

Public Roads Management Plan

Longwalls 30 and 31

Mandalong Mine

MEMS-EP-9000-PRMP-9020

June 2021

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DOCUMENT CONTROL

Name:

Public Roads Management Plan

DOCUMENT DETAILS

Author: Phil Enright

Number: MEMS-EP-9000-PRMP-9051

Revision No.: 2
Document Status Final

APPROVAL	Revision No.	Date Sent	Details of Approval	Approved By	Approval Date
DETAILS	0	15/03/2021	Draft	P. Enright Mining Approvals Coordinator	15/03/2021
	1	22/03/2021	Final	P. Enright Mining Approvals Coordinator	25/03/2021
	2	25/06/2021	Final	P. Enright Mining Approvals Coordinator	25/06/2021

	Name	Department	Circulation Date
CIRCULATION	Director – Resource	NSW Department of	25/03/2021
DETAILS	Assessments	Planning, Industry and	
		Environment – Resource	
		Assessments (DPIE)	
	Director – Resource	NSW Department of	26/06/2021
	Assessments	Planning, Industry and	
		Environment – Resource	
		Assessments (DPIE)	
	Natural Resource	Crown Lands- DPIE	25/03/2021
	Management Project		
	Officer		
	Natural Resource	Crown Lands- DPIE	26/06/2021
	Management Project		
	Officer		

1 BACKGROUND

1.1 Introduction

Mandalong Mine is an existing underground longwall coal mine located on the western side of Lake Macquarie near Morisset, approximately 35 km southwest of Newcastle. Centennial Mandalong Pty Ltd is the operator of the mine and is a wholly owned subsidiary of Centennial Coal Company Pty Limited.

Development Consent for Mandalong Mine (SSD-5144) was approved on 12 October 2015 and permits extraction of 6.5 million tonnes of run-of-mine (ROM) coal per calendar year until 31 December 2040.

An Extraction Plan is required to be developed and approved prior to undertaking secondary extraction. This Extraction Plan, prepared for Longwalls 30 and 31 (LW30-31), describes the applicable regulatory framework, mine planning, management and monitoring measures to be implemented to protect all surface/subsurface natural and built features in addition to administering public safety measures associated with secondary extraction.

This Public Roads Management Plan has been developed in accordance with the current requirements of Condition 6, Schedule 4 of SSD-5144 for the extraction of LW30-31, and in accordance with Mining Leases (ML1722 and ML1744) requirements issued under the Mining Act 1992 to extract the longwall panels within the West Wallarah Seam.

The Extraction Plan and Public Roads Management Plan have been prepared generally in accordance with the Department of Planning & Environment, *Draft Guidelines for the Preparation of Extraction Plans V5* (2015) and the Department of Industry - Resources Regulator, *Managing Risks of Subsidence Guide: WHS (Mines and Petroleum Sites) Legislation* (2017).

The area applicable to this extraction plan is defined in detail in Section 3.1.

1.2 Project Description

The Extraction Plan area comprises a surface area of approximately 209 hectares. Across the Extraction Plan area the ground surface elevation ranges from 40 m to 240 m. Due to the elevated topography, alluvium is limited in this area. The depth of cover above the West Wallarah Seam in this area ranges from approximately 285 m to 500 m.

The existing surface environment of the Extraction Plan area includes creeks, native bushland, steep slopes and archaeological heritage items.

There are nine private properties, one property owned by Central Coast Council, one owned by Centennial Coal and one Crown Land lot. A small area of Olney State Forest is located at the southern extent of the Extraction Plan Area. Of the nine privately owned properties, four dwellings will be affected by subsidence. Local roads, power lines, telecommunication networks and other associated infrastructure are also included in the area of potential subsidence influence. This infrastructure is managed by the Built Features Management Plan and supporting individual infrastructure management plans developed for Public Roads (Crown), Telstra Communications and Ausgrid Powerlines.

2 Purpose

The purpose of the Public Roads Management Plan is to provide the management strategies, controls and monitoring programs to be implemented for the management of potential subsidence impacts on public roads affected by the extraction of LW30 and LW31.

3 Scope

3.1 Extraction Plan Area

The Public Roads Management Plan applies to the management of risks relating to the development of subsidence from the extraction of LW30-31, located within Centennial Mandalong Mining Leases (ML1722 and ML1744) and Development Consent SSD-5144. The Extraction Plan Area is defined by a minimum 26.5° angle of draw or 20mm limit of subsidence at the Upper 95% Confidence Limits from the extents of proposed extraction LW30-31 as shown in **Figure 1**.

3.2 Public Roads

There are two public unsealed Crown roads (Toepfers Road and Kiar Ridge Road) present within the Extraction Plan Area as shown in **Figure 1**. The roads are unsealed with reinforced concrete pipe culverts at watercourse crossings. There are unnamed and unformed Crown roads located in the north east of Extraction Plan Area between Lots 1 & 2 DP 805044 and bisecting Lot 140 DP 755238.

Access along the two unsealed Crown roads is limited to 4-wheel drive vehicles with locked gates at the Central Coast Council property and the boundary of Olney State Forest.

3.3 Unsealed Tracks and Fire Trails

Kiar Ridge Fire Trail is located within the Extraction Plan Area. The fire trail is gravel construction and is suitable for 4-wheel drive vehicles. The fire trail is located predominantly outside the longwall void with limited exposure to subsidence.

Two private access roads also traverse the Extraction Plan Area. The most northern single lane private access road services two properties and is partly sealed. The second single lane gravel access road services one private property.

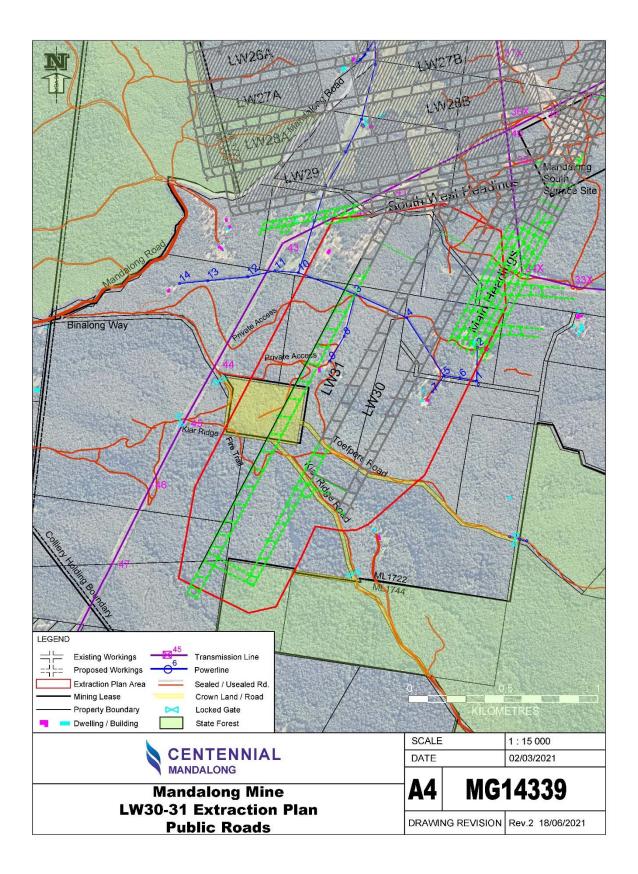


Figure 1 – Public Roads and Mine Workings within Extraction Plan Area

4 Consultation and Plan Development

The Public Roads Management Plan has been prepared and developed in consultation with the key stakeholders being Lake Macquarie City Council (LMCC), Central Coast Council, Crown Lands, Resources Regulator (RR) and affected landowners as required by Development Consent SSD-5144. A summary of the consultation for the Extraction Plan and the Public Roads Management Plan is presented in **Table 1** and a copy of the correspondence included in **Appendix 4**.

The process for consultation, communication and the provision of information pertaining to this management plan will be managed according to Centennial Mandalong's **HSMC-SC-Information and Communications Arrangements** and **HSMS-SE-6592-Consultation Arrangements**.

