

Appendix F

Land Management Plan

DONALDSON COAL PTY LIMITED

ABEL MINE

Appendix F

Land Management Plan

EP / SMP Area 4

May 2014

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Document Control

Description

Document No.	Abel EP / SMP Area 4
Title	Land Management Plan
General Description	To provide a framework to manage land that may be affected by subsidence from pillar extraction 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
APPROVED	Phillip Brown	Position Environment and Community Relations Manager	Signed	Date
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Revisions

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

The nominated Coordinator for this document is	Technical Services Manager
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1 INTRODUCTION

Donaldson Coal Pty Ltd (Donaldson) a subsidiary of Yancoal Australia Pty Limited (Yancoal), operates Abel Mine, an underground coal mine located approximately 23 kilometres north-west of Newcastle in the Newcastle Coalfield of New South Wales. Abel Mine has successfully undertaken pillar extraction mining using the Bord and Pillar system within the Upper Donaldson seam between 2010 and 2014 in Abel's SMP Areas 1, 2 and 3.

Project Approval 05_0136 (Development Consent) for the mine was granted by the Department of Planning on 7 June 2007. Mining (first workings and pillar extraction, subject to an SMP approval) is presently approved under the Project Approval, Mining Operations Plan and lease conditions to take place within Mining Lease ML 1618. Project Approval 05_0136 was modified (MOD 3) under delegated authority of the Minister for Planning and Infrastructure on 4 December 2013 to allow the method of extraction to include shortwall and longwall as well as bord and pillar extraction methods in the Upper and Lower Donaldson Seams and an increase in ROM coal extraction at Abel Mine.

Abel Mine commenced coal production in May 2008. The Mine currently employs approximately 360 personnel (including contractors) and current produces approximately 2.5 million tonnes per annum (tpa), with a proposed maximum production of 6.1 million tonnes of thermal / soft coking coal from the Upper and Lower Donaldson coal seams. Abel's production is railed to Newcastle for the export market.

This Land Management Plan (LMP) has been prepared to meet the conditions of Project Approval 05_0136 MOD 3 and to manage the predicted subsidence impacts resulting from secondary extraction of Panels 27 to 35 within the Upper Donaldson Seam at Abel Mine using bord and pillar techniques. The location of Abel Mine EP / SMP Area 4 is shown in **Figure 1**.

1.1 Land Ownership and Access

The Extraction Plan Area extends underneath Cessnock City Council roads as well as private rural residential land holdings and privately owned access roads. The north eastern portion of the Extraction Plan area is primarily located beneath Donaldson Coal owned land. It is important to note that Abel Mine will not undertake any rectification works on land outside of Abel's ownership without landowner permission.

Abel Mine has a comprehensive consultation program to facilitate access for monitoring and potential remediation activities within SMP Areas 1, 2 & 3 and has commenced consultation with landowners in Extraction Plan (EP) / Subsidence Management Plan (SMP) Area 4.

1.2 Related Documents

This LMP will fit within Abel Mine's Environmental Management System as a key component plan to the Area 4 Extraction Plan. In Particular the following documents, or their future iterations thereof, as required by current development consent are of relevance to land management:

- Heritage Management Plan (HMP);
- Biodiversity Management Plan (BMP);
- Subsidence Monitoring Program (SM Program);
- Water Management Plan (WMP);

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- Built Features Management Plan (BFMP); and
- Mining Operations Plan (MOP).

This LMP should be read and implemented in conjunction with the latest approved versions of the above documents.

1.3 Structure of this Report

The remainder of this LMP is structured as follows:

Section 2.0	Outlines the purpose and objectives of this management plan.
Section 3.0	Describes the existing environment, identifying potential risks to the landscape as a result of pillar extraction in EP / SMP Area 4. Summarises existing management and mitigation measures in place.
Section 4.0	Identifies the potential environmental consequences, as relevant to land management, resulting from pillar extraction in EP / SMP Area 4.
Section 5.0	Outlines the monitoring methodologies to be implemented for land management under this LMP.
Section 6.0	Sets out performance measures and performance indicators relevant to the management of land affected by pillar extraction in EP / SMP Area 4.
Section 7.0	Sets out a contingency plan for land management, including a Trigger Action Response Plan (TARP)
Section 8.0	Outlines the reporting, review and responsibilities of this LMP.

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2 PURPOSE AND OBJECTIVES

The purpose of this LMP is to provide a framework to manage land that may be affected by subsidence from pillar extraction mining in the Upper Donaldson coal seam in EP / SMP Area 4 at Abel Mine and includes areas of steep slopes and general surface drainage. However this LMP does not describe management of watercourses or alluvium with EP / SMP Area 4. These environmental aspects will be managed separately in the Water Management Plan.

2.1 Statutory Requirements

The Project Approval 05_0136 MOD 3 requirements relevant to this LMP are reproduce in **Appendix A**.

2.2 Objectives of the LMP

The objectives of the LMP are to:

- Establish baseline data to inform future management activities;
- Identify and describe the environmental consequences of pillar extraction in EP / SMP Area 4;
- Specify the objectives and performance measures to effectively manage the environmental consequences on land within EP / SMP Area 4;
- Identify performance indicators and completion criteria which will be used to judge the effectiveness of land management activities and the environmental performance of EP / SMP Area 4;
- Describe the monitoring methods which will be employed to inform and/or trigger land management activities;
- Provide contingency measures which explicitly provide for adaptive management;
- Describe the process for responding to any incidents, complaints or non-compliance with statutory requirements; and
- Outline a process detailing periodic review of this plan and continual improvement.

2.3 Rehabilitation Objectives

Rehabilitation objectives for land affected by mining in EP / SMP Area 4 as presented in **Table 1**.

