

Transmission Line Management Plan

TransGrid TL25/26

Towers 36 – 37

Longwall 57-60

Mandalong Mine

MEMS-EP-9000-TLMP-9053

Rev 2 - December 2023

Centennial Coal Company Limited
ABN 30 003 714 538

Level 18, 1 Market Street,
Sydney NSW 2000, Australia
T: +61 02 9266 2700
E: info@centennialcoal.com.au
www.centennialcoal.com.au



Table of Contents

1	BACKGROUND.....	1
1.1	INTRODUCTION	1
1.2	PROJECT DESCRIPTION	2
2	PURPOSE	2
3	SCOPE	2
3.1	EXTRACTION PLAN AREA.....	2
3.2	TRANSGRID TRANSMISSION LINES NO. TL25/26 & TL24	2
4	CONSULTATION AND PLAN DEVELOPMENT	4
5	REGULATORY REQUIREMENTS	5
5.1	DEVELOPMENT CONSENT.....	5
5.2	MINING LEASES	7
5.3	WORK HEALTH AND SAFETY LEGISLATION	7
5.4	EXTRACTION PLAN GUIDELINES	13
6	PERFORMANCE MEASURES AND INDICATORS	14
6.1	MINE DESIGN	14
6.2	SUBSIDENCE PREDICTION	14
6.3	PERFORMANCE MEASURES	16
6.3.1	SSD-5144	16
6.4	PERFORMANCE INDICATORS	17
7	RISK MANAGEMENT.....	18
7.1	IDENTIFIED RISKS.....	18
7.1.1	Horizontal Strain Predictions for TL25/26 Towers 40 to 31.....	18
7.1.2	Horizontal Strain Predictions for TL24 Towers 26 to 36X	21
7.2	RISK ASSESSMENT OUTCOME	23
8	TRANSMISSION TOWERS AND PREDICTED IMPACTS	25
8.1	TOWERS 36 TO 37	25
8.1.1	Predicted Impacts.....	25
9	MANAGEMENT MEASURES	25
10	MONITORING PROGRAM	26
10.1	BASELINE MONITORING.....	26
10.1.1	Detail Aerial Mapping	26
10.1.2	Conventional Subsidence Monitoring.....	26
10.2	SUBSIDENCE MONITORING	27
10.2.1	Subsidence Monitoring Zones.....	27
10.2.2	Monitoring Setup for Tower 36 to 37.....	28
10.2.3	Survey Standards.....	29
11	ADAPTIVE MANAGEMENT	31
12	CONTINGENCY PLANS.....	31
13	ROLES AND RESPONSIBILITIES	32
14	REPORTING	33
15	AUDIT AND REVIEW	33
15.1	AUDIT	34
15.2	REVIEW	34

16	DOCUMENT CONTROL.....	34
17	REFERENCES.....	35

List of Figures

FIGURE 1 – TRANSGRID TRANSMISSION LINES AND MINE WORKINGS	3
FIGURE 2 – MAXIMUM PREDICTED VERTICAL SUBSIDENCE, TRANSMISSION TOWERS AND MINE PLAN.....	24

List of Tables

TABLE 1 – OVERVIEW OF STAKEHOLDERS CONSULTED SPECIFICALLY FOR THE MANAGEMENT PLAN	4
TABLE 2 - DEVELOPMENT CONSENT CONDITIONS SSD-5144	5
TABLE 3 - SUMMARY OF WHS LEGISLATION RELATING TO MINE SUBSIDENCE	7
TABLE 4 – EXTRACTION PLAN GUIDELINE REQUIREMENTS FOR KEY SUB PLANS.....	13
TABLE 5 - SUBSIDENCE IMPACT PERFORMANCE MEASURES SSD-5144	16
TABLE 6 – PERFORMANCE INDICATORS	17
TABLE 7 – PREDICTED U95%CL FAR-FIELD EFFECTS AT THE TL25/26 (TOWERS 31 - 40) DUE TO PROPOSED LW 57 - 60: PRINCIPAL STRAIN ALIGNS WITH TOWER SIDES	19
TABLE 8 – PREDICTED U95%CL SUBSIDENCE EFFECTS AT THE TL25/26 (TOWERS 31 - 40) DUE TO PROPOSED LW 57 - 60: TOWER DIAGONALS	20
TABLE 9 – PREDICTED U95%CL FAR-FIELD EFFECTS AT THE TL24 (TOWERS 26 - 36X) DUE TO PROPOSED LW 57 - 60: PRINCIPAL STRAIN ALIGNS WITH TOWER SIDES	21
TABLE 10 – PREDICTED U95%CL SUBSIDENCE EFFECTS AT THE TL24 (TOWERS 26 - 36X) DUE TO PROPOSED LW 57 - 60: TOWER DIAGONALS	22
TABLE 11 – SUBSIDENCE SENSITIVITIES	23
TABLE 12 – TRANSGRID TL25/26 TOWERS 36 AND 37 SUBSIDENCE MONITORING SUMMARY	30
TABLE 13 – ROLES AND RESPONSIBILITIES	32
TABLE 14 - REPORTING REQUIREMENTS.....	33

Appendices

APPENDIX 1	TRIGGER ACTION RESPONSE PLANS
APPENDIX 2	SUBSIDENCE MONITORING PLAN
APPENDIX 3	KEY PERSONNEL LIST
APPENDIX 4	INSPECTION CHECK LIST
APPENDIX 5	CORRESPONDENCE

DOCUMENT CONTROL

DOCUMENT DETAILS	Name:		Transmission Line Management Plan LW57-60		
	Author:		Clint Allen		
	Number:		MEMS-EP-9000-TLMP-9053		
	Revision No.:		2		
	Document Status		Revision		
06/07/2023	Revision for TransGrid review	Date Sent	Details of Approval	Approved By	Approval Date
	0	25/01/2023	Draft for TransGrid review	Clint Allen Mining Approvals Coordinator	03/03/2023
	0	13/03/2023	Final for TransGrid submission	Clint Allen Mining Approvals Coordinator	3/04/2023
	1	20/03/2023	Revision for TransGrid review	Clint Allen Mining Approvals Coordinator	3/06/2023
	2	05/01/2024	Revision for TransGrid review	Clint Allen Mining Approvals Coordinator	30/01/2024
CIRCULATION DETAILS	Name		Department	Circulation Date	
	Matthew Heath Transmission Line and Cable Asset Strategist		Transmission Line and Cable Asset Strategist Network	Draft 25/01/2023 Rev.1	
	Director – Resource Assessments		NSW Department of Planning and Environment – Resource Assessments (DPE)	Rev.1	
	Matthew Heath Transmission Line and Cable Asset Strategist		Transmission Line and Cable Asset Strategist Network	Draft 05/01/2024 Rev.2	
	Director – Resource Assessments		NSW Department of Planning, Housing and Industry – Resource Assessments (DPHI)	Rev.2	

1 BACKGROUND

1.1 Introduction

Mandalong Mine is a modern underground longwall operation located on the western side of Lake Macquarie near Morisset and west of the M1 Motorway. The Mine is situated approximately 130 km north of Sydney and 35 km from the Port of Newcastle, supplying up to 6.5 million tonnes of coal to the domestic power and export markets.

Centennial Mandalong Pty Ltd (Centennial Mandalong) is the operator of Mandalong Mine and is a wholly owned subsidiary of Centennial Coal Company Limited which is also a wholly owned subsidiary of Banpu Public Company Limited.

Mandalong Mine commenced longwall mining in 2005 and operates narrow longwall panels in the East Wallarah Seam that utilise the bridging effect of the overlying massive conglomerate and sandstone strata to provide reduced levels of subsidence.

The Centennial Mandalong complex comprises:

- The Mandalong Mine underground workings including longwall panels, development units and surface infrastructure located near Morisset;
- The Cooranbong Entry Site, consisting of the Cooranbong Colliery underground workings and surface infrastructure located near Dora Creek;
- The Delta Entry Site, which encompasses an entry and coal delivery system, located near Wyee at the Vales Point Rail Unloader Facility; and
- The new surface facilities site, referred to as the Mandalong South Surface Site located off Mandalong Road. The surface facilities are currently being constructed.

Mandalong Mine operates under Development Consent SSD-5144 which was granted on 12 October 2015 by the NSW Planning Assessment Commission under Part 4, Division 4.1 of the NSW Environmental Planning and Assessment Act 1979 (EP&A Act) and provided for extension of the mining area with a production limit of 6.5 million tonnes per annum of thermal coal from the West Wallarah and East Wallarah Seams using a combination of longwall and continuous miner methods until 31 December 2040.

An Extraction Plan is required to be developed and approved prior to undertaking secondary extraction. The Extraction Plan is prepared for Longwall's 57-60 (LW57-60), and 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 Transmission Line Management Plan has been developed in accordance with the current requirements of Condition 6, Schedule 4 of SSD-5144 for the extraction of LW57-60 and in accordance with Mining Lease (ML1722) requirements issued under the Mining Act 1992 to extract longwall panels within the East Wallarah Seam. The Extraction Plan and Transmission Line Management Plan have been prepared generally in accordance with the Department of Planning & Environment, *Extraction Plan Guideline* (2022) 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 302 hectares. Across the Extraction Plan area, the ground surface elevation ranges from 29 m to 142m. Due to the elevated topography, alluvium is limited in this area. The depth of cover above the East Wallarah Seam in this area ranges from approximately 210 m to 410 m. The existing surface environment of the Extraction Plan area includes watercourses, native bushland, steep slopes and archaeological heritage items.

There is one private property and one property owned by Centennial Coal. No inhabited dwellings will be affected by subsidence. Unsealed private tracks, transmission towers, power lines, 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 TransGrid transmission lines, Ausgrid Powerlines and a Property Subsidence Management Plan for the one private property.

2 Purpose

The purpose of the Transmission Line Management Plan is to provide the strategies, controls, and monitoring programs to be implemented for the management of potential subsidence impacts on TransGrid 330kV Transmission Line No. 25/26 Towers 36 and 37.

3 Scope

3.1 Extraction Plan Area

The Transmission Line Management Plan applies to the management of risks relating to the development of subsidence from the extraction of LW57-60, located within Centennial Mandalong Mining Lease (ML1722) and Development Consent SDD-5144. The Extraction Plan Area is defined by a the 26.5° angle of draw from the extents of the proposed LW57-60 extraction or the 20mm limit of vertical subsidence as shown in **Figure 1**.

3.2 TransGrid Transmission Lines No. TL25/26 & TL24

The TL25/26 Transmission line and towers 36 & 37 intersect the north-west corner of the Extraction Plan area, which are under the care and control of TransGrid. The TL25/26 transmission line is a double circuit line that is constructed in a steel lattice tower structure arrangement, and supplies electricity from Vales Point Power Station to Sydney. The transmission line network location and mine workings are shown in **Figure 1**.

All other towers are outside the 20mm limit of subsidence including the entire TL24 Transmission Line and the effects of subsidence on these towers is considered limited. It is also unlikely these towers will be impacted by anomalous or unconventional subsidence movements in response to the extraction of LW57-60. As such, this plan has been developed to manage the far-field subsidence effects for Towers 36 to 37.

