due will be reduced proportionally to reflect any period during which the Mandalong Mine is not operating.</p> <p>The Lake Macquarie Foundation will distribute the income from the fund:</p> <ul style="list-style-type: none"> (a) to worthy community organisations in the Morisset and Mandalong areas; and (b) after consultation with a representative from each of the Morisset and Mandalong communities.
Post-Mining Closure and Rehabilitation	
Rehabilitate the mine to an agreed final land use	<p>Within five years of mine closure, Centennial Mandalong will prepare a detailed Mine Closure Management Plan with the aim of creating a land use capability compatible with the pre-mining land use (unless other beneficial uses are pre-determined and agreed). In addition to addressing the removal of surface infrastructure, the Plan will include:</p> <ul style="list-style-type: none"> • Rehabilitation of disturbed areas including spreading of stockpiled topsoil accordance with commitments in this EIS, revegetation using locally occurring native plant species, and rehabilitation of disturbed land to a condition that is self-sustaining or where maintenance requirements are consistent with an agreed post-mining land use; and • Final rehabilitation success criteria.

MOD 1 – MANDALONG TRANSMISSION LINE TL24 RELOCATION PROJECT

Category	Commitment/Action
General	<p>Prior to commencement of construction activities for the Project, a Construction Environmental Management Plan (CEMP) will be developed. The CEMP will address mitigation and management actions identified for the relevant environmental values.</p> <p>TransGrid's existing Environmental Management System and supporting policies and procedures are in place for the operation and maintenance of TL24.</p>
Ecology	<p>A Flora and Fauna Management Plan will form an Appendix to the CEMP. This plan will include:</p> <ul style="list-style-type: none"> • Unnecessary vegetation clearing will be avoided by marking the clearing limit with flagging tape; • All contractors will be advised of the designated work area through a site induction process; • Vehicles/machinery will use designated access tracks. Speeds will be limited to 40 kilometres per hour to reduce the potential of fauna strike and to reduce dust generation; • Measures will be implemented as required to prevent the spread of weeds and potential importation of <i>Phytophthora</i>;

Category	Commitment/Action
	<ul style="list-style-type: none"> Where possible, clearing activities should be timed to avoid removal of hollow-bearing trees during breeding season of threatened species (avoiding winter and spring); and A suitably qualified person is to be present to supervise hollow-bearing tree clearing within the impact area. <p>Lot 152 DP 755238 will be included in the Mandalong Mine Land Management Strategy to offset the impacts of vegetation clearing for the Project.</p>
Erosion and Sediment Control	<p>An Erosion and Sediment Control Plan (ESCP) will form an Appendix to the CEMP. The ESCP will identify works as necessary to ensure the required protection is given to downslope lands and waterways. The ESCP will specifically address:</p> <ul style="list-style-type: none"> Tunnel soil erosion; and Mitigation and management measures in accordance with Managing Urban Stormwater: Soils and Construction – Vol 1 (Landcom, 2004) – also known as the 'Blue Book'.
Traffic	<p>A Construction Traffic Management Plan will form an Appendix to the CEMP to address the impacts of the construction works on the local road network.</p> <p>Construction traffic will not exceed 79 vtpd.</p>
Heritage	<p>The CEMP will include the following:</p> <ul style="list-style-type: none"> 'No go zone' to be established at sites AHIMS#45-3-1227, AHIMS#45-3-3534, AHIMS#45-3-3539, AHIMS#45-3-3541 and AHIMS#45-3-3540 for the duration of the proposed works; If unrecorded Aboriginal objects are identified in the TL24 Easement during future works, all works in the immediate area must cease and the area should be cordoned off as appropriate with high visibility tape. OEH must be notified via the Enviroline (131 555) so that the site can be adequately assessed and managed; If skeletal remains are identified all work must cease in the immediate area to prevent any further harm to the remains. Local NSW Police must be contacted immediately. No action is to be undertaken until police provide written notification. If the remains are identified as Aboriginal, the OEH Enviroline (131 555) must be contacted. No work is to continue until OEH provides written notification about the action plan for the management of the skeletal remains and formulated a management plan if required; If during the course of development works, suspected historic cultural heritage material is uncovered, work should cease in that area immediately. The OEH Enviroline (131 555) should be notified and works only recommence when an approved management strategy has been developed; L1 landing skid: If it is not possible to avoid harming the skid, it will be archivally recorded by a qualified historical archaeologist prior to dismantling. The archival recording should be in accordance with How to Prepare Archival Records of Heritage Items (NSW Heritage Office) and Photographic Recording of Heritage Items using Digital Film or Capture (NSW Heritage Office 2006); and L3 landing skid: The area of the skid will be cordoned off to ensure no inadvertent physical impact.
Air Quality	<p>The CEMP will include air quality mitigation and management strategies which will include:</p> <ul style="list-style-type: none"> Standard work procedures to minimise emissions of particulate matter for example maintaining plant and equipment to ensure optimal operating conditions; and Utilising water sprays/carts to dampen exposed surfaces and trafficable areas including operations near R16 and R20 due to the close proximity of the tower to the residence.
Noise	<p>The CEMP will include noise mitigation and management strategies which will include:</p> <ul style="list-style-type: none"> Restrict construction activities to the day-time period as per the NSW Interim Construction Noise Guideline (DECCW, 2009) being Monday to Friday 07:00 to 18:00, Saturday 08:00 to 13:00 and no work on Sundays or public holidays. Exceptions to this include emergency works or delivery of equipment or materials outside of standard hours as requested by police or other authorities for safety

Category	Commitment/Action
	<p>reasons. [Noting that there may be a requirement for TransGrid to undertake some stringing or cutting in activities outside of the daytime hours stipulated in the ICNG if any of the required outages on the lines are not possible during normal construction times]; and</p> <ul style="list-style-type: none"> All equipment will be inspected and maintained on a regular basis to ensure good working order; and Community consultation will be undertaken prior to commencement of construction.

Mod 6 – MSSS Discharge

Category	Commitment/Action
Water Quality Monitoring	<p>Establish additional water quality monitoring locations (Sediment Dam and MCUS) and undertake water quality monitoring in accordance with Table 4 of the SEE.</p> <p>Implement quarterly water quality and annual aquatic ecology monitoring in Morans Creek upstream and downstream of the confluence of the unnamed creek to assess any downstream impacts due to discharges.</p>
Water Management	<p>Undertake weekly site inspections at MSSS and immediately following 40 mm of rainfall in the preceding 24 hours to inspect the capacity, structural integrity and effectiveness of the Gross Pollutant Trap and Sediment Dam.</p> <p>Review and revise where necessary the site's Water Management Plan to reflect the outcomes of the modification.</p>
Surface Water	Undertake six-monthly visual and photographic inspections of the Unnamed Creek on Centennial owned land to assess for evidence of scouring. Implement appropriate mitigation measures should evidence of scouring be detected.
Aboriginal Heritage	Review and revise where necessary the Northern Region Aboriginal Cultural Heritage Management Plan to reflect the outcomes of the modification.
Biodiversity	If a local population of <i>Mixophyes balbus</i> is detected downstream from the MSSS Sediment Dam, hygiene protocols for controlling chytrid fungus would be instigated, including flushing of car tyres with a disinfecting solution.
Biodiversity Offsets	Any identified impacts to threatened flora or fauna will be quantified and offset in accordance with the NSW <i>Biodiversity Offset Policy for Major Projects</i> . Biodiversity monitoring will be undertaken in accordance with Section 4.2 of the Centennial Coal's Northern Region Biodiversity Management Plan (NRBMP) with any biodiversity offsets implemented in accordance with Section 4.6 of the NRBMP.

Mod 7 – Construction of a 33 kV powerline

Aspect	Commitment
Aboriginal Cultural Heritage	<p>The following mitigation measures will be implemented:</p> <ul style="list-style-type: none"> Centennial Mandalong will ensure that its employees and contractors are aware that it is an offence under Section 86 of the NPW Act to harm or desecrate an Aboriginal object unless that harm or desecration is authorised by an approved ACHMP (as applicable to the current Project) and the requirements of that plan have been met in relation to mitigation activities; The CEMP will include all heritage commitments from the Aboriginal Cultural Heritage Assessment Report and will address specific management requirements for the Project; The three newly identified isolated artefacts (Mandalong IF 1-3) located within the existing power line easement (refer Figure 9) will be subject to surface collection in accordance with the methodology provided in the Aboriginal Cultural Heritage and Archaeological Assessment (Umwelt, 2019); For the duration of the Project, temporary protection (in the form of high visibility fencing) will be put in place at grinding groove sites AHIMS 45-3-3470, 45-3-3526 and 45-3-3527 to prevent incidental impacts during Project works; Due to the potential for additional grinding groove sites to be present (but not visible) along minor drainage lines within the Project Area, heavy vehicle movements will be avoided across any areas of sandstone exposure on minor drainage lines;

	<ul style="list-style-type: none"> Following the completion of vegetation clearance in the areas of low-moderate archaeological potential (refer Figure 10) an opportunity will be provided for an additional inspection of these areas by an archaeologist and Aboriginal party representatives. Any surface artefacts may be subject to surface collection in accordance with the Aboriginal Cultural Heritage and Archaeological Assessment (Umwelt, 2019). The opportunity will be provided to an archaeologist and the registered Aboriginal parties to monitor removal of topsoil within the area of low-moderate archaeological potential (including that disturbed for excavation of the pole location) and to collect any Aboriginal objects that may be identified; and In the event that a previously unrecorded Aboriginal object is identified within the Project Area, it will be managed in accordance with the unexpected finds protocol included in the ACHMP.
Noise	<p>To minimise noise emissions from construction works the following reasonable and feasible controls will be implemented:</p> <ul style="list-style-type: none"> Community consultation will be undertaken prior to the commencement of and during construction. All residents who will likely experience noise levels above the noise affected levels for construction work prescribed in the ICNG will be informed of the nature of works to be carried out, the expected noise levels and duration, as well as contact details in the event of a complaint; Construction activities will be restricted to the day period (Monday to Friday 7:00am to 6:00pm, Saturday 8:00am to 1:00pm and no work on Sundays or public holidays). It should be noted that there may be a requirement for certain activities such as stringing or cutting in to occur outside of these hours however Centennial Mandalong will consult as necessary with affected residents; Quietest available equipment will be selected where possible for affected locations and noisy activities should be scheduled for the least noise sensitive time of day; The mulcher will not operate within 100 m of any residence; Clearing crews that include a mulcher will maintain a separation of 900 m when working on the proposed easement north of Schofield Road; All equipment will be inspected and maintained on a regular basis to ensure they are in good working order; Simultaneous operation of plant will be restricted where possible; Operations will be modified in the event of enhancing weather conditions that cause an unacceptable increase in offsite noise levels; The noise mitigation measures will be included in the CEMP developed for the project; and Centennial will consult and undertake ongoing consultation with affected residents to give sufficient notice of any helicopter activity.
Biodiversity	<p>The following mitigation measures will be implemented during construction of the Project to avoid and minimise impacts on native vegetation and habitat. These will be documented in the CEMP for the Project:</p> <ul style="list-style-type: none"> Impacts on Fauna and their Habitat: <ul style="list-style-type: none"> Retain habitat trees and significant tree limbs (where possible); Confirm habitat tree numbers and distribution; Mark habitat trees and estimate height; Identify limbs of habitat value with enough clearance below power lines for retention; and Clearly mark out a buffer area to prevent damage during construction; Install substitute habitat: <ul style="list-style-type: none"> Habitat trees to be impacted by the proposed works are to be quantified and offset adjacent to the site; and Hollow bearing trees are to be replaced by nest boxes at a ratio of at least 1:1; Fauna protection protocols: <ul style="list-style-type: none"> Pre-clearance surveys by qualified ecologist prior to tree removal; and Apply procedures to safely fell habitat trees and release areas for any rescued fauna; Retain other habitat attributes:

	<ul style="list-style-type: none"> ○ Hollow logs and rock habitat within the clearance areas will be retained and carefully placed into the adjacent bushland; • Maintain upper catchment hydrology (maintain ephemerality): <ul style="list-style-type: none"> ○ Erosion and sediment controls will be designed to prevent permanent or semi-permanent ponding of water where possible; <p>Indirect impacts on native vegetation and habitat:</p> <ul style="list-style-type: none"> • Protect adjacent habitat or vegetation: <ul style="list-style-type: none"> ○ Boundaries for vegetation removal clearly established prior to clearing using tape/rope; ○ All vehicles and equipment accessing site must use established access tracks only; and ○ Restrict load/equipment set down areas to well within the designated impact area; • Minimise noise and light spill: <ul style="list-style-type: none"> ○ Avoid night work; and ○ Take measures to reduce noise. • Dust management: <ul style="list-style-type: none"> ○ Visual monitoring of dust generated during earthworks, suspending work if dust is blown into adjacent bushland and use of water carts; • Weed and pathogen management: <ul style="list-style-type: none"> ○ Good hygiene practices are to be used to reduce the risk of spreading weeds and pathogens, including ensuring that all machinery, materials and personnel are clean of any weed seed to entering the site Priority Weeds listed under Biosecurity Act 2015 to be actively managed on site to limit the spread of weeds into the adjacent forested areas; ○ Weeds removed from the subject site are to be disposed of appropriately at an approved waste facility; ○ Occurrences of pathogens (e.g. Myrtle Rust and Phytophthora) will be reported, treated and monitored; and ○ Quarantine controls will be applied to prevent introduction of Chytrid disease; • Partitioning off threatened flora species: <ul style="list-style-type: none"> ○ Patches of threatened plants are to be identified and marked out to minimise indirect impacts of clearing/construction activities; and ○ A qualified ecologist is present during initial vegetation removal to identify these environmentally sensitive areas; • CEMP: <ul style="list-style-type: none"> ○ The Project CEMP will include the safeguards included in the BDAR and detail unexpected threatened species finds procedure and rehabilitation following construction; • Staff and contractor training and site briefing to educate contractors on biodiversity management measures; <ul style="list-style-type: none"> ○ Contractors are made aware of biodiversity management measures through toolbox talks and review of the CEMP; • Sediment and erosion controls: <ul style="list-style-type: none"> ○ Erosion and sediment control measures are to be implemented and maintained to reduce sediment moving offsite, and sediment laden water entering any watercourse; ○ Erosion controls are to be regularly inspected for their functionality and maintained if required, especially after rainfall; ○ Excavated material should be stockpiled well away from areas where native vegetation is to be retained and waterways; and ○ Work areas stabilised progressively during works; • Prevent Water Pollution: <ul style="list-style-type: none"> ○ No release of dirty water into drainage lines/waterways. Water will be released from the easement during construction via sediment controls; ○ All fuel/chemicals are to be stored in either self-bunded containers or in a bunded facility;
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	<ul style="list-style-type: none"> ○ An emergency spill kit is always to be kept on sites where equipment is being used; ○ An emergency spill response plan will be appended to the CEMP; and ○ Regular inspection of equipment and vehicles for fuel or oil leaks; • Avoid vehicle strike: <ul style="list-style-type: none"> ○ Vehicles will adhere to a 40 km/hr speed limit on dirt tracks.
Air Quality	<p>To minimise air quality impacts from construction works the following measures will be implemented:</p> <ul style="list-style-type: none"> • Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager. The head or regional office contact information would also be displayed; • Develop and implement an Air Quality Management Plan (AQMP), which may include measures to control other emissions, which will be included in the Contractor CEMP; • Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken; • Make the complaints log available for relevant regulators as required; • Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation; • Perform daily inspections to monitor dust and record inspection results; • Carry out regular visual site inspections to monitor compliance with the AQMP and record visual inspection results; • Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged adverse weather conditions; • Cover, seed or fence stockpiles to minimise wind erosion; • Ensure all on-road vehicles comply with relevant vehicle emission standards, where applicable; • Minimise prolonged idling of vehicles; • Minimise the use of diesel or petrol powered equipment by using battery powered equipment where practicable; • Ensure an adequate water supply for the site for effective dust/particulate matter suppression/ mitigation, only using non-potable water, where possible and appropriate; • Minimise drop heights from loading or handling equipment; • Waste materials will be disposed of at an appropriate facility. There will be no burning of waste materials; • Use water-assisted dust sweeper(s) on the access and local roads to remove, as necessary, any material tracked out of the site; • Avoid dry sweeping of large areas; • Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport; • Record all inspections of haul routes and any subsequent actions.
Visual	<p>The visual mitigation measures to be implemented during the construction of the Project will be:</p> <ul style="list-style-type: none"> • Undertaking a review of materials and colour finishes for selected components including the use of non-reflective finishes to structures where possible; • Minimising tree removal where possible; • Avoidance of temporary light spill beyond the construction site where temporary lighting is required; • Progressively rehabilitating any disturbed areas where necessary; • Protecting mature trees alongside transmission line easements where retained; and • These mitigation measures will be captured within the Project's CEMP.
Bushfire	<p>The bushfire mitigation measures to be implemented during the construction of the Project will be:</p> <ul style="list-style-type: none"> • The power line will be constructed in accordance with the Ausgrid vegetation clearance requirements specified in Ausgrid Network Standard NS179 Vegetation Management

	<p>(with clearance zones of up to 63 m wide) to allow for the safe operation of the line in all meteorological conditions;</p> <ul style="list-style-type: none"> • All fuels and flammable materials used during construction will be stored appropriately; • All machinery will be maintained to operate in good working order to minimise ignition risks; • Contractor vehicles and machinery will be fitted with fire extinguishers; • Staff will be made aware of their obligations for minimising bushfire risk during construction, e.g. no smoking on site, etc.; • The recognition of “Very High” (or greater) Fire Danger Rating days should inform people’s movements in bushland areas and trigger a requirement to view the “Current Fires and Incidents” page on the RFS website (https://www.rfs.nsw.gov.au/fire-information/fires-near-me); • All contractors working on site will be made aware of the emergency evacuation procedures in the event of a bush fire; and • Bushfire mitigation measures, as well as emergency evacuation procedures will be included in the CEMP.
Surface and Groundwater	<p>The following mitigation measures will be applied:</p> <ul style="list-style-type: none"> • Poles will be installed progressively along the alignment to ensure minimum ground disturbance at any one time; • As there is the potential for erosion and sediment impacts to occur during the construction phase, mitigation and management measures will be implemented as required in accordance with: <ul style="list-style-type: none"> ○ <i>Managing Urban Stormwater: Soils and Construction – Volume 1</i> (Landcom 2004) also known as The Blue Book; and ○ <i>Managing Urban Stormwater: Soils and Construction – Volume 2A Installation of services; and Managing Urban Stormwater: Soils and Construction – Volume 2C Unsealed roads</i>; • Install water crossings enabling works as necessary to assist with construction access within the 4.5 m disturbance width; • All areas temporarily disturbed during construction of the power line will be revegetated as soon as practical following completion of construction; • Control measures will be implemented to manage risks associated with the handling of fuel through providing spill kits in close proximity to major plant items. Any temporary fuel storage will be positioned away from waterways and bunded.
Waste	<p>The following mitigation measures will be implemented to manage waste generated by the Project:</p> <ul style="list-style-type: none"> • Any excess VENM will be transported to the Newstan Colliery reject emplacement areas or Hawkmount Quarry; • With the exception of logs/timber requested by the landholders, any green waste generated during clearing will be mulched, and then either: <ul style="list-style-type: none"> ○ Used on site for sediment and erosion control; ○ Used at the MSSS for sediment and erosion control; ○ Transported to Newstan Colliery for rehabilitation works; or ○ Provided to any of the landholders along the power line easement; • All other wastes generated during construction such as construction materials, paper/cardboard, and domestic waste will be removed from site and disposed of at an appropriately licensed waste facility; and • Opportunities for waste reduction will be identified in accordance with the <i>Waste Avoidance and Recovery Act 2001</i>. This will include, but not be limited to, the segregation of material for reuse, recycling and/or disposal.



Centennial Coal

Appendix 1B

SSD-5145

Development Consent

Section 89E of the *Environmental Planning and Assessment Act 1979*

As delegate of the Minister for Planning, I approve the development application referred to in Schedule 1, subject to the conditions in Schedules 2 to 5.

These conditions are required to:

- prevent, minimise, and/or offset adverse environmental impacts;
- set standards and performance measures for acceptable environmental performance;
- require regular monitoring and reporting; and
- provide for the ongoing environmental management of the development.

Oliver Holm
Executive Director
Resource Assessments & Compliance

Sydney

2015

SCHEDULE 1

Application Number:	SSD-5145
Applicant:	Centennial Northern Coal Services Pty Limited
Consent Authority:	Minister for Planning
Land:	See Appendix 1
Development:	Northern Coal Services Project

Red type represents December 2017 modification

TABLE OF CONTENTS

DEFINITIONS	1
ADMINISTRATIVE CONDITIONS	3
OBLIGATION TO MINIMISE HARM TO THE ENVIRONMENT	3
TERMS OF CONSENT	3
LIMITS ON CONSENT	3
STRUCTURAL ADEQUACY	4
DEMOLITION	4
OPERATION OF PLANT AND EQUIPMENT	4
EVIDENCE OF CONSULTATION	4
COMPLIANCE	4
ENVIRONMENTAL CONDITIONS – GENERAL	5
NOISE	5
AIR QUALITY AND GREENHOUSE GAS	7
METEOROLOGICAL MONITORING	8
WATER	8
BIODIVERSITY	10
HERITAGE	11
TRAFFIC & TRANSPORT	12
VISUAL	12
WASTE	12
BUSHFIRE MANAGEMENT	12
REHABILITATION	12
ADDITIONAL PROCEDURES	14
NOTIFICATION OF LANDOWNERS	14
INDEPENDENT REVIEW	14
ENVIRONMENTAL MANAGEMENT, REPORTING AND AUDITING	15
ENVIRONMENTAL MANAGEMENT	15
REPORTING	17
INDEPENDENT ENVIRONMENTAL AUDIT	17
ACCESS TO INFORMATION	17
APPENDIX 1: SCHEDULE OF LAND	19
APPENDIX 2: DEVELOPMENT LAYOUT	22
APPENDIX 3: NOISE ASSESSMENT	25
APPENDIX 4: NOISE RECEIVERS	26
APPENDIX 5: ABORIGINAL CULTURAL HERITAGE	28
APPENDIX 6: APPLICANT'S STATEMENT OF COMMITMENTS	30

DEFINITIONS

Annual review	The review of operations required by Condition 11 of Schedule 5
Applicant	Centennial Northern Coal Services Pty Limited, or any other person or persons who rely on this consent to carry out the development that is subject to this consent
ARI	Annual recurrence interval
BCA	Building Code of Australia
Built features	Includes any building or work erected or constructed on land, including dwellings, outbuildings and infrastructure such as any formed road, street, path, walk, or driveway and any pipeline, water, sewer, telephone, gas or other service main
CCC	Community Consultative Committee
CES	Cooranbong Entry Site, as shown in Figure 2 of Appendix 2
CPP	Coal preparation plant
Conditions of this consent	Conditions contained in Schedules 2 to 5 inclusive
Coal transportation and processing operations	Includes the following, where carried out on the site: <ul style="list-style-type: none"> • processing, handling and storage of coal; • transportation of coal by private haul road, conveyor or rail; and • transportation and emplacement of coal rejects and tailings
CLWD	Crown Lands and Water Division of the Department of Industry
Construction activities	The construction works at the CES and NCSS, including construction of coal stockpiles, the CPP, piping of LT Creek, pollution control works and automation of coal handling facilities as described in the EIS
CPI	Consumer Price Index, as published by the Australian Bureau of Statistics
DA 73-11-98	Development consent for the Newstan Colliery Lease Extension Area, granted on 14 May 1999, as since modified
DA 97/800	Development consent for the Mandalong Mine, granted on 14 October 1998, as since modified
Day	The period from 7.00 am to 6.00 pm on Monday to Saturday, and 8.00 am to 6.00 pm on Sundays and Public Holidays
Department	Department of Planning and Environment
Development	The development described in the EIS
DPI	Department of Primary Industries
DRG	Division of Resources and Geoscience, of the Department
EIS	Environmental Impact Statement titled <i>Northern Coal Logistics Project Environmental Impact Statement</i> , dated September 2014; associated response to issues raised in submissions, titled <i>Northern Coal Logistics Project Response to Submissions</i> , dated February 2015; and additional information regarding residual concerns, titled <i>Mandalong Southern Extension Project Response to RTS Report</i> , dated April 2015
EPA	Environment Protection Authority
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
EP&A Regulation	<i>Environmental Planning and Assessment Regulation 2000</i>
EPL	Environment Protection Licence issued under the POEO Act
Evening	The period from 6.00 pm to 10.00 pm
Feasible	Feasible relates to engineering considerations and what is practical to build or to implement
Ha	Hectare
Heritage item	An item as defined under the <i>Heritage Act 1977</i> and/or an Aboriginal object or Aboriginal place as defined under the <i>National Parks and Wildlife Act 1974</i>
HLLS	Hunter Local Land Services
Incident	A set of circumstances that: <ul style="list-style-type: none"> • causes or threatens to cause material harm to the environment; and/or • breaches or exceeds the limits or performance measures/criteria in this consent
Land	As defined in the EP&A Act, except for where the term is used in the noise and air quality conditions in Schedules 3 and 4 of this consent where it is defined to mean the whole of a lot, or contiguous lots owned by the same landowner, in a current plan registered at the Land Titles Office at the date of this consent
LMCC	Lake Macquarie City Council
Material harm to the environment	Actual or potential harm to the health or safety of human beings or to ecosystems that is not trivial
Minister	Minister for Planning, or delegate

Mitigation	Activities associated with reducing the impacts of the development prior to or during those impacts occurring
Morning shoulder period	The period from 6am to 7am, Monday to Saturday, and 6am to 8am on Sunday and Public Holidays
NCSS	Newstan Colliery Surface Site as shown in Figure 3 of Appendix 2
Night	The period from 10pm to 7am on Monday to Saturday, and 10.00 pm to 8.00 am on Sundays and Public Holidays. Where a Morning Shoulder period applies, the Night period reduces to the period from 10pm to 6am
OEH	Office of Environment and Heritage
POEO Act	<i>Protection of the Environment Operations Act 1997</i>
Privately-owned land	Land that is not owned by a public agency or a mining or power generation company (or its subsidiary)
Product coal	Saleable coal transported from the site, whether processed or unprocessed
Reasonable	Reasonable relates to the application of judgement in arriving at a decision, taking into account: mitigation benefits, cost of mitigation versus benefits provided, community views and the nature and extent of potential improvements
Registered Aboriginal Parties	Aboriginal community stakeholders listed in Table 1 of Appendix 5
Rehabilitation	The restoration of land disturbed by the development to a good condition to ensure it is safe, stable and non-polluting
Remediation	Activities associated with partially or fully repairing or rehabilitating the impacts of the development or controlling the environmental consequences of this impact
ROM coal	Run-of-mine coal
SANSW	<i>Subsidence Advisory NSW</i>
SEE (Mod 1)	<i>Statement of Environmental Effects titled 'Northern Coal Logistics Project Development Consent SSD-5145 Section 96(1A) Modification Statement of Environmental Effects' dated October 2017, and the Response to Submissions titled RE: SSD-5145 MOD 1 Response to Submissions Letter Report dated 15 December 2017, all prepared by Centennial Coal Company Ltd</i>
Secretary	The Secretary of the Department, or nominee
Site	All land to which the development application applies as listed in Appendix 1 and shown in Appendix 2
Statement of Commitments	The Applicant's commitments, as set out in the EIS, and shown in Appendix 6

SCHEDULE 2 ADMINISTRATIVE CONDITIONS

OBLIGATION TO MINIMISE HARM TO THE ENVIRONMENT

1. In addition to meeting the specific performance measures and criteria established under this consent, the Applicant **must** implement all reasonable and feasible measures to prevent and/or minimise any **material** harm to the environment that may result from the construction, operation, or rehabilitation of the development.

TERMS OF CONSENT

2. The Applicant **must** carry out the development:
 - (a) generally in accordance with the EIS **and SEE (Mod 1)**;
 - (b) in accordance with the Development Layout and Statement of Commitments; and
 - (c) in accordance with the conditions of this consent.

Note: The Development Layout is shown in the figures in Appendix 2.

3. If there is any inconsistency between the **documents identified in condition 2(a)**, the more recent document shall prevail to the extent of the inconsistency. However, the conditions of this consent shall prevail to the extent of any inconsistency.
4. **The Applicant must comply with any reasonable requirement/s of the Secretary arising from the Department's assessment of:**
 - (a) **any strategies, plans, programs, reviews, audits, reports or correspondence submitted in accordance with this consent (including any stages of these documents);**
 - (b) **any reviews, reports or audits commissioned by the Department regarding compliance with this consent; and**
 - (c) **the implementation of any actions or measures contained in these documents.**

LIMITS ON CONSENT

Coal Transportation and Processing Operations

5. The Applicant may carry out coal transportation and processing operations on the site until 31 December 2045.

Note: Under this consent, the Applicant is required to rehabilitate the site and perform additional undertakings to the satisfaction of either the Secretary or DRG. Consequently this consent will continue to apply in all other respects other than the right to conduct coal transportation and processing operations until the rehabilitation of the site and these additional undertakings have been carried out satisfactorily.

6. In any calendar year, the Applicant **must** not:
 - (a) receive, handle or process more than 8 million tonnes of ROM coal at the NCSS site;
 - (b) transport more than 6 million tonnes of ROM coal from the CES to the NCSS;
 - (c) transport more than 6 million tonnes of ROM coal from the CES to Eraring Power Station;
 - (d) receive more than 4.5 million tonnes of ROM coal from Newstan Colliery at the NCSS;
 - (e) transport more than 0.88 million tonnes of ROM coal from Awaba Colliery to the NCSS;
 - (f) transport more than 4.5 million tonnes of product coal from the NCSS to Eraring Power Station;
 - (g) transport more than 0.5 million tonnes of product coal (middlings) from NCSS to CES; and
 - (h) transport more than 8 million tonnes of product coal from the NCSS by rail.
7. The Applicant **must** not despatch more than 8 trains from the site in any day.
8. Prior to transporting more than 5.5 million tonnes of coal by rail in any calendar year, the Applicant **must** construct the automated coal recovery and train loading system as proposed in the EIS, to the satisfaction of the Secretary. Following its construction, the Applicant **must** use the automated coal recovery and train loading system for all transport of coal by rail.

Hours of Operation

9. The Applicant **must** comply with the operating hours in Table 1.

Table 1: Operating hours

Activity	Operating Hours
Coal transportation and processing operations; maintenance activities	24 hours a day, 7 days per week
Construction activities	7.00 am to 6.00 pm on Monday to Friday, and 8.00 am to 1.00 pm on Saturday, with no construction activities on Sunday or on public holidays

Note: This condition does not apply in the event of a direction from police or other relevant authority for safety or emergency reasons regarding works which may need to be undertaken to avoid loss of life, property loss and/or to prevent environmental harm.

STRUCTURAL ADEQUACY

10. The Applicant **must** ensure that all new buildings and structures, and any alterations or additions to existing buildings and structures that are part of the development, are constructed in accordance with:
- the relevant requirements of the BCA; and
 - any additional requirements of the MSB, where the building or structure is located on land within a declared Mine Subsidence District.

Notes:

- Under Part 4A of the EP&A Act, the Applicant is required to obtain construction and occupation certificates for the proposed building works.*
- Part 8 of the EP&A Regulation sets out the requirements for the certification of the development.*
- Under Section 15 of the Mine Subsidence Compensation Act 1961, the Applicant is required to obtain the MSB's approval before subdivision or constructing any improvements in a Mine Subsidence District.*

DEMOLITION

11. The Applicant **must** ensure that all demolition work is carried out in accordance with *Australian Standard AS 2601-2001: The Demolition of Structures*, or its latest version.

OPERATION OF PLANT AND EQUIPMENT

12. The Applicant **must** ensure that all plant and equipment used at the site is:
- maintained in a proper and efficient condition; and
 - operated in a proper and efficient manner.

EVIDENCE OF CONSULTATION

13. Where conditions of this consent require a document to be prepared in consultation with an identified party, the Applicant **must**:
- consult with the relevant party prior to submitting the subject document to the Secretary for approval; and
 - provide details of the consultation undertaken including:
 - a description of how matters raised by those consulted have been resolved to the satisfaction of both the Applicant and the party consulted; and
 - details of any disagreement remaining between the party consulted and the Applicant, and how the Applicant has addressed the matters not resolved.

COMPLIANCE

14. The Applicant **must** ensure that all employees, contractors and sub-contractors are made aware of, and instructed to comply with, the conditions of this consent relevant to activities they carry out in respect of the project.

SCHEDULE 3 ENVIRONMENTAL CONDITIONS – GENERAL

NOISE

Construction Noise

- The Applicant **must** ensure that the noise generated by construction activities is managed in accordance with the requirements of the *Interim Construction Noise Guideline* (DECC, 2009), as may be updated from time to time.

Operational Noise Criteria

- Until the automated coal recovery and train loading system required by condition 8 of Schedule 2 is in use, the Applicant **must** ensure that the operational noise generated by the development (including maintenance activities) does not exceed the criteria in Table 2 at any residence on privately-owned land.

Table 2: Operational Noise Criteria

Receiver	Noise Limit (dB(A))				
	Morning Shoulder ($L_{Aeq}(15\text{ min})$)	Day ($L_{Aeq}(15\text{ min})$)	Evening ($L_{Aeq}(15\text{ min})$)	Night ($L_{Aeq}(15\text{ min})$)	Night ($L_{A1}(1\text{ min})$)
NC2	36	36	35	35	45
NC3, Residences around NC6	40	40	39	39	45
23	-	37	37	37	45
26	-	36	36	36	45
All other residences on privately-owned land	-	35	35	35	45
		($L_{Aeq}(1\text{ hour})$)			
NC6 (school), when in use	-	45 (external to school building)	-	-	-

Notes to Table 2:

- The receiver locations in Table 2 are shown in Figures 1 and 2 of Appendix 4.
- Criteria for the Morning Shoulder period only applicable where these have been specifically developed for this period.

Noise generated by the development is to be measured in accordance with the relevant requirements and exemptions (including certain meteorological conditions) of the *NSW Noise Policy for Industry* (EPA, 2017). Appendix 3 sets out the meteorological conditions under which these criteria apply, and the requirements for evaluating compliance with these criteria.

However, these criteria do not apply if the Applicant has an agreement with the relevant landowner to exceed the noise criteria in Table 2, and the Applicant has advised the Department in writing of the terms of this agreement.

- Once the automated coal recovery and train loading system required by condition 8 of Schedule 2 is in use, and thereafter, the Applicant **must** ensure that the operational noise generated by the development (including maintenance activities) does not exceed the criteria in Table 3 at any residence on privately-owned land.

Table 3: Operational Noise Criteria

Receiver	Noise Limit (dB(A))				
	Morning Shoulder ($L_{Aeq}(15\text{ min})$)	Day ($L_{Aeq}(15\text{ min})$)	Evening ($L_{Aeq}(15\text{ min})$)	Night ($L_{Aeq}(15\text{ min})$)	Night ($L_{A1}(1\text{ min})$)
NC2	35	35	35	35	45
NC3, Residences around NC6	38	38	37	37	45
23	-	37	37	37	45
26	-	36	36	36	45

All other residences on privately-owned land	-	35	35	35	45
		(<i>L_{Aeq}(1 hour)</i>)			
NC6 (school), when in use	-	45 (external to school building)	-	-	-

Notes to Table 3:

- The receiver locations in Table 3 are shown in Figures 1 and 2 of Appendix 4.
- Criteria for the Morning Shoulder period only applicable where these have been specifically developed for this period.

Noise generated by the development is to be measured in accordance with the relevant requirements and exemptions (including certain meteorological conditions) of the *NSW Noise Policy for Industry* (EPA, 2017). Appendix 3 sets out the meteorological conditions under which these criteria apply, and the requirements for evaluating compliance with these criteria.

However, these criteria do not apply if the Applicant has an agreement with the relevant landowner to exceed the noise criteria in Table 3, and the Applicant has advised the Department in writing of the terms of this agreement.

Operating Conditions

4. The Applicant **must**:
 - (a) implement best management practice to minimise the construction, operational, road and rail noise of the development;
 - (b) operate an on-site noise management system that uses a combination of predictions, forecasting and real-time and attended noise monitoring of all noise associated with the development, to ensure compliance with the relevant conditions of this consent, including noise during construction and operations;
 - (c) minimise the noise impacts of the development during meteorological conditions under which the noise limits in this consent do not apply (see Appendix 3); and
 - (d) regularly assess noise monitoring data to determine whether the development is complying with the relevant conditions of consent, to the satisfaction of the Secretary.

Noise Management Plan

5. The Applicant **must** prepare a Noise Management Plan for the development to the satisfaction of the Secretary. This plan must:
 - (a) be prepared in consultation with the EPA, by suitably qualified and experienced persons whose appointment has been approved by the Secretary;
 - (b) be submitted to the Secretary for approval by 31 March 2016 unless otherwise agreed by the Secretary;
 - (c) describe the measures that would be implemented to ensure compliance with the noise criteria and operating conditions of this consent;
 - (d) describe the proposed noise management system in detail;
 - (e) include a monitoring program that evaluates and reports on:
 - the effectiveness of the on-site noise management system;
 - compliance against the noise criteria in this consent; and
 - compliance with the noise operating conditions in condition 4 above;
 - (f) include a program to calibrate and validate the real-time monitoring results with the attended monitoring results over time, so the real-time noise monitoring program can be used to better indicate compliance with the noise criteria in this consent, and trigger further attended monitoring as necessary;
 - (g) defines what constitutes a noise incident, and includes a protocol for identifying and notifying the Department and relevant stakeholders of any noise incidents; and
 - (h) outlines procedures to manage responses to any complaints or issues raised by the owners of affected residences.

The Applicant must implement the plan as approved by the Secretary.

AIR QUALITY & GREENHOUSE GAS

Odour

6. The Applicant **must** ensure that no offensive odours are emitted from the site, as defined under the POEO Act.

Air Quality Criteria

7. The Applicant **must** ensure that all reasonable and feasible avoidance and mitigation measures are employed so that particulate matter emissions generated by the development do not cause exceedances of the criteria in Table 4 at any residence on privately-owned land.

Table 4: Air quality criteria

Pollutant	Averaging Period	Criterion	
Particulate matter < 10 µm (PM ₁₀)	Annual	a,d 25 µg/m ³	
Particulate matter < 10 µm (PM ₁₀)	24 hour	b 50 µg/m ³	
Total suspended particulates (TSP)	Annual	a,d 90 µg/m ³	
^c Deposited dust	Annual	^b 2 g/m ² /month	a,d 4 g/m ² /month

Notes to Table 4:

a Cumulative impact (ie increase in concentrations due to the development plus background concentrations due to all other sources).

b Incremental impact (ie increase in concentrations due to the development alone, with zero allowable exceedances of the criteria over the life of the development).

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

d Excludes extraordinary events such as bushfires, prescribed burning, dust storms, fire incidents or any other activity agreed by the Secretary.

e "Reasonable and feasible avoidance measures" includes, but is not limited to, the operational requirements in conditions 9 and 10 to develop and implement an air quality management system that ensures operational responses to the risks of exceedance of the criteria.

Mitigation Measures

8. If the development causes an exceedance of the air quality criteria in Table 4, the Applicant **must**, upon receiving a written request for air quality mitigation measures from the landowner, undertake air quality mitigation measures directed towards reducing the potential human health and amenity impacts of the development at a residence. These measures may include (for example):
 - (a) air conditioning, including heating;
 - (b) first flush water systems;
 - (c) installation and regular replacement of water filters;
 - (d) cleaning of rainwater tanks;
 - (e) clothes dryers; and
 - (f) regular cleaning or any residence and its related amenities, such as barbeque areas and swimming pools.

If within 3 months of receiving this request from the owner, the Applicant and the owner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Secretary for resolution.

Operating Conditions

9. The Applicant **must**:
 - (a) implement all reasonable and feasible measures to minimise the:
 - off-site odour and dust emissions of the development; and
 - release of greenhouse gas emissions from the development;
 - (b) minimise any visible air pollution generated by the development;
 - (c) minimise the surface disturbance of the site;
 - (d) operate a comprehensive air quality management system to ensure compliance with the relevant conditions of this consent; and

- (e) minimise the air quality impacts of the development during adverse meteorological conditions and extraordinary events (see note d to Table 4 above), to the satisfaction of the Secretary.

Air Quality & Greenhouse Gas Management Plan

- 10. The Applicant **must** prepare an Air Quality & Greenhouse Gas Management Plan for the development, to the satisfaction of the Secretary. This plan must:
 - (a) be prepared in consultation with EPA, by suitably qualified and experienced persons whose appointment has been approved by the Secretary;
 - (b) be submitted to the Secretary for approval by 31 March 2016, unless otherwise agreed by the Secretary;
 - (c) describe the measures that would be implemented to ensure compliance with the relevant air quality criteria and operating conditions of this consent;
 - (d) describe the on-site air quality management system in detail; and
 - (e) include an air quality monitoring program that:
 - adequately supports the air quality management system;
 - includes PM_{2.5} monitoring;
 - includes the use of real-time monitors to evaluate the performance of the development;
 - evaluates and reports on:
 - compliance with the air quality criteria;
 - the effectiveness of the air quality management system; and
 - compliance against the air quality operating conditions in condition 9 above;
 - defines what constitutes an air quality incident, and includes a protocol for identifying and notifying the Department and relevant stakeholders of any air quality incidents.

The Applicant must implement the plan as approved by the Secretary.

METEOROLOGICAL MONITORING

- 11. For the life of the development, the Applicant **must** ensure that there is a suitable meteorological station operating in the vicinity of the site that:
 - (a) complies with the requirements in the *Approved Methods for Sampling and Analysis of Air Pollutants in New South Wales* guideline; and
 - (b) is capable of continuous real-time measurement of the atmospheric stability category determined by the sigma theta method in accordance with the *NSW Noise Policy for Industry (EPA, 2017)*.

