Appendix J

Public Safety Management Plan

DONALDSON COAL PTY LIMITED

ABEL MINE

Appendix J

Public Safety Management Plan

EP / SMP Area 4

May 2014

Prepared by	Daniel Lee	Document No		EP / SMP - Area 4 Public Safety Management Plan
Approved by	David Gibson	Version No	1	
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Document Control

Description

Document No.	Abel EP / SMP Area 4
Title	Public Safety Management Plan
General Description	To manage public safety in any surface areas that may be affected by subsidence from mining in Area 4 at Abel Mine
Key Support Documents	Abel Mine EP / SMP Area 4

Approvals

ORIGINATOR	Daniel Lee	Position Registered Surveyor	Signed	Date
REVIEWED	Tony Sutherland	Position Technical Services Manager	Signed	Date
APPROVED	David Gibson	Position Operations Manager	Signed	Date

Revisions

					Approved	
Version #	**Date**	**Description**	**By**	**Checked**	**Name**	**Signed**
1	May 2014					

The nominated Coordinator for this document is	Technical Services Manager

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1 PURPOSE AND SCOPE

This Management Plan describes the processes developed, including identification of key risks and proposed management strategies, to manage Public Safety in any surface areas that may be affected by subsidence arising from pillar extraction mining by Abel Mine in the Extraction Plan (EP) / Subsidence Management Plan (SMP) Area 4.

2 RESPONSIBILITIES AND RESOURCES

The Technical Services Manager - Donaldson Underground Operations is responsible for monitoring the implementation of this plan.

The Abel Manager of Mining Engineering is responsible for ensuring that sufficient resources are available to implement the requirements of this Plan.

Each of the management strategies developed to manage subsidence allocates responsibilities in relation to their implementation. Relevant personnel will be provided with a copy of appropriate documents. Training will be provided.

3 SUBMISSION

This plan is submitted to the Director Mine Safety Operations for approval.

4 BACKGROUND

Abel commenced coal production in May 2008 with secondary extraction commencing in July 2010. The EP / SMP application area contains 209ha, approximately 7.5% of the current lease area of 2755 ha.

Mining will take place in the application area under a combination of land owned by Donaldson Coal, and a number of private rural residential land holdings. The current application seeks approval to mine coal by the pillar extraction method from the Upper Donaldson Seam at depths of cover ranging generally from 50 to 280 metres.

The layout of the panels has been designed to provide management outcomes of subsidence impacts in line with the Statement of Commitments and Project Approval and to conduct the mining operations in a responsible manner, considering the existing and future environment and the community, while optimising resource recovery in the area in accordance with the principles of ecologically sustainable development. It is proposed to conduct mining in the proposed extraction panels generally bounded by the depth of cover and the lease to the north, the previously approved SMP Area 3 to the east and by resource thickness / quality of the Upper Donaldson seam to the south.

Maximum subsidence predicted for the pillar extraction panels in the application area is 1,450 mm, which represents 51% of the maximum extraction height of 2.8 metres, maximum predicted strains >30 mm/m and tilts up to 70 mm/m excluding areas nominated to be protected.

The EP / SMP application area surface is a combination of native bushland, residential rural properties, and public and private roads. Management measures are proposed to address any predicted environmental impacts for the surface above the application area.

Natural features are generally limited to Four Mile Creek, a Schedule 1 stream and associated tributaries, with some steep slopes above the southern ends of the proposed panels. The ecology assessment outcome was that subsidence would not result in a significant impact on any threatened flora or fauna species or any threatened or conservation significant ecological communities unless there was a significant long term loss of available water.

Man – made features include:

- Principal residences, Other Surface Structures and outbuildings;
- Business or commercial premises;
- Ausgrid rural 11kV and 415V domestic power lines;
- Telstra copper communication cables;
- Private communication tower;
- State survey control marks;
- Public roads and culverts (Black Hill Road, Meredith Road and Browns Road);
- Access roads and tracks;
- Cattle stockyards, holding areas and water troughs;
- Various fences, gates and cattle grids;
- A number of dams; and
- Aboriginal places and sites.

This Management Plan for Area 4 includes the regular inspection of surface areas, subsidence monitoring and outlines procedures and actions to be implemented to manage the safety of the general public in the surface areas of the EP / SMP approved area that may be affected by subsidence resulting from mining by Abel Mine