Table 1 – Overview of Stakeholders Consulted Specifically for this Management Plan

Stakeholder	Date	Consultation Type and Summary of Aspects/Issues	Section Addressed
Central Coast Council (CC Council)	23/09/2020	Meeting between Centennial Mandalong and Central Coast Council representatives. Provided information on the mining operation, subsidence, MOD9 LW30-33, proposed Extraction Plan, proposed mining within Central Coast LGA and near Buttonderry Waste Facility.	Appendix 2
Affected Landowners	Ongoing	Consultation has been and will continue to be undertaken through the Property Subsidence Management Plan (PSMP) process.	Section 4
CC Council	2/11/2020	Email to CC Council to provide information on proposed Extraction Plan and draft Access Agreement for subsidence monitoring on property MS0120.	Section 4 Appendix 2
CC Council	3/11/2020	CC Council acknowledged email and forwarded the draft access agreement to the appropriate department.	Section 4 Appendix 2
LMCC	5/11/2020	Phone call from Centennial Mandalong to LMCC to enquire where the Council's responsibility for Toefpers Road and Kiar Ridge Road extended to. J. Marshall from the Property Section confirmed that LMCC responsibility only extended to the sealed section of the roads ending at State Forest, outside the proposed mining area.	Section 4 Appendix 2
Crown Lands - DPIE	6/11/2020	Phone call from Centennial Mandalong to Mr Mark Grace to discussed proposed mining beneath Toefpers Road and Kiar Ridge Road. Confirmed that roads were Crown Roads on private property. Minor tracks consistent with fire trails were within the Crown Road easements. Centennial Mandalong provided overview of proposed mining LW30-31 and timeframes. Discussion on mining approvals and the Department responsibility in relation to Crown Roads. Explained that the process was similar to	Section 4 Appendix 2
		mining beneath the crown road, Chapman Road in Extraction Plan LW24-24A. Centennial to provide some additional information	

CC Council 8/12/2020 Centennial Mandalong enquire regarding status of proposed access agreement for subsidence monitoring. CC Council 21/12/2020 CC Council provided person responsible for dealing with access agreements, Section Manager – Natural Assets and Biodiversity. Section 4 Appendix 2	Stakeholder	Date	Consultation Type and Summary of	Section
CC Council 8/12/2020 Centennial Mandalong enquire regarding status of proposed access agreement for subsidence monitoring. CC Council 21/12/2020 CC Council provided person responsible for dealing with access agreements, Section Manager – Natural Assets and Biodiversity. CC Council 4/01/2021 Email for Centennial Mandalong Section Manager – Natural Assets and Biodiversity to provide information on proposed Extraction Plan and draft access agreement for subsidence monitoring. Crown Lands - DPIE 19/02/2021 Centennial Mandalong provided a draft copy of the Land Management Plan for review. CC Council 19/02/2021 Centennial Mandalong provided a draft copy of the Land Management Plan for review. Resource Regulator Meeting with Senior Mine Safety Officer (Subsidence Engineering) and site inspection of Extraction Plan Area LW30-31. Provided overview and discussion on Built Features Management Plan, Property Subsidence Management Plans and Subsidence Monitoring Program. Crown Lands - DPIE 019/03/2021 Centennial Mandalong provided a draft copy of the Subsidence Management Plans and Subsidence Monitoring Program. Crown Lands - Contennial Mandalong provided a draft copy of the Public Roads Management Plan for review. Crown Lands comments from review the Land Management Plan is included in the Public Roads Management Plan. Crown Lands - DPIE email confirming they are satisfied with draft Public Roads Management Plan. Crown Lands - DPIE email confirming they are satisfied with draft Public Roads Management Plan. Centennial revised the Public Roads Management Plan to include comments received from Crown			Aspects/Issues	Addressed
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Natural Assets and Biodiversity. Email for Centennial Mandalong Section Manager - Natural Assets and Biodiversity to provide information on proposed Extraction Plan and draft access agreement for subsidence monitoring.	CC Council	21/12/2020	_	Section 4
CC Council A/01/2021 Email for Centennial Mandalong Section Manager - Natural Assets and Biodiversity to provide information on proposed Extraction Plan and draft access agreement for subsidence monitoring.				Appendix 2
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DPIE satisfied with draft Public Roads Management Appendix 2 Plan. Centennial revised the Public Roads Management Plan to include comments received from Crown	Crown Lands -	25/03/2021		Section 4
Plan. Centennial revised the Public Roads Management Plan to include comments received from Crown	DPIE		= :	Appendix 2
Plan to include comments received from Crown				
Plan to include comments received from Crown			Centennial revised the Public Roads Management	
			=	
			Lands – DPIE.	

5 Regulatory Requirements

Centennial Mandalong operations are conducted in accordance with the relevant legislation and requirements of statutory authorities. Legislative and regulatory requirements are generally recognised through the imposition of conditions on the development consent, licences, mining approvals and Work, Health and Safety legislation.

5.1 Development Consent

Development Consent SSD-5144 provides a number of conditions relating to the preparation of the Built Features Management Plans. These conditions are summarised in **Table 2** below, together with the notation of the section of this document in which each matter is addressed.

Table 2 - Development Consent Conditions SSD-5144

Condition	Development Consent Condition	Section Addressed
Schedule 4	Performance Measures – Built Features	Section 6
Condition 4	The Applicant must ensure that the development does not cause any	and
	exceedances of the performance measures in Table 7, to the	Table 6
	satisfaction of the Secretary.	
Schedule 4	Performance Measures	Section 6
Condition 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.	
Schedule 4	Extraction Plan	Extraction Plan
Condition 6 (g)	(g) include a Built Features Management Plan, which has been	LW30-31
	prepared in consultation with RR and the owners of affected built	5 11.5
	features, to manage the potential subsidence impacts and/or	Built Features
	environmental consequences of the proposed second workings, and	Management Plan
	which:	LW30-31
	addresses in appropriate detail all items of key public information (with postingless as a first test to the second of	Dublic Doods
	infrastructure (with particular consideration to	Public Roads Management Plan
	tension/angle/suspension towers on transmission lines), and other public infrastructure;	LW30-31
		LVV30-31
	 has been prepared following appropriate consultation with the owner/s of potentially affected feature/s; 	Section 4
	 recommends appropriate remedial measures and includes 	30000114
	commitments to mitigate, repair, replace or compensate all	Section 7
	predicted impacts on potentially affected built features in a	30000117
	timely manner; and	Section 9
	 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;	
Schedule 4	(o) Trigger Action Response Plan addressing all features in Tables 6	Section 12
Condition 6 (o)	and 7 which contain:	
. ,	appropriate triggers to warn of the development of an	Appendix 1
	increasing risk of exceedance of any performance measures;	
	 specific actions to respond to high risk exceedance of any 	

Condition	Development Consent Condition	Section Addressed
	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; 	
Schedule 4	(p) include a Contingency Plan that expressly provides for:	Section 12
Condition 6 (p)	 adaptive management where monitoring indicates that there 	
	has been an exceedance of any performance measure in	Appendix 1
	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;	
Statement of	Subsidence Monitoring and Management	This Plan
Commitments	As part of the development of each Extraction Plan, Centennial	and
	Mandalong will update the Public Safety Management Plan and Built	Built Features
	Features Management Plans in consultation with the relevant	Management Plan
	infrastructure owners.	

5.2 Mining Leases

The Extraction Plan Area for LW30-31 is associated with two approved mining leases held by Centennial Mandalong; ML1722 and ML1744. **Table 3** summaries the relevant conditions relating to the Extraction Plan for LW30-31 and preparation of the Built Features Management Plan.

Table 3 – Summary of ML1722 and ML1744 conditions relating to Built Features

	Mining Lease No. 1722 and 1744	Section Addressed
ML1722 and ML1744 Condition 6	Extraction Plan (a) In this condition: (i) approved Extraction Plan means a plan, being: A. an extraction plan or subsidence management plan approved in accordance with the conditions of a relevant development consent and provided to the Secretary; or B. a subsidence management plan relating to the mining operations subject to this lease: I. submitted to the Secretary on or before 31 December 2014; and II. approved by the Secretary. (ii) relevant development consent means a development consent or project approval issued under the Environmental Planning & Assessment Act 1979 relating to the mining operations subject to this lease. (b) The lease holder must not undertake any underground mining operations that may cause subsidence except in accordance with an approved Extraction Plan. (a) The lease holder must ensure that the approved Extraction Plan provides for the effective management of risks associated with any subsidence resulting from mining operations carried out under this lease. (b) The lease holder must notify the Secretary within 48 hours of any: (i) incident caused by subsidence which has a potential to expose any person to health and safety risks; (ii) significant deviation from the predicted nature, magnitude, distribution, timing and duration of subsidence effects, and of the potential impacts and consequences of those deviations on built features and the health and safety of any person; or (iii) significant failure or malfunction of a monitoring device or risk control measure set out in the approved Extraction Plan addressing: A. built features; B. public safety; or C. subsidence monitoring.	Extraction Plan LW30-31 Built Features Management Plan LW30-31 Public Roads Management Plan LW30-31 Public Safety Management Plan LW30-31 Subsidence Monitoring Program LW30-31

5.3 Extraction Plan Guidelines

The Extraction Plan and Public Roads Management Plan have been prepared generally in accordance with the Department of Planning & Environment, Draft Guidelines for the Preparation of Extraction Plans V5 (2015). **Table 4** provides a summary of the guideline's requirements for key component plans together with the notation of the section of this document in which each matter is addressed.