Table 1. Rehabilitation Objectives

Table 12: Rehabilitation Objectives (applicable to EP / SMP Area 4)

Feature	Objective
<i>Mine site (as a whole)</i>	<i>Safe, stable & non-polluting; and Final land use compatible with surrounding land uses.</i>
<i>Watercourses within project area</i>	<i>Hydraulically and geomorphologically stable.</i>
<i>Other land affected by the project</i>	<i>Restore ecosystem function, including maintaining or establishing self-sustaining ecosystems comprised of:</i>

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Feature	Objective
	<ul style="list-style-type: none"> - Local native plant species (unless the Executive Director Mineral Resources agrees otherwise); and - A landform consistent with the surrounding environment.
<i>Built features damaged by mining operations</i>	Repair to pre-mining condition or equivalent unless: <ul style="list-style-type: none"> -The owner agrees otherwise; or -The damage is fully restored, repaired or compensated under the Mine Subsidence Compensation Act 1961.
<i>Community</i>	Ensure public safety; and Minimise the adverse socio-economic effects associated with mine closure.

Note: These rehabilitation objectives apply to all subsidence impacts and environmental consequences caused by mining taking place after the date of this approval; and to all surface infrastructure sites and other disturbance which forms part of the project, whether constructed prior to or following the date of this approval.

3 EXISTING ENVIRONMENT

3.1 Land Ownership

Land ownership within EP / SMP Area 4 is shown in **Appendix B**. Land ownership within the Extraction Plan Area is a combination of Donaldson Coal owned land, private rural residential land holdings, and local government roads. Landholders and the general public may therefore access these areas.

A Public Safety Management Plan (PuSMP) for EP / SMP Area 4 will be developed as part of the Extraction Plan to address public safety risks as a result of secondary extraction in the Extraction Plan area.

3.2 General Landform

The Extraction Plan surface area is approximately 209 ha and is located within the suburb of Black Hill. The Extraction Plan area is bounded by the depth of cover and the mining 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. The natural surface within the Extraction Plan Area falls towards the north east with the tributaries draining into Four Mile Creek above and downstream of the proposed panels.

The surface levels directly above the proposed panels vary from a low point of approximately 50 metres Australian Height Datum (AHD) along the tributary above proposed Panel 29 to a high point of approximately 190 metres AHD above the southern end of Panel 34.

3.3 Steep Slopes

A steep slope has been defined as areas of land having natural gradients greater than 1 in 3 (i.e. 33%, or an angle to the horizontal of 18°). The natural surface gradients above the proposed mining area are typically less than 1 in 3 (i.e. 18° or 33%). The ridgeline located above the southern part of the proposed mining area has natural gradients typically varying up to 1 in 2 (i.e. 27° or 50%), with some isolated area having natural gradients up to 1 in 1.5 (i.e. 33° or 67%). Elsewhere the natural gradients are typically less than 1 in 3, which is the threshold used to define steep slopes.

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The surface soils along the steep slopes have been derived from the Waratah Sandstone (Pnw), the Lambton Subgroup (Pnl) and the Adamstown Subgroup (Pna) of the Newcastle Coal Measures. The steep slopes are stabilised by natural bushland which can be seen from **Figure 2**.