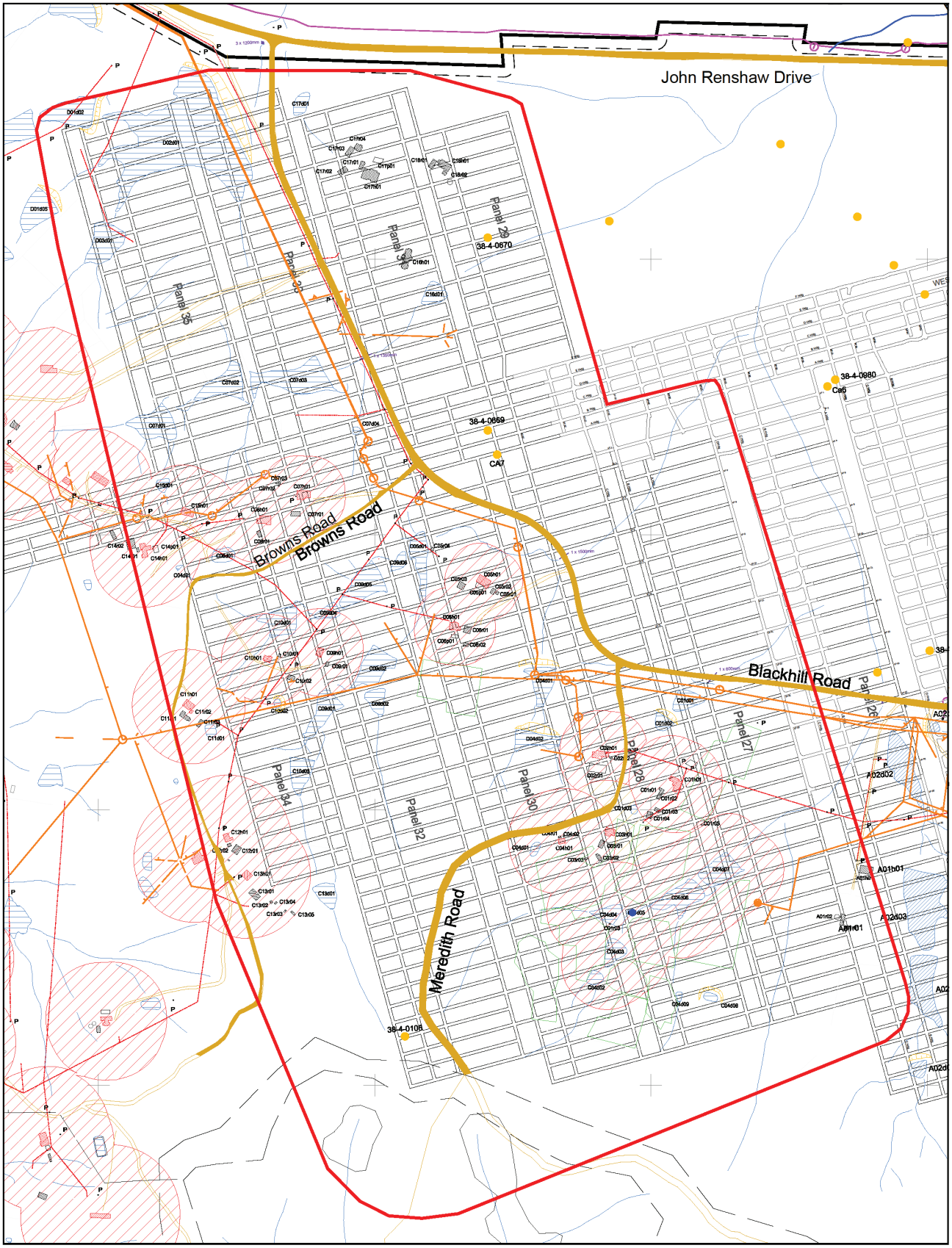

Figure 1 – Abel Mine EP / SMP Area 4

5 APPROACH TO PUBLIC SAFETY MANAGEMENT

The Mine's overall strategy to ensure Public Safety relating to the surface areas that may be affected by subsidence arising from partial pillar extraction is:

1. **Measure baseline information** – Established background data for the surface above the mining area by inspection and in certain areas also subsidence survey.

2. **Regular Monitoring of the effects of mining** – Continue monitoring and inspection of identified key positions relating to the extraction position

3. **Regularly assess and interpret monitoring and inspections** – Monitoring and inspection data is analysed to identify any variations from predictions, unexpected anomalies, visual impact or items presenting potential impact on Public Safety.

4. **Implement Immediate Responses –** If potential impact on Public Safety is observed or reported implement an immediate response including notification to the landowner.

5. **Re-assess any impacts** – where variations and/or impacts are greater than predictions made in the EP / SMP, as nominated in the Trigger, Action and Management Response Plan, additional assessment/investigation of impacts will be undertaken. This will be carried out by specialist consultants, Abel personnel and appropriate stakeholders where required.

6. **Identify and implement remedial actions** – if impacts require mitigation and /or remedial action, these actions will be implemented in conjunction with the landholder and appropriate relevant stakeholder.

6 PERFORMANCE MEASURES

The performance measures in relation to public safety will be based around reducing risk to members of the public to as low as reasonably practical. **Table 1.** Indicates the performance measures in relation to Public Safety for the EP / SMP Area.

Table 1. Public Safety Performance Measures

Subsidence Impact	Performance Measure
Surface cracking	Surface cracking or deformation remediated where required in accordance with the Land Management Plan (LMP) to not impact public safety.
Dams	Impacts to dam walls monitored and maintained to minimise risk of failure in accordance with individual Built Features Management Plan (BFMP) including Dam Monitoring Management Strategy (DMMS) and Water Management Plan (WMP).

Subsidence Impact	Performance Measure
Public roads	Public roads remediated to not impact on public safety in conjunction with the Mine Subsidence Board (MSB).
Steep slopes	Exclusions established where risk to public identified. Remedial measures implemented to remove risk.
Flooding and access	Access to and from private properties established to maintain safe passage.

7 IDENTIFICATION OF RISKS

The surface to be undermined is described in **Section 4.**

As part of the EP / SMP Area 4 application process a Risk Assessment was conducted to examine the potential impact created by subsidence on the surface above the Area 4 mining area. No public safety risks in the extreme risk category were identified. Four risks were identified in the high risk category, with one having a potentially catastrophic, 2 having a potentially major and one having a potentially minor consequence. All risks identified had either existing controls or additional controls / further actions which have been implemented or are available to identify, control or remediate these risks.

The possible Public Safety risks are listed below with a summary of the EP / SMP Area application Risk Assessment results relating to surface features attached as **Appendix A.**

- Personal injury from dam wall failure including flooding of John Renshaw Drive and Blackhill Road (Risk Assessment to be held prior to mining)
- Injury to road user on Blackhill Road, Meredith Road and Browns Road due to impact of mine subsidence (addressed in Built Features Management Plan)
- Injury to persons and/or animals, due to sinkholes (shallow workings)
- Damage and/or loss of clearance to 11kV Ausgrid powerlines
- Damage and/or loss of Telstra communication cables;
- Damage (cracking) to internal property access tracks;
- Damage (cracking) to general surface; and
- Tree falls due to subsidence

Controls, monitoring and remedial action, identified as core items have been addressed in this Management Plan including,

- Regular monitoring of areas posing potential safety risks – monitoring introduced though no high risk areas identified.
- Erection of warning signs along public roads, access roads and walkways – to include mine contact numbers to report damage and be installed prior to commencement of pillar extraction.
- Entry restrictions – identified as part of management actions and remedial measures if Public Safety Risk identified.

- Backfilling of dangerous surface cracks – noted as remedial measure if identified.
- Remediation of any areas with adverse grade impacts or potential ponding (deformation).
- Provision of timely notification of mining progress to the landholder, community and any other stakeholders where management of Public Safety is required – noted as part of management actions.