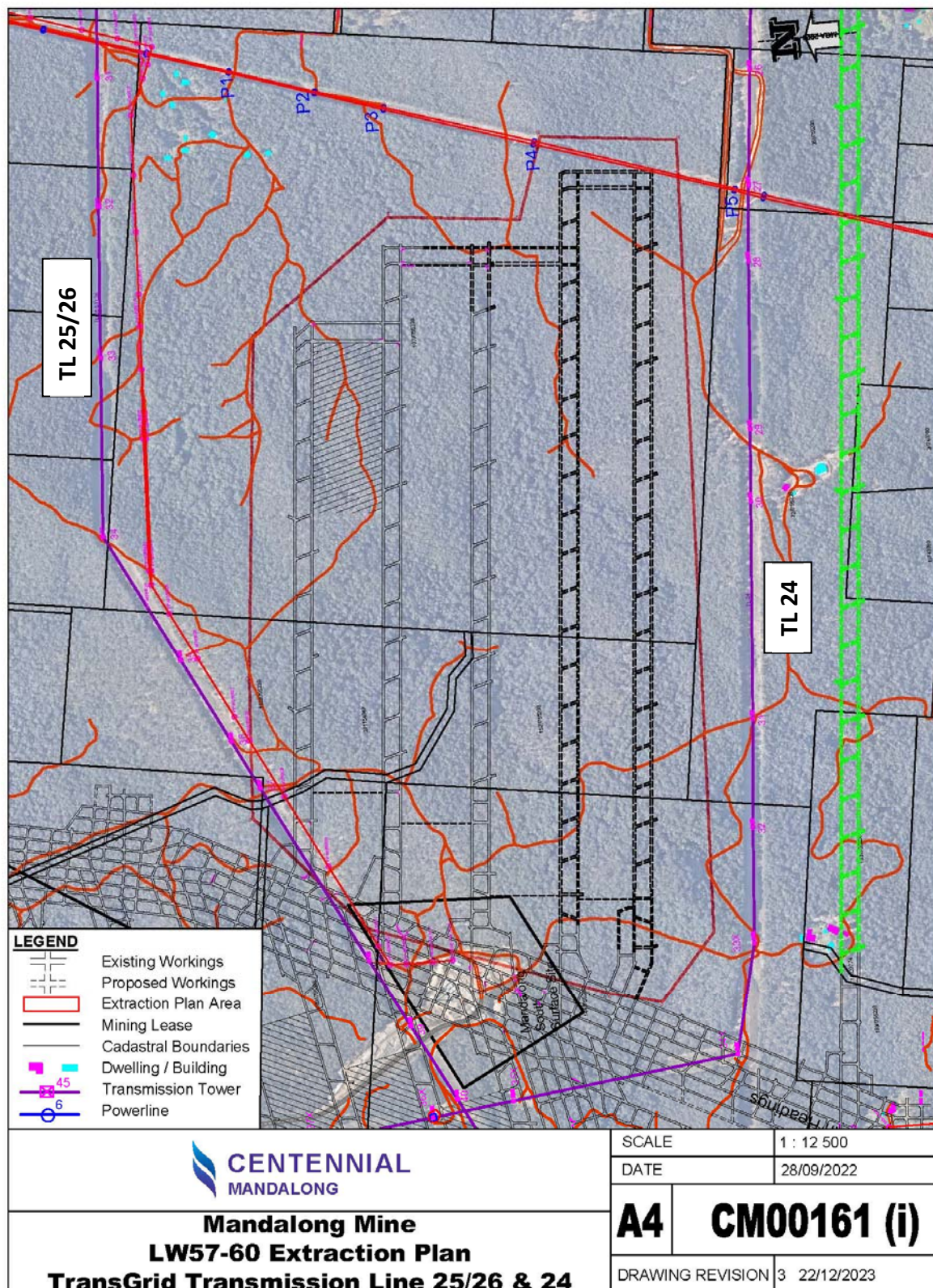


Figure 1 – TransGrid Transmission Lines and Mine Workings

4 Consultation and Plan Development

The Transmission Line Management Plan has been prepared and developed in consultation with key stakeholders as required by Development Consent SSD-5144. A summary of the consultation for the Transmission Line Management Plan TL25/26 Towers 36 - 37 is presented in **Table 1** and copy of the correspondence included in **Appendix 5**.

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 the Management Plan

Stakeholder	Date	Consultation Type and Summary of Aspects/Issues	Section Addressed
TransGrid	2016-Onwards	Ongoing consultation during the development of TransGrid management plans for Longwalls 21 - 32 relating to TL25/26 Towers 39 to 45 and TL24 Towers 48 to 35.	Section 4
TransGrid	16/11/2022	Centennial provided the Draft TransGrid Tower Assessment (DGS 2022) to TransGrid for review.	Section 4
TransGrid	25/11/2022	Email from TransGrid Engineer's with comments on Draft TransGrid Tower Assessment (DGS 2022). Following on from initial email TransGrid project manager and Centennial discussed LW57 finishing position and design capacity of Towers via several emails.	Section 4
TransGrid	12/12/2022	Centennial provided updated draft Transmission Line Management Plan with revised predictions report from DGS.	Section 4
TransGrid	25/01/2023	Centennial provided updated draft Transmission Line Management Plan.	Section 4
TransGrid	6/03/2023	Email from TransGrid Engineer's with comments request for plan displaying monitoring schedule for towers 36 & 37 on TL25/26.	Section 4
TransGrid	6/03/2023	Centennial replied to comments stating plan requested is within document as appendix 2 (MG00269) which is a plan displaying the information within section 10.2.2.1.	Section 4
TransGrid	10/03/2023	Email from TransGrid Engineer's with comments requests for several updates to plan CM00269 are Management plan.	Section 4
TransGrid	13/03/2023	Centennial provided updated Transmission Line Management Plan.	Section 4
TransGrid	___/01/2024	Centennial provided updated draft Transmission Line Management Plan.	Section 4

5 Regulatory Requirements

Activities at Centennial Mandalong operations are conducted in accordance with 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 several 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 Condition 4	Performance Measures – Built Features 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.	Section 6 and Table 5
Schedule 4 Condition 5	Performance Measures 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.	Section 6
Schedule 4 Condition 6 (g)	Extraction Plan (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;	Extraction Plan LW57-60 Built Features Management Plan LW57-60 Transmission Line No. 25/26 Towers 36 to 37. Management Plan LW57-60 Section 4 Section 7 Section 9
Schedule 4 Condition 6 (o)	(o) Trigger Action Response Plan addressing all features in Tables 6 and 7 which contain:	Section 12 and

Condition	Development Consent Condition	Section Addressed
	• appropriate triggers to warn of the development of an increasing risk of exceedance of any performance measures; • 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;	Appendix 1
Schedule 4 Condition 6 (p)	(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;	Section 12 and Appendix 1
Statement of Commitments	Subsidence Monitoring and Management 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.	This Plan Built Features Management Plan

5.2 Mining Leases

The Extraction Plan Area for LW57-60 is associated with one mining leases held by Centennial Mandalong; ML1722. There are no conditions relating to the Extraction Plan and preparation of the Transmission Line Management Plan.

5.3 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 3**.

Table 3 - 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	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	Section 9 Section 10

Work Health and Safety Legislation Clause	Requirement	Section Addressed
Clause 37	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 (c) installed, set up and used correctly.	Volume 3 of LW57-60 EP
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) 2022 Clause 14	Management of risks to health and safety (cl 617 model WHS Regs) (1) A person conducting a business or undertaking at a mine or petroleum site must manage risks to health and safety associated with mining operations or petroleum operations at the mine or petroleum site in accordance with the WHS Regulations, Part 3.1. (2) A person conducting a business or undertaking at a mine or petroleum site must ensure a risk assessment is conducted in accordance with this section by a person who is competent to conduct the risk assessment having regard to the nature of the hazard. Maximum penalty— (a) for an individual—36 penalty units, or (b) for a body corporate—180 penalty units. (3) In conducting a risk assessment, the person must have regard to the following— (a) the nature of the hazard, (b) the likelihood of the hazard affecting the health or safety of a person, (c) the severity of the potential health and safety consequences. (4) Subsection (3) does not limit the operation of another requirement to conduct a risk assessment under this Regulation. (5) A person conducting a business or undertaking at a mine or petroleum site, who is the operator of the mine or petroleum site or who is a contractor, must keep a record of the following— (a) each risk assessment conducted under this section and the name and competency of the person who conducted the risk assessment, (b) the control measures implemented to eliminate or minimise a risk that was identified by the risk assessment. (6) A person conducting a business or undertaking at a mine or petroleum site is not required to keep a record of a risk assessment if—	Section 7 MS-1001

Work Health and Safety Legislation Clause	Requirement	Section Addressed
	(a) the risk assessment is required to be carried out by an individual before the worker commences a task that forms part of an activity, and (b) the person keeps a record of risk assessments that addresses the overall activity being undertaken, of which the task forms a part. (7) A record kept under subsection (5) by an operator of a mine or petroleum site forms part of— (a) the safety management system of the mine or petroleum site, and (b) the records of the mine or petroleum site. (8) A record, kept under subsection (5) by a contractor who has prepared a contractor health and safety management plan, forms part of the plan.	
WHS Regulation (Mines and Petroleum Sites) 2022 Clause 15	Review of control measures (cl 618 model WHS Regs) (1) A person conducting a business or undertaking at a mine or petroleum site must review and as necessary revise control measures implemented under section 14(5)(b) in the following circumstances— (a) an audit of the effectiveness of the safety management system for the mine or petroleum site 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 4, (c) an incident referred to in section 124 occurs, (d) another incident occurs that is required to be notified to the regulator under the WHS laws. (2) The operator of a mine or petroleum site must ensure a control measure the subject of a request under the WHS Regulations, clause 38(4) is reviewed and as necessary revised, whether the request is made— (a) to the operator by a health and safety representative, or (b) notified to the operator under subsection (3). (3) A person conducting a business or undertaking at the mine or petroleum site who is not the operator of the mine or petroleum site must immediately notify the operator of a request made to the person under the WHS Regulations, clause 38(4).	Section 11 Section 15 MS-1001 Section 14
WHS Regulation (Mines and Petroleum Sites) 2022 Clause 27 Identification of principal mining hazard management plan	Identification of principal hazards and conduct of risk assessments (1) (1) The operator of a mine or petroleum site must identify all principal hazards associated with mining operations or petroleum operations at the mine or petroleum site. (2) Maximum penalty— (3) (a) for an individual—60 penalty units, or (4) (b) for a body corporate—300 penalty units. (5) (2) The operator must conduct, in relation to each principal 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 hazard. (6) Maximum penalty— (7) (a) for an individual—60 penalty units, or (8) (b) for a body corporate—300 penalty units. (9) (3) The operator, in conducting a risk assessment under subsection (2), must— (10) (a) use investigation and analysis methods appropriate to the principal hazard being considered, and (11) (b) consider the principal hazard individually and also cumulatively with other hazards at the mine or petroleum site.	Centennial Risk Management System – consistent with AS/NZS ISO 31000:2009 Risk Assessments in Appendix 4 Extraction Plan Subsidence WHS No. 1001025001 Built Features LW57-60 No. 1001320064 Environment LW57-60 No. 1001320066 PSMPs LW57-60 No. 1001320065

Work Health and Safety Legislation Clause	Requirement	Section Addressed
WHS Regulation (Mines and Petroleum Sites) 2022 Clause 28 Preparation of principal mining hazard management plan	Preparation of principal hazard management plan (1) (1) The operator of a mine or petroleum site must prepare a principal hazard management plan for each principal hazard associated with mining operations or petroleum operations at the mine or petroleum site in accordance with this section and Schedule 1. (2) Maximum penalty— (3) (a) for an individual—60 penalty units, or (4) (b) for a body corporate—300 penalty units. (5) (2) A principal hazard management plan must— (6) (a) provide for the management of all aspects of risk control in relation to the principal hazard, and (7) (b) as far as reasonably practicable, be set out and expressed in a way that is readily understandable by persons who use it. (8) (3) A principal hazard management plan must— (9) (a) describe the nature of the principal hazard, and (10) (b) describe how the principal hazard relates to other hazards associated with mining operations or petroleum operations at the mine or petroleum site, and (11) (c) describe the analysis methods used in identifying the principal hazard, and (12) (d) include a record of the most recent risk assessment conducted in relation to the principal hazard, and (13) (e) describe the investigation and analysis methods used in determining the control measures to be implemented, and (14) (f) describe all control measures to be implemented to manage risks to health and safety associated with the principal hazard, and (15) (g) describe the arrangements in place for providing the information, training and instruction required by the WHS Regulations, clause 39 in relation to the principal hazard, and (16) (h) refer to the design principles, engineering standards and technical standards relied on for control measures for the principal hazard, and (17) (i) set out the reasons for adopting or rejecting each control measure considered. (18) (4) The operator of a mine or petroleum site must consider the following when preparing a principal hazard management plan for a principal hazard at the mine or petroleum site— (19) (a) the matters set out in Schedule 1 for the principal hazard, (20) (b) other matters relevant to managing the risks associated with the principal hazard. (21) (5) The operator of a mine or petroleum site at which there is a principal hazard must ensure no mining operations or petroleum operations are carried out at the mine or petroleum site that may give rise to the hazard before the principal hazard management plan for the hazard has been prepared in accordance with this section. (22) Maximum penalty (subsection (5))— (23) (a) for an individual—60 penalty units, or (24) (b) for a body corporate—300 penalty units.	Extraction Plan LW57-60 and Public Safety Management Plan and Transmission Line Management Plan
WHS Regulation (Mines and Petroleum Sites) 2022 Clause 70 Subsidence	Subsidence (1) In complying with section 14, the mine operator of an underground coal mine must manage risks to health and safety associated with subsidence at the mine. (2) Without limiting subsection (1), the mine operator must ensure— (a) as far as reasonably practicable, the rate, method, layout, schedule and sequence of mining operations do not put the health and safety of a person at risk from subsidence, and (b) monitoring of subsidence is conducted, including monitoring of its effects on relevant surface and subsurface features, and	Section 6.1 Extraction Plan Appendix 4 - Risk Assessments Section 9 Section 10 Section 13

Work Health and Safety Legislation Clause	Requirement	Section Addressed
	(c) an investigation of subsidence and an interpretation of subsidence information is carried out only by a competent person, and (d) all subsidence monitoring data is provided to the regulator— (i) in the approved way and form, and (ii) at the times required by the regulator, and (e) as far as reasonably practicable, procedures are implemented for the effective consultation, co-operation and co-ordination of action in relation to subsidence between the mine operator and relevant persons conducting business or an undertaking that is, or is likely to be, affected by subsidence.	Section 14 TARPs
WHS Regulation (Mines and Petroleum Sites) 2022 Clause 124 Duty to notify regulator of certain incidents	124 Duty to notify regulator of certain incidents (1) The operator of a mine or petroleum site must take all reasonable steps to ensure the regulator is notified in accordance with this section after becoming aware of an 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 an illness or injury that requires medical treatment within the meaning of Schedule 9, section 12, or (b) is a high potential incident. (m) an indication from monitoring data of the development of subsidence that may result in damage to plant or structures or a failure of ground,	Appendix 1 TARPs Section 14 Public Safety Management Plan and Land Management Plan
WHS Regulation (Mines and Petroleum Sites) 2022 Schedule 1 Subsidence Clause 6 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 conditions that may cause elevated or abnormal subsidence or the formation of sinkholes, (c) the characteristics of a previously excavated or abandoned workings that may interact with a proposed or existing mine workings, (d) the existence, distribution, geometry and stability of significant voids, standing pillars or remnants within an old pillar workings that may interact with a 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, 2022) Extraction Plan including (Key sub-plans)
WHS Regulation (Mines and Petroleum Sites) 2022 Schedule 3 Clause 17 High Risk Activities	Secondary extraction (1) Secondary extraction is identified as a high risk activity. (2) The waiting period for the activity is 3 months. (3) The information and documents that must be provided in relation to the 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 method 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 near the proposed activity including land use and details of who owns or occupies land that may be affected by subsidence, (d) for a pillar extraction, details of the procedures for the recovery of buried and immobile mining plant in or around a goaf,	Extraction Plan LW57-60 High Risk Activity Notification for LW57-60

Work Health and Safety Legislation Clause	Requirement	Section Addressed
	(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.	