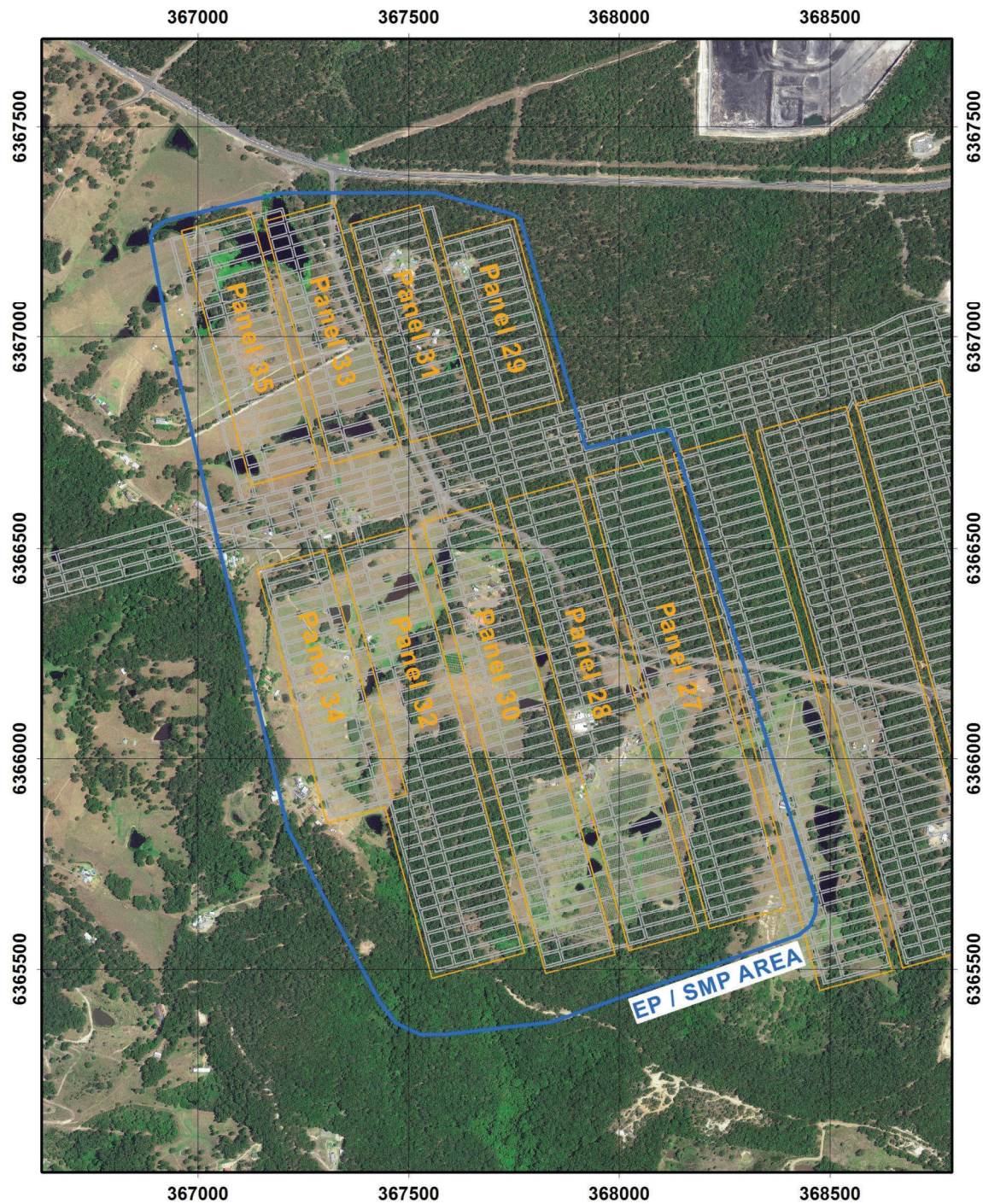


Figure 2. Aerial Photograph showing the Extent of Natural Vegetation

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3.4 Cliffs / Rock face Features

Cliffs have been defined as continuous rock faces, having heights greater than 10 metres and minimum slopes of 2 to 1 (i.e. greater than 63%) and lengths greater than 20 metres. Minor cliffs have been defined as continuous or segmented rock faces, having heights greater than 5 metres and minimum slopes of 2 to 1.

There were no cliffs or minor cliffs identified within EP / SMP Area 4, based on the Light Detection and Ranging (LiDAR) survey, the orthophotograph of the area, or from the site investigations.

3.5 Hydrology and Drainage

EP / SMP Area 4 is located entirely within the upper catchment of Four Mile Creek, which is a Schedule 1 stream as shown in **Figure 3**. The creek drains in a northerly direction from the ridgeline associated with Black Hill and, after crossing under John Renshaw Drive, drains through the Donaldson and Bloomfield mine lease areas. Four Mile Creek continues under the New England Highway and onto the Hunter River floodplain to the north of Ashtonfield and to the west of Hexham. Land use within the Four Mile Creek catchment includes agricultural land, undisturbed native bush and rural residential properties.

EP / SMP Area 4 is located to the north of Black Hill ridge and grades from steeper slopes (up to 100% in isolated places) along the southern boundary to flatter slopes (<5%) along the northern boundary and towards the north eastern corner. The area also contains numerous farm dams. Watercourses are managed in accordance with the Area 4 and Abel Mine Water Management Plan.

3.6 Soil Landscape

The *Soil Landscape of the Newcastle 1:100 000 Sheet* (Matthei, 1995) describes the soils in the area as predominantly belonging to the Beresfield soil landscape unit with minor differences on either side of Black Hill Road. Key features of the Beresfield soil landscape unit are:

- Friable brownish-black sandy loam topsoil (50 – 100mm deep) overlying hard setting yellowish-brown sandy-clay loam (50-300mm deep) and brown clay near the ridge crests. These soils tend to be highly erodible in concentrated flows;
- Similar, but shallower soils on the mid slopes with some areas where the sandy loam topsoil is absent on the mid-slopes. These soils tend to be hard setting and have moderate erodibility in concentrated flows.

As can be seen in **Figure 2** there are two distinct patterns of land use with Area 4:

1. Predominately full forested land to the north of Black Hill Road, and
2. Cleared land with some remnant forest to the south of Black Hill Road.

3.7 Flora and Fauna

Four vegetation communities have been mapped across the EP / SMP area (**Table 2**), two of which are listed as endangered ecological communities (EEC) in the NSW Threatened Species Conservation Act 1995. The dominant community present in the EP / SMP Area 4 is the EEC Lower Hunter Spotted Gum – Ironbark Forest. A vegetation map of Area 4 can be seen in **Figure 4**.

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Table 2. Vegetation Communities within EP / SMP Area 4

Local Community	NSW PCT Unit and Name	Status	Area (ha)
Farm dams	-	-	7
MU15 Costal Foothills Spotted Gum - Ironbark Forest	874 Grey Ironbark - Spotted Gum - Grey Box open forest on hills of the Hunter Valley, Sydney Basin Bioregion	-	48
MU17 Lower Hunter Spotted Gum - Ironbark Forest	1207 Spotted Gum - Broad-leaved Ironbark grassy open forest of dry hills of the lower Hunter Valley, Sydney Basin Bioregion	EEC Lower Hunter Spotted Gum – Ironbark Forest in the Sydney Basin Bioregion	56
MU1a Subtropical Rainforest	- Giant Stinging Tree - Fig dry subtropical rainforest of the NSW North Coast Bioregion and Brigalow Belt South Bioregion ¹	EEC Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions	2
MU5 Variant - paperbark riparian vegetation	1282 Turpentine - Grey Myrtle forest of sheltered sandstone gullies of the Central Coast hinterland, Sydney Basin Bioregion	-	7
Cleared farmland, roads, cultivation, dwellings and other infrastructure	-	-	90

¹Nearest equivalent but has no PCT code.

No threatened flora species have been recorded either within or near the EP / SMP Area 4.

Seventeen threatened species of bird, four threatened species of marsupials, nine threatened species of bats and one threatened species of frog have been recorded from within a five kilometre radius of the EP / SMP Area. Several of these species have been recorded locally and could possibly occur with the EP / SMP Area. A full list of threatened fauna species recorded within five kilometre of the EP / SMP Area can be found in the BMP.

As required under PA05_0136 (MOD3), a Biodiversity Management Plan (BMP) (Hunter Eco, 2014) has been prepared to manage the potential environmental consequences of second workings on aquatic and terrestrial flora and fauna, with a specific focus on threatened species.