Table 4 - Extraction Plan Guideline Requirements for Key Component Plans

Extraction Plan Guideline Requirement – Key Component Plans	Section Addressed
An overview of all landscape features, heritage sites, environmental values, built features or other values to be managed under the component plan	Section 1 Section 3
Setting out all performance measures included in the development consent relevant to the features or values to be managed under the component plan	Section 6
Setting out clear objectives to ensure the delivery of the performance measures and all other relevant statutory requirements (including relevant safety legislation)	Section 6
Proposing performance indicators to establish compliance with these performance measures and statutory requirements;	Section 6 TARP
Describe the landscape features, heritage sites and environmental values to be managed under the component plan, and their significance. It should be noted that a full description of such features, sites and values would commonly have been provided and considered in a recent environmental impact assessment. Consequently, this section can be relatively brief, and focus on the presentation of appropriate figures and/or graphical plans;	Section 8
Describe all currently-predicted subsidence impacts and environmental consequences relevant to the features, sites and values to be managed under the component plan;	Section 8
Describe all measures planned to remediate these impacts and/or consequences, including any measures proposed to ensure that impacts and/or consequences comply with performance measures and/or the Applicant's commitments; Describe the existing baseline monitoring network and the current baseline	Section 9 Section 10.2 TARPS in Appendix 1 Section 10.1
monitoring results, including pre-subsidence photographic surveys of key landscape features and key heritage sites which may be subject to significant subsidence impacts (such as significant watercourses, swamps and Aboriginal heritage sites);	
Fully describing the proposed monitoring of subsidence impacts and environmental consequences;	Section 10.2
Describe the proposed monitoring of the success of remediation measures following implementation;	Section 9
Describe adaptive management proposed to avoid repetition of unpredicted subsidence impacts and/or environmental consequences;	Section 11 And TARPS in Appendix 1
Describe contingency plans proposed to prevent, mitigate or remediate subsidence impacts and/or environmental consequences which substantially exceed predictions or which exceed performance measures;	Section 11 Section 12 TARPS in Appendix 1
Listing responsibilities for implementation of the plan; and	Section 13
An attached Trigger, Action, Response Plan (effectively a tabular summary of most of the above).	Appendix 1

5.4 Work Health and Safety Legislation

Mandalong Mine has developed a Safety Management System framework (MS-1001) that integrates plans, policies and procedures that enables a systematic approach to establishing and maintaining effective systems to manage health and safety consistent with WHS legislation and AS/NZS 4804:2001.

The following Work, Health and Safety (WHS) requirements have been considered for the Extraction Plan principally within the context of subsidence related risks to public safety, including to private property and public infrastructure and in reference to *Managing Risks of Subsidence Guide: WHS (Mines and Petroleum Sites) Legislation* (NSW Department of Industry - Resources Regulator, 2017).

Work Health and Safety legislation relating to the management of risk to health and safety from mine subsidence is addressed in **Table 5**.

Table 5 - Summary of WHS Legislation Relating to Mine Subsidence

Work Health and Safety Legislation Clause	Requirement	Section Addressed
WHS Regulation 2017 Clause 34	Duty to identify hazards A duty holder, in managing risks to health and safety, must identify reasonably foreseeable hazards that could give rise to risks to health and safety.	Section 7 Section 8 Extraction Plan Appendix 4 - Risk Assessments
WHS Regulation 2017 Clause 35	Managing risks to health and safety A duty holder, in managing risks to health and safety, must: (a) eliminate risks to health and safety so far as is reasonably practicable, and (b) if it is not reasonably practicable to eliminate risks to health and safety, minimise those risks so far as is reasonably practicable.	Section 6.1 Section 7 Section 9 Section 11
WHS Regulation 2017 Clause 36	Hierarchy of control measures (1) This clause applies if it is not reasonably practicable for a duty holder to eliminate risks to health and safety. (2) A duty holder, in minimising risks to health and safety, must implement risk control measures in accordance with this clause. (3) The duty holder must minimise risks, so far as is reasonably practicable, by doing 1 or more of the following: (a) substituting (wholly or partly) the hazard giving rise to the risk with something that gives rise to a lesser risk, (b) isolating the hazard from any person exposed to it, (c) implementing engineering controls. (4) If a risk then remains, the duty holder must minimise the remaining risk, so far as is reasonably practicable, by implementing administrative controls. (5) If a risk then remains, the duty holder must minimise the remaining risk, so far as is reasonably practicable, by ensuring the provision and use of suitable personal protective equipment. Note. A combination of the controls set out in this clause may be used to minimise risks, so far as is reasonably practicable, if a single control is not sufficient for the purpose.	Section 6.1 Section 7 Section 9 MS-1001
WHS Regulation 2017 Clause 37	Maintenance of control measures A duty holder who implements a control measure to eliminate or minimise risks to health and safety must ensure that the control measure is, and is maintained so that it remains, effective, including by ensuring that the control measure is and remains: (a) fit for purpose, and (b) suitable for the nature and duration of the work, and	Section 9 Section 10 Volume 3 of LW30-31 EP

Work Health and Safety Legislation Clause	Requirement	Section Addressed
	(c) installed, set up and used correctly.	
WHS Regulation 2017 Clause 38	Review of control measures (1) A duty holder must review and as necessary revise control measures implemented under this Regulation so as to maintain, so far as is reasonably practicable, a work environment that is without risks to health or safety. (2) Without limiting subclause (1), the duty holder must review and as necessary revise a control measure in the following circumstances: (a) the control measure does not control the risk it was implemented to control so far as is reasonably practicable, (b) before a change at the workplace that is likely to give rise to a new or different risk to health or safety that the measure may not effectively control, (c) a new relevant hazard or risk is identified, (d) the results of consultation by the duty holder under the Act or this Regulation indicate that a review is necessary, (e) a health and safety representative requests a review under subclause (4). (3) Without limiting subclause (2) (b), a change at the workplace includes: (a) a change to the workplace itself or any aspect of the work environment, or (b) a change to a system of work, a process or a procedure. (4) A health and safety representative for workers at a workplace may request a review of a control measure if the representative reasonably believes that: (a) a circumstance referred to in subclause (2) (a), (b), (c) or (d) affects or may affect the health and safety of a member of the work group represented by the health and safety representative, and (b) the duty holder has not adequately reviewed the control measure in response to the circumstance.	Section 11 Section 15 Extraction Plan Appendix 4 - Risk Assessments
WHS Regulation (Mines and Petroleum Sites) 2014 Clause 9	Management of risks to health and safety (cl 617 model WHS Regs) (1) A person conducting a business or undertaking at a mine must manage risks to health and safety associated with mining operations at the mine in accordance with Part 3.1 of the WHS Regulations. (2) A person conducting a business or undertaking at a mine must ensure that a risk assessment is conducted in accordance with this clause by a person who is competent to conduct the particular risk assessment having regard to the nature of the hazard. (3) In conducting a risk assessment, the person must have regard to: (a) the nature of the hazard, and (b) the likelihood of the hazard affecting the health or safety of a person, and (c) the severity of the potential health and safety consequences. (4) Nothing in subclause (3) limits the operation of any other requirement to conduct a risk assessment under this Regulation. (5) A person conducting a business or undertaking at a mine (who is the mine operator of the mine or who is a contractor) must keep a record of the following: (a) each risk assessment conducted under this clause and the name and competency of the person who conducted the risk assessment, (b) the control measures implemented to eliminate or minimise any risk that was identified through any such risk assessment. (6) A person conducting a business or undertaking at a mine is not required to keep a record of a risk assessment if: (a) the risk assessment is one that an individual worker is required to carry out before commencing a particular task, and (b) the person keeps a record of risk assessments that addresses the overall activity being undertaken (of which the task forms a part) such as risk assessments carried out in relation to the development of the safety management system for the mine or for a principal mining hazard management plan. (7) The record kept under subclause (5): (a) if kept by a mine operator—forms part of the safety management system of the mine and the records of the mine, or (b) if kept by a contract	Section 7 MS-1001