5.4 Extraction Plan Guidelines

The Extraction Plan and Transmission Line Management Plan have been prepared generally in accordance with the Department of Planning & Environment, *Extraction Plan Guideline* (NSW Department of Planning & Environment, 2022). **Table 4** provides a summary of the guideline's requirements for key sub 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 Sub Plans

Extraction Plan Guideline Requirement – Key Sub Plans	Section Addressed
A short overview of relevant landscape features, heritage sites, environmental values, built features or other values to be managed under the sub-plan;	Section 1 Section 3
Setting out the consent's performance measures directly relevant to the features or values to be managed under the sub-plan;	Section 6
Setting out clear objectives to ensure the delivery of the performance measures and all other relevant statutory requirements;	Section 6 Section 6.1
Setting out performance indicators to ensure compliance with the performance measures and statutory requirements;	Section 6 TARPS
A description of the relevant features or values to be managed under the sub-plan and their significance;	Section 8
A description of all currently predicted subsidence impacts and environmental consequences relevant to the features and values to be managed under the sub-plan;	Section 8
A description of 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 mining company's commitments;	Section 9 Section 10.2 TARPS in Appendix 1
A description of the baseline monitoring network and baseline monitoring results, including pre-subsidence photographic surveys of key landscape features and key heritage sites that may be subject to significant subsidence impacts (such as significant watercourses, swamps and Aboriginal heritage sites);	Section 10.1
A description of the proposed environmental monitoring of subsidence impacts and environmental consequences;	Section 10.2
A description of proposed monitoring of remediation measures;	Section 10.2
A description of adaptive management;	Section 11 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

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 (160.2m to 200.6m) combined with 40.6m to 41.6m 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 LW57-60 on surface and subsurface features present within the Extraction Plan Area has been prepared by Ditton Geotechnical Services (2022) and subsequent updated predictions are 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 - 32.
- (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 (LW1-32).

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 allows built features including private dwellings to remain safe, serviceable and repairable.

The Transmission Line Management Plan aims to ensure the performance measures for “330 kV power supply infrastructure” in SSD-5144 Schedule 4 Condition 4 Table 7 are not exceeded. The performance measures are shown in **Table 5**.

Table 5 - 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 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.

6.4 Performance Indicators

To establish compliance with the performance measures outlined in **Section 6.3**, Centennial Mandalong has established a subsidence and environmental monitoring program developed in consultation with TransGrid and the 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 out in **Table 5** and infrastructure requirements.

The Performance Indicators have been established for each built feature. The TARPS provide the trigger values as outlined in **Table 6**.

Table 6 – Performance Indicators

Performance Indicator	Tigger	Action / Response
Level 1 Low	Operations within prediction and approved impact.	Continue 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. <i>The approved Performance Measures of Development Consent SSD-5144 and other relevant approvals.</i>	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. 1001320064) for Built Features affected by subsidence from the secondary extraction of LW57-60, including TransGrid 330kV transmission lines. A full copy of the risk assessment is included within the Extraction Plan LW57-60 Appendix 4.

7.1 Identified Risks

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

- Potential for increased or decreased tensions in various spans which could cause tower or conductor failure due to tilting or horizontal movement of towers.
- Potential for buckling of the tower or induced stresses in the tower members lessening the tower's ability to carry the normal transmission line loads due to differential movement of tower legs;
- Potential reduction of clearance between line conductors and tower which could place line at risk of tripping under extreme conditions due to tilting; and
- Potential interruption of service to customers.

Subsidence predictions for the Transgrid Towers 26 to 36X along the 330 kV Transmission Line (TL) 24 and Towers 31 to 40 along TL 25/26 were prepared by Ditton Geotechnical Services (2022) and provided to TransGrid for the assessment of subsidence impacts. The results indicate that the location of the proposed longwalls will limit the CWC tower leg spread values to < 8 mm between the tower sides and < 10 mm between the diagonals. The expected values are likely to be < 5 mm for the sides and diagonals.

7.1.1 Horizontal Strain Predictions for TL25/26 Towers 40 to 31

The predicted Credible Worst Case (CWC) vertical subsidence and far-field effects for ten (10) TransGrid Towers 26 to 32 & 33X & 36X along TL24 (Eraring to Vales Point Power stations) due to LW57 to 60 are provided in **Table 7** (tower sides) and **Table 8** (tower diagonals).

Table 7 – Predicted U95%CL Far-Field Effects at the TL25/26 (Towers 31 - 40) due to Proposed LW 57 - 60: Principal Strain Aligns with Tower Sides

Tower #	Closest LW#	Shortest distance to LW goaf edge x (m)	Cover Depth at Tower H (m)	x/H	Angle of Draw to Tower (o)	Max Total Tower Horiz Disp. HD _{max} (mm) Model 2 (U95%CL)	Tower Horiz. Disp. MGA Grid Bearing θ_1 (000°)	Tower Side Grid Bearing $\theta_{x,y}$ (000°)	Maximum Tower Horizontal Strain (mm/m) Model 3b (U95%CL)				Tower Leg-Leg Distance & Maximum Potential Spread (U95%CL)			
									e_1	θ_{x1} (o)	e_x	e_y	L_x (m)	Spread d_x (mm)	L_y (m)	Spread d_y (mm)
40	59	566	326	1.74	60	97	152	152 (y)	0.17	0	-0.06	0.17	8.4	-0.5	8.9	1.6
39	58	556	334	1.66	59	102	153	063	0.19	90	-0.06	0.19	8.4	-0.5	9.0	1.7
38	58	414	310	1.34	53	107	153	063	0.26	90	-0.09	0.26	8.4	-0.7	9.0	2.3
37	57	210	350	0.60	31	158	063	063	0.66	0	0.66	-0.22	9.75	6.5	9.6	-2.1
36	57	219	367	0.60	31	166	064	064	0.70	0	0.70	-0.23	7.53	5.3	10.0	-2.3
35	57	356	335	1.06	47	127	063	154 (y)	0.38	0	-0.13	0.38	10.0	-1.3	10.0	3.8
34	57	567	302	1.88	62	85	170	170 (y)	0.14	0	-0.05	0.14	10.5	-0.5	10.4	1.4
33	57	574	278	2.06	64	73	185	185 (y)	0.10	0	-0.03	0.10	9.04	-0.3	8.26	0.9
32	57	580	212	2.74	70	43	185	185 (y)	0.04	0	-0.01	0.04	12.05	-0.1	12.0	0.5
31	57	584	200	2.92	71	38	184	184 (y)	0.03	0	-0.01	0.03	9.5	-0.1	10.8	0.3

Bold - Tension Tower; Underlined - installed with cruciforms; ^ - Maximum (principal) horizontal strain (e_1) due to far-field affects. Minor principal strain = $-0.33 \times$ major principal strain. $e_{x,y} = (e_1 + e_2)/2 \pm (e_1 - e_2)\cos(2\theta_{1x})/2$ where θ_{x1} - Minimum angle between principal strain (e_1) & tower x-axis (which is sub-parallel to conductors). The tower y-axis is normal to conductors.

red - tower side leg spread > 10 mm; *Italics* - prediction exceeds Level 3 TARP of 8 mm but is < 10 mm.

Table 8 – Predicted U95%CL Subsidence Effects at the TL25/26 (Towers 31 - 40) due to Proposed LW 57 - 60: Tower Diagonals

Tower #	Closest LW#	Normal distance to LW goaf edge x (m)	Cover H (m)	x/H	Angle of Draw to Tower (o)	Max Total Tower Horiz Disp. HD _{max} (mm) Model 2 (U95%CL)	Tower Horiz. Disp. MGA Grid Bearing θ_1 (000°)	Tower Diagonal Grid Bearing θ_D (000°)	Maximum Tower Horizontal Strain [^] (mm/m) Model 3b (U99%CL)				Tower Leg-Leg Distance & Maximum Potential Spread (U95%CL)			
									e ₁	θ_{D1} (o)	e _{D1}	e _{D2}	L _{D1} (m)	Spread d _{D1} (mm)	L _{D2} (m)	Spread d _{D2} (mm)
40	59	566	326	1.74	60	97	016	016	0.17	0	0.17	-0.06	12.24	2.1	12.24	-0.7
39	58	556	334	1.66	59	102	016	016	0.19	0	0.19	-0.06	12.31	2.4	12.31	-0.8
38	58	414	310	1.34	53	107	016	016	0.26	0	0.26	-0.09	12.31	3.2	12.31	-1.0
37	57	210	350	0.60	31	158	019	019	0.66	0	0.66	-0.22	13.68	<i>9.1</i>	13.68	-3.0
36	57	219	367	0.60	31	166	011	011	0.70	0	0.70	-0.23	12.52	<i>8.7</i>	12.52	-2.0
35	57	356	335	1.06	47	127	019	019	0.38	0	0.38	-0.13	14.14	5.4	14.14	-1.8
34	57	567	302	1.88	62	85	036	036	0.14	0	0.14	-0.05	14.78	2.0	14.78	-0.7
33	57	574	278	2.06	64	73	052	052	0.10	0	0.10	-0.03	12.25	1.3	12.25	-0.4
32	57	580	212	2.74	70	43	050	050	0.04	0	0.04	-0.01	17.01	0.6	17.01	-0.2
31	57	584	200	2.92	71	38	045	045	0.03	0	0.03	-0.01	14.38	0.4	14.38	-0.1

Bold - Tension Tower; Underlined - installed with cruciforms; ^ - Maximum (principal) horizontal strain (e₁) includes far-field affects. Minor principal strain = -0.33 x major principal strain; e_{D1,2} = (e₁+e₂)/2 +/- (e₁-e₂)cos(2 θ_{1D})/2 where θ_{x1} - Minimum angle between principal strain (e₁) & tower x-axis (which is sub-parallel to conductors). Tower y-axis is normal to conductors.

red - tower diagonal leg spread > 10 mm; *Italics* - prediction exceeds Level 3 TARP of 8 mm but is < 10 mm.

7.1.2 Horizontal Strain Predictions for TL24 Towers 26 to 36X

The predicted Credible Worst Case (CWC) vertical subsidence and far-field effects for eleven (11) TransGrid Towers 26 to 32 & 33X & 36X along TL24 (Eraring to Vales Point Power stations) due to LW57 to 60 are provided in **Table 9** (tower sides) and **Table 10** (tower diagonals).

The tables indicate tower tilt and displacement directions for conductor tension analysis purposes and tower leg spread in the direction along the conductor (x-axis) and normal to the conductor (y-axis).