8 NOTIFICATION, MONITORING AND INSPECTION SCHEDULE

The subsidence from mining, in EP / SMP Area 4 is not expected to have a major impact on the general surface though there may be impact on the Black Hill Road, Meredith Road and Browns Road which will require actions and are addressed in the Built Features Management Plan. Management of Public Safety is largely controlled by programmed and targeted inspection as well as reviewing predicted subsidence against actual subsidence.

8.1 Notification

Notifications to any landholders, the general public, relevant stakeholders and appropriate authorities either have or will be provided. These include.

- Newspaper advertisements relating to the EP / SMP Application.
- Notification of EP / SMP approvals to relevant parties.
- Signposting of mining area.

8.2 Subsidence Monitoring

A description of the surface, relevant features and improvements above the extraction panels is contained in **Section 4** with locations of these items shown on the attached plan.

Monitoring is conducted as per the various Management Plans and Monitoring Programs submitted, consisting of a combination of subsidence surveys, surface and underground monitoring and inspections and monitoring of ecological conditions.

These Plans and Programs generally focus on intensive monitoring in the initial stages of pillar extraction and the long term monitoring of subsidence effects that may develop over time.

8.3 Subsidence Inspections

Inspections are to be conducted as per the various Management Plans and Monitoring Programs submitted, consisting of a combination of visual and photographic inspections as detailed in the Management Plans and Programs and referenced in **Table 2**.

8.4 Scope and Frequency of Inspections

Regular inspections, at frequencies detailed in the Management Plans and Programs are to be initially concentrated on the current mining area, mining location and subsidence area (based on 26.5 degrees angle of draw). Inspections are concentrated on items identified in the initial pre-mining survey.

Inspections are carried out by experienced persons and follow an inspection checklist to include the items noted above.

At the completion of mining in each panel a full surface inspection will be conducted and results included in the Subsidence Management Status Report.

Listed below is a schedule of inspections and subsidence survey frequencies of areas of potential Public Safety risk (**Table 2**).

9 ACTIONS AND REMEDIAL MEASURES

Abel will install appropriate warning signage, positioned along public and property access roads and property boundaries, prior to the commencement of pillar extraction, advising of the potential for subsidence impacts. The objective of the signage is to ensure users of the public and access roads and surrounding area are aware of potential hazards resulting from subsidence. Mine contact details shall be included to enable any damage to be reported.

Visual inspections will identify impacts on access roads or natural features. Inspections and monitoring noted in the relevant Management Plans will identify impacts on infrastructure and improvements.

9.1 Public Safety Issues Identified During Inspections or Monitoring

If these inspections reveal any Public Safety issue (see **Table 3**) that requires remedial works to ensure Public Safety the person conducting the inspection shall:

- Immediately notify the Manager of Mining Engineering and/or Environmental Manager of the findings.

- Erect “NO ROAD” or barrier tape and warning signs if immediate remediation is not possible

- The Manager of Mining Engineering shall immediately notify the District Inspector of Coal Mines, landholder and any infrastructure owner.

9.2 Remediation of Public Safety Issues

Following completion of the above, the Manager of Mining Engineering or his nominee shall:

- Arrange inspections of area at regular intervals including installation of appropriate barriers if required, until remediation works are carried out.

- Arrange for remediation works as detailed in **Table 3**. This will require consultation with the Department of Trade and Investment, Regional Infrastructure and Services, landholder, possibly Mine Subsidence Board, infrastructure owner, specialist consultants and appropriate stakeholder, as noted in current Management Plans and Programs, to prepare appropriate remediation plan relating to the particular item. Notification to the general public may form a part of the remediation plan.

9.3 Adaptive Management

It is unlikely based on subsidence predictions and previous mining impact observed in SMP Areas 1, 2 and 3 thus far that nay adaptive management will be required. If however continued impact outside that expected occurs due to mining subsidence, Abel Mine is committed to reviewing options with landholders, the MSB and service/infrastructure providers to put measures in place to prevent on-going reoccurrence.

9.4 Contingency Plans

Where any unexpected and uncontrolled public risk presents itself, Abel Mine will provide on-going resources to prevent access to the affected area until such time a remediation plan can be enacted. If this prevents members of the public access to their residence, Abel Mine will assist in making alternative arrangements including temporary accommodation.

10 TRAINING

All personnel who conduct Subsidence Monitoring Program inspections will be trained in the requirements of this Public Safety Management Plan. Training will be conducted on the identification of the various subsidence impacts and the associated public safety risks.

11 REPORTING

Results of subsidence surveys, visual inspections and photographic monitoring will be documented with the Subsidence Monitoring Program. The effectiveness of the Panel 27 to 35 Public Safety Management Plan in managing public safety risks will be reported where relevant in the Extraction Plan Stakeholder Reporting process and the Annual Review / Annual Environmental Management Report.

Additionally, notification will be provided to relevant Authorities of any incident or occurrence as detailed in the Triggers Actions and Management Responses.

12 REVIEW

This plan will be reviewed as necessary including:

- In the event that the Director Mine Safety Operations raises issues that necessitate a review;
- In the event that any of the landholders or infrastructure owners raise issues that necessitate a review;
- Inspections or monitoring demonstrate that the impacts are such that a review is warranted.

Any review will be conducted in consultation with the Director Mine Safety Operations and landholder. In the event of the management plan being changed a copy will be sent to the relevant agencies.

Table 2: Inspection and Survey Schedule

Area of Influence	Visual Inspection Frequency	Visual Inspection by	Photographic Monitoring Frequency	Photographic Monitoring by	Subsidence Survey Frequency	Subsidence Survey by
• Private Properties requiring an individual BFMP - Property Subsidence Management Plan (Including dams, access tracks, fences, other structures etc)	Pre and post mining plus Monday, Wednesday and Friday while in active mining zone (frequency increased to daily if triggers exceeded as per TARP)	Technical Services representative	Pre and post mining plus if changes noted on visual inspections	Technical Services representative	As detailed in Subsidence Monitoring Program and individual BFMP - PSMP	Abel survey staff or external survey contractor
• Donaldson Coal owned land	Pre and post mining plus weekly while in active mining zone	Technical Services representative	Pre and post mining plus if changes noted on visual inspections	Technical Services representative	As detailed in Subsidence Monitoring Program and PuSMP	Abel survey staff or external survey contractor
• Infrastructure - Ausgrid power lines	Refer to the Built Features (Ausgrid) Management Plan					
• Infrastructure – Public Roads	Refer to Built Features (Public Roads) Management Plan					
• Infrastructure – telecommunication cables	Refer to Built Features (Telstra) Management Plan					

Results of each survey will be forwarded to the Principal Subsidence Engineer in accordance with the relevant Management Plan.