Work Health and Safety Legislation Clause	Requirement	Section Addressed
WHS Regulation (Mines and Petroleum Sites) 2014 Clause 10	Review of control measures (cl 618 model WHS Regs) (1) A person conducting a business or undertaking at a mine must review and as necessary revise control measures implemented under clause 9 in the following circumstances: (a) an audit of the effectiveness of the safety management system for the mine indicates a deficiency in a control measure, (b) a worker is moved from a hazard or assigned to different work in response to a recommendation contained in a health monitoring report provided under Part 3, (c) an incident referred to in clause 128 occurs, (d) any other incident occurs that is required to be notified to the regulator under the WHS laws. (2) The mine operator of a mine must ensure that a control measure that is the subject of a request by a health and safety representative under clause 38 (4) of the WHS Regulations is reviewed and as necessary revised, whether the request is made to the mine operator or notified to the mine operator under subclause (3) by another person conducting a business or undertaking at the mine. (3) A person conducting a business or undertaking at the mine who is not the mine operator of the mine must immediately notify the mine operator of a request made to the person under clause 38 (4) of the WHS Regulations. (4) A health and safety representative for workers at the mine may request a review of a control measure under clause 38 (4) of the WHS Regulations as if the circumstances referred to in subclause (1) were included as a circumstance in clause 38 (4) (a) of the WHS Regulations.	Section 11 Section 14 Section 15 MS-1001
WHS Regulation (Mines and Petroleum Sites) 2014 Clause 23 Identification of principal mining hazard management plan	 The mine operator of a mine must identify all principal mining hazards associated with mining operations at the mine. The mine operator must conduct, in relation to each principal mining hazard identified, a risk assessment that involves a comprehensive and systematic investigation and analysis of all aspects of risk to health and safety associated with the principal mining hazard. The mine operator, in conducting a risk assessment under subclause (2), must: use investigation and analysis methods that are appropriate to the principal mining hazard being considered, and consider the principal mining hazard individually and also cumulatively with other hazards at the mine. 	Centennial Risk Management System — consistent with AS/NZS ISO 31000:2009 Risk Assessments in Appendix 4 Extraction Plan Subsidence WHS No. 1001025001 Built Features LW30-31 No. 1001284061 Environment LW30-31 No. 1001284063 PSMP LW25-31 No.

Work Health and Safety Legislation Clause	Requirement	Section Addressed
		1001285007
WHS Regulation (Mines and Petroleum Sites) 2014 Clause 24 Preparation of principal mining hazard management plan	(1) The mine operator of a mine must consider the following when preparing a principal mining hazard management plan for a principal mining hazard at the mine in accordance with this clause and Schedule 1. (2) A principal mining hazard management plan must: (a) provide for the management of all aspects of risk control in relation to the principal mining hazard, and (b) so far as is reasonably practicable, be set out and expressed in a way that is readily understandable by persons who use it. (3) A principal mining hazard management plan must: (a) describe the nature of the principal mining hazard to which the plan relates, and (b) describe how the principal mining hazard relates to other hazards associated with mining operations at the mine, and (c) describe the analysis methods used in identifying the principal mining hazard to which the plan relates, and (d) include a record of the most recent risk assessment conducted in relation to the principal mining hazard, and (e) describe the investigation and analysis methods used in determining the control measures to be implemented, and (f) describe all control measures to be implemented to manage risks to health and safety associated with the principal mining hazard, and (g) describe the arrangements in place for providing the information, training and instruction required by clause 39 of the WHS Regulations in relation to the principal mining hazard, and (h) refer to any design principles, engineering standards and technical standards relied on for control measures for the principal mining hazard, and (i) set out the reasons for adopting or rejecting each control measure considered. (4) The mine operator of a mine must consider the following when preparing a principal mining hazard management plan for a principal mining hazard, and (b) any other matter relevant to managing the risks associated with the principal mining hazard, and	Extraction Plan LW30-31 and Public Safety Management Plan And Public Roads Management Plan
WHS Regulation (Mines and Petroleum Sites) 2014 Clause 67 Subsidence WHS Regulation (Mines and	 (1) In complying with clause 9, the mine operator of an underground coal mine must manage risks to health and safety associated with subsidence at the mine. (2) Without limiting subclause (1), the mine operator must ensure that: (a) so far as is reasonably practicable, the rate, method, layout, schedule and sequence of mining operations do not put the health and safety of any person at risk from subsidence, and (b) monitoring of subsidence is conducted, including monitoring of its effects on relevant surface and subsurface features, and (c) any investigation of subsidence and any interpretation of subsidence information is carried out only by a competent person, and (d) all subsidence monitoring data is provided to the regulator in the form and at the times required by the regulator, and (e) so far as is reasonably practicable, procedures are implemented for the effective consultation, co-operation and co-ordination of action with respect to subsidence between the mine operator and relevant persons conducting any business or undertaking that is, or is likely to be, affected by subsidence (1) The operator of a mine or petroleum site must take all reasonable steps to ensure that the regulator is notified in accordance with this clause after becoming aware of an 	Section 6.1 Section 9 Section 10 Section 13 TARPs Extraction Plan Appendix 4 - Risk Assessments Appendix 1 TARPs
Petroleum Sites) 2014 Clause 128 Duty to notify regulator of	incident (other than a notifiable incident) arising out of the carrying out of mining operations or petroleum operations at the mine or petroleum site, but only if the incident: (a) results in illness or injury that requires medical treatment within the meaning of clause 13 of Schedule 9, or (b) is a high potential incident.	Public Safety Management Plan and

Work Health and Safety Legislation Clause	Requirement	Section Addressed
certain incidents	 (5) In this clause: high potential incident means any of the following: (m) any indication from monitoring data of the development of subsidence which may result in any incident referred to in clause 179 (a) (xvi) - a failure of ground, or of slope stability control measures, or 179 (a) (xvii) - rock falls, instability of cliffs, steep slopes or natural dams, occurrence of sinkholes, development of surface cracking or deformations or release of gas at the surface, due to subsidence. 	Public Roads Management Plan Land Management Plan Section 14
WHS Regulation (Mines and Petroleum Sites) 2014 Schedule 1 Subsidence Clause 3C Principal hazard management plans — additional matters to be considered	Subsidence The following matters must be considered in developing the control measures to manage the risks of subsidence: (a) the characteristics of all relevant surface and subsurface features, (b) the characteristics of all relevant geological, hydrogeological, hydrological, geotechnical, topographic and climatic conditions, including any conditions that may cause elevated or abnormal subsidence or the formation of sinkholes, (c) the characteristics of any previously excavated or abandoned workings that may interact with any proposed or existing mine workings, (d) the existence, distribution, geometry and stability of significant voids, standing pillars or remnants within any old pillar workings that may interact with any proposed or existing mine workings, (e) the predicted and actual nature, magnitude, distribution, timing and duration of subsidence, (f) the rate, method, layout, schedule and sequence of mining operations.	Extraction Plan - Appendix 1 (Ditton Geotechnical Services, 2021) Extraction Plan and Volume 3 (Component Plans)
WHS Regulation (Mines and Petroleum Sites) 2014 Schedule 3 Clause 16 High Risk Activities	Secondary extraction or pillar extraction, splitting or reduction (1) The following are identified as high risk activities: (a) secondary extraction by longwall mining, shortwall mining or miniwall mining, (b) pillar extraction, (c) pillar splitting, (d) pillar reduction. (2) The waiting period for any such activity is 3 months. (3) The information and documents that must be provided in relation to any such activity are as follows: (a) details of the authoritative sources used in determining that the proposed method of work can be done safely, (b) engineering plans showing the manner and sequence of extraction, endorsed by the individual nominated to exercise the statutory function of mining engineering manager at the mine, (c) information about the land above or in the vicinity of the proposed activity including land use and details of who owns or occupies any land that may be affected by subsidence, (d) in the case of a pillar extraction, details of the procedures for the recovery of buried and immobile mining plant in or around a goaf, (e) details of how the risks to the health and safety of workers and other persons from subsidence caused by the activity will be managed.	Extraction Plan LW30-31 and High Risk Activity Notification for LW30-31

6 Performance Measures and Indicators

6.1 Mine Design

Mandalong Mine is designed to provide reduced levels of subsidence by using sub-critical longwall panels (180m to 200m) combined with 43m to 53m wide chain pillars that utilise the bridging effect of the overlying massive conglomerate and sandstone strata. This design is proven and provides subsidence impacts below safe, serviceable and repairable (SSR) criteria for dwellings and also minimises the impacts to the flood plain, natural features and built features managed by this plan.