Table 9 – Predicted U95%CL Far-Field Effects at the TL24 (Towers 26 - 36X) due to Proposed LW 57 - 60: Principal Strain Aligns with Tower Sides

Tower #	Closest LW#	Shortest distance to LW goaf edge x (m)	Cover Depth at Tower H (m)	x/H	Angle of Draw to Tower (o)	Max Total Tower Horiz Disp. HD _{max} (mm) Model 2 (U95%CL)	Tower Horiz. Disp. MGA Grid Bearing θ_1 (000°)	Tower x-axis Grid Bearing θ_x (000°)	Maximum Tower Horizontal Strain [^] (mm/m) Model 3b (U95%CL)				Tower Leg-Leg Distance & Maximum Potential Spread (U95%CL)			
									e_1	θ_{x1} (o)	e_x	e_y	L_x (m)	Spread d_x (mm)	L_y (m)	Spread d_y (mm)
36X	57	638	317	1.98	63	86	088	088	0.09	0	0.09	-0.03	11.27	1.1	11.52	-0.4
35X	60	529	314	1.66	59	96	088	088	0.14	0	0.14	-0.05	11.27	1.6	11.52	-0.6
34X	60	494	329	1.50	56	106	135	135	0.18	0	0.19	-0.06	14.38	2.7	15.00	-0.9
33X	60	327	372	0.88	41	151	099	099	0.48	0	0.48	-0.16	10.45	5.0	10.49	-1.7
32	60	320	366	0.87	41	150	001	091	0.48	0	-0.16	0.48	4.4	-0.7	8.6	4.1
31	60	320	372	0.86	41	152	002	092	0.49	0	-0.16	0.49	4.3	-0.7	7.4	3.7
30	60	315	328	0.96	44	129	004	094	0.38	0	-0.13	0.38	7.3	-0.9	6.6	2.5
29	60	313	327	0.96	44	129	001	091	0.38	0	-0.13	0.38	6.6	-0.8	8.6	3.3
28	60	309	307	1.01	45	119	000	090	0.33	0	-0.11	0.33	7.0	-0.8	7.2	2.4
27	60	309	305	1.01	45	118	006	096	0.33	0	-0.11	0.33	10.2	-1.1	8.5	2.8
26	60	319	267	1.19	50	97	006	096	0.23	0	-0.08	0.23	7.70	-0.6	6.87	1.6

Bold - Tension Tower; Underlined - installed with cruciforms; *Italics* - predictions may be ignored if cruciform footings installed. Maximum subsidence < 50 mm and < 0.5 mm/m tilt predicted for all towers. ^ - Maximum (principal) horizontal strain (e_1) includes far-field affects. Minor principal strain = $-0.33 \times$ major principal strain; θ_{x1} - Minimum angle between principal strain (e_1) & tower x-axis; Tower x-axis is parallel to conductors; Tower y-axis is normal to conductors.

red - tower side leg spread > 10 mm; $e_{x,y} = (e_1 + e_2)/2 \pm (e_1 - e_2)\cos(2\theta_{1x})/2$

Table 10 – Predicted U95%CL Subsidence Effects at the TL24 (Towers 26 - 36X) due to Proposed LW 57 - 60: Tower Diagonals

Tower #	Closest LW#	Normal distance to LW goaf edge x (m)	Cover H (m)	x/H	Angle of Draw to Tower (o)	Max Total Tower Horiz Disp. HD_{max} (mm) Model 2 (U95%CL)	Tower Horiz. Disp. MGA Grid Bearing θ_1 (000°)	Tower Diagonal Grid Bearing θ_D (000°)	Maximum Tower Horizontal Strain [^] (mm/m) Model 4 (U99%CL)				Tower Leg-Leg Distance & Maximum Potential Spread (U95%CL)			
									e_1	θ_{D1} (o)	e_{D1}	e_{D2}	L_{D1} (m)	Spread d_{D1} (mm)	L_{D2} (m)	Spread d_{D2} (mm)
36X	57	638	317	1.98	63	86	042	042	0.09	0	0.09	-0.03	16.12	1.5	16.12	-0.5
35X	60	529	314	1.66	59	96	042	042	0.14	0	0.14	-0.05	16.12	2.3	16.12	-0.8
34X	60	494	329	1.50	56	106	089	089	0.18	0	0.19	-0.06	20.78	3.8	20.78	-1.3
33X	60	327	372	0.88	41	151	054	054	0.48	0	0.48	-0.16	14.80	7.2	14.80	-2.4
32	60	320	366	0.87	41	150	028	028	0.48	0	0.48	0.06	9.62	4.6	9.62	0.6
31	60	320	372	0.86	41	152	032	032	0.49	0	0.49	0.01	8.57	4.2	8.57	0.1
30	60	315	328	0.96	44	129	052	052	0.38	0	0.38	-0.12	9.84	3.7	9.84	-1.2
29	60	313	327	0.96	44	129	038	038	0.38	0	0.38	-0.10	10.78	4.1	10.78	-1.0
28	60	309	307	1.01	45	119	044	044	0.33	0	0.33	-0.11	10.06	3.4	10.06	-1.1
27	60	309	305	1.01	45	118	056	056	0.33	0	0.33	-0.10	13.27	4.4	13.27	-1.3
26	60	319	267	1.19	50	97	055	055	0.23	0	0.23	-0.07	10.32	2.3	10.32	-0.7

Bold - Tension Tower; Underlined - installed with cruciforms; ^ - Maximum (principal) horizontal strain (e_1) includes far-field affects. Minor principal strain = $-0.33 \times \text{major principal strain}$; θ_{x1} - Minimum angle between principal strain (e_1) & tower x-axis; Tower x-axis is parallel to conductors; Tower y-axis is normal to conductors.

red - tower diagonal leg spread > 10 mm; $e_{D1,2} = (e_1 + e_2)/2 \pm (e_1 - e_2)\cos(2\theta_{1D})/2$

Following acceptance of the most recent subsidence predictions incorporating the latest measured subsidence results up to LW57-60 (**Table 7 - 10**), a Risk Assessment was held. The risk assessment team considered the tolerance of built features to both the maximum subsidence prediction (mean); and credible worst-case (Upper 95% Confident Limits).

In the case of the transmission towers, the Credible Worse-Case values were adopted for the purpose of TARP development as shown in **tables 7 – 10**.

Table 11 – Subsidence Sensitivities

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

7.2 Risk Assessment Outcome

A risk ranking (low, moderate, significant, high or extreme) was assigned to each risk/hazard. The risk ranking for TransGrid towers 36 to 37 located outside of the practical angle of draw limit was assessed as **Low** at the maximum predicted subsidence (Credible Worst-Case, Upper 95% Confidence Limits). No additional control measures were identified apart from the monitoring program detailed in this management plan.

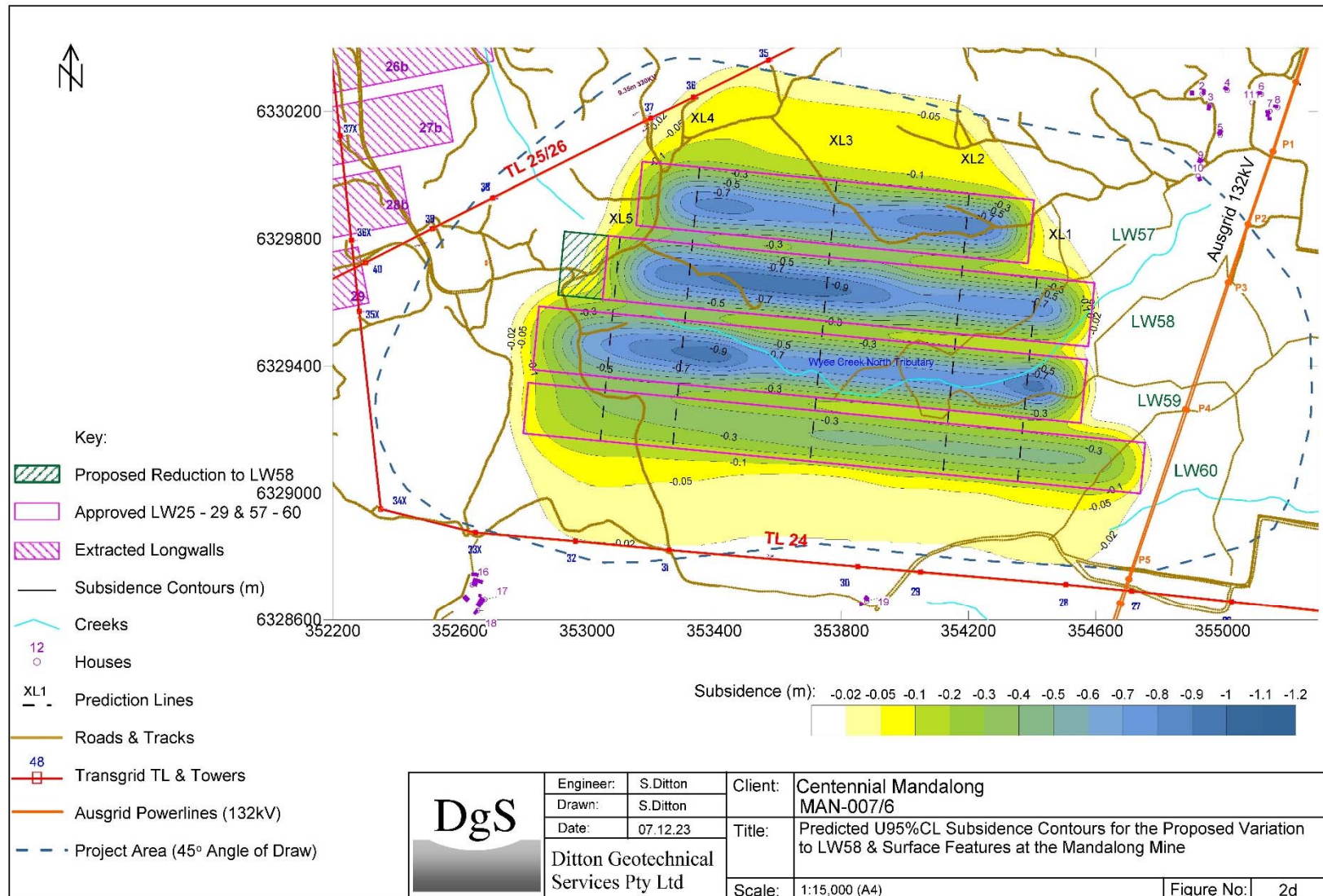


Figure 2 – Maximum Predicted Vertical Subsidence, Transmission Towers and Mine Plan

8 Transmission Towers and Predicted Impacts

8.1 Towers 36 to 37

TransGrid is responsible for the care and maintenance of the 330kV and high voltage power supply network within Mandalong. The Transmission Line Management Plan TransGrid Towers TL25/26 Towers 36-37 (MEMS-EP-9000-TLMP-9053) has been prepared for the LW57-60 Extraction Plan and developed in consultation with TransGrid, based on the most recent subsidence predictions prepared by Ditton Geotechnical Services, (2022) as detailed in **Table 7** and **Table 8**.

An initial subsidence assessment covering Towers 36 to 37 was undertaken in October 2022 by DgS and at the time, Centennial Mandalong had planned to mine LWs 57-59 at 200.6m wide and LW 60 at 160.2m with, and at the full length adjacent to Towers 36 and 37 (TL25/26). However, the current predictions were commissioned in response to the original strains (Predicted U95% CL) being greater than the lower(green) TARP, which ultimately resulted in the decision to shorten LW57. The LW57 take off road will now be moved 100m inbye (away) from Towers 36 and 37.

Ditton Geotechnical Services updated the subsidence predictions based on the new LW57-60 Extraction Plan Area. The shortening of LW57 results in a significant reduction in predicted subsidence impacts on Towers 36 and 37, as both towers are now located outside of the practical angle of draw from LW57-60.

8.1.1 Predicted Impacts

Considering the above, as both towers covered by this management plan (i.e., 36 to 37) are now located to the West of LW57-60's Extraction Plan Area and outside of the 26.5° practical angle of draw, The results indicate that the proposed relocation of LW57's finishing point (as shown on Figure 2) will increase the angle of draw and decrease the far-field strains and leg-spread predictions at Towers 37 and 36 along TL25/26. It is considered that the proposed amendment to the finishing position will control the Credible Worst-Case effects to tower leg spread for both the sides and diagonals for Towers 36 and 37 after mining of LW57 to 60 is completed. The anticipated strains are predicted to be within the tolerable limits of the towers as defined by TransGrid.

9 Management Measures

The management strategy implemented is the industry standard for managing subsidence effects on high voltage transmission lines. As the towers considered by this plan are located outside of the practical angle of draw, the appropriate management strategy is to undertake a monitoring program, similar to that undertaken for TL25/26 Towers 38 and 43 located beyond the 26.5° angle of draw from mining LW28 and LW29.

Subsidence monitoring and visual inspections will be conducted at the towers before, during and after the completion of mining as detailed in **Section 10.2**.

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 data to manage the risks associated with both conventional and non-conventional subsidence;
- Provide appropriate and timely subsidence information to assess against triggers established in the TARPs, including data for trend analysis to inform adaptive management; and
- 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 production (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 star pickets, nominally spaced at 10m intervals.

Within the Extraction Plan area, two crosslines have been proposed:

- Centreline 57 Located on Centennial owned property over LW57; and
- Crossline 27 Located on Centennial owned property and private property (Hardt MS0011) LW57-60.

The monitoring point spacing, survey methods and scheduled visual inspections allow for the detection of both conventional and non-conventional subsidence movements due to any potential changes in geological conditions and mining within steep slope areas within the Extraction Plan Area.

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 0.50m and is dependent on the geotechnical conditions and the depth of cover. Tilts and strains typically remain relatively 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, with 32 longwall panels now completed, 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
- 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 two 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 two previous longwall panels, defined as being from the start of the nominated crosslines up to the Active Longwall Subsidence Zone.

10.2.2 Monitoring Setup for Tower 36 to 37

All towers are positioned outside the 26.5° AOD of LW57-60.

