Stature for Risk Management

Administration:

Risk Assessment Title: Mandalong Extraction Plan LW30-31 Built Features
Revision: 1
Region: North
Site: Mandalong
Department: ZZZZ Whole Site
Equipment / Process: Community
Stature Risk Assessment No.: 1001284061
Study Lifecycle State: Risk Assessment In Progress
Potential Hazard No.: 43795
PULSE Actions Required URL:
Site Risk Assessment Ref. No. (Optional):

Study Approval

Approver	Approved / Rejected	Date	Comments
1. Col Macdonald	Approved	Feb 15, 2021	

1. Background

An Extraction Plan is required by the Department of Planning, Industry and Environment (DPIE) as specified Development Consent SSD-5144 and Mining Lease conditions.
This Risk Assessment will identify and manage the risks to health and safety associated with subsidence caused by the extraction for LW30-31 on built features.

Longwalls 30 and 31 have been reoriented in a south-west to north-east direction as approved by MOD 9 to SSD-5144.

Both TransGrid TL24 and TL25/26 are located outside the Extraction Plan Area for LW30-31.

The majority of the area is freehold land with a limited number of dwellings and unsealed access roads.

An Ausgrid 11kV line traverses the Extraction Plan Area, supplying a limited number of properties.

Telstra communication line traverses the extraction area.

2. Objective

The following Hierarchy of Controls offers a framework for considering the effectiveness of controls. Note that the effectiveness of a control that is intended to reduce a risk decreases from top to bottom of the list. In other words, the closer the control type is to the top of the hierarchy, the more potentially effective the control.

·Eliminate the hazard or energy source (do not use the energy)
·Minimise or replace the hazard or energy source (reduce the amount of energy to a less damaging level or replace the energy with another that has less potential negative consequences)
·Control the hazard or energy using engineered devices (ex. Lock outs, chemical containers, mechanical roof support, gas monitors, etc.)
·Control the hazard or energy by using physical barriers (ex. machine guarding, fences or enclosures, etc.)
·Control the hazard or energy with procedures (ex. Isolation procedures, standard operating procedures, etc.)
·Control the hazard or energy with personal protective equipment (ex. hard hats, boots with toe caps, gloves, safety glasses, welding gear, etc.)
·Control the hazard or energy with warnings and awareness (ex. posters, labels, warning signs, verbal warnings, etc.)

To identify, assess and control the risks to health and safety caused by subsidence on built features, resulting from the extraction for LW30-31 .

3. Potential Hazards

Predicted subsidence
Subsidence at the worst-case, Upper 95% Confidence Limits

4. Risk Assessment Boundary Definition

This risk assessment covers built features located within the Extraction Plan Area for LW30-31.
Built features located on private property are assessed separately.
There are no reticulated water and gas lines in the Extraction Plan area.

5. Risk Assessment Methods

Risk Assessment Methods:

Workplace Risk Assessment and Control (WRAC): Yes
Fault Tree Analysis (FTA):
Safety Integrity Level Analysis to Australian Standard 61508 (SIL):
Bow Tie Analysis (BTA):
Failure Modes and Effects Analysis (FMEA):
Hazard and Operability Analysis (HAZOP):

6. Previous Risk Assessment and other documents to be used and/or referenced

Document Name	Title	Version	Referenced Document Date
Extraction Plan Risk Assessment LW25-31 Built Features			
Extraction Plan Risk Assessment LW25-31 PSMP			
Extraction Plan Risk Assessment LW25-31 Environment			
Draft Guidelines for the Preparation of Extraction Plans V5			
Managing Risk of Subsidence, Guide:WHS (Mines and Petroleum Sites Legislation) (NSW Department of Industry - Resources Regulator, 2017)			
Subsidence Prediction and Impact Assessment LW30-31, MAN-005/2 (Ditton Geotechnical Services, 2021)			
Flood Assessment Longwalls 1 to 33 (Umwelt, 2020)			
Telstra Communications Assessment Report for Extraction Plan LW30-33 (Comms Network Solutions, 2020)			
Built Features Management Plan LW25-31			
Plans MG14065 and MG14066 Proposed workings LW30-31 - surface features and infrastructure			

7. Venue and Time

Date	Description	Location	Start Time	End Time	Comment
1. 13-Jan-2021	Scoping	Mandalong	9:00 AM	2:30 PM	
2. 04-Feb-2021	Risk Assessment	Mandalong	10:00 AM	12:00 PM	