6.2 Subsidence Prediction

Subsidence predictions and potential impacts from the extraction of LW30-31 on surface and subsurface features present within the Extraction Plan Area has been prepared by Ditton Geotechnical Services (2021) based on the following methodology:

- (i) The development of a geotechnical model of the overburden and immediate roof-pillar-floor system using available borehole log and testing data.
- (ii) Prediction of maximum subsidence effect parameters for the proposed longwalls.
- (iii) Review of Mandalong Mine's subsidence data and impacts associated with LWs 1 27.
- (iv) Prediction of first and final subsidence effect profiles and final contours and assessment of the potential impacts to existing and proposed features or developments.
- (v) Prediction of post-mining surface levels.
- (vi) Potential surface cracking widths and their general location.
- (vii) Prediction of sub-surface heights of continuous and discontinuous fracturing above the proposed longwall panels.
- (viii) Potential ponding depth locations.
- (ix) Potential surface gradient changes and erosion / slope stability impacts.
- (x) Valley Closure and Uplift potential along watercourses.
- (xi) Far-field horizontal displacements and strains.
- (xii) Predicted impacts and management strategies required for the environment, developments and Aboriginal and European Heritage sites.

Two empirically based prediction models (ACARP, 2003 and SDPS°) have been used to generate subsidence profiles and contours above the proposed longwall panels after mining is complete. Surfer 8° software has then been used to generate subsidence, tilt, horizontal displacement, and strain contours above the panels from the SDPS° output files.

The subsidence predictions models used in this study are summarised below:

ACARP, 2003 - An empirical model that was originally developed for predicting maximum single
and multiple longwall panel subsidence, tilt, curvature and strain in the Newcastle Coalfield. The
model database included measured subsidence parameters and overburden geology data, which
have been back analysed to predict the subsidence reduction potential (SRP) of massive lithology
in terms of 'Low', 'Moderate' and 'High' SRP categories.

The model database also includes chain pillar subsidence, inflexion point distance, goaf edge subsidence and angle of draw prediction models, which allow subsidence profiles to be

generated for any number of panels and a range of appropriate confidence limits. The Upper 95% Confidence Limit (U95%CL) has been adopted in this study for predictions of the Credible Worst-Case values.

The model has been updated by Ditton Geotechnical Services (DgS) since 2007 to allow the original **ACARP**, **2003** model to be applied to other Australian Coalfields and improve its robustness over a greater range of mining geometries and geologies.

• SDPS°, 2007 - A US developed (Virginia Polytechnical Institute) influence function model for subsidence predictions above longwalls or pillar extraction panels. The model requires calibration to measured subsidence profiles to reliably predict the subsidence and differential subsidence profiles required to assess impacts on surface features.

The model also includes a database of percentage of hard rock (i.e. massive sandstone / conglomerate) that effectively reduces subsidence above super-critical and sub-critical panels due to either bridging or bulking of collapsed material. This is consistent with the **ACARP**, **2003** models prediction methodology.

Pre-feasibility studies of appropriate panel widths and set-back distances required to minimise or limit surface impacts to manageable levels have been undertaken by Centennial Mandalong and DgS prior to the preparation of the predictions. The outcomes of the preliminary analysis have resulted in the mining geometry and layout adopted.

Based on regression analysis techniques, curves of 'best fit' have been used to estimate Mean and Credible Worst-Case (Upper 95% Confidence Limits) for the subsidence effects due to the proposed longwalls. The curves are based on measured subsidence data in the NSW Coalfields and key mining geometry parameters (refer **ACARP**, **2003**). The Mandalong mining experience to-date has also been reviewed against the database (LW1-23).

The prediction method allows specialist consultants to assess the potential range of impacts to a given feature in a probabilistic manner. Impact Management Plans and strategies can then be developed that allows appropriate Trigger Action Responses and mine planning adjustments or mitigation measures necessary to deliver satisfactory outcomes to stakeholders.

6.3 Performance Measures

6.3.1 SSD-5144

As outlined in **Section 6.1**, the primary objective of the mine design is to prevent any significant mine induced risk to built features by providing low levels of subsidence, that allow built features including private dwellings to remain safe, serviceable and repairable.

The Public Roads Management Plan aims to ensure the performance measures in SSD-5144 Schedule 4 Condition 4 Table 7 are not exceeded. The performance measures are shown in **Table 6**.

Table 6 - Subsidence Impact Performance Measures SSD-5144

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
Privately-owned residences	practicable.
Local Roads	Loss of serviceability must be fully
Local Nodus	compensated.
Other built features and improvements,	
(including access roads, farm dams,	Damage must be fully repairable, and must be fully
swimming pools, tracks and fences)	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.

6.4 Performance Indicators

To establish compliance with the performance measured outlined in **Section 6.3**, Centennial Mandalong has established a subsidence and environmental monitoring program developed in consultation with the built feature owners and RR. Trigger Action Response Plans (TARPs) have also been established and provided in **Appendix 1**. These documents establish the appropriate subsidence monitoring, parameters and associated trigger levels to demonstrate that subsidence performance satisfies the Subsidence Performance Measures set in **Table 6** and infrastructure requirements.

The Performance Indicators have been established for each built feature including public roads. The TARPS provide the trigger values as outlined in **Table 7**.

Table 7 – Performance Indicators

Performance Indicator	Tigger	Action / Response
Level 1 Low	Operations within prediction and approved impact.	Continued operations and monitoring as normal.
Level 2 Medium	Operations within approved impacts but exceed or potentially exceed predictions.	Review and investigation processes are engaged, with adaptive management as required.
Level 3 High	Operations exceed approved impact.	Adaptive Management fully engaged

7 Risk Management

Centennial Mandalong has adopted the Stature Risk Assessment Program which was developed to ensure consistency in all risk assessments across the Centennial Coal operations. The Stature Risk Assessment Program sets out a consequences table and risk ranking matrix for managing identified risks consistent with AS/NZS ISO 31000:2009.

All operational processes undertaken at the Centennial Mandalong operations are subject to the risk assessment process prior to implementation. The process for risk and change management is undertaken according to the methodology and tools contained within HSMS-SE-1024-Risk Management Arrangements and HSMS-SE-1082- Change Management System.

Centennial Mandalong completed a WRAC Risk Assessment (No. 1001284061) for Built Features affected by subsidence from the secondary extraction of LW30-31, including public roads. A full copy of the risk assessment is included in Appendix 4 of the Extraction Plan LW30-31.

7.1 Identified Risks

Mandalong Mine has well established Public Roads Management Plans, which have been developed and refined since the commencement of longwall mining in 2005. Potential hazards to public roads and public safety from the impact of mine subsidence can include:

- Potential for surface cracking edges of extraction void and travelling abutments particularly in rock outcrop areas;
- Potential for surface humps (compression) near centre of extracted panels and travelling abutment;
- Potential for step change in road pavement associated with cracking;
- Potential change in super-elevation in the road;
- Potential erosion and local slope stability of fill embankment if cracking occurs;
- Potential reduced serviceability of drainage channels, under-road pipes and culverts; and
- Potential increase in flooding hazards for roads and access roads.

The risk assessment team also considered the tolerance of Mandalong Road to subsidence impact. Two case studies were modelled:

- 1. Maximum subsidence prediction (mean); and
- 2. Credible Worst-Case (Upper 95% Confident Limits).

This enabled a form of sensitivity analysis of the subsidence predictions to be made as outlined in **Table 8**.

Prediction	Cause
Maximum Predicted Subsidence (Mean)	Expected geotechnical conditions
Maximum Predicted Subsidence (Credible Worst-Case, U95% CL)	Geotechnical conditions worse than anticipated

Table 8 - Subsidence Sensitivities

Table 9 provides the maximum subsidence predictions at the Worst-Case (Upper 95% Confidence Limits) for Mandalong Road. Maximum subsidence predictions are provided as well as in-line with the road alignment.