Monitoring is to include:

- A survey pin placed at each of the concrete footings (four points). Measurements will be recorded to determine level, tilt and strain.
- The strain measurements are to be measured between each adjacent leg and across diagonal legs where physically possible. If diagonal strain measurements are inaccessible distances shall be calculated through theodolite observations (accuracy +/- 4mm).
- Four monitoring pegs will be placed adjacent to each tower leg to monitor ground movement at the tower.
- One survey peg is to be established in line with the transmission line to enable the tower to be monitored for both longitudinal and transverse tilt.
- Earthwire peak is also to be monitored during the tower survey to determine both longitudinal and transverse tilt.

10.2.2.1 Monitoring Schedule Suspension Tower 36

Monitoring of Tower 36 will be undertaken using conventional surveys (monitoring will be installed prior Longwall 57). These surveys will consist of:

- Resurvey at Longwall 57 chainage 140m (perpendicular to tower);
- Resurvey at Longwall 57 chainage 70m (halfway between perpendicular and 0m);
- Resurvey at Longwall 57 chainage 0m
- Resurvey one month after completion of Longwall 57; and
- Resurvey one month after completion of Longwall 57 or after no further changes in monitoring data;
- Resurvey at Longwall 58 chainage 223m (perpendicular to tower);
- Resurvey at Longwall 58 chainage 0m
- Resurvey one month after completion of Longwall 58 or after no further changes in monitoring data;
- Additional surveys as requested by TransGrid or as dictated in the TARP
 - Orange TARP – Advisory, including daily strain measurements between adjacent tower legs and vertical subsidence differential between tower footings.

10.2.2.2 Monitoring Schedule Suspension Tower 37

Monitoring of Tower 37 will be undertaken using conventional surveys (monitoring will be installed prior Longwall 57). These surveys will consist of:

- Resurvey at Longwall 57 chainage 105m (approach AOD);
- Resurvey at Longwall 57 chainage 12m (perpendicular to tower);
- Resurvey at Longwall 57 chainage 0m
- Resurvey one month after completion of Longwall 57 or after no further changes in monitoring data; and
- Resurvey at Longwall 58 chainage 95m (perpendicular to tower);
- Resurvey at Longwall 57 chainage 48m (halfway between perpendicular and 0m);
- Resurvey at Longwall 58 chainage 0m
- Resurvey one month after completion of Longwall 58 or after no further changes in monitoring data; and
- Additional surveys as requested by TransGrid or as dictated in the TARP
 - Orange TARP – Advisory, including daily strain measurements between adjacent tower legs and vertical subsidence differential between tower footings.
 -

Table 12 provides the monitoring program summary for Towers 36 to 37.

10.2.3 Survey Standards

All surveys are to be carried out in accordance with the LW57-60 Subsidence Monitoring Program.

Standard 1 – EDM differential levelling and strain measurement

- EDM differential levelling will be conducted with reference to the quality as defined in SP1 of $6mm * \sqrt{k} (km)$
- EDM strain measurements will be conducted with reference to the quality as defined in SP1, relative uncertainty target accuracy $\pm 2mm$ per strain bay distance.
- Survey equipment specification - 1" total station theodolite, distance measurement $\pm 2mm + 2$ ppm.

Standard 2 – Digital Level differential levelling and strain measurement

- Digital Level differential levelling will be conducted with reference to the quality as defined in SP1 of $6mm * \sqrt{k} (km)$
- Strain measurements by standardised steel band. Target accuracy $\pm 2mm$ per strain bay distance.

Table 12 – TransGrid TL25/26 Towers 36 and 37 Subsidence Monitoring Summary

Feature	Location	Monitoring Method	Parameter	Monitoring Frequency and Duration
TransGrid Transmission Line No. 25/26	Towers 36 & 37	Ground peg – Top of tower measurement.	Earthwire peaks monitored to determine both longitudinal and transverse tilt.	Baseline - Installation of and survey prior to mining commencing LW57-60. During Mining LW57 - at Longwall 57 chainage 105m (approach AOD). - LW57 chainage 140m & 12m respectively (perpendicular to tower). - LW57 chainage 70m (halfway between perpendicular and 0m). - LW57 chainage 0m (full subsidence). Post Mining - One month after completion of mining LW57 and continue monitoring if movement detected. During Mining LW58 - LW58 chainage 223m & 95m respectively (perpendicular to towers) - LW58 chainage 48m (halfway between perpendicular and 0m). - LW58 chainage 0m (full subsidence). Post Mining - One month after completion of mining LW58 and continue monitoring if movement detected.
	Suspension Towers Located to the West of LW57-60 (outside Angle of Draw) Affected by far-field subsidence from LW57-60 Only	Pins A survey pin placed at each of the concrete footings (four points) and reflectorless shot to top of tower. Visual Inspection Pins A survey pin placed at each of the concrete footings (four points). Strains The strain measurements are to be measured between each adjacent leg and across diagonal legs*.	Presence of mine-induced damage – surface cracking. Vertical subsidence. Risk to public safety. Transmission Line – tilting of tower, buckling of tower members; change in conductor sag/tension; ground clearance.	

**If a theodolite is used to calculate diagonal strain it must be noted in the Monitoring Report (due to the accuracy of this equipment).*

11 Adaptive Management

In addition to the narrow longwall panel design specifically adopted 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 the transmission line 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 the TransGrid 330kV transmission line towers. 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 TARP in **Appendix 1**.

13 Roles and Responsibilities

The responsibility for implementation, monitoring and review of the Transmission Line Management Plan lies with the Mining Approvals Coordinator. The roles and responsibilities for the Transmission Line Management Plan are outline in **Table 13**.

Table 13 – Roles and Responsibilities

Position	Responsibility
Mine Manager	• Authorisation of the Transmission Line Management Plan • 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 TransGrid, DPE, 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 Transmission Line 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, RR, TransGrid, SA NSW and Ditton Geotechnical Services.
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 *Extraction Plan Guideline* (NSW Department of Planning & Environment, 2022), as summarised in **Table 14**.

Table 14 - 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 DPE TransGrid DgS SA NSW CCC
Bi-Monthly Subsidence Impact Reporting	If a new impact is identified, compile after monthly subsidence report.	Distinguish impact: - within predictions; - those which exceed predictions but remain within performance measures and/or performance indicators; and - those which exceed performance measures and/or performance indicators. Report to include: - full description; - location identification using aerial photos with longwall layout superimposed; - photos of the impact; and - preliminary characterisation of the impact in accordance with the relevant TARP(s).	
Annual Review	Annual Report required under development consent SSD-5144.	Report to include: - impacts and environmental monitoring results; and - summary of subsidence impacts.	
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.	
Mining Notifications	One month prior to mining beneath Transmission Towers 36 and 37.	Scheduled date that the transmission towers will be affected by far-field subsidence.	TransGrid

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 TransGrid Management Plan are to be audited annually for compliance and effectiveness during the extraction of LW57-60.

Any non-conformances or deficiencies found during the audit are to be brought to the attention of the Mining Approvals 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 Transmission Line 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;
- With each new Extraction Plan;
- Where triggered by circumstances in either Clause 15 or Clause 124 of WHS (Mines and Petroleum Sites) Regulation or Clause 38 WHS Regulation; 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 References

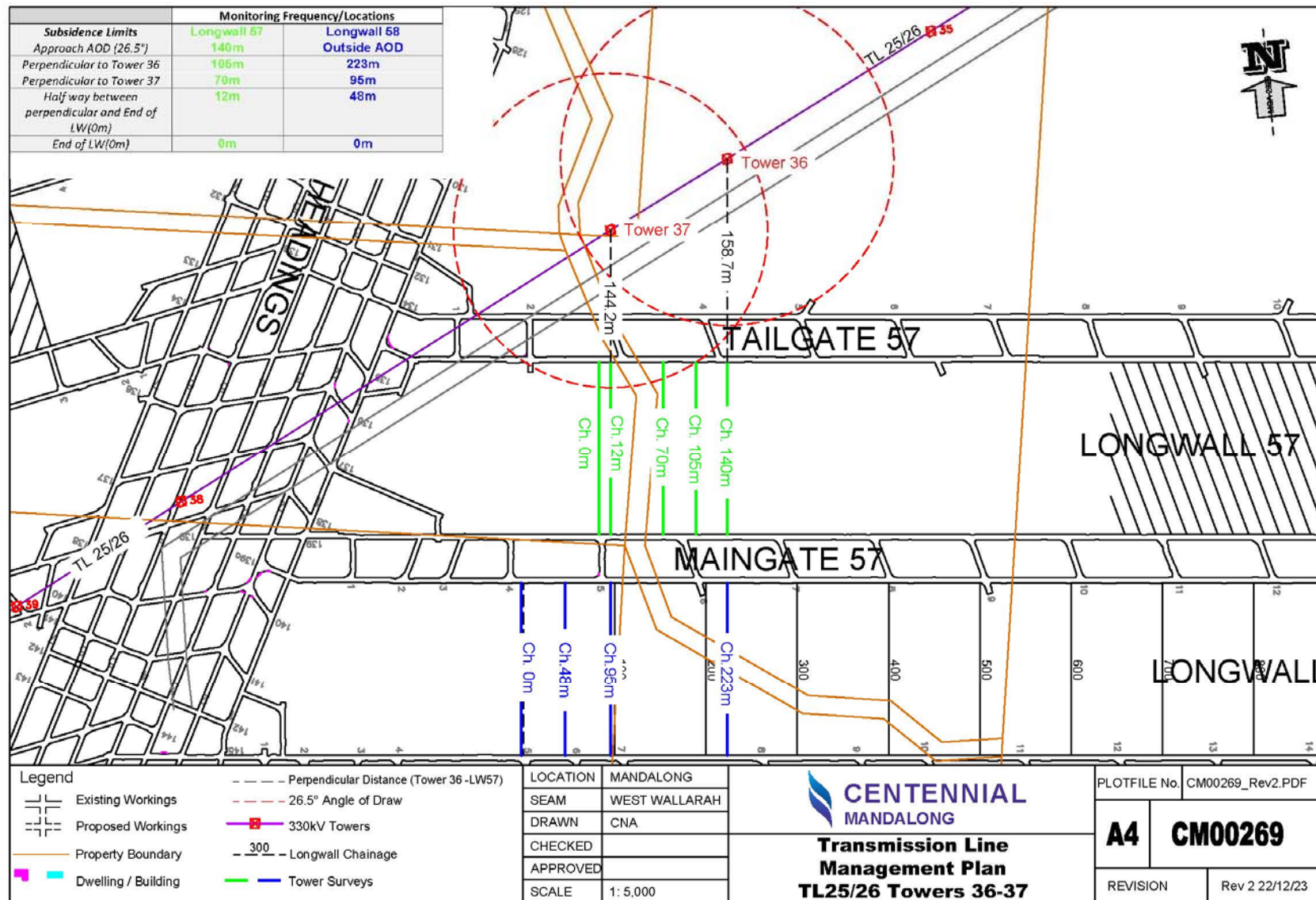
- Ditton Geotechnical Services. (2022). *Subsidence Assessment for the Proposed LW57-60 Extraction Plan at the Mandalong Mine - MAN-007/4.*
- Ditton Geotechnical Services. (2022). *Subsidence Assessment for Transgrid Towers (TL24 and TL25/26) & Proposed LW57-60 Extraction Plan MAN-007/3a.*
- Ditton Geotechnical Services. (2023). *Subsidence Assessment for the Proposed Variation to LW58 MAN-007/6.*
- NSW Department of Industry - Resources Regulator. (2017). *Managing Risk of Subsidence, Guide: WHS(Mines and Petroleum Sites) Legislation.*
- NSW Department of Planning & Environment. (2022). *Extraction Plan Guideline.*

Appendix 1 Trigger Action Response Plans

Transmission Line 25/26 Vales Point to Sydney - 330kV Double Circuit – Suspension Towers 36 and 37			
Management Period	Monitoring	Trigger	Response
Baseline studies prior to mining LW57-60	- Survey of ground and footing monitoring marks - Survey of tower legs on TL25/26 - Tower 36 & 37. - Earth Peaks Monitoring	Documentation of pre- mining conditions.	- Document and Report to: - TransGrid; - Principal Subsidence Engineer – RR - SA NSW
During mining	Level 1 – LOW	Operations with prediction and approved impact	
	- Survey of ground and footing monitoring marks - Earth Peaks Monitoring	- No observable surface deformations <5 mm separation between tower legs* - Vertical subsidence < 0.050m overall - Tilt < 0.4mm/m <5mm vertical subsidence differential between tower footings*	- Centennial to provide subsidence monitoring to: - TransGrid - Principal Subsidence Engineer - RR
	Level 2 – ADVISORY	Operations within approved impact but exceed or potentially exceed predictions	
	- Survey of ground and footing monitoring marks - Survey of tower legs on TL25/26 - Tower 44 and 45 - Earth Peaks Monitoring	- Observable surface deformations; and / or - Separation between tower legs* (5 to 10 mm); - Vertical subsidence > 0.050m overall - Tilt > 0.4mm/m <10mm vertical subsidence differential between tower footings* - Subsidence greater than predicted maximum (Upper 95% CL).	- Notify the following Key Stakeholders, as appropriate, within 24hrs of becoming aware of the trigger/s: - TransGrid - Principal Subsidence Engineer – RR - Daily strain measurements between adjacent tower legs - Daily levelling at each leg footing to determine vertical subsidence differential - Continue monitoring and consultation with TransGrid.
	Level 3 – HIGH	Operations exceed approved impact	
	- Survey of ground and cruciform footing monitoring marks - Survey of tower legs on TL25/26 Tower 44 and 45 - Earth Peaks Monitoring	- Observable surface or tower deformations; and / or - Separation between tower legs* (>10mm); - Subsidence greater than predicted maximum (Upper 95% CL). <10mm vertical subsidence differential between tower footings*	- Notify Key Stakeholders, as appropriate, immediately following awareness of the trigger/s being met: - TransGrid; - Principal Subsidence Engineer – RR - Undertake additional 3D survey and check against pre-mining monitoring data and review against predictions; - TransGrid and Centennial to undertake visual inspections accordingly; - Liaise with TransGrid regarding any remediation action/s plan - Report monitoring data to Principal Subsidence Engineer - RR within 48 hrs - Centennial to review mining options and Extraction Plan
Post mining	- Survey of monitoring lines/points - Survey of tower legs on TL25/26 - Tower 36 and 37 - Earth Peaks Monitoring	Check against subsidence predictions and baseline survey	- Centennial to provide subsidence monitoring to: - TransGrid - Principal Subsidence Engineer – RR

*leg separation and vertical differential settlement to be measured between any two legs\footings.