ABEL MINE – TRIGGER ACTION RESPONSE PLAN (TARP)

SUBSIDENCE MANAGEMENT PANEL 27 TO PANEL 35

			CONTAINMENT / REMEDIATION MEASURES	ADAPTIVE MANAGEMENT MEASURES & CONTINGENCY PLANS
Triggers	SUBSIDENCE PARAMETERS	**Normal** **LESS THAN MAXIMUM PREDICTED**	Monitoring as per SM Program	
		Trigger Level 1 **EXCEEDS MAX PREDICTED SUBSIDENCE PARAMETERS FOR EACH PANEL (by less than 15%)**	Monitoring as per SM Program Notify OM, TSM and ECM	Review subsidence predictions based on monitoring data
		Trigger Level 2 **EXCEEDS MAX PREDICTED SUBSIDENCE PARAMETERS FOR EACH PANEL (by more than 15%)**	Notify P&E and DTIRIS Notify affected landholders and/or infrastructure owners	Increase frequency of subsidence parameter monitoring Update subsidence predictions based on monitoring data Update impact assessment on natural and built features Review mine plan including panel width and pillar widths in consultation with P&E and DTIRIS Review and update Extraction Plan
	PRINCIPAL RESIDENCES (PROTECTED)	**Normal** **LESS THAN MAXIMUM PREDICTED 20mm**	Monitoring as per SM Program & BFMP	
		Trigger Level 1 **EXCEEDS MAX PREDICTED SUBSIDENCE PARAMETERS 20mm**	Notify OM, TSM and ECM Notify P&E and DTIRIS Notify affected landholder	Increase frequency of subsidence parameter monitoring Update impact assessment on principal residence Review mine plan including Subsidence Control Zones in consultation with P&E and DTIRIS Review and update Extraction Plan
	BUILT FEATURES (PRIVATE PROPERTY)	**Normal** No damage requiring remediation	Monitoring as per Individual Built Features Management Plans (BFMP)	
		Trigger Level 1 Built Feature experience damage below Safe Serviceable Repairable (SSR) criteria	Notify landholder Assist landholder with information to aid in MSB claim Monitoring as per Individual Built Features Management Plans (BFMP) Implement measures as per the BFMP	Review impact assessment based on observed damage Review landholder BFMP
		Trigger Level 2 Built Feature experiences damage above Safe Serviceable Repairable (SSR) criteria	Notify landholder Notify P&E and DTIRIS Assist landholder with information to aid in MSB claim Implement measures as per the BFMP	Update impact assessment based on observed damage Review landholder BFMP
	BUILT FEATURES (INFRASTRUCTURE) (POWERLINES, TELECOMMUNICATIONS & PUBLIC ROADS)	**Normal** No damage requiring remediation	Monitoring as per Individual Built Features Management Plans (BFMP)	
		Trigger Level 1 Built Feature experience damage below Safe Serviceable Repairable (SSR) criteria	Notify infrastructure owner Assist infrastructure owner with information to aid in MSB claim Monitoring as per Individual Built Features Management Plans (BFMP) Implement measures as per the BFMP	Review impact assessment based on observed damage Review individual BFMP for services in conjunction with Infrastructure owner to ensure these remain safe and serviceable
		Trigger Level 2 Built Feature experience damage above Safe Serviceable Repairable (SSR) criteria	Notify infrastructure owner Notify DTIRIS Assist infrastructure owner with information to aid in MSB claim Monitoring as per Individual Built Features Management Plans (BFMP) Implement measures as per the BFMP	Update impact assessment based on observed damage Review individual BFMP for services in conjunction with Infrastructure owner to ensure these remain safe and serviceable
	SURFACE IMPACTS THAT RESULTS IN PUBLIC SAFETY ISSUES	**Normal** Minor cracking as detailed in LMP	Monitoring as per SM Program, LMP and PuSMP	
		Trigger Level 1 Moderate cracking, surface irregularities (ie humps), unstable trees	Notify landowner in accordance with PuSMP Rehabilitate landform, land use and ecosystem function to that of existing pre mining in accordance with LMP in consultation with landowner	Review impact assessment based on observed damage
		Trigger Level 2 Major cracking, surface irregularities (ie humps), erosion Mass movement of steep slope	Notify landowner in accordance with PuSMP Rehabilitate landform, land use and ecosystem function to that of existing pre mining in accordance with LMP in consultation with landowner Notify DTIRIS Implement public safety risk mitigation in accordance with PuSMP (notification, warning signs, traffic control)	Update impact assessment based on observed damage Provide ongoing resources to prevent access to the affected area until remediation plan can be enacted Remediate in accordance with LMP
	WATERCOURSE MANAGEMENT (WATER QUALITY)	**Normal**		
		Trigger Level 1 Salinity (EC) levels above the trigger level occur for 3 consecutive months	Increase monitoring frequency of metals (Fe, Al, Mn) to monthly to establish whether water quality is being impacted by underground mining.	Review impact assessment
		Trigger Level 2 Fe, Al or Mn levels exceed the trigger level for 3 consecutive months	Investigate contaminant pathways to identify source of contamination through further assessment.	Develop mitigation plan to manage and remediate contamination
	WATERCOURSE MANAGEMENT (CHANNEL / BANK STABILITY)	**Normal** Minor cracking as detailed in LMP	Monitoring as per SM Program, LMP and PuSMP	
		Trigger Level 1 Moderate cracking in creek bed / banks, surface irregularities (i.e. humps), unstable trees, scouring of bed / banks	Rehabilitate landform, land use and ecosystem function to that of existing pre mining	Review impact assessment based on observed damage
		Trigger Level 2 Major cracking, surface irregularities (ie humps), major scouring of bed / banks	Rehabilitate landform, land use and ecosystem function to that of existing pre mining in accordance with LMP in consultation with landowner	Update impact assessment based on observed damage Provide ongoing resources to prevent access to the affected area until remediation plan can be enacted
	FLOOD AND PONDING	**Normal** No change in drainage or ponding	Monitoring as per SM Program and Land Management Plan	
		Trigger Level 1 Drainage or ponding impacts land use in a way it hadn't prior to subsidence or additional erosion due to change in water drainage patterns	Develop plan in consultation with landowner	Remediate in accordance with LMP
		Trigger Level 2 Ponding prevents access to property	Correct drainage to allow temporary access	Correct drainage flow to prevent future access issues
	CULTURAL HERITAGE	**Normal** No impact to identified sites	Monitoring as per HMP	
		Trigger Level 1 Remediation required in area of identified artefact Remediation encounters new Cultural Heritage site	Surface collection in accordance with HMP If sites found during remedial works notify Registered Aboriginal Parties and OEH, follow protocol in HMP	Temporary storage of sites for repositioning after works Complete Aboriginal Site Impact Recording Form per HMP
		Trigger Level 2 Subsidence impact on grinding groove		
	ECOLOGICAL MONITORING	**Normal** No impact of terrestrial flora and fauna	Monitoring as per Biodiversity Management Plan	
		Trigger Level 1 Isolated subsidence induced impact on terrestrial flora and fauna identified by Ecologist or SM Program	Develop remediation plan as appropriate in consultation with land owner	
		Trigger Level 2 Isolated subsidence induced impact on threatened terrestrial flora and fauna identified by Ecologist or SM Program	Determine if subsidence incident has occurred in consultation with specialists Review of monitoring data	Undertake corrective actions in consultation OEH and landowner Monitor after completion to ensure effectiveness
Responsibilities	OPERATIONS MANAGER	Ensure adequate resources are available to implement the Extraction Plan		
	TECHNICAL SERVICES MANAGER	Arrange monitoring as per the Built Features MP Arrange monitoring as per Land MP Arrange monitoring as per Public Safety MP Owner of the BFMP, LMP & PuSMP Owner of the Coal Resources Recovery Plan	Assist Built Feature owner with MSB claim Notify DRE and PSE of identified public safety issues Notify P&E and DRE of subsidence exceedance Notify landholder of subsidence exceedance Arrange temporary water replacement as required Arrange pre mining subsidence building inspections per BFMP	Update subsidence prediction and impact assessment as required Increase frequency of subsidence monitoring in consultation with PSE Signage and access restriction as per PuSMP Stabilise unstable structures Reduce safety hazards to that or pre mining Review mine plan as required in consultation with P&E and DRE
	ENVIRONMENT & COMMUNITY MANAGER	Arrange monitoring as per Biodiversity Management Plan Arrange monitoring as per HMP Arrange monitoring as per the Water Management Plan Owner of the BMP, HMP & WMP Seek access for monitoring programs	Rehabilitate landform in accordance with LMP, WMP, BMP and HMP Develop biodiversity remediation plan in consultation with land owner	Provide ongoing resources to prevent access to the affected area until remediation plan can be enacted Develop remediation strategy with OEH Correct drainage to prevent future access issues
	REGISTERED MINE SURVEYOR	Arrange monitoring as per Subsidence Monitoring Program Undertake subsidence monitoring as per SMP, LMP, BFMP and PuSMP		

