DONALDSON COAL PTY LIMITED

ABEL MINE

SMP Area 2 Pillar Extraction
Upper Donaldson Seam

Subsidence Management Plan

May 2011

Approved
Mathew Blackham
Manager of Mining Engineering
Abel Mine
Date: 24 May 2011

Document Control

Description

Document No.	Abel SMP Area 2
Title	Subsidence Management Plan
General Description	Details the proposed monitoring, management principles and actions that will be implemented to manage any potential impacts associated with the pillar extraction mining of Abel SMP Area 2.
Key Support Documents	Abel Mine SMP Area 2 SMP Written Report

Approvals

ORIGINATOR	Kevin Price	Brunskill Pty Limited	Signed	Date 03/05/2011
REVIEWED	Tony Sutherland	Position Technical Services Manager Donaldson - Underground Operations	Signed	Date 24/5/11
APPROVED	Matthew Blackham	Position Manager of Mining Engineering Abel Mine	Signed	Date 25-5-11
APPROVED	Name	Position Director Environmental Sustainability Industry & Investment NSW Minerals and Energy	Signed	Date

Revisions

Version #	Date	Description	By	Checked	Approved Name	Approved Signed
1	May 2011					

The nominated Coordinator for this document is: Manager of Mining Engineering

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1 PURPOSE

This document forms a component of the SMP Application for pillar extraction of SMP Area 2 in the Upper Donaldson Seam at Abel Mine. Refer to **Figure 1** for locality map.

The purpose of this management plan is to act as a framework document to demonstrate how the impacts of subsidence are proposed to be managed as a result of pillar extraction mining in Abel SMP Area 2 in the Upper Donaldson seam. The document aims to demonstrate the structured approach adopted by Abel in environmental management, particularly related to subsidence.

The Management Plan also fulfils the requirements of mining lease conditions in relation to establishing a Subsidence Management Plan.

2 SCOPE

This document relates to the management of subsidence as a result of pillar extraction mining in Abel SMP Area 2 in the Upper Donaldson Seam. The proposed layout of the mine workings is shown on **Figure 2**.

3 RESPONSIBILITIES AND RESOURCES

The Donaldson Technical Services manager – 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.

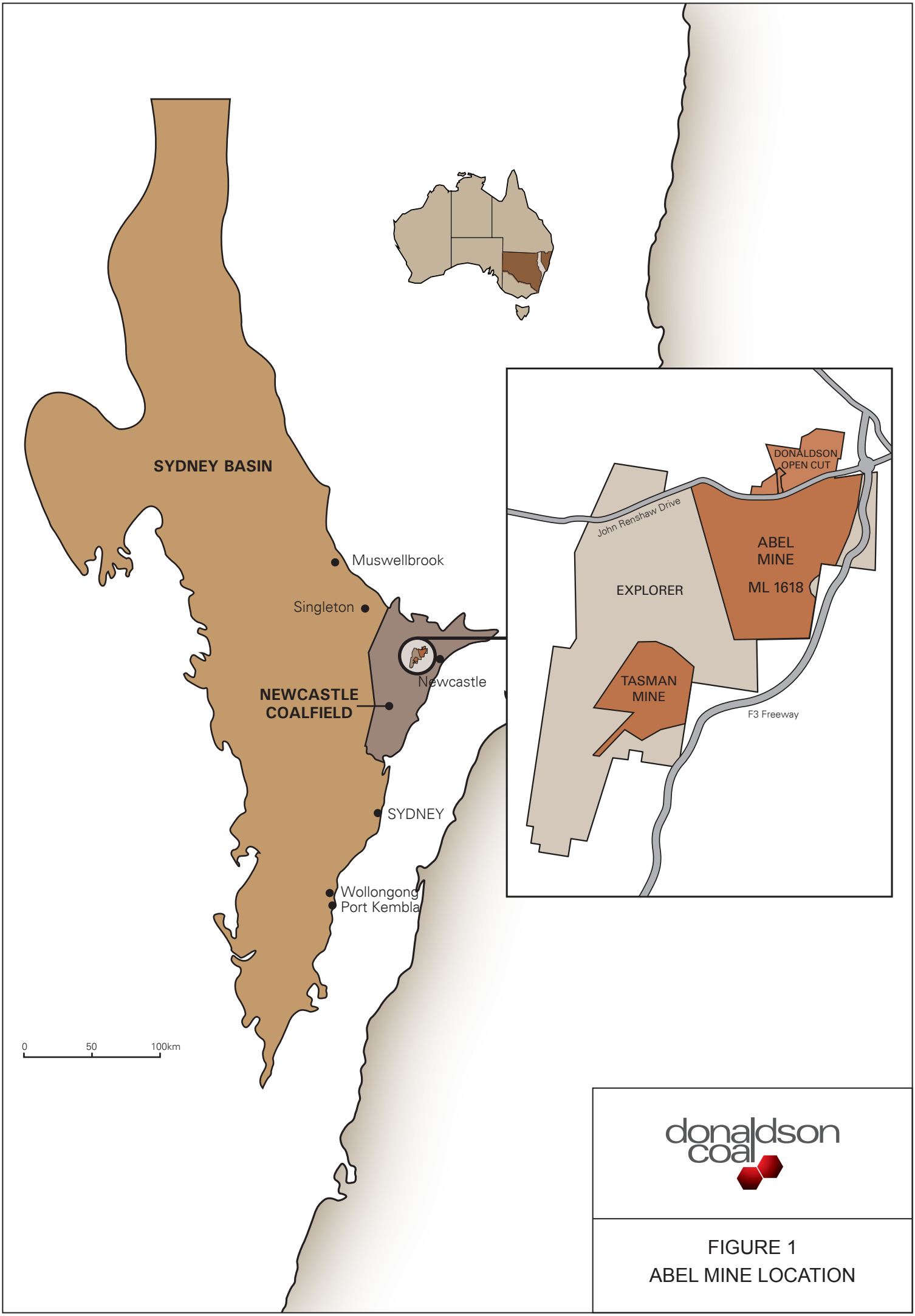
Each of the management strategies developed to manage subsidence allocates responsibilities in relation to their implementation. Relevant personnel will be provided with a copy of relevant documents. Training will be provided where deemed appropriate.