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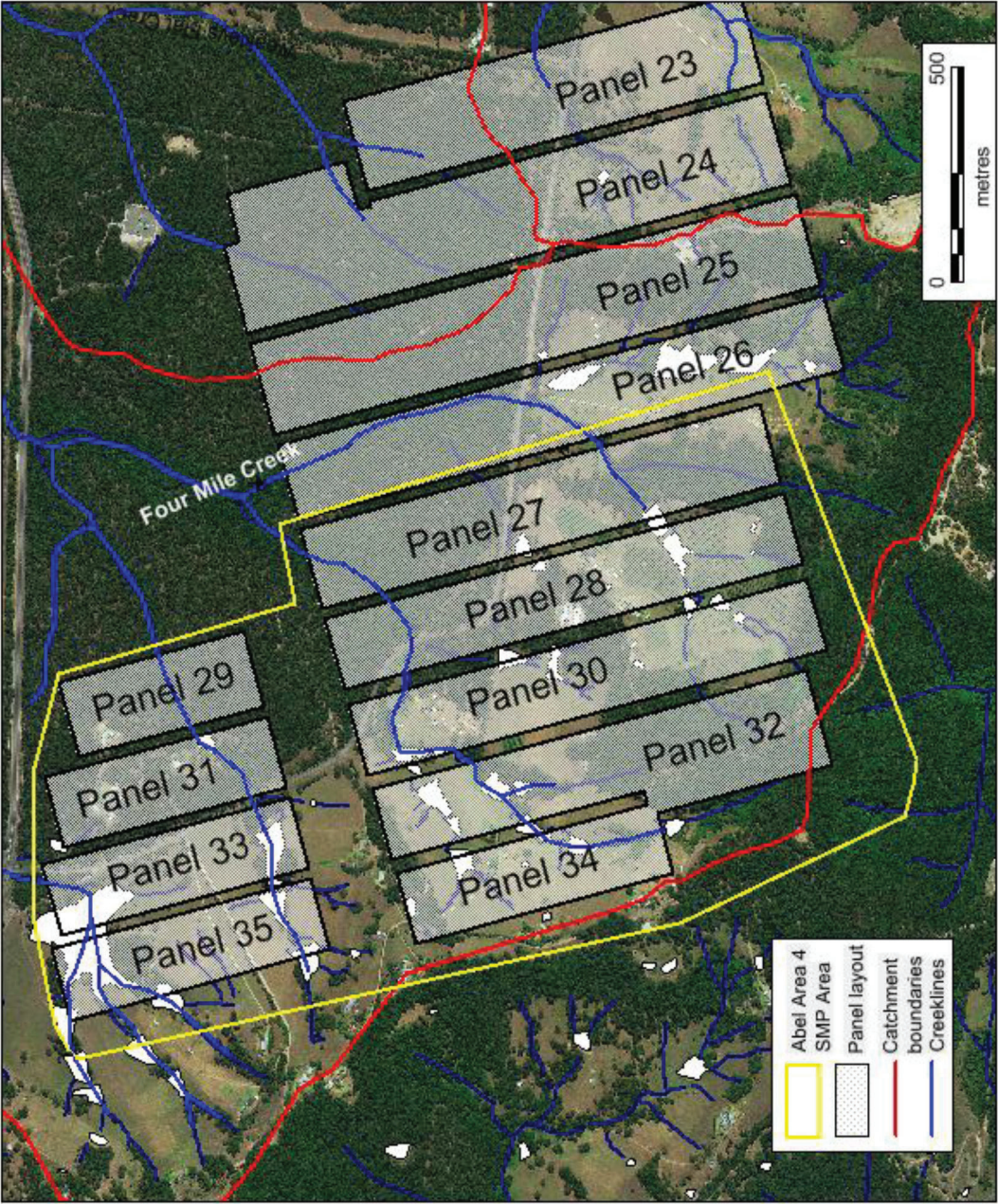


Figure 3. EP / SMP Area 4 Creeks and Catchment

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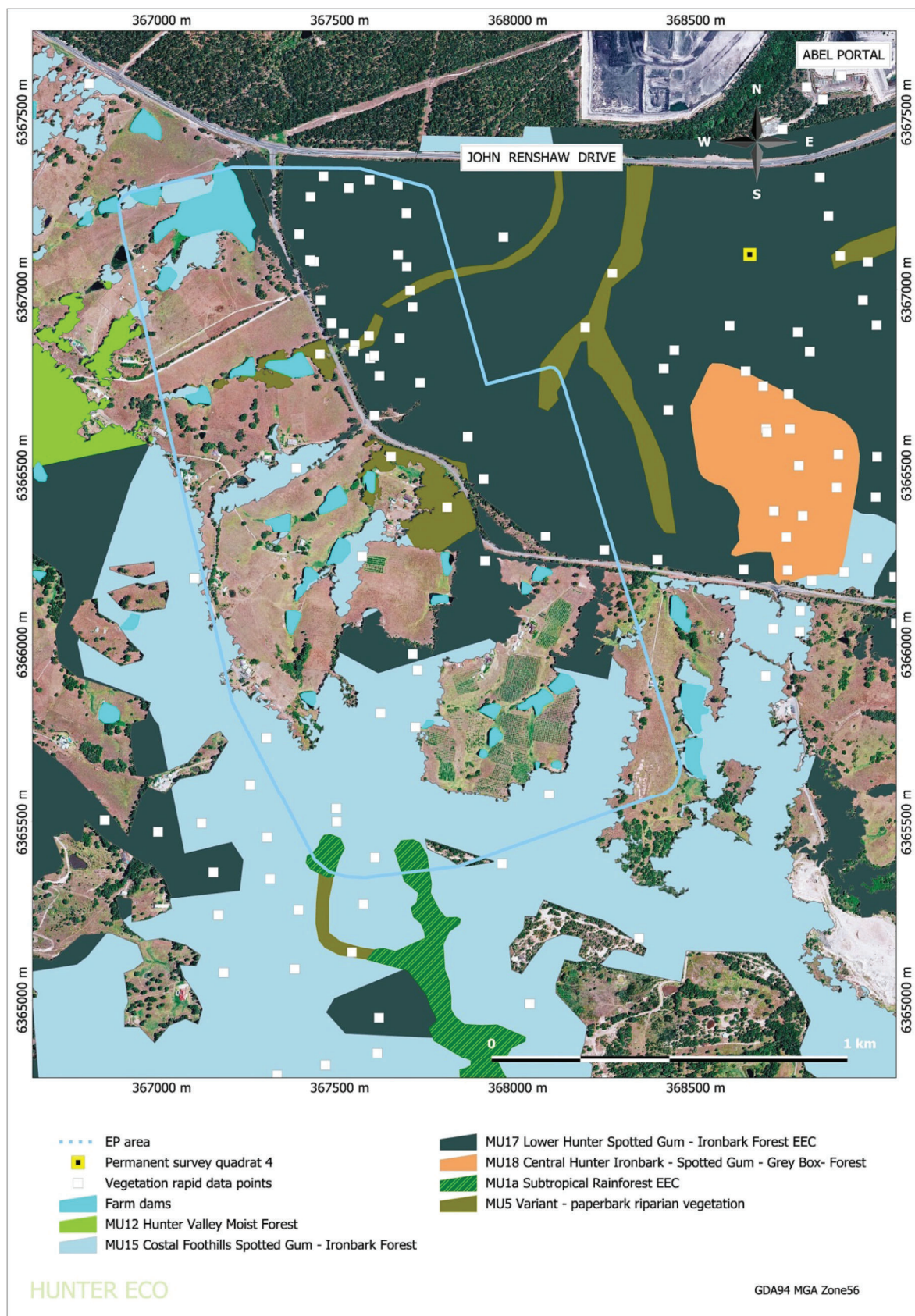