APPENDIX A – RISK ASSESSMENT RESULTS TABLE – NATURAL FEATURES AND SURFACE IMPROVEMENTS – EP / SMP AREA 4

P#	Process	S#	Sub-process	H#	Risk Issue	Causes	Existing Controls	Loss Type	Consequence	Likelihood	Risk Rank	Risk Level	Further Actions
3	Farm Land and Facilities	3.05	Farm dams and water reticulation system (Large northern dam - Talley dam)	3.05.02	Personal injury from dam wall failure including flooding of John Renshaw Dr and Blackhill Rd	1. Cracking 2. Strains 3. LTA dam condition	1. 3 x 1200 diameter culverts under John Renshaw Dr 2. Develop Dam Monitoring and Management Strategy (DMMS) for all dams prior to any mining occurring which will impact on the dams 3. PSMP process	P	5	D	19	H	1. Develop specific DMMS and PSMP 2. Consider partial extraction system under dam 3. Consider installing an extensometer and piezometer in adjacent Panel prior to undermining dam 4. Survey dam 5. Conduct dam specific RA including public safety on John Renshaw Dr and inrush potential 6. CL88 process 7. review impacts on previously undermined dams 8. Consult with RMS
2	Public Utilities	2.04	State Survey marks	2.04.01	Use of disturbed State Survey Marks	1. Disturbance of State Survey Marks due to subsidence	1. Location of marks known 2. Notify Department of Lands 3. Requirement to re-establish marks following subsidence	O	2	A	16	H	1. Conduct further searches to identify State Survey Marks

P#	Process	S#	Sub-process	H#	Risk Issue	Causes	Existing Controls	Loss Type	Consequence	Likelihood	Risk Rank	Risk Level	Further Actions
2	Public Utilities	2.01	Roads (all types, including culverts)	2.01.01	Injury to road user on Blackhill Rd, Meredith Rd and Browns Rd due to impact of mine subsidence	1. Cracking 2. Steps (Scarps) 3. Change in road profile 4. Reduction in sight distance on road 5. Change in drainage / damage to culverts 6. Tree falling	1. Road management plan with Cessnock City Council 2. Public Safety Management Plan 3. Ongoing consultation 4. Industry experience mining under roads at similar depth 5. Experience from SMP Area 3	P	4	D	14	H	1. Review and update Built Feature MP including Road MP and Public Safety MP 2. Review Blackhill Rd risk assessment to include Meredith and Browns Rd 3. Panel design to minimise impact to Blackhill Rd
7	Other	7.01	Sinkholes	7.01.01	Injury to persons and/or animals	1.Subsidence	1. No extraction <50m depth of cover 2. Full extraction in Area 4 3. Full extraction in borehole seam workings 200m above Panels 30 and 32 4. Archival research on historical workings	P	4	D	14	H	1. Borehole seam reactivation issue to be assessed in MSEC report 2. Assess 50m depth of cover over Panel 29
3	Farm Land and Facilities	3.02	Internal access roads / tracks	3.02.01	Damage to internal property access tracks	1. Cracking 2. Steps (Scarps) 3. Change in road profile 4. Change in drainage 5. Tree falling	1. Previous Donaldson experience 2. Ongoing consultation with property owners 3. Established methods of remediation 4. PSMP process	O	2	B	12	M	1. Develop specific PSMP's