9. Risk Assessment Team Selection

Name	Position	Company	Industry Start Date	E-Mail Address	Role	Experience relevant to the role in the risk assessment	Pulse User No.	Attendance	
								1. 13-Jan-2021	2. 04-Feb-2021
Phil Enright	Subsidence Management Coordinator	Centennial Mandalong	23-Aug-1982	phil.enright@centennialcoal.com.au	Risk Assessment Owner	39	60001	P	P
Col MacDonald	Compliance Manager	Centennial Mandalong	06-Dec-1977	colin.macdonald@centennialcoal.com.au	Facilitator	43	80094	P	P
Stuart Macdonald	Safety Health Representative (SHR)	Centennial Mandalong	21-Jan-1985	stumac61@bigpond.com	Team Member	36	82111		P
Jeffrey Dunwoodie	Environmental & Community Coordinator	Centennial Mandalong	02-Dec-2002	jeffrey.dunwoodie@centennialcoal.com.au	Team Member	18	80084		P
Iain Hornshaw	Approvals Coordinator Approvals Manager	Centennial Coal		Iain.hornshaw@centennialcoal.com.au	Team Member	11	100066		P
Mark Harrower	Project Surveyor	Centennial Mandalong	14-Jan-1985	mark.harrower@centennialcoal.com.au	Team Member	36	80013		P
Dominic Neylan	Approvals Graduate	Centennial Coal		dominic.neylan@centennialcoal.com.au	Team Member	1			P
Kieran.Fiatarone	Environmental Graduate	Centennial Coal		kieran.j.fiatarone@centennialcoal.com.au	Team Member	1	100450		P

WRAC Analysis Worksheet

Step	Potential Incident	Current Controls	L	MRC	RR	Recommended Control	Bow Tie Extension
1. Public roads - Crown Roads Toefpers Rd and Kiar Ridge Rd, both unsealed.	There is a risk to Mandalong from ::: predicted subsidence on public roads ::: Caused by: ▪ expected geotechnical conditions Resulting in: ▪ damage to road pavement requiring repair ▪ development of significant cracking in pavement ▪ flood hazard ▪ ineffective road drainage ▪ risk to public safety ▪ rock rollout ▪ slope instability.	1.1.a. Public Roads Management Plan 1.1.b. Subsidence monitoring line established along Toefpers Rd LW30-31 1.1.c. Weekly visual inspections when road is within active longwall subsidence zone, then weekly for six months 1.1.d. Subsidence monitoring program 1.1.e. restricted access - locked gates at either end of roads (private property and Olney State Forest) 1.1.f. The roads are earth tracks only and 4 wheel drive access.	**C** (D)	1 (PI)	**4 (L)**		
	There is a risk to Mandalong from ::: subsidence at the worst- case, Upper 95% Confidence Limits affecting public roads ::: Caused by: ▪ geotechnical conditions being worse than anticipated Resulting in: ▪ damage to road pavement requiring repair ▪ development of significant cracking in pavement ▪ flood hazard ▪ ineffective road drainage ▪ risk to public safety ▪ rock rollout ▪ slope instability.	1.2.a. The roads are earth tracks only and 4 wheel drive access. 1.2.b. Public Roads Management Plan 1.2.c. Subsidence monitoring line established along Toefpers Rd LW30-31 1.2.d. Weekly visual inspections when access road is within active longwall subsidence zone, then weekly for six months 1.2.e. Subsidence monitoring program 1.2.f. Restricted access - locked gates at either end of roads (private property and Olney State Forest)	**D** (D)	1 (PI)	**2 (L)**		
2. Telstra communications network - Copper cables and supporting pits, conduits and joints	There is a risk to Mandalong from ::: predicted subsidence on Telstra communications network :::	2.1.a. Telstra Audit and Impact Assessment LW30-33 (Comms Network Solutions, 2020) 2.1.b. Aerial copper cables over LW30-33	**D** (D)	1 (R)	**2 (L)**		