Table 9 – Summary of Worst-Case Subsidence Predictions for Roads Above LW30-31

Road	LW#	Final Maximum Subsidence S _{max} (m)	Final Maximum Tilt T _{max} (mm/m)	Final Maximum Tensile Strain* (mm/m)	Final Maximum Compressive Strain* (mm/m)
Kiar Ridge	30-31	1.16	13	3	4
Toepfers	30-31	1.08	13	3	4

^{* -} Tensile and compressive strains may increase 2 times occasionally due to crack development.

7.2 Risk Assessment Outcome

A risk ranking (low, moderate, significant, high or extreme) was assigned to each risk/hazard. The risk ranking for the public roads is assessed as **Low** at the maximum predicted subsidence. The only additional control measure was the installation of subsidence warning signs at road access points. The full risk assessment is included in Appendix 4 of the Extraction Plan LW30-31.

8 Public Roads and Predicted Impacts

8.1 Public Roads

Crown Lands are responsible for the two public unsealed roads (Toepfers Road and Kiar Ridge Road) present within the Extraction Plan Area. There are unnamed and unformed Crown roads located in the north east of Extraction Plan Area between Lots 1 & 2 DP 805044 and bisecting Lot 140 DP 755238.

8.1.1 Predicted Impacts

The impacts due to the predicted subsidence effects for proposed LW30 to 31 may include:

- Tensile crack widths of between 20 mm & 50 mm.
- Compressive shearing or heaving between 20 mm & 40 mm.
- Increase of super-elevation in the road of 1.0% to 1.3%.
- Cracking of culverts and fill embankments due to curvatures of +/- 0.3 to 0.5 km-1 (radius of curvature from 3.3 km to 2 km).
- Erosion and slope instability of fill embankments.

The subsidence impacts predicted for the proposed mining layout for LW30 to 31 are consistent with observed impacts for the given tilt and strain at Mandalong to-date and are similar to the values approved under SSD-5144 MOD 9.

Flood Impact Assessment

Flood modelling conducted by Umwelt (2020) for mining up to and including Longwall 33 indicates that LWs 30-31 will have no significant impacts to the functionality of roads and transport as result of the proposed landform.

8.2 Unsealed Tracks and Fire Trails

Kiar Ridge Fire Trail is gravel construction and is suitable for 4-wheel drive vehicles. The fire trail is located predominantly outside the longwall void with limited exposure to subsidence.

Two private access roads also traverse the Extraction Plan Area. The most northern single lane private access road services two properties and is partly sealed. The second single lane gravel access road services one private property.

8.2.1 Predicted Impacts

The impacts due to the predicted subsidence effects may include:

- Tensile crack widths of between 20 mm and 320 mm.
- Compressive shearing or shoving between 20 mm and 160 mm.
- Increase of super-elevation in the road of 0.2% to 1.5%.
- Cracking of culverts and fill embankments.

9 Management Measures

Access to the two crown roads, Toefpers Road and Kiar Ridge Road are limited by:

- Locked gates at private property and Olney State Forest;
- 4 wheel drive access; and
- Located within private property boundaries.

Subsidence warning signs will be installed at road access points and mining notifications will be provided to landowners and agencies. The management strategy is to monitor subsidence and conduct weekly visual inspections of the affected sections of the public and private access roads as outlined in **Section 10.2**.

Any repairs, temporary or otherwise, to the Kiar Ridge fire trail will be undertaken in consultation with Crown Lands and the NSW Rural Fire Service to ensure that the road is repaired to the appropriate fire trail standard.

Private property access roads are managed in accordance with the Property Subsidence Management Plans (PSMP). Any necessary repairs will be undertaken in consultation with the private landholder and in accordance with their PSMP.

10 Monitoring Program

The Mandalong Mine Subsidence Monitoring Program consists of conventional subsidence monitoring, visual inspections and aerial LIDAR surveys, developed in order to:

- Demonstrate mine development and extraction is undertaken as per approved designs;
- Provide information to demonstrate statutory compliance and obligations are satisfied;
- Targeted monitoring of sensitive surface and built features;
- Meet stakeholder monitoring requirements to minimise impact to infrastructure;
- Provide appropriate and timely subsidence information to assess against triggers established in the TARPs.
- To provide data for future monitoring systems for ongoing mining within Mandalong mining leases.

The Subsidence Monitoring Program is scheduled in the Centennial Compliance Database. The compliance database allows for surveys, inspections and notifications to be scheduled on either time or productions schedule (longwall face position). The required actions are assigned to the relevant role to ensure the subsidence monitoring program is achieved.

10.1 Baseline Monitoring

10.1.1 Detail Aerial Mapping

An aerial LIDAR survey was undertaken in April 2020, providing the pre-mining landform for the Extraction Plan area and post mining landform for Longwalls 1 to 25. The LIDAR surveys provide surface mapping with a vertical accuracy of 0.15m. Aerial LIDAR surveys of the whole mining area are conducted approximately every three years.

10.1.2 Conventional Subsidence Monitoring

Centennial Mandalong has a well-established conventional subsidence line monitoring program, with currently over 80km of crosslines and centrelines established over the whole mining area. The monitoring lines typically consist of buried star pickets within cast iron covers, nominally spaced at 10m intervals.

Within the Extraction Plan area three crosslines will be established:

Crossline 23 Centennial property from LW28-30

• Crossline 24 Toefpers Road (Crown Rd easement) over LW30-33

Crossline 25
 Private access road over LW31

The location of the monitoring lines is shown in Figure 2.

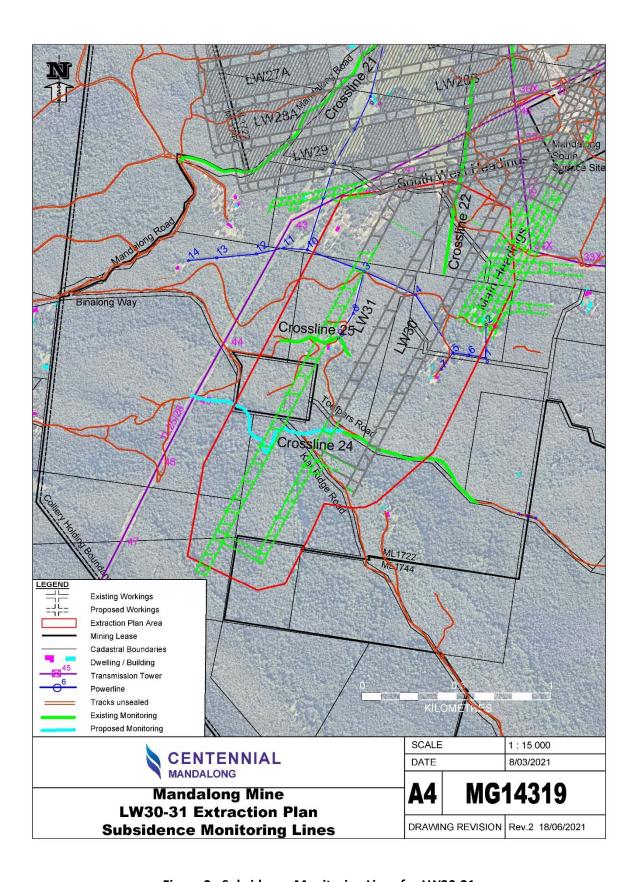


Figure 2 –Subsidence Monitoring Lines for LW30-31

10.2 Subsidence Monitoring

10.2.1 Subsidence Monitoring Zones

Mandalong Mine has developed three subsidence monitoring zones to accommodate the development of subsidence from the narrow longwall panels and the bridging effect of the overlying massive strata that provides the reduced levels of subsidence. Unique to Mandalong Mine and as a result of the bridging massive strata, subsidence develops later than in typical longwall operations, with the majority of subsidence realised after the longwall face has retreated approximately 500m.

Additional subsidence also develops over the longwall panel following the extraction of the next adjacent longwall panel. This is due to the compression of the intervening chain pillar and strata. The additional subsidence contributed is typically in the order of 0.30m and is dependent on the geotechnical conditions and the depth of cover. Tilts and strains typically remain unchanged and may be reduced as a result of the decreased vertical subsidence differential between the maingate chain pillar and the centre of the longwall panel. In areas with higher depth of cover over 300m some additional minor settlement may occur following the extraction of the adjacent two to three longwall panels.

Accordingly, Mandalong has developed three subsidence monitoring zones which define required monitoring activities in actively subsiding and stable areas of the mine as follows below. Full details of proposed monitoring activities within each zone are described within the Subsidence Monitoring Program for each Extraction Plan progressively approved by the mine.