WATER

Water Supply

- 12. The Applicant **must** ensure that it has sufficient water for all stages of the development, and if necessary, adjust the scale of its operations to match its available water supply.

Note: Under the Water Act 1912 and/or the Water Management Act 2000, the Applicant is required to obtain the necessary water licences for the development.

Water Pollution

- 13. Unless an EPL authorises otherwise, the Applicant **must** comply with Section 120 of the POEO Act.
- 14. The Applicant **must** implement all reasonable and feasible measures to reduce water pollution associated with the discharge of mine-water (particularly salinity and dissolved or suspended metals associated with groundwater pumped from underground mine workings) required to comply with any EPL applying to the development.

Mine-Water Discharges Management Plan

- 15. The Applicant **must** prepare a Mine-Water Discharges Management Plan for the development to the satisfaction of the Secretary. This plan must:
 - (a) be prepared in consultation with the EPA, by suitably qualified and experienced persons whose appointment has been approved by the Secretary;
 - (b) be submitted to the Secretary for approval by 30 June 2016 unless otherwise agreed by the Secretary;
 - (c) describe the measures that would be implemented to ensure compliance with conditions 13 and 14 and relevant performance measures in Table 5;

- (d) include targets, developed in co-operation with the EPA, to reduce acute and chronic toxicity from mine-water discharged from both the NCSS and CES to achieve the in-stream water quality and aquatic ecology objectives and criteria required by condition 16 below;
- (e) include measures, developed in co-operation with the EPA to be implemented over 2-year, 10-year and life-of-project timeframes to reduce the salinity and metals toxicity in mine-water discharged from both the NCSS and CES to achieve these targets; and
- (f) take into account relevant requirements of the Water Management Plan required by condition 17 below.

The Applicant must implement the plan as approved by the Secretary.

Water Management Performance Measures

16. The Applicant **must** comply with the performance measures in Table 5, to the satisfaction of the Secretary.

Table 5: Water Management Performance Measures

Feature	Performance Measure
Potable Water	<ul style="list-style-type: none"> Minimise the use of potable water from the public supply for purposes where non-potable water is acceptable.
Site (as a whole)	<ul style="list-style-type: none"> Design, install and maintain erosion and sediment controls generally in accordance with the series <i>Managing Urban Stormwater: Soils and Construction</i> including <i>Volume 1</i>, <i>Volume 2A – Installation of Services</i> and <i>Volume 2C – Unsealed Roads</i>. Design, install and maintain any infrastructure within 40 m of watercourses generally in accordance with the <i>Guidelines for Controlled Activities on Waterfront Land</i> (DPI 2012), or the latest version. Design, install and maintain creek crossings generally in accordance with the <i>Policy and Guidelines for Fish Friendly Waterway Crossings</i> (NSW Fisheries 2003) and <i>Why Do Fish Need To Cross The Road? Fish Passage Requirements for Waterway Crossings</i> (NSW Fisheries 2003), or the latest versions.
Sediment Dams	<ul style="list-style-type: none"> Maintain dams generally in accordance with the series <i>Managing Urban Stormwater: Soils and Construction – Volume 1 and Volume 2E Mines and Quarries</i>.
Clean water diversions	<ul style="list-style-type: none"> Design, install and maintain new clean water diversion structures to convey the 100 year ARI flood. Maximise as far as reasonable and feasible the diversion of clean water around disturbed areas on site.
Mine-water storages	<ul style="list-style-type: none"> Design, install and maintain mine-water storage infrastructure to ensure no unlicensed or uncontrolled discharge of mine-water off-site.
Aquatic and riparian ecosystems (including affected sections of LT, Stony and Lords Creeks, unnamed watercourses receiving discharges from Hawkmount Quarry and CES, Muddy Creek and Muddy Lake)	<ul style="list-style-type: none"> Maintain or improve baseline channel stability Develop site-specific in-stream water quality and aquatic ecology (macroinvertebrate health and ecotoxicity assessment) objectives and criteria in consultation with the EPA and in accordance with any EPL applying to the NCSS and/or CES.
Chemical and hydrocarbon storage	<ul style="list-style-type: none"> Chemical and hydrocarbon products to be stored in bunded areas in accordance with the relevant Australian Standards.

Water Management Plan

17. The Applicant **must** prepare and a Water Management Plan for the development to the satisfaction of the Secretary. This plan must:
- (a) be prepared in consultation with **CLWD** and the EPA, by suitably qualified and experienced persons whose appointment has been approved by the Secretary;
 - (b) be submitted to the Secretary for approval by 31 March 2016, unless otherwise agreed by the Secretary;
 - (c) include detailed performance criteria and describe measures to ensure that the Applicant complies with the Water Management Performance Measures in Table 5;
 - (d) include the following, in addition to the standard requirements for management plans (see condition 2 of Schedule 5):
 - (i) a Site Water Balance, that includes details of:
 - water use and management on site;

- any off-site water discharges; and
 - reporting procedures, including the preparation of a site water balance for each calendar year of the development; and
 - investigates and implements all reasonable and feasible measures to minimise potable water use and to recycle water;
- (ii) a Surface Water Management Plan, that includes:
- detailed baseline data on water flows and quality in the watercourses that could be affected by the development;
 - a detailed description of the development's water management systems, including the:
 - clean water diversion systems;
 - erosion and sediment controls; and
 - mine-water management systems;
 - detailed plans including design objectives and performance criteria for:
 - design and management for the emplacement of coal reject materials and any potential acid-forming materials;
 - the proposed piping of LT Creek to enable the construction of coal stockpiles; and
 - management of sodic and dispersible soils;
 - detailed performance criteria, including trigger levels, for investigating any potentially adverse impacts associated with:
 - the water management systems;
 - downstream surface water quality;
 - downstream watercourse channel stability, particularly for the Fassifern Archery Club section of LT Creek;
 - downstream flooding impacts; and
 - stream and riparian vegetation health;
 - a program to monitor and report on:
 - the effectiveness of the water management systems; and
 - surface water flows and water quality, and the condition of stream and riparian vegetation in the watercourses on site and downstream of the site;
 - macroinvertebrate health and ecotoxicity parameters downstream of mine-water discharges; and
 - downstream flooding impacts;
 - reporting procedures for the results of the monitoring program; and
 - a plan to respond to any exceedances of the performance criteria, and mitigate any adverse surface water impacts of the development.

The Applicant must implement the plan as approved by the Secretary.

BIODIVERSITY

Biodiversity Offset Strategy

18. Prior to clearing any native vegetation, the Applicant **must** finalise a Biodiversity Offset Strategy, to compensate for the clearing of 2.13 ha of *Coastal Foothills Spotted Gum – Ironbark Forest*, 5.06 ha of *Coastal Plains Smooth-barked Apple Woodland* and 241 clumps of *Tetratheca juncea*. The Biodiversity Offset Strategy must:
- (a) be finalised in consultation with OEH;
 - (b) include a suitable biodiversity offset area, and make arrangements to manage, protect and provide long-term security for the biodiversity offset area; and
 - (c) make other arrangements to offset vegetation clearing, such as research into genetic diversity of *Tetratheca juncea*, in consultation with OEH, to the satisfaction of the Secretary.

Biodiversity Management Plan

19. The Applicant **must** prepare a Biodiversity Management Plan for the development to the satisfaction of the Secretary. This plan must:
- (a) be prepared in consultation with OEH and HLLS, and submitted to the Secretary for approval prior to clearing any native vegetation or by 31 December 2016, whichever is the sooner;
 - (b) describe the short-term, medium-term, and long-term measures that would be implemented to:
 - manage remnant vegetation and habitat at the site;
 - avoid or minimise direct and indirect impacts to threatened species outside of proposed areas of ground disturbance; and
 - implement the Biodiversity Offset Strategy;
 - (c) include detailed performance and completion criteria for the Biodiversity Offset Strategy;
 - (d) include a detailed description of the measures that would be implemented over the next 3 years (to be

- updated for each 3-year period following initial preparation of the plan) to:
 - enhance the quality of existing vegetation and fauna habitat;
 - minimise the impacts to fauna, including undertaking pre-clearance surveys;
 - replace cleared hollow-bearing trees with appropriate nest boxes at a ratio of 2:1;
 - provide for the translocation of *Tetratheca juncea* clumps affected by the development;
 - manage salinity;
 - control erosion, weeds, feral pests and unauthorised access; and
 - manage bushfire risk; and
- (e) include a program to monitor and report on these measures, and progress against the performance and completion criteria.

The Applicant must implement the plan as approved by the Secretary.

Conservation Bond

20. Within 6 months of the approval of the Biodiversity Management Plan, unless the Secretary agrees otherwise, the Applicant **must** lodge a Conservation Bond with the Department, to ensure that the Biodiversity Offset Strategy is implemented in accordance with the performance and completion criteria of the Biodiversity Management Plan.

The sum of the bond **must** be determined by:

- (a) calculating the full cost of implementing the Biodiversity Offset Strategy (other than land acquisition costs); and
- (b) employing a suitably qualified quantity surveyor to verify the calculated costs.

The calculation of the Conservation Bond must be submitted to the Department for approval at least 1 month prior to the lodgment of the bond.

The Conservation Bond must be reviewed and if required, an updated bond must be lodged with the Department within 3 months following:

- (a) an update or revision to the Biodiversity Management Plan;
- (b) the completion of an Independent Environmental Audit in which recommendations relating to the implementation of the Biodiversity Offset Strategy have been made; or
- (c) a request for review by the Secretary.

The Secretary will release the bond if the offset strategy is completed generally in accordance with the completion criteria in the Biodiversity Management Plan. If the offset strategy is not completed generally in accordance with the completion criteria in the Biodiversity Management Plan, the Secretary will call in all, or part of, the Conservation Bond, and arrange for the satisfactory completion of the relevant works.

Notes:

- Alternative funding arrangements for long-term management of the Biodiversity Offset Strategy, such as provision of capital and management funding as agreed by OEH as part of a Biobanking Agreement, or transfer to the conservation reserve estate can be used to reduce the liability of the Conservation Bond.
- The sum of the bond may be reviewed in conjunction with any revision to the Biodiversity Management Plan.

HERITAGE

Heritage Management Plan

21. The Applicant **must** prepare a Heritage Management Plan for the development, to the satisfaction of the Secretary. This plan must:
- (a) be prepared in consultation with OEH and Registered Aboriginal Parties;
 - (b) be submitted to the Secretary for approval, prior to commencement of construction activities, or by 31 March 2016, whichever is sooner; and
 - (c) include:
 - a description of the measures that would be implemented to:
 - protect, monitor and/or manage Aboriginal cultural heritage items including the scarred tree adjacent to Hawkmount Quarry identified as RPS COAL LOG 1 (AHIMS 45-7-0324);
 - manage the discovery of previously unidentified Aboriginal items;
 - maintaining and managing reasonable access for Aboriginal stakeholders to heritage items on the Applicant's land;
 - ongoing consultation with Aboriginal stakeholders in the conservation and management of Aboriginal cultural heritage;
 - a short-term and long-term strategy for the storage of any Aboriginal cultural heritage items salvaged on site; and

- a protocol for the management of impacts to historic heritage sites/items, including archival recording where impacts to historic heritage sites/items cannot be avoided.

The Applicant must implement the plan as approved by the Secretary.

Note: This plan can be incorporated with any Heritage Management Plan for Centennial's other mines and mine infrastructure on the Central Coast / Lake Macquarie areas.

TRAFFIC AND TRANSPORT

22. The Applicant **must**, at its own cost, repair any damage to any local road caused by construction traffic from the development, to the satisfaction of LMCC.

Construction Traffic Management Plan

23. The Applicant **must** prepare a Construction Traffic Management Plan for the development, to the satisfaction of the Secretary. This plan must:
- be prepared in consultation with LMCC;
 - be approved by the Secretary prior to the commencement of construction at NCSS or Hawkmount Quarry; and
 - detail the measures that would be applied to:
 - limit the noise and dust impacts of construction traffic; and
 - avoid and/or limit potential conflicts between construction traffic and other road users.

The Applicant must implement the plan as approved by the Secretary.

VISUAL

Visual Amenity and Lighting

24. The Applicant **must**:
- implement all reasonable and feasible measures to minimise the visual and off-site lighting impacts of the development;
 - ensure that all external lighting associated with the development complies with *Australian Standard AS4282 (INT) 1995 - Control of Obtrusive Effects of Outdoor Lighting*; and
 - take all practical measures to shield views of mining operations from users of public roads and privately-owned residences,
- to the satisfaction of the Secretary.

WASTE

25. The Applicant **must**:
- minimise and monitor the waste generated by the development;
 - ensure that the waste generated by the development is appropriately stored, handled and disposed of in accordance with the requirements of the EPA;
 - manage on-site sewage treatment and disposal in accordance with the requirements of LMCC and EPA; and
 - report on waste management and minimisation in the Annual Review,
- to the satisfaction of the Secretary.

BUSHFIRE MANAGEMENT

26. The Applicant **must**:
- ensure appropriate Asset Protection Zones are maintained at NCSS and CES, to the satisfaction of LMCC;
 - ensure that the NCSS and CES are suitably equipped to respond to fires; and
 - assist the Rural Fire Service and emergency services as much as possible if there is a fire in the vicinity of the site.

REHABILITATION

Rehabilitation Objectives

27. The Applicant **must** rehabilitate the site to the satisfaction of **DRG**. This rehabilitation must be generally consistent with the proposed rehabilitation strategy described in the EIS, and comply with the objectives in Table 6.

Table 6: Rehabilitation Objectives

Feature	Objective
Site (as a whole)	<ul style="list-style-type: none"> • Safe, stable & non-polluting
Surface infrastructure	<ul style="list-style-type: none"> • To be decommissioned and removed, unless DRG agrees otherwise. • NCSS, CES, Hawkmount Quarry and Reject Emplacement areas to be made safe and hydraulically and geotechnically stable. • NCSS and CES to be rehabilitated for use as light industrial areas; or revegetated with suitable local native plant species to a landform consistent with the surrounding environment.
Rehabilitation materials	<ul style="list-style-type: none"> • Materials from areas disturbed under this consent (including topsoils, substrates and seeds) are to be recovered, managed and used as rehabilitation resources.
Reject Emplacement Areas	<ul style="list-style-type: none"> • Hawkmount Quarry and the Reject Emplacement Area sites to be revegetated with suitable local native plant species, and to a landform consistent with the surrounding environment. • Capping materials (including depth of application) to be approved by DRG prior to capping.
Revegetated final landforms	<ul style="list-style-type: none"> • Stable and sustain the intended land use. • Consistent with surrounding topography to minimise visual impacts. • Incorporate relief patterns and design principles consistent with natural drainage.
Native flora and fauna	<ul style="list-style-type: none"> • Flora species used in rehabilitation selected to re-establish and complement local and regional biodiversity. • Rehabilitated areas contribute to achieving self-sustaining biodiversity habitats.
All watercourses subject to mine-water discharges	<ul style="list-style-type: none"> • Hydraulically and geomorphologically stable, with aquatic ecology and riparian vegetation that is the same or better than prior to grant of this consent.
Water quality	<ul style="list-style-type: none"> • Water retained on site is fit for the intended post mining land use(s). • Water management is consistent with the regional catchment management strategy.
Community	<ul style="list-style-type: none"> • Ensure public safety. • Minimise the adverse socio-economic effects of mine closure.

Progressive Rehabilitation

28. The Applicant **must** rehabilitate the site progressively, that is, as soon as is practicable following disturbance, to the satisfaction of DRG.

Rehabilitation Management Plan

29. The Applicant **must** prepare a Rehabilitation Management Plan for the development, to the satisfaction of the Secretary and DRG. This plan must:
- be prepared consultation with DRG, OEH, CLWD, LMCC and the CCC;
 - be submitted to the Secretary and DRG for approval prior to clearing any native vegetation, or as otherwise agreed by the Secretary;
 - be prepared in accordance with relevant guidelines and consistent with the rehabilitation objectives in the EIS and in Table 6;
 - describe how the performance of the rehabilitation would be monitored and assessed against the objectives in Table 6;
 - provide for detailed development closure planning, including measures to minimise socio-economic effects associated with mine closure, to be developed prior to the site being placed on care and maintenance; and
 - be integrated with the other management plans required under this consent.

The Applicant must implement the plan as approved by the Secretary.

Note: The Rehabilitation Management Plan must address all land impacted by the development, whether prior to or following the date of this consent.

SCHEDULE 4

ADDITIONAL PROCEDURES

NOTIFICATION OF LANDOWNERS

1. As soon as practicable after obtaining monitoring results showing:
 - (a) an exceedance of any relevant criteria in Schedule 3, the Applicant **must** notify affected landowners in writing of the exceedance, and provide regular monitoring results to each affected landowner until the development is again complying with the relevant criteria; and
 - (b) an exceedance of any relevant air quality criteria in Schedule 3, the Applicant **must** send a copy of the NSW Health fact sheet entitled "Mine Dust and You" (as may be updated from time to time) to the affected landowners and/or existing tenants of the land (including the tenants of any mine-owned land).

INDEPENDENT REVIEW

2. If an owner of privately-owned land considers the development to be exceeding the relevant criteria in Schedule 3, then he/she may ask the Secretary in writing for an independent review of the impacts of the development on his/her land.

If the Secretary is satisfied that an independent review is warranted, then within 2 months of the Secretary's decision the Applicant **must**:

- (a) commission a suitably qualified, experienced and independent person, whose appointment has been approved by the Secretary, to:
 - consult with the landowner to determine his/her concerns;
 - conduct monitoring to determine whether the development is complying with the relevant criteria in Schedule 3; and
 - if the development is not complying with these criteria, identify and implement measures to ensure compliance with the relevant criteria; and
 - (b) give the Secretary and landowner a copy of the independent review.
-

SCHEDULE 5

ENVIRONMENTAL MANAGEMENT, REPORTING AND AUDITING

ENVIRONMENTAL MANAGEMENT

Environmental Management Strategy

1. The Applicant **must** prepare an Environmental Management Strategy for the development to the satisfaction of the Secretary. This strategy must:
 - (a) be submitted to the Secretary for approval by 31 March 2016, or as otherwise agreed by the Secretary;
 - (b) provide the strategic framework for environmental management of the development;
 - (c) identify the statutory approvals that apply to the development;
 - (d) describe the role, responsibility, authority and accountability of all key personnel involved in the environmental management of the development;
 - (e) describe the procedures that would be implemented to:
 - keep the local community and relevant agencies informed about the operation and environmental performance of the development;
 - receive, handle, respond to, and record complaints;
 - resolve any disputes that may arise during the course of the development;
 - respond to any non-compliance; and
 - respond to emergencies; and
 - (f) include:
 - **references to** any strategies, plans and programs approved under the conditions of this consent; and
 - a clear plan depicting all the monitoring required to be carried out under the conditions of this consent.

The Applicant must implement the strategy as approved by the Secretary.

Management Plan Requirements

2. The Applicant **must** ensure that the management plans required under this consent are prepared in accordance with any relevant guidelines, and include:
 - (a) detailed baseline data;
 - (b) a description of:
 - the relevant statutory requirements (including any relevant approval, licence or lease conditions);
 - any relevant limits or performance measures/criteria; and
 - the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures;
 - (c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;
 - (d) a program to monitor and report on the:
 - impacts and environmental performance of the development; and
 - effectiveness of any management measures;
 - (e) a contingency plan to manage any unpredicted impacts and their consequences and to ensure that ongoing impacts reduce to levels below relevant impact assessment criteria as quickly as possible;
 - (f) a program to investigate and implement ways to improve the environmental performance of the development over time;
 - (g) a protocol for managing and reporting any:
 - incidents;
 - complaints;
 - non-compliances with statutory requirements; and
 - exceedances of the impact assessment criteria and/or performance criteria; and
 - (h) a protocol for periodic review of the plan.

Note: The Secretary may waive some of these requirements if they are unnecessary or unwarranted for particular management plans.

Application of Existing Management Plans

3. Prior to the approval of management plans under this consent, the Applicant **must** manage development undertaken pursuant to this consent in accordance with any equivalent or similar management plan/s required under development consents DA 97/800 or DA 73-11-98.

Staged Submission of Strategies, Plans or Programs

4. With the approval of the Secretary, the Applicant may submit any strategies, plans or programs required by this consent on a progressive basis.

Note: If the submission of any strategy, plan or program is to be staged, then the Applicant must ensure that existing strategy, plan or program must clearly describe the specific stage to which the strategy, plan or program applies, the relationship of this stage to any future stages, and the trigger for updating the strategy, plan or program.

Consolidation of Strategies, Plans or Programs

5. With the approval of the Secretary, the Applicant may incorporate any strategies, plans or programs required by this consent with the strategies, plans and programs required for Centennial's mining operations within the general vicinity of the development.

Revision of Strategies, Plans and Programs

6. Within 3 months of:
- (a) the submission of an incident report under condition 9 below;
 - (b) the submission of an annual review under condition 11 below;
 - (c) the submission of an audit report under condition 12 below; or
 - (d) **the approval of any modification to the conditions of this consent;**
- the Applicant **must** review, and if necessary revise, the strategies, plans, and programs required under this consent to the satisfaction of the Secretary.

Where this review leads to revisions in any such document, then within 4 weeks of the review, the revised document must be submitted to the Secretary for approval.

Note: This condition ensures that strategies, plans and programs are updated on a regular basis, and incorporate any recommended measures to improve the environmental performance of the development.

Adaptive Management

7. The Applicant must assess and manage development-related risks to ensure that there are no exceedances of the criteria and/or performance measures in Schedule 3. Any exceedance of these criteria and/or performance measures constitutes a breach of this consent and may be subject to penalty or offence provisions under the EP&A Act or EP&A Regulation.

Where any exceedance of these criteria and/or performance measures has occurred, the Applicant must, at the earliest opportunity:

- (a) take all reasonable and feasible steps to ensure that the exceedance ceases and does not reoccur;
- (b) consider all reasonable and feasible options for remediation (where relevant) and submit a report to the Department describing those options and any preferred remediation measures or other course of action; and
- (c) implement remediation measures as directed by the Secretary, to the satisfaction of the Secretary.

Community Consultative Committee

8. The Applicant must establish a Community Consultative Committee (CCC) for the development to the satisfaction of the Secretary. This CCC must be operated in general accordance with the **Community Consultative Committee (CCC) Guidelines for State Significant Developments** (Department of Planning and Environment, 2016) or its latest version.

Notes:

- *This condition may be satisfied by a CCC for the Newstan / Awaba Mines already in place as at the date of this consent.*
- *In accordance with the Guidelines, the CCC must include an independent chair and appropriate representation from the Applicant, Council, recognised environmental groups and the local community.*
- *The CCC is an advisory committee. The Department and other relevant agencies are responsible for ensuring that the Applicant complies with this consent.*
- *The requirement for this CCC may be fulfilled by a regional CCC for Centennial's mines and mine infrastructure in the Central Coast/Lake Macquarie areas.*

REPORTING

Incident Reporting

9. The Applicant **must** immediately notify the Secretary and any other relevant agencies of any incident that has caused, or threatens to cause, material harm to the environment. For any other incident associated with the development, the Applicant **must** notify the Secretary and any other relevant agencies as soon as practicable after the Applicant becomes aware of the incident. Within 7 days of the date of the incident, the Applicant **must** provide the Secretary and any relevant agencies with a detailed report on the incident, and such further reports as may be requested.

Regular Reporting

10. The Applicant **must** regularly report the environmental performance of the development on its website, in accordance with the reporting arrangements in any plans or programs approved under the conditions of this consent.

Annual Review

11. By the end of March each year, or as otherwise agreed by the Secretary, the Applicant **must submit a report to the Department reviewing** the environmental performance of the development to the satisfaction of the Secretary. This review must:
 - (a) describe the development (including any rehabilitation) that was carried out in the past calendar year, and the development that is proposed to be carried out over the current calendar year;
 - (b) include a comprehensive review of the monitoring results and complaints records of the development over the past calendar year, which includes a comparison of these results against the:
 - (i) relevant statutory requirements, limits or performance measures/criteria;
 - (ii) requirements of any plan or program required under this consent;
 - (iii) monitoring results of previous years; and
 - (iv) relevant predictions in the **documents identified in condition 2(a) of Schedule 2**;
 - (c) identify any non-compliance over the past calendar year, and describe what actions were (or are being) taken to ensure compliance;
 - (d) identify any trends in the monitoring data over the life of the development;
 - (e) identify any discrepancies between the predicted and actual impacts of the development, and analyse the potential cause of any significant discrepancies; and
 - (f) describe what measures will be implemented over the current calendar year to improve the environmental performance of the development.

INDEPENDENT ENVIRONMENTAL AUDIT

12. By 14 May 2018, and every 3 years thereafter, unless the Secretary directs otherwise, the Applicant **must** commission, **commence and** pay the full cost of an Independent Environmental Audit of the development. This audit must:
 - (a) be conducted by a suitably qualified, experienced and independent team of experts whose appointment has been endorsed by the Secretary;
 - (b) include consultation with the relevant agencies;
 - (c) assess the environmental performance of the development and whether it is complying with the requirements in this consent and any relevant EPL or Mining Lease (including any assessment, plan or program required under these approvals);
 - (d) review the adequacy of strategies, plans or programs required under the abovementioned approvals;
 - (e) recommend appropriate measures or actions to improve the environmental performance of the development, and/or any assessment, plan or program required under the abovementioned approvals; **and**
 - (f) **be conducted and reported to the satisfaction of the Secretary.**

Note: This audit team must be led by a suitably qualified auditor and include experts in any field specified by the Secretary.

13. Within **12 weeks of commencing** this audit, or as otherwise agreed by the Secretary, the Applicant **must** submit a copy of the audit report to the Secretary, together with its response to any recommendations contained in the audit report **and a timetable for the implementation of any measures proposed to address the recommendations.**

ACCESS TO INFORMATION

14. Within 3 months of the date of this consent, the Applicant **must**:
 - (a) make copies of the following publicly available on its website:

- (i) the documents referred to in condition 2(a) and (b) of Schedule 2;
 - (ii) all current statutory approvals for the development;
 - (iii) all approved strategies, plans and programs required under the conditions of this consent;
 - (iv) a comprehensive summary of the monitoring results of the development, reported in accordance with the specifications in any conditions of this consent, or any approved plans and programs;
 - (v) a complaints register, updated monthly;
 - (vi) minutes of CCC meetings for the last 2 years;
 - (vii) the annual reviews of the development;
 - (viii) any independent environmental audit of the development, and the Applicant's response to the recommendations in any audit;
 - (ix) any other matter required by the Secretary; and
- (b) keep this information up-to-date,
to the satisfaction of the Secretary.
-

APPENDIX 1: SCHEDULE OF LAND

Lot	Schedule	DP
100		1149240
104		1149241
103		1149241
1		1031778
7306		1164232
UCL		418269
7306		1164232
214		755207
1		582126
65		1126625
153		755207
102		755218
7305		1149082
7304		1149082
215		755207
11		1050120
1		659579
C		381399
78		755207
27		755207
64		755207
390		1064199
591		607932
1		121470
631		816256
442		583057
148		728974
149		728974
391		1064199
443		583057
435		1111527
441		583057
186		755218
187		755218
170		755218
179		755218
173		755218
169		755218
1	A	6747
2	A	6747
171		755218
208		755207
205		755207
8		821188
8		1031859
447		1064562
12		1031859
322		39722
318		39722

Lot	Schedule	DP
155		755207
23		264502
100		1127677
101		1127677
3		1031778
2		1031778
20		1031778
15		1031778
13		1031778
6		46737
234		755207
19		1031778
102		1149241
66		755207
7		1031778
5		1031778
17		1031778
18		1031778
4		46737
5		46737
10		1031778
8		1031778
6		1031778
4		1031778
16		1031778
9		1031778
11		1031778
12		1031778
1		1108065
630		816256
259		1139078
207		755207
211		755207
206		755207
230		755207
226		755207
225		755207
224		755207
223		755207
227		755207
101		755218
20		840668
211		840670
211		702166
210		755218
20		734860
221		702167
101		828283
24		264502
1		960790
97		755218

Lot	Schedule	DP
1		817425
184		755218
21		734860
100		828283
10		1050120

APPENDIX 2: DEVELOPMENT LAYOUT

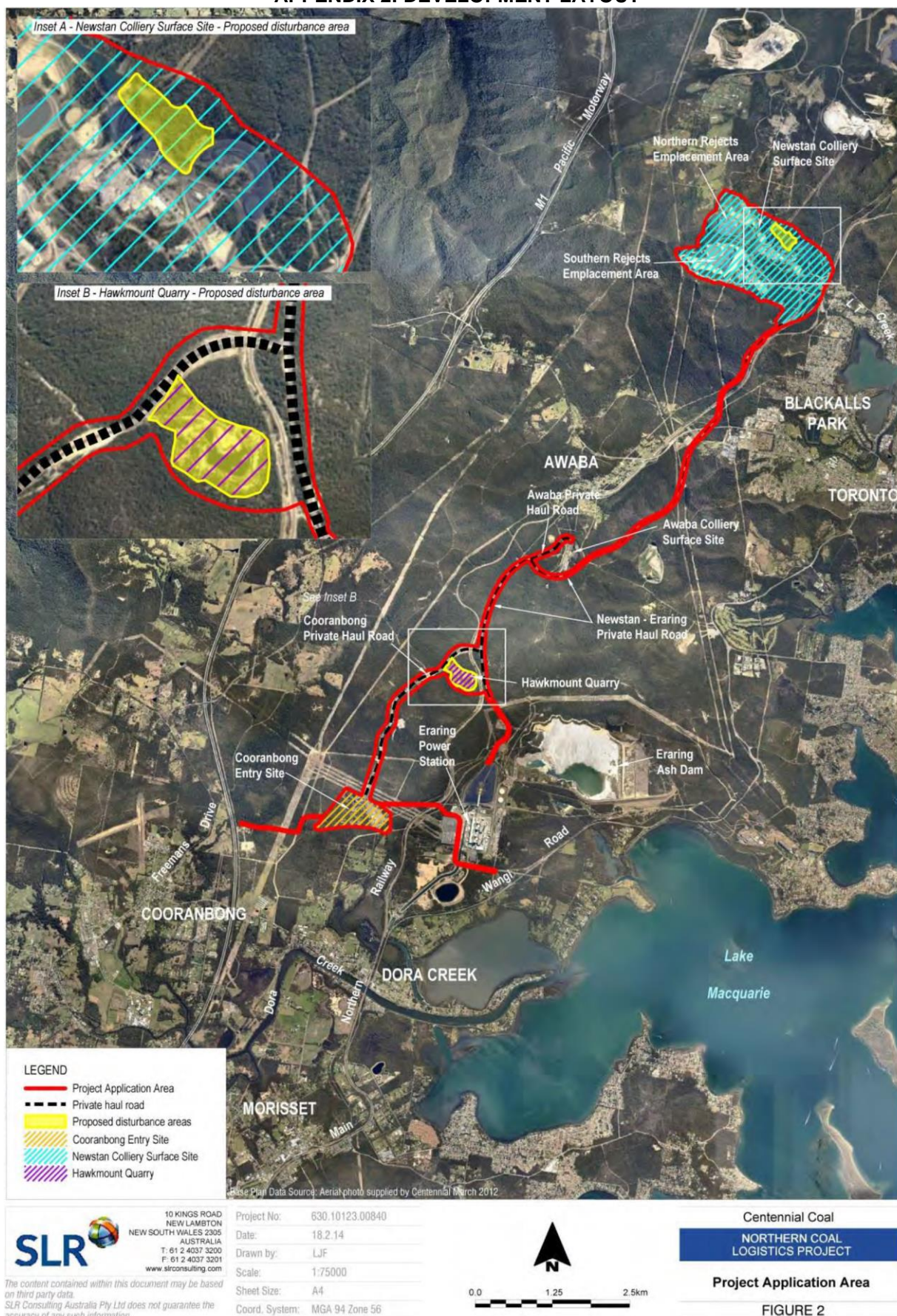


Figure 1: Northern Coal Logistics Project- Application Area



Figure 2: Cooranbong Entry Site (CES)



Figure 3: Newstan Colliery Surface Site (NCSS)

APPENDIX 3: NOISE ASSESSMENT

Applicable Meteorological Conditions

1. The noise criteria in Tables 2 and 3 of the conditions are to apply under all meteorological conditions except the following:
 - (a) Wind speeds greater than 3 m/s at 10 m above ground level; or
 - (b) Stability category F temperature inversion conditions and wind speeds greater than 2 m/s at 10 m above ground level; or
 - (c) Stability category G temperature inversion conditions.

Determination of Meteorological Conditions

2. Except for wind speed at microphone height, the data to be used for determining meteorological conditions shall be that recorded by the meteorological station located on the site.

Compliance Monitoring

3. Attended monitoring is to be used to evaluate compliance with the relevant conditions of this consent.
4. Unless the Secretary agrees otherwise, this monitoring is to be carried out in accordance with the relevant requirements for reviewing performance set out in the *NSW Noise Policy for Industry 2017 (EPA, 2017)* (as amended from time to time), in particular the requirements relating to:
 - (a) monitoring locations for the collection of representative noise data;
 - (b) meteorological conditions during which collection of noise data is not appropriate;
 - (c) equipment used to collect noise data, and conformity with Australian Standards relevant to such equipment; and
 - (d) modifications to noise data collected, including for the exclusion of extraneous noise and/or penalties for modifying factors apart from adjustments for duration.

APPENDIX 4: NOISE RECEIVER LOCATIONS

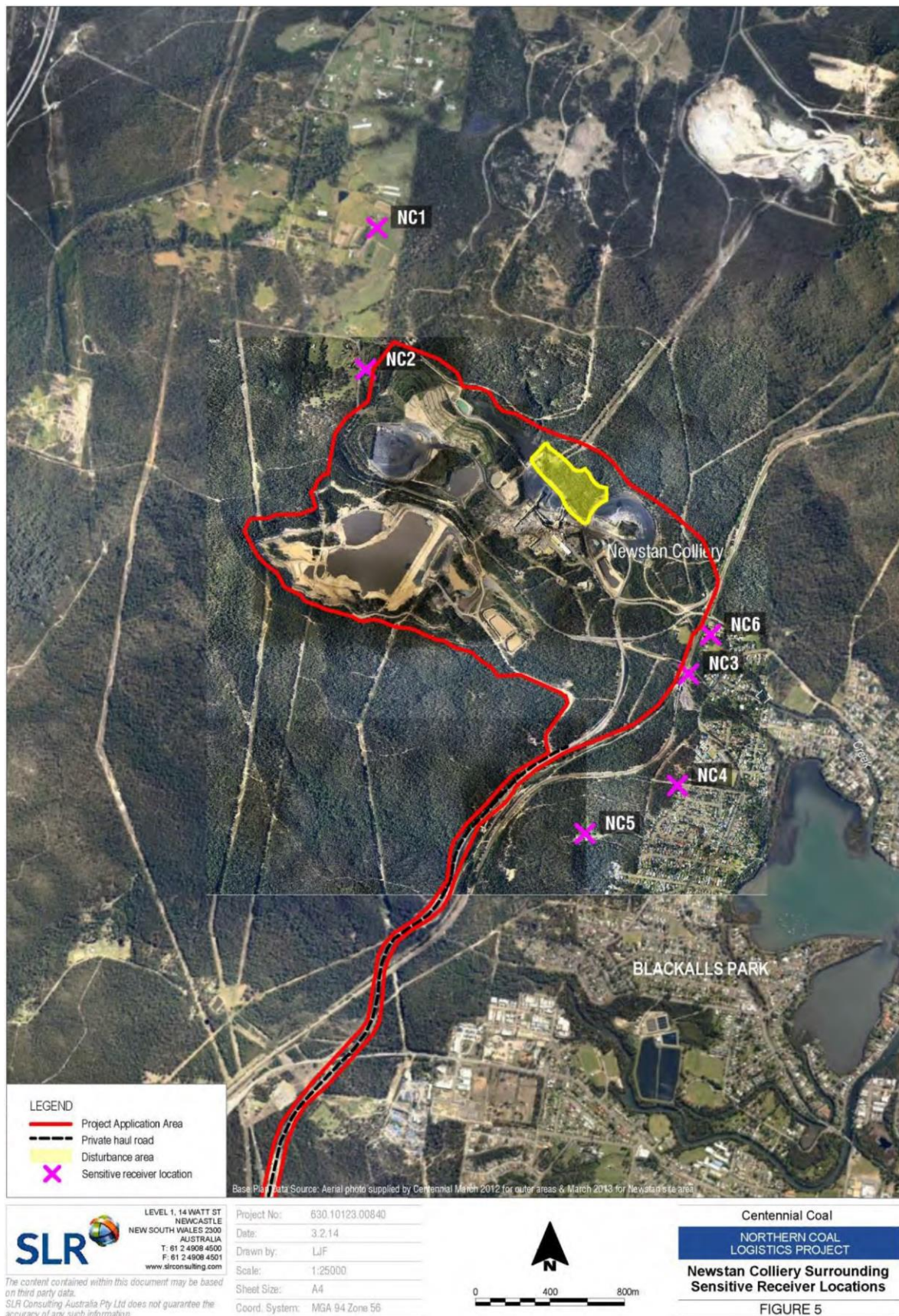


Figure 1: NCSS - Noise Receiver Locations



Figure

2: CES - Noise Receiver Locations

APPENDIX 5: ABORIGINAL CULTURAL HERITAGE

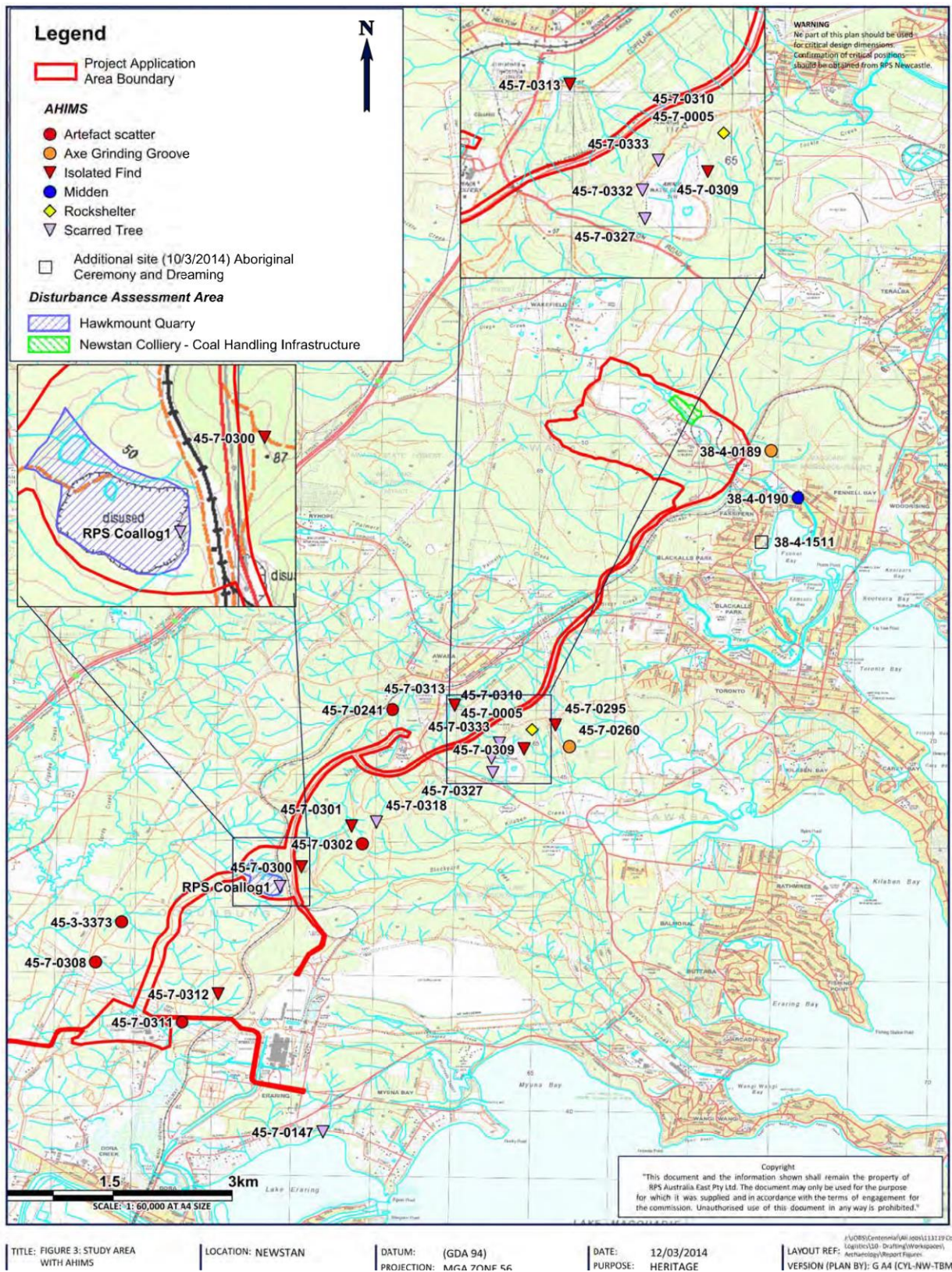


Figure 1: Aboriginal cultural heritage sites

Table 1: Registered Aboriginal Parties

Awakabal Descendants Traditional Owners Aboriginal Corporation
Awakabal Traditional Owners Aboriginal Corporation
Bahtabah Local Aboriginal Land Council
Biraban Local Aboriginal Land Council
Cacatua Culture Consultants
Darkinjung Local Aboriginal Land Council
Guringai Tribal Link
Wonn 1
Yula-Punaal Education and Healing Aboriginal Corporation