Step	Potential Incident	Current Controls	L	MRC	RR	Recommended Control	Bow Tie Extension
	Caused by: ▪ expected geotechnical conditions Resulting in: ▪ damage to Telstra communications network ▪ interruption of service to customers ▪ risk to public safety.	2.1.c. No optical fibre cables within Extraction Plan Area 2.1.d. Communications Management Plan 2.1.e. Weekly visual inspections when access road is within active longwall subsidence zone, then weekly for six months 2.1.f. Public Safety Management Plan 2.1.g. Subsidence monitoring program					
	There is a risk to Mandalong from ::: subsidence at the worst- case, Upper 95% Confidence Limits affecting Telstra communications network ::: Caused by: ▪ geotechnical conditions being worse than anticipated Resulting in: ▪ damage to Telstra communications network ▪ interruption of service to customers ▪ risk to public safety.	2.2.a. Telstra Audit and Impact Assessment LW30-33 (Comms Network Solutions, 2020) 2.2.b. Aerial copper cables over LW30-33 2.2.c. No optical fibre cables within Extraction Plan Area 2.2.d. Communications Management Plan 2.2.e. Weekly visual inspections when access road is within active longwall subsidence zone, then weekly for six months 2.2.f. Public Safety Management Plan 2.2.g. Subsidence monitoring program	**D** (D)	1 (R)	**2 (L)**		
3. Ausgrid 11kV Powerlines	There is a risk to Mandalong from ::: predicted subsidence on powerlines ::: Caused by: ▪ expected geotechnical conditions Resulting in: ▪ damage to poles, cross arms, insulators and conductors ▪ interruption of service to customers ▪ reduced conductor ground clearance ▪ risk to public safety ▪ tilting poles causing increased or decreased conductor tension.	3.1.a. Powerline Management Plan 3.1.b. Ausgrid subsidence mitigation work to network 3.1.c. Public Safety Management Plan 3.1.d. Weekly visual inspections when access road is within active longwall subsidence zone, then weekly for six months 3.1.e. Subsidence monitoring program	**D** (IF)	2 (R)	**5 (L)**		

Step	Potential Incident	Current Controls	L	MRC	RR	Recommended Control	Bow Tie Extension
	There is a risk to Mandalong from ::: subsidence at the worst- case, Upper 95% Confidence Limits affecting powerlines ::: Caused by: ▪ geotechnical conditions being worse than anticipated Resulting in: ▪ damage to poles, cross arms, insulators and conductors ▪ interruption of service to customers ▪ reduced conductor ground clearance ▪ risk to public safety ▪ tilting poles causing increased or decreased conductor tension.	3.2.a. Mine design providing low levels of subsidence 3.2.b. Powerline Management Plan 3.2.c. Ausgrid subsidence mitigation work to network 3.2.d. Public Safety Management Plan 3.2.e. Weekly visual inspections when access road is within active longwall subsidence zone, then weekly for six months 3.2.f. Subsidence monitoring program	**D** (IF)	2 (R)	**5 (L)**		
4. Olney State Forest tracks and trails	There is a risk to Mandalong from ::: predicted subsidence on tracks and trails ::: Caused by: ▪ expected geotechnical conditions Resulting in: ▪ damage to track and trail ▪ ineffective road drainage ▪ risk to public safety ▪ rock rollout ▪ slope instability ▪ surface cracking.	4.1.a. Land Management Plan 4.1.b. Public Safety Management Plan 4.1.c. Weekly visual inspections when access road is within active longwall subsidence zone, then weekly for six months 4.1.d. restricted access - locked gates at either end of roads (private property and Olney State Forest) 4.1.e. The roads are earth tracks only and 4 wheel drive access.	**D** (D)	1 (PI)	**2 (L)**		
	There is a risk to Mandalong from ::: subsidence at the worst- case, Upper 95% Confidence Limits affecting tracks and trails ::: Caused by: ▪ geotechnical conditions being worse than anticipated Resulting in: ▪ damage to track and trail	4.2.a. The roads are earth tracks only and 4 wheel drive access. 4.2.b. Limited steep slope areas within Extraction Plan Area 4.2.c. Land Management Plan 4.2.d. Public Safety Management Plan 4.2.e. Weekly visual inspections when access road is within active longwall subsidence zone, then weekly for six months	**D** (D)	1 (PI)	**2 (L)**		

Step	Potential Incident	Current Controls	L	MRC	RR	Recommended Control	Bow Tie Extension
	▪ ineffective road drainage ▪ risk to public safety ▪ rock rollout ▪ slope instability ▪ surface cracking.	4.2.f. restricted access - locked gates at either end of roads (private property and Olney State Forest)					
5. State Survey Marks	There is a risk to Mandalong from ::: predicted subsidence on state survey marks ::: Caused by: ▪ expected geotechnical conditions Resulting in: ▪ change in state survey mark location ▪ incorrect coordinates and RL.	5.1.a. Built Features Management Plan 5.1.b. Subsidence monitoring program	**A** (D)	1 (F)	**11 (S)**	1. Investigate clearing for access to trig. station.	