P#	Process	S#	Sub-process	H#	Risk Issue	Causes	Existing Controls	Loss Type	Consequence	Likelihood	Risk Rank	Risk Level	Further Actions
3	Farm Land and Facilities	3.05	Farm dams and water reticulation system (Large northern dam - Talley dam)	3.05.01	Damage to dam resulting in loss of aesthetics	1. Cracking 2. Strains	1. Statement of commitments to provide water in the event of interruption of supply of water from dam 2. Develop Dam Monitoring and Management Strategy (DMMS) for all dams prior to any mining occurring which will impact on the dams 3. PSMP process	R	2	B	12	M	1. Develop specific DMMS and PSMP 2. Consider partial extraction system under dam 3. Consider installing an extensometer and piezometer in adjacent Panel prior to undermining dam 4. Survey dam 5. conduct dam specific RA including public safety on John Renshaw Dr and inrush potential 6. CL88 process 7. review impacts on previously undermined dams
1	Natural Features	1.03	Springs	1.03.01	Increase of flow from saline spring on Osborn's property	1. Change in shallow ground water due to mining activities	1. Inspections, remediation as per the Property Subsidence MP (PSMP) and Environmental MP (EMP) 2. Investigations by Hydrogeologist 3. Location of spring confirmed 4. Water sampling undertaken	E	3	D	9	M	1. Inspections, remediation as per the Property Subsidence MP and Environmental MP

P#	Process	S#	Sub-process	H#	Risk Issue	Causes	Existing Controls	Loss Type	Consequence	Likelihood	Risk Rank	Risk Level	Further Actions
2	Public Utilities	2.03	Telecommunication lines (overhead/ underground)	2.03.01	Damage to Telstra Local Copper Cables	1. Strains	1. Built Features MP including Telstra copper Management Plan 2. Industry and Donaldson experience mining under power lines at similar depth 3. Site specific subsidence predictions	O	3	D	9	M	1. Undertake an audit of copper cable locations within EP / SMP Area 4 and develop a MP to mitigate risk 2. Consider provision of mobile phones in PSMP in the event of damage to Telstra cables
1	Natural Features	1.06	Steep slopes (1 in 3)	1.06.01	Increased width in surface cracking resulting in issues with public safety / erosion	1. Strain 2. Topography	1. Surface gradients less than 1 in 2 2. Naturally vegetated slopes 3. Higher depth of cover (>140m)	E	3	D	9	M	1. Steep slope characterisation 2. To be assessed as per the PSMP process 3. Review existing methods of remediation for larger cracks
1	Natural Features	1.01	Schedule 1 or Schedule 2 tributaries	1.01.01	Loss of surface water flow in existing creeks	1. Surface cracking 2. Cracking in creek 3. Ponding in creek	1. Surface grades minimise ponding 2. Experience from SMP Area 1, 2 and 3 show location, intensity and depth of cracking is relatively minor 3. Provide supplementary supply in the event of water loss from dams 4. Dam monitoring management strategy (DMMS) 5. previous experience from region show minimal impacts on ephemeral streams from surface cracking following remediation 6. Inspections, remediation as per the Property Subsidence MP (PSMP) and Environmental MP (EMP) including surface water management plan	E	2	C	8	M	1. Inspections, remediation as per the Property Subsidence MP and Environmental MP

P#	Process	S#	Sub-process	H#	Risk Issue	Causes	Existing Controls	Loss Type	Consequence	Likelihood	Risk Rank	Risk Level	Further Actions
4	Residential Establishments	4.02	"Other surface structures" e.g. sheds, solar panels, septic tanks, rainwater tanks, swimming pools and separate garages	4.02.01	Damage to other structures	1. Strains 2. Tilt	1. Previous industry and Donaldson experience with mining under similar structures 2. Ongoing consultation with property owners 3. Established methods of remediation 4. PSMP process	O	2	C	8	M	1. Develop specific PSMP
3	Farm Land and Facilities	3.04	Farm dams and water reticulation system	3.04.01	Damage to dams and water reticulation systems resulting in loss of service-ability / integrity of dam wall	1. Cracking 2. Strains	1. Statement of commitments to provide water in the event of interruption of supply of water from dam 2. Develop Dam Monitoring and Management Strategy (DMMS) for all dams prior to any mining occurring which will impact on the dams 3. PSMP process	O	2	C	8	M	1. Develop specific DMMS and PSMP
3	Farm Land and Facilities	3.06	Farm structures e.g. sheds	3.06.01	Damage to farm structures due to subsidence	1. Strains 2. Tilt	1. Previous industry and Donaldson experience with mining under similar structures 2. Ongoing consultation with property owners 3. Established methods of remediation 4. Farm structures inherently more flexible than brick structures 5. PSMP process	O	2	C	8	M	1. Develop specific PSMP