Figure 4. EP / SMP Area 4 Vegetation Map

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4 POTENTIAL ENVIRONMENTAL CONSEQUENCES OF MINE SUBSIDENCE

Detailed subsidence predictions and impact assessment (MSEC676, 2014) have been prepared by Mine Subsidence Engineering Consultants (MSEC) as part of the EP / SMP Area 4 application to mine Panels 27 to 35 in the Upper Donaldson coal seam at Abel Mine.

The predicted subsidence for the proposed panels has been determined using the Incremental Profile Method, which has been calibrated for local conditions using the monitoring data from the previously extracted bord and pillar total extraction panels in SMP Areas 1 to 3 at the mine. The maximum predicted subsidence is 1,450 mm, which represents 51% of the maximum extraction height of 2.8 metres, and is the maximum achievable for bord and pillar total extraction in single-seam mining conditions. A summary of the maximum predicted values of incremental conventional subsidence, tilt and curvature, due to the extraction of each of the proposed panels is shown below in **Table 3**.

Table 3. Maximum Predicted Incremental Conventional Subsidence, Tilt and Curvature Resulting from the Extraction of Each of the Proposed Panels

Panel	Maximum Predicted Incremental Conventional Subsidence (mm)	Maximum Predicted Incremental Conventional Tilt (mm/m)	Maximum Predicted Incremental Conventional Hogging Curvature (km ⁻¹)	Maximum Predicted Incremental Conventional Sagging Curvature (km ⁻¹)
Due to Panel 27	1,400	70	>3.0	>3.0
Due to Panel 28	1,350	50	>3.0	>3.0
Due to Panel 29	1,050	40	>3.0	>3.0
Due to Panel 30	1,400	40	3.0	3.0
Due to Panel 31	1,200	40	>3.0	>3.0
Due to Panel 32	1,350*	35*	1.5*	1.5*
Due to Panel 33	1,300	60	>3.0	>3.0
Due to Panel 34	750	10	0.5	0.5
Due to Panel 35	1,350	60	>3.0	>3.0

Note: * denotes that locally increased subsidence could occur above the southern end of Panel 32 where it is located beneath the historic workings in the Borehole Seam. The predicted parameters in this location, however, are less than the maxima provided in the above table due to the higher depths of cover. The maximum predicted parameters above the southern end of Panel 32, for multi-seam conditions, are 800 mm subsidence, 15 mm/m tilt and 0.5 km⁻¹ curvature.

Separate maximum total conventional subsidence predictions, tilt and curvatures for steep slopes located above the southern part of the proposed Extraction Plan Area are provide in **Table 4**.

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Table 4. Maximum Predicted Total Conventional Subsidence, Tilt and Curvature for Steep Slopes Located above the Southern Part of the Proposed Mining Area

Panel	Maximum Predicted Total Conventional Subsidence (mm)	Maximum Predicted Total Conventional Tilt (mm/m)	Maximum Predicted Total Conventional Hogging Curvature (km ⁻¹)	Maximum Predicted Total Conventional Sagging Curvature (km ⁻¹)
After Panel 27	< 20	< 0.5	< 0.01	< 0.01
After Panel 28	600	15	0.5	1.0
After Panel 30	650	20	1.0	1.0
After Panel 32	1,250	25	1.0	1.0
After Panel 34	1,250	30	1.0	1.0

The maximum predicted tilt for the steep slopes located in the southern part of the proposed mining area is 30 mm/m (i.e. 3.0 %, or 1 in 33). The maximum predicted tilt for the isolated steep slopes along the alignments of the streams is 70 mm/m (i.e. 7 %, or 1 in 140). The predicted tilts are small when compared to the natural grades of the steep slopes, which are greater than 1 in 3 and, therefore, the tilts are unlikely to result in any adverse impact on the stability of the steep slopes.

The steep slopes are more likely to be affected by curvatures and strains. The potential impacts would generally result from the downslope movement of the surface soils, causing tension cracks to appear at the tops and sides of the slopes and compression ridges could possibly form at the bottoms of the slopes.

If tension cracks were to develop, as a result of the extraction of the proposed Panels 27 to 35, it is possible that soil erosion could occur if these cracks were left untreated. It is possible, therefore, that some remediation might be required, including infilling of surface cracks with soil or other suitable materials, or by locally regrading and re compacting the surface. In some cases, erosion protection measures may be needed, such as the planting of additional vegetation in order to stabilise the slopes in the longer term.