Appendix 2 Subsidence Monitoring Plan



Appendix 3 Key Personnel List

Mandalong Mine		Contact	Phone No.	Mobile No.	Email
Mining Approvals Coordinator		Clint Allen	49730948	0408 372 152	clint.allen@centennialcoal.com.au
Subsidence Surveyor		Dane Sharp	49730945		dane.sharp@centennialcoal.com.au
Technical Service Superintendent		Jarred Stanes	49730951		jarred.stanes@centennialcoal.com.au
Environmental Coordinator		Jeff Dunwoodie	49730947	0448 490 023	jeffrey.dunwoodie@centennialcoal.com.au
Mine Manager		Justin Peterkin	49730931	0414 713 711	justin.peterkin@centennialcoal.com.au
Purchasing Coordinator		Amy Hancock	49730939		amy.hancock@centennialcoal.com.au
Emergency Order No. Procedure MAN6257					
Control Room (24hr)		Control Room Operators	49730901 or 49730902	0428 247 788	mandalong.control@centennialcoal.com.au
TransGrid					
Project Manager – Works Delivery		Matthew Heath	(02) 9620 0416	TBC	matthew.heath@transgrid.com.au
Asset Strategist		Sanu Maharjan	9284 3446		Sanu.Maharjan@transgrid.com.au
TransGrid System Operation			9620 0121		system.operator@transgrid.com.au
TransGrid Maintenance Group			9620 0350		TransmissionLines.andEasementsMaintenance@transgrid.com.au
TransGrid Emergency Number			1800 027 253		
Subsidence NSW Advisory					
Emergency Service		24hr Emergency Service	1800 248 083		
Department of Regional NSW - Resources Regulator					
Principal Engineer	Subsidence	Ray Ramage	1300 814 609	0422 551 293	ray.ramage@regional.nsw.gov.au

Appendix 4 Inspection Check List

SUBSIDENCE INSPECTION CHECKLIST		
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		
Warning Signage		
Powerline / Transmission Line – poles, towers, insulators, conductors, reduced 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
- Damage to poles, insulators or conductors
- Damage to transmission tower, tilting or buckling
- 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 infrastructure or surface

Immediately notify the:

- Mine Manager
 - Mining Approvals Coordinator
 - Subsidence Surveyor
 - Subsidence Advisory NSW – Emergency Service phone number
 - Transgrid - Emergency Service phone number
-

Appendix 5 Correspondence

Re: Mandalong Mine Extraction Plan LW57-60 - TransGrid TL25/26 [Official]

Clint Allen <Clint.Allen@centennialcoal.com.au>

Thu 11/17/2022 11:01 AM

To: Matthew Heath <Matthew.Heath@transgrid.com.au>

Hi Matthew,

Thanks again for the update and looking forward to your response.

From: Matthew Heath <Matthew.Heath@transgrid.com.au>

Sent: Thursday, November 17, 2022 9:57 AM

To: Clint Allen <Clint.Allen@centennialcoal.com.au>

Subject: RE: Mandalong Mine Extraction Plan LW57-60 - TransGrid TL25/26 [Official]

Hi Chris,

Sanu will be looking at this early next week, so I should have a response by the end of next week.

Cheers,

Matt

Data Classification: Official

From: Clint Allen <Clint.Allen@centennialcoal.com.au>

Sent: Wednesday, 16 November 2022 11:36 AM

To: Matthew Heath <Matthew.Heath@transgrid.com.au>

Subject: Re: Mandalong Mine Extraction Plan LW57-60 - TransGrid TL25/26 [Official]

Hi Matthew,

Thank you for the email and phone call updating me with the progress.

Regards

Clint Allen

Approvals Coordinator



p: +61 (0) 2 4973 0948 | m: +61 (0) 4 0837 2152

Centennial | Mandalong

12 Kerry Anderson Drive | Mandalong | NSW | 2264 | Australia

centennialcoal.com.au

Attention:

This message and any files transmitted with it are confidential and intended solely for the use of those persons to whom the message is addressed. If you have received this message in error please notify the sender immediately and then delete this message. Any unauthorised form of reproduction of this message or any files transmitted with it is strictly prohibited. Any views or opinions presented in this message are solely those of the author and do not necessarily represent those of Centennial Coal Company Pty Limited. The recipient should check this message and any attachments for the presence of viruses. Centennial Coal Company Pty Limited accepts no liability for any damage caused by any virus transmitted by this message.

From: Matthew Heath <Matthew.Heath@transgrid.com.au>
Sent: Wednesday, November 16, 2022 11:15 AM
To: Clint Allen <Clint.Allen@centennialcoal.com.au>; Jeffree Cairns <Jeffree.Cairns@transgrid.com.au>
Cc: Carol Anthoney <Carol.Anthoney@lumea.com.au>; Phil Enright <Phil.Enright@centennialcoal.com.au>
Subject: RE: Mandalong Mine Extraction Plan LW57-60 - TransGrid TL25/26 [Official]

Hi Clint,

As discussed, this has been passed onto our design department for comment, once this is received we will formulate our response. I have just sent them a reminder.

Kind regards,

Matthew Heath

Transmission Line and Cable Asset Strategist | Network

Transgrid | 200 Old Wallgrove Road, Wallgrove, NSW, 2766

T: (02) 9620 0416

E: Matthew.Heath@transgrid.com.au **W:** www.transgrid.com.au



Data Classification: *Official*

From: Clint Allen <Clint.Allen@centennialcoal.com.au>
Sent: Wednesday, 16 November 2022 7:26 AM
To: Jeffree Cairns <Jeffree.Cairns@transgrid.com.au>; Matthew Heath <Matthew.Heath@transgrid.com.au>
Cc: Carol Anthoney <Carol.Anthoney@lumea.com.au>; Phil Enright <Phil.Enright@centennialcoal.com.au>
Subject: Re: Mandalong Mine Extraction Plan LW57-60 - TransGrid TL25/26

Hi Jeffree and Matthew,

I am just following up on the correspondence sent on November 4 regarding Mandalong Mine Extraction Plan LW57-60 - TransGrid TL25/26. This Extraction plan approval is of critical nature to our business. Can you please contact me ASAP to discuss.

Regards

Clint Allen

Approvals Coordinator



p: +61 (0) 2 4973 0948 | m: +61 (0) 4 0837 2152

Centennial | Mandalong

12 Kerry Anderson Drive | Mandalong | NSW | 2264 | Australia

centennialcoal.com.au

Attention:

This message and any files transmitted with it are confidential and intended solely for the use of those persons to whom the message is addressed.

If you have received this message in error please notify the sender immediately and then delete this message. Any unauthorised form of reproduction of this message or any files transmitted with it is strictly prohibited. Any views or opinions presented in this message are solely those of the author and do not necessarily represent those of Centennial Coal Company Pty Limited. The recipient should check this message and any attachments for the presence of viruses. Centennial Coal Company Pty Limited accepts no liability for any damage caused by any virus transmitted by this message.

From: Clint Allen

Sent: Friday, November 4, 2022 7:11 AM

To: Jeffree.Cairns@transgrid.com.au <Jeffree.Cairns@transgrid.com.au>; Matthew.Heath@transgrid.com.au <Matthew.Heath@transgrid.com.au>

Subject: Mandalong Mine Extraction Plan LW57-60 - TransGrid TL25/26

Hi Jeffree and Matthew,

Mandalong Mine is currently preparing an Extraction Plan for LW57-60 and will mine near another section of TL25/26 at Mandalong. We are planning to submit the Extraction Plan for approval to the Department of Planning by late Decemebr 2023.

While the proposed LW57 will not directly mine beneath the towers (TL25/26 Towers 31 to 37), please find attached a subsidence assessment report (Ditton Geotechnical Services) similar to that prepared for LW32 for far-field movements.

Can you please review and provide consultation on the report by mid December 2023.

Please call me to discuss if you have any questions.

Disclaimer:

This e-mail may contain privileged and confidential information intended only for the addressees named above. If you are not the intended recipient please delete this e-mail and advise the sender. TransGrid's Privacy Policy is available on our website <https://www.transgrid.com.au/privacy>. Any use, dissemination, distribution, reproduction of this email is prohibited. Unless explicitly attributed, the opinions expressed in this e-mail are those of the author only and do not represent the official view of TransGrid. E-mail communications with TransGrid may be subject to automated e-mail filtering, which could result in the delay or deletion of a legitimate e-mail before it is read by its intended recipient. TransGrid does not accept liability for any corruption or viruses that arise as a result of this e-mail.

"COVID-19 UPDATE: TransGrid office personnel have transitioned to working remotely, staying home to keep our people and community safe while working to ensure that we continue to provide the support you need during these uncertain times. We appreciate staying connected is important so while face-to-face meetings have been suspended due to physical distancing requirements, we offer other ways for you to contact us, meet with us and access the people, information and resources you require." Please consider the environment before printing this e-mail.

2022-629 Mandalong Mine Extraction Plan LW57-60 - TransGrid TL25/26 [Official]

Easements&Development <Easements&Development@transgrid.com.au>

Tue 11/29/2022 2:41 PM

To: Clint Allen <Clint.Allen@centennialcoal.com.au>

Good Afternoon Clint,

Transgrid Reference Number: 2022-629

Location: Mandalong Mine

Proposal: Extraction Plan

Transgrid: Transmission Line 25 Eraring PS – Sydney West + 26 Munmorah PS – Vineyard 330kV Structures 36 + 37

As per Matthew's email please quote **Transgrid Reference Number: 2022-629** in all correspondence and please email all information etc. including maintenance plan to: easements&development@transgrid.com.au.

Please do not use the Transgrid portal as it is unreliable.

Regards

Michael

Michael Platt

Easements and Development Assessment Advisor | Community and Policy

Transgrid | 200 Old Wallgrove Road, Wallgrove, NSW, 2766

T: (02) 9620 0161 **M:** 0427 529 997

E: Michael.Platt@transgrid.com.au **W:** www.transgrid.com.au



Data Classification: *Official*

From: Matthew Heath <Matthew.Heath@transgrid.com.au>

Sent: Friday, 25 November 2022 3:53 PM

To: Clint Allen <Clint.Allen@centennialcoal.com.au>

Cc: Michael Platt <Michael.Platt@transgrid.com.au>

Subject: RE: Mandalong Mine Extraction Plan LW57-60 - TransGrid TL25/26 [Official]

Hi Clint,

As per our discussion as with reference to the dot-points below.

- This just refers to the loading of the structure with reference to the original design capacity.
- Thanks, we look forward to receiving it.
- This just refers to the initial enquiry at which point it will get a reference number so it can be tracked.
I've cc'd Michael Platt into this email (and attached your original email) to facilitate this.

Kind regards,

Matthew Heath

Transmission Line and Cable Asset Strategist | Network

Transgrid | 200 Old Wallgrove Road, Wallgrove, NSW, 2766

T: (02) 9620 0416

E: Matthew.Heath@transgrid.com.au **W:** www.transgrid.com.au



Data Classification: *Official*

From: Clint Allen <Clint.Allen@centennialcoal.com.au>

Sent: Friday, 25 November 2022 1:48 PM

To: Matthew Heath <Matthew.Heath@transgrid.com.au>

Subject: Re: Mandalong Mine Extraction Plan LW57-60 - TransGrid TL25/26 [Official]

Hi Matthew,

I tried to call you to discuss your reply as I had a few comments and questions.

- Can you please explain the comment " Tower 37 is utilised at close to 100% of its design capacity" ?
- We will make a decision on the finishing position of LW57, get the predictions re-run and create the Management Plan and will then submit it to you guys once again.
- When you refer to enquiries to TransGrid , Does that infer all correspondence go through the Transgrid's Easement Enquiry portal?