APPENDIX 6: APPLICANT'S STATEMENT OF COMMITMENTS

Desired Outcome	Commitment/Action
Construction Management	
Minimise impacts from the upgrade works at the Newstan Colliery Surface Site on the environment and sensitive receivers	Six months prior to the commencement of any construction activities at the Newstan Colliery Surface Site, Northern Coal Services will develop a Construction Environmental Management Plan.
	All construction activity at the Newstan Colliery Surface Site will occur between the standard hours of 7.00 am to 6.00 pm Monday to Friday and 8.00 am to 1.00 pm on Saturday (no construction on Sundays or public holidays).
Environmental Management and Reporting	
Enable Northern Coal Services to manage its operations in an environmentally appropriate manner	Within six months following development consent, Centennial will develop a single consolidated EMS for Centennial's northern operations, including the Northern Coal Logistics Project. The review will take into consideration the environmental assessments undertaken as part of this EIS, the commitments made in this EIS and all relevant consent conditions.
Enable Northern Coal Services to meet its statutory reporting obligations	Northern Coal Services will obtain a new EPL for the Project in accordance with the POEO Act requirements.
	Each year, Northern Coal Services will prepare an Annual Review, which will report environmental monitoring results and evaluate performance for the previous 12 month period, to be distributed to the relevant government agencies, Newstan Colliery CCC and Mandalong Mine CCC.
	Northern Coal Services will report all monitoring results monthly on Centennial's website in accordance with the POEO Act.
Soil and Land Capability	
Appropriate management of topsoil during construction	Northern Coal Services will incorporate soil stripping, handling, stockpiling and transportation management activities into the Construction Environmental Management Plan for the proposed upgrade works at the Newstan Colliery Surface Site.
Water	
Monitor water impacts on the environment	Within six months of development consent, Northern Coal Services will develop a single consolidated Water Management Plan, including a water monitoring program, for the Northern Coal Logistics Project.
Minimise impacts to waterways downstream of Newstan Colliery Surface Site	<u>LT Creek</u> <ul style="list-style-type: none"> The stability of LT Creek through the Fassifern Archery Club will be increased with the construction of small rock bed control structures within the flow area. Quarterly and event based waterway visual inspections of LT Creek will be undertaken during the initial period of increased discharge via Newstan LDP001 until the stability of the creek under the new flow regime has been confirmed.
	<u>Stony Creek</u> The stability of waterway between Newstan LDP017 and Stony Creek will be monitored. If identified as necessary, localised bank protection works will be undertaken to bank

	sections where water discharges from Newstan Colliery Surface Site are identified as reducing bank stability. Such works will be subject to land owner consent.
Flora and Fauna	
Monitor and mitigate impacts to Bat Alley at the Newstan Colliery Surface Site	<p>The Strategy for the Conservation of Bats in Derelict Mines (NPWS 2001) will be followed. In addition:</p> <ul style="list-style-type: none"> A 50 metre exclusion or non-disturbance zone will be maintained around Bat Alley consistent with advice sought from RPS (2014a). The Project design incorporates light and sound barrier walls around the proposed ROM coal stockpile in this locality.
Mitigate impacts to threatened species at Newstan Colliery Surface Site and Hawkmount Quarry REA	As part of the detailed design phase for the upgrade works at the Newstan Colliery Surface Site, Northern Coal Services will ensure that that proposed disturbance footprint is positioned to minimise removal of <i>T. juncea</i> (the Project includes removal of 376 clumps of <i>T. juncea</i>).
	As part of the detailed design phase for the establishment of the Hawkmount Quarry REA, Northern Coal Services will ensure that that proposed disturbance footprint is positioned to minimise removal of <i>G. parviflora</i> subsp. <i>parviflora</i> (the Project includes removal of one stem of <i>G. parviflora</i> subsp. <i>parviflora</i>).
	As part of the detailed design phase for the establishment of the Hawkmount Quarry REA, Northern Coal Services will ensure that that proposed disturbance footprint is positioned to avoid removal of any <i>T. juncea</i> .
Offset the ecological impacts of the Project	<p>Northern Coal Services will implement the following compensatory measures to offset the potential ecological impacts of the Project:</p> <ul style="list-style-type: none"> Prior to disturbance activities at the Newstan Colliery Surface Site, develop and implement a <i>T. juncea</i> translocation research program to build on the current knowledge regarding translocation of this species. The 376 clumps of <i>T. juncea</i> within the proposed disturbance area at Newstan Colliery Surface Site will be translocated and monitored in accordance with the proposed research program. Within 6 months following completion of vegetation clearing at the Newstan Colliery Surface Site and/or Hawkmount Quarry, nest boxes will be installed at a ratio of 1:1 (i.e. one nest box for every habitat hollow removed). The design and installation of nest boxes will draw on the information obtained from the five year research program undertaken by Centennial Mandalong into the utilisation of different nest box designs and aspects. Within 12 months following development consent, fund the development and implementation of a research proposal to investigate genetic patterns among and within populations of <i>T. juncea</i> from a range of habitat types. The benefits of this research will assist in determining whether conservation and offsetting actions can protect the genetic diversity of <i>T. juncea</i>.
Aboriginal Heritage	
Monitor, mitigate and manage impacts to Aboriginal heritage sites	The scarred tree (RPS COAL LOG 1; AHIMS 45-7-0324) identified at Hawkmount Quarry will be clearly identified and avoided by proposed surface works. If any surface works are to occur within 100 metres of this site, a suitable buffer zone will be established to cordon off the area and avoid unintentional impact.
	If further Aboriginal site(s) are identified in the Project Application Area, any surface works in the vicinity will cease and a suitably qualified archaeologist and representatives

	from the registered Aboriginal parties will be contacted in order to ensure appropriate assessment and management.
	All relevant Northern Coal Services employees and contractors will be made aware of their statutory obligations for Aboriginal heritage under the NPW Act 1974 as part of the site induction process.
Non-Indigenous Heritage	
Minimise impacts to items of European heritage	If further non-Indigenous cultural heritage material is in the Project Application Area, any surface works in the vicinity will cease and a suitably qualified heritage consultant will be contacted to assess the item. Northern Coal Services will adopt the appropriate mitigation measures, as provided by the heritage consultant, before recommencement of work.
	All relevant Northern Coal Services employees and contractors will be made aware of their statutory obligations for non-Indigenous heritage under the Heritage Act 1977 as part of the site induction process.
Air Quality	
Mitigate air quality impacts at Newstan Colliery Surface Site	In order to achieve the air quality criteria at receptors surrounding the Project Application Area for the life of the Project, an Air Quality Management Plan will be prepared taking into consideration the commitments made in this EIS and relevant consent conditions.
	Northern Coal Services will commit to automating the train loading operations aspect of the Northern Coal Logistics Project once it is proposed to export 5.5 Mtpa. Water sprays will be installed on the transfer point of the train loading bin so as to minimise dust generation during the loading of trains.
	Northern Coal Services will undertake regular reviews of the air quality model for the site as the volume of coal increases.
	Northern Coal Services will install automation in the coal handling operations between the CHPP and the rail loop stockpile as required to maintain compliance with air quality criteria and to meet operational efficiency requirements. Automatic water sprays on all new transfer points between the CHPP, the new product coal stockpile and the rail loop stockpile will be installed.
Monitor air quality impacts from the Project	<p>Northern Coal Services will continue the existing air quality monitoring program at Newstan Colliery Surface Site and Cooranbong Entry Site, which comprises:</p> <ul style="list-style-type: none"> • Newstan Colliery Surface Site - monitoring of dust deposition, TSP, PM10 and PM2.5; and • Cooranbong Entry Site - monitoring of dust deposition, TSP and PM10.
Noise	
Reduce noise emissions from the Newstan Colliery Surface Site	In order to achieve the noise criteria at receptors surrounding the Project Application Area for the life of the Project, a Noise Management Plan will be prepared taking into consideration the commitments made in this EIS and relevant consent conditions.
	The proposed new CPP will be clad with noise attenuating panels.
Visual Amenity	

Minimising visual impacts from the Newstan Colliery Surface Site	New infrastructure items will be dark in tone and constructed of non-reflective materials.
	All new lighting installations will be low level intensity lighting comprising individual and directional spot lighting design to minimise light spill.
Dangerous Goods	
Provide safe storage, handling and disposal of dangerous goods	Within six months following development consent, Northern Coal Services will update the existing Newstan Colliery Emergency Management System and Mandalong Mine Emergency Management System to cover the Project. These updates will take into consideration the relevant requirements under the impending Workplace Health and Safety (Mines) Act 2013, commitments made in this EIS and all relevant consent conditions.
Bushfire	
Reduce risk to Northern Coal Services infrastructure and local landholders' properties from bushfire	Within six months following development consent, Northern Coal Services will develop a single consolidated Emergency Management System for the Project to incorporate the findings and conclusions of the bushfire risk assessment (Kleinfelder 2014), the commitments made in this EIS and all relevant consent conditions.
Post-Mining Closure and Rehabilitation	
Rehabilitate the Project Application Area to agreed final land uses	<p>Within five years of Project completion, Northern Coal Services will prepare a detailed Closure Management Plan with the aim of rehabilitating the Project Application Area to create a landform with land use compatible with the surrounding land-use and/or the pre- determined and agreed beneficial land use(s). In addition to addressing the removal of surface infrastructure, the Closure Management Plan will include:</p> <ul style="list-style-type: none"> • Rehabilitation of disturbed areas to a condition that is self-sustaining or where maintenance requirements are consistent with an agreed post-mining land use; and • Final rehabilitation success criteria.
Social	
Continue to engage with stakeholders	Northern Coal Services will continue to implement the Stakeholder Engagement Strategy for the Project.



Centennial Coal

**Appendix 2
DP&E Extension for
Approval of Rehabilitation
Management Plan**



Planning & Environment

Planning Services Resource Assessments

Contact: Margaret Kirton
Phone: (02) 9228 6289
Email: margaret.kirton@planning.nsw.gov.au

Mr Jeffrey Dunwoodie
Environment & Community Coordinator
Centennial Coal
PO Box 1000
Toronto NSW 2283


Dear Mr Dunwoodie

Mandalong Southern Extension Project (SSD 5144) Rehabilitation Management Plan

I refer to your letter dated 21 January 2016, on behalf of Centennial Mandalong, requesting the approval of the Department to incorporate the Rehabilitation Management Plan into the mine's Mining Operations Plan (MOP).

The Rehabilitation Management Plan is required under condition 33 of Schedule 3 of the mine's development consent. The MOP is separately required by the Division of Resources and Energy (DRE). The Department acknowledges there is overlap between the two plans, particularly with regards to rehabilitation. As such, the Secretary approves Centennial Mandalong's request to combine the Rehabilitation Management Plan and the MOP into a single document. Centennial Mandalong is advised, however, that it must ensure all consent conditions relating to the Rehabilitation Management Plan are fully addressed in the MOP.

Centennial Mandalong also seeks an extension of time to submit the Rehabilitation Management Plan. The Department has reviewed Centennial Mandalong's reasons for this request, noting that it would allow Centennial Mandalong to complete appropriate consultation with DRE, OEH, NOW, LMCC and the CCC. The Department considers these reasons acceptable.

You are therefore advised that the Secretary agrees to the requested extension of time. The Secretary now requires the Rehabilitation Management Plan / MOP to be submitted by 30 June 2016.

Should you have any questions about this letter, please contact Margaret Kirton on 9228 6289.

Yours sincerely



Howard Reed *22.1.16*
Director Resource Assessments
as the Secretary's nominee



Centennial Coal

Appendix 3 Feedback from Stakeholder Consultation

Response to Comments

No.	Department Comment	Centennial Response	Action	Addressed?
DPE				
1	Provide feedback received from the required stakeholders in an Appendix	Feedback attached to MOP as Appendix 3. This table details responses to feedback and how addressed in the document.	As comment – included in Appendix 3.	Yes
2	The RMP does not clearly identify the type of monitoring to be undertaken in relation to the performance and completion criteria in Tables 23-27	Section 8.1 has been updated to include commitment to develop a dedicated monitoring program during the MOP term.	As comment	Yes
3	Section 7.3.4.1 – Surface cracking – replace ‘may’ with ‘will’ or some other more definitive phrasing	-	As comment	Yes
4	Table 31 Rehabilitation TARP – Species composition response condition red – trigger action should include implementing remediation measures following the investigation of remedial actions	-	As comment	Yes
DPI Water				
1	Section 1.2.3.5 refers to current water licences held at the Mandalong site which includes licence 20BL173524, which has an annual groundwater entitlement of 1825ML. Based on review of the environmental assessment for the Southern Mandalong Extension project DPI Water is aware of the proposed increase in groundwater take to a maximum of 2154ML in the years 2035-36. Centennial will therefore be required to acquire additional entitlement prior to the groundwater take exceeding 1825ML/yr. Further advice on this matter was provided by DPI Water in a review of the Water Management Plan (WMP) for the project.	Centennial will remain within the existing licenced entitlement of 1825 ML per annum during the MOP term.	No action	N/A
2	Section 3.3 refers to the management of surface water and groundwater to be carried out consistently with the Northern	Section 3.3.3 and 3.3.4 have been updated to refer to the Mandalong Mine WMP.	As comment	Yes

Response to Comments

No.	Department Comment	Centennial Response	Action	Addressed?
	Operations Regional WMP. Due to the development of a draft WMP as part of the Southern Extension Project, reviewed by DPI Water in March 2016, it is recommended this WMP also be referred to. This is considered a key point as DPI Water's response on the draft WMP for project SSD-5144 included a number of recommendations in regards to groundwater monitoring and contingencies, water quality analysis and development of specific performance criteria.			
	Section 3.4.15 has identified groundwater as a moderate risk to rehabilitation due to the risk of underground mine workings filling during closure and/or operations and potential uncontrolled seepage and discharge. DPI Water supports the proposal to further understand this issue as it is important to identify the potential impacts to enable consideration of viable mitigating options and to quantify potential water licensing requirements for ongoing water take during and post mining. This information is also important to address the rehabilitation objectives for watercourses as set out in the project approval (SSD5144). It is requested this information be used to update relevant management plans when available and to inform future mine planning.	Noted	Addressed in Section 3.4.15	Yes
3	Table 20 and Section 7.3.7 refer to water management structures to be retained upon mine closure. DPI Water advises the retention of dams on minor watercourses at the rehabilitated site will need to be in accordance with the Maximum Harvestable Rights Dam Capacity of the property. Further information on this issue can be accessed at the following link:	Noted	Added to domain rehabilitation objective in Table 21	Yes

Response to Comments

No.	Department Comment	Centennial Response	Action	Addressed?
	http://www.water.nsw.gov.au/water-licensing/basic-water-rights/harvesting-runoff			
4	Section 7.3.4 refers to rehabilitation methodologies for a range of impacts associated with subsidence that have impacts on watercourses and surface water/groundwater flows. It is not clear how this section relates with what is to be addressed in the Extraction Plan for the site in terms of trigger action response plans and contingency plans. DPI Water recommends consistency needs to be ensured between the two plans where relevant and any works need to be in consultation with DPI Water.	As per Section 7.3.4, subsidence mitigation works will be undertaken in accordance with the approved SMP/Extraction Plan and the appropriate TARPs. We have deleted the specifics which are reproduced from the LW 18-21 SMP EMP and have referenced the document instead.	Minor change to wording to clarify wording	Yes
5	Table 31 refers to triggers related to drainage condition in accordance with design criteria established in the document. It is recommended the specific section be referred to as this is not clear, and based on reviewing the document no clear design criteria were provided that could be monitored. This part also refers to triggers of “minor drainage issues” and “significant drainage issues” however it is not clear what these categories mean and whether they are complying or not complying with the rehabilitation objectives. Further detail is recommended. The impacts referred to in Section 7.3.4 in the previous point would be considered or associated with key drainage issues for this site.	TARP elements 3&4 have been updated with more detail	As comment	Yes
6	DPI Water supports works within watercourses and generally within waterfront land to be in accordance with DPI Water’s Guidelines for Controlled Activities on Waterfront Land (CAA Guidelines). This guideline can be accessed at the following link: http://www.water.nsw.gov.au/water-licensing/approvals/controlled-activity	Noted	N/A	N/A

Response to Comments

No.	Department Comment	Centennial Response	Action	Addressed?
7	Appendix 5 which includes a number of key plans relevant to the post mining layout was not included within the version provided for DPI Water to review.	Drawings were provided to DPI Water on CD with the draft MOP for review	N/A	N/A
DRE				
1	The intent of the MOP is to address mining operations within Mining Leases. Activities subject of Mining Lease Applications, Exploration Licences and Authorisations should not be included in the content of the MOP.	<p>As outlined in Section 1.2 of ESG3 inclusion of consents authorisations and licences including exploration authorisations and all other approvals and licences issued by govt agencies is required within a MOP document.</p> <p>Likewise Section 2.3 of ESG3 requires the MOP to identify and describe scheduled exploration activities and the requirements of the DC and/or EL that may surround the mine on which exploration activities occur. As such, the MOP has not been updated to remove reference to exploration activities.</p>	No action	N/A
2	Exploration activity approvals must be applied for separately to the Mining Operation Plan. All surface disturbing activities conducted on Exploration Licences are subject to activity approvals under the Environmental Planning and Assessment Act, 1979.	<p>As stated in Section 2.2.1 Centennial Mandalong prepared an Exploration Activities Management Plan for the site in accordance with the requirements of SSD-5144. This plan was prepared in consultation with DRE who's response dated 1 April 2016 stated that:</p> <p>"Centennial Mandalong is required to ensure that the exploration activities covered by SSD-5144 are included within Mandalong's Mining</p>	No action	N/A

Response to Comments

No.	Department Comment	Centennial Response	Action	Addressed?
		Operations Plan” As stated in Section 2.2.1 exploration activities within the MOP area will be undertaken in accordance with the EAMP.		
3	ESU suggests that the following additional competition criteria be considered for inclusion in the MOP such that performance indicators and completion /relinquishment criteria are adequately addressed:	See below	-	-
	Phase 2: Landform Establishment:			
	a. Develop criteria that includes; - Quantifiable demonstration that the landform is stable and non-polluting; and - Gradients for the proposed landform.	<ul style="list-style-type: none"> - Geotechnical report completed by qualified person at mine closure shows landform is stable and suitable for post mining land use. - Rehabilitated slopes are generally less than 10 degrees unless otherwise agreed with the DRE (or contemporary equivalent) 	As response	Yes
	Phase 3: Growth Media development:			
	b. Develop criteria for rehabilitation areas; woodland, forest and rural land that includes; - Quantifiable criteria for soil fertility, including justification/source; and - Include the trigger levels for undertaking soil amelioration if criteria is not met and proposed soil amelioration.	<ul style="list-style-type: none"> - “Topsoil’s and topsoil substitutes have been tested to assess suitability for post mining land use” - further detailed criteria included in ecosystem and landform establishment - TARP element 6 	As response	Yes

Response to Comments

No.	Department Comment	Centennial Response	Action	Addressed?
	Phase 4: Ecosystem and Landform Establishment			
	c. Include completion criteria for the rehabilitation area woodland;	Completion criteria updated as per comment	As comment	Yes
	d. Develop a strategy and time frame for establishing a monitoring program and establishing baseline data for rehabilitation areas woodland, forest and rural land. This should include the following: <ul style="list-style-type: none"> - Species composition compared to analogue sites and the targeted - Species selection compared to regionally occurring woodland. This may include defining the vegetation community proposed to be established; - Presence of weeds compared to analogue sites; and - Develop measurable completion criteria which will demonstrate achievement of the proposed final landuse of rural land and forest. 	Completion criteria updated as per comment	As comment	Yes
	Phase 5: Ecosystem Sustainability			Yes
	e. Completion criteria for rehabilitation areas woodland, forest and rural land must be included in this section. This criteria should include, but not necessarily limited to; <ul style="list-style-type: none"> - Recruitment and succession of both long lived and short lived species; - Canopy cover compared to analogue sites; and - Weed presence compared to analogue sites. 	Completion criteria updated as per comment	As comment	Yes
	f. Provide the water quality ranges for key analytes associated with any water discharge offsite with reference to Environment Protection Licence (EPL) limits, as appropriate. Note that it is	The completion criteria references the EPL. This is considered sufficient since the key analytes contained in the EPL may change	No action	N/A

Response to Comments

No.	Department Comment	Centennial Response	Action	Addressed?
	considered that mine closure may occur beyond surrender of EPL.	during the MOP term.		
	g. Provide objectives and completion criteria for water quality of retained water management structures.	This is included for domain C	No action	N/A
4	Section 7.2 states that rehabilitation of disturbed areas during the construction of the Mandalong South Service Site (MSSS) and access road are not reflected in the MOP tables or plans – they should be included if physically on the mining title.	Reference to MSSS progressive rehabilitation has been removed as it will be completed at Mine Closure.	As response	Yes
5	Section 8.2 must include a commitment and methodology for identifying analogue sites for completion criteria.	Section 8.2.1 added committing to identifying appropriate analogue sites during the MOP term	As comment	Yes
6	Each Trigger Action Response Plan (TARP) aspect should link directly to completion criteria presented in section 6 of the MOP. The TARP must be consistent with the completion criteria, i.e. slope gradient is specified in the TARP but not specified in the completion criteria.	Column 3 with “Element Number” has been included in the TARP to provide the direct link. SLR has updated TARP to ensure consistency	As comment	Yes
7	Final MOP document and associated plans must be signed	Noted	Centennial to sign final	N/A
8	Note that Mining Operations Plan must be consistent with the Extraction Plan.	The Extraction Plans for Longwalls 22 to 24A have yet to be prepared. The MOP is consistent with MOD2 (ie extended first workings in longwalls 22 and 23). Following approval of LW 22 and 23 secondary extraction a MOP amendment will be required to be consistent with this Extraction Plan.	N/A	Yes
9	The following comments are provided on the plans: a. Existing vegetation within the Underground Mining Area, that is	a. In accordance with ESG 3, the secondary domains show the post mining land use,	As response	Yes

Response to Comments

No.	Department Comment	Centennial Response	Action	Addressed?
	<p>not proposed to be disturbed, should be differentiated from the secondary rehabilitation domains. Note that Table 30 will require updating if changes to the secondary domain are made.</p> <p>b. The series 1 Mandalong South Surface Site plans shows a lined polygon which is not shown on the legend.</p> <p>c. The series 3 Delta Entry Site plans shows the SSD-5144 project approval boundary in red and the project disturbance boundary in blue. These boundaries do not align - please provide justification for this.</p>	<p>therefore the undisturbed vegetation within the underground mining area has the same post mining land use as that rehabilitated to vegetation. The primary domains differentiate the disturbed vegetation areas from the undisturbed. Notwithstanding this, the secondary domain wording has been changed to remove the reference to (existing).</p> <p>b . This is ML 1722 surface lease and has been updated and included in the legend</p> <p>c. The additional area in blue forms Development Consent DA 35-2-2004 for the Delta Entry Site which is held by Centennial Mandalong and included in the MOP as discussed in Section 2.1.3. This has been added to the plans.</p>		
CCC (Mandalong Community Association)				
1	<p>The MCA look forward to working closely with Centennial as a major landholder in the Mandalong Valley and effectively a member of our community.</p> <p>MCA members are particularly interested in the following issues:</p> <ol style="list-style-type: none"> 1. Subsidence, 2. Surface water – in particular any changes to surface water patterns due to subsidence. 3. Community cohesiveness. 4. Rehabilitation 	Noted.	No action	N/A

Response to Comments

No.	Department Comment	Centennial Response	Action	Addressed?
	MCA members are keen to work with Centennial to create outcomes that will be a credit not only to residents but also to Centennial.			
2	<p>Stakeholder Engagement Strategy (SES)</p> <p>The SES objectives are important and the following suggestions aim to enhance the outcomes of the SES:</p> <p>1. Interviews with stakeholders whom have been subject to the existing (complete) Mandalong mine extraction impacts and mitigations. The aim of this process would be to document the impacts that did occur on properties and the mitigation measures undertaken.</p> <p>2. The documentation of the outcomes of mitigation – what measures were highly effective, which were moderately effective and which were not particularly effective.</p>	<p>Post mining consultation and remediation is undertaken in accordance with the individual Property Subsidence Management Plans (PSMPs). Mitigation and remediation are reported in the Annual Review and discussed at the CCC meetings (eg. ponding remediation).</p> <p>Section 3.5 (and Section 4.4) of the MOP includes a commitment from Centennial Mandalong to undertake stakeholder consultation regarding mine closure five years prior to planned closure of the mine to assist in minimise long term impacts associated with mine closure, including socio-economic impacts.</p>	No action	N/A
3	<p>The community of Mandalong has been somewhat fractured by the purchase of nearly a third of properties in the Valley for the existing Mandalong Mine.</p> <p>The MCA would suggest that there are ways to link rehabilitation with the reestablishment of community cohesiveness.</p> <p>One way of doing this would be to expand rehabilitation activities from Centennial owned land to stakeholder held land. With the use of other inputs such as the Green Army, perhaps LLS,</p>	As detailed in Section 3.3.6 of the MOP, the Mandalong Southern Extension Project committed to the development of a Land Management Strategy to conserve and enhance the vegetation communities on three parcels of land (including riparian zones and wetlands) to compensate for the loss of 15.6 hectares of vegetation as part of the	No action	N/A

Response to Comments

No.	Department Comment	Centennial Response	Action	Addressed?
	community participation and Centennials' support, it would be possible to drive projects – say focussing on riparian zones and wetlands, with replanting of endemic species, subsequently linking rehabilitation works and encouraging a catchment approach.	<p>Mandalong Southern Extension Project. The proposed relocation of TL24 will also result in 8.5 ha of vegetation clearing for the establishment of the new easement.</p> <p>Centennial Mandalong has included in the Land Management Strategy an additional area of 73.6 ha in order to compensate for the loss of vegetation communities.</p> <p>Section 3.5 (and Section 4.4) of the MOP also includes a commitment from Centennial Mandalong to undertake stakeholder consultation regarding mine closure five years prior to planned closure of the mine to assist in minimise long term impacts associated with mine closure, including socio-economic impacts.</p>		
OEH				
	A draft version of the MOP was provided to OEH on 6 June 2016. No comments were received from OEH.			
LMCC				
	A draft version of the MOP was provided to LMCC on 6 June 2016. No comments were received from LMCC.			
Independent Environmental Audit (June 2016)				
	Include the following information in the MOP to further align with DA 97/800 CoA 12 (i):		As comment	Yes

Response to Comments

No.	Department Comment	Centennial Response	Action	Addressed?
	<ul style="list-style-type: none">• A summary of the historic, current and proposed land use in Section 1.5 (as required by ESG3); and• A landuse description for wetlands, forests and areas of potential heritage or archaeological significance (particularly in areas likely to be inundated by ponding).	<p>Section 1.4 updated with further information.</p> <p>Added Section 1.4.3 on topography and natural features. Heritage is sufficiently covered throughout the MOP.</p>		



Jeffrey Dunwoodie
Centennial Mandalong
PO Box 1000
TORONTO NSW 2283

Contact Tim Baker
Phone 02 6841 7403
Mobile 0428 162 097
Fax 02 6884 0096
Email Tim.Baker@dpi.nsw.gov.au

Our ref OUT17/3579

Dear Jeffrey,

**Centennial Mandalong – revised Mining Operations Plan /
Rehabilitation Management Plan**

I refer to your letter dated 17th January 2017 requesting comment from DPI Water in relation to the revised Mining Operations Plan and Rehabilitation Management Plan for Centennial Mandalong.

It is recognised this consultation is in response to comments from DPI Water on the draft documents dated 27th June 2016. DPI Water has reviewed the revised documentation and is satisfied with the amendments.

Should you have any further queries in relation to this submission please do not hesitate to contact Tim Baker on (02) 6841 7403.

Yours sincerely

Irene Zinger
Regional Manager – Metro Water Regulatory Operations
1 February 2017



Centennial Coal
Mandalong

12 Kerry Anderson Drive
Mandalong NSW 2264
PO Box 1000
Toronto NSW 2283 Australia

T: 61 2 4973 0900
F: 61 2 4973 0999
E: info@centennialcoal.com.au
W: www.centennialcoal.com.au

17 January 2017

**BY MAIL
BY EMAIL**

Mr Tim Baker
Senior Water Regulation Officer
DPI – Water
PO Box 717
DUBBO, NSW 2830

Dear Mr. Baker,



Centennial Mandalong – Mining Operations Plan / Rehabilitation Management Plan

Centennial Mandalong has recently provided a revised version of the Mining Operations Plan / Rehabilitation Management Plan to the Department of Planning & Environment for approval in accordance with Condition 33 of Schedule 3 of SSD-5144.

A revision to the Mining Operations Plan / Rehabilitation Management Plan was completed following receipt of the DPI Water comments on 8 July 2016.

Following a review of the document, the Department of Planning & Environment have requested that Centennial Mandalong provide evidence that DPI Water are satisfied with the amendments made to the revised version of the Mining Operations Plan / Rehabilitation Management Plan.

Enclosed with this letter is a copy of the revised version of the Mining Operations Plan / Rehabilitation Management Plan, which includes a table in Appendix 3 in which Centennial Mandalong provides a response to each of the DPI Water comments.

Could you please provide a response as to whether this version of the Mining Operations Plan / Rehabilitation Management Plan satisfies the requirements of DPI Water.

If you have any questions or require any further information in regards to this matter, please contact me on (02) 4973 0947 or 0448 490 023.

Yours sincerely

Jeffrey Dunwoodie
Environment & Community Coordinator

Enclosed

- Centennial Mandalong Mining Operations Plan / Rehabilitation Management Plan (November 2016).



**Planning Services
Resource Assessments**

Name: Lauren Evans

Phone: 9274 6311

Email: lauren.evans@planning.nsw.gov.au

Mr John Turner
Mine Manager
Centennial Coal Mandalong
PO Box 1000
Toronto NSW 2283

Dear Mr Turner

**Mandalong Southern Extension Project (SSD 5144)
Mining Operations Plan / Rehabilitation Management Plan**

The Department has reviewed the revised Mining Operations Plan (dated December 2016) for the Mandalong Southern Extension Project, which has been submitted to the Department to satisfy condition 33 of Schedule 3 of the development consent which requires the preparation of a Rehabilitation Management Plan.

The Department considers that Centennial Coal Mandalong has not adequately demonstrated that consultation with the stakeholders listed on condition 33 of Schedule 3 has been completed and considered in the preparation of the Rehabilitation Management Plan. The Department's comments on this document are enclosed in **Attachment A**.

The Department therefore requests that this document be re-submitted once the comments contained in **Attachment A** have been addressed, and no later than **31 January 2017**.

Should you have any enquiries in relation to this matter, please contact Lauren Evans.

Yours sincerely

Howard Reed

Director

Resource Assessments

As the Secretary's nominee

2.12.16

Attachment A

Revised December 2016
Matters in red type require attention.

Rehabilitation Management Plan - condition 33, Schedule 3	Compliance (Yes/No)	Comment	Action Required
<i>The Applicant shall prepare a Rehabilitation Management Plan for the development, to the satisfaction of the Secretary and DRE. This plan must:</i>			
(a) be prepared in consultation with DRE, OEH, NOW, LMCC and the CCC;		Please provide the feedback received from the required stakeholders in an Appendix. <i>Initial correspondence from DRE and DPI provided in Appendix 3. Are these agencies satisfied with Centennial's response? Provide copies of subsequent correspondence in Appendix 3. No evidence of consultation with OEH, LMCC or the CCC.</i>	As per comment. <i>Note the comments and amend the plan accordingly.</i>
(b) be submitted to the Secretary for approval by 31 March 2016, or as otherwise agreed by the Secretary;	Y	The Secretary granted an extension for the submission of this plan by 30 June 2016.	N/A
(c) be prepared in accordance with the relevant guidelines and consistent with the rehabilitation objectives in the EIS and Table 5;	Y	-	NFA
(d) describe how the performance of the rehabilitation would be monitored and assessed against the objectives in Table 5;	N	The RMP does not clearly identify the type of monitoring to be undertaken in relation to the performance and completion criteria in Tables 23-27. <i>Satisfied – see Section 8.1.</i>	Provide further information.
(e) provide for detailed mine-closure planning, including measures to minimise socio-economic effects associated with mine closure, to be developed prior to the site being placed on care and maintenance;	Y	-	NFA
(f) be integrated with the other management plans required under this consent. <i>Note: The RMP must address all land impacted by the mine, whether prior to or following the date of this consent.</i>	Y	-	NFA
Other Comments			
<ul style="list-style-type: none"> Section 7.3.4.1 <i>Surface Cracking</i> – replace 'may' with 'will' or some other more definitive phrasing. <i>Satisfied</i> Table 31 Rehabilitation Trigger Action Response Plan – Species Composition Response Condition Red – Trigger action should include implementing remediation measures following the investigation of remedial options. <i>Satisfied</i> 			

29 November 2016

John Turner
Centennial Mandalong Pty Ltd
PO Box 1000
Toronto NSW 2283

Dear John,

Mining Authorisation Number(s) ML1431, ML1443, ML1543, ML1722, Mining Act 1992, CCL762, MPL191 and MPL329, Mining Act 1973, Centennial Mandalong Approval of Mining Operations Plan

NOTICE OF APPROVAL

Pursuant to Condition 2 of ML1431, ML1443 and ML1543 and Condition 3 of ML1722, Mining Act 1992 and Condition 20 of CCL762 and Condition 2 of MPL191 Mining Act 1973, the Centennial Mandalong Mining Operations Plan (MOP) that was submitted to the Department on 8 November 2016 (DRE Reference: INW16/59895) is approved for the period from the date of this approval until 23 November 2023.

This MOP approved by DRE is limited to:

- the rehabilitation objectives and completion criteria; and,
- the schedule of rehabilitation activities proposed for the MOP period.

It is the responsibility of the Authorisation Holder to ensure that all mining and mining related operations described in this MOP are as approved within the relevant Project Approval or Development Consent and all necessary approvals, consents or permits required under the relevant NSW or Commonwealth regulations have been obtained prior to carrying out the operations.

It is the responsibility of the Authorisation Holder to fulfil their obligations and commitments to the rehabilitation outcomes and performance standards as approved by the relevant consent authority to ensure the rehabilitation outcomes identified are achieved.

ASSESSED DEPOSIT

Approval of this MOP has triggered a review of the assessment of the security deposit required to secure funding for the fulfilment of rehabilitation obligations under ML1431, ML1443, ML1543, ML1722, Mining Act 1992, CCL762, MPL191 and MPL329, Mining Act 1973.

Environmental Sustainability Unit
PO Box 344 Hunter Region Mail Centre NSW 2310
516 High St MAITLAND NSW 2320
Email: minres.environment@industry.nsw.gov.au
Tel: 02 4931 6605 **Fax:** 02 4931 6790 **Web:** www.resourcesandenergy.nsw.gov.au
ABN 72189919072

Notice of the change in the security deposit condition related to this MOP approval will be provided separately.

DEFINITIONS

In this letter, words have the meaning given to those terms in the *Mining Act 1992*, unless otherwise specified below.

Department means NSW Department of Industry, Skills and Regional Development.

Authorisation Holder means the holder of the relevant authorisation(s).

Mining Operations Plan means the project, mining and mining related operations described in the "Mining Operations Mandalong Mine" prepared by Centennial Coal and dated December 2016 to November 2023.

If you have any questions about this Notice, please contact Marianne Bonnay directly on 02 4931 6575.



MONIQUE MEYER

Manager Northern Region (Principal Inspector)

Environmental Sustainability Unit

Signed under delegation by the Minister for Industry, Resources & Energy.

Signed under delegation from the Secretary of the Department of Industry, Skills and Regional Development.



Planning Services

Resource Assessments

Name: Genevieve Seed

Phone: 9228 6489

Email: genevieve.seed@planning.nsw.gov.au

Mr John Turner
Mine Manager
Centennial Coal Mandalong
PO Box 1000
Toronto NSW 2283

Dear Mr Turner

**Mandalong Southern Extension Project (SSD 5144)
Rehabilitation Management Plan**

I refer to your letter dated 30 June 2016 submitting a Rehabilitation Management Plan for the Mandalong Southern Extension Project.

The Department has reviewed the management plan and requests revisions regarding several aspects, which are outlined in **Attachment A**.

If you have any enquiries about this matter, please contact Genevieve Seed.

Yours sincerely

Howard Reed

Director

Resource Assessments

As the Secretary's nominee

Attachment A

<i>Rehabilitation Management Plan - condition 33, Schedule 3</i>	Compliance (Yes/No)	Comment	Action Required
<i>The Applicant shall prepare a Rehabilitation Management Plan for the development, to the satisfaction of the Secretary and DRE. This plan must:</i>			
(a) be prepared in consultation with DRE, OEH, NOW, LMCC and the CCC;	N	Please provide the feedback received from the required stakeholders in an Appendix.	As per comment.
(b) be submitted to the Secretary for approval by 31 March 2016, or as otherwise agreed by the Secretary;	Y	The Secretary granted an extension for the submission of this plan by 30 June 2016.	N/A
(c) be prepared in accordance with the relevant guidelines and consistent with the rehabilitation objectives in the EIS and Table 5;	Y	-	N/A
(d) describe how the performance of the rehabilitation would be monitored and assessed against the objectives in Table 5;	N	The RMP does not clearly identify the type of monitoring to be undertaken in relation to the performance and completion criteria in Tables 23-27.	Provide further information.
(e) provide for detailed mine-closure planning, including measures to minimise socio-economic effects associated with mine closure, to be developed prior to the site being place on care and maintenance;	Y	-	N/A
(f) be integrated with the other management plans required under this consent. <i>Note: The RMP must address all land impacted by the mine, whether prior to or following the date of this consent.</i>	Y	-	N/A
Other Comments			
<ul style="list-style-type: none"> Section 7.3.4.1 <i>Surface Cracking</i> – replace 'may' with 'will' or some other more definitive phrasing. Table 31 Rehabilitation Trigger Action Response Plan – Species Composition Response Condition Red – Trigger action should include implementing remediation measures following the investigation of remedial options. 			



20 July 2016

John Turner
Centennial Mandalong Pty Ltd
PO Box 1000
Toronto NSW 2283

Dear John,

Mining Authorisation Number(s) ML1431, ML1443, ML1543, ML1722, Mining Act 1992, CCL762, MPL191 and MPL329, Mining Act 1973, Centennial Mandalong– Further Information Required

The Mandalong Mine Mining Operations Plan (MOP) provided to DRE for consultation has been forwarded to the Environmental Sustainability Unit, Northern Region, for a detailed assessment.

The detailed assessment has identified that further information is required to allow for the Environmental Sustainability Unit's assessment of the MOP.

Required Information:

1. The intent of the MOP is to address mining operations within Mining Leases. Activities subject of Mining Lease Applications, Exploration Licences and Authorisations should not be included in the content of the MOP.
2. Exploration activity approvals must be applied for separately to the Mining Operation Plan. All surface disturbing activities conducted on Exploration Licences are subject to activity approvals under the Environmental Planning and Assessment Act, 1979.
3. ESU suggests that the following additional competition criteria be considered for inclusion in the MOP such that performance indicators and completion /relinquishment criteria are adequately addressed:

Phase 2: Landform Establishment:

- a. Develop criteria that includes;
 - Quantifiable demonstration that the landform is stable and non-polluting; and
 - Gradients for the proposed landform.

Phase 3: Growth Media development:

- b. Develop criteria for rehabilitation areas; woodland, forest and rural land that includes;
 - Quantifiable criteria for soil fertility, including justification/source; and
 - Include the trigger levels for undertaking soil amelioration if criteria is not met and proposed soil amelioration.

Phase 4: Ecosystem and Landform Establishment

- c. Include completion criteria for the rehabilitation area woodland;

Environmental Sustainability Unit

PO Box 344 Hunter Region Mail Centre NSW 2310
516 High St MAITLAND NSW 2320

Email: minres.environment@industry.nsw.gov.au

Tel: 02 4931 6605 **Fax:** 02 4931 6790 **Web:** www.resourcesandenergy.nsw.gov.au

ABN 72189919072

- d. Develop a strategy and time frame for establishing a monitoring program and establishing baseline data for rehabilitation areas woodland, forest and rural land. This should include the following:
 - Species composition compared to analogue sites and the targeted
 - Species selection compared to regionally occurring woodland. This may include defining the vegetation community proposed to be established;
 - Presence of weeds compared to analogue sites; and
 - Develop measurable completion criteria which will demonstrate achievement of the proposed final landuse of rural land and forest.

Phase 5: Ecosystem Sustainability

- e. Completion criteria for rehabilitation areas woodland, forest and rural land must be included in this section. This criteria should include, but not necessarily limited to;
 - Recruitment and succession of both long lived and short lived species;
 - Canopy cover compared to analogue sites; and
 - Weed presence compared to analogue sites.
 - f. Provide the water quality ranges for key analytes associated with any water discharge offsite with reference to Environment Protection Licence (EPL) limits, as appropriate. Note that it is considered that mine closure may occur beyond surrender of EPL.
 - g. Provide objectives and completion criteria for water quality of retained water management structures.
4. Section 7.2 states that rehabilitation of disturbed areas during the construction of the Mandalong South Service Site (MSSS) and access road are not reflected in the MOP tables or plans – they should be included if physically on the mining title.
 5. Section 8.2 must include a commitment and methodology for identifying analogue sites for completion criteria.
 6. Each Trigger Action Response Plan (TARP) aspect should link directly to completion criteria presented in section 6 of the MOP. The TARP must be consistent with the completion criteria, i.e. slope gradient is specified in the TARP but not specified in the completion criteria.
 7. Final MOP document and associated plans must be signed
 8. Note that Mining Operations Plan must be consistent with the Extraction Plan.
 9. The following comments are provided on the plans:
 - a. Existing vegetation within the Underground Mining Area, that is not proposed to be disturbed, should be differentiated from the secondary rehabilitation domains. Note that Table 30 will require updating if changes to the secondary domain are made.
 - b. The series 1 Mandalong South Surface Site plans shows a lined polygon which is not shown on the legend.

