DONALDSON COAL PTY LIMITED

TASMAN MINE

Subsidence Management Plan

Subsidence Monitoring Program - Surface

August 2008
# Document Control

## Description

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<tr>
<td>Title</td>
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<td>General Description</td>
<td>Provides a program for the management of subsidence monitoring on the surface in the area potentially influenced by mining at Tasman mine.</td>
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<td>Key Support Documents</td>
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## Approvals

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<tr>
<th>ORIGINATOR</th>
<th>Kevin Price</th>
<th>Position</th>
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<td></td>
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<tr>
<td>REVIEWED</td>
<td>Tony Sutherland</td>
<td>Position Manager Mining Engineering</td>
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<td>26/08/08</td>
<td>Version 1</td>
<td>K Price</td>
<td></td>
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## Consultation

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The nominated Coordinator for this document is Manager of Mining Engineering
TABLE OF CONTENTS

1. PURPOSE AND SCOPE ........................................................................................................ 4
2. RESPONSIBILITIES AND RESOURCES ........................................................................ 4
3. CONSULTATION ............................................................................................................... 4
4. BACKGROUND .................................................................................................................. 4
5. APPROACH TO SUBSIDENCE MONITORING ............................................................... 8
6. MONITORING SCHEDULE ............................................................................................. 8
   6.1 Subsidence Monitoring ............................................................................................... 8
      6.1.1 Panel – Centre Line and Cross Line ...................................................................... 8
      6.1.2 Mount Sugarloaf Lookout Road Line ..................................................................... 8
   6.2 Surface Features – Surface Inspections and Photographic Monitoring .................... 10
      6.2.1 Surface Inspections, Parameters, Monitoring and Frequency ............................... 10
      6.2.2 Photographic Monitoring, Parameters, Methods and Frequency ......................... 10
   6.3 Infrastructure – Powerlines, Cables and Roads / Tracks ........................................... 10
   6.4 Monitoring – General Information ............................................................................ 10
7. SURVEY STANDARDS ................................................................................................... 12
8. REPORTING .................................................................................................................... 12
9. REVIEW .......................................................................................................................... 12

FIGURE

Figure 1  Subsidence, Photographic Monitoring and Inspections Locations for Panel .......... 6
Figure 2  Subsidence, Photographic Monitoring and Inspections Locations for SMP Area .... 7

TABLE

Table 1  Subsidence Line Monitoring Methods and Parameters ......................................... 9
Table 2  Surface Inspections and Photographic Monitoring Methods and Parameters ........ 11
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) by Tasman in the Subsidence Management Plan area of pillar extraction panels. The program includes monitoring both pre and post mining for the panel. The proposed Subsidence Line locations and the monitoring details of relevant natural and man-made features are to be supplied for each individual panel prior to mining, as Figure 1. Individual subsidence line survey programs and details are listed in Table 1.

The proposed monitoring program for each panel shall be submitted to the Principal Subsidence Engineer and shall consist of plans (Figures 1 and 2) and letter outlining the proposed monitoring layout relevant to the panel as an addendum to this document.

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

2. RESPONSIBILITIES AND RESOURCES

The Tasman 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 Tasman 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 DPI – Mineral Resources for approval.

4. BACKGROUND

Construction of the Tasman mine infrastructure commenced in January 2006 and underground development commenced, in accordance with the approved Mining Operations Plan, in September 2006. Surface construction was essentially completed by October 2006 and the Initial Development phase was completed by September 2007. Tasman uses the bord and pillar method of mining and development of mining panels which could support secondary extraction. The SMP Application has been lodged for approval of this secondary pillar reduction / extraction in the subject Panel(s).

Monitoring of each panel will be conducted in accordance with the approved Monitoring Program, including the land and any infrastructure overlying the panel.

This Subsidence Monitoring Program includes the monitoring of:

- Subsidence, strain and tilt across agreed sections of the surface above the Panel with a central line and cross line;
- Continued subsidence and horizontal movement along Mount Sugarloaf Lookout Road, primarily to provide information on any far field subsidence movements,
- Movement surveys to selected points adjacent to cliff tops; and
- Photographic monitoring, visual inspections and possibly subsidence surveys of key surface features including but not limited to infrastructure, man made features, cliffs, roads and tracks.
FIGURE 1: SUBSIDENCE, PHOTOGRAPHIC MONITORING AND INSPECTION LOCATIONS FOR PANEL

Note - Plan to be attached for each individual Panel
FIGURE 2: SUBSIDENCE, PHOTOGRAPHIC MONITORING AND INSPECTION LOCATIONS FOR CURRENT SMP AREA

Note - Plan to be attached for each individual Panel
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 Tasman personnel where required.

6. MONITORING SCHEDULE

The monitoring schedule for each panel is explained in greater detail in the following section.

6.1 Subsidence Monitoring

6.1.1 Panel – Centre Line and Cross Line

Stable star picket line to be established, where practical and accessible, along the centre line and cross line generally as shown on the plan. Stations to be placed at generally 10 metre centres, though this may not be possible in the vicinity of cliff lines. Monitoring by total station survey to provide x and y values (anticipated accuracy +/- 10mm). Survey by precision level and measurement by steel band to provide higher accuracy information for strain calculations will also be conducted where possible subject to the nature of the terrain. Monitoring points to be installed adjacent to or on cliff tops, key surface features and/or infrastructure generally as shown on the plan.