10.2.1.1 Active Subsidence Zone for Visual Monitoring

The "Active Subsidence Zone" for visual monitoring inspections is defined as:

- 100m in advance of the current longwall face position; and
- the following 500m of longwall extraction (i.e. 500m behind the face position).

10.2.1.2 Active Longwall Zone for Crossline Monitoring

The "Active Longwall Subsidence Zone" includes the nominated crosslines for the current longwall panel and the three previous longwall panels.

10.2.1.3 Stable Longwall Subsidence Zone for Crossline Monitoring

The "Stable Longwall Subsidence Zone" represents the stable non-subsiding areas beyond the three previous longwall panels, defined as being from the start of the nominated crosslines up to the Active Longwall Subsidence Zone.

10.3 Public Roads

Subsidence monitoring will be conducted post mining for each longwall panel. Weekly visual inspections will be conducted when Crown, fire trails and private access roads are located within the active subsidence zone of each longwall. Monthly visual inspections along the roads will continue for the following six months or when the next longwall mines beneath the public road. The results of the visual inspections will be recorded on the subsidence inspection checklist sheet and filed.

Table 10 provides the monitoring program summary for Mandalong Road.

Table 10 – Mandalong Road Subsidence Monitoring Summary

Feature	Location	Monitoring Method	Parameter	Monitoring Frequency and Duration
Public (Crown) Roads Public Roads Management Plan Private Access Roads	Public (Crown) Roads Toefpers Rd Kiar Ridge Rd	Crossline 24 and Crossline 25 Star posts adjacent to road at 10m spacing. and	Vertical subsidence, tilt and strain.	Baseline Prior to mining LW30 and LW31. Post Mining 2 months after mining LW30 and
PSMP Unsealed Tracks and Fire Trails	Private Access Roads Private Properties	Crossline 23 Star posts on Centennial property at 10m spacing.		LW31. <u>Stable Zone</u> 2 yearly
	Fire Trails and unsealed tracks Kiar Ridge Fire Trail	Visual Inspection	Presence of mine-induced damage: surface tensile cracking in pavement surface compressive shearing in pavement surface cracking in fill embankments erosion of local slope stability for fill embankment if cracking occurs cracking to culverts and under-road pipes road drainage	Active Zone Weekly visual inspection while roads are within the active subsidence zone. Post Mining Monthly visual inspection for the following six months or until the commencement of weekly
			Risk to public safety	inspections for the next longwall panel.

11 Adaptive Management

In addition to the sub-critical longwall panel layout specifically designed to provide reduced levels of subsidence and impact, Centennial Mandalong developed an adaptive management approach designed to avoid repetition of any unpredicted subsidence and or environmental consequences. This system involves the monitoring and evaluation of impacts to public roads against the performance indicators defined in **Section 6.4** and contingency plan (TARP) in the event that a performance indicator is exceeded.

12 Contingency Plans

Trigger Action Response Plans (TARP) have been developed using performance indicators for public roads. In the event that subsidence monitoring and or visual inspections identify that a performance indicator has been exceeded, Centennial Mandalong will implement the contingency measures as detailed in the TARPs (refer **Appendix 1**).

13 Roles and Responsibilities

The responsibility for implementation, monitoring and review of the Public Roads Management Plan lies with the Mining Approvals Coordinator. The roles and responsibilities for the Public Roads Management Plan are outlined in **Table 11**.

Table 11 –Roles and Responsibilities

	'
Position	Responsibility
Mine Manager	Authorisation of the Public Roads Management Plan
Ivillie ivialiagei	Ensuring that sufficient resources are available to implement this plan.
Mining Approvals Coordinator	 Implementation, monitoring and review of this plan, including: Ensure that the Subsidence Monitoring Program, required inspections, mining notifications are scheduled into the Centennial Compliance Database prior to the commencement of each longwall panel. Ensuring subsidence monitoring and inspections are conducted at the required schedule and persons conducting monitoring/inspections are trained in the requirements of this plan. Consulting with the landowners, infrastructure owners and relevant government departments including Local Councils, DPIE, Crown Roads, RR and SA NSW. Review and assess the subsidence monitoring results against the performance measures. Notification of any exceedance of performance indicators in accordance with the TARPs and management plan. Coordinating any remedial work as required. Preparation and submission of formal reporting requirements outlined in this plan. Review and audit of the Public Roads Management Plan.
Subsidence Surveyor	 Establishment of subsidence monitoring in accordance with the Subsidence Monitoring Program. Ensure all subsidence surveys are conducted in accordance with the approved Subsidence Monitoring Program. Review and assess subsidence monitoring results. Notify the Mining Approvals Coordinator of any identified public safety issues. Provide the monitoring results to the Mining Approvals Coordinator, Ditton Geotechnical Services, RR and SA NSW.
Survey Department	 When required, conduct inspections within the applicable subsidence zone to the standard required, using the subsidence inspection checklist. Promptly notify the Mining Approvals Coordinator of any issue identified during a subsidence inspection.

14 Reporting

Reporting will be completed in accordance with the Guidelines for the Preparation of Extraction Plans (NSW Department of Planning & Environment, 2015), as summarised in **Table 12**.

Table 12 - Reporting Requirements

Report	Trigger	Requirements	Stakeholders
Incident Reporting	Any occasion or incident in accordance with consent condition, WHS Regulations or TARP.	 In accordance with requirements of: Development Consent Schedule 6 Condition 10; or WHS Regulation (Mines and Petroleum Sites) Clause 128; or TARP. 	RR
Bi-Monthly Subsidence Impact	If a new impact is identified, compile after monthly subsidence.	Distinguish impact: • within predictions;	DPIE
Reporting	Subsiderice.	 those which exceed predictions but remain within performance measures and/or performance indicators; and 	Crown Lands
		those which exceed performance measures and/or performance indicators.	DgS SA NSW
		Report to include: • full description;	ССС
		 location identification using aerial photos with longwall layout superimposed; 	Forestry Corporation
		 photos of the impact; and preliminary characterisation of the impact in accordance with the relevant TARP(s). 	
Annual	Annual Report required	Report to include:	RR
Review	under development consent SSD-5144.	 six-monthly reports of impacts and environmental monitoring results; monitoring results; and 	DPIE
		 summary of subsidence impacts. 	ccc
			Govt. Agencies
			Local Councils
Community Consultative Committee (CCC)	CCC meetings are typically held three times per year.	Subsidence and environmental performance is included as an agenda item at each meeting.	ссс
Mining	One month prior to mining	Scheduled date that the public roads will	Crown Lands-
Notifications	beneath Crown Roads and private access roads (PSMP)	be affected by subsidence and within the Active Subsidence Zone.	DPIE
			Landholders

15 Audit and Review

Audit and review procedures are outlined in Centennial Mandalong's Safety Management System that comply with the NSW Work Health and Safety (Mines and Petroleum Sites) Regulations. These procedures are utilised to manage, audit and review functions of the Built Features Management Plan. Refer Document **HSMS-SE-1028- System Evaluation**.

15.1 Audit

The requirements of the Public Roads Management Plan are to be audited annually for compliance and effectiveness during the extraction of LW30-31.

Any non-conformances or deficiencies found during the audit are to be brought to the attention of the System Coordinator so that corrective actions can be outlined. These corrective actions are to be allocated and carried out accordance with **HSMS-SE-1029** - **Corrective Action Procedure**.

15.2 Review

The Public Roads Management Plan will be reviewed annually or in the event that one of the following occurs:

- Stakeholders raise issues that necessitates a review;
- Where unpredicted impacts or consequences have required implementation of contingency actions under this plan;
- Monitoring, incident or audit processes demonstrate a review is required;
- Where triggered by a TARP;
- Where triggered by circumstances in either Clause 10 or Clause 128 of WHS (Mines and Petroleum Sites) Regulation or Clause 38 WHS Regulation;
- With each new Extraction Plan; or
- Change in mine design or layout.

16 Document Control

An integrated Document Control Procedure is incorporated into Centennial Mandalong's Safety Management System.

Documents, data and records pertaining to this plan will be managed according to **HSMS-SE-1025-Information Control**.

17 BIBLIOGRAPHY

- Ditton Geotechnical Services. (2021). Subsidence Predictions and Impact Assesment for Proposed LW30 and 31 MAN-005/2.
- Ditton Geotechnical Services. (2021). Subsidence Assessment for the Proposed Shortening of LW30 as a Variation to the LW30 & 31 Extraction Plan MAN-005/8.
- NSW Department of Industry Resources Regulator. (2017). *Managing Risk of Subsidence, Guide:* WHS(Mines and Petroleum Sites) Legislation.
- NSW Department of Planning & Environment. (2015). Draft Guidelines for the Preparation of Extraction Plans V5.
- Umwelt. (2020). Flood Impact Assessment Mandalong Southern Extension Project Modification.