- c. The series 3 Delta Entry Site plans shows the SSD-5144 project approval boundary in red and the project disturbance boundary in blue. These boundaries do not align - please provide justification for this.

Please note that all plans relating to the MOP area could not be reviewed adequately, due to file size and inability to print.

These comments are provided for your information and a full assessment of the Mining Operations Plan will be undertaken on submission of the final document.

If you require additional information on this matter please contact the undersigned at the Environmental Sustainability Unit's Maitland office on 4931 6739.

Yours sincerely,



Kate Walsh
Inspector Environment
Environmental Sustainability Unit



Department of Primary Industries

Mr Jeffrey Dunwoodie
Centennial Mandalong
PO Box 1000
TORONTO NSW 2283
Jeffrey.dunwoodie@centennialcoal.com.au

Contact Tim Baker
Phone 02 6841 7403
Mobile 0428 162 097
Fax 02 6884 0096
Email Tim.Baker@dpi.nsw.gov.au

Our ref OUT16/24721

Dear Mr Dunwoodie,

Centennial Mandalong – draft Mining Operations Plan / Rehabilitation Management Plan

I refer to your letter dated 6 June 2016 requesting comment from DPI Water in relation to the draft Mining Operations Plan and Rehabilitation Management Plan for Centennial Mandalong. It is recognised this consultation is in accordance with Schedule 3, Condition 33 of Development Consent SSD-5144, and Schedule 3, Condition 29 of Development Consent SSD-5145. The following comments are provided to assist in finalising the plan.

- Section 1.2.3.5 refers to current water licences held at the Mandalong site which includes licence 20BL173524, which has an annual groundwater entitlement of 1825ML. Based on review of the environmental assessment for the Southern Mandalong Extension project DPI Water is aware of the proposed increase in groundwater take to a maximum of 2154ML in the years 2035-36. Centennial will therefore be required to acquire additional entitlement prior to the groundwater take exceeding 1825ML/yr. Further advice on this matter was provided by DPI Water in a review of the Water Management Plan (WMP) for the project.
- Section 3.3 refers to the management of surface water and groundwater to be carried out consistently with the Northern Operations Regional WMP. Due to the development of a draft WMP as part of the Southern Extension Project, reviewed by DPI Water in March 2016, it is recommended this WMP also be referred to. This is considered a key point as DPI Water's response on the draft WMP for project SSD-5144 included a number of recommendations in regards to groundwater monitoring and contingencies, water quality analysis and development of specific performance criteria.
- Section 3.4.15 has identified groundwater as a moderate risk to rehabilitation due to the risk of underground mine workings filling during closure and/or operations and potential uncontrolled seepage and discharge. DPI Water supports the proposal to further understand this issue as it is important to identify the potential impacts to enable consideration of viable mitigating options and to quantify potential water licensing requirements for ongoing water take during and post mining. This information is also important to address the rehabilitation objectives for watercourses as set out in the project approval (SSD5144). It is requested this information be used to update relevant management plans when available and to inform future mine planning.
- Table 20 and Section 7.3.7 refer to water management structures to be retained upon mine closure. DPI Water advises the retention of dams on minor watercourses at the rehabilitated site will need to be in accordance with the Maximum Harvestable Rights Dam Capacity of the property. Further information on this issue can be accessed at the following link: <http://www.water.nsw.gov.au/water-licensing/basic-water-rights/harvesting-runoff>
- Section 7.3.4 refers to rehabilitation methodologies for a range of impacts associated with subsidence that have impacts on watercourses and surface water/groundwater flows. It is not clear how this section relates with what is to be addressed in the Extraction Plan for the site in terms of trigger action response plans and contingency plans. DPI Water recommends

consistency needs to be ensured between the two plans where relevant and any works need to be in consultation with DPI Water.

- Table 31 refers to triggers related to drainage condition in accordance with design criteria established in the document. It is recommended the specific section be referred to as this is not clear, and based on reviewing the document no clear design criteria were provided that could be monitored. This part also refers to triggers of “minor drainage issues” and “significant drainage issues” however it is not clear what these categories mean and whether they are complying or not complying with the rehabilitation objectives. Further detail is recommended. The impacts referred to in Section 7.3.4 in the previous point would be considered or associated with key drainage issues for this site.
- DPI Water supports works within watercourses and generally within waterfront land to be in accordance with DPI Water’s Guidelines for Controlled Activities on Waterfront Land (CAA Guidelines). This guideline can be accessed at the following link: <http://www.water.nsw.gov.au/water-licensing/approvals/controlled-activity>
- Appendix 5 which includes a number of key plans relevant to the post mining layout was not included within the version provided for DPI Water to review.

Should you have any further queries in relation to this submission please do not hesitate to contact Tim Baker on (02) 6841 7403.

Yours sincerely



Mitchell Isaacs
Director Planning Policy & Assessment Advice
27 June 2016

Angela Besant
President
Mandalong Community Association
C/- 42 Little Valley Rd
Mandalong NSW 2264

29/06/2016

Mr Jeff Dunwoodie
Environment & Community Coordinator
Jeffrey.Dunwoodie@centennialcoal.com.au

Re: Review of the draft Mining Operations Plan / Rehabilitation Management Plan

The Mandalong Community Association would like to thank Mr Dunwoodie for the extension of time from the 24th of June 2016 to the 29th of June 2016 to provide a review of the MOP/Rehab Plan. This allowed us to consult with the members of the MCA at our AGM on the 25th June 2016, and incorporate community comments in the review.

To provide a context for the agenda of the MCA and its members, below is an extract from our Constitution:

The purpose of the Mandalong Community Association is to support all members of the local community and to build social cohesion and a sense of community amongst the people in Mandalong and their friends. Members of the association work to support each other and to confront challenges to our lifestyle and collective rights.

The MCA look forward to working closely with Centennial as a major landholder in the Mandalong Valley and effectively a member of our community.

MCA members are particularly interested in the following issues:

1. Subsidence,

2. Surface water – in particular any changes to surface water patterns due to subsidence.
3. Community cohesiveness.
4. Rehabilitation

MCA members are keen to work with Centennial to create outcomes that will be a credit not only to residents but also to Centennial. The suggestions below aim to forward that process.

Stakeholder Engagement Strategy (SES)

The SES objectives are important and the following suggestions aim to enhance the outcomes of the SES:

1. Interviews with stakeholders whom have been subject to the existing (complete) Mandalong mine extraction impacts and mitigations. The aim of this process would be to document the impacts that did occur on properties and the mitigation measures undertaken.
2. The documentation of the outcomes of mitigation – what measures were highly effective, which were moderately effective and which were not particularly effective.

It would be very beneficial for stakeholders to see a review of the effectiveness of mitigation measures – this could help inform Centennial and provide an experienced based review to help alleviate the concern of stakeholders whom have yet to be undermined. It would also provide Centennial with the opportunity to 'showcase' the best of rehabilitation and management practices.

The community of Mandalong has been somewhat fractured by the purchase of nearly a third of properties in the Valley for the existing Mandalong Mine. The MCA would suggest that there are ways to link rehabilitation with the re-establishment of community cohesiveness.

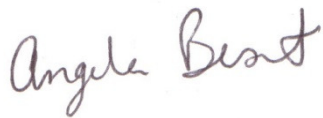
One way of doing this would be to expand rehabilitation activities from Centennial owned land to stakeholder held land. With the use of other inputs such as the Green Army, perhaps LLS, community participation and Centennials' support, it would be possible to drive projects – say focussing on riparian zones and wetlands, with replanting of endemic species, subsequently linking rehabilitation works and encouraging a catchment approach.

As Centennials properties are sold back into private hands we welcome new residents to the Valley. The Mandalong community would be grateful for support from Centennial to assist help the MCA to organise and promote an annual event to encourage residents to get to know the members of the community. The MCA is working to rebuild the Mandalong community to pre-mining participation levels.

On behalf of the MCA I would like to thank Centennial for the opportunity to provide this submission. We would welcome the opportunity to discuss ways in which we can work together in the physical and social rehabilitation of the valley.

If you have any queries please do not hesitate to contact me on 0412836031.

Kind Regards

A handwritten signature in dark ink, reading "Angela Besant". The signature is written in a cursive, flowing style.

Angela Besant
President
MCA



Centennial Coal

Mandalong

12 Kerry Anderson Drive
Mandalong NSW 2264
PO Box 1000
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W: www.centennialcoal.com.au

6 June 2016

BY MAIL

Mr Richard Bath
Senior Team Leader Planning
Hunter Central Coast Region
Regional Operations Group
Office of Environment & Heritage
Locked Bag 1002 DANGAR NSW 2309

Dear Mr Bath,



Centennial Mandalong – Management Plan for Review

On 21 October 2015, the NSW Planning & Assessment Commission (PAC) approved the Mandalong Southern Extension Project (SSD-5144).

In accordance with Condition 33 of Schedule 3 of SSD-5144, a draft copy of the combined Centennial Mandalong Mining Operations Plan / Rehabilitation Management Plan (including figures and appendices) has been enclosed for your review and comment.

Any feedback on the draft Mining Operations Plan / Rehabilitation Management Plan is requested to be provided by 5pm on Friday 24 June 2016 to:

Jeffrey Dunwoodie
Environment & Community Coordinator
Centennial Mandalong
PO Box 1000
TORONTO, NSW 2283.
Jeffrey.Dunwoodie@centennialcoal.com.au

Centennial Mandalong is required to submit the combined Mining Operations Plan / Rehabilitation Management Plan to the NSW Department of Planning & Environment & the Division of Resources & Energy for approval by 30 June 2016.

Yours sincerely


John Turner
Mine Manager

Enclosed

- Centennial Mandalong Mining Operations Plan / Rehabilitation Management Plan



Centennial Coal

Mandalong

12 Kerry Anderson Drive
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W: www.centennialcoal.com.au

6 June 2016

BY MAIL

Mr Symon Walpole
Ecosystem Enhancement Officer
Lake Macquarie City Council
Box 1906 HRMC NSW 2310

Dear Symon,



Centennial Mandalong – Management Plan for Review

On 21 October 2015, the NSW Planning & Assessment Commission (PAC) approved the Mandalong Southern Extension Project (SSD-5144).

In accordance with Condition 33 of Schedule 3 of SSD-5144, a draft copy of the combined Centennial Mandalong Mining Operations Plan / Rehabilitation Management Plan (including figures and appendices) has been enclosed for your review and comment.

Any feedback on the draft Mining Operations Plan / Rehabilitation Management Plan is requested to be provided by 5pm on Friday 24 June 2016 to:

Jeffrey Dunwoodie
Environment & Community Coordinator
Centennial Mandalong
PO Box 1000
TORONTO, NSW 2283.
Jeffrey.Dunwoodie@centennialcoal.com.au

Centennial Mandalong is required to submit the combined Mining Operations Plan / Rehabilitation Management Plan to the NSW Department of Planning & Environment & the Division of Resources & Energy for approval by 30 June 2016.

Yours sincerely

John Turner
Mine Manager

Enclosed

- Centennial Mandalong Mining Operations Plan / Rehabilitation Management Plan



Centennial Coal

Mandalong

12 Kerry Anderson Drive
Mandalong NSW 2264
PO Box 1000
Toronto NSW 2283 Australia

T: 61 2 4973 0900
F: 61 2 4973 0999
E: info@centennialcoal.com.au
W: www.centennialcoal.com.au



7 June 2016

Dear CCC Member,

Centennial Mandalong – Management Plan for Review

On 21 October 2015, the NSW Planning & Assessment Commission (PAC) approved the Mandalong Southern Extension Project (SSD-5144).

In accordance with Condition 33 of Schedule 3 of SSD-5144, a draft copy of the combined Centennial Mandalong Mining Operations Plan / Rehabilitation Management Plan (including figures and appendices) has been enclosed for your review and comment.

Any feedback on the draft Mining Operations Plan / Rehabilitation Management Plan is requested to be provided by 5pm on Friday 24 June 2016 to:

Jeffrey Dunwoodie
Environment & Community Coordinator
Centennial Mandalong
PO Box 1000
TORONTO, NSW 2283.
Jeffrey.Dunwoodie@centennialcoal.com.au

Centennial Mandalong is required to submit the combined Mining Operations Plan / Rehabilitation Management Plan to the NSW Department of Planning & Environment & the Division of Resources & Energy for approval by 30 June 2016.

Yours sincerely

Jeff Dunwoodie
Environment & Community Coordinator

Enclosed

- Centennial Mandalong Mining Operations Plan / Rehabilitation Management Plan

Mr. Phil Enright
Mining Approvals Coordinator
Centennial Coal Mandalong
PO Box 1000
TORONTO NSW 2283

phil.enright@centennialcoal.com.au

Dear Mr. Enright

Mandalong Extraction Plan Longwalls 24 + 24A – Consultation.

Thank you for your letter of 15 November 2017 forwarding details of the LW24 + 24A Extraction Plan for purposes of consultation in accordance with the provisions of Condition 6, Schedule 4, of Development Consent SSD 5144 dated of 12 October 2015 as modified (MOD 5) 1 August 2017.

In response, DRG advises that you, as the proponent, must prepare and implement a Mining Operation Plan (MOP) to the satisfaction of the Director Environmental Sustainability of DRG. The MOP must:

- a. be prepared in consultation with DRG and with relevant agencies and stakeholders to the relevant DRG Guidelines;
- b. be submitted and approved by the Director Environmental Sustainability of DRG prior to the commencement of activities;
- c. address all aspects of rehabilitation of subsidence impacts, including rehabilitation objectives, completion criteria and rehabilitation monitoring.
- d. include a detailed monitoring program.
- e. be reviewed in the Annual Environment Management Report

Specifically, the Trigger Action Response Plan (TARP) is to be updated to include subsidence considerations. The TARP is to be consistent with and build on the EP TARPs related to the repair of subsidence land use and biodiversity. The MOP TARP should include triggers for further actions are to be quantitative, time related and be linked to a monitoring schedule.

The MOP should also include a summary of surface subsidence impacts that have been identified, what rehabilitation has taken place and a schedule for rehabilitation of those impacts until rehabilitation has been completed.

DRG is happy to meet to assist in addressing the above recommendations.

As the DPE Assessment Unit have advised us of lodgement of the EP, and seeking DRG's response, I have copied them into this letter in the interests of efficient communication.

Should you have any further questions in relation to this matter, please contact Alex Love, Project Coordinator, Royalty & Advisory Services, at the Department on 9841 8582.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Alex Love'.

Alex Love
Project Coordinator
Royalty & Advisory Services
Divisions of Resources and Geosciences

cc Paul Freeman DPE



Centennial Coal

Appendix 4 Schedule of Lands

Mandalong Mine Schedule of Lands

Lot No	Deposited Plan No	Land Tenure	Mining Authorisation
	0	FCNSW	MLA457
	0	FCNSW	EL6317
1	1014	FREEHOLD	PAA
2	1014	FREEHOLD	PAA
3	1014	FREEHOLD	PAA
4	1014	FREEHOLD	PAA
5	1014	FREEHOLD	PAA
6	1014	FREEHOLD	PAA
7	1014	FREEHOLD	PAA
8	1014	FREEHOLD	PAA
9	1014	FREEHOLD	PAA
10	1014	FREEHOLD	PAA
11	1014	FREEHOLD	PAA
12	1014	FREEHOLD	PAA
13	1014	FREEHOLD	PAA
14	1014	FREEHOLD	PAA
15	1014	FREEHOLD	PAA
16	1014	FREEHOLD	PAA
17	1014	FREEHOLD	PAA
18	1014	FREEHOLD	PAA
1	1021	FREEHOLD	PAA
2	1021	FREEHOLD	PAA
3	1021	FREEHOLD	PAA
4	1021	FREEHOLD	PAA
5	1021	FREEHOLD	PAA
6	1021	FREEHOLD	PAA
7	1021	FREEHOLD	PAA
8	1021	FREEHOLD	PAA
9	1021	FREEHOLD	PAA
10	1021	FREEHOLD	PAA
11	1021	FREEHOLD	PAA
12	1021	FREEHOLD	PAA
13	1021	FREEHOLD	PAA
14	1021	FREEHOLD	PAA
15	1021	FREEHOLD	PAA
16	1021	FREEHOLD	PAA
17	1021	FREEHOLD	PAA
18	1021	FREEHOLD	PAA
19	1021	FREEHOLD	PAA
20	1021	FREEHOLD	PAA
21	1021	FREEHOLD	PAA
22	1021	FREEHOLD	PAA
23	1021	FREEHOLD	PAA
24	1021	FREEHOLD	PAA
25	1021	FREEHOLD	PAA
26	1021	FREEHOLD	PAA
27	1021	FREEHOLD	PAA
28	1021	FREEHOLD	PAA
29	1021	FREEHOLD	PAA
30	1021	FREEHOLD	PAA
1	2799	FREEHOLD	PAA, CL762
2	2799	FREEHOLD	PAA, CL762
3	2799	FREEHOLD	PAA, CL762
4	2799	FREEHOLD	PAA, CL762
5	2799	FREEHOLD	PAA, CL762
6	2799	FREEHOLD	PAA, CL762
7	2799	FREEHOLD	PAA, CL762
8	2799	FREEHOLD	PAA, CL762
9	2799	FREEHOLD	PAA, CL762
10	2799	FREEHOLD	PAA, CL762
11	2799	FREEHOLD	PAA, CL762
12	2799	FREEHOLD	PAA, CL762
13	2799	FREEHOLD	PAA, CL762
14	2799	FREEHOLD	PAA, CL762
15	2799	FREEHOLD	PAA, CL762

Lot No	Deposited Plan No	Land Tenure	Mining Authorisation
16	2799	FREEHOLD	PAA, CL762
17	2799	FREEHOLD	PAA, CL762
18	2799	FREEHOLD	PAA, CL762
19	2799	FREEHOLD	PAA, CL762
20	2799	FREEHOLD	PAA, CL762
21	2799	FREEHOLD	PAA, CL762
22	2799	FREEHOLD	PAA, CL762
24	2799	FREEHOLD	PAA, CL762
25	2799	FREEHOLD	PAA, CL762
26	2799	FREEHOLD	PAA, CL762
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29	2799	FREEHOLD	PAA, CL762
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34	2799	FREEHOLD	PAA, CL762
35	2799	FREEHOLD	PAA, CL762
36	2799	FREEHOLD	PAA, CL762
3	3039	FREEHOLD	PAA, ML1443
4	3533	FREEHOLD	PAA
2	4800	FREEHOLD	PAA, CL762
3	4800	FREEHOLD	PAA, CL762
4	4800	FREEHOLD	PAA, CL762
5	4800	FREEHOLD	PAA, CL762
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25	4800	FREEHOLD	PAA, CL762
26	4800	FREEHOLD	PAA, CL762
27	4800	FREEHOLD	PAA, CL762
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31	4800	FREEHOLD	PAA, CL762
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46	4800	FREEHOLD	PAA, CL762
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63	4800	FREEHOLD	PAA, CL762
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65	4800	FREEHOLD	PAA, CL762
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79	4800	FREEHOLD	PAA, CL762
83	4800	FREEHOLD	PAA, CL762
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90	4800	FREEHOLD	PAA, CL762
91	4800	FREEHOLD	PAA, CL762
92	4800	FREEHOLD	PAA, CL762
1	6325	FREEHOLD	PAA, CL762
2	6325	FREEHOLD	PAA, CL762
3	6325	FREEHOLD	PAA, CL762

Mandalong Mine Schedule of Lands

Lot No	Deposited Plan No	Land Tenure	Mining Authorisation
4	6325	FREEHOLD	PAA, CL762
5	6325	FREEHOLD	PAA, CL762
6	6325	FREEHOLD	PAA, CL762
7	6325	FREEHOLD	PAA, CL762
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15	6325	FREEHOLD	PAA, CL762
16	6325	FREEHOLD	PAA, CL762
17	6325	FREEHOLD	PAA, CL762
18	6325	FREEHOLD	PAA, CL762
19	6325	FREEHOLD	PAA, CL762
20	6325	FREEHOLD	PAA, CL762
22	6325	FREEHOLD	PAA, CL762
23	6325	FREEHOLD	PAA, CL762
24	6325	FREEHOLD	PAA, CL762
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1	6747	CROWN	PAA, CL762
2	6747	CROWN	PAA, CL762
2	6747	FREEHOLD	PAA, CL762
3	6747	CROWN	PAA
3	6747	FREEHOLD	PAA, CL762
4	6747	CROWN	PAA, CL762
4	6747	FREEHOLD	PAA, CL762
5	6747	CROWN	PAA, CL762
5	6747	FREEHOLD	PAA, CL762
6	6747	CROWN	PAA, CL762
6	6747	FREEHOLD	PAA, CL762
7	6747	FREEHOLD	PAA, CL762
8	6747	FREEHOLD	PAA, CL762
9	6747	FREEHOLD	PAA, CL762
10	6747	FREEHOLD	PAA, CL762
11	6747	FREEHOLD	PAA, CL762
12	6747	FREEHOLD	PAA, CL762
13	6747	FREEHOLD	PAA, CL762
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19	6747	FREEHOLD	PAA, CL762
20	6747	FREEHOLD	PAA, CL762
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37	6961	FREEHOLD	PAA, CL762
38	6961	FREEHOLD	PAA, CL762
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2	7744	FREEHOLD	PAA, CL762
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4	7744	FREEHOLD	PAA, CL762
5	7744	FREEHOLD	PAA, CL762
6	7744	FREEHOLD	PAA, CL762
7	7744	FREEHOLD	PAA, CL762
8	7744	FREEHOLD	PAA, CL762

Lot No	Deposited Plan No	Land Tenure	Mining Authorisation
9	7744	FREEHOLD	PAA, CL762
10	7744	FREEHOLD	PAA, CL762
11	7744	FREEHOLD	PAA, CL762
12	7744	FREEHOLD	PAA, CL762
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50	7744	FREEHOLD	PAA, CL762
52	7744	FREEHOLD	PAA, CL762
53	7744	FREEHOLD	PAA, CL762
1	7917	FREEHOLD	PAA, ML1722
2	7917	FREEHOLD	PAA, ML1722, EL6317
3	7917	FREEHOLD	PAA, ML1722, EL6317
4	7917	FREEHOLD	PAA, ML1722, EL6317
5	7917	FREEHOLD	PAA, ML1722, EL6317
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1	8009	FREEHOLD	PAA, CL762, EL6317
2	8009	FREEHOLD	PAA, CL762
3	8009	FREEHOLD	PAA, CL762
4	8009	FREEHOLD	PAA, CL762
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18	8009	FREEHOLD	PAA, CL762
19	8009	FREEHOLD	PAA, CL762
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23	8009	FREEHOLD	PAA, CL762
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3	8926	FREEHOLD	PAA, ML1722, EL6317
4	8926	FREEHOLD	PAA, ML1722, EL6317
5	8926	FREEHOLD	PAA, ML1722, EL6317

Mandalong Mine Schedule of Lands

Lot No	Deposited Plan No	Land Tenure	Mining Authorisation
6	8926	FREEHOLD	PAA, ML1722, EL6317
7	8926	FREEHOLD	PAA, ML1722, EL6317
8	8926	FREEHOLD	PAA, ML1722, EL6317
27	9149	FREEHOLD	PAA, CL762, EL6317
28	9149	FREEHOLD	PAA, CL762
36	9149	FREEHOLD	PAA, CL762
37	9149	FREEHOLD	PAA, CL762
38	9149	FREEHOLD	PAA, CL762
39	9149	FREEHOLD	PAA, CL762
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47	9149	FREEHOLD	PAA, CL762
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52	9149	FREEHOLD	PAA, CL762
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96	9149	FREEHOLD	PAA, CL762
98	9149	FREEHOLD	PAA, CL762
99	9149	FREEHOLD	PAA, CL762
100	9149	FREEHOLD	PAA

Lot No	Deposited Plan No	Land Tenure	Mining Authorisation
101	9149	FREEHOLD	PAA, CL762
102	9149	FREEHOLD	PAA, CL762
103	9149	FREEHOLD	PAA, CL762
106	9149	FREEHOLD	PAA, CL762
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113	9149	FREEHOLD	PAA, CL762
114	9149	FREEHOLD	PAA, CL762
115	9149	FREEHOLD	PAA, CL762
118	9149	FREEHOLD	PAA, CL762
31	9632	FREEHOLD	PAA, CL762
32	9632	FREEHOLD	PAA, CL762
33	9632	FREEHOLD	PAA, CL762
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47	9632	FREEHOLD	PAA, CL762
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54	9632	FREEHOLD	PAA, ML1443, CL762
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60	9632	FREEHOLD	PAA, ML1443
61	9632	FREEHOLD	PAA, ML1443
62	9632	FREEHOLD	PAA, ML1443
83	9632	FREEHOLD	PAA, ML1443
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14	11249	FREEHOLD	PAA, CL762
15	11249	FREEHOLD	PAA, CL762
16	11249	FREEHOLD	PAA, CL762
17	11249	FREEHOLD	PAA, CL762
18	11249	FREEHOLD	PAA, CL762

Mandalong Mine Schedule of Lands

Lot No	Deposited Plan No	Land Tenure	Mining Authorisation
19	11249	FREEHOLD	PAA, CL762
20	11249	FREEHOLD	PAA, CL762
21	11249	FREEHOLD	PAA, CL762
22	11249	FREEHOLD	PAA, CL762
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26	11249	FREEHOLD	PAA, CL762
28	11249	FREEHOLD	PAA, CL762
29	11249	FREEHOLD	PAA, CL762
30	11249	FREEHOLD	PAA, CL762
31	11249	FREEHOLD	PAA, CL762
32	11249	FREEHOLD	PAA, CL762
1	12993	FREEHOLD	PAA, CL762
2	12993	FREEHOLD	PAA, CL762
3	12993	FREEHOLD	PAA, CL762
4	12993	FREEHOLD	PAA, CL762
5	12993	FREEHOLD	PAA, CL762
6	12993	FREEHOLD	PAA, CL762
9	12993	FREEHOLD	PAA, CL762
10	12993	FREEHOLD	PAA, CL762
11	12993	FREEHOLD	PAA, CL762
12	12993	FREEHOLD	PAA, CL762
13	12993	FREEHOLD	PAA, CL762
14	12993	FREEHOLD	PAA, CL762
15	12993	FREEHOLD	PAA, CL762
16	12993	FREEHOLD	PAA, CL762
17	12993	FREEHOLD	PAA, CL762
18	12993	FREEHOLD	PAA, CL762
19	12993	FREEHOLD	PAA, CL762
20	12993	FREEHOLD	PAA, CL762
21	12993	FREEHOLD	PAA, CL762
22	12993	FREEHOLD	PAA, CL762
23	12993	FREEHOLD	PAA, CL762
24	12993	FREEHOLD	PAA, CL762
25	12993	FREEHOLD	PAA, CL762
26	12993	FREEHOLD	PAA, CL762
27	12993	FREEHOLD	PAA, CL762
28	12993	FREEHOLD	PAA, CL762
29	12993	FREEHOLD	PAA, CL762
30	12993	FREEHOLD	PAA, CL762
31	12993	FREEHOLD	PAA, CL762
32	12993	FREEHOLD	PAA, CL762
33	12993	FREEHOLD	PAA, CL762
34	12993	FREEHOLD	PAA, CL762
35	12993	FREEHOLD	PAA, CL762
36	12993	FREEHOLD	PAA, CL762
37	12993	FREEHOLD	PAA, CL762
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39	12993	FREEHOLD	PAA, CL762
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41	12993	FREEHOLD	PAA, CL762
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43	12993	FREEHOLD	PAA, CL762
44	12993	FREEHOLD	PAA, CL762
45	12993	FREEHOLD	PAA, CL762
46	12993	FREEHOLD	PAA, CL762
47	12993	FREEHOLD	PAA, CL762
48	12993	FREEHOLD	PAA, CL762
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50	12993	FREEHOLD	PAA, CL762
54	12993	FREEHOLD	PAA, CL762
55	12993	FREEHOLD	PAA, CL762
56	12993	FREEHOLD	PAA, CL762
57	12993	FREEHOLD	PAA, CL762

Lot No	Deposited Plan No	Land Tenure	Mining Authorisation
61	12993	FREEHOLD	PAA, CL762
62	12993	FREEHOLD	PAA, CL762
63	12993	FREEHOLD	PAA, CL762
64	12993	FREEHOLD	PAA, CL762
65	12993	FREEHOLD	PAA, CL762
66	12993	FREEHOLD	PAA, CL762
67	12993	FREEHOLD	PAA, CL762
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69	12993	FREEHOLD	PAA, CL762
70	12993	FREEHOLD	PAA, CL762
71	12993	FREEHOLD	PAA, CL762
72	12993	FREEHOLD	PAA, CL762
73	12993	FREEHOLD	PAA, CL762
74	12993	FREEHOLD	PAA, CL762
75	12993	FREEHOLD	PAA, CL762
76	12993	FREEHOLD	PAA, CL762
77	12993	FREEHOLD	PAA, CL762
3	13318	FREEHOLD	PAA, ML1443
8	13318	FREEHOLD	PAA, ML1443
9	13318	FREEHOLD	PAA, ML1443
10	13318	FREEHOLD	PAA, ML1443
13	13318	FREEHOLD	PAA, ML1443
15	13318	FREEHOLD	PAA, ML1443
16	13318	FREEHOLD	PAA, ML1443
17	13318	FREEHOLD	PAA, ML1443
18	13318	FREEHOLD	PAA, ML1443
19	13318	FREEHOLD	PAA, ML1443
20	13318	FREEHOLD	PAA, ML1443
22	13318	FREEHOLD	PAA, ML1443
23	13318	FREEHOLD	PAA, ML1443
24	13318	FREEHOLD	PAA, ML1443
25	13318	FREEHOLD	PAA, ML1443
101	15150	FREEHOLD	PAA, CL762
102	15150	FREEHOLD	PAA, CL762
103	15150	FREEHOLD	PAA, CL762
104	15150	FREEHOLD	PAA, CL762
105	15150	FREEHOLD	PAA, CL762
106	15150	FREEHOLD	PAA, CL762
107	15150	FREEHOLD	PAA, CL762
108	15150	FREEHOLD	PAA, CL762
109	15150	FREEHOLD	PAA, CL762
110	15150	FREEHOLD	PAA, CL762
111	15150	FREEHOLD	PAA, CL762
112	15150	FREEHOLD	PAA, CL762
113	15150	FREEHOLD	PAA, CL762
114	15150	FREEHOLD	PAA, CL762
115	15150	FREEHOLD	PAA, CL762
116	15150	FREEHOLD	PAA, CL762
117	15150	FREEHOLD	PAA, CL762
118	15150	FREEHOLD	PAA, CL762
119	15150	FREEHOLD	PAA, CL762
120	15150	FREEHOLD	PAA, CL762
121	15150	FREEHOLD	PAA, CL762
122	15150	FREEHOLD	PAA, CL762
123	15150	FREEHOLD	PAA, CL762
124	15150	FREEHOLD	PAA, CL762
125	15150	FREEHOLD	PAA, CL762
126	15150	FREEHOLD	PAA, CL762
127	15150	FREEHOLD	PAA, CL762
128	15150	FREEHOLD	PAA, CL762
129	15150	FREEHOLD	PAA, CL762
130	15150	FREEHOLD	PAA, CL762
131	15150	FREEHOLD	PAA, CL762
132	15150	FREEHOLD	PAA, CL762
133	15150	FREEHOLD	PAA, CL762

Mandalong Mine Schedule of Lands

Lot No	Deposited Plan No	Land Tenure	Mining Authorisation
95	19828	FREEHOLD	PAA, CL762
96	19828	FREEHOLD	PAA, CL762
97	19828	FREEHOLD	PAA, CL762
100	19828	FREEHOLD	PAA, CL762
101	19828	FREEHOLD	PAA, CL762
102	19828	FREEHOLD	PAA, CL762
1	21063	FREEHOLD	PAA, CL762
2	21063	FREEHOLD	PAA, CL762
3	21063	FREEHOLD	PAA, CL762
4	21063	FREEHOLD	PAA, CL762
5	21063	FREEHOLD	PAA, CL762
6	21063	FREEHOLD	PAA, CL762
7	21063	FREEHOLD	PAA, CL762
1	21089	FREEHOLD	PAA, CL762
2	21089	FREEHOLD	PAA, CL762
3	21089	FREEHOLD	PAA, CL762
4	21089	FREEHOLD	PAA, CL762
5	21089	FREEHOLD	PAA, CL762
1	21373	FREEHOLD	PAA, CL762
2	21373	FREEHOLD	PAA, CL762
3	21373	FREEHOLD	PAA, CL762
4	21373	FREEHOLD	PAA, CL762
5	21373	FREEHOLD	PAA, CL762
6	21373	FREEHOLD	PAA, CL762
1	21403	FREEHOLD	PAA, CL762
2	21403	FREEHOLD	PAA, CL762
3	21403	FREEHOLD	PAA, CL762
4	21403	FREEHOLD	PAA, CL762
5	21403	FREEHOLD	PAA, CL762
6	21403	FREEHOLD	PAA, CL762
7	21403	FREEHOLD	PAA, CL762
8	21403	FREEHOLD	PAA, CL762
9	21403	FREEHOLD	PAA, CL762
10	21403	FREEHOLD	PAA, CL762
11	21403	FREEHOLD	PAA, CL762
12	21403	FREEHOLD	PAA, CL762
13	21403	FREEHOLD	PAA, CL762
14	21403	FREEHOLD	PAA, CL762
15	21403	FREEHOLD	PAA, CL762
16	21403	FREEHOLD	PAA, CL762
22	21403	FREEHOLD	PAA, CL762
23	21403	FREEHOLD	PAA, CL762
24	21403	FREEHOLD	PAA, CL762
25	21403	FREEHOLD	PAA, CL762
26	21403	FREEHOLD	PAA, CL762
27	21403	FREEHOLD	PAA, CL762
28	21403	FREEHOLD	PAA, CL762
29	21403	FREEHOLD	PAA, CL762
30	21403	FREEHOLD	PAA, CL762
31	21403	FREEHOLD	PAA, CL762
32	21403	FREEHOLD	PAA, CL762
33	21403	FREEHOLD	PAA, CL762
34	21403	FREEHOLD	PAA, CL762
35	21403	FREEHOLD	PAA, CL762
36	21403	FREEHOLD	PAA, CL762
37	21403	FREEHOLD	PAA, CL762
38	21403	FREEHOLD	PAA, CL762
39	21403	FREEHOLD	PAA, CL762
40	21403	FREEHOLD	PAA, CL762
41	21403	FREEHOLD	PAA, CL762
42	21403	FREEHOLD	PAA, CL762
43	21403	FREEHOLD	PAA, CL762
44	21403	FREEHOLD	PAA, CL762
B	21403	FREEHOLD	PAA, CL762
E	21403	FREEHOLD	PAA, CL762

Lot No	Deposited Plan No	Land Tenure	Mining Authorisation
F	21403	FREEHOLD	PAA, CL762
1	22034	FREEHOLD	PAA, CL762
2	22034	FREEHOLD	PAA, CL762
3	22034	FREEHOLD	PAA, CL762
4	22034	FREEHOLD	PAA, CL762
5	22034	FREEHOLD	PAA, CL762
6	22034	FREEHOLD	PAA, CL762
7	22034	FREEHOLD	PAA, CL762
8	22034	FREEHOLD	PAA, CL762
4	22944	FREEHOLD	PAA, CL762
7	22944	FREEHOLD	PAA, CL762
8	22944	FREEHOLD	PAA, CL762
9	22944	FREEHOLD	PAA, CL762
51	25812	FREEHOLD	PAA, CL762
52	25812	FREEHOLD	PAA, CL762
53	25812	FREEHOLD	PAA, CL762
1	31746	FREEHOLD	PAA, CL762
2	31746	FREEHOLD	PAA, CL762
3	31746	FREEHOLD	PAA, CL762
4	31746	FREEHOLD	PAA, CL762
5	31746	FREEHOLD	PAA, CL762
6	31746	FREEHOLD	PAA, CL762
7	31746	FREEHOLD	PAA, CL762
8	31746	FREEHOLD	PAA, CL762
9	31746	FREEHOLD	PAA, CL762
10	31746	FREEHOLD	PAA, CL762
11	31746	FREEHOLD	PAA, CL762
12	31746	FREEHOLD	PAA, CL762
13	31746	FREEHOLD	PAA, CL762
14	31746	FREEHOLD	PAA, CL762
15	31746	FREEHOLD	PAA, CL762
16	31746	FREEHOLD	PAA, CL762
17	31746	FREEHOLD	PAA, CL762
18	31746	FREEHOLD	PAA, CL762
19	31746	FREEHOLD	PAA, CL762
20	31746	FREEHOLD	PAA, CL762
21	31746	FREEHOLD	PAA, CL762
23	31746	FREEHOLD	PAA, CL762
518	41966	FREEHOLD	PAA, CL762
520	43409	CROWN	PAA, CL762
521	43409	CROWN	PAA, CL762
1	46770	FREEHOLD	PAA, CL762
2	46770	FREEHOLD	PAA, CL762
3	46770	FREEHOLD	PAA, CL762
4	46770	FREEHOLD	PAA, CL762
5	46770	FREEHOLD	PAA, CL762
6	46770	FREEHOLD	PAA, CL762
7	46770	FREEHOLD	PAA, CL762
8	46770	FREEHOLD	PAA, CL762
9	46770	FREEHOLD	PAA, CL762
10	46770	FREEHOLD	PAA, CL762
11	46770	FREEHOLD	PAA, CL762
12	46770	FREEHOLD	PAA, CL762
13	46770	FREEHOLD	PAA, CL762
	66365	FREEHOLD	PAA, CL762
	66682	FREEHOLD	PAA, CL762
	68221	FREEHOLD	PAA, CL762
	68621	FREEHOLD	PAA, CL762
	69494	FREEHOLD	PAA, CL762
	70240	FREEHOLD	PAA, CL762
	70725	FREEHOLD	PAA, CL762
	70849	FREEHOLD	PAA, CL762
	71661	FREEHOLD	PAA, CL762
	73052	FREEHOLD	PAA, CL762
	73547	FREEHOLD	PAA, CL762

Mandalong Mine Schedule of Lands

Lot No	Deposited Plan No	Land Tenure	Mining Authorisation
	75116	FREEHOLD	PAA, CL762
	76102	FREEHOLD	PAA, CL762
	76251	FREEHOLD	PAA, CL762
	76401	FREEHOLD	PAA, CL762
	76485	FREEHOLD	PAA, CL762
	77448	FREEHOLD	PAA, CL762
	77602	FREEHOLD	PAA, CL762
	79427	FREEHOLD	PAA, CL762
	79692	FREEHOLD	PAA, CL762
	80923	FREEHOLD	PAA, CL762
	81078	FREEHOLD	PAA, CL762
	81288	FREEHOLD	PAA, CL762
	81394	FREEHOLD	PAA, CL762
	81673	FREEHOLD	PAA, CL762
	82036	FREEHOLD	PAA, CL762
	83865	FREEHOLD	PAA, CL762
	89368	FREEHOLD	PAA, CL762
	89451	FREEHOLD	PAA, CL762
	90676	FREEHOLD	PAA, CL762
	91363	FREEHOLD	PAA, CL762
7018	93179	CROWN	PAA
7032	93586	CROWN	PAA, CL762
7033	93586	CROWN	PAA, CL762
7039	93587	CROWN	PAA, CL762
7042	93588	CROWN	PAA, CL762
7051	93589	CROWN	PAA, CL762
7034	93590	CROWN	PAA, CL762
7035	93590	CROWN	PAA, CL762
7036	93590	CROWN	PAA, CL762
7040	93591	CROWN	PAA, CL762
7041	93591	CROWN	PAA, CL762
7045	93593	CROWN	PAA, CL762
7047	93594	CROWN	PAA, CL762
7050	93595	CROWN	PAA, CL762
7030	93597	CROWN	PAA, CL762
7031	93597	CROWN	PAA, CL762
7043	93598	CROWN	PAA, CL762
7044	93598	CROWN	PAA, CL762
7048	93599	CROWN	PAA, CL762
7001	93610	CROWN	PAA, ML1443
A	103242	FREEHOLD	PAA, CL762
B	103242	FREEHOLD	PAA, CL762
A	103559	FREEHOLD	PAA, CL762
B	103559	FREEHOLD	PAA, CL762
C	103559	FREEHOLD	PAA, CL762
A	103687	FREEHOLD	PAA, CL762
B	103687	FREEHOLD	PAA, CL762
A	110119	FREEHOLD	PAA, ML1443
1	111906	FREEHOLD	PAA, ML1443
2	111906	FREEHOLD	PAA, ML1443
3	111906	LOCAL GOVT AUTHORITY	PAA, ML1443
4	111906	FREEHOLD	PAA, ML1443
5	111906	LOCAL GOVT AUTHORITY	PAA, ML1443
6	111906	FREEHOLD	PAA, ML1443
8	111906	FREEHOLD	PAA, ML1722, EL6317
11	111906	FREEHOLD	PAA, ML1443
12	111906	FREEHOLD	PAA, ML1722, EL6317
1	120999	FREEHOLD	PAA, CL762
1	121285	FREEHOLD	PAA, CL762
1	125136	FREEHOLD	PAA, ML1443
1	126320	FREEHOLD	PAA, CL762
2	126594	FREEHOLD	PAA, ML1443