P#	Process	S#	Sub-process	H#	Risk Issue	Causes	Existing Controls	Loss Type	Consequence	Likelihood	Risk Rank	Risk Level	Further Actions
5	Areas of Archaeological and/or Cultural Significance	5.01	Aboriginal heritage	5.01.02	Damage to Black Hill Pathway	1. Subsidence	1. Location of Black Hill Pathway is known 2. Cultural Heritage Assessment Report for Abel Upgrade Modification has determined that partial or no loss of value will occur in the event of subsidence impacting Black Hill Pathway and that no management action is required	R	2	C	8	M	1. Review methods of surface remediation with stakeholders to ensure no loss of value of Black Hill Pathway occurs whilst subsidence remediation works are undertaken 2. Record location of Black Hill Pathway on EP / SMP Application Plan 2 3. Further discussions with South East Archaeology
1	Natural Features	1.02	Aquifers, known groundwater resources	1.02.02	Additional flow to underground workings resulting in business interruption	1. Connective cracking 2. Depressurisation of aquifers due to mining activities greater than predicted 3. Intersection with geological structures	1. Ground Water Management Plan 2. Pumping capacity is approximately 3 times current flows 3. Mapping of geological structures 4. Additional surface storage (West pit) available 5. CL88 process 6. Existing surface water management plan 7. Existing underground water storage area (East Area)	O	2	C	8	M	1. Consider installation of additional piezometers and surface extensometers 2. Investigate options for managing additional water make
1	Natural Features	1.02	Aquifers, known groundwater resources	1.02.03	Elevated salinity in groundwater inflows through mine workings	1. Connection with overlying aquifers with elevated salinity 2. Possible increase in salinity at greater depths	1. Ground Water Management Plan 2. Monitoring flow and salinity 3. Additional surface storage (West pit) available 4. Existing underground water storage area (East Area) 5. Previous experience from existing areas	E	2	C	8	M	1. Investigate options for managing additional water make

P#	Process	S#	Sub-process	H#	Risk Issue	Causes	Existing Controls	Loss Type	Consequence	Likelihood	Risk Rank	Risk Level	Further Actions
3	Farm Land and Facilities	3.01	Agricultural utilisation or agricultural suitability of farm land	3.01.01	Stock safety Temporary loss of utilisation	1. Surface cracking	1. Previous Donaldson experience 2. Ongoing consultation with property owners 3. Established methods of remediation 4. PSMP including the option to install electric fence to exclude stock from impacted areas	R	2	D	5	L	1. Develop PSMP's
5	Areas of Archaeological and/or Cultural Significance	5.01	Aboriginal heritage	5.01.01	Damage to Aboriginal artefacts e.g. isolated scatters	1. Subsidence	1. Artefact locations have been identified 2. Heritage surveys have been completed 3. Aboriginal Heritage Assessment report has been finalised 4. Subsidence assessment indicates artefact scatters are unlikely to be impacted 5. Consultation with Aboriginal community	R	2	C	5	L	1. Review methods of surface remediation with stakeholders to ensure artefacts are not damaged whilst any subsidence remediation works are undertaken 2. Further discussions with South East Archaeology

P#	Process	S#	Sub-process	H#	Risk Issue	Causes	Existing Controls	Loss Type	Consequence	Likelihood	Risk Rank	Risk Level	Further Actions
1	Natural Features	1.02	Aquifers, known groundwater resources	1.02.01	Loss of groundwater resource	1. Connective cracking 2. Depressurisation of aquifers due to mining activities greater than predicted 3. Intersection with geological structures	1. Ground Water Management Plan 2. Limited resource not currently utilised (no registered ground water bores) 3. Past experience mining in area	E	2	D	5	L	1. Confirm no bores in Area as per PSMP process
2	Public Utilities	2.02	Electricity power lines (overhead/ underground)	2.02.01	Damage and / or loss of clearance to 11kV Ausgrid Power line	1. Subsidence 2. Tilt	1. Timber poles more resilient to subsidence impacts 2. Built Features MP including Power line Management Plan 3. Industry and Donaldson experience mining under power lines at similar depth 4. Site specific subsidence predictions	O	2	D	5	L	1. Review and update existing Ausgrid Power line MP 2. Clearance surveys to be conducted prior to completion of MP review 3. Site inspection and actions by Ausgrid

P#	Process	S#	Sub-process	H#	Risk Issue	Causes	Existing Controls	Loss Type	Consequence	Likelihood	Risk Rank	Risk Level	Further Actions
3	Farm Land and Facilities	3.03	Fences, gates and cattle grids and cattle yards	3.03.01	Damage to fences and / or gates including resulting loss of livestock	1. Strain 2. Subsidence 3. Falling tree 4. Cracking	1. Previous Donaldson experience 2. Ongoing consultation with property owners 3. Established methods of remediation 4. Establishing electric fence on external road boundary 5. PSMP process	R	2	D	5	L	1. Develop specific PSMP's
1	Natural Features	1.01	Schedule 1 or Schedule 2 tributaries	1.01.02	Increased erosion	1. Step / scarp subsidence developing a head cut scouring erosion	1. Has not happened in previous SMP Areas 2. Inspections, remediation as per the Property Subsidence MP (PSMP) and Environmental MP (EMP)	E	2	D	5	L	1. Inspections, remediation as per the Property Subsidence MP and Environmental MP

P#	Process	S#	Sub-process	H#	Risk Issue	Causes	Existing Controls	Loss Type	Consequence	Likelihood	Risk Rank	Risk Level	Further Actions
4	Residential Establishments	4.01	Principal Residences and proposed Principal Residences	4.01.01	Damage to Principal Residences requiring repair	1. Subsidence impacts	1. Statement of Commitments 2. Subsidence control zones (SCZ) to limit subsidence to 20mm at Principal Residences (assumed 26.5 degrees for design purposes) 3. Pillar Extraction Management Plan (PEMP) including Authority to Mine (ATM) 4. Mine schedule provides for substantial amount of subsidence data prior to setting out SCZ underneath Principal Residences 5. Periodic review and recalibration if required of subsidence model 6. Mine design and layout 7. SMP mine design compliance audit 8. PSMP process 9. Experience with SMP Area 2 and 3	O	1	D	2	L	1. Mine Subsidence Board pre mining building and property inspections 2. Develop Monitoring arrangements (Subsidence) 3. Develop specific PSMP
6	Commercial Establishments	6.02	Radio Communication Tower	6.02.01	Damage to tower	1.Subsidence	1. Ground truthing 2. PSMP process 3. Located within overlapping SCZ's	O	1	D	2	L	1. Mine Subsidence Board inspections to determine tolerable levels 2. Develop specific PSMP 3. Review by telecommunications engineer