6.1.2 Mount Sugarloaf Lookout Road Line

Surveys to continue along previously established monitoring line established along or adjacent to the edge of the road. The purpose of this survey line is to provide information on any far field movements. Control survey information will be established from the State Survey grid, a minimum distance of 1 Km from the extraction area. Monitoring by total station survey to provide x, y and z values.
<table>
<thead>
<tr>
<th>Subsidence Line</th>
<th>Purpose</th>
<th>Survey Stations</th>
<th>Station Spacing</th>
<th>Monitoring Frequency</th>
<th>Survey Standard</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panel Centre Line No</td>
<td>Centre line subsidence, tilt and strain. Angle of draw. Horizontal displacement.</td>
<td>Star pickets driven to refusal or pins in rock.</td>
<td>Generally 10 metres</td>
<td>Pre and Post mining. Six months and twelve months post mining</td>
<td>Standard A</td>
<td>Tasman mine surveyor</td>
</tr>
<tr>
<td>Key surface features and/or infrastructure</td>
<td>Monitoring of subsidence impacts. May include subsidence, tilt strain and horizontal displacement.</td>
<td>Star pickets driven to refusal or pins/marks in feature</td>
<td>Random, as shown on plan</td>
<td>Pre and Post mining. Six months and twelve months post mining</td>
<td>Standard A or B</td>
<td>Tasman mine surveyor</td>
</tr>
<tr>
<td>Cliff lines</td>
<td>Horizontal displacement.</td>
<td>Star pickets driven to refusal or pins/marks in feature</td>
<td>Random, as shown on plan</td>
<td>Pre and Post mining. Six months and twelve months post mining</td>
<td>Standard B</td>
<td>Tasman mine surveyor</td>
</tr>
<tr>
<td>Mount Sugarloaf Lookout Road Line</td>
<td>Horizontal Displacement, potential “far field” movement</td>
<td>Survey pegs and concrete monuments at various centres. Previously installed prior to Panel 1 North</td>
<td>As shown on plan</td>
<td>Pre and Post mining of each panel. Maximum interval six months</td>
<td>Standard B</td>
<td>Tasman mine surveyor</td>
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</table>
6.2 Surface Features – Surface Inspections and Photographic Monitoring

Surface features may include infrastructure, axe grinding grooves, rock formations, cliffs, drainage lines, tracks and steep slopes. A pre-mining inspection for each panel will identify surface features that require further monitoring post mining and also any existing disturbance from previous mining operations.

6.2.1 Surface Inspections, Parameters, Monitoring and Frequency

A pre-mining inspection of the panel shall be undertaken prior to commencement of pillar reduction / extraction. The purpose of this inspection is to gain a baseline record of the surface before underground pillar reduction. Visual inspections will then be conducted of any sensitive surface features at fortnightly intervals during undermining by the panel plus post mining. If any change is noted photographs will be taken. The purpose of these inspections is to gain a baseline record of the surface before underground pillar reduction / extraction takes place, to identify sensitive surface features and monitor any impacts.

6.2.2 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 reduction / extraction and at completion of mining. Additional photography will be undertaken if visual inspections, conducted at fortnightly intervals 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).

6.3 Infrastructure – Powerlines, Cables and Roads / Tracks

Visual inspections will be conducted on a weekly basis during the relevant pillar reduction / extraction within 100 metres radius of the infrastructure and fortnightly during mining of the remainder of the panel.

6.4 Monitoring – General Information

Installation of subsidence monitoring lines may be restricted due to limited access due to the nature of the terrain and agreement of landholders in relation to certain areas.

The proposed monitoring program for each panel shall be submitted to the Principal Subsidence Engineer and shall consist of plans (Figures 1 and 2) and letter outlining the proposed monitoring layout relevant to the panel as an addendum to this document.

Monitoring or inspections shall not be discontinued or the approved monitoring program modified without the agreement of the Principal Subsidence Engineer.
Table 2. Surface Inspections and Photographic Monitoring Methods and Parameters

<table>
<thead>
<tr>
<th>Item</th>
<th>Monitoring Type</th>
<th>Monitoring Frequency</th>
<th>Notes</th>
<th>Responsibility</th>
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<tr>
<td>Surface features</td>
<td>Photographic</td>
<td>● Pre mining&lt;br&gt;● Additional if visual inspections identify impact&lt;br&gt;● Post mining</td>
<td></td>
<td>Tasman mine surveyor</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>Photographic</td>
<td>● Pre mining&lt;br&gt;● Additional if visual inspections identify impact&lt;br&gt;● Post mining</td>
<td>May also include subsidence survey monitoring</td>
<td>Tasman mine surveyor</td>
</tr>
<tr>
<td>Surface features</td>
<td>Visual inspections</td>
<td>● Pre mining&lt;br&gt;● Fortnightly during undermining&lt;br&gt;● Post mining</td>
<td></td>
<td>Tasman mine surveyor</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>Visual inspections</td>
<td>● Pre mining&lt;br&gt;● Weekly while pillar reduction / extraction within 100 metre radius.&lt;br&gt;● Fortnightly during remainder of pillar reduction / extraction.&lt;br&gt;● Post mining</td>
<td></td>
<td>Tasman mine surveyor</td>
</tr>
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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**
Total station coordination (x,y) and digital level (z). Strain measurements between stations by steel tape. Surveys conducted at intervals noted within document. Traverse accuracy to be ICSM SP1 Class D or better. Level accuracy to be ICSM SP1 Class LD or Class B.

**STANDARD B**
Total station coordination (x,y) and level (z). Surveys conducted at intervals noted within document. Traverse accuracy to be ICSM SP1 Class D or better.

8. REPORTING

Information generated as a result of monitoring surveys conducted over subsidence lines 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 panel.

The review at the completion of each panel will be conducted in consultation with the Department of Primary Industries – 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 sent to the relevant agencies, infrastructure and land owners.