Lot No	Deposited Plan No	Land Tenure	Mining Authorisation
1	126595	FREEHOLD	PAA, ML1443
1	126678	FREEHOLD	PAA, CL762
20	129122	FREEHOLD	PAA
21	129122	FREEHOLD	PAA
22	129122	FREEHOLD	PAA
23	129122	FREEHOLD	PAA
24	129122	FREEHOLD	PAA
25	129122	FREEHOLD	PAA
15	129157	FREEHOLD	PAA
11	131034	FREEHOLD	PAA, CL762
3	168774	FREEHOLD	PAA, ML1443, ML 1543
4	168774	FREEHOLD	PAA, ML1443, ML 1543
1	172621	FREEHOLD	PAA, CL762
1	178951	FREEHOLD	PAA, CL762
1	188470	FREEHOLD	PAA
1	207226	FREEHOLD	PAA, ML1443
1	208441	FREEHOLD	PAA, CL762
2	208441	FREEHOLD	PAA, CL762
3	208441	FREEHOLD	PAA, CL762
4	208441	FREEHOLD	PAA, CL762
1	215590	FREEHOLD	PAA, CL762
2	215590	FREEHOLD	PAA, CL762
3	215590	FREEHOLD	PAA, CL762
4	215590	FREEHOLD	PAA, CL762
5	215590	FREEHOLD	PAA, CL762
6	215590	FREEHOLD	PAA, CL762
9	215590	FREEHOLD	PAA, CL762
3	220921	FREEHOLD	PAA, CL762
4	220921	FREEHOLD	PAA, CL762
5	220921	FREEHOLD	PAA, CL762
6	220921	FREEHOLD	PAA, CL762
1	235035	FREEHOLD	PAA, CL762
2	235035	FREEHOLD	PAA, CL762
3	235035	FREEHOLD	PAA, CL762
4	235035	FREEHOLD	PAA, CL762
1	236664	FREEHOLD	PAA, CL762
2	236664	FREEHOLD	PAA, CL762
3	236664	FREEHOLD	PAA, CL762
4	236664	FREEHOLD	PAA, CL762
5	236664	FREEHOLD	PAA, CL762
6	236664	FREEHOLD	PAA, CL762
7	236664	FREEHOLD	PAA, CL762
8	236664	FREEHOLD	PAA, CL762
9	236664	FREEHOLD	PAA, CL762
11	236664	FREEHOLD	PAA, CL762
12	236664	FREEHOLD	PAA, CL762
13	236664	FREEHOLD	PAA, CL762
14	236664	FREEHOLD	PAA, CL762
15	236664	FREEHOLD	PAA, CL762
16	236664	FREEHOLD	PAA, CL762
17	236664	FREEHOLD	PAA, CL762
18	236664	FREEHOLD	PAA, CL762
19	236664	FREEHOLD	PAA, CL762
20	236664	FREEHOLD	PAA, CL762
216	239175	FREEHOLD	PAA
217	239175	FREEHOLD	PAA
1	243785	FREEHOLD	PAA, CL762
1	246326	FREEHOLD	PAA, CL762
2	246326	FREEHOLD	PAA, CL762
3	246326	FREEHOLD	PAA, CL762
4	246326	FREEHOLD	PAA, CL762
3	247539	FREEHOLD	PAA, ML1722, EL6317
4	247539	FREEHOLD	PAA, ML1722,

Mandalong Mine Schedule of Lands

Lot No	Deposited Plan No	Land Tenure	Mining Authorisation
			EL6317
5	247539	FREEHOLD	PAA, ML1722, EL6317
7	247539	FREEHOLD	PAA, ML1722, EL6317
14	248498	FREEHOLD	PAA, ML1722, EL6317
15	248498	FREEHOLD	PAA, ML1722, EL6317, MLA457,
16	248498	FREEHOLD	PAA, ML1722, EL6317
17	248498	FREEHOLD	PAA, ML1722, EL6317
18	248498	FREEHOLD	PAA, ML1722, EL6317
19	248498	FREEHOLD	PAA, ML1722, EL6317
21	248498	FREEHOLD	PAA, ML1722, EL6317
1	248590	FREEHOLD	PAA, ML1443
2	248590	FREEHOLD	PAA, ML1443
3	248590	FREEHOLD	PAA, ML1443
4	248590	FREEHOLD	PAA, ML1443
5	248590	FREEHOLD	PAA, ML1443
1	253901	FREEHOLD	PAA, ML1722, EL6317
2	253901	FREEHOLD	PAA, ML1722, EL6317
3	253901	FREEHOLD	PAA, ML1722, EL6317
4	253901	FREEHOLD	PAA, ML1722, EL6317
5	253901	FREEHOLD	PAA, ML1722, EL6317
6	253901	FREEHOLD	PAA, ML1722, EL6317
14	259424	FREEHOLD	PAA, CL762
1	261460	FREEHOLD	PAA, ML1722, EL6317
2	261460	FREEHOLD	PAA, ML1722, EL6317
3	261460	FREEHOLD	PAA, ML1443, ML1722, EL6317,
6	261460	FREEHOLD	PAA, ML1443, ML1543, ML1722, EL6317
12	261890	FREEHOLD	PAA, ML1443, CL762
10	261891	FREEHOLD	PAA, ML1443
11	261891	FREEHOLD	PAA, ML1443
1	262159	FREEHOLD	PAA, CL762
2	262159	FREEHOLD	PAA, CL762
3	262159	FREEHOLD	PAA, CL762
4	262159	FREEHOLD	PAA, CL762
5	262159	FREEHOLD	PAA, ML1443, CL762
6	262159	FREEHOLD	PAA, ML1443, CL762
7	262159	FREEHOLD	PAA, CL762
8	262159	FREEHOLD	PAA, ML1443
9	262159	FREEHOLD	PAA, CL762
10	262159	FREEHOLD	PAA, ML1443, CL762
11	262159	FREEHOLD	PAA, CL762
13	262159	FREEHOLD	PAA, ML1443, CL762
14	262159	FREEHOLD	PAA, ML1443, CL762
15	262159	CROWN	PAA, CL762
1	262160	FREEHOLD	PAA, CL762, ML1443
2	262160	CROWN	PAA, CL762
3	262160	FREEHOLD	PAA, ML1443

Lot No	Deposited Plan No	Land Tenure	Mining Authorisation
5	262160	FREEHOLD	PAA, ML1443
10	262205	FREEHOLD	PAA, CL762
11	262205	FREEHOLD	PAA, CL762
12	262205	FREEHOLD	PAA, CL762
4	262501	FREEHOLD	PAA, CL762
6	262501	FREEHOLD	PAA, CL762
7	262501	FREEHOLD	PAA, CL762
8	262501	FREEHOLD	PAA, CL762
9	262501	FREEHOLD	PAA, CL762
10	262501	FREEHOLD	PAA, CL762
11	262501	FREEHOLD	PAA, CL762
12	262501	FREEHOLD	PAA, CL762
13	262501	FREEHOLD	PAA, CL762
14	262501	FREEHOLD	PAA, CL762
15	262501	FREEHOLD	PAA, CL762
16	262501	FREEHOLD	PAA, CL762
19	262501	FREEHOLD	PAA, CL762
22	262501	FREEHOLD	PAA, CL762
23	262501	FREEHOLD	PAA, CL762
24	262501	FREEHOLD	PAA, CL762
25	262501	FREEHOLD	PAA, CL762
26	262501	FREEHOLD	PAA, CL762
27	262501	FREEHOLD	PAA, CL762
31	262501	FREEHOLD	PAA, CL762
9	262720	FREEHOLD	PAA, ML1722, EL6317
4	264501	FREEHOLD	PAA
23	264502	FREEHOLD	PAA
24	264502	FREEHOLD	PAA
10	264503	FREEHOLD	PAA
11	264503	FREEHOLD	PAA
12	264503	FREEHOLD	PAA
13	264503	FREEHOLD	PAA
15	264503	FREEHOLD	PAA
21	264503	FREEHOLD	PAA
1	264590	FREEHOLD	PAA, CL762
2	264590	FREEHOLD	PAA, CL762
3	264590	FREEHOLD	PAA, CL762
4	264590	FREEHOLD	PAA, CL762
5	264590	FREEHOLD	PAA, CL762
6	264590	FREEHOLD	PAA, CL762
7	264590	FREEHOLD	, CL762
7	264590	FREEHOLD	PAA
8	264590	FREEHOLD	PAA, CL762
9	264590	FREEHOLD	PAA, CL762
10	264590	FREEHOLD	PAA, CL762
1	285639	FREEHOLD	PAA, CL762
2	285639	FREEHOLD	PAA, CL762
3	285639	FREEHOLD	PAA, CL762
4	285639	FREEHOLD	PAA, CL762
5	285639	FREEHOLD	PAA, CL762
1	303221	FREEHOLD	PAA, CL762
2	307645	FREEHOLD	PAA, CL762
1	309399	FREEHOLD	PAA, CL762
1	310026	FREEHOLD	PAA, CL762
1	312843	FREEHOLD	PAA, CL762
1	317437	FREEHOLD	PAA, CL762
A	319453	FREEHOLD	PAA, CL762
B	319453	FREEHOLD	PAA, CL762
A	319704	FREEHOLD	PAA, CL762
B	319704	FREEHOLD	PAA, CL762
1	324031	FREEHOLD	PAA, ML1443
4	324031	FREEHOLD	PAA, ML1443
5	324031	FREEHOLD	PAA, ML1443
B	328561	FREEHOLD	PAA, CL762
A	347689	FREEHOLD	PAA, CL762

Mandalong Mine Schedule of Lands

Lot No	Deposited Plan No	Land Tenure	Mining Authorisation
B	347689	FREEHOLD	PAA, CL762
C	347689	FREEHOLD	PAA, CL762
1	349570	FREEHOLD	PAA, CL762
2	349570	FREEHOLD	PAA, CL762
1	354959	FREEHOLD	PAA, CL762
A	356550	FREEHOLD	PAA, CL762
1	357347	FREEHOLD	PAA, ML1443
B	358934	FREEHOLD	PAA, CL762
A	359502	FREEHOLD	PAA, CL762
1	360488	FREEHOLD	PAA, CL762
A	363123	FREEHOLD	PAA, CL762
1	365231	FREEHOLD	PAA, CL762
2	365231	FREEHOLD	PAA, CL762
A	369364	FREEHOLD	PAA, CL762
B	369364	FREEHOLD	PAA, CL762
C	369364	FREEHOLD	PAA, CL762
D1	378159	FREEHOLD	PAA, CL762
A	378498	FREEHOLD	PAA, CL762
B	378498	FREEHOLD	PAA, CL762
1	382470	FREEHOLD	PAA, ML1443
A	385142	FREEHOLD	PAA, CL762
C	385142	FREEHOLD	PAA, CL762
A	389823	FREEHOLD	PAA, ML1722, EL6317
A	390945	FREEHOLD	PAA, CL762
B	390945	FREEHOLD	PAA, CL762
1	392111	FREEHOLD	PAA, ML1722, EL6317
2	393644	FREEHOLD	PAA, CL762
A	396531	FREEHOLD	PAA, CL762
B	396531	FREEHOLD	PAA, CL762
B	397233	FREEHOLD	PAA, CL762
A	402238	FREEHOLD	PAA, CL762
B	402238	FREEHOLD	PAA, CL762
C	402238	FREEHOLD	PAA, CL762
B	411272	FREEHOLD	PAA, CL762
C	411272	FREEHOLD	PAA, CL762
A	413734	FREEHOLD	PAA, CL762
A	415044	FREEHOLD	PAA, CL762
B	415044	FREEHOLD	PAA, CL762
B	432124	FREEHOLD	PAA, CL762
1	441992	FREEHOLD	PAA, CL762
B	443445	FREEHOLD	PAA, CL762
C	443445	FREEHOLD	PAA, CL762
A	445041	FREEHOLD	PAA, CL762
A	447420	FREEHOLD	PAA, CL762
5	449314	FREEHOLD	PAA, CL762
1	450211	FREEHOLD	PAA, CL762
26	456275	FREEHOLD	PAA, CL762
27	456275	FREEHOLD	PAA, CL762
1	501458	FREEHOLD	PAA, CL762
2	501458	FREEHOLD	PAA, CL762
1	502247	FREEHOLD	PAA, CL762
1	502914	FREEHOLD	PAA, CL762
2	502914	FREEHOLD	PAA, CL762
3	503197	FREEHOLD	PAA, CL762
1	503611	FREEHOLD	PAA, CL762
2	503611	FREEHOLD	PAA, CL762
2	504749	FREEHOLD	PAA, ML1443
1	505054	FREEHOLD	PAA, CL762
2	505054	FREEHOLD	PAA, CL762
2	505715	FREEHOLD	PAA, CL762
24	508705	FREEHOLD	PAA, CL762
25	508705	FREEHOLD	PAA, CL762
26	508705	FREEHOLD	PAA, CL762
27	508705	FREEHOLD	PAA, CL762

Lot No	Deposited Plan No	Land Tenure	Mining Authorisation
28	508705	FREEHOLD	PAA, CL762
2	508750	FREEHOLD	PAA, CL762
1	509850	FREEHOLD	PAA, CL762
2	509850	FREEHOLD	PAA, CL762
1	510965	FREEHOLD	PAA, CL762
1	511786	FREEHOLD	PAA, CL762
2	511786	FREEHOLD	PAA, CL762
441	517403	FREEHOLD	PAA, CL762
442	517403	FREEHOLD	PAA, CL762
1	518081	FREEHOLD	PAA, ML1722, EL6317
411	520793	FREEHOLD	PAA, CL762
412	520793	FREEHOLD	PAA, CL762
117	521713	FREEHOLD	PAA, CL762
118	521713	FREEHOLD	PAA, CL762
1	524013	FREEHOLD	PAA, CL762
2	524013	FREEHOLD	PAA, CL762
3	524013	FREEHOLD	PAA, CL762
1	524410	FREEHOLD	PAA, CL762
2	524410	FREEHOLD	PAA, CL762
2	524687	FREEHOLD	PAA, CL762
37	528601	FREEHOLD	PAA, CL762
38	528601	FREEHOLD	PAA, CL762
11	529466	FREEHOLD	PAA, CL762
12	529466	FREEHOLD	PAA, CL762
2	529914	FREEHOLD	PAA, CL762
11	533825	FREEHOLD	PAA, CL762
71	533892	FREEHOLD	PAA, CL762
72	533892	FREEHOLD	PAA, CL762
1	536372	FREEHOLD	PAA, CL762
2	536372	FREEHOLD	PAA, CL762
1	537355	FREEHOLD	PAA, CL762
2	537355	FREEHOLD	PAA, CL762
1	537744	FREEHOLD	PAA, CL762
2	537744	FREEHOLD	PAA, CL762
1	538275	FREEHOLD	PAA, CL762
2	538275	FREEHOLD	PAA, CL762
3	538275	FREEHOLD	PAA, CL762
902	541065	FREEHOLD	PAA, ML1443
901	542306	FREEHOLD	PAA, ML1443
902	542306	FREEHOLD	PAA, ML1443
903	542306	FREEHOLD	PAA, ML1443
210	545241	FREEHOLD	PAA, CL762
211	545241	FREEHOLD	PAA, CL762
21	548495	FREEHOLD	PAA, CL762
22	548495	FREEHOLD	PAA, CL762
2	549382	FREEHOLD	PAA, CL762
2	549437	FREEHOLD	PAA, CL762
2	550601	FREEHOLD	PAA, CL762
1	552101	FREEHOLD	PAA, ML1722, EL6317
2	552101	FREEHOLD	PAA, ML1722, EL6317
3	552101	FREEHOLD	PAA, ML1722, EL6317
1	552883	FCNSW	PAA, ML1443
2	552883	FREEHOLD	PAA, ML1443
1	553093	FREEHOLD	PAA, ML1722, EL6317
2	553093	FREEHOLD	PAA, ML1722, EL6317
211	553196	FREEHOLD	PAA, ML1443
212	553196	FREEHOLD	PAA, ML1443
761	553373	FREEHOLD	PAA, CL762
762	553373	FREEHOLD	PAA, CL762
31	553798	FREEHOLD	PAA, CL762

Mandalong Mine Schedule of Lands

Lot No	Deposited Plan No	Land Tenure	Mining Authorisation
32	553798	FREEHOLD	PAA, CL762
231	554009	FREEHOLD	PAA, CL762
232	554009	FREEHOLD	PAA, CL762
351	554283	FREEHOLD	PAA, CL762
352	554283	FREEHOLD	PAA, CL762
1	555211	FREEHOLD	PAA, CL762
1	555883	FREEHOLD	PAA, CL762
2	555883	FREEHOLD	PAA, CL762
1	555891	FREEHOLD	PAA, ML1443
4	555891	FREEHOLD	PAA, ML1443
1	555953	FREEHOLD	PAA, CL762
2	555953	FREEHOLD	PAA, CL762
420	556602	FREEHOLD	PAA, CL762
421	556602	FREEHOLD	PAA, CL762
391	556611	FREEHOLD	PAA, CL762
392	556611	FREEHOLD	PAA, CL762
1	557230	FREEHOLD	PAA, ML1443
2	557230	FREEHOLD	PAA, ML1443
3	557230	FREEHOLD	PAA, ML1443
21	557595	FREEHOLD	PAA, CL762
22	557595	FREEHOLD	PAA, CL762
201	563005	FREEHOLD	PAA, CL762
202	563005	FREEHOLD	PAA, CL762
31	563340	FREEHOLD	PAA, CL762
32	563340	FREEHOLD	PAA, CL762
301	563457	FREEHOLD	PAA, CL762
302	563457	FREEHOLD	PAA, CL762
751	563578	FREEHOLD	PAA, CL762
752	563578	FREEHOLD	PAA, CL762
281	563610	FREEHOLD	PAA, CL762
282	563610	FREEHOLD	PAA, CL762
283	563610	FREEHOLD	PAA, CL762
1	564573	FREEHOLD	PAA, CL762
2	564573	FREEHOLD	PAA, CL762
102	564680	FREEHOLD	PAA, CL762
771	566928	FREEHOLD	PAA, CL762
772	566928	FREEHOLD	PAA, CL762
4	568228	FREEHOLD	, EL6317
5	568228	FREEHOLD	PAA, ML1722, EL6317
100	570320	FREEHOLD	PAA, CL762
101	570320	FREEHOLD	PAA, CL762
10	571835	FREEHOLD	PAA, CL762
11	571835	FREEHOLD	PAA, CL762
1	573133	FREEHOLD	PAA, CL762
2	573133	FREEHOLD	PAA, CL762
41	575937	FREEHOLD	PAA, CL762
42	575937	FREEHOLD	PAA, CL762
11	582283	FREEHOLD	PAA, ML1443
12	582283	FREEHOLD	PAA, ML1443
5002	585398	FREEHOLD	PAA, CL762
2	585399	FREEHOLD	PAA, CL762
3	585399	FREEHOLD	PAA, CL762
4	585399	FREEHOLD	PAA, CL762
5	585400	FREEHOLD	PAA, CL762
6	585400	FREEHOLD	PAA, CL762
7	585400	FREEHOLD	PAA, CL762
8	585401	FREEHOLD	PAA, CL762
9	585401	FREEHOLD	PAA, CL762
10	585401	FREEHOLD	PAA, CL762
11	585401	FREEHOLD	PAA, CL762
12	585402	FREEHOLD	PAA, CL762
13	585402	FREEHOLD	PAA, CL762
14	585402	FREEHOLD	PAA, CL762
15	585403	FREEHOLD	PAA, CL762
16	585403	FREEHOLD	PAA, CL762

Lot No	Deposited Plan No	Land Tenure	Mining Authorisation
17	585403	FREEHOLD	PAA, CL762
18	585403	FREEHOLD	PAA, CL762
19	585404	FREEHOLD	PAA, CL762
20	585404	FREEHOLD	PAA, CL762
21	585404	FREEHOLD	PAA, CL762
22	585404	FREEHOLD	PAA, CL762
23	585405	FREEHOLD	PAA, CL762
24	585405	FREEHOLD	PAA, CL762
25	585405	FREEHOLD	PAA, CL762
26	585405	FREEHOLD	PAA, CL762
27	585406	FREEHOLD	PAA, CL762
28	585406	FREEHOLD	PAA, CL762
29	585406	FREEHOLD	PAA, CL762
30	585406	FREEHOLD	PAA, CL762
31	585407	FREEHOLD	PAA, CL762
32	585407	FREEHOLD	PAA, CL762
33	585407	FREEHOLD	PAA, CL762
34	585407	FREEHOLD	PAA, CL762
1612	587100	FREEHOLD	PAA, CL762
117	587386	FREEHOLD	PAA, CL762
118	587386	FREEHOLD	PAA, CL762
501	589634	FREEHOLD	PAA, CL762
502	589634	FREEHOLD	PAA, CL762
1	590896	CROWN	PAA, CL762
2	590896	CROWN	PAA, CL762
1	592090	FREEHOLD	PAA, CL762
2	592090	FREEHOLD	PAA, CL762
191	592808	FREEHOLD	PAA, CL762
192	592808	FREEHOLD	PAA, CL762
1	593089	FREEHOLD	PAA, CL762
12	594056	FREEHOLD	PAA, CL762
13	594056	FREEHOLD	PAA, CL762
14	594056	FREEHOLD	PAA, CL762
1	595576	FREEHOLD	PAA, CL762
431	604046	FREEHOLD	PAA, CL762
432	604046	FREEHOLD	PAA, CL762
1	608315	FREEHOLD	PAA, CL762
2	608315	FREEHOLD	PAA, CL762
121	609010	FREEHOLD	PAA, CL762
122	609010	FREEHOLD	PAA, CL762
1	609712	FREEHOLD	PAA
2	609712	FREEHOLD	PAA
33	610386	FREEHOLD	PAA, ML1443
34	610386	FREEHOLD	PAA, ML1443
41	612282	FREEHOLD	PAA, CL762
42	612282	FREEHOLD	PAA, CL762
7	613014	FREEHOLD	PAA, CL762
2	614183	FREEHOLD	PAA, CL762
361	614968	FREEHOLD	PAA, CL762
362	614968	FREEHOLD	PAA, CL762
51	615359	FREEHOLD	PAA, CL762
52	615359	FREEHOLD	PAA, CL762
61	617128	FREEHOLD	PAA, CL762
62	617128	FREEHOLD	PAA, CL762
1	617884	FREEHOLD	PAA, CL762
2	617884	FREEHOLD	PAA, CL762
201	619145	FREEHOLD	PAA, CL762
202	619145	FREEHOLD	PAA, CL762
491	619394	FREEHOLD	PAA, CL762
3	620092	CROWN	PAA, CL762
1	620993	FREEHOLD	PAA, ML1722, EL6317
2	620993	FREEHOLD	PAA, ML1722, EL6317
1	621697	FREEHOLD	PAA, CL762
2	621697	FREEHOLD	PAA, CL762

Mandalong Mine Schedule of Lands

Lot No	Deposited Plan No	Land Tenure	Mining Authorisation
3	621697	FREEHOLD	PAA, CL762
231	622307	FREEHOLD	PAA, CL762
232	622307	FREEHOLD	PAA, CL762
1	623517	FREEHOLD	PAA, ML1443
100	624192	FREEHOLD	PAA, CL762
101	624192	FREEHOLD	PAA, CL762
1	624849	FREEHOLD	PAA, CL762
2	624849	FREEHOLD	PAA, CL762
311	625394	FREEHOLD	PAA, ML1443
71	625580	FREEHOLD	PAA, CL762
1	626309	FREEHOLD	PAA, CL762
151	626867	FREEHOLD	PAA, CL762
152	626867	FREEHOLD	PAA, CL762
21	628036	FREEHOLD	PAA, CL762
22	628036	FREEHOLD	PAA, CL762
411	628252	FREEHOLD	PAA, CL762
412	628252	FREEHOLD	PAA, CL762
61	629128	FREEHOLD	PAA, ML1443
1	629227	FREEHOLD	PAA, CL762
2	629227	FREEHOLD	PAA, CL762
1041	630642	FREEHOLD	PAA, ML1443
1042	630642	FREEHOLD	PAA, ML1443
21	631659	FREEHOLD	PAA, ML1722, EL6317
1	632805	FREEHOLD	PAA, CL762
90	650040	FREEHOLD	PAA, CL762
10	650915	FREEHOLD	PAA, ML1443
1	651468	FREEHOLD	PAA, CL762
15	653823	FREEHOLD	PAA, CL762
1	654586	FREEHOLD	PAA, CL762
17	654841	FREEHOLD	PAA
29	656680	FREEHOLD	PAA, CL762
105	658253	FREEHOLD	PAA, ML1443
86	658254	FREEHOLD	PAA, CL762
89	658755	FREEHOLD	PAA, CL762
70	658756	FREEHOLD	PAA, CL762
116	659006	FREEHOLD	PAA, CL762
92	661018	FREEHOLD	PAA, ML1722, EL6317
14	661114	FREEHOLD	PAA, ML1443
1	661791	FREEHOLD	PAA, CL762
106	662079	FREEHOLD	PAA, CL762
50	663624	FREEHOLD	PAA, CL762
9	663685	FREEHOLD	PAA, CL762
30	664329	FREEHOLD	PAA, CL762
7	665945	FREEHOLD	PAA, ML1443
95	665946	FREEHOLD	PAA, CL762
11	701945	FREEHOLD	PAA, CL762
51	701946	FREEHOLD	PAA, CL762
210	702166	FREEHOLD	PAA
211	702166	FREEHOLD	PAA
220	702167	NSW GOVT	PAA
221	702167	FREEHOLD	PAA
201	702506	FREEHOLD	PAA, CL762
202	702506	FREEHOLD	PAA, CL762
30	702647	FREEHOLD	PAA, ML1443
11	703269	FREEHOLD	PAA, CL762
12	703269	FREEHOLD	PAA, CL762
721	703855	FREEHOLD	PAA, CL762
532	704447	FREEHOLD	PAA, CL762
530	704462	FREEHOLD	PAA, CL762
100	705921	FREEHOLD	PAA, CL762
121	706627	FREEHOLD	PAA, CL762
122	706627	FREEHOLD	PAA, CL762
123	706627	FREEHOLD	PAA, CL762
124	706627	FREEHOLD	PAA, CL762

Lot No	Deposited Plan No	Land Tenure	Mining Authorisation
141	706893	FREEHOLD	PAA, CL762
142	706893	FREEHOLD	PAA, CL762
122	709158	FREEHOLD	PAA
621	711394	FREEHOLD	PAA, ML1443
623	711394	FREEHOLD	PAA, ML1443
2	711459	FREEHOLD	PAA, ML1443
3	711459	FREEHOLD	PAA, ML1443
121	712787	FREEHOLD	PAA, CL762
122	712787	FREEHOLD	PAA, CL762
1	712811	FREEHOLD	PAA, CL762
2	712811	FREEHOLD	PAA, CL762
3	712811	FREEHOLD	PAA, CL762
4	712811	FREEHOLD	PAA, CL762
51	714494	FREEHOLD	PAA, ML1443
100	715718	FREEHOLD	PAA, ML1443
731	719040	FREEHOLD	PAA, ML1443
732	719040	FREEHOLD	PAA, ML1443
2	719762	FREEHOLD	PAA, ML1722, EL6317
533	720684	FREEHOLD	PAA, CL762
16	722264	CROWN	PAA, CL762
1	723285	FREEHOLD	PAA, CL762
198	727714	FREEHOLD	PAA, ML1443
1	727748	FREEHOLD	PAA, CL762
543	727762	FREEHOLD	PAA, CL762
544	727762	FREEHOLD	PAA, CL762
545	727762	CROWN	PAA, CL762
556	729949	FREEHOLD	PAA, ML1553, CL762
501	730395	FREEHOLD	PAA, ML1722, EL6317
502	730395	FREEHOLD	PAA, ML1722, EL6317
503	730395	FREEHOLD	PAA, ML1722, EL6317
504	730395	FREEHOLD	PAA, ML1722, EL6317
1	730938	FREEHOLD	PAA, CL762
2	730938	FREEHOLD	PAA, CL762
580	733227	FREEHOLD	PAA, ML1443
1	734844	FREEHOLD	PAA, CL762
2	734844	FREEHOLD	PAA, CL762
3	734844	FREEHOLD	PAA, CL762
4	734844	FREEHOLD	PAA, CL762
91	736661	FREEHOLD	PAA, CL762
92	736661	FREEHOLD	PAA, CL762
1	740760	FREEHOLD	PAA, ML1722, EL6317
2	740760	FREEHOLD	PAA, ML1722, EL6317
5	748323	FREEHOLD	PAA, ML1443
5	755218	FREEHOLD	PAA
6	755218	FREEHOLD	PAA
7	755218	FREEHOLD	PAA
8	755218	FREEHOLD	PAA
9	755218	FREEHOLD	PAA
10	755218	FREEHOLD	PAA
14	755218	FREEHOLD	PAA
15	755218	FREEHOLD	PAA
48	755218	FREEHOLD	PAA
51	755218	FREEHOLD	PAA, CL762
53	755218	FREEHOLD	PAA
97	755218	CROWN	PAA
108	755218	FREEHOLD	PAA
109	755218	FREEHOLD	PAA, CL762
110	755218	FREEHOLD	PAA
111	755218	FREEHOLD	PAA, CL762

Mandalong Mine Schedule of Lands

Lot No	Deposited Plan No	Land Tenure	Mining Authorisation
112	755218	FREEHOLD	PAA, CL762
113	755218	CROWN	PAA, CL762
114	755218	CROWN	PAA, CL762
116	755218	CROWN	PAA
143	755218	FREEHOLD	PAA
150	755218	CROWN	PAA, CL762
151	755218	FREEHOLD	PAA
152	755218	FREEHOLD	PAA, CL762
156	755218	FREEHOLD	PAA, CL762
169	755218	FREEHOLD	PAA, CL762
170	755218	FREEHOLD	PAA
171	755218	CROWN	PAA
173	755218	FREEHOLD	PAA
179	755218	FREEHOLD	PAA, CL762
184	755218	CROWN	PAA
186	755218	FREEHOLD	PAA, CL762
187	755218	FREEHOLD	PAA
208	755218	FREEHOLD	PAA
210	755218	FREEHOLD	PAA
95	755223	FREEHOLD	PAA, ML1443
100	755223	FREEHOLD	PAA, ML1443
134	755223	FREEHOLD	PAA, ML1443
2	755238	FREEHOLD	PAA, ML1443
4	755238	FREEHOLD	PAA, ML1443
5	755238	FREEHOLD	PAA, ML1722, EL6317, MLA457, PAA, ML1443, ML 1543
6	755238	FREEHOLD	
8	755238	FREEHOLD	PAA, ML1443
16	755238	FREEHOLD	PAA, ML1443
17	755238	FREEHOLD	PAA, ML1443, ML 1543
18	755238	FREEHOLD	PAA, ML1443
24	755238	FREEHOLD	PAA, ML1443
25	755238	FREEHOLD	PAA, ML1443
28	755238	FREEHOLD	PAA, ML1443
29	755238	FREEHOLD	PAA, ML1443
33	755238	FREEHOLD	PAA, ML1443
36	755238	FREEHOLD	PAA, ML1722, EL6317
38	755238	NSW GOVT	PAA, ML1443
39	755238	FCNSW	PAA, ML1443
41	755238	FREEHOLD	PAA, ML1443, ML 1543
43	755238	CROWN	PAA, ML1443
44	755238	FREEHOLD	PAA, ML1443, EL6317, ML 1543, ML1722
46	755238	FREEHOLD	PAA, ML1443
47	755238	FREEHOLD	PAA, ML1443
49	755238	FREEHOLD	PAA, ML1443
52	755238	FREEHOLD	PAA, ML1443, EL6317, ML 1543, ML1722
53	755238	FREEHOLD	PAA, ML1722, EL6317
54	755238	FREEHOLD	PAA, ML1443, ML 1543
56	755238	FREEHOLD	PAA, ML 1543
59	755238	FREEHOLD	PAA, ML1722, EL6317
61	755238	FREEHOLD	PAA, ML1443, ML 1543
62	755238	FREEHOLD	PAA, ML1722, EL6317
63	755238	FREEHOLD	PAA, ML1722,

Lot No	Deposited Plan No	Land Tenure	Mining Authorisation
			EL6317
67	755238	FREEHOLD	PAA, ML1443
68	755238	FREEHOLD	PAA, ML1443
72	755238	FREEHOLD	PAA, ML1722, EL6317
76	755238	FREEHOLD	PAA, ML1443
78	755238	NSW GOVT	PAA, ML1722, EL6317, MLA457,
79	755238	FCNSW	PAA, ML1722, EL6317
81	755238	FREEHOLD	PAA, ML1443
82	755238	FREEHOLD	PAA, ML1722, EL6317
88	755238	FREEHOLD	PAA, ML1443
89	755238	FREEHOLD	PAA, ML1443
90	755238	FCNSW	PAA, ML1443
91	755238	FREEHOLD	PAA, ML1722, EL6317
93	755238	FREEHOLD	PAA, ML1443
94	755238	FCNSW	PAA, ML1443
95	755238	FCNSW	PAA, ML1443
96	755238	FREEHOLD	PAA, ML1443
101	755238	FREEHOLD	PAA, ML1722, EL6317, MLA457,
103	755238	FREEHOLD	PAA, ML1722, EL6317
107	755238	FREEHOLD	PAA, ML1722, EL6317
108	755238	NSW GOVT	PAA, ML1722, EL6317, MLA457,
113	755238	FREEHOLD	PAA, ML1443
114	755238	FREEHOLD	PAA, ML1722, EL6317, MLA457,
115	755238	NSW GOVT	PAA, ML1722, EL6317, MLA457,
116	755238	FREEHOLD	PAA, ML 1543, ML1722, EL6317,
117	755238	FREEHOLD	PAA, ML1443
118	755238	FREEHOLD	PAA, ML1722, EL6317
122	755238	NSW GOVT	PAA, ML1722, EL6317, MLA457,
131	755238	FREEHOLD	MLA457, EL6317, MLA457
131	755238	FREEHOLD	PAA, ML1722
132	755238	FREEHOLD	PAA, ML 1543, ML1722, EL6317,
135	755238	FREEHOLD	PAA, ML1722, EL6317
140	755238	FREEHOLD	PAA, ML1722, EL6317
141	755238	FREEHOLD	PAA, ML1443
142	755238	FCNSW	PAA, ML1443
144	755238	FREEHOLD	PAA, ML1722, EL6317
144	755238	FREEHOLD	Surface Lease
145	755238	FREEHOLD	PAA, ML1722, EL6317, MLA457,
146	755238	FREEHOLD	, EL6317
147	755238	FCNSW	PAA, ML1722, EL6317
148	755238	FREEHOLD	PAA, ML1722, EL6317
150	755238	NSW GOVT	
150	755238	FCNSW	PAA, ML1722, EL6317
151	755238	FREEHOLD	PAA, ML1443

Mandalong Mine Schedule of Lands

Lot No	Deposited Plan No	Land Tenure	Mining Authorisation
152	755238	FREEHOLD	PAA, ML1722, EL6317
153	755238	FREEHOLD	PAA, ML 1543, ML1722, EL6317,
154	755238	FREEHOLD	PAA, ML1443
157	755238	FCNSW	PAA, ML1722, EL6317, MLA457,
177	755238	NSW GOVT	PAA, ML1722, EL6317, MLA457,
179	755238	FREEHOLD	PAA, ML1443, EL6317, ML 1543, ML1722
180	755238	FREEHOLD	PAA, ML1722, EL6317
180	755238	FREEHOLD	Surface Lease
190	755238	NSW GOVT	PAA, ML1722, MLA457, EL6317,
191	755238	NSW GOVT	PAA, ML1722, EL6317, MLA457,
192	755238	FREEHOLD	PAA, ML1722, EL6317
193	755238	FREEHOLD	PAA, ML1722, EL6317
194	755238	FREEHOLD	PAA, ML1722, EL6317, MLA457,
195	755238	NSW GOVT	PAA, ML1722, EL6317, MLA457,
196	755238	FREEHOLD	PAA, CL762
3	755242	FREEHOLD	PAA, CL762
53	755242	FREEHOLD	PAA, CL762
54	755242	FREEHOLD	PAA, CL762
57	755242	FREEHOLD	PAA, CL762
58	755242	FREEHOLD	PAA, CL762
60	755242	FREEHOLD	PAA, CL762
61	755242	FREEHOLD	PAA, CL762
68	755242	FREEHOLD	PAA, CL762
69	755242	FREEHOLD	PAA, CL762
72	755242	FREEHOLD	PAA, CL762
75	755242	FREEHOLD	PAA, CL762
76	755242	FREEHOLD	PAA, CL762
77	755242	FREEHOLD	PAA, CL762
78	755242	FREEHOLD	PAA, CL762
82	755242	FREEHOLD	PAA, CL762
83	755242	FREEHOLD	PAA, CL762
84	755242	FREEHOLD	PAA, CL762
85	755242	FREEHOLD	PAA, CL762
86	755242	FREEHOLD	PAA, CL762
87	755242	FREEHOLD	PAA, CL762
91	755242	FREEHOLD	PAA, CL762
92	755242	FREEHOLD	PAA, CL762
97	755242	FREEHOLD	PAA, CL762
115	755242	FREEHOLD	PAA, CL762
117	755242	FREEHOLD	PAA, CL762
120	755242	FREEHOLD	PAA, CL762
123	755242	FREEHOLD	PAA, CL762
124	755242	FREEHOLD	PAA, CL762
125	755242	FREEHOLD	PAA, CL762
126	755242	FREEHOLD	PAA, CL762
127	755242	CROWN	PAA, CL762
128	755242	FREEHOLD	PAA, CL762
129	755242	FREEHOLD	PAA, CL762
130	755242	FREEHOLD	PAA, CL762
131	755242	FREEHOLD	PAA, CL762
132	755242	FREEHOLD	PAA, CL762
133	755242	FREEHOLD	PAA, CL762
138	755242	FREEHOLD	PAA, CL762

Lot No	Deposited Plan No	Land Tenure	Mining Authorisation
139	755242	FREEHOLD	PAA, CL762
140	755242	FREEHOLD	PAA, CL762
141	755242	FREEHOLD	PAA, CL762
142	755242	FREEHOLD	PAA, CL762
143	755242	FREEHOLD	PAA, CL762
144	755242	FREEHOLD	PAA, CL762
145	755242	FREEHOLD	PAA, CL762
146	755242	FREEHOLD	PAA, CL762
147	755242	FREEHOLD	PAA, CL762
148	755242	FREEHOLD	PAA, CL762
149	755242	FREEHOLD	PAA, CL762
150	755242	FREEHOLD	PAA, CL762
151	755242	CROWN	PAA, CL762
152	755242	CROWN	PAA, CL762
153	755242	CROWN	PAA, CL762
160	755242	CROWN	PAA, CL762
161	755242	CROWN	PAA, CL762
162	755242	CROWN	PAA, CL762
163	755242	FREEHOLD	PAA, CL762
164	755242	FREEHOLD	PAA, CL762
171	755242	FREEHOLD	PAA, CL762
174	755242	FREEHOLD	PAA, CL762
327	755242	FREEHOLD	PAA, ML1553
408	755242	FREEHOLD	PAA, CL762
447	755242	CROWN	PAA, CL762
469	755242	CROWN	PAA, CL762
478	755242	FREEHOLD	PAA, CL762
488	755242	FREEHOLD	PAA, CL762
489	755242	CROWN	PAA, CL762
558	755242	CROWN	PAA, ML1443, CL762
43	755245	FREEHOLD	PAA, ML1722, EL6317
49	755245	FREEHOLD	PAA, ML1722, EL6317
59	755271	FREEHOLD	, EL6317
68	755271	FREEHOLD	EL6317, EL6317
153	755271	FREEHOLD	PAA, ML1722, EL6317
158	755271	FREEHOLD	, EL6317
158	755271	FREEHOLD	PAA, ML1722
168	755271	FREEHOLD	PAA, ML1722, EL6317
169	755271	CROWN	, EL6317
172	755271	FREEHOLD	PAA, ML1722, EL6317
175	755271	CROWN	PAA, ML1722, EL6317, MLA457,
186	755271	FREEHOLD	PAA, ML1722, EL6317
226	755271	FREEHOLD	PAA, ML1722, EL6317
1	758707	CROWN	PAA, CL762
1	758707	FREEHOLD	PAA, CL762
2	758707	FREEHOLD	PAA, CL762
3	758707	FREEHOLD	PAA, CL762
4	758707	FREEHOLD	PAA, CL762
5	758707	CROWN	PAA, CL762
5	758707	FREEHOLD	PAA, CL762
6	758707	CROWN	PAA, CL762
6	758707	FREEHOLD	PAA, CL762
7	758707	CROWN	PAA, CL762
7	758707	FREEHOLD	PAA, CL762
8	758707	CROWN	PAA, CL762
8	758707	FREEHOLD	PAA, CL762
9	758707	CROWN	PAA, CL762
9	758707	FREEHOLD	PAA, CL762