P#	Process	S#	Sub-process	H#	Risk Issue	Causes	Existing Controls	Loss Type	Consequence	Likelihood	Risk Rank	Risk Level	Further Actions
7	Other	7.02	Additional subsidence from old workings	7.02.01	Reactivation of borehole seam workings causing impacts to the surface	1.Subsidence	1 .Full extraction in borehole seam workings 200m above Panels 30 and 32 2. Archival research on historical workings 3. Approx. 200m. of interburden between seams	O	1	D	2	L	1. Borehole seam reactivation issue to be assessed in MSEC report
1	Natural Features	1.04	Land prone to flooding or inundation	1.04.01	Increased area of ponding or flooding as a result of subsidence and rainfall event	1. Differential Subsidence associated with flat gradients 2. Significant rainfall event	1. Ephemeral streams 2. Existing natural gradients 3. Existing farm dams on stream alignments	E	1	D	2	L	1. Assessment based on additional modelling to determine post mining contours

P#	Process	S#	Sub-process	H#	Risk Issue	Causes	Existing Controls	Loss Type	Consequence	Likelihood	Risk Rank	Risk Level	Further Actions
1	Natural Features	1.05	Natural Vegetation	1.05.01	Change in habitat / fauna	1. Falling tree 2. Dieback	1. Mine design 2. Monitoring arrangements 3. Visual inspections 4. TARPs - remediation works 5. Previous experience 6. Environmental Management plan Including Flora and Fauna MP	E	1	D	2	L	1. Inspections, remediation as per the Property Subsidence MP and Environmental MP
1	Natural Features	1.05	Natural Vegetation	1.05.02	Visual impact	1. Falling tree 2. Dieback	1. Mine design 2. Monitoring arrangements 3. Visual inspections 4. TARPs - remediation works 5. Previous experience 6. Environmental Management plan Including Flora and Fauna MP 7. PSMP process	E	1	D	2	L	1. Inspections, remediation as per the Property Subsidence MP and Environmental MP

P#	Process	S#	Sub-process	H#	Risk Issue	Causes	Existing Controls	Loss Type	Consequence	Likelihood	Risk Rank	Risk Level	Further Actions
6	Commercial Establishments	6.01	Fuel Depot	6.01.01	Damage to fuel depot and building	1. Subsidence	1. Ground Truthing 2. PSMP process 3. Located within overlapping SCZ's	O	1	E	1	L	1. Mine Subsidence Board inspections to determine tolerable levels 2. Develop specific PSMP

APPENDIX B – TIMING FOR BFMP DEVELOPMENT AND ACTIONS FOR PUBLIC SAFETY – EP / SMP AREA 4

Asset	Description	Ownership at time of submission	Specific Management Plan	Timing for preparation of individual BFMP	Safety Actions
Private Properties	Features may include: House Water tanks Rural Sheds Dams Private access roads/driveways Fences Swimming pools	Osborn, H.D. Osborn, N.I. Beach, D.S. Osborn, J.M. Frances, A. L. Jennings, A.J. East, C.P. Perkins, G.J. Latham, K.M. Williams, K.R Shirley, D.A. Osborn, J.M. Steel, G.P. Brown, PJ Morgan, R.T. Brown, L.J. Brown, R.A. Talley, N.J. Fraser, D&C Kranz, P&C	Individual landholder BFMP's (Property Subsidence Management Plans PSMP and Dam Monitoring Management Strategies DMMS)	As per BFMP and flowchart in Appendix D	As per the individual BFMP's (PSMP and DMMS)
Public Roads	Blackhill Road (sealed)	Cessnock City Council	BFMP – Public Roads	Prior to Panel 27 impacting	Erect subsidence warning signs and contact details
	Meredith Road (sealed & unsealed)	Cessnock City Council	BFMP – Public Roads	Prior to Panel 28 impacting	Erect subsidence warning signs and contact details
	Browns Road (sealed)	Cessnock City Council	BFMP – Public Roads	Prior to Panel 30 impacting	Erect subsidence warning signs and contact details

Asset	Description	Ownership at time of submission	Specific Management Plan	Timing for preparation of individual BFMP	Safety Actions
Electricity Power Lines	11kV Powerlines Local Distribution lines	Ausgrid	BFMP – Ausgrid	Prior to Panel 27 impacting	Inspections as per the Ausgrid BFMP
Telecommunications Lines	Local Copper Cables	Telstra	BFMP – Telstra	Prior to Panel 27 impacting	Inspections as per the Telstra BFMP

APPENDIX C – ABEL MINE EP / SMP AREA 4 STAKEHOLDER LIST

Position	Name	Phone
DONALDSON COAL		
Operations Manager	David Gibson	4015 1102
Technical Services Manager	Tony Sutherland	4015 1105
Environment and Community Relations Manager	Phillip Brown	4015 2502
Registered Mine Surveyor	Matthew Wright	4015 1118
Abel Mine After Hours	Control Room	4015 1140
GOVERNMENT		
DRE Mine Safety – Coal Inspectors	Maitland Office	4931 6666
DRE – Principal Subsidence Engineer	Maitland Office	4931 6666
MSB District Manager	Richard Pickles	4908 4300
Cessnock City Council After Hours Contact Number (emergency)	-	4940 7816
Cessnock City Council Operations – Works Delivery Manager	Geoff Bent	4993 4284
Cessnock City Council Asset Engineer	Les Morgan	0413 314 434
Ausgrid – Manager of Customer Supply, Planning and Reliability, Lower Hunter	Pat Boyle	4910 1701
Telstra – Senior Technical Specialist	Mark Schneider	8851 2297
Land and Property Information – Senior Surveyor, Hunter Survey Infrastructure & Geodesy	Peter O'Kane	4925 9984
Planning and Environment	Paul Freeman	9228 6111
LANDHOLDERS	Refer to Abel Mine internal contact register	

APPENDIX D – PROPERTY SUBSIDENCE MANAGEMENT PLAN (PSMP) FLOWCHART

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Property Subsidence Management Plan (PSMP) - Flowchart

DONALDSONCOAL
Part of the Yancoal Australia Group