Appendix 1 Trigger Action Response Plan

Monitoring and Controls Trigger		Action			
Public Roads – LW30 -31					
 Centennial to establish subsidence monitoring / inspection sites for public roads prior to mining. Centennial to mark the centreline and edges of current longwall panel one month prior to public road being affected by subsidence. Centennial to notify Crown Lands one month prior to public road affected by subsidence from each longwall panel. Centennial to conduct weekly visual inspections of public roads when located within Active Subsidence Zone. Record results on the Subsidence Inspection Checklist. Centennial to conduct post-mining surveys following the development of subsidence (majority of subsidence developed when LW is completed or LW face is 800m past feature). Centennial to provide pre and post mining subsidence monitoring results to stakeholders. 	 LEVEL 1 – LOW Operations within prediction and approved impact Development of subsidence and impact as expected. Subsidence within predicted range (U95% CL). Negligible visible impact on gravel access roads. Possible minor tensile and compressive cracking to pavement not requiring immediate repairs. LEVEL 2 – MEDIUM Operations within approved impact but exceed or potentially exceed predictions Development of subsidence exceeding or potentially exceeding prediction (Upper 95% Confidence Limits). Tensile and compressive strains may increase 2 times predicted values due to crack development. Vertical subsidence greater than predicted. Typically minor impact to gravel access roads. Cracking may be visible on roads – development of minor compression hump near centre of longwall and minor tensile cracking to pavement at edges. Repairs to pavement may be required to reseal pavement. 	 Centennial to conduct post mining inspection and subsidence monitoring and provide results to the Landowner, RR and Crown Lands. Centennial to advise Landowner and Crown Lands of observed damage to the public road. Centennial to erect warning signs near affected area of road if necessary. Centennial to conduct post mining inspection and subsidence monitoring and provide results to the Landowner, RR and Crown Lands. Centennial to conduct repairs to damaged pavement. 			
CONTROLS Flood Modelling and Assessment LW30-31 (Umwelt 2020) determined that there was no predicted increase in flood hazard category on the access road at both the 1 year and 100 year ARI Storm Events.	 LEVEL 3 – HIGH Operations exceed approved impact Development of subsidence and impact greater than expected (Upper 95% Confidence Limits). Cracking to road pavement requiring immediate repairs to ensure public safety. Repairs required, reshaping road, restoring drainage and resealing pavement. 	 Centennial to immediately advise Landowner and Crown Lands of observed damage to the public road. Centennial to erect warning signs near affected area of road. Centennial to conduct post mining inspection and subsidence monitoring and provide results to Landowner, RR and Crown Lands. Centennial to conduct repairs to damaged pavement. Centennial to review results and predictions as per Extraction Plan. Centennial to notify external stakeholders including relevant government agencies in accordance with Incident Reporting S6 Condition 10 and WHS Regulations. 			

Appendix 2 Key Personnel List

Mandalong Mine	Contact	Phone No.	Mobile No.	Email
Mining Approvals Coordinator	Phil Enright	49730948	0439 409 781	phil.enright@centennialcoal.com.au
Subsidence Surveyor	Mark Harrower	49730955	0447 234 185	mark.harrower@centennialcoal.com.au
Technical Service Manager	Brendan Newham	49730951	0438 401 275	brendan.newham@centennialcoal.com.au
Environmental Coordinator	Jeff Dunwoodie	49730947	0448 490 023	jeffrey.dunwoodie@centennialcoal.com.au
Purchasing Coordinator	Amy Hancock	49730939	0414 713 711	amy.hancock@centennialcoal.com.au
Emergency Order No.				
Refer Procedure Doc1 - MAN6257				
Control Room (24hr)	Control Room Operators	49730901 or 49730902	0428 247 788	mandalong.control@centennialcoal.com.au
SA NSW				
Emergency Service	24hr Emergency Service	1800 248 083		
Civil Earth Works				
Barrie Toepfer Earthmoving - Manager	Barrie Toepfer	43571216	0407 783 791	

Appendix 3 Inspection Check List

SUBSIDENCE INS	PECTION CHECKLI	ST		
Date & Time				
Longwall Number				
Face Position (chainage)				
Road or Area Inspected				
Inspected by:				
Inspection Zone (Face chainage - 500m) to (Face chainage +100m)				
INSPECTION ITEM	CHECKED	COMMENTS		
Surface cracking				
Surface humps (compression)				
Step change in road pavement				
Damage to roadside drainage channels, under-road				
pipes and culverts.				
Warning Signage				
Powerline – poles, insulators, conductors, reduced conductor clearance.				
conductor clearance.				
Rock mass stability				
Dams				
Other				

SUBSIDENCE INSPECTION CHECKLIST

Where to Inspect

500 metres behind and 100 metres in front of the current face position.

Cover the full subsidence bowl out to the 26.5° angle of draw.

What to look for

- Surface cracking edges of extraction void and travelling abutments particularly in rock outcrop areas.
- Surface humps (compression) near centre of extracted panels and travelling abutment
- Step change in land surface associated with cracking
- Serviceability of the road and drainage devices including under-road pipes and culverts
- Damage to poles, insulators or conductors
- Increase or decrease in conductor tension
- Reduced conductor clearance
- Rock mass stability boulders and cuttings.
- Any effect that may cause a safety risk to road users. If unsure report immediately.

Actions if there is damage to the road, infrastructure or surface

Immediately notify the:

- Mine Manager
- Mining Approvals Coordinator
- Subsidence Surveyor
- Lake Macquarie City Council Emergency Response phone number
- Subsidence Advisory NSW Emergency Service phone number
- Ausgrid Emergency Service phone number

If road repairs or remediation work is required these will be undertaken by LMCC or by their approved contractor.

Appendix 4 Correspondence



Mandalong Mine draft Public Roads Management Plan LW 30-31 Phil Enright to: Mark Grace



19/03/2021 10:02 AM

Cc: "Colin Frew"

Hi Mark

Following on from your review of the Land Management Plan, please find attached the draft Public Roads Management Plan LW30-31 for your review.

The management plan includes the relevant comments provided from the Land Management Plan review. Note that the documents follow the same structure.

Thank you for your assistance.



Mandalong Mine Public Roads Management Plan LW25-31 Draft.pdf

Phil Enright	Hi Mark, Thank you for reviewing the Land M	05/03/2021 01:54:44 PM
"Mark Grace"	Hi Phil Thanks for providing the Department o	04/03/2021 04:49:29 PM



Crown Lands comment on draft Mandalong Mine Public Roads Management Plan LW25-31Mark Grace to: Phil Enright 25/03/2021 10:57 AM

Cc: "Colin Frew"

From: "Mark Grace" <mark.grace@crownland.nsw.gov.au> To: "Phil Enright" <phil.enright@centennialcoal.com.au> Cc: "Colin Frew" <colin.frew@crownland.nsw.gov.au>

History: This message has been replied to.

Hi Phil

Thanks for providing the Department of Planning, Environment and Planning – Crown Lands (the Department) with the opportunity to comment on the draft Public Roads Management Plan for longwalls 30-31.

I have reviewed the draft plan and provide the following comments:

- Section 3.2 Crown public roads within the extraction area include not only Toefpers Road and Kiar Ridge Road but also the unnamed and unformed (may need to ground truth to confirm) Crown roads located in the north east quadrant – between Lots 1 & 2 DP 805044 and bisecting Lot 140 DP 755238
- Section 3.2.1 placing unsealed tracks and fire trails within private property under the main heading "Public Roads" may be misleading - the only public roads within the extraction area are listed above, any other formed tracks and trails are not within the public road network
- Section 8.1 see comment for Section 3.2 above additional Crown roads to be included

Notwithstanding the above comments the Department is satisfied with the draft Public Roads Management Plan.

If you have any questions please call me.

Regards

Mark

Mark Grace

Natural Resource Management Project Officer

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The Department of Planning, Industry and Environment acknowledges that it stands on Aboriginal land. We acknowledge the traditional custodians of the land and we show our respect for elders past, present and emerging through thoughtful and collaborative approaches to our work, seeking to demonstrate our ongoing commitment to providing places in which Aboriginal people are included socially, culturally and economically.

Centennial Mandalong

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