Mandalong Mine Schedule of Lands

Lot No	Deposited Plan No	Land Tenure	Mining Authorisation
10	758707	CROWN	PAA, CL762
10	758707	FREEHOLD	PAA, CL762
11	758707	CROWN	PAA, CL762
11	758707	FREEHOLD	PAA, CL762
12	758707	CROWN	PAA, CL762
12	758707	FREEHOLD	PAA, CL762
13	758707	CROWN	PAA, CL762
13	758707	FREEHOLD	PAA, CL762
14	758707	CROWN	PAA, CL762
14	758707	FREEHOLD	PAA, CL762
15	758707	CROWN	PAA, CL762
15	758707	FREEHOLD	PAA, CL762
16	758707	CROWN	PAA, CL762
16	758707	FREEHOLD	PAA, CL762
17	758707	CROWN	PAA, CL762
17	758707	FREEHOLD	PAA, CL762
18	758707	CROWN	PAA, CL762
18	758707	FREEHOLD	PAA, CL762
19	758707	CROWN	PAA, CL762
19	758707	FREEHOLD	PAA, CL762
20	758707	FREEHOLD	PAA, CL762
21	758707	FREEHOLD	PAA, CL762
22	758707	FREEHOLD	PAA, CL762
524	771299	FREEHOLD	PAA, ML1553
1	771319	FREEHOLD	PAA, CL762
69	772148	FREEHOLD	PAA, ML1443
6	772171	FREEHOLD	, EL6317
1	772871	FREEHOLD	PAA, ML1722, EL6317
5	775655	FREEHOLD	PAA, CL762
6	775655	CROWN	PAA, CL762
7	775655	CROWN	PAA, CL762
8	775655	CROWN	PAA, CL762
10	775655	FREEHOLD	PAA, CL762
1	776368	FREEHOLD	PAA, CL762
2	776368	FREEHOLD	PAA, CL762
11	777034	FREEHOLD	PAA, CL762
12	777034	FREEHOLD	PAA, CL762
2	777422	FREEHOLD	PAA, CL762
411	777642	FREEHOLD	PAA, CL762
412	777642	FREEHOLD	PAA, CL762
77	778375	FREEHOLD	PAA, CL762
78	778375	FREEHOLD	PAA, CL762
79	778375	FREEHOLD	PAA, CL762
1	781856	FREEHOLD	PAA, CL762
2	781856	FREEHOLD	PAA, CL762
3	785604	FREEHOLD	PAA
15	788481	FREEHOLD	PAA, ML1722, EL6317
16	788481	FREEHOLD	PAA, ML1722, EL6317
31	790154	FREEHOLD	PAA, CL762
32	790154	FREEHOLD	PAA, CL762
33	790154	FREEHOLD	PAA, CL762
34	790154	FREEHOLD	PAA, CL762
35	790154	FREEHOLD	PAA, CL762
930	790219	FREEHOLD	PAA, CL762
931	790219	FREEHOLD	PAA, CL762
871	792373	FREEHOLD	PAA, CL762
872	792373	FREEHOLD	PAA, CL762
874	792373	FREEHOLD	PAA, CL762
11	792921	FREEHOLD	PAA, CL762
12	792921	FREEHOLD	PAA, CL762
11	793589	FREEHOLD	PAA, CL762
12	793589	FREEHOLD	PAA, CL762
13	793589	FREEHOLD	PAA, CL762

Lot No	Deposited Plan No	Land Tenure	Mining Authorisation
15	793589	FREEHOLD	PAA, CL762
16	793589	FREEHOLD	PAA, CL762
70	794193	FREEHOLD	PAA, CL762
71	794193	FREEHOLD	PAA, CL762
72	794193	FREEHOLD	PAA, CL762
1	796812	FREEHOLD	PAA, CL762
6	800491	FREEHOLD	PAA, ML1443
7	800491	FREEHOLD	PAA, ML1443
9	800491	FREEHOLD	PAA, ML1443
10	800491	FREEHOLD	PAA, ML1443
1	800964	FREEHOLD	PAA, CL762
2	800964	FREEHOLD	PAA, CL762
3	800964	FREEHOLD	PAA, CL762
131	801632	FREEHOLD	PAA, CL762
132	801632	FREEHOLD	PAA, CL762
100	803620	FREEHOLD	PAA, CL762
11	803750	FREEHOLD	PAA, CL762
12	803750	FREEHOLD	PAA, CL762
13	803750	FREEHOLD	PAA, CL762
14	803750	FREEHOLD	PAA, CL762
24	803877	FREEHOLD	PAA, CL762
26	803877	FREEHOLD	PAA, CL762
1	804316	FREEHOLD	PAA, CL762
2	804316	FREEHOLD	PAA, CL762
3	804316	FREEHOLD	PAA, CL762
1	805044	FREEHOLD	PAA, ML1722, EL6317
2	805044	FREEHOLD	PAA, ML1722, EL6317
3	805044	FREEHOLD	PAA, ML1722, EL6317, MLA457,
4	805044	FREEHOLD	PAA, ML1722, MLA457, EL6317,
301	806475	FREEHOLD	PAA, CL762
302	806475	FREEHOLD	PAA, CL762
1	807685	FREEHOLD	PAA, CL762
2	807685	FREEHOLD	PAA, CL762
1	809113	FREEHOLD	PAA, CL762
2	809113	FREEHOLD	PAA, CL762
31	809617	FREEHOLD	PAA, CL762
32	809617	FREEHOLD	PAA, CL762
33	809617	FREEHOLD	PAA, CL762
20	812406	FREEHOLD	PAA, ML1443
21	812406	FREEHOLD	PAA, ML1443
22	812406	FREEHOLD	PAA, ML1443
24	812406	FREEHOLD	PAA, ML1443
11	813385	FREEHOLD	PAA, ML1443
12	813385	FREEHOLD	PAA, ML1443
13	813385	FREEHOLD	PAA, ML1443
14	813385	FREEHOLD	PAA, ML1443
15	813385	FREEHOLD	PAA, ML1443
16	813385	FREEHOLD	PAA, ML1443
17	813385	FREEHOLD	PAA, ML1443
18	813385	FREEHOLD	PAA, ML1443
49	815727	FREEHOLD	PAA, ML1443
1	816174	FREEHOLD	PAA, CL762
2	816174	FREEHOLD	PAA, CL762
3	816174	FREEHOLD	PAA, CL762
217	818749	FREEHOLD	PAA, CL762
1	819348	FREEHOLD	PAA, CL762
2	819348	FREEHOLD	PAA, CL762
14	819512	FREEHOLD	PAA, CL762
15	819512	FREEHOLD	PAA, CL762
1001	819530	FREEHOLD	PAA, ML1722, EL6317
1002	819530	FREEHOLD	PAA, ML1722,

Mandalong Mine Schedule of Lands

Lot No	Deposited Plan No	Land Tenure	Mining Authorisation
			EL6317
555	821108	CROWN	PAA, CL762
1	822126	FREEHOLD	PAA, ML1722, EL6317
1	822176	FREEHOLD	PAA, CL762
1	823774	FREEHOLD	PAA, ML1722, EL6317
101	826748	FREEHOLD	PAA, CL762
102	826748	FREEHOLD	PAA, CL762
30	826779	FREEHOLD	PAA, ML1443
31	826779	FREEHOLD	PAA, ML1443, ML 1543
11	828895	FREEHOLD	PAA, CL762
12	828895	FREEHOLD	PAA, CL762
812	829055	FREEHOLD	PAA, CL762
27	829792	FREEHOLD	PAA, ML1443
28	829792	FREEHOLD	PAA, ML1443
1	831211	FREEHOLD	PAA
2	831211	FREEHOLD	PAA
211	831749	FREEHOLD	PAA, CL762
212	831749	FREEHOLD	PAA, CL762
2	831930	FREEHOLD	PAA, CL762
1031	834199	FREEHOLD	PAA, CL762
1032	834199	FREEHOLD	PAA, CL762
102	834295	FREEHOLD	PAA, ML1722, EL6317
1	834388	FREEHOLD	PAA, ML1722, EL6317
2	834388	FREEHOLD	PAA, ML1722, EL6317
861	835160	FREEHOLD	PAA, ML1443
862	835160	FREEHOLD	PAA, ML1443
1	838687	FREEHOLD	PAA, CL762
12	838870	FREEHOLD	, EL6317
11	839702	FREEHOLD	PAA, CL762
101	840020	FREEHOLD	PAA, CL762
102	840020	FREEHOLD	PAA, CL762
1	840145	FREEHOLD	PAA, ML1443
2	840145	FREEHOLD	PAA, ML1443
118	840182	FREEHOLD	PAA, CL762
11	841261	FREEHOLD	PAA, CL762
12	841261	FREEHOLD	PAA, CL762
15	844164	FREEHOLD	PAA, CL762
150	844839	FREEHOLD	PAA, CL762
151	844839	FREEHOLD	PAA, CL762
11	847210	FREEHOLD	PAA, CL762
12	847210	FREEHOLD	PAA, CL762
51	851636	FREEHOLD	PAA, ML1443
52	851636	FREEHOLD	PAA, ML1443
1	851648	FREEHOLD	PAA, ML1443
2	851648	FREEHOLD	PAA, EL6317, ML1443, ML1722,
121	852340	FREEHOLD	PAA, CL762
122	852340	FREEHOLD	PAA, CL762
1	853595	FREEHOLD	PAA, CL762
2	853595	FREEHOLD	PAA, CL762
119	853723	FREEHOLD	PAA, CL762
120	853723	FREEHOLD	PAA, CL762
50	854475	FREEHOLD	PAA, ML1443
51	854475	FREEHOLD	PAA, ML1443
1	854723	FREEHOLD	PAA, CL762
200	855397	FREEHOLD	PAA, ML1722, EL6317
201	855397	FREEHOLD	PAA, ML1722, EL6317
731	857114	FREEHOLD	PAA, CL762

Lot No	Deposited Plan No	Land Tenure	Mining Authorisation
732	857114	FREEHOLD	PAA, CL762
733	857114	FREEHOLD	PAA, CL762
61	858044	FREEHOLD	PAA, ML1722, EL6317
63	858044	FREEHOLD	PAA, ML1443
10	859161	FREEHOLD	PAA, CL762
11	859161	FREEHOLD	PAA, CL762
12	859161	FREEHOLD	PAA, CL762
180	859434	FREEHOLD	PAA, ML1443
181	859434	FREEHOLD	PAA, ML1443
1	860244	FREEHOLD	PAA, CL762
1	860927	FREEHOLD	PAA, CL762
129	861903	FREEHOLD	PAA, CL762
10	862071	FREEHOLD	PAA, CL762
11	862071	FREEHOLD	PAA, CL762
1	862597	FREEHOLD	PAA, ML1443
2	862597	FREEHOLD	PAA, ML1443
100	862723	FREEHOLD	PAA, CL762
101	862723	FREEHOLD	PAA, CL762
90	864664	FREEHOLD	PAA, CL762
91	864664	FREEHOLD	PAA, CL762
721	864902	FREEHOLD	PAA, ML1443
722	864902	FREEHOLD	PAA, ML1443
723	864902	FREEHOLD	PAA, ML1443
724	864902	FREEHOLD	PAA, ML1443
725	864902	FREEHOLD	PAA, ML1443
341	865314	FREEHOLD	PAA, CL762
342	865314	FREEHOLD	PAA, CL762
343	865314	FREEHOLD	PAA, CL762
344	865314	FREEHOLD	PAA, CL762
1	865799	FREEHOLD	PAA, CL762
2	865799	FREEHOLD	PAA, CL762
3	865799	FREEHOLD	PAA, CL762
4	865799	FREEHOLD	PAA, CL762
5	865799	FREEHOLD	PAA, CL762
121	866321	FREEHOLD	PAA, CL762
122	866321	FREEHOLD	PAA, CL762
123	866321	FREEHOLD	PAA, CL762
108	866864	FREEHOLD	PAA, CL762
109	866864	FREEHOLD	PAA, CL762
51	867220	FREEHOLD	PAA, ML1443
52	867220	FREEHOLD	PAA, ML1443, ML 1543, ML1722, EL6317
51	867406	FREEHOLD	PAA, ML1443
52	867406	FREEHOLD	PAA, ML1443, ML1722, EL6317,
53	867406	FREEHOLD	PAA, ML1443, ML1722, EL6317,
54	867406	FREEHOLD	PAA, ML1443, ML1722, EL6317,
112	867567	FREEHOLD	PAA, CL762
113	867567	FREEHOLD	PAA, CL762
101	869330	FREEHOLD	PAA, CL762
102	869330	FREEHOLD	PAA, CL762
11	869483	FREEHOLD	PAA, ML1443, ML 1543
12	869483	FREEHOLD	PAA, ML1443, ML 1543
51	871090	FREEHOLD	PAA, CL762
52	871090	FREEHOLD	PAA, CL762
161	872445	FREEHOLD	PAA, CL762
162	872445	FREEHOLD	PAA, CL762
11	872456	FREEHOLD	PAA, ML1722, EL6317
161	872460	FREEHOLD	PAA, CL762

Mandalong Mine Schedule of Lands

Lot No	Deposited Plan No	Land Tenure	Mining Authorisation
162	872460	FREEHOLD	PAA, CL762
163	872460	FREEHOLD	PAA, CL762
90	872723	FREEHOLD	PAA, CL762
91	872723	FREEHOLD	PAA, CL762
101	872891	FREEHOLD	PAA, CL762
102	872891	FREEHOLD	PAA, CL762
1	873022	FREEHOLD	PAA, ML1443
2	873022	FREEHOLD	PAA, ML1443
1172	876055	FREEHOLD	PAA, CL762
21	876359	FREEHOLD	PAA, CL762
22	876359	FREEHOLD	PAA, CL762
42	877350	FREEHOLD	PAA, CL762
660	878061	LOCAL GOVT AUTHORITY	PAA, ML1443
661	878061	FREEHOLD	PAA, ML1443
651	878062	LOCAL GOVT AUTHORITY	PAA, ML1443
652	878062	LOCAL GOVT AUTHORITY	PAA, ML1443
300	878333	FREEHOLD	PAA, EL6317, ML1443, ML1722,
301	878333	FREEHOLD	PAA, EL6317, ML1443, ML1722,
302	878333	FREEHOLD	PAA, ML1443, EL6317, ML1722,
1061	878387	FREEHOLD	PAA, ML1722, EL6317
1062	878387	FREEHOLD	PAA, ML1722, EL6317
1	878414	FREEHOLD	PAA, ML1443
2	878414	FREEHOLD	PAA, ML1443
3	878414	FREEHOLD	PAA, ML1443
4	878414	FREEHOLD	PAA, ML1443
801	878765	FREEHOLD	PAA, CL762
802	878765	FREEHOLD	PAA, CL762
121	881828	FREEHOLD	PAA, CL762
122	881828	FREEHOLD	PAA, CL762
12	882224	FREEHOLD	PAA, CL762
70	882407	FREEHOLD	PAA, ML1722, EL6317
105	882928	FREEHOLD	PAA, CL762
106	882928	FREEHOLD	PAA, CL762
107	882928	FREEHOLD	PAA, CL762
108	882928	FREEHOLD	PAA, CL762
109	882928	FREEHOLD	PAA, CL762
111	882928	FREEHOLD	PAA, CL762
112	882928	FREEHOLD	PAA, CL762
113	882928	FREEHOLD	PAA, CL762
114	882928	FREEHOLD	PAA, CL762
115	882928	FREEHOLD	PAA, CL762
117	882928	FREEHOLD	PAA, CL762
119	882928	FREEHOLD	PAA, CL762
120	882928	FREEHOLD	PAA, CL762
122	882928	FREEHOLD	PAA, CL762
123	882928	FREEHOLD	PAA, CL762
124	882928	FREEHOLD	PAA, CL762
125	882928	FREEHOLD	PAA, CL762
127	882928	FREEHOLD	PAA, CL762
128	882928	FREEHOLD	PAA, CL762
1	909016	CROWN	PAA, CL762
1	919600	FREEHOLD	PAA, ML1443
1	921300	FREEHOLD	PAA, CL762
1	921363	FREEHOLD	PAA, CL762
2	921363	FREEHOLD	PAA, CL762
1	921728	FREEHOLD	PAA, CL762
1	921780	FREEHOLD	PAA, CL762

Lot No	Deposited Plan No	Land Tenure	Mining Authorisation
1	923244	FREEHOLD	PAA, CL762
1	923530	FREEHOLD	PAA, CL762
3	929116	FREEHOLD	PAA, CL762
1	954487	FREEHOLD	PAA, CL762
A	954714	FREEHOLD	PAA, CL762
1	957458	FREEHOLD	PAA, ML1443, ML 1543
3	957458	FREEHOLD	PAA, ML1443, ML 1543
4	957458	FREEHOLD	PAA, ML1443, ML 1543
1	958953	FREEHOLD	PAA, CL762
2	958953	FREEHOLD	PAA, CL762
3	958953	FREEHOLD	PAA, CL762
4	958953	FREEHOLD	PAA, CL762
5	958953	FREEHOLD	PAA, CL762
1	960790	FREEHOLD	PAA
1	965807	FREEHOLD	PAA, CL762
2	965807	FREEHOLD	PAA, CL762
1	1001669	FREEHOLD	PAA, ML1722, EL6317
2	1001669	FREEHOLD	PAA, ML1722, EL6317
401	1001919	FREEHOLD	PAA, CL762
403	1001919	FREEHOLD	PAA, CL762
404	1001919	FREEHOLD	PAA, CL762
405	1001919	FREEHOLD	PAA, CL762
1211	1001980	FREEHOLD	PAA, CL762
1212	1001980	FREEHOLD	PAA, CL762
1	1002965	FREEHOLD	PAA, CL762
2	1002965	FREEHOLD	PAA, CL762
3	1002965	FREEHOLD	PAA, CL762
111	1003323	FREEHOLD	PAA, CL762
22	1003511	FREEHOLD	PAA, ML1722, EL6317
1221	1006152	FREEHOLD	PAA, CL762
1222	1006152	FREEHOLD	PAA, CL762
271	1006208	FREEHOLD	PAA, CL762
272	1006208	FREEHOLD	PAA, CL762
961	1006265	FREEHOLD	PAA, CL762
962	1006265	FREEHOLD	PAA, CL762
85	1006474	CROWN	PAA, CL762
87	1006474	FREEHOLD	PAA, CL762
91	1006474	FREEHOLD	PAA, CL762
92	1006474	CROWN	PAA, CL762
306	1006483	FREEHOLD	PAA, CL762
307	1006483	FREEHOLD	PAA, CL762
308	1006483	FREEHOLD	PAA, CL762
309	1006483	FREEHOLD	PAA, CL762
310	1006483	FREEHOLD	PAA, CL762
312	1006483	FREEHOLD	PAA, CL762
313	1006483	FREEHOLD	PAA, CL762
314	1006483	FREEHOLD	PAA, CL762
315	1006483	FREEHOLD	PAA, CL762
316	1006483	FREEHOLD	PAA, CL762
322	1006483	FREEHOLD	PAA, CL762
323	1006483	FREEHOLD	PAA, CL762
324	1006483	FREEHOLD	PAA, CL762
60	1007162	FREEHOLD	PAA, ML1722, EL6317
201	1012916	FREEHOLD	PAA, CL762
202	1012916	FREEHOLD	PAA, CL762
203	1012916	FREEHOLD	PAA, CL762
206	1012916	FREEHOLD	PAA, CL762
207	1012916	FREEHOLD	PAA, CL762
208	1012916	FREEHOLD	PAA, CL762

Mandalong Mine Schedule of Lands

Lot No	Deposited Plan No	Land Tenure	Mining Authorisation
209	1012916	FREEHOLD	PAA, CL762
210	1012916	FREEHOLD	PAA, CL762
212	1012916	FREEHOLD	PAA, CL762
214	1012916	FREEHOLD	PAA, CL762
215	1012916	FREEHOLD	PAA, CL762
216	1012916	FREEHOLD	PAA, CL762
218	1012916	FREEHOLD	PAA, CL762
219	1012916	FREEHOLD	PAA, CL762
220	1012916	FREEHOLD	PAA, CL762
221	1012916	FREEHOLD	PAA, CL762
222	1012916	FREEHOLD	PAA, CL762
223	1012916	FREEHOLD	PAA, CL762
131	1013712	FREEHOLD	PAA, CL762
1	1014877	FREEHOLD	PAA, CL762
3	1014877	FREEHOLD	PAA, CL762
4	1014877	FREEHOLD	PAA, CL762
6	1014877	FREEHOLD	PAA, CL762
7	1014877	FREEHOLD	PAA, CL762
8	1014877	FREEHOLD	PAA, CL762
1	1019085	FREEHOLD	PAA, ML1443
1581	1020097	FREEHOLD	PAA, ML1443
1582	1020097	FREEHOLD	PAA, ML1443
7003	1021488	CROWN	PAA, CL762
7037	1021489	CROWN	PAA, CL762
7038	1021489	CROWN	PAA, CL762
558	1025295	FREEHOLD	PAA, CL762
559	1025295	FREEHOLD	PAA, CL762
161	1028142	FREEHOLD	PAA, CL762
162	1028142	FREEHOLD	PAA, CL762
701	1030086	CROWN	PAA, CL762
7008	1030354	CROWN	PAA, CL762
7025	1030778	CROWN	PAA, ML1443, CL762
7027	1030779	CROWN	PAA, CL762
7005	1030795	CROWN	PAA, CL762
7006	1030795	CROWN	PAA, CL762
7003	1030927	CROWN	PAA, ML1443
251	1031184	FREEHOLD	PAA, CL762
252	1031184	FREEHOLD	PAA, CL762
16	1031463	FREEHOLD	PAA, CL762
17	1031463	FREEHOLD	PAA, CL762
1	1031558	FREEHOLD	PAA, CL762
2	1031558	FREEHOLD	PAA, CL762
32	1032041	FREEHOLD	PAA, CL762
7005	1032132	CROWN	PAA, CL762
31	1034933	FREEHOLD	PAA, CL762
32	1034933	FREEHOLD	PAA, CL762
33	1034933	FREEHOLD	PAA, CL762
11	1036804	FREEHOLD	PAA, CL762
12	1036804	FREEHOLD	PAA, CL762
41	1037312	FREEHOLD	PAA, ML1443
42	1037312	FREEHOLD	PAA, ML1443, ML1722, EL6317,
562	1040179	FREEHOLD	PAA, CL762
563	1040179	FREEHOLD	PAA, CL762
564	1040179	FREEHOLD	PAA, CL762
565	1040179	FREEHOLD	PAA, CL762
566	1040179	FREEHOLD	PAA, CL762
567	1040179	FREEHOLD	PAA, CL762
568	1040179	FREEHOLD	PAA, CL762
569	1040179	FREEHOLD	PAA, CL762
570	1040179	FREEHOLD	, CL762
570	1040179	FREEHOLD	PAA
561	1040182	FREEHOLD	PAA, CL762
10	1042380	FREEHOLD	PAA, CL762
11	1042380	FREEHOLD	PAA, CL762
1	1043880	FREEHOLD	PAA, CL762

Lot No	Deposited Plan No	Land Tenure	Mining Authorisation
2	1043880	FREEHOLD	PAA, CL762
51	1044496	FREEHOLD	PAA, CL762
52	1044496	FREEHOLD	PAA, CL762
1	1045010	FREEHOLD	PAA, CL762
2	1045010	FREEHOLD	PAA, CL762
3	1045010	FREEHOLD	PAA, CL762
4	1045010	FREEHOLD	PAA, CL762
1	1047043	FREEHOLD	PAA, CL762
2	1047043	FREEHOLD	PAA, ML1443, CL762
1034	1049569	FREEHOLD	PAA, CL762
10	1050120	FREEHOLD	PAA, CL762
11	1050120	FREEHOLD	PAA, CL762
87	1051952	FREEHOLD	PAA, CL762
101	1053223	FREEHOLD	PAA, CL762
102	1053223	FREEHOLD	PAA, CL762
1	1053723	FREEHOLD	PAA, CL762
2	1053723	FREEHOLD	PAA, CL762
3	1053723	FREEHOLD	PAA, CL762
4	1053723	FREEHOLD	PAA, CL762
7052	1055701	CROWN	PAA, CL762
7053	1055701	CROWN	PAA, CL762
13	1058676	FREEHOLD	PAA, ML1443
14	1058676	FREEHOLD	PAA, ML1443
1	1061375	FREEHOLD	PAA, CL762
2	1061375	FREEHOLD	PAA, CL762
1	1063659	FREEHOLD	PAA, ML1443
2	1063659	FREEHOLD	PAA, ML1443
101	1064538	FREEHOLD	PAA, CL762
102	1064538	FREEHOLD	PAA, CL762
1	1064641	FREEHOLD	PAA, ML1553, CL762
11	1064820	FREEHOLD	PAA, CL762
12	1064820	FREEHOLD	PAA, CL762
15	1064820	FREEHOLD	PAA, CL762
17	1064820	FREEHOLD	PAA, CL762
19	1064820	FREEHOLD	PAA, CL762
20	1064820	FREEHOLD	PAA, CL762
21	1064820	FREEHOLD	PAA, CL762
22	1064820	FREEHOLD	PAA, CL762
24	1064820	FREEHOLD	PAA, CL762
26	1064820	FREEHOLD	PAA, CL762
28	1064820	FREEHOLD	PAA, CL762
30	1064820	LOCAL GOVT AUTHORITY	PAA, CL762
31	1064820	LOCAL GOVT AUTHORITY	PAA, CL762
7021	1066247	CROWN	PAA, CL762
7022	1066247	CROWN	PAA, CL762
1	1067643	FREEHOLD	PAA, CL762
2	1067643	FREEHOLD	PAA, CL762
7024	1068372	CROWN	PAA, ML1443
7022	1068373	CROWN	PAA, ML1443, ML1553
7023	1068373	CROWN	PAA, ML1443
251	1069932	FREEHOLD	PAA, CL762
252	1069932	FREEHOLD	PAA, CL762
21	1069976	FREEHOLD	PAA, CL762
22	1069976	FREEHOLD	PAA, CL762
7026	1070830	FREEHOLD	PAA, CL762
7016	1073303	CROWN	PAA, CL762
7079	1073310	CROWN	PAA, ML1443, CL762
1871	1075680	FREEHOLD	PAA, ML1722, EL6317
7001	1077055	CROWN	PAA, CL762
1	1077362	CROWN	PAA, CL762
261	1079256	FREEHOLD	PAA, CL762
262	1079256	FREEHOLD	PAA, CL762

Mandalong Mine Schedule of Lands

Lot No	Deposited Plan No	Land Tenure	Mining Authorisation
1	1079690	FREEHOLD	PAA, CL762
2	1079690	FREEHOLD	PAA, CL762
1	1088606	FREEHOLD	PAA, CL762
2	1088606	FREEHOLD	PAA, CL762
3	1088606	FREEHOLD	PAA, CL762
4	1088606	FREEHOLD	PAA, CL762
5	1088606	FREEHOLD	PAA, CL762
6	1088606	FREEHOLD	PAA, CL762
7	1088606	FREEHOLD	PAA, CL762
8	1088606	FREEHOLD	PAA, CL762
9	1088606	FREEHOLD	PAA, CL762
10	1088606	FREEHOLD	PAA, CL762
11	1088606	FREEHOLD	PAA, CL762
12	1088606	FREEHOLD	PAA, CL762
13	1088606	FREEHOLD	PAA, CL762
1	1090233	FREEHOLD	PAA, ML1443
2	1090233	FREEHOLD	PAA, ML1443
3	1090233	FREEHOLD	PAA, ML1443
41	1094102	FREEHOLD	PAA, CL762
42	1094102	FREEHOLD	PAA, CL762
43	1094102	FREEHOLD	PAA, CL762
1	1094503	FREEHOLD	PAA, CL762
1	1095214	FREEHOLD	PAA, ML1722, EL6317
181	1097047	FREEHOLD	PAA, CL762
182	1097047	FREEHOLD	PAA, CL762
183	1097047	FREEHOLD	PAA, CL762
11	1098712	FREEHOLD	PAA, CL762
18	1099798	FREEHOLD	PAA, CL762
1	1099987	FREEHOLD	PAA, CL762
2	1099987	FREEHOLD	PAA, CL762
31	1101735	FREEHOLD	PAA, ML1443
3	1102901	FREEHOLD	PAA, CL762
11	1103785	FREEHOLD	PAA, CL762
12	1103785	FREEHOLD	PAA, CL762
1	1106669	FREEHOLD	PAA, CL762
72	1107394	FREEHOLD	PAA, CL762
73	1107394	FREEHOLD	PAA, CL762
70	1112050	FREEHOLD	PAA, CL762
71	1112050	FREEHOLD	PAA, CL762
111	1113510	FREEHOLD	PAA, ML1722, EL6317
112	1113510	FREEHOLD	PAA, ML1722, EL6317
113	1113510	FREEHOLD	PAA, ML1722, EL6317
11	1114114	FREEHOLD	PAA, CL762
7010	1115300	CROWN	PAA, CL762
661	1115844	FREEHOLD	PAA, CL762
100	1116960	FREEHOLD	PAA, CL762
7028	1120627	CROWN	PAA, CL762
7029	1121279	CROWN	PAA, CL762
7055	1124688	CROWN	PAA, CL762
1	1127461	FREEHOLD	PAA, CL762
151	1133983	FREEHOLD	PAA, CL762
152	1133983	FREEHOLD	PAA, CL762
345	1134469	FREEHOLD	PAA, CL762
7308	1138891	CROWN	PAA, CL762
121	1140714	FREEHOLD	PAA, ML1722, EL6317
122	1140714	FREEHOLD	PAA, ML1722, EL6317
7300	1141022	CROWN	PAA, CL762
7301	1141022	CROWN	PAA, CL762
7300	1141580	CROWN	PAA, CL762
7325	1141789	CROWN	PAA, CL762

Lot No	Deposited Plan No	Land Tenure	Mining Authorisation
7327	1141932	CROWN	PAA, CL762
1	1143022	CROWN	PAA, CL762
2	1143022	CROWN	PAA, CL762
7300	1145151	CROWN	, EL6317
7300	1145151	CROWN	PAA, ML1722, EL6317
7306	1145752	CROWN	PAA, CL762
621	1148233	FREEHOLD	PAA, CL762
622	1148233	FREEHOLD	PAA, CL762
411	1149105	FREEHOLD	PAA, CL762
412	1149105	FREEHOLD	PAA, CL762
100	1150513	FREEHOLD	PAA, CL762
1	1150621	FREEHOLD	PAA, CL762
131	1150713	FREEHOLD	PAA, CL762
134	1150713	FREEHOLD	PAA, CL762
135	1150713	FREEHOLD	PAA, CL762
136	1150713	FREEHOLD	PAA, CL762
5859	1151652	FREEHOLD	PAA, CL762
5860	1151652	FREEHOLD	PAA, CL762
1	1152746	FREEHOLD	PAA, CL762
2	1152746	LOCAL GOVT AUTHORITY	PAA, CL762
1	1154049	CROWN	PAA, ML1722, EL6317
2	1154049	CROWN	PAA, ML1722, EL6317
3	1154049	CROWN	PAA, ML1722, EL6317
4	1154049	CROWN	PAA, ML1722, EL6317
1	1159057	FREEHOLD	PAA, CL762
45	1159229	FREEHOLD	PAA, ML1443
1	1160370	NSW GOVT	PAA, CL762
156	1162774	FREEHOLD	PAA, CL762
1	1163044	FREEHOLD	PAA, CL762
7310	1163329	CROWN	PAA, CL762
7306	1164232	CROWN	PAA
1	1164463	FREEHOLD	PAA, CL762
2	1164463	FREEHOLD	PAA, CL762
3	1164463	FREEHOLD	PAA, CL762
160	1169663	FREEHOLD	PAA, CL762
161	1169663	FREEHOLD	PAA, CL762
162	1169663	FREEHOLD	PAA, CL762
163	1169663	FREEHOLD	PAA, CL762
164	1169663	FREEHOLD	PAA, CL762
1	1180679	FREEHOLD	PAA, CL762
2	1180679	FREEHOLD	PAA, CL762
3	1180679	FREEHOLD	PAA, CL762
4	1180679	FREEHOLD	PAA, CL762
5	1180679	FREEHOLD	PAA, CL762
51	1181165	FREEHOLD	PAA, CL762
165	1182991	FREEHOLD	PAA, CL762
166	1182991	FREEHOLD	PAA, CL762
46	1183213	FREEHOLD	PAA, CL762
47	1183213	FREEHOLD	PAA, CL762
48	1183213	FREEHOLD	PAA, CL762
49	1183213	FREEHOLD	PAA, CL762
50	1183213	FREEHOLD	PAA, CL762
101	1183537	FREEHOLD	PAA, CL762
102	1183537	FREEHOLD	PAA, CL762
103	1183537	FREEHOLD	PAA, CL762
104	1183537	FREEHOLD	PAA, CL762
105	1183537	FREEHOLD	PAA, CL762
1	1183568	FREEHOLD	PAA, CL762
2	1183568	FREEHOLD	PAA, CL762
571	1184702	FREEHOLD	PAA, CL762

Mandalong Mine Schedule of Lands

Lot No	Deposited Plan No	Land Tenure	Mining Authorisation
572	1184702	FREEHOLD	PAA, CL762
573	1184702	FREEHOLD	PAA, CL762
574	1184702	CROWN	PAA, CL762
575	1184702	CROWN	PAA, CL762
3	1191221	CROWN	PAA, CL762
4	1191261	NSW GOVT	PAA, CL762
5	1191327	NSW GOVT	PAA, CL762
6	1191327	NSW GOVT	PAA, CL762
7	1191327	NSW GOVT	PAA, CL762
8	1191332	NSW GOVT	PAA, CL762
9	1191335	NSW GOVT	PAA, CL762
10	1191340	NSW GOVT	PAA, CL762
206	1192775	FREEHOLD	PAA, CL762
207	1192775	FREEHOLD	PAA, CL762
208	1192775	FREEHOLD	PAA, CL762
209	1192775	FREEHOLD	PAA, CL762
131	1194754	FREEHOLD	PAA, CL762
132	1194754	FREEHOLD	PAA, CL762
30	1195002	FREEHOLD	PAA, CL762
31	1195002	FREEHOLD	PAA, CL762
32	1195002	FREEHOLD	PAA, CL762
33	1195002	FREEHOLD	PAA, CL762
34	1195002	FREEHOLD	PAA, CL762
35	1195002	FREEHOLD	PAA, CL762
36	1195002	FREEHOLD	PAA, CL762
37	1195002	FREEHOLD	PAA, CL762
39	1195002	FREEHOLD	PAA, CL762
40	1195002	FREEHOLD	PAA, CL762
41	1195002	FREEHOLD	PAA, CL762
42	1195002	FREEHOLD	PAA, CL762
43	1195002	FREEHOLD	PAA, CL762

Lot No	Deposited Plan No	Land Tenure	Mining Authorisation
44	1195002	FREEHOLD	PAA, CL762
45	1195002	LOCAL GOVT AUTHORITY	PAA, CL762
1	1195968	FREEHOLD	PAA, CL762
308	1197605	FREEHOLD	PAA, CL762
309	1197605	FREEHOLD	PAA, CL762
310	1197605	FREEHOLD	PAA, CL762
311	1197605	FREEHOLD	PAA, CL762
312	1197605	FREEHOLD	PAA, CL762
313	1197605	FREEHOLD	PAA, CL762
314	1197605	FREEHOLD	PAA, CL762
53	1201140	LOCAL GOVT AUTHORITY	PAA, ML1443
54	1201140	FREEHOLD	PAA, ML1443, CL762
1	1202811	CROWN	PAA, ML1443
1	1202946	CROWN	PAA, ML 1543, ML1722, EL6317,
1	1206512	FREEHOLD	PAA, CL762
2	1206512	FREEHOLD	PAA, CL762
3	1206512	FREEHOLD	PAA, CL762
4	1206512	FREEHOLD	PAA, CL762
5	1206512	FREEHOLD	PAA, CL762
6	1206512	FREEHOLD	PAA, CL762
7	1206512	FREEHOLD	PAA, CL762
8	1206512	FREEHOLD	PAA, CL762
9	1206512	FREEHOLD	PAA, CL762
10	1206512	FREEHOLD	PAA, CL762
11	1206512	FREEHOLD	PAA, CL762
12	1206512	FREEHOLD	PAA, CL762
23	1209003	FREEHOLD	PAA, ML1443
1331	1212858	FREEHOLD	PAA, CL762
1332	1212858	FREEHOLD	PAA, CL762



Centennial Coal

Appendix 5 Risk Assessment

Site: Mandalong
Title: Risks to Rehabilitation - Mandalong MOP
Stature ID:1001124015
Version: 1
Lifecycle State:

1 of 54



Centennial Coal

Stature for Risk Management

Administration:

Risk Assessment Title: Risks to Rehabilitation - Mandalong MOP

Version: 1

Region: North

Site: Mandalong

Department: Surface

Equipment / Process: Services

Stature Risk Assessment No.: 1001124015

Study Lifecycle State: Risk Assessment Made Effective

Potential Hazard No.: 34023

PULSE Actions Required URL:

Site Risk Assessment Ref. No. (Optional):



Executive Summary of Top 10 Risks

Background	Potential Incident	RR
Flora	<p>There is a risk to Mandalong from</p> <p>::: Changes in the existing riparian community :::</p> <p>Caused by: Cessation of pumping from the Cooranbong workings</p> <p>Resulting in: Complaints or Impact on environment.</p>	13 (S)
Contaminated Land	<p>There is a risk to Mandalong from</p> <p>::: Failure to achieve the rehabilitation outcome prescribed in the MOP :::</p> <p>Caused by: Contaminated land occurring on the site at closure or Contamination due to past poor practices. Long term use of the site Spills, leaks etc.</p> <p>Resulting in: Constraint for future land use or Impact on environment or Inability to reach closure and relinquishment of the lease. or Unplanned remediation costs.</p>	13 (S)
Social impacts	<p>There is a risk to Mandalong from</p> <p>::: Change in community expectations for mine closure :::</p> <p>Caused by: Significant period of time until mine closure</p> <p>Resulting in: Complaints or Increased cost for unplanned work.</p>	13 (S)
Geology and Geochemistry	<p>There is a risk to Mandalong from</p> <p>::: Uncontrolled seepage of water from sealed workings :::</p> <p>Caused by: Mine workings filling up & passing through different geological stratas (low pH, metals etc)</p> <p>Resulting in: Impact on environment. or Inability to reach closure and relinquishment of the lease. or Requirement to treat water long term..</p>	9 (M)



Background	Potential Incident	RR
Mine Subsidence	<p>There is a risk to Mandalong from</p> <p>::: Changes in flood path :::</p> <p>Caused by: Mine subsidence greater than predicted</p> <p>Resulting in: Failure to achieve the rehabilitation outcome prescribed in the MOP or Property acquisition triggers or Safety concerns..</p>	9 (M)
Soil type and Suitability	<p>There is a risk to Mandalong from</p> <p>::: Failure to achieve the rehabilitation outcome prescribed in the MOP :::</p> <p>Caused by: Failure to recover available topsoil material or Lack of available topsoil material or Naturally dispersive soils</p> <p>Resulting in: Failure to achieve the rehabilitation outcome prescribed in the MOP or Inability to reach closure and relinquishment of the lease. .</p>	9 (M)
Slopes and Slope Management	<p>There is a risk to Mandalong from</p> <p>::: Long-term stability failure of batters and slopes :::</p> <p>Caused by: Geotechnical failure or Poor design and construction</p> <p>Resulting in: Additional costs for rework. or Inability to reach closure and relinquishment of the lease. or Safety concerns..</p>	9 (M)
Slopes and Slope Management	<p>There is a risk to Mandalong from</p> <p>::: Slippage of natural slopes :::</p> <p>Caused by: Failure to remediate subsidence cracks appropriately</p> <p>Resulting in: Additional costs for rework. or Impact on Aboriginal sites. or Inability to reach closure and relinquishment of the lease. or Safety concerns..</p>	9 (M)



Background	Potential Incident	RR
Ground Water	<p>There is a risk to Mandalong from</p> <p>::: Failure to achieve the rehabilitation outcome prescribed in the MOP :::</p> <p>Caused by: Connectivity between groundwater and surface or Underground mine filling with water due to mine closure or Underground mine filling with water during operations</p> <p>Resulting in: Impact on environment or Inability to reach closure and relinquishment of the lease. or Uncontrolled seepage and discharge to the environment.</p>	<p>9 (M)</p>
Greenhouse Gases, methane drainage / venting	<p>There is a risk to Mandalong from</p> <p>::: Failure to achieve the rehabilitation outcome prescribed in the MOP :::</p> <p>Caused by: Failure to seal mine entries or Failure to seal monitoring bores, service bores and exploration bores or Surface to seam cracking providing gas pathway</p> <p>Resulting in: Failure to achieve the rehabilitation outcome prescribed in the MOP or Impact on environment or Inability to reach closure and relinquishment of the lease. or Safety concerns..</p>	<p>9 (M)</p>



Executive Summary of Top 10 Severities

Background	Potential Incident	MRC
Geology and Geochemistry	<p>There is a risk to Mandalong from</p> <p>::: Uncontrolled seepage of water from sealed workings :::</p> <p>Caused by: Mine workings filling up & passing through different geological stratas (low pH, metals etc)</p> <p>Resulting in: Impact on environment. or Inability to reach closure and relinquishment of the lease. or Requirement to treat water long term..</p>	3
Mine Subsidence	<p>There is a risk to Mandalong from</p> <p>::: Changes in flood path :::</p> <p>Caused by: Mine subsidence greater than predicted</p> <p>Resulting in: Failure to achieve the rehabilitation outcome prescribed in the MOP or Property acquisition triggers or Safety concerns..</p>	3
Soil type and Suitability	<p>There is a risk to Mandalong from</p> <p>::: Failure to achieve the rehabilitation outcome prescribed in the MOP :::</p> <p>Caused by: Failure to recover available topsoil material or Lack of available topsoil material or Naturally dispersive soils</p> <p>Resulting in: Failure to achieve the rehabilitation outcome prescribed in the MOP or Inability to reach closure and relinquishment of the lease. .</p>	3
Flora	<p>There is a risk to Mandalong from</p> <p>::: Changes in the existing riparian community :::</p> <p>Caused by: Cessation of pumping from the Cooranbong workings</p> <p>Resulting in: Complaints or Impact on environment.</p>	3



Background	Potential Incident	MRC
Slopes and Slope Management	<p>There is a risk to Mandalong from</p> <p>::: Long-term stability failure of batters and slopes :::</p> <p>Caused by: Geotechnical failure or Poor design and construction</p> <p>Resulting in: Additional costs for rework. or Inability to reach closure and relinquishment of the lease. or Safety concerns..</p>	3
Slopes and Slope Management	<p>There is a risk to Mandalong from</p> <p>::: Slippage of natural slopes :::</p> <p>Caused by: Failure to remediate subsidence cracks appropriately</p> <p>Resulting in: Additional costs for rework. or Impact on Aboriginal sites. or Inability to reach closure and relinquishment of the lease. or Safety concerns..</p>	3
Ground Water	<p>There is a risk to Mandalong from</p> <p>::: Failure to achieve the rehabilitation outcome prescribed in the MOP :::</p> <p>Caused by: Connectivity between groundwater and surface or Underground mine filling with water due to mine closure or Underground mine filling with water during operations</p> <p>Resulting in: Impact on environment or Inability to reach closure and relinquishment of the lease. or Uncontrolled seepage and discharge to the environment.</p>	3
Contaminated Land	<p>There is a risk to Mandalong from</p> <p>::: Failure to achieve the rehabilitation outcome prescribed in the MOP :::</p> <p>Caused by: Contaminated land occurring on the site at closure or Contamination due to past poor practices. Long term use of the site Spills, leaks etc.</p> <p>Resulting in: Constraint for future land use or Impact on environment or Inability to reach closure and relinquishment of the lease. or Unplanned remediation costs.</p>	3



Background	Potential Incident	MRC
Greenhouse Gases, methane drainage / venting	<p>There is a risk to Mandalong from</p> <p>::: Failure to achieve the rehabilitation outcome prescribed in the MOP :::</p> <p>Caused by: Failure to seal mine entries or Failure to seal monitoring bores, service bores and exploration bores or Surface to seam cracking providing gas pathway</p> <p>Resulting in: Failure to achieve the rehabilitation outcome prescribed in the MOP or Impact on environment or Inability to reach closure and relinquishment of the lease. or Safety concerns..</p>	3
Social impacts	<p>There is a risk to Mandalong from</p> <p>::: Change in community expectations for mine closure :::</p> <p>Caused by: Significant period of time until mine closure</p> <p>Resulting in: Complaints or Increased cost for unplanned work.</p>	3

Study Approval

Approver	Approved / Rejected	Date	Comments
1. Nerida Manley	Approved	July 02, 2015	
2. Nerida Manley	Approved	July 02, 2015	
3. John Turner [Johnt]	Approved	December 28, 2015	

1. Background

Following the approval of the Mandalong Southern Extension Project (SSD-5144) on 12 October 2015 SLR Consulting Australia (SLR) was engaged by Centennial Mandalong to facilitate a Rehabilitation Risk Assessment workshop for Mandalong Mine.