The requirement and methodology for any erosion and sediment control and remediation techniques would be determined in consideration of the: potential impacts when unmitigated, including potential risks to public safety and the potential for self-healing or long-term degradation; potential impacts of the control/remediation technique, including site accessibility; and consultation with relevant stakeholders.

Environmental consequences of subsidence may include risks to public safety, livestock, land use impacts, erosion and changes to vegetation coverage through altered water movement. An example of subsidence crack repairs above SMP Area 1 are shown in **Figure 5**. The subsidence impacts and environmental consequences as relevant to land management activities with EP / SMP Area 4 are summarized in **Table 5**.

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1. Excavator digs down to base of crack



2. Area compacted and re filled



3. Area re seeded



4. Rehab completed

Figure 5. Typical Subsidence Crack Repairs

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Table 5. Potential Environmental Consequences Associated with Land Subsidence

Subsidence Impact	Summary of Subsidence Predictions	Potential Environmental Consequence
Surface Cracking	Surface cracking resulting from the extraction of the proposed panels 27 to 35 is expected to be of a minor nature, which can be easily remediated by infilling with soil or other suitable materials, or by locally regarding and re compacting the surface.	Cracks in soil surface, causing potential risk to public safety and livestock. Increased risk of erosion.
Slope Instability	The potential impacts would generally result from the downslope movement of the surface soils, causing tension cracks to appear at the tops and sides of the slopes and compression ridges could possibly form at the bottoms of the slopes.	Surface cracking and/or compression ridges increases the probability of soil erosion, potential risk to public safety and livestock and changes to vegetation coverage. Soil loss and exposure of sub-soil
Surface Ponding	Localised increased ponding areas could occur along the tributaries, as a result of the proposed mining of Panels 27 to 35.	Changes to vegetation coverage
		Altered surface flow and increased erosion
		Altered soil moisture or nutrient distribution patterns

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5 MONITORING

General landform condition inspections will be undertaken on a regular basis to assess subsidence related impacts in accordance with the Abel Mine Subsidence Monitoring Program (SM Program), Property Subsidence Management Plans (PSMPs) and PuSMP. General condition monitoring will only be conducted with the agreement of the relevant landowner.

The general condition monitoring activities will identify:

- Surface cracking, particularly around edges of extraction voids, travelling abutments and steep slopes;
- Surface humps near centre of extracted panels, travelling abutments and topographic lows of adjacent steep slopes;
- Step changes in land surface;
- Slope, boulder and tree instability; and
- General vegetation condition and % of ground cover.

Where remedial works are required following subsidence impacts, additional monitoring will be undertaken to identify the progress of revegetation activities and confirm the success and adequacy of remediation and repair works. The timing and degree of additional monitoring activities will be dependent on the nature of remediation works required.

However as a minimum, follow up monitoring activities will be undertaken on a quarterly basis until the success of remedial work is adequately demonstrated. Where sensitive environmental features are identified (e.g. threatened species or habitats) additional monitoring requirements may be established in consultation with affected landholders.

6 OBJECTIVES, PERFORMANCE MEASURES, INDICATORS AND CRITERIA

Detailed objectives, performance measures, indicators and criteria for the management of land have been developed for EP/ SMP Area 4 and are presented in **Table 6**.

Monitoring will be used to assess the impact of the operations against these performance measures and indicators as detailed in Section 5.

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Table 6. Objectives, performance Measures, Indicators and Criteria

Objectives	Performance Measure	Performance Indicator	Criteria
Restore ecosystem function, including maintaining or establishing self-sustaining ecosystems comprised of: - Local native plant species (unless the Executive Director Mineral Resources agrees otherwise); and - A landform consistent with the surrounding environment. Watercourses are hydraulically and geomorphologically stable.	Inspect & Identify Regular inspections of the subsidence zone in accordance with the SM Program, PSMP and PuSMP to identify surface cracking, erosion points, compression ridges on steep slopes, surface ponding and steep slope instability	Results of monitoring undertaken in accordance with SM Program, PSMP and PuSMP	SM Program, PSMP and PuSMP implemented. Any surface cracking, erosion points, compression ridges on steep slopes, surface ponding areas and steep slope instability are identified to allow assessment.
	Assess & Plan Identified surface cracking, erosion points, compression ridges, surface ponding areas and steep slope instability are assessed to identify appropriate remedial measures and any constraints.	Assessment of SM Program results and planned remedial measures completed.	All identified impacts are assessed and specific remedial measures developed. Management measures of the Extraction Plan are followed: -PSMP -Heritage Management Plan (HMP) -Biodiversity Management Plan (BMP) – including management of any clearing activities required. Consultation with landholder regarding proposed remedial measures undertaken.
	Consult Landholder is consulted in relation to the requirements and nature of remedial measures required	Record of landholder consultation	Erosion and sediment control are implemented for remedial works. Topsoil is conserved during remedial works and reused in vegetation establishment. Landform subsidence impact repaired commensurate with size and scale of impact (e.g. major landform impact by filling or ripping the soil and re compacting,
	Landform Remedial Measures The assessed landform surface cracking, erosion points and compression ridges, areas of drainage impact (e.g. surface ponding) are remediated as necessary.	Landform remediated and prepared for vegetation establishment. Capacity of land to drain freely confirmed.	
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Objectives	Performance Measure	Performance Indicator	Criteria
		No unplanned ponding of water.	<p>minor surface cracking may be remediated through infilling with soil or other suitable material).</p> <p>Landform (including existing drainage contours) is free draining except for purpose built dams and structures. This may include filling using imported material and/or earthworks to reshape the land and re-establish the natural drainage pathway.</p>
	Vegetation Establishment Remediated areas revegetated with species selected based on the existing land use and surround vegetation.	Percentage Ground Cover Species Mix Monitoring of vegetation success	<p>Ground cover comparable to pre-mining environment is re-established following remediation activities.</p> <p>For pasture areas: Remediated areas revegetated with species based on the existing land use (i.e. pasture) and surround vegetation.</p> <p>For native bushland: Remediated areas revegetated with native species based on the surrounding vegetation.</p> <p>Ecosystem function is rehabilitated to that existing pre mining and consistent with the surrounding landform.</p>
Ensure public safety	General landform public safety impacts are remediated. Identified slope instability issues are managed.	Inspection results indicate no public safety hazards post mining.	<p>Areas of steep slope and general landform have been inspected during SM Program, PSMP and PuSMP activities.</p> <p>PuSMP implemented where necessary based on SM Program results.</p> <p>General landform condition impacts remediated in accordance with this LMP.</p>