Recommended Controls

Recommended Controls	Place(s) Used	Risk Ranking			Allocated To	Required By Date	Control Importance	Pulse User No.	PULSE Ref. No.
		L	C	RR					
1. Investigate clearing for access to trig. station.	Events: 5.1	**A**	1	11 (S)	Phil Enright	01-Apr-2021	1	60001	

CEY Risk Matrix Page 1

CENTENNIAL RISK MATRIX							Likelihood					
							A Certain	B Probable	C Possible	D Remote	E Improbable	Description (D)
Rating	Consequence Note: Consequence may result from a single event or may represent a cumulative impact over a period of 12 months. Use the worst case reasonable consequence if there is more than one.						Common	Has Happened within Centennial	Could Happen & has happened in non-CEY operations	Not Likely	Practically impossible	Probability (Pb)
	Financial Impact to Annual Business Plan (F)	Personal Injury (PI)	Business Interruption (BI)	Legal (L)	Reputation (R)	Environment (E)	Frequent incidents	Regular incidents	Infrequent incidents	Unlikely to occur. Very few recorded or known incidents	May occur in exceptional circumstances. Almost no recorded incidents.	Incident Frequency (IF)
							Operations – within 3 months	Operations – within 2 years	Operations – within 5 years	Operations – within 10 years	Operations – within 30 years	Operations (Op)
							Project – Every project	Project – Every 2 projects	Project – Every 5 projects	Project – Every 10 projects	Project – Every 30 projects	Project (Pr)
5. Catastrophic	>$50m	Multiple Fatalities	> 1month	Prolonged litigation, heavy fines, potential jail term	Prolonged International media attention	Long term impairment habitats/ ecosystem	25 (E)	24 (E)	21 (H)	19 (H)	15 (S)	
4. Major	$10m - $50m	Single Fatality	1 week to 1 month	Major breach/ major litigation	International media attention	Long term effects of ecosystem	23 (E)	22 (E)	18 (H)	14 (S)	10 (M)	
3. Moderate	$1m - $10m	Serious/ Disabling Injury	1 day to 1 week	Serious breach of regulation. prosecution/ fine	National media attention	Serious medium term environmental effects	20 (H)	17 (H)	13 (S)	9 (M)	6 (L)	
2. Minor	$100k - $1m	Lost Time Injury	12 hrs to 1 day	Non-compliance, breaches in regulation	Adverse local public attention	Minor effects to physical environment	16 (S)	12 (S)	8 (M)	5 (L)	3 (L)	
1. Insignificant	<$100k	First Aid Treatment Only	< 12 hrs	Low level compliance issue	Local complaints	Limited physical damage	11 (S)	7 (M)	4 (L)	2 (L)	1 (L)	

CEY Risk Matrix Page 2

Risk Rating	Risk Category		Generic Management Actions
22 to 25	E	Extreme	Action is required to eliminate or reduce the risk. If the risk is considered to be ALARP then the decision to accept the risk is to be made by Centennial Coal Chief Executive
17 to 21	H	High	Action is required to eliminate or reduce the risk. If the risk is considered to be ALARP then the decision to accept the risk is to be made by the relevant Centennial Coal Executive General Manager
11 to 16	S	Significant	Action is required to eliminate or reduce the risk. If the risk is considered to be ALARP then the decision to accept the risk is to be made by the Manager of the Centennial Coal Operation
7 to 10	M	Moderate	Action is required to eliminate or reduce the risk. If the risk is considered to be ALARP then the decision to accept the risk is to be made by the Manager of the Centennial Coal Operation
1 to 6	L	Low	Actions to eliminate or further reduce the risk should be considered. If risk is considered to be ALARP then the decision to accept the risk is to be made by the risk assessment owner (no recommended control is required to be created for this)

CEY Risk Matrix Page 3

BOW TIE ANALYSIS - Control Effectiveness Matrix

TYPE OF CONTROL	Examples	Description	Rank	Control Category	CONTROL – Impact / Status / Quality				
					A >= 80%	B 50 – 80%	C 50 / 50%	D 50 – 20%	E <= 20%
	Replace electric hand tools with compressed air alternatives in wet conditions	Eliminates a hazard by removal	1.	Elimination of hazard	100	45.0	40.0	14.0	10.0
	Replace large diameter, heavy cables with smaller ones that are easier to handle manually	Replace element with less risky alternative	2.	Substitution	85.0	40.0	35.0	13.0	8.5
	Automatic fire fighting sprinkler systems, Earth Leakage protection devices	An automatic device that operates without intervention by personnel	3.	Engineered without people	70.0	30.0	25.0	12.0	7.0
	Fire alarm that sounds & the operator then has to initiate an evacuation	A device that requires personnel to respond to a stimulus	4.	Engineered with people	50.0	20.0	14.0	10.0	5.0
	Inspection, maintenance and repair of machinery	A process carried out by personnel	5.	Procedural	20.0	15.0	10.0	6.5	2.0
	Employee made aware of dangers of large moving equipment where the operators have limited vision	Induction training programs	6.	Awareness	5.0	3.0	2.5	1.5	1.0