In accordance with the NSW Department of Trade and Investment, Regional Infrastructure and Services (NSW Trade & Investment) ESG3: Mining Operations Plan (MOP) Guidelines (2013) SLR understands that as part of this MOP, Centennial are required to undertake a risk assessment to identify specific environmental issues associated with activities conducted under relevant mining leases as well as specific measures to be implemented to mitigate those risks. It is understood that it will have a key focus on mine closure and rehabilitation based issues, but will also meet the general requirements of the MOP Guidelines and satisfy the development consent condition 33 of Schedule 3 (prepare a Rehabilitation Management Plan).

2. Objective

The following Hierarchy of Controls offers a framework for considering the effectiveness of controls. Note that the effectiveness of a control that is intended to reduce a risk decreases from top to bottom of the list. In other words, the closer the control type is to the top of the hierarchy, the more potentially effective the control.

- Eliminate the hazard or energy source (do not use the energy)
- Minimise or replace the hazard or energy source (reduce the amount of energy to a less damaging level or replace the energy with another that has less potential negative consequences)
- Control the hazard or energy using engineered devices (ex. Lock outs, chemical containers, mechanical roof support, gas monitors, etc.)
- Control the hazard or energy by using physical barriers (ex. machine guarding, fences or enclosures, etc.)
- Control the hazard or energy with procedures (ex. Isolation procedures, standard operating procedures, etc.)
- Control the hazard or energy with personal protective equipment (ex. hard hats, boots with toe caps, gloves, safety glasses, welding gear, etc.)
- Control the hazard or energy with warnings and awareness (ex. posters, labels, warning signs, verbal warnings, etc.)

The purpose of the Risk Assessment is to:

- To identify risks to the continued operation of the mine through the facilitation of a Risk Assessment;
- To identify risks for rehabilitation and closure planning;
- Identify the specific nature of the risk/hazard;
- Identify the existing controls that are in place to manage the risk/hazard;
- Evaluate the consequence and likelihood of the risk/hazard;
- Develop a series of controls/actions to reduce all risk/hazard to an acceptable level.



3. Potential Hazards

Failure to achieve MOP rehabilitation requirements.
Discharge of poor water quality including acid mine drainage.
Spontaneous combustion impedes rehabilitation.
Subsidence events.
Erosion and sediment control on disturbed areas.
Impacts to biodiversity at mine closure including cessation of pumping.
Slope stability of rehabilitated areas.
Contaminated land at the surface sites.
Hazardous materials and dangerous goods.
Release of greenhouse gases.
Air quality, noise impacts during rehabilitation earthworks.
Bushfire.
Drought.
Surface water and flooding.
Settlement in shafts/drifts.
Community and social impacts from mine closure.

4a. Risk Assessment Boundary Definition

The boundary of this risk assessment is defined as the operations carried out within the MOP Boundary.

4b. Boundary Definition

5. Risk Assessment Methods

Risk Assessment Methods:

Workplace Risk Assessment and Control (WRAC): Yes

Fault Tree Analysis (FTA):

Safety Integrity Level Analysis to Australian Standard 61508 (SIL):

Bow Tie Analysis (BTA):

Failure Modes and Effects Analysis (FMEA):

Hazard and Operability Analysis (HAZOP):

6. Previous Risk Assessment and other documents to be used and/or referenced

Document Name	Title	Version	Referenced Document Date
ESG3	Mining Operations Plan (MOP) Guidelines, September 2013		
MOP	Centennial Mandalong MOP Amendment A (November 2015)	Amendment A v2	
Mandalong Southern Extension Project EIS	Appendix E - Rehabilitation and Decommissioning Strategy (February 2013)		

7. Information Required for Risk Assessment

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8. Venue and Time

Date	Description	Location	Start Time	End Time	Comment
1. 09-Dec-2015	Scoping	Project office, 202 Mandalong Road, Mandalong	1:00 PM	2:00 PM	
2. 14-Dec-2015	Assessment	Project office, 202 Mandalong Road, Mandalong	8:00 AM	2:00 PM	



9. Risk Assessment Team Selection

Name	Title	Company	Industry Start Date	Yrs. of Exp.	Mobile Phone #	E-Mail Address	Pulse User No.	Role	Attendance	
									1. 09-Dec-2015	2. 14-Dec-2015
Andrew Hutton	Technical Director	SLR	01-Nov-1995	21				Facilitator	A	P
Nathan Archer	Associate Consultant	SLR	14-Dec-2005	10				Team Member	A	P
Jeffrey Dunwoodie	Environmental & Community Coordinator	Centennial Mandalong	02-Dec-2002	14	0448490023	jeffrey.dunwoodie@centennialcoal.com.au	80084	Risk Assessment Owner	P	P
Peter Cook	Project Manager - Mandalong South	Centennial Mandalong	15-Sep-1985	31	0406 384 421	peter.cook@centennialcoal.com.au	100152	Team Member	P	P
Anna Walsh	Technical Services-Mandalong Sth Project	Centennial Mandalong	01-Dec-2001	15	0422368970	anna.walsh@centennialcoal.com.au	100198	Team Member	A	P
Phil Enright	Subsidence Management Coordinator	Centennial Mandalong	25-Aug-1983	33	0439 409 781	phil.enright@centennialcoal.com.au	60001	Team Member	A	P
Paul Williams	Group Environmental Manager	Centennial Mandalong	15-Jan-1995	21	0408 965 145	paul.williams@centennialcoal.com.au	100028	Team Member	A	P

10. Scope Confirmation

Approver	Scope Confirmation	Date	Comments
1. Veronica Howat	Yes	June 02, 2015	
2. John Turner [Johnt]	Yes	December 09, 2015	



WRAC Analysis Worksheet

Step	Potential Incident	Current Controls	L	MRC	RR	Recommended Control	Bow Tie Extension
1. Geology and Geochemistry	<p>There is a risk to Mandalong from</p> <p>::: Failure to achieve the rehabilitation outcome prescribed in the MOP :::</p> <p>Caused by:</p> <p>Historical fill used on sites or Inappropriate placement of shaft excavation materials or Less than adequate knowledge of material and its geochemistry or Presence of mapped Acid Sulphate Soils</p> <p>Resulting in:</p> <p>Inability to reach closure and relinquishment of the lease..</p>	1.1.a. Contaminated Site Assessment (Phase 1)	D (D)	2 (F)	5 (L)	5. Include in the MOP the requirement to undertake further contaminated site assessment work.	
		1.1.b. Mapped Acid Sulphate Soils					
	<p>There is a risk to Mandalong from</p> <p>::: Uncontrolled seepage of water from sealed workings :::</p> <p>Caused by:</p> <p>Mine workings filling up & passing through different geological stratas (low pH, metals etc)</p> <p>Resulting in:</p> <p>Impact on environment. or Inability to reach closure and relinquishment of the lease. or Requirement to treat water long term..</p>	1.1.c. Acid Sulphate Soil Management Plan	D (D)	3 (E)	9 (M)	1. Investigate seam and surface contour to determine potential seepage location.	
		1.1.d. Ability to transport and emplace at Newstan Southern Rejects Emplacement Area					
		1.2.a. Water level monitoring	D (D)	3 (E)	9 (M)		
		1.2.b. Depth of cover to seam					
2. Spontaneous	There is a risk to Mandalong from	2.1.a. Bushfire Management Plan	D	2	5		

Step	Potential Incident	Current Controls	L	MRC	RR	Recommended Control	Bow Tie Extension
Combustion	<p>::: Spontaneous Combustion impedes rehabilitation :::</p> <p>Caused by: Bushfire or Poor management of stockpile materials with propensity for spontaneous combustion.</p> <p>Resulting in: Cost of managing spontaneous combustion outbreak. or Impact on established rehabilitation. or Inability to reach closure and relinquishment of the lease..</p>	2.1.b. Spontaneous Combustion management plan	(D)	(F)	(L)		
3. Acid Mine Drainage	<p>There is a risk to Mandalong from</p> <p>::: Failure to achieve the rehabilitation outcome prescribed in the MOP :::</p> <p>Caused by: Less than adequate knowledge of material and its geochemistry</p> <p>Resulting in: Impact on environment. or Inability to reach closure and relinquishment of the lease. or Requirement to treat water long term..</p>	3.1.a. Water quality monitoring indicated no acid mine drainage issues	E (D)	1 (E)	1 (L)		
4. Mine Subsidence	<p>There is a risk to Mandalong from</p> <p>::: Subsidence cracks above historical workings (Cooranbong) :::</p> <p>Caused by: Mining under waterways or Shallow depth of cover in Cooranbong mining areas</p> <p>Resulting in: Failure to achieve the rehabilitation outcome prescribed in the MOP or Inability to reach closure and relinquish lease or Ongoing costs for rehabilitation and liability or Safety concerns..</p>	<p>4.1.a. Mine workings allowed to fill up with water which may decrease the risk of subsidence</p> <p>4.1.b. Subsidence Management Plan</p>	D (Op)	2 (F)	5 (L)		



Step	Potential Incident	Current Controls	L	MRC	RR	Recommended Control	Bow Tie Extension
	<p>There is a risk to Mandalong from</p> <p>::: Subsidence cracks above Mandalong workings :::</p> <p>Caused by: Mining method or Mining under waterways or Steep slopes or Thinning Mandalong conglomerate beam</p> <p>Resulting in: Failure to achieve the rehabilitation outcome prescribed in the MOP or Inability to reach closure and relinquish lease or Loss of alluvial groundwater or Ongoing costs for rehabilitation and liability or Ponding or Safety concerns..</p>	<p>4.2.a. Mine workings allowed to fill up with water which may decrease the risk of subsidence.</p> <p>4.2.b. Mine design</p>	D (D)	2 (F)	5 (L)		
	<p>There is a risk to Mandalong from</p> <p>::: Changes in flood path :::</p> <p>Caused by: Mine subsidence greater than predicted</p> <p>Resulting in: Failure to achieve the rehabilitation outcome prescribed in the MOP or Property acquisition triggers or Safety concerns..</p>	<p>4.3.a. Mine design</p> <p>4.3.b. Flood model</p>	D (D)	3 (F)	9 (M)		
5. Erosion and Sediment Control	<p>There is a risk to Mandalong from</p> <p>::: Erosion and sediment on disturbed areas on pit top areas :::</p> <p>Caused by: Failure of existing rehabilitation areas or Less than adequate water management system and/or design</p> <p>Resulting in: Failure to achieve the rehabilitation outcome prescribed in the MOP or Impact on environment. or Impact on established rehabilitation..</p>	<p>5.1.a. Erosion and Sediment Control Plan</p> <p>5.1.b. Water Management Plan</p> <p>5.1.c. Water management infrastructure on the surface</p>	D (Pb)	2 (E)	5 (L)		

Step	Potential Incident	Current Controls	L	MRC	RR	Recommended Control	Bow Tie Extension
	<p>There is a risk to Mandalong from</p> <p>∴ Erosion and sediment on disturbed areas on pit top areas during construction and/or demolition of infrastructure ∴</p> <p>Caused by: Less than adequate water management system and/or design or Naturally dispersive soils</p> <p>Resulting in: Failure to achieve the rehabilitation outcome prescribed in the MOP or Impact on environment. .</p>	5.2.a. Water management infrastructure on the surface	C (D)	2 (F)	8 (M)		
		5.2.b. Water Management Plan					
		5.2.c. Erosion and Sediment Control Plan.					
		5.2.d. Contractor Management Plan.					
	<p>There is a risk to Mandalong from</p> <p>∴ Exploration sites ∴</p> <p>Caused by: Less than adequate water management system and/or design or Naturally dispersive soils</p> <p>Resulting in: Failure to achieve the rehabilitation outcome prescribed in the MOP or Impact on environment. .</p>	5.3.a. Contractor Management Plan.	D (D)	2 (F)	5 (L)		
		5.3.b. Erosion and Sediment Control Plan.					
		5.3.c. Water Management Plan					
		5.3.d. Water management infrastructure on the surface					
		5.3.e. Annual rehabilitation audit on drill sites.					
6. Soil type and Suitability	<p>There is a risk to Mandalong from</p> <p>∴ Failure to achieve the rehabilitation outcome prescribed in the MOP ∴</p> <p>Caused by: Failure to recover available topsoil material or Lack of available topsoil material or Naturally dispersive soils</p> <p>Resulting in: Failure to achieve the rehabilitation outcome prescribed in the MOP or Inability to reach closure and relinquishment of the lease. .</p>	6.1.a. Construction Management Plan for MSSS.	D (Pb)	3 (F)	9 (M)	2. Contract for MSSS construction to include topsoil stripping and stockpiling requirements.	

Step	Potential Incident	Current Controls	L	MRC	RR	Recommended Control	Bow Tie Extension
	There is a risk to Mandalong from ::: Loss of agricultural land capability ::: Caused by: Inappropriate rehabilitation Resulting in: Failure to achieve the rehabilitation outcome prescribed in the MOP or Inability to reach closure and relinquishment of the lease. .	6.2.a. Agricultural land capability is mapped	D (D)	2 (F)	5 (L)		
7. Flora	There is a risk to Mandalong from ::: Failure to achieve the rehabilitation outcome prescribed in the MOP ::: Caused by: Failure to manage weeds or Not considering requirements in rehabilitation planning or Unapproved grazing pressures (kangaroos, deer, rabbits etc.) Resulting in: Inability to reach closure and relinquishment of the lease. .	7.1.a. Flora & Fauna / Weed and Pest Management Plan	B (Pb)	1 (F)	7 (M)		
		7.1.b. Contractor onsite managing weeds / pests					
	There is a risk to Mandalong from ::: Changes in the existing riparian community ::: Caused by: Cessation of pumping from the Cooranbong workings Resulting in: Complaints or Impact on environment.		C (Pb)	3 (E)	13 (S)	3. Include in the MOP a commitment that prior to mine closure investigate impacts of ceasing water discharge.	
	There is a risk to Mandalong from ::: Impacts to Groundwater Dependent Ecosystems (GDEs) :::	7.3.a. Subsidence Management Plan.	D (D)	2 (E)	5 (L)		
		7.3.b. Alluvial groundwater monitoring.					
		7.3.c. Mine design.					

Step	Potential Incident	Current Controls	L	MRC	RR	Recommended Control	Bow Tie Extension
	Caused by: Mine subsidence Resulting in: Impact on environment.	7.3.d. GDE are mapped. 7.3.e. Bi-annual floodpath monitoring. 7.3.f. Bi-annual wetland monitoring.					
8. Fauna	There is a risk to Mandalong from ::: Failure to achieve the rehabilitation outcome prescribed in the MOP ::: Caused by: Failure to manage pests (kangaroo, deer) Resulting in: Inability to reach closure and relinquishment of the lease. .	8.1.a. Flora & Fauna / Weed and Pest Management Plan 8.1.b. Contractor onsite managing weeds / pests	E (Pb)	1 (F)	1 (L)		
9. Overburden Characterisation	There is a risk to Mandalong from ::: Water and sediment impacts off site ::: Caused by: Not appropriately stockpiling shaft excavated material at Mandalong South Surface Site (MSSS) Resulting in: Cost of rehandling material or Impact on environment.	9.1.a. Construction Management Plan.	D (D)	2 (F)	5 (L)		
10. Slopes and Slope Management	There is a risk to Mandalong from ::: Long-term stability failure of batters and slopes ::: Caused by: Geotechnical failure or Poor design and construction Resulting in: Additional costs for rework. or Inability to reach closure and relinquishment of the lease. or Safety concerns..	10.1.a. Engineering design for MSSS. 10.1.b. Geotechnical investigation completed.	D (Pb)	3 (F)	9 (M)		



Step	Potential Incident	Current Controls	L	MRC	RR	Recommended Control	Bow Tie Extension
	There is a risk to Mandalong from ::: Slippage of natural slopes ::: Caused by: Failure to remediate subsidence cracks appropriately Resulting in: Additional costs for rework. or Impact on Aboriginal sites. or Inability to reach closure and relinquishment of the lease. or Safety concerns..	10.2.a. Subsidence management plan and monitoring. 10.2.b. Aboriginal Cultural heritage management Plan 10.2.c. Public Safety Management Plan. 10.2.d. Steep Slopes Management Plan.	D (Pb)	3 (F)	9 (M)		
11. Ground Water	There is a risk to Mandalong from ::: Failure to achieve the rehabilitation outcome prescribed in the MOP ::: Caused by: Connectivity between groundwater and surface or Underground mine filling with water due to mine closure or Underground mine filling with water during operations Resulting in: Impact on environment or Inability to reach closure and relinquishment of the lease. or Uncontrolled seepage and discharge to the environment.	11.1.a. Water Management Plan 11.1.b. Mine design 11.1.c. Subsidence Management Plan 11.1.d. Water level monitoring	D (Pb)	3 (F)	9 (M)		
12. Surface Water	There is a risk to Mandalong from ::: Failure to achieve the rehabilitation outcome prescribed in the MOP ::: Caused by: Ponding Resulting in: Cost for remediation or Impact on environment or Inability to reach closure and relinquishment of the lease. .	12.1.a. Water Management Plan 12.1.b. Subsidence Management Plan	D (Pb)	2 (F)	5 (L)		
13. Contaminated Land	There is a risk to Mandalong from	13.1.a. Contaminated Site Assessment (Phase 1).	C (D)	3 (F)	13 (S)	4. Complete Phase 2 investigations at Mandalong and Cooranbong.	



Step	Potential Incident	Current Controls	L	MRC	RR	Recommended Control	Bow Tie Extension
	<p>::: Failure to achieve the rehabilitation outcome prescribed in the MOP :::</p> <p>Caused by: Contaminated land occurring on the site at closure or Contamination due to past poor practices. Long term use of the site Spills, leaks etc.</p> <p>Resulting in: Constraint for future land use or Impact on environment or Inability to reach closure and relinquishment of the lease. or Unplanned remediation costs.</p>	13.1.b. MSSS design to Australian Standards.					
14. Hazardous Materials and Dangerous Goods	<p>There is a risk to Mandalong from</p> <p>::: Failure to achieve the rehabilitation outcome prescribed in the MOP :::</p> <p>Caused by: Failure to identify HAZMAT at closure or Hazardous materials and dangerous goods remaining on the site at closure (e.g. radiation source, asbestos)</p> <p>Resulting in: Constraint for future land use or Impact on environment or Inability to reach closure and relinquishment of the lease. or Safety concerns. or Unplanned remediation costs.</p>	14.1.a. Hazardous Materials Assessments completed at Mandalong & Cooranbong.	D (D)	2 (F)	5 (L)		
15. Greenhouse Gases, methane drainage /	There is a risk to Mandalong from	15.1.a. Air Quality and Greenhouse Gas Management Plan	D (D)	3 (F)	9 (M)		

Step	Potential Incident	Current Controls	L	MRC	RR	Recommended Control	Bow Tie Extension
venting	<p>::: Failure to achieve the rehabilitation outcome prescribed in the MOP :::</p> <p>Caused by: Failure to seal mine entries or Failure to seal monitoring bores, service bores and exploration bores or Surface to seam cracking providing gas pathway</p> <p>Resulting in: Failure to achieve the rehabilitation outcome prescribed in the MOP or Impact on environment or Inability to reach closure and relinquishment of the lease.. or Safety concerns..</p>	15.1.b. Sealing to DRE standards					
16. Air Quality	<p>There is a risk to Mandalong from</p> <p>::: Increased airborne dust :::</p> <p>Caused by: Inability to rehabilitate disturbed areas or Rehabilitation / closure activities</p> <p>Resulting in: Complaints or Exceedence of Development Consent Requirements or Exceedence of Licence Limits or Prosecution and fines.</p>	16.1.a. Air Quality and Greenhouse Gas Management Plan	C (D)	2 (R)	8 (M)		
		16.1.b. Dust monitoring					
		16.1.c. Contractor Management Plan.					
17. Noise	<p>There is a risk to Mandalong from</p> <p>::: Increased noise during decommissioning :::</p> <p>Caused by: Demolition activites (e.g. hammering foundations) or Increased truck movements during demobilisation or Intensive earthworks at end of mining</p> <p>Resulting in: Complaints or Exceedence of Development Consent Requirements or Prosecution and fines.</p>	17.1.a. Noise Management Plan	C (D)	2 (R)	8 (M)		
		17.1.b. Noise Monitoring					
		17.1.c. Contractor Management Plan.					



Step	Potential Incident	Current Controls	L	MRC	RR	Recommended Control	Bow Tie Extension
18. Blasting	There is a risk to Mandalong from ::: Not applicable to this risk assessment ::: Caused by: Na Resulting in: Na.	18.1.a.	E (D)	1 (E)	1 (L)		
19. Visual and Lighting	There is a risk to Mandalong from ::: Some rehabilitation and closure works at elevated locations ::: Caused by: Exposed areas visible or Lighting plant visible during demolition and bulk earthworks. Resulting in: Complaints.	19.1.a. Natural vegetation screening. 19.1.b. Standard construction hours	E (D)	1 (R)	1 (L)		
20. Aboriginal Cultural Heritage	There is a risk to Mandalong from ::: Disturbance of known Aboriginal site ::: Caused by: Unintended interaction with Aboriginal site due to lack of awareness Resulting in: Loss of culturally significant site or Prosecution.	20.1.a. Aboriginal Cultural heritage management Plan	C (Pb)	2 (L)	8 (M)		
		20.1.b. Permits 20.1.c. Bi-annual consultation.					
	There is a risk to Mandalong from ::: Loss of access to cultural sites on Centennial owned land ::: Caused by: Mine closure and sale of land Resulting in: Reputation damage..		C (Pb)	1 (R)	4 (L)		

Step	Potential Incident	Current Controls	L	MRC	RR	Recommended Control	Bow Tie Extension
21. European Heritage	There is a risk to Mandalong from ::: European heritage sites impacted at mine closure ::: Caused by: Closure or rehabilitation activities Resulting in: Loss of historic site/s.	21.1.a. Cultural Heritage Management Plan. 21.1.b. Sites identified and mapped.	E (D)	1 (R)	1 (L)		
22. Bushfire	There is a risk to Mandalong from ::: Loss of established rehabilitation ::: Caused by: Bushfire originating off-site or Bushfire started from rehabilitation / demolition activities Resulting in: Additional costs for rework of rehabilitation Exposed areas (erosion, sediment, dust) or Damage to rehabilitation.	22.1.a. Bushfire Management Plan	C (Pb)	2 (F)	8 (M)		
		22.1.b. Contractor Management Plan.					
		22.1.c. Working relationship with RFS.					
	There is a risk to Mandalong from ::: Loss of non-Centennial assets ::: Caused by: Bushfire started from rehabilitation / demolition activities Resulting in: Compensation costs to land holder or Safety concerns..	22.2.a. Construction Management Plan for MSSS.	D (Pb)	2 (F)	5 (L)		
		22.2.b. Contractor Management Plan.					
	There is a risk to Mandalong from ::: Rehabilitation of access tracks ::: Caused by: Mine closure Resulting in: Restriction of Rural Fire Service access.	22.3.a. Working relationship with RFS.	D (D)	2 (R)	5 (L)		



Step	Potential Incident	Current Controls	L	MRC	RR	Recommended Control	Bow Tie Extension
23. Drought	There is a risk to Mandalong from ::: Failure to establish rehabilitation at closure ::: Caused by: Drought conditions when completing final rehabilitation Resulting in: Delay rehabilitation or Increased cost for rework.	23.1.a. Use of native species in rehabilitation	C (D)	2 (F)	8 (M)		
		23.1.b. Coastal location					
24. Settlement in rehabilitation areas	There is a risk to Mandalong from ::: Failure to achieve the rehabilitation outcome prescribed in the MOP ::: Caused by: Settlement of material sealing/capping in shafts and / or drifts. Resulting in: Changes to water management or Inability to reach closure and relinquishment of the lease. or Ponding or Safety concerns..	24.1.a. Sealing to DRE requirements.	D (Pb)	2 (F)	5 (L)		
25. Social impacts	There is a risk to Mandalong from ::: Negative community response ::: Caused by: Failure to rehabilitate to the MOP requirements. or Mine closure Resulting in: Complaints or Loss of employment and local economic impact. or Reputation damage..	25.1.a. Community Consultative Committee (CCC).	C (D)	2 (R)	8 (M)		
		25.1.b. Stakeholder engagement.					
		25.1.c. Stakeholder Engagement Plan					
	There is a risk to Mandalong from ::: Change in community expectations for mine closure :::	25.2.a. Stakeholder engagement.	C (D)	3 (F)	13 (S)		
		25.2.b. Stakeholder Engagement Plan					
		25.2.c. Community Consultative Committee (CCC).					

Step	Potential Incident	Current Controls	L	MRC	RR	Recommended Control	Bow Tie Extension
	Caused by: Significant period of time until mine closure Resulting in: Complaints or Increased cost for unplanned work.	25.2.d. Development Consent					

WRAC Analysis Sorted by RR

Instructions:

WRAC Analysis Sorted by RR (hover for instructions):

Step	Potential Incident	Current Controls	L	MRC	RR	Recommended Control
7. Flora	There is a risk to Mandalong from ::: Changes in the existing riparian community ::: Caused by: Cessation of pumping from the Cooranbong workings Resulting in: Complaints or Impact on environment.		C (Pb)	3 (E)	13 (S)	3. Include in the MOP a commitment that prior to mine closure investigate impacts of ceasing water discharge.
13. Contaminated Land	There is a risk to Mandalong from ::: Failure to achieve the rehabilitation outcome prescribed in the MOP ::: Caused by: Contaminated land occurring on the site at closure or Contamination due to past poor practices. Long term use of the site Spills, leaks etc. Resulting in: Constraint for future land use or Impact on environment or Inability to reach closure and relinquishment of the lease. or Unplanned remediation costs.	13.1.a. Contaminated Site Assessment (Phase 1). 13.1.b. MSSS design to Australian Standards.	C (D)	3 (F)	13 (S)	4. Complete Phase 2 investigations at Mandalong and Cooranbong.
25. Social impacts	There is a risk to Mandalong from ::: Change in community expectations for mine closure ::: Caused by: Significant period of time until mine closure Resulting in: Complaints or Increased cost for unplanned work.	25.2.a. Stakeholder engagement. 25.2.b. Stakeholder Engagement Plan 25.2.c. Community Consultative Committee (CCC). 25.2.d. Development Consent	C (D)	3 (F)	13 (S)	
1. Geology and	There is a risk to Mandalong from	1.2.a. Water level monitoring	D	3	9	1. Investigate seam and surface contour to determine potential

Instructions:

WRAC Analysis Sorted by RR (hover for instructions):

Step	Potential Incident	Current Controls	L	MRC	RR	Recommended Control
Geochemistry	<p>::: Uncontrolled seepage of water from sealed workings :::</p> <p>Caused by: Mine workings filling up & passing through different geological stratas (low pH, metals etc)</p> <p>Resulting in: Impact on environment. or Inability to reach closure and relinquishment of the lease. or Requirement to treat water long term..</p>	1.2.b. Depth of cover to seam	(D)	(E)	(M)	seepage location.
4. Mine Subsidence	<p>There is a risk to Mandalong from</p> <p>::: Changes in flood path :::</p> <p>Caused by: Mine subsidence greater than predicted</p> <p>Resulting in: Failure to achieve the rehabilitation outcome prescribed in the MOP or Property acquisition triggers or Safety concerns..</p>	<p>4.3.a. Mine design</p> <p>4.3.b. Flood model</p>	D (D)	3 (F)	9 (M)	
6. Soil type and Suitability	<p>There is a risk to Mandalong from</p> <p>::: Failure to achieve the rehabilitation outcome prescribed in the MOP :::</p> <p>Caused by: Failure to recover available topsoil material or Lack of available topsoil material or Naturally dispersive soils</p> <p>Resulting in: Failure to achieve the rehabilitation outcome prescribed in the MOP or Inability to reach closure and relinquishment of the lease. .</p>	6.1.a. Construction Management Plan for MSSS.	D (Pb)	3 (F)	9 (M)	2. Contract for MSSS construction to include topsoil stripping and stockpiling requirements.
10. Slopes and Slope Management	<p>There is a risk to Mandalong from</p> <p>::: Long-term stability failure of batters and slopes :::</p>	<p>10.1.a. Engineering design for MSSS.</p> <p>10.1.b. Geotechnical investigation completed.</p>	D (Pb)	3 (F)	9 (M)	

Instructions:

WRAC Analysis Sorted by RR (hover for instructions):

Step	Potential Incident	Current Controls	L	MRC	RR	Recommended Control
	<p>Caused by: Geotechnical failure or Poor design and construction</p> <p>Resulting in: Additional costs for rework. or Inability to reach closure and relinquishment of the lease. or Safety concerns..</p>					
10. Slopes and Slope Management	<p>There is a risk to Mandalong from ::: Slippage of natural slopes :::</p> <p>Caused by: Failure to remediate subsidence cracks appropriately</p> <p>Resulting in: Additional costs for rework. or Impact on Aboriginal sites. or Inability to reach closure and relinquishment of the lease. or Safety concerns..</p>	10.2.a. Subsidence management plan and monitoring.	D (Pb)	3 (F)	9 (M)	
		10.2.b. Aboriginal Cultural heritage management Plan				
		10.2.c. Public Safety Management Plan.				
		10.2.d. Steep Slopes Management Plan.				
11. Ground Water	<p>There is a risk to Mandalong from ::: Failure to achieve the rehabilitation outcome prescribed in the MOP :::</p> <p>Caused by: Connectivity between groundwater and surface or Underground mine filling with water due to mine closure or Underground mine filling with water during operations</p> <p>Resulting in: Impact on environment or Inability to reach closure and relinquishment of the lease. or Uncontrolled seepage and discharge to the environment.</p>	11.1.a. Water Management Plan	D (Pb)	3 (F)	9 (M)	
		11.1.b. Mine design				
		11.1.c. Subsidence Management Plan				
		11.1.d. Water level monitoring				
15. Greenhouse Gases, methane drainage / venting	<p>There is a risk to Mandalong from ::: Failure to achieve the rehabilitation outcome prescribed in the MOP :::</p> <p>Caused by:</p>	15.1.a. Air Quality and Greenhouse Gas Management Plan	D (D)	3 (F)	9 (M)	
		15.1.b. Sealing to DRE standards				

Instructions:

WRAC Analysis Sorted by RR (hover for instructions):

Step	Potential Incident	Current Controls	L	MRC	RR	Recommended Control
	<p>Failure to seal mine entries or Failure to seal monitoring bores, service bores and exploration bores or Surface to seam cracking providing gas pathway</p> <p>Resulting in: Failure to achieve the rehabilitation outcome prescribed in the MOP or Impact on environment or Inability to reach closure and relinquishment of the lease. or Safety concerns..</p>					
5. Erosion and Sediment Control	<p>There is a risk to Mandalong from</p> <p>::: Erosion and sediment on disturbed areas on pit top areas during construction and/or demolition of infrastructure :::</p> <p>Caused by: Less then adequate water management system and/or design or Naturally dispersive soils</p> <p>Resulting in: Failure to achieve the rehabilitation outcome prescribed in the MOP or Impact on environment. .</p>	5.2.a. Water management infrastructure on the surface	C (D)	2 (F)	8 (M)	
		5.2.b. Water Management Plan				
		5.2.c. Erosion and Sediment Control Plan.				
		5.2.d. Contractor Management Plan.				
16. Air Quality	<p>There is a risk to Mandalong from</p> <p>::: Increased airborne dust :::</p> <p>Caused by: Inability to rehabilitate disturbed areas or Rehabilitation / closure activities</p> <p>Resulting in: Complaints or Exceedence of Development Consent Requirements or Exceedence of Licence Limits or Prosecution and fines.</p>	16.1.a. Air Quality and Greenhouse Gas Management Plan	C (D)	2 (R)	8 (M)	
		16.1.b. Dust monitoring				
		16.1.c. Contractor Management Plan.				
17. Noise	<p>There is a risk to Mandalong from</p> <p>::: Increased noise during decommissioning :::</p>	17.1.a. Noise Management Plan	C (D)	2 (R)	8 (M)	
		17.1.b. Noise Monitoring				
		17.1.c. Contractor Management Plan.				

Instructions:

WRAC Analysis Sorted by RR (hover for instructions):

Step	Potential Incident	Current Controls	L	MRC	RR	Recommended Control
	<p>Caused by: Demolition activities (e.g. hammering foundations) or Increased truck movements during demobilisation or Intensive earthworks at end of mining</p> <p>Resulting in: Complaints or Exceedence of Development Consent Requirements or Prosecution and fines.</p>					
20. Aboriginal Cultural Heritage	<p>There is a risk to Mandalong from ::: Disturbance of known Aboriginal site :::</p> <p>Caused by: Unintended interaction with Aboriginal site due to lack of awareness</p> <p>Resulting in: Loss of culturally significant site or Prosecution.</p>	20.1.a. Aboriginal Cultural heritage management Plan	C (Pb)	2 (L)	8 (M)	
		20.1.b. Permits				
		20.1.c. Bi-annual consultation.				
22. Bushfire	<p>There is a risk to Mandalong from ::: Loss of established rehabilitation :::</p> <p>Caused by: Bushfire originating off-site or Bushfire started from rehabilitation / demolition activities</p> <p>Resulting in: Additional costs for rework of rehabilitation Exposed areas (erosion, sediment, dust) or Damage to rehabilitation.</p>	22.1.a. Bushfire Management Plan	C (Pb)	2 (F)	8 (M)	
		22.1.b. Contractor Management Plan.				
		22.1.c. Working relationship with RFS.				
23. Drought	<p>There is a risk to Mandalong from ::: Failure to establish rehabilitation at closure :::</p> <p>Caused by: Drought conditions when completing final rehabilitation</p>	23.1.a. Use of native species in rehabilitation	C (D)	2 (F)	8 (M)	
		23.1.b. Coastal location				

Instructions:

WRAC Analysis Sorted by RR (hover for instructions):

Step	Potential Incident	Current Controls	L	MRC	RR	Recommended Control
	Resulting in: Delay rehabilitation or Increased cost for rework.					
25. Social impacts	There is a risk to Mandalong from ::: Negative community response ::: Caused by: Failure to rehabilitate to the MOP requirements. or Mine closure Resulting in: Complaints or Loss of employment and local economic impact. or Reputation damage..	25.1.a. Community Consultative Committee (CCC).	C (D)	2 (R)	8 (M)	
		25.1.b. Stakeholder engagement.				
		25.1.c. Stakeholder Engagement Plan				
7. Flora	There is a risk to Mandalong from ::: Failure to achieve the rehabilitation outcome prescribed in the MOP ::: Caused by: Failure to manage weeds or Not considering requirements in rehabilitation planning or Unapproved grazing pressures (kangaroos, deer, rabbits etc.) Resulting in: Inability to reach closure and relinquishment of the lease. .	7.1.a. Flora & Fauna / Weed and Pest Management Plan	B (Pb)	1 (F)	7 (M)	
		7.1.b. Contractor onsite managing weeds / pests				
1. Geology and Geochemistry	There is a risk to Mandalong from ::: Failure to achieve the rehabilitation outcome prescribed in the MOP ::: Caused by: Historical fill used on sites or Inappropriate placement of shaft excavation materials or Less than adequate knowledge of material and its geochemistry or Presence of mapped Acid Sulphate Soils Resulting in: Inability to reach closure and relinquishment of the lease..	1.1.a. Contaminated Site Assessment (Phase 1)	D (D)	2 (F)	5 (L)	5. Include in the MOP the requirement to undertake further contaminated site assessment work.
		1.1.b. Mapped Acid Sulphate Soils				
		1.1.c. Acid Sulphate Soil Management Plan				
		1.1.d. Ability to transport and emplace at Newstan Southern Rejects Emplacement Area				

Instructions:

WRAC Analysis Sorted by RR (hover for instructions):

Step	Potential Incident	Current Controls	L	MRC	RR	Recommended Control
2. Spontaneous Combustion	<p>There is a risk to Mandalong from</p> <p>::: Spontaneous Combustion impedes rehabilitation :::</p> <p>Caused by: Bushfire or Poor management of stockpile materials with propensity for spontaneous combustion.</p> <p>Resulting in: Cost of managing spontaneous combustion outbreak. or Impact on established rehabilitation. or Inability to reach closure and relinquishment of the lease..</p>	2.1.a. Bushfire Management Plan	D (D)	2 (F)	5 (L)	
		2.1.b. Spontaneous Combustion management plan				
4. Mine Subsidence	<p>There is a risk to Mandalong from</p> <p>::: Subsidence cracks above historical workings (Cooranbong) :::</p> <p>Caused by: Mining under waterways or Shallow depth of cover in Cooranbong mining areas</p> <p>Resulting in: Failure to achieve the rehabilitation outcome prescribed in the MOP or Inability to reach closure and relinquish lease or Ongoing costs for rehabilitation and liability or Safety concerns..</p>	4.1.a. Mine workings allowed to fill up with water which may decrease the risk of subsidence	D (Op)	2 (F)	5 (L)	
		4.1.b. Subsidence Management Plan				
4. Mine Subsidence	<p>There is a risk to Mandalong from</p> <p>::: Subsidence cracks above Mandalong workings :::</p> <p>Caused by: Mining method or Mining under waterways or Steep slopes or Thinning Mandalong conglomerate beam</p> <p>Resulting in: Failure to achieve the rehabilitation outcome prescribed in the MOP or Inability to reach</p>	4.2.a. Mine workings allowed to fill up with water which may decrease the risk of subsidence.	D (D)	2 (F)	5 (L)	
		4.2.b. Mine design				

Instructions:

WRAC Analysis Sorted by RR (hover for instructions):

Step	Potential Incident	Current Controls	L	MRC	RR	Recommended Control
	closure and relinquish lease or Loss of alluvial groundwater or Ongoing costs for rehabilitation and liability or Ponding or Safety concerns..					
5. Erosion and Sediment Control	<p>There is a risk to Mandalong from</p> <p>::: Erosion and sediment on disturbed areas on pit top areas :::</p> <p>Caused by: Failure of existing rehabilitation areas or Less then adequate water management system and/or design</p> <p>Resulting in: Failure to achieve the rehabilitation outcome prescribed in the MOP or Impact on environment. or Impact on established rehabilitation..</p>	5.1.a. Erosion and Sediment Control Plan	D (Pb)	2 (E)	5 (L)	
		5.1.b. Water Management Plan				
		5.1.c. Water management infrastructure on the surface				
5. Erosion and Sediment Control	<p>There is a risk to Mandalong from</p> <p>::: Exploration sites :::</p> <p>Caused by: Less then adequate water management system and/or design or Naturally dispersive soils</p> <p>Resulting in: Failure to achieve the rehabilitation outcome prescribed in the MOP or Impact on environment. .</p>	5.3.a. Contractor Management Plan.	D (D)	2 (F)	5 (L)	
		5.3.b. Erosion and Sediment Control Plan.				
		5.3.c. Water Management Plan				
		5.3.d. Water management infrastructure on the surface				
		5.3.e. Annual rehabilitation audit on drill sites.				
6. Soil type and Suitability	<p>There is a risk to Mandalong from</p> <p>::: Loss of agricultural land capability :::</p> <p>Caused by: Inappropriate rehabilitation</p> <p>Resulting in: Failure to achieve the rehabilitation outcome prescribed in the MOP or Inability to reach closure and relinquishment of the lease. .</p>	6.2.a. Agricultural land capability is mapped	D (D)	2 (F)	5 (L)	

