DONALDSON COAL PTY LIMITED

ABEL MINE

Subsidence Management Plan

Subsidence Monitoring Program

Panels 5 - 8
Surface

May 2011

Document Control

Description

Document No.	
Title	Subsidence Monitoring Program - Panels 5 - 8 – Surface
General Description	Provides a program for the management of subsidence monitoring on the surface in the area potentially influenced by mining in Panels 5 - 8 at Abel Mine.
Key Support Documents	Abel Mine Subsidence Management Plan

Approvals

ORIGINATOR	Grant Lord	Position Registered Mine Surveyor	Signed	Date
REVIEWED	Tony Sutherland	Position Technical Services Manager	Signed	Date
APPROVED	Tony Sutherland	Position Technical Services Manager	Signed	Date
CONFIRMED **(I&I-MR if Applicable)**		Position	Signed	Date

Revisions

					Approved	
Version #	**Date**	**Description**	**By**	**Checked**	**Name**	**Signed**
2	30/05/11	11kv and 132kv Power Pole Monitoring Schedule	MW	GL		

Consultation

Version#	Date	Name	Position

The nominated Coordinator for this document is	Manager of Mining Engineering

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1. PURPOSE AND SCOPE

The purpose of this Monitoring Program is to provide a subsidence monitoring and reporting program to measure and monitor both subsidence and any effects relating to mining (pillar extraction) in the Subsidence Management Plan area. The program includes monitoring both pre and post mining for Panels 5 - 8 within SMP Area 1. The proposed subsidence mark locations and the relevant surface features are shown on **Figure 1**. Individual monitoring programs and details are listed in **Section 6 – Monitoring Details**.

This Monitoring Program has been developed as part of the Abel Subsidence Management Plan.

2. RESPONSIBILITIES AND RESOURCES

The Abel Mine Surveyor is responsible for the implementation of the subsidence monitoring component and the visual and photographic monitoring and inspection component of this Program.

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

3. CONSULTATION

This program has been developed considering recommendations contained within reports provided by Ditton Geotechnical Services Pty Ltd, in consultation with officers of Mineral Resources and is submitted to the Principal Subsidence Engineer I & I – Mineral Resources for approval.

4. BACKGROUND

Abel Mine is an underground coal mine operated by Donaldson Coal Pty Limited. The mine access, entries and primary surface facilities are located approximately 23km north-west of Newcastle on John Renshaw Drive at Blackhill. Abel commenced mining operations in May 2008, and commenced pillar extraction during June 2010. Abel uses the bord and pillar method to develop mining panels which will support secondary extraction. An SMP Approval has been received for secondary extraction of Area 1, which includes Panels 5 - 8 within the Upper Donaldson Seam.

This Subsidence Monitoring Program includes the monitoring of:

- Longitudinal and transverse monitoring lines above extraction panels
- Photographic monitoring and visual inspections of the general surface plus power poles, water lines, roads, tracks and fences.

Telstra OFC

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EA1

EA2

EA3

EA4

EA5

EA6

Panel 8

Panel 7

Panel 6

Panel 5

Panel 4

Panel 15

34B

32B

31B

30B

Optus OFC

Energy Australia 132kV powerline

Australia 11kV powerline

EAST MAINS

Creek

Bor

tap

trough

1431

1430

1434

Contaminated Site

Capped Area

26m

0 100 200 300

LEGEND

- Private road/track
- Watercourse
- Surface Contours
- Pipeline (buried poly)
- Fence
- 11kv Power line
- 132kV Power line
- Existing Subsidence Marks (204)
- Proposed Subsidence Marks
- Proposed Extraction Area
- Building (derelict)
- Fibre Optic Cable
- Transmission Tower

donaldson coal

ABEL MINE
PANELS 5 - 8
PROPOSED SUBSIDENCE MONITORING LOCATIONS

SCALE	As Shown	DWG No. :	a1d0049.dwg
DRAWN	G. LORD	REVISION :	
CHECKED			
DATE	16th May 2011		

5. APPROACH TO SUBSIDENCE MONITORING

The Mine's overall strategy for monitoring and management is:

1. **Measure baseline information** - Established background data for the surface above the mining area.

2. **Monitor the effects of mining** - Continue monitoring of identified parameters at key positions relating to the mining position.

3. **Regularly assess and interpret monitoring** – Monitoring data is analysed to identify any variations from predictions or unexpected anomalies.

4. **Subsidence Management Status Reports** - Regular reports will be supplied to the relevant Stakeholders, along with periodic consultation meetings. Such updates will review the monitoring results, review the requirement to reassess subsidence effects and identify/implement remedial actions (see below).

5. **Reporting of monitoring results** – as described in **Section 7.**

6. **Re-assess any impacts** – where variations are greater than predictions made in the SMP, additional assessment/investigation of impacts will be undertaken. This will be carried out by specialist consultants and Abel personnel where required.

6. MONITORING DETAILS

6.1 Subsidence Monitoring

6.1.1 Longitudinal and Transverse Monitoring Lines

Stable marks to be established along the centreline of each panel as well as a single crossline perpendicular to the centrelines. These lines will extend beyond the 26.5 degree angle of draw. Stations to be placed at generally 10 metre spacing's along the lines. Monitoring by precise level and steel band to provide level, strain and tilt information (anticipated accuracy +/- 3mm). See "Figure 1" for proposed monitoring point locations.