Regards

Clint Allen

Approvals Coordinator



p: +61 (0) 2 4973 0948 | m: +61 (0) 4 0837 2152

Centennial | Mandalong

12 Kerry Anderson Drive | Mandalong | NSW | 2264 | Australia

centennialcoal.com.au

Attention:

This message and any files transmitted with it are confidential and intended solely for the use of those persons to whom the message is addressed. If you have received this message in error please notify the sender immediately and then delete this message. Any unauthorised form of reproduction of this message or any files transmitted with it is strictly prohibited. Any views or opinions presented in this message are solely those of the author and do not necessarily represent those of Centennial Coal Company Pty Limited. The recipient should check this message and any attachments for the presence of viruses. Centennial Coal Company Pty Limited accepts no liability for any damage caused by any virus transmitted by this message.

From: Matthew Heath <Matthew.Heath@transgrid.com.au>

Sent: Thursday, November 24, 2022 4:54 PM

To: Clint Allen <Clint.Allen@centennialcoal.com.au>; Jeffree Cairns <Jeffree.Cairns@transgrid.com.au>

Cc: Sanu Maharjan <Sanu.Maharjan@transgrid.com.au>; Charles Kurniawan <Charles.Kurniawan@transgrid.com.au>

Subject: RE: Mandalong Mine Extraction Plan LW57-60 - TransGrid TL25/26 [Official]

Hi Clint,

Comment from Transgrid is as follows:

The predicted strain levels at Tower 37 and Tower 36 are 11.4mm and 8.8mm respectively, these are higher than limits specified in the TARP.

LW 57 will be required to be cut short in order to reduce horizontal strains on Towers 37 and 36.

The 2 mitigation options discussed in the report are:

1. Minimum of 60m cut short to achieve strains <8mm
2. Minimum of 158m cut short to achieve strains <5mm

According to the TARP, once strain level exceeds 8mm, it becomes a RED (High Risk) zone. The operator is then required to inspect the affected towers for any damage and increase monitoring frequency as any further increases in strain are likely to cause severe damage to the tower.

Tower 37 is utilised at close to 100% of its design capacity while Tower 36 is approximately 60% utilised. The high utilisation and closer proximity of Tower 37 to LW 57 would make it the higher risk structure, as it is most exposed to strain and most vulnerable to the affects.

Centennial Coal will have to make a commercial assessment on the risk versus cost of the additional 100m (158 m cut short versus 60 m) of LW. However, considering the time required to rectify any damage to the tower(s) and the disruption this would cause within the network, Transgrid's preference would be for the LW 57 to be cut short the full 158 m in order to reduce this risk.

Finally, although we're happy to provide the information, could you please direct enquiries through the Transgrid's Easement Enquiry portal (<https://ampup.transgrid.com.au/PublicEasement/>) so that they are captured correctly within that system?

Kind regards,

Matthew Heath

Transmission Line and Cable Asset Strategist | Network

Transgrid | 200 Old Wallgrove Road, Wallgrove, NSW, 2766

T: (02) 9620 0416

E: Matthew.Heath@transgrid.com.au **W:** www.transgrid.com.au



From: Clint Allen <Clint.Allen@centennialcoal.com.au>

Sent: Friday, 4 November 2022 6:11 AM

To: Jeffree Cairns <Jeffree.Cairns@transgrid.com.au>; Matthew Heath <Matthew.Heath@transgrid.com.au>

Subject: Mandalong Mine Extraction Plan LW57-60 - TransGrid TL25/26

Hi Jeffree and Matthew,

Mandalong Mine is currently preparing an Extraction Plan for LW57-60 and will mine near another section of TL25/26 at Mandalong. We are planning to submit the Extraction Plan for approval to the Department of Planning by late Decemebr 2023.

While the proposed LW57 will not directly mine beneath the towers (TL25/26 Towers 31 to 37), please find attached a subsidence assessment report (Ditton Geotechnical Services) similar to that prepared for LW32 for far-field movements.

Can you please review and provide consultation on the report by mid December 2023.

Please call me to discuss if you have any questions.

Regards

Clint Allen

Approvals Coordinator



p: +61 (0) 2 4973 0948 | m: +61 (0) 4 0837 2152

Centennial | Mandalong

12 Kerry Anderson Drive | Mandalong | NSW | 2264 | Australia

centennialcoal.com.au

Attention:

This message and any files transmitted with it are confidential and intended solely for the use of those persons to whom the message is addressed. If you have received this message in error please notify the sender immediately and then delete this message. Any unauthorised form of reproduction of this message or any files transmitted with it is strictly prohibited. Any views or opinions presented in this message are solely those of the author and do not necessarily represent those of Centennial Coal Company Pty Limited. The recipient should check this message and any attachments for the presence of viruses. Centennial Coal Company Pty Limited accepts no liability for any damage caused by any virus transmitted by this message.

Disclaimer:

This e-mail may contain privileged and confidential information intended only for the addressees named above. If you are not the intended recipient please delete this e-mail and advise the sender. TransGrid's Privacy Policy is available on our website <https://www.transgrid.com.au/privacy>. Any use, dissemination, distribution, reproduction of this email is prohibited. Unless explicitly attributed, the opinions expressed in this e-mail are those of the author only and do not represent the official view of TransGrid. E-mail communications with TransGrid may be subject to automated e-mail filtering, which could result in the delay or deletion of a legitimate e-mail before it is read by its intended recipient. TransGrid does not accept liability for any corruption or viruses that arise as a result of this e-mail.

"COVID-19 UPDATE: TransGrid office personnel have transitioned to working remotely, staying home to keep our people and community safe while working to ensure that we continue to provide the support you need during these uncertain times. We appreciate staying connected is important so while face-to-face meetings have been suspended due to physical distancing requirements, we offer other ways for you to contact us, meet with us and access the people, information and resources you require." Please consider the environment before printing this e-mail.

Re: Transgrid Reference Number: 2022-629 [Official]

Clint Allen <Clint.Allen@centennialcoal.com.au>

Thu 3/9/2023 1:54 PM

To: Easements&Development <easements&development@transgrid.com.au>

Cc: Matthew Heath <Matthew.Heath@transgrid.com.au>; Maharjan, Sanu <sanu.maharjan@transgrid.com.au>

Hi Matthew & Sanu,

Is the plan (MG00269) acceptable to Transgrid?

From: Clint Allen <Clint.Allen@centennialcoal.com.au>

Sent: Monday, March 6, 2023 11:08 AM

To: Matthew Heath <Matthew.Heath@transgrid.com.au>; Maharjan, Sanu <sanu.maharjan@transgrid.com.au>

Cc: Easements&Development <Easements&Development@transgrid.com.au>

Subject: Re: Transgrid Reference Number: 2022-629 [Official]

Hi Matthew and Sanu,

Thanks for your comments below, please refer to appendix 2 (MG00269) which is a plan displaying the information within section 10.2.2.1.

From:

Sent: Monday, March 6, 2023 10:40 AM

To: Clint Allen <Clint.Allen@centennialcoal.com.au>

Subject: FW: Transgrid Reference Number: 2022-629 [Official]

Good morning Clint,

TransGrid Reference Number: 2022-629

Location: Longwall 57-60 at Mandalong Mine

Proposal: Extraction

Transgrid: Transmission Lines 26+27

Please see information from Sanu to Matthew.

I am unsure if you are communicating directly with Matthew Heath etc. Normally all communications comes to Transgrid via easements&development@transgrid.com.au.

If suits you better, please email directly with them & CC E&D only or via easements&development@transgrid.com.au. And we will record all emails and pass on your communications.

Regards

Michael

Michael Platt

Easements and Development Assessment Advisor | Community and Policy

Transgrid | 200 Old Wallgrove Road, Wallgrove, NSW, 2766

T: (02) 9620 0161 **M:** 0427 529 997

E: Michael.Platt@transgrid.com.au **W:** www.transgrid.com.au



Data Classification: *Official*

From: Sanu Maharjan <Sanu.Maharjan@transgrid.com.au>

Sent: Friday, 3 March 2023 6:32 PM

To: Matthew Heath <Matthew.Heath@transgrid.com.au>

Cc: Michael Platt <Michael.Platt@transgrid.com.au>; Jeffree Cairns <Jeffree.Cairns@transgrid.com.au>; Charles Kurniawan <Charles.Kurniawan@transgrid.com.au>; Conor Reynolds <Conor.Reynolds@transgrid.com.au>

Subject: RE: Transgrid Reference Number: 2022-629 [Official]

Hi Matt,

It will be good have a layout of LW57 & LW58 which shows chainage specified in section 10.2.2.1 and T36 & T37 positions.

I am not sure if Sunil has been involved in this. My contact can be added to receive monitoring info.

TransGrid				
Project Manager – Works Delivery	Melissa Daniels	(02) 9620 0416	TBC	matthew.heath@transgrid.com.au
Designer	Sunil Palikhe	9284 3144		Sunil.Palikhe@transgrid.com.au
TransGrid System Operation		9620 0121		system.operator@transgrid.com.au

Attached has few more comments.

Regards
Sanu

From: Clint Allen <Clint.Allen@centennialcoal.com.au>
Sent: Wednesday, 1 March 2023 9:05 AM
To: Easements&Development <Easements&Development@transgrid.com.au>
Cc: Matthew Heath <Matthew.Heath@transgrid.com.au>; Michael Platt <Michael.Platt@transgrid.com.au>; Jeffree Cairns <Jeffree.Cairns@transgrid.com.au>; Charles Kurniawan <Charles.Kurniawan@transgrid.com.au>; Sanu Maharjan <Sanu.Maharjan@transgrid.com.au>
Subject: Transgrid Reference Number: 2022-629

Hi Matthew,
I am following up Transgrid's response to the draft management plan for TL25/26 Extraction plan, Longwall 57-60 at Mandalong Mine. We are just about ready to submit to DPE and require your response ASAP.
Regards

Clint Allen
Approvals Coordinator



p: +61 (0) 2 4973 0948 | m: +61 (0) 4 0837 2152

Centennial | Mandalong
12 Kerry Anderson Drive | Mandalong | NSW | 2264 | Australia
centennialcoal.com.au

Attention:
This message and any files transmitted with it are confidential and intended solely for the use of those persons to whom the message is addressed. If you have received this message in error please notify the sender immediately and then delete this message. Any unauthorised form of reproduction of this message or any files transmitted with it is strictly prohibited. Any views or opinions presented in this message are solely those of the author and do not necessarily represent those of Centennial Coal Company Pty Limited. The recipient should check this message and any attachments for the presence of viruses. Centennial Coal Company Pty Limited accepts no liability for any damage caused by any virus transmitted by this message.

Data Classification: *Official*

Disclaimer:
This e-mail may contain privileged and confidential information intended only for the addressees named above. If you are not the intended recipient please delete this e-mail and advise the sender. TransGrid's Privacy Policy is available on our website <https://www.transgrid.com.au/privacy>. Any use, dissemination, distribution, reproduction of this email is prohibited. Unless explicitly attributed, the opinions expressed in this e-mail are those of the author only and do not represent the official view of TransGrid. E-mail communications with TransGrid may be subject to automated e-mail filtering, which could result in the delay or deletion of a legitimate e-mail before it is read by its intended recipient. TransGrid does not accept liability for any corruption or viruses that arise as a result of this e-mail.

"COVID-19 UPDATE: TransGrid office personnel have transitioned to working remotely, staying home to keep our people and community safe while working to ensure that we continue to provide the support you need during these uncertain times. We appreciate staying connected is important so while face-to-face meetings have been suspended due to physical distancing requirements, we offer other ways for you to contact us, meet with us and access the people, information and resources you require." Please consider the environment before printing this e-mail.

2022-629 Longwall 57-60 at Mandalong Mine Extraction [Sensitive]

Easements&Development <Easements&Development@transgrid.com.au>

Fri 3/10/2023 11:56 AM

To: Clint Allen <Clint.Allen@centennialcoal.com.au>

Good morning Clint,

TransGrid Reference Number: 2022-629

Location: Longwall 57-60 at Mandalong Mine

Proposal: Extraction

Transgrid: Transmission Lines 26+27

Please email ALL correspondence to: easements&development@transgrid.com.au

Please see Transgrid response to plan (MG00269) below:

Following on from Sanu's previous comments, the plan referenced below (Appendix 2) **does not provide sufficient detail for Transgrid to understand:**

- The distances from the edges of the longwalls to the towers; and
- The chainages mentioned in the Monitoring Schedules for towers 36 and 37.

It is also noted that while the modelled resultant leg spread is below the 10mm TARP threshold, it's predicted to be 9.1mm and 8.7mm at towers 36 and 37 respectively (per Table 8). Therefore Transgrid require that the monitoring frequencies align with the proximity of the subsidence zones as they approach the structures (a plan detailing the chainages mentioned above will help in Transgrid's understanding of this).

Further:

- When a theodolite is used to calculate diagonal strain it must be noted in the Monitoring Report (due to the accuracy of this equipment).
- Table 13, Monitoring frequency and Duration for Post Mining should be updated to read – For at least one month after completion of mining LW57/ LW58 and no further changes observed in monitoring data.
- The inclusion of the requirement within the TARP Level 3 Triggers - Differential vertical subsidence between legs >10mm.