Instructions:

WRAC Analysis Sorted by RR (hover for instructions):

Step	Potential Incident	Current Controls	L	MRC	RR	Recommended Control
7. Flora	There is a risk to Mandalong from ::: Impacts to Groundwater Dependent Ecosystems (GDEs) ::: Caused by: Mine subsidence Resulting in: Impact on environment.	7.3.a. Subsidence Management Plan.	D (D)	2 (E)	5 (L)	
		7.3.b. Alluvial groundwater monitoring.				
		7.3.c. Mine design.				
		7.3.d. GDE are mapped.				
		7.3.e. Bi-annual floodpath monitoring.				
		7.3.f. Bi-annual wetland monitoring.				
9. Overburden Characterisation	There is a risk to Mandalong from ::: Water and sediment impacts off site ::: Caused by: Not appropriately stockpiling shaft excavated material at Mandalong South Surface Site (MSSS) Resulting in: Cost of rehandling material or Impact on environment.	9.1.a. Construction Management Plan.	D (D)	2 (F)	5 (L)	
12. Surface Water	There is a risk to Mandalong from ::: Failure to achieve the rehabilitation outcome prescribed in the MOP ::: Caused by: Ponding Resulting in: Cost for remediation or Impact on environment or Inability to reach closure and relinquishment of the lease. .	12.1.a. Water Management Plan	D (Pb)	2 (F)	5 (L)	
		12.1.b. Subsidence Management Plan				
14. Hazardous Materials and Dangerous Goods	There is a risk to Mandalong from ::: Failure to achieve the rehabilitation outcome prescribed in the MOP ::: Caused by: Failure to identify HAZMAT at closure or Hazardous materials and dangerous goods	14.1.a. Hazardous Materials Assessments completed at Mandalong & Cooranbong.	D (D)	2 (F)	5 (L)	

Instructions:

WRAC Analysis Sorted by RR (hover for instructions):

Step	Potential Incident	Current Controls	L	MRC	RR	Recommended Control
	remaining on the site at closure (e.g. radiation source, asbestos) Resulting in: Constraint for future land use or Impact on environment or Inability to reach closure and relinquishment of the lease. or Safety concerns. or Unplanned remediation costs.					
22. Bushfire	There is a risk to Mandalong from ::: Loss of non-Centennial assets ::: Caused by: Bushfire started from rehabilitation / demolition activities Resulting in: Compensation costs to land holder or Safety concerns..	22.2.a. Construction Management Plan for MSSS.	D (Pb)	2 (F)	5 (L)	
		22.2.b. Contractor Management Plan.				
22. Bushfire	There is a risk to Mandalong from ::: Rehabilitation of access tracks ::: Caused by: Mine closure Resulting in: Restriction of Rural Fire Service access.	22.3.a. Working relationship with RFS.	D (D)	2 (R)	5 (L)	
24. Settlement in rehabilitation areas	There is a risk to Mandalong from ::: Failure to achieve the rehabilitation outcome prescribed in the MOP ::: Caused by: Settlement of material sealing/capping in shafts and / or drifts. Resulting in: Changes to water management or Inability to reach closure and relinquishment of the lease. or Ponding or Safety concerns..	24.1.a. Sealing to DRE requirements.	D (Pb)	2 (F)	5 (L)	
20. Aboriginal Cultural Heritage	There is a risk to Mandalong from		C (Pb)	1 (R)	4 (L)	

Instructions:

WRAC Analysis Sorted by RR (hover for instructions):

Step	Potential Incident	Current Controls	L	MRC	RR	Recommended Control
	<p>∴ Loss of access to cultural sites on Centennial owned land ∴</p> <p>Caused by: Mine closure and sale of land</p> <p>Resulting in: Reputation damage..</p>					
3. Acid Mine Drainage	<p>There is a risk to Mandalong from</p> <p>∴ Failure to achieve the rehabilitation outcome prescribed in the MOP ∴</p> <p>Caused by: Less then adequate knowledge of material and its geochemistry</p> <p>Resulting in: Impact on environment. or Inability to reach closure and relinquishment of the lease. or Requirement to treat water long term..</p>	3.1.a. Water quality monitoring indicated no acid mine drainage issues	E (D)	1 (E)	1 (L)	
8. Fauna	<p>There is a risk to Mandalong from</p> <p>∴ Failure to achieve the rehabilitation outcome prescribed in the MOP ∴</p> <p>Caused by: Failure to manage pests (kangaroo, deer)</p> <p>Resulting in: Inability to reach closure and relinquishment of the lease. .</p>	<p>8.1.a. Flora & Fauna / Weed and Pest Management Plan</p> <p>8.1.b. Contractor onsite managing weeds / pests</p>	E (Pb)	1 (F)	1 (L)	
18. Blasting	<p>There is a risk to Mandalong from</p> <p>∴ Not applicable to this risk assessment ∴</p> <p>Caused by: Na</p> <p>Resulting in: Na.</p>	18.1.a.	E (D)	1 (E)	1 (L)	
19. Visual and Lighting	There is a risk to Mandalong from	19.1.a. Natural vegetation screening.	E (D)	1 (R)	1 (L)	

Instructions:

WRAC Analysis Sorted by RR (hover for instructions):

Step	Potential Incident	Current Controls	L	MRC	RR	Recommended Control
	<p>Some rehabilitation and closure works at elevated locations</p> <p>Caused by: Exposed areas visible or Lighting plant visible during demolition and bulk earthworks.</p> <p>Resulting in: Complaints.</p>	19.1.b. Standard construction hours				
21. European Heritage	<p>There is a risk to Mandalong from</p> <p>European heritage sites impacted at mine closure</p> <p>Caused by: Closure or rehabilitation activities</p> <p>Resulting in: Loss of historic site/s.</p>	<p>21.1.a. Cultural Heritage Management Plan.</p> <p>21.1.b. Sites identified and mapped.</p>	E (D)	1 (R)	1 (L)	

WRAC Analysis Sorted by Consequence

Instructions:

WRAC Analysis Sorted by Consequence (hover for instructions):

Step	Potential Incident	Current Controls	L	MRC	RR	Recommended Control
4. Mine Subsidence	<p>There is a risk to Mandalong from</p> <p>::: Changes in flood path :::</p> <p>Caused by: Mine subsidence greater than predicted</p> <p>Resulting in: Failure to achieve the rehabilitation outcome prescribed in the MOP or Property acquisition triggers or Safety concerns..</p>	<p>4.3.a. Mine design</p> <p>4.3.b. Flood model</p>	D (D)	3 (F)	9 (M)	
6. Soil type and Suitability	<p>There is a risk to Mandalong from</p> <p>::: Failure to achieve the rehabilitation outcome prescribed in the MOP :::</p> <p>Caused by: Failure to recover available topsoil material or Lack of available topsoil material or Naturally dispersive soils</p> <p>Resulting in: Failure to achieve the rehabilitation outcome prescribed in the MOP or Inability to reach closure and relinquishment of the lease. .</p>	6.1.a. Construction Management Plan for MSSS.	D (Pb)	3 (F)	9 (M)	2. Contract for MSSS construction to include topsoil stripping and stockpiling requirements.
10. Slopes and Slope Management	<p>There is a risk to Mandalong from</p> <p>::: Long-term stability failure of batters and slopes :::</p> <p>Caused by: Geotechnical failure or Poor design and construction</p> <p>Resulting in: Additional costs for rework. or Inability to reach closure and relinquishment of the lease. or Safety concerns..</p>	<p>10.1.a. Engineering design for MSSS.</p> <p>10.1.b. Geotechnical investigation completed.</p>	D (Pb)	3 (F)	9 (M)	

Instructions:

WRAC Analysis Sorted by Consequence (hover for instructions):

Step	Potential Incident	Current Controls	L	MRC	RR	Recommended Control
10. Slopes and Slope Management	<p>There is a risk to Mandalong from</p> <p>::: Slippage of natural slopes :::</p> <p>Caused by: Failure to remediate subsidence cracks appropriately</p> <p>Resulting in: Additional costs for rework. or Impact on Aboriginal sites. or Inability to reach closure and relinquishment of the lease. or Safety concerns..</p>	10.2.a. Subsidence management plan and monitoring.	D (Pb)	3 (F)	9 (M)	
		10.2.b. Aboriginal Cultural heritage management Plan				
		10.2.c. Public Safety Management Plan.				
		10.2.d. Steep Slopes Management Plan.				
11. Ground Water	<p>There is a risk to Mandalong from</p> <p>::: Failure to achieve the rehabilitation outcome prescribed in the MOP :::</p> <p>Caused by: Connectivity between groundwater and surface or Underground mine filling with water due to mine closure or Underground mine filling with water during operations</p> <p>Resulting in: Impact on environment or Inability to reach closure and relinquishment of the lease. or Uncontrolled seepage and discharge to the environment.</p>	11.1.a. Water Management Plan	D (Pb)	3 (F)	9 (M)	
		11.1.b. Mine design				
		11.1.c. Subsidence Management Plan				
		11.1.d. Water level monitoring				
13. Contaminated Land	<p>There is a risk to Mandalong from</p> <p>::: Failure to achieve the rehabilitation outcome prescribed in the MOP :::</p> <p>Caused by: Contaminated land occurring on the site at closure or Contamination due to past poor practices. Long term use of the site Spills, leaks etc.</p> <p>Resulting in: Constraint for future land use or Impact</p>	13.1.a. Contaminated Site Assessment (Phase 1).	C (D)	3 (F)	13 (S)	4. Complete Phase 2 investigations at Mandalong and Cooranbong.
		13.1.b. MSSS design to Australian Standards.				

Instructions:

WRAC Analysis Sorted by Consequence (hover for instructions):

Step	Potential Incident	Current Controls	L	MRC	RR	Recommended Control
	on environment or Inability to reach closure and relinquishment of the lease. or Unplanned remediation costs.					
15. Greenhouse Gases, methane drainage / venting	<p>There is a risk to Mandalong from</p> <p>::: Failure to achieve the rehabilitation outcome prescribed in the MOP :::</p> <p>Caused by: Failure to seal mine entries or Failure to seal monitoring bores, service bores and exploration bores or Surface to seam cracking providing gas pathway</p> <p>Resulting in: Failure to achieve the rehabilitation outcome prescribed in the MOP or Impact on environment or Inability to reach closure and relinquishment of the lease. or Safety concerns..</p>	<p>15.1.a. Air Quality and Greenhouse Gas Management Plan</p> <p>15.1.b. Sealing to DRE standards</p>	D (D)	3 (F)	9 (M)	
25. Social impacts	<p>There is a risk to Mandalong from</p> <p>::: Change in community expectations for mine closure :::</p> <p>Caused by: Significant period of time until mine closure</p> <p>Resulting in: Complaints or Increased cost for unplanned work.</p>	<p>25.2.a. Stakeholder engagement.</p> <p>25.2.b. Stakeholder Engagement Plan</p> <p>25.2.c. Community Consultative Committee (CCC).</p> <p>25.2.d. Development Consent</p>	C (D)	3 (F)	13 (S)	
1. Geology and Geochemistry	<p>There is a risk to Mandalong from</p> <p>::: Uncontrolled seepage of water from sealed workings :::</p> <p>Caused by: Mine workings filling up & passing through different geological stratas (low pH, metals etc)</p> <p>Resulting in:</p>	<p>1.2.a. Water level monitoring</p> <p>1.2.b. Depth of cover to seam</p>	D (D)	3 (E)	9 (M)	1. Investigate seam and surface contour to determine potential seepage location.



Instructions:

WRAC Analysis Sorted by Consequence (hover for instructions):

Step	Potential Incident	Current Controls	L	MRC	RR	Recommended Control
	Impact on environment. or Inability to reach closure and relinquishment of the lease. or Requirement to treat water long term..					
7. Flora	<p>There is a risk to Mandalong from</p> <p>::: Changes in the existing riparian community :::</p> <p>Caused by: Cessation of pumping from the Cooranbong workings</p> <p>Resulting in: Complaints or Impact on environment.</p>		C (Pb)	3 (E)	13 (S)	3. Include in the MOP a commitment that prior to mine closure investigate impacts of ceasing water discharge.
16. Air Quality	<p>There is a risk to Mandalong from</p> <p>::: Increased airborne dust :::</p> <p>Caused by: Inability to rehabilitate disturbed areas or Rehabilitation / closure activities</p> <p>Resulting in: Complaints or Exceedence of Development Consent Requirements or Exceedence of Licence Limits or Prosecution and fines.</p>	<p>16.1.a. Air Quality and Greenhouse Gas Management Plan</p> <p>16.1.b. Dust monitoring</p> <p>16.1.c. Contractor Management Plan.</p>	C (D)	2 (R)	8 (M)	
17. Noise	<p>There is a risk to Mandalong from</p> <p>::: Increased noise during decommissioning :::</p> <p>Caused by: Demolition activites (e.g. hammering foundations) or Increased truck movements during demobilisation or Intensive earthworks at end of mining</p> <p>Resulting in: Complaints or Exceedence of Development Consent Requirements or Prosecution and fines.</p>	<p>17.1.a. Noise Management Plan</p> <p>17.1.b. Noise Monitoring</p> <p>17.1.c. Contractor Management Plan.</p>	C (D)	2 (R)	8 (M)	

Instructions:

WRAC Analysis Sorted by Consequence (hover for instructions):

Step	Potential Incident	Current Controls	L	MRC	RR	Recommended Control
22. Bushfire	There is a risk to Mandalong from ::: Rehabilitation of access tracks ::: Caused by: Mine closure Resulting in: Restriction of Rural Fire Service access.	22.3.a. Working relationship with RFS.	D (D)	2 (R)	5 (L)	
25. Social impacts	There is a risk to Mandalong from ::: Negative community response ::: Caused by: Failure to rehabilitate to the MOP requirements. or Mine closure Resulting in: Complaints or Loss of employment and local economic impact. or Reputation damage..	25.1.a. Community Consultative Committee (CCC). 25.1.b. Stakeholder engagement. 25.1.c. Stakeholder Engagement Plan	C (D)	2 (R)	8 (M)	
20. Aboriginal Cultural Heritage	There is a risk to Mandalong from ::: Disturbance of known Aboriginal site ::: Caused by: Unintended interaction with Aboriginal site due to lack of awareness Resulting in: Loss of culturally significant site or Prosecution.	20.1.a. Aboriginal Cultural heritage management Plan 20.1.b. Permits 20.1.c. Bi-annual consultation.	C (Pb)	2 (L)	8 (M)	
1. Geology and Geochemistry	There is a risk to Mandalong from ::: Failure to achieve the rehabilitation outcome prescribed in the MOP ::: Caused by: Historical fill used on sites or Inappropriate placement of shaft excavation materials or Less than adequate knowledge of material and its geochemistry or Presence of mapped	1.1.a. Contaminated Site Assessment (Phase 1) 1.1.b. Mapped Acid Sulphate Soils 1.1.c. Acid Sulphate Soil Management Plan 1.1.d. Ability to transport and emplace at Newstan Southern Rejects Emplacement Area	D (D)	2 (F)	5 (L)	5. Include in the MOP the requirement to undertake further contaminated site assessment work.

Instructions:

WRAC Analysis Sorted by Consequence (hover for instructions):

Step	Potential Incident	Current Controls	L	MRC	RR	Recommended Control
	Acid Sulphate Soils Resulting in: Inability to reach closure and relinquishment of the lease..					
2. Spontaneous Combustion	There is a risk to Mandalong from ::: Spontaneous Combustion impedes rehabilitation ::: Caused by: Bushfire or Poor management of stockpile materials with propensity for spontaneous combustion. Resulting in: Cost of managing spontaneous combustion outbreak. or Impact on established rehabilitation. or Inability to reach closure and relinquishment of the lease..	2.1.a. Bushfire Management Plan 2.1.b. Spontaneous Combustion management plan	D (D)	2 (F)	5 (L)	
4. Mine Subsidence	There is a risk to Mandalong from ::: Subsidence cracks above historical workings (Cooranbong) ::: Caused by: Mining under waterways or Shallow depth of cover in Cooranbong mining areas Resulting in: Failure to achieve the rehabilitation outcome prescribed in the MOP or Inability to reach closure and relinquish lease or Ongoing costs for rehabilitation and liability or Safety concerns..	4.1.a. Mine workings allowed to fill up with water which may decrease the risk of subsidence 4.1.b. Subsidence Management Plan	D (Op)	2 (F)	5 (L)	
4. Mine Subsidence	There is a risk to Mandalong from ::: Subsidence cracks above Mandalong workings ::: Caused by:	4.2.a. Mine workings allowed to fill up with water which may decrease the risk of subsidence. 4.2.b. Mine design	D (D)	2 (F)	5 (L)	

Instructions:

WRAC Analysis Sorted by Consequence (hover for instructions):

Step	Potential Incident	Current Controls	L	MRC	RR	Recommended Control
	<p>Mining method or Mining under waterways or Steep slopes or Thinning Mandalong conglomerate beam</p> <p>Resulting in: Failure to achieve the rehabilitation outcome prescribed in the MOP or Inability to reach closure and relinquish lease or Loss of alluvial groundwater or Ongoing costs for rehabilitation and liability or Ponding or Safety concerns..</p>					
5. Erosion and Sediment Control	<p>There is a risk to Mandalong from</p> <p>::: Erosion and sediment on disturbed areas on pit top areas during construction and/or demolition of infrastructure :::</p> <p>Caused by: Less then adequate water management system and/or design or Naturally dispersive soils</p> <p>Resulting in: Failure to achieve the rehabilitation outcome prescribed in the MOP or Impact on environment. .</p>	5.2.a. Water management infrastructure on the surface	C (D)	2 (F)	8 (M)	
		5.2.b. Water Management Plan				
		5.2.c. Erosion and Sediment Control Plan.				
		5.2.d. Contractor Management Plan.				
5. Erosion and Sediment Control	<p>There is a risk to Mandalong from</p> <p>::: Exploration sites :::</p> <p>Caused by: Less then adequate water management system and/or design or Naturally dispersive soils</p> <p>Resulting in: Failure to achieve the rehabilitation outcome prescribed in the MOP or Impact on environment. .</p>	5.3.a. Contractor Management Plan.	D (D)	2 (F)	5 (L)	
		5.3.b. Erosion and Sediment Control Plan.				
		5.3.c. Water Management Plan				
		5.3.d. Water management infrastructure on the surface				
		5.3.e. Annual rehabilitation audit on drill sites.				
6. Soil type and Suitability	<p>There is a risk to Mandalong from</p> <p>::: Loss of agricultural land capability :::</p>	6.2.a. Agricultural land capability is mapped	D (D)	2 (F)	5 (L)	

Instructions:

WRAC Analysis Sorted by Consequence (hover for instructions):

Step	Potential Incident	Current Controls	L	MRC	RR	Recommended Control
	<p>Caused by: Inappropriate rehabilitation</p> <p>Resulting in: Failure to achieve the rehabilitation outcome prescribed in the MOP or Inability to reach closure and relinquishment of the lease. .</p>					
9. Overburden Characterisation	<p>There is a risk to Mandalong from ::: Water and sediment impacts off site :::</p> <p>Caused by: Not appropriately stockpiling shaft excavated material at Mandalong South Surface Site (MSSS)</p> <p>Resulting in: Cost of rehandling material or Impact on environment.</p>	9.1.a. Construction Management Plan.	D (D)	2 (F)	5 (L)	
12. Surface Water	<p>There is a risk to Mandalong from ::: Failure to achieve the rehabilitation outcome prescribed in the MOP :::</p> <p>Caused by: Ponding</p> <p>Resulting in: Cost for remediation or Impact on environment or Inability to reach closure and relinquishment of the lease. .</p>	<p>12.1.a. Water Management Plan</p> <p>12.1.b. Subsidence Management Plan</p>	D (Pb)	2 (F)	5 (L)	
14. Hazardous Materials and Dangerous Goods	<p>There is a risk to Mandalong from ::: Failure to achieve the rehabilitation outcome prescribed in the MOP :::</p> <p>Caused by: Failure to identify HAZMAT at closure or Hazardous materials and dangerous goods remaining on the site at closure (e.g. radiation source, asbestos)</p>	14.1.a. Hazardous Materials Assessments completed at Mandalong & Cooranbong.	D (D)	2 (F)	5 (L)	

Instructions:

WRAC Analysis Sorted by Consequence (hover for instructions):

Step	Potential Incident	Current Controls	L	MRC	RR	Recommended Control
	Resulting in: Constraint for future land use or Impact on environment or Inability to reach closure and relinquishment of the lease. or Safety concerns. or Unplanned remediation costs.					
22. Bushfire	There is a risk to Mandalong from ::: Loss of established rehabilitation ::: Caused by: Bushfire originating off-site or Bushfire started from rehabilitation / demolition activities Resulting in: Additional costs for rework of rehabilitation Exposed areas (erosion, sediment, dust) or Damage to rehabilitation.	22.1.a. Bushfire Management Plan	C (Pb)	2 (F)	8 (M)	
		22.1.b. Contractor Management Plan.				
		22.1.c. Working relationship with RFS.				
22. Bushfire	There is a risk to Mandalong from ::: Loss of non-Centennial assets ::: Caused by: Bushfire started from rehabilitation / demolition activities Resulting in: Compensation costs to land holder or Safety concerns..	22.2.a. Construction Management Plan for MSSS.	D (Pb)	2 (F)	5 (L)	
		22.2.b. Contractor Management Plan.				
23. Drought	There is a risk to Mandalong from ::: Failure to establish rehabilitation at closure ::: Caused by: Drought conditions when completing final rehabilitation Resulting in: Delay rehabilitation or Increased cost for rework.	23.1.a. Use of native species in rehabilitation	C (D)	2 (F)	8 (M)	
		23.1.b. Coastal location				

Instructions:

WRAC Analysis Sorted by Consequence (hover for instructions):

Step	Potential Incident	Current Controls	L	MRC	RR	Recommended Control
24. Settlement in rehabilitation areas	<p>There is a risk to Mandalong from</p> <p>::: Failure to achieve the rehabilitation outcome prescribed in the MOP :::</p> <p>Caused by: Settlement of material sealing/capping in shafts and / or drifts.</p> <p>Resulting in: Changes to water management or Inability to reach closure and relinquishment of the lease. or Ponding or Safety concerns..</p>	24.1.a. Sealing to DRE requirements.	D (Pb)	2 (F)	5 (L)	
5. Erosion and Sediment Control	<p>There is a risk to Mandalong from</p> <p>::: Erosion and sediment on disturbed areas on pit top areas :::</p> <p>Caused by: Failure of existing rehabilitation areas or Less then adequate water management system and/or design</p> <p>Resulting in: Failure to achieve the rehabilitation outcome prescribed in the MOP or Impact on environment. or Impact on established rehabilitation..</p>	<p>5.1.a. Erosion and Sediment Control Plan</p> <p>5.1.b. Water Management Plan</p> <p>5.1.c. Water management infrastructure on the surface</p>	D (Pb)	2 (E)	5 (L)	
7. Flora	<p>There is a risk to Mandalong from</p> <p>::: Impacts to Groundwater Dependent Ecosystems (GDEs) :::</p> <p>Caused by: Mine subsidence</p> <p>Resulting in: Impact on environment.</p>	<p>7.3.a. Subsidence Management Plan.</p> <p>7.3.b. Alluvial groundwater monitoring.</p> <p>7.3.c. Mine design.</p> <p>7.3.d. GDE are mapped.</p> <p>7.3.e. Bi-annual floodpath monitoring.</p> <p>7.3.f. Bi-annual wetland monitoring.</p>	D (D)	2 (E)	5 (L)	
19. Visual and Lighting	<p>There is a risk to Mandalong from</p>	19.1.a. Natural vegetation screening.	E (D)	1 (R)	1 (L)	



Instructions:

WRAC Analysis Sorted by Consequence (hover for instructions):

Step	Potential Incident	Current Controls	L	MRC	RR	Recommended Control
	<p>∴ Some rehabilitation and closure works at elevated locations ∴</p> <p>Caused by: Exposed areas visible or Lighting plant visible during demolition and bulk earthworks.</p> <p>Resulting in: Complaints.</p>	19.1.b. Standard construction hours				
20. Aboriginal Cultural Heritage	<p>There is a risk to Mandalong from</p> <p>∴ Loss of access to cultural sites on Centennial owned land ∴</p> <p>Caused by: Mine closure and sale of land</p> <p>Resulting in: Reputation damage..</p>		C (Pb)	1 (R)	4 (L)	
21. European Heritage	<p>There is a risk to Mandalong from</p> <p>∴ European heritage sites impacted at mine closure ∴</p> <p>Caused by: Closure or rehabilitation activities</p> <p>Resulting in: Loss of historic site/s.</p>	<p>21.1.a. Cultural Heritage Management Plan.</p> <p>21.1.b. Sites identified and mapped.</p>	E (D)	1 (R)	1 (L)	
7. Flora	<p>There is a risk to Mandalong from</p> <p>∴ Failure to achieve the rehabilitation outcome prescribed in the MOP ∴</p> <p>Caused by: Failure to manage weeds or Not considering requirements in rehabilitation planning or Unapproved grazing pressures (kangaroos, deer, rabbits etc.)</p> <p>Resulting in: Inability to reach closure and</p>	<p>7.1.a. Flora & Fauna / Weed and Pest Management Plan</p> <p>7.1.b. Contractor onsite managing weeds / pests</p>	B (Pb)	1 (F)	7 (M)	

Instructions:

WRAC Analysis Sorted by Consequence (hover for instructions):

Step	Potential Incident	Current Controls	L	MRC	RR	Recommended Control
	relinquishment of the lease. .					
8. Fauna	<p>There is a risk to Mandalong from</p> <p>::: Failure to achieve the rehabilitation outcome prescribed in the MOP :::</p> <p>Caused by: Failure to manage pests (kangaroo, deer)</p> <p>Resulting in: Inability to reach closure and relinquishment of the lease. .</p>	<p>8.1.a. Flora & Fauna / Weed and Pest Management Plan</p> <p>8.1.b. Contractor onsite managing weeds / pests</p>	E (Pb)	1 (F)	1 (L)	
3. Acid Mine Drainage	<p>There is a risk to Mandalong from</p> <p>::: Failure to achieve the rehabilitation outcome prescribed in the MOP :::</p> <p>Caused by: Less then adequate knowledge of material and its geochemistry</p> <p>Resulting in: Impact on environment. or Inability to reach closure and relinquishment of the lease. or Requirement to treat water long term..</p>	3.1.a. Water quality monitoring indicated no acid mine drainage issues	E (D)	1 (E)	1 (L)	
18. Blasting	<p>There is a risk to Mandalong from</p> <p>::: Not applicable to this risk assessment :::</p> <p>Caused by: Na</p> <p>Resulting in: Na.</p>	18.1.a.	E (D)	1 (E)	1 (L)	

Recommended Controls

Recommended Controls Do NOT enter additional Recommended Controls on this sheet.	Place(s) Used	Allocated To	Required By Date	Pulse User No.	PULSE Ref. No.
		(Only one SITE person for each Recommended Control)			
1. Investigate seam and surface contour to determine potential seepage location.	Events: 1.2	Mark Harrower	15-Apr-2016	80013	34023.87468
2. Contract for MSSS construction to include topsoil stripping and stockpiling requirements.	Events: 6.1	Peter Cook	01-Jul-2016	100152	34023.87469
3. Include in the MOP a commitment that prior to mine closure investigate impacts of ceasing water discharge.	Events: 7.2	Jeffrey Dunwoodie	15-Jan-2016	80084	34023.87470
4. Complete Phase 2 investigations at Mandalong and Cooranbong.	Events: 13.1	Jeffrey Dunwoodie	31-Dec-2016	80084	34023.87471
5. Include in the MOP the requirement to undertake further contaminated site assessment work.	Events: 1.1	Jeffrey Dunwoodie	15-Jan-2016	80084	34023.87472



CEY Risk Matrix Page 1

CENTENNIAL RISK MATRIX							Likelihood					Description (D)
Rating	Consequence						A Certain	B Probable	C Possible	D Remote	E Improbable	
	Note: Consequence may result from a single event or may represent a cumulative impact over a period of 12 months. Use the worst case reasonable consequence if there is more than one.						Common	Has Happened within Centennial	Could Happen & has happened in non-CEY operations	Not Likely	Practically impossible	Probability (Pb)
	Financial Impact to Annual Business Plan (F)	Personal Injury (PI)	Business Interruption (BI)	Legal (L)	Reputation (R)	Environment (E)	Frequent incidents	Regular incidents	Infrequent incidents	Unlikely to occur. Very few recorded or known incidents	May occur in exceptional circumstances. Almost no recorded incidents.	Incident Frequency (IF)
							Operations – within 3 months	Operations – within 2 years	Operations – within 5 years	Operations – within 10 years	Operations – within 30 years	Operations (Op)
							Project – Every project	Project – Every 2 projects	Project – Every 5 projects	Project – Every 10 projects	Project – Every 30 projects	Project (Pr)
5. Catastrophic	>\$50m	Multiple Fatalities	> 1 month	Prolonged litigation, heavy fines, potential jail term	Prolonged International media attention	Long term impairment habitats/ ecosystem	25 (E)	24 (E)	21 (H)	19 (H)	15 (S)	
4. Major	\$10m - \$50m	Single Fatality	1 week to 1 month	Major breach/ major litigation	International media attention	Long term effects of ecosystem	23 (E)	22 (E)	18 (H)	14 (S)	10 (M)	
3. Moderate	\$1m - \$10m	Serious/ Disabling Injury	1 day to 1 week	Serious breach of regulation. prosecution/ fine	National media attention	Serious medium term environmental effects	20 (H)	17 (H)	13 (S)	9 (M)	6 (L)	
2. Minor	\$100k - \$1m	Lost Time Injury	12 hrs to 1 day	Non-compliance, breaches in regulation	Adverse local public attention	Minor effects to physical environment	16 (S)	12 (S)	8 (M)	5 (L)	3 (L)	
1. Insignificant	<\$100k	First Aid Treatment Only	< 12 hrs	Low level compliance issue	Local complaints	Limited physical damage	11 (S)	7 (M)	4 (L)	2 (L)	1 (L)	



CEY Risk Matrix Page 2

Risk Rating	Risk Category		Generic Management Actions
22 to 25	E	Extreme	Immediate intervention required from senior management to eliminate or reduce this risk
17 to 21	H	High	Imperative to eliminate or reduce risk to a lower level by the introduction of control measures. Management planning required at senior levels
11 to 16	S	Significant	Corrective action required, senior management attention needed to eliminate or reduce risk
7 to 10	M	Moderate	Corrective action to be determined, management responsibility must be specified
1 to 6	L	Low	Monitor and manage by corrective action where practicable

CEY Risk Matrix Page 3

BOW TIE ANALYSIS - Control Effectiveness Matrix									
TYPE OF CONTROL	Examples	Description	Rank	Control Category	CONTROL – Impact / Status / Quality				
					A ≥ 80%	B 50 – 80%	C 50 / 50%	D 50 – 20%	E ≤ 20%
	Replace electric hand tools with compressed air alternatives in wet conditions	Eliminates a hazard by removal	1.	Elimination of hazard	100	45.0	40.0	14.0	10.0
	Replace large diameter, heavy cables with smaller ones that are easier to handle manually	Replace element with less risky alternative	2.	Substitution	85.0	40.0	35.0	13.0	8.5
	Automatic fire fighting sprinkler systems, Earth Leakage protection devices	An automatic device that operates without intervention by personnel	3.	Engineered without people	70.0	30.0	25.0	12.0	7.0
	Fire alarm that sounds & the operator then has to initiate an evacuation	A device that requires personnel to respond to a stimulus	4.	Engineered with people	50.0	20.0	14.0	10.0	5.0
	Inspection, maintenance and repair of machinery	A process carried out by personnel	5.	Procedural	20.0	15.0	10.0	6.5	2.0
	Employee made aware of dangers of large moving equipment where the operators have limited vision	Induction training programs	6.	Awareness	5.0	3.0	2.5	1.5	1.0






Centennial Coal

Appendix 6

Summary of Remnant Ponding Remediation





Summary of Remnant Ponding and Remediation for LW1-23



Remnant Ponding Remediation							
Location	Description	Remediation	Remediation Comments	Ponding Predicted	Subsidence Completed	Status	Property Ref. Lot & DP
Longwall 1 (P1)	Open grassland	Proposed new dam and area levelled as per PSMP	Continuing negotiations with landowner.	No	Yes	Negotiations with landowner ongoing	Ref. 6 2//557230
Longwall 2 (P2)	Open grassland	Drained	Constructed open drain and connected to nearby water course. 	Yes	Yes	Completed	Ref. 7, 8 1//557230 3//557230
Longwall 3 (P3)	Open grassland	Drained	Constructed open drain and connected to nearby water course. 	Yes	Yes	Completed	Ref. 7 1//557230
Longwall 4 (P4)	Open grassland	Allowed to remain as a source of water for stock.		Yes	Yes	Completed	Ref. 7, 59 1//557230 580//73322 7

Remnant Ponding Remediation							
Location	Description	Remediation	Remediation Comments	Ponding Predicted	Subsidence Completed	Status	Property Ref. Lot & DP
Longwall 5 (P5)	Open grassland	Drained	<p>Constructed open drain and connected to nearby water course. Fenced to restrict stock access causing erosion.</p> 	No	Yes	Completed	Ref. 59 580//73322 7
Longwall 6 (P6)	Open grassland	Drained	<p>Installed sub-surface drainage and drainage to Stockton Creek.</p> 	Yes	Yes	Completed	Ref. 56 12//582283
Longwall 6 (P6A)	Open grassland	Drained	<p>Improved existing open drainage to ponded area.</p> 	No	Yes	Completed	Ref. 61 903//54230 6
Longwall 7 (P7)	Open grassland fringed with Cabbage Gums and <i>Melaleuca biconvexa</i> .	Drained	<p>Open drain constructed and connected to nearby water course. Drainage designed to allow access across by farm machinery and stock.</p> 	Yes	Yes	Completed	Ref. 56 12//582283

Remnant Ponding Remediation							
Location	Description	Remediation	Remediation Comments	Ponding Predicted	Subsidence Completed	Status	Property Ref. Lot & DP
Longwall 7 (P7A)	Open grassland	Allowed to remain as extension of existing dam.	Extension of existing dam	Yes	Yes	Completed	Ref. 55 11/582283
Longwall 7 (P7B)	Open grassland		Regrade natural drainage line and open drain. 	No	Yes	Completed	Ref. 52 93/9632
Longwall 8 (P8)	Expansion of an already wet area having scattered Swamp Mahogany and <i>Melaleuca biconvexa</i> .	Remain as expansion of existing freshwater wetland and fenced. Included in Wetland Monitoring Program as Wetland 9.	Following a period of monitoring and limited options for drainage, a decision was made to fence the wetland to protect from stock and allow to develop as a freshwater wetland. The wetland is now included in the wetland monitoring program (Wetland 9). 	Yes	Yes	Completed	Ref. 55 11/582283
Longwall 8 (P8A)	Open grassland and <i>Melaleuca biconvexa</i> Existing wetland	Expansion of existing Wetland 8.	Continue to monitor and report on Wetland 8 as per Wetland Management Plan.	No	Yes	Completed	Ref.42 25//755238
Longwall 9 (P9)	Mixed Cabbage Gum and paperbark forest.	Remain as extension of existing freshwater wetland.	Several threatened <i>Melaleuca biconvexa</i> paperbarks are present and remediation would involve losses of these through gaining access by machinery. Consequently remediation was not undertaken.	Yes	Yes	Completed	Ref. 57 180//85943 4

Remnant Ponding Remediation							
Location	Description	Remediation	Remediation Comments	Ponding Predicted	Subsidence Completed	Status	Property Ref. Lot & DP
Longwall 10 (P10)	Mixed Cabbage Gum and paperbark forest.	Remain as freshwater wetland.	Several threatened paperbarks <i>Melaleuca biconvexa</i> are present and remediation would involve losses of these through gaining access by machinery. Consequently remediation was not undertaken.	No	Yes	Completed	Ref. 57 180//85943 4
Longwall 11 (P11)	Mixed paperbark woodland in an already periodically inundated area. Contains threatened <i>Melaleuca biconvexa</i> paperbarks. Ponding has extended an existing wetland.	Remain as freshwater wetland	Will be monitored periodically to determine whether increased inundation is having a net detrimental impact on the habitat.	Yes	Yes	Completed	Ref. 44 9//800491
Longwall 13 (P13)	Open grassland and Redgum Rough-barked Apple Forest	Minor increase in low lying area. No permanent ponding.	Existing ponding has been moved towards centre of longwall panel. 	No	Yes	Completed	Ref. 44 , 50 9//800491 10//800491
Longwall 13 (P13A)	Open grassland	Minor increase in low lying area. No permanent ponding.	No impact on grazing area.	Yes	Yes	Completed	Ref. 26 10//650914
Longwall 15 (P15)	Alluvial Tall Moist Forest and Redgum Rough-barked Apple Forest.	No remediation required.	No increase to existing ponding evident.	Yes	Yes	Completed	Ref. 67, 69 16//813385 61//755238

Remnant Ponding Remediation							
Location	Description	Remediation	Remediation Comments	Ponding Predicted	Subsidence Completed	Status	Property Ref. Lot & DP
Longwall 16 (P16)	Redgum Rough-barked Apple Forest and Coastal Foothill Spotted Gum-Ironbark Forest.	Increase in existing ponded area remediated to pre-mining condition. Minimal impact on flora	Constructed open drain and connected to nearby water course to return existing ponding to pre-mining levels. Quarterly ecology monitoring program in place. 	Yes	Yes	Completed	Ref. 69 61/755238
Longwall 16 (P16A)	Open grassland	Filled and drain installed to restore drainage due to increase in depth and extent of ponding.		Yes	Yes	Completed	Ref.33 861/835160
Longwall 17 (P17)	Freshwater Wetland Complex EEC and Redgum Rough-barked Apple Forest EEC	No remediation required.	Marginal increase in extent and depth of wetland as predicted. No predicted long-term impact on wetland. Wetland 4 & 5 in Wetland Management Plan 	Yes	Yes	Completed Wetland monitoring ongoing	Ref. 68 22/812406
Longwall 17 (P17A)	Open grassland and Redgum Rough-barked Apple Forest EEC	Installed open drain and pipes to reduce slight increase in area and depth of existing ponding.		Yes	Yes	Completed	Ref. 70 54/755238

Remnant Ponding Remediation							
Location	Description	Remediation	Remediation Comments	Ponding Predicted	Subsidence Completed	Status	Property Ref. Lot & DP
Longwall 18 (P18)	Freshwater Wetland Complex EEC and Redgum Rough-barked Apple Forest EEC	No remediation required.	Marginal increase in extent and depth of wetland predicted. No predicted long-term impact on wetland. Wetland 4 & 5 in Wetland Management Plan	Yes	Yes	Monitoring	Ref. 68 22/812406
Longwall 18 (P18A)	Open grassland	Filled ponded to restore pasture.		No	Yes	Completed	Ref. 70 54/755238
Longwall 18 (P18B)	Prickly Ridge Forest Road Hunter Valley Moist Forest Open grassland	Upgraded road and installed additional drainage lines.	Increase in length and depth of ponding along Prickly Ridge Forest Road was remediated and road upgraded as agreed by Forest Corporation NSW. 	Yes	Yes	Completed	Ref. 71, 37 45/1159229 46/755238
Longwall 18 (P18C)	Access road and open grassland	Raise access road, install pipes and regrade existing drain.		Yes	Yes	Completed	Ref. 70 54/755238
Longwall 18 (P18D)	Open grassland	Construct drain from dam overflow to the existing drain and regrade.		Yes	Yes	Completed	Ref. 70 54/755238
Longwall 18 (P18E)	Open grassland	Constructed dam at location of existing ponding site. Overflow constructed with open drain and pipes to creek.		Yes	Yes	Completed	Ref. 70 54/755238
Longwall 18 (P18F)	Open grassland	Filled minor ponding with top soil.		No	Yes	Completed	Ref. 77 1/1063659

Remnant Ponding Remediation

Location	Description	Remediation	Remediation Comments	Ponding Predicted	Subsidence Completed	Status	Property Ref. Lot & DP
Longwall 19 (P19)	Farm dam and open grassland		No ponding or remediation expected with LW18 and LW19 shortened to protect property improvements.	Yes	No	Completed	Ref. 82 1/957458
Longwall 19 (P19A)	Open grassland and access road	Installed drainage to creek and upgraded access road.	Ponding against and along access road was remediated with sub-surface drainage. Upgraded access road. 	No	Yes	Completed	Ref. 82 1/957458
Longwall 19 (P19B)	Open grassland and dam	Increase in existing ponding near dam.	Monitor with potential to fill site if required by landowner.	No	Yes	Monitoring	Ref. 82 1/957458
Longwall 19 (P19C)	Open grassland	Regrade existing drain to remove remnant ponding in paddock.		No	Yes	Completed	Ref. 70 54/755238
Longwall 20 (P20)	Open grassland	Install four pipes at existing ponding site and minor regrading of existing drainage line. Replace open drain with 350 dia. pipes.		Yes	Yes	Completed	Ref. 82 1/957458
Longwall 21 (P21)	Open grassland and dam		No indication of ponding between dams following subsidence from LW21 and settlement of LW22.	Yes	No	Monitoring	Ref. 74 76/755238
Longwall 22 (P22)	Open grassland near creek		Predicted increase in existing ponding.	Yes	No	Monitoring	Ref. 73 93/755238
Longwall 22 (P22A)	Open grassland		Predicted increase in existing ponding.	Yes	No	Monitoring	Ref. 85 4/957458
Longwall 23 (P23)	Dam		Increase in ponding between dam and raised access road.	Yes	No	Monitoring	Ref. 90 11/869483



Centennial Coal

Appendix 7 6 MOP Plans