6.1.2 11kV and 132kV Power Pole Monitoring

Stable marks established adjacent to power poles. Monitoring by total station survey to provide x, y and z values to establish movement of poles. Also radiations measured to top of each pole to measure for any possible tilt. (anticipated accuracy +/- 10mm). See "Figure 1" for proposed monitoring point locations.

6.1.3 Buried Fibre Optic Cable

Stable marks to be placed at approximately 10m centres, immediately adjacent to the fibre optic cable. Surveys will be by precision level and measurements by steel band to provide information for strain calculations.

6.1.4 Transgrid - 330kv Transmission Tower Monitoring

Stable marks to be established on each leg of the tower and on the ground adjacent to each leg. Survey by precision level and measurements by steel band to provide information for tilt and strain calculations.
Check of verticality by observing the "earth wire peak" of each tower using a reflectorless Total Station Theodolite.

6.2 Monitoring Schedule

Survey Line	Survey Stations	Station Spacing	Monitoring Frequency	Survey Standards
Centre Line / Cross Line	Star Pickets	Generally 10m apart	Pre & post mining 6 months post 12 months post	Standard B
Transgrid Tower monitoring for level & strain	Star Pickets / Stable Marks on Structure	Adjacent to each leg of tower	Pre & post mining 6 months post 12 months post Also weekly surveys when tower is in active mining area.	Standard B
Transgrid monitoring for verticality	Star Pickets / Stable Marks on Structure	Adjacent to each leg of tower	Pre & post mining 6 months post 12 months post	Standard C
Fibre Optic Monitoring	Star Pickets	Adjacent to buried cable	Pre & post mining 6 months post 12 months post Also weekly surveys when cable is in active mining area	Standard B
11kV and 132kV Power Pole monitoring	Stable Marks	Adjacent to each pole	Pre & post mining	Standard A

6.3 Surface Features – Surface Inspections and Photographic Monitoring

Surface features above Panels 5 - 8 include paddocks used for cattle grazing interspersed with areas of medium density tree cover and private access roads to paddocks. A pre-mining inspection of the area will identify existing condition of the surface area.

6.3.1 Surface Inspections, Parameters, Monitoring and Frequency

A pre-mining inspection of the panels shall be undertaken prior to commencement of pillar extraction. The purpose of this inspection is to gain a baseline record of the surface before carrying out pillar extraction beneath an area. Visual inspections will then be conducted of any sensitive surface features at regular intervals during undermining by the panel plus post mining. If any change is noted photographs will be taken and used as a comparison against the baseline photographs.

6.3.2 Photographic Monitoring, Parameters, Methods and Frequency

Where sensitive surface features are located during the pre-mining visual inspection, photographic monitoring sites will be established (with GPS location). Photographic inspections of the panel shall be undertaken prior to commencement of pillar extraction and at completion of mining. Additional photography will be undertaken if visual inspections, conducted during mining, reveal any changes.

A summary of results will be reported to the Principal Subsidence Engineer. An annual summary will be prepared for the Annual Environment Management Report (AEMR).

6.4 Monitoring – General Information

Monitoring or inspections shall not be discontinued or the approved monitoring program modified without the agreement of the Principal Subsidence Engineer.

Table 1. Surface Inspections and Photographic Monitoring Methods and Parameters

Item	Monitoring Type	Monitoring Frequency	Notes	Responsibility
Surface features	Photographic	• Pre mining • Additonal if visual inspections identify impact • Post mining		Abel mine surveyor
Surface features	Visual inspections	• Pre mining • weekly during undermining • Post mining		Abel mine surveyor

7. SURVEY STANDARDS

GENERAL

- Control survey information datum for both coordinates and level to be either from State Survey Grid or confirmed unaffected station installed from State Survey Grid.

STANDARD A

- Location of marks by Total station coordination (x,y) and level (z).
- Expected accuracy +/-10mm
- Traverse accuracy to be ICSM SP1 Class D or better.

STANDARD B

- Precision leveling with an expected accuracy of +/-5mm
- Strain measurements with an expected accuracy of +/-2mm

STANDARD C

- Reflectorless measurement to earth wire peak of transmission tower using reflectorless total station from a fixed point adjacent to the base of the tower. Fixed point to be referenced to at least 2 feet of the base of the tower to maintain relativity.
- Expected accuracy of +/-10mm.

8. REPORTING

Information generated as a result of monitoring surveys conducted over subsidence marks shall be supplied to the Principal Subsidence Engineer in Excel format via e-mail.

Results of each survey, in Excel format, shall be forwarded promptly following completion.

9. REVIEW

This plan will be reviewed as necessary including:

- In the event that relevant stakeholders raise issues that necessitate a review;
- Monitoring demonstrates that the subsidence results are such that a review is warranted; and/or
- At the completion of each mining Panel.

The review at the completion of each panel will be conducted in consultation with Industry and Investment – Mineral Resources, Principal Subsidence Engineer.

The objective of the review will be to ensure that the program is adequately and efficiently measuring subsidence parameters. In the event of the monitoring program being changed a copy will be provided on the Donaldson Coal website.