Finally, could the below table be update to include my position as Asset Strategist (circled red), and remove Sunil's contact details (circled green) as the Transgrid designer and replace with Sanu's as follows:

Sanu Maharjan
T: (02) 9284 3446
E: Sanu.Maharjan@transgrid.com.au

Mandalong Mine	Contact	Phone No.	Mobile No.	Email
Mining Approvals Coordinator	Clint Allen	49730948	0408 372 152	clint.allen@centennialcoal.com.au
Subsidence Surveyor	Mark Harrower	49730955	0447 234 185	mark.harrower@centennialcoal.com.au
Technical Service Superintendent	Jarred Stanes	49730951		jarred.stanes@centennialcoal.com.au
Environmental Coordinator	Jeff Dunwoodie	49730947	0448 490 023	jeffrey.dunwoodie@centennialcoal.com.au
Mine Manager	Justin Peterkin	49730931		justin.peterkin@centennialcoal.com.au
Purchasing Coordinator	Amy Hancock	49730939	0414 713 711	amy.hancock@centennialcoal.com.au
Emergency Order No. Procedure MAN6257				
Control Room (24hr)	Control Room Operators	49730901 or 49730902	0428 247 788	mandalong.control@centennialcoal.com.au
TransGrid				
Project Manager – Works Delivery	Melissa Daniels	(02) 9620 0416	TBC	matthew.heath@transgrid.com.au
Designer	Sunil Palikhe	9284 3144		Sunil.Palikhe@transgrid.com.au
TransGrid System Operation		9620 0121		system.operator@transgrid.com.au
TransGrid Maintenance Group		9620 0350		TransmissionLines.andEasementsMaintenance@transgrid.com.au
TransGrid Emergency Number		1800 027 253		
Subsidence Advisory NSW				
Emergency Service	24hr Emergency Service	1800 248 083		
Department of Regional NSW - Resources Regulator				
Principal Subsidence Engineer	Ray Ramage	1300 814 609	0422 551 293	ray.ramage@regional.nsw.gov.au

Transgrid | 200 Old Wallgrove Road, Wallgrove, NSW, 2766

T: (02) 9620 0161 **M:** 0427 529 997

E: Michael.Platt@transgrid.com.au **W:** www.transgrid.com.au



We acknowledge the Aboriginal and Torres Islander people as the Traditional Custodians of the land which we provide our services. We pay our respects to their Elders, past and present.



Data Classification: *Sensitive*

Disclaimer:

This e-mail may contain privileged and confidential information intended only for the addressees named above. If you are not the intended recipient please delete this e-mail and advise the sender. TransGrid's Privacy Policy is available on our website <https://www.transgrid.com.au/privacy>. Any use, dissemination, distribution, reproduction of this email is prohibited. Unless explicitly attributed, the opinions expressed in this e-mail are those of the author only and do not represent the official view of TransGrid. E-mail communications with TransGrid may be subject to automated e-mail filtering, which could result in the delay or deletion of a legitimate e-mail before it is read by its intended recipient. TransGrid does not accept liability for any corruption or viruses that arise as a result of this e-mail.

"COVID-19 UPDATE: TransGrid office personnel have transitioned to working remotely, staying home to keep our people and community safe while working to ensure that we continue to provide the support you need during these uncertain times. We appreciate staying connected is important so while face-to-face meetings have been suspended due to physical distancing requirements, we offer other ways for you to contact us, meet with us and access the people, information and resources you require." Please consider the environment before printing this e-mail.

FW: 2024-027 Mandalong Mine Request for Urgent Review: Variation to LW57-60 Extraction Plan [Official]

Easements&Development <Easements&Development@transgrid.com.au>

Tue 1/30/2024 7:08 AM

To: Clint Allen <Clint.Allen@centennialcoal.com.au>

Hi Clint,

Transgrid Reference number: 2024 - 027

Location: Centennial Mandalong Mine

Proposal: Variation to LW57-60 Extraction Plan

Transgrid: Transmission Line 25/26 Structures 36 – 37

Please see comments from Sanu in regard to Transgrid Reference Number: 2024 – 027 Centennial Mandalong Mine Variation to LW57-60 Extraction Plan

- I do not see issue with amended proposal

Regards

Michael

Michael Platt

Easements & Development Assessment Advisor | Community and Policy

Transgrid | 180 Thomas Street, Sydney, NSW, 2000

T: (02) 9620 0161 **M:** 0427 529 997

E: Michael.Platt@transgrid.com.au **W:** www.transgrid.com.au

Data Classification: Official

From: Sanu Maharjan <Sanu.Maharjan@transgrid.com.au>

Sent: Thursday, January 25, 2024 5:45 PM

To: Easements&Development <Easements&Development@transgrid.com.au>

Cc: Michael Platt <Michael.Platt@transgrid.com.au>

Subject: RE: 2024-027 Mandalong Mine Request for Urgent Review: Variation to LW57-60 Extraction Plan [Official]

Hi Michael,

I do not see issue with amended proposal.

Regards

Sanu

Sanu Maharjan

Senior Structural Engineer - Transmission Line and Cable Design | Delivery

Transgrid | 180 Thomas Street, Sydney, NSW, 2000

T: (02) 9284 3446 **M:** 0408 574 445

E: Sanu.Maharjan@transgrid.com.au **W:** www.transgrid.com.au

Data Classification: Official

From: Easements&Development <Easements&Development@transgrid.com.au>
Sent: Thursday, January 25, 2024 10:09 AM
To: Sanu Maharjan <Sanu.Maharjan@transgrid.com.au>
Subject: 2024-027 Mandalong Mine Request for Urgent Review: Variation to LW57-60 Extraction Plan [Official]

Hi Sanu,

Transgrid Reference number: 2024 - 027

Location: Centennial Mandalong Mine

Proposal: Variation to LW57-60 Extraction Plan

Transgrid: Transmission Line 25/26 Structures 36 – 37

Clint from Centennial has called asking if Transgrid could respond to variation ASAP as they have a very tight schedule.

Could you please review ASAP.

Thanks

Michael

Michael Platt

Easements & Development Assessment Advisor | Community and Policy

Transgrid | 180 Thomas Street, Sydney, NSW, 2000
T: (02) 9620 0161 **M:** 0427 529 997
E: Michael.Platt@transgrid.com.au **W:** www.transgrid.com.au

Data Classification: Official

From: Matthew Heath <Matthew.Heath@transgrid.com.au>
Sent: Wednesday, January 10, 2024 11:59 AM
To: Easements&Development <Easements&Development@transgrid.com.au>; Sanu Maharjan <Sanu.Maharjan@transgrid.com.au>
Cc: Michael Platt <Michael.Platt@transgrid.com.au>; Charles Kurniawan <Charles.Kurniawan@transgrid.com.au>
Subject: RE: Mandalong Mine Request for Urgent Review: Variation to LW57-60 Extraction Plan [Official]

Hi Michael,

Unless Sanu identifies something that increases the risk to our assets which is not addressed under the updated monitoring schedule I do not see any problems with the amended proposal. The alteration is due to the Longwall 58 being reduced in length and subsequently finishing further away from our assets (TL 25/26, structure 36 and 37) than previously planned.

Kind regards,

Matthew Heath

Transmission Line and Cable Asset Strategist | Network

Transgrid | 200 Old Wallgrove Road, Wallgrove, NSW, 2766
T: (02) 9620 0416
E: Matthew.Heath@transgrid.com.au **W:** www.transgrid.com.au

Data Classification: Official

From: Easements&Development <Easements&Development@transgrid.com.au>
Sent: Monday, January 8, 2024 11:19 AM
To: Matthew Heath <Matthew.Heath@transgrid.com.au>; Sanu Maharjan <Sanu.Maharjan@transgrid.com.au>
Cc: Michael Platt <Michael.Platt@transgrid.com.au>
Subject: FW: Mandalong Mine Request for Urgent Review: Variation to LW57-60 Extraction Plan

Matthew and Sanu

We have received a request from Clint Allen of Centennial Mining for a further variation to an LW57-60 Extraction Plan at Centennial Mandalong – see below.

Michael Platt was looking after this matter and Michael returns from Long Service Leave next Wednesday.

It would be appreciated if you can review Centennial's request and provide a response for Michael to review next week.

Regards

Stephen Mair

Easements and Development Assessment Advisor | Community and Policy

Transgrid | 180 Thomas St Sydney, NSW, 2000

T: () **M:** 0412 625 959,

E: Stephen.Mair@transgrid.com.au **W:** www.transgrid.com.au

We acknowledge the Aboriginal and Torres Islander people as the Traditional Custodians of the land which we provide our services. We pay our respects to their Elders, past and present.

Data Classification: Official

From: Clint Allen <Clint.Allen@centennialcoal.com.au>
Sent: Friday, January 5, 2024 2:15 PM
To: Easements&Development <Easements&Development@transgrid.com.au>
Subject: Mandalong Mine Request for Urgent Review: Variation to LW57-60 Extraction Plan

Dear Matthew,

I trust this email finds you well. I am writing to inform you about a proposed second variation to the LW57-60 Extraction Plan at Centennial Mandalong. The primary objective is to reduce the length of Longwall 58, thus avoiding the mining of a seam split area. In this modification, the longwall 58 recovery roadway will be relocated to the East of the original position.

The reduction in the extraction area falls within the assessed extents of Longwall 57-60 as outlined in the Extraction Plan. Importantly, this adjustment will not increase the previously assessed impacts. However, it will necessitate minor updates to the monitoring schedule chainage locations for TL25/26 Transmission towers (36 & 37) specified in the TransGrid Management Plan.

Attached to this email, you will find the revised version of the Transmission Line Management Plan (TransGrid TL25/26 Towers 36 – 37, Longwall 57-60 MEMS-EP-9000-TLMP-9053 - Rev 2 - December 2023). The key changes made for this revision are outlined below:

1. Reductions in the predicted subsidence impacts to towers TL25/26 Towers 38 & 39 in table 7 and 8 (per DGS Report No. MAN-007-6 Variation to LW58 Subsidence Assessment Dec 2023).
2. Figure 2 is updated (Mine workings only).
3. Monitoring schedule for Tower 36 - 37, LW58 chainages adjusted due to the change in longwall 58 ending position - section 10.2.1, section 10.2.2, and table 12. Please note that there is no change to predicted subsidence impacts for Towers 36 & 37.
4. Appendix 2 Subsidence Monitoring Plan (CM 269) has been updated.
5. Inclusion of the latest Geotechnical report by Ditton Geotechnical Services Pty Ltd - DGS Report No. MAN-007-6 Variation to LW58 Subsidence Assessment Dec 2023.

I kindly request your prompt review and feedback on these proposed changes as I am required to submit this variation within the month of January. Feel free to contact me should you have any questions or require additional information.

Thank you for your attention to this matter.

 [Mandalong Mine TransGrid TL25-26 Tower 36-37 Management Plan Rev2_240105_1.pdf](#)
 [CM00269_Rev2.pdf](#)  [DGS Report No. MAN-007-6 Variation to LW58 Subsidence Assessment Dec 2023.pdf](#)

Regards

Clint Allen

Approvals Coordinator

p: +61 (0) 2 4973 0948 | m: +61 (0) 4 0837 2152

Centennial | Mandalong

12 Kerry Anderson Drive | Mandalong | NSW | 2264 | Australia

centennialcoal.com.au

Attention:

This message and any files transmitted with it are confidential and intended solely for the use of those persons to whom the message is addressed. If you have received this message in error please notify the sender immediately and then delete this message. Any unauthorised form of reproduction of this message or any files transmitted with it is strictly prohibited. Any views or opinions presented in this message are solely those of the author and do not necessarily represent those of Centennial Coal Company Pty Limited. The recipient should check this message and any attachments for the presence of viruses. Centennial Coal Company Pty Limited accepts no liability for any damage caused by any virus transmitted by this message.

Disclaimer:

This e-mail may contain privileged and confidential information intended only for the addressees named above. If you are not the intended recipient please delete this e-mail and advise the sender. TransGrid's Privacy Policy is available on our website <https://www.transgrid.com.au/privacy>. Any use, dissemination, distribution, reproduction of this email is prohibited. Unless explicitly attributed, the opinions expressed in this e-mail are those of the author only and do not represent the official view of TransGrid. E-mail communications with TransGrid may be subject to automated e-mail filtering, which could result in the delay or deletion of a legitimate e-mail before it is read by its intended recipient. TransGrid does not accept liability for any corruption or viruses that arise as a result of this e-mail.

"COVID-19 UPDATE: TransGrid office personnel have transitioned to working remotely, staying home to keep our people and community safe while working to ensure that we continue to provide the support you need during these uncertain times. We appreciate staying connected is important so while face-to-face meetings have been suspended due to physical distancing requirements, we offer other ways for you to contact us, meet with us and access the people, information and resources you require." Please consider the environment before printing this e-mail.

Centennial Mandalong

**12 Kerry Anderson Drive
Mandalong NSW 2264
PO Box 1000
Toronto NSW 2283
Telephone 1800 730 919
Facsimile 49 730 999**