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In the event the performance measures provided in Section 6 are considered to have been exceeded, or are likely to be exceeded, Abel Mine will undertake the following:

- Report the likely exceedance of the performance indicator to the relevant agencies as required under the development consent or legislation after becoming aware of the exceedance;
- Assess public safety and where appropriate implement safety measures in accordance with site procedures;
- Identify an appropriate course of action with respect to the identified impact in consultation with appropriate specialists and relevant agencies;
- Submit the proposed course of action to nay relevant government agencies for consultation / approval (if required);
- Implement the approved course of action, consistent with other relevant management plans to the satisfaction of the appropriate agencies (if required); and
- Review the effectiveness of this LMP to adequately manage potential impacts within the limits of the project approval.

7.1 Trigger Action Response Plan

The following Trigger Action Response Plan (TARP) identifies the proposed contingencies strategies in the event of unexpected variation or impacts to rehabilitation outcomes. A risk based approach has been used to assess the potential consequences and mitigation measures. **Table 7** outlines the key identified risks, triggers and proposed mitigation measures.

Table 7. Proposed Mitigation Measures to Reduce Key Risks

Risk	Trigger	Proposed Mitigation Measure
Surface subsidence impacts are greater than predicted	Data obtained from subsidence monitoring program indicates exceedance of predicted levels and significant subsidence induced impacts requiring remediation. Significant steep slope stability issues identified.	Assess public safety and where applicable, implement additional safety measures in accordance with the PuSMP or as otherwise necessary to prevent injury or harm to any person. Remedial actions will be implemented based on the outcomes of investigations and undertaken in consultation with landowner and relevant government agencies as required. A review of the SM program and a general landform inspection will be undertaken to assess the adequacy of remedial actions.
Wind and water erosion	Visual monitoring indicates sites of persistent wind or water erosion	Erosion and sediment controls will be employed during rehabilitation activities, including repair of subsidence areas. Where persistent issues are identified additional controls may be employed including planting of windbreaks and/or minor re contouring of the landform to improve local drainage characteristics.

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Risk	Trigger	Proposed Mitigation Measure
Poor vegetation establishment success	Monitoring data indicates noncompliance with performance criteria in terms of remediation of subsidence impacts	Review species mix used to ensure alignment with seasonal conditions of the site. Where possible use native species associated with the target vegetation communities. Undertake follow up maintained and/or replanting activities where required.

8 PLAN IMPLEMENTATION

8.1 Reporting Framework

8.1.1 Annual Review / Annual Environmental Management Report (AEMR)

The Annual Review / AEMR is prepared to summarise Abel Mine's environmental performance for the reporting year and is prepared in accordance with Schedule 6 Condition 4 of Project Approval 05_0136 MOD 3 and to satisfy Mining Lease conditions.

Performance in accordance with this LMP, as a key component plan of the Extraction Plan, will be reported using timings and protocols as the main Extraction Plan.

8.1.2 Regular

The results of the monitoring undertaken in accordance with the LMP will be provided to the relevant landowner at a frequency agreed in the individual BFMPs Property Subsidence Management Plans.

8.2 Reporting Framework

Regular review of the LMP (as part of the Extraction Plan) is required by Project Approval 05_0136 MOD 3. In particular, Abel Mine is required to review, and if necessary revise, the strategies, plan and programs of this Extraction Plan within 3 months of submission of an :

- Annual review under condition 4 of schedule 6;
- Incident report under condition 7 of schedule 6;
- Audit report under condition 9 of schedule 6; and
- Any modification to the conditions of PA05_0136 MOD 3

Any revision to the LMP must be completed to the satisfaction of the Director-General.

8.3 Extraction Plan Roles and Accountabilities

Detailed below are key personnel involved with implementing this Extraction Plan to manage subsidence, their roles and responsibilities.

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Role	Responsibilities
Operations Manager (OM)	<ul style="list-style-type: none"> • Make appropriate resources available for the implementation of this Extraction Plan • Conduct underground mining activities in accordance with the Extraction Plan Coal Resource Recovery Plan. • Notify and liaise with DRE Inspectors (if required)
Technical Services Manager (TSM)	<ul style="list-style-type: none"> • Owner of the Extraction Plan • Liaise with Government Agencies and Community members in relation to subsidence matters and the Extraction Plan subsidence predictions and monitoring program • Manage / implement subsidence management actions required by the Extraction Plan in relation to Built Features and general landform • Coordinate Registered Mine Surveyor to ensure subsidence monitoring is undertaken in accordance with the Extraction Plan • Review subsidence monitoring data against predictions and TARPs in order to trigger any actions required on the basis of subsidence results • Manage / implement subsidence management actions required by the Extraction Plan in relation to Infrastructure • Review subsidence predictions based on monitoring information and the TARPs • Liaise with Mine Subsidence Board in relation to Built Features impacts • Review and update the Extraction Plan and sub plans as required • Provide support and guidance in relation to subsidence effects to Environment & Community Relations Manager
Environment and Community Relations Manager (ECM)	<ul style="list-style-type: none"> • Ensure that all environmental monitoring and reporting is undertaken in accordance with the Extraction Plan and sub environmental management plans • Train remediation contractors on mitigation measures for remedial works • Liaise with Government Agencies in relation to environmental consequences of subsidence and proposed management strategies • Liaise with Landholders in relation to environmental consequences of subsidence and in relation to access for the Extraction Plan monitoring program • Notify and liaise with neighbours and community in relation to mining timing and monitoring performance
Registered Mine Surveyor (RMS)	<ul style="list-style-type: none"> • Ensure that all subsidence monitoring is completed to the requirements of the Subsidence Monitoring Program and provided to the TSM for review • Liaise with the Environment & Community Relations Manager to gain required access for subsidence monitoring • Provide training for subsidence impact measurements and observations in accordance with SM program

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9 REFERENCES

MSEC, 2014, Abel Underground Mine: EP / SMP Area 4 – Proposed Panels 27 to 35, Subsidence Predictions and Impact Assessments for the Natural and Built Features in Support of the EP / SMP Application, Report No. MSEC676, Revision A

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APPENDIX A – APPROVAL CONDITIONS

Table A1. Conditions of project approval 05_0136 MOD 3 (as modified)

Condition No.	Condition Requirement	Addressed in LMP
Schedule 3, Condition 4 (d)	Include detailed performance indicators for each of the performance measure in Conditions 1 and 3 in Schedule 3;	Section 6.0
Schedule 3, Condition 4 (g)	Provide revised predictions of the potential subsidence effects, subsidence impacts and environmental consequences of the proposed second workings, incorporating any relevant information obtain since project approval.	Section 4.0
Schedule 3, Condition 4 (i)	Include a Land Management Plan, which has been prepared in consultation with any affected public authorities, to manage the potential impacts and/or environmental consequences of the proposed second workings on land in general, with a specific focus on cliffs, rock face features and steep slopes.	This LMP
Schedule 3, Condition 4 (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 Conditions 1 and 3 in Schedule 3, or where any such exceedance appears likely.	Section 7.0
Schedule 3, Condition 4 (r)	Include a program to collect sufficient baseline data for future Extraction Plans.	Section 5.0
Schedule 3, Condition 5	The Proponent shall ensure that the land management plan required under conditions 4(i) includes: <ul style="list-style-type: none"> (a) a revised assessment of the potential environmental consequences of the Extraction Plan, incorporating any relevant information that has been obtained since this approval; and (b) detailed description of the measures that would be implemented to remediate predicted impacts. 	Section 4.0 Section 6.0
Schedule 4, Condition 27	Rehabilitation Objectives The Proponent shall rehabilitate the site to the satisfaction of the Executive Director Mineral Resources. This rehabilitation must be generally consistent with the proposed rehabilitation strategy described in the EA, and comply with the objectives in Table 12.	Section 2.3
Schedule 4, Condition 28	The Proponent shall carry out the rehabilitation of the site progressively, that is, as soon as reasonably practicable following disturbance.	Section 6.0
Schedule 5, Condition 1	Notification of Landowners As soon as practicable obtaining monitoring results which show: <ul style="list-style-type: none"> (a) an exceedance of any relevant criteria in Schedule 4, the Proponent shall notify affected landowners in writing of the exceedance, and provide regular monitoring results to each affected landowner until the Proponent is again complying with the relevant criteria. 	Section 7.0

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Condition No.	Condition Requirement	Addressed in LMP
Schedule 6, Condition 2	<p>Management Plan Requirements</p> <p>The proponent shall ensure that the management plans required under this approval are prepared in accordance with any relevant guidelines, and include:</p> <ul style="list-style-type: none"> (a) detailed baseline data; (b) a description of: <ul style="list-style-type: none"> I. the relevant statutory requirements (including any relevant approval, licence or lease conditions); II. any relevant limits or performance measures/criteria; III. the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the project or any management measures; (c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria; (d) a program to monitor and report on the: <ul style="list-style-type: none"> I. impacts and environmental performance of the project; II. effectiveness of any management measures (see c above); (e) a contingency plan to manage any unpredicted impacts and their consequences and to ensure that ongoing impacts reduce to levels below relevant impact assessment criteria as quickly as possible; (f) a program to investigate and implement ways to improve the environmental performance of the project over time; (g) a protocol for managing and reporting any: <ul style="list-style-type: none"> I. incidents; II. complaints; III. non-compliances with statutory requirements; and IV. exceedances of the impact assessment criteria and/or performance criteria; and <p>a protocol for periodic review of the plan.</p>	This LMP
Schedule 6, Condition 3	<p>Adaptive Management</p> <p>The Proponent must assess and manage project-related risks to ensure that there are no exceedances of the criteria and/or performance measures in Schedules 3 and 4. Any exceedance of these criteria and/or performance measures constitutes a breach of this approval and may be subject to penalty or offence provisions under the EP&A Act or EP&A Regulation. Where any exceedance of these criteria and/or performance measures has occurred, the Proponent must, at the earliest opportunity:</p> <ul style="list-style-type: none"> (a) take all reasonable and feasible steps to ensure that the exceedance ceases and does not recur; (b) consider all reasonable and feasible options for remediation (where relevant) and submit a report to 	Section 7.0

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Condition No.	Condition Requirement	Addressed in LMP
	the Department describing those options and any preferred remediation measures or other course of action; and implement remediation measures as directed by the Director-General, to the satisfaction of the Director-General.	
Schedule 6, Condition 5	<p>Revision of Strategies, Plans and Programs</p> <p>Within 3 months of the submission of an:</p> <ul style="list-style-type: none"> (a) annual review under condition 4 of schedule 6; (b) incident report under condition 7 of schedule 6; (c) audit report under condition 3 of schedule 7; and (d) or any modification to the conditions of this approval, <p>the Proponent shall review, the strategies, plans and programs required under this approval to the satisfaction of the Director-General. Where this review leads to revisions in any such document, then within 4 weeks of the review the revised document must be submitted for the approval of the Director-General.</p> <p><i>Note: This is to ensure the strategies, plans and programs are updated on a regular basis, and incorporate any recommended measures to improve the environmental performance of the project</i></p>	Section 8.0

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APPENDIX B – 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	

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