4 CONSULTATION AND SUBMISSION

Relevant stakeholders including the landowner(s), Abel Community Consultative Committee, various government agencies, infrastructure owners and operators, specialist consultants and the results of the Abel Mine Subsidence Risk Assessment (HMS 973) have provided valuable input into the development of the SMP and proposed management strategies.

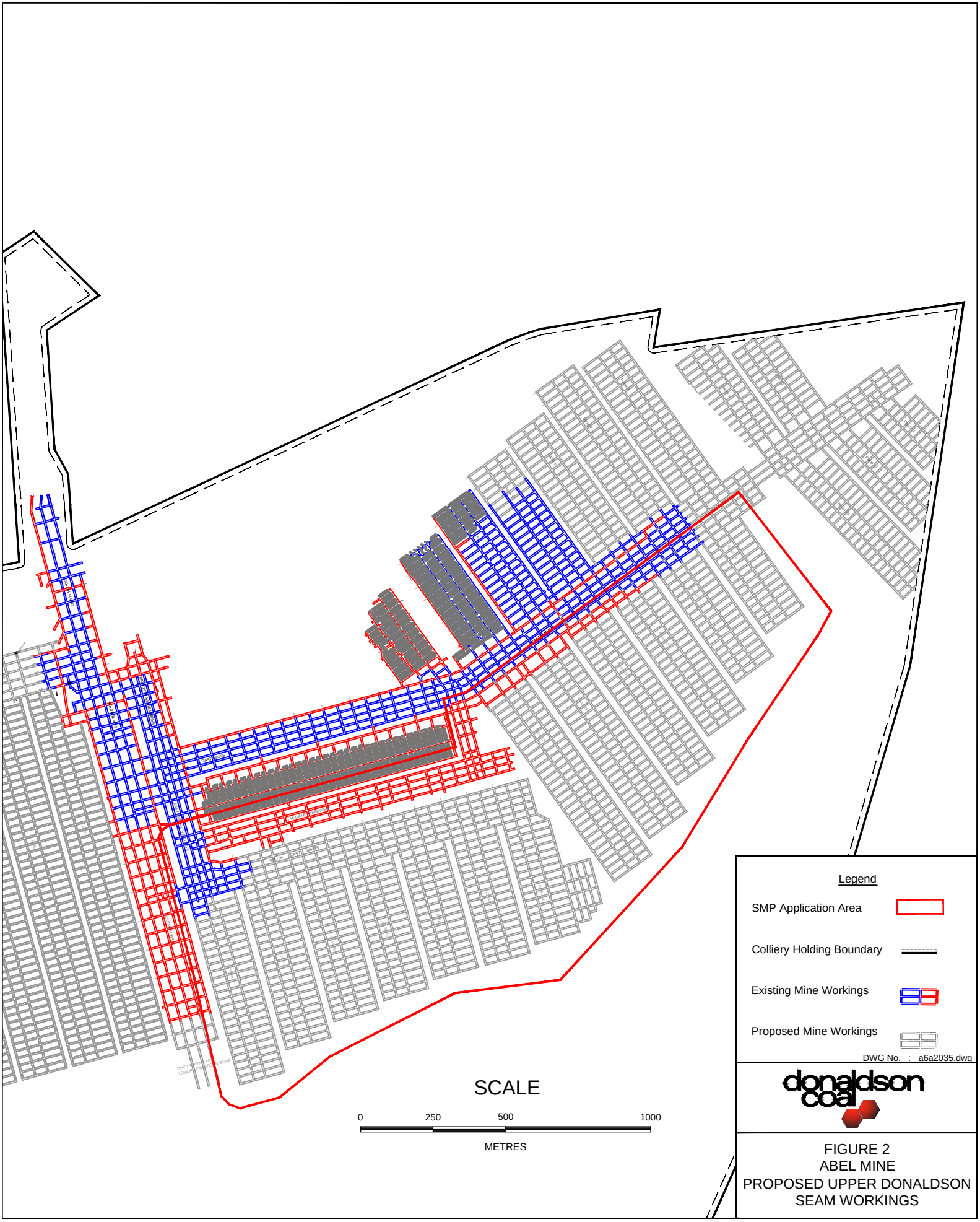
Further input is expected as part of the application review process and will be incorporated, where applicable, in any review of these strategies.

This plan is submitted to the Director Environmental Sustainability for approval as part of the SMP application.



donaldson coal

FIGURE 1
ABEL MINE LOCATION



donaldson coal

FIGURE 2
ABEL MINE
PROPOSED UPPER DONALDSON SEAM WORKINGS

5 BACKGROUND

Abel commenced coal production in May 2008 and will progressively increase production to 4.5mtpa. The SMP application area contains 211 ha, approximately 8% of the current lease area of 2,755 ha.

Mining will take place in the application area under a combination of land owned by Black Hill Land Pty Limited, the Catholic Diocese of Maitland and Newcastle, a narrow strip traversing the area owned by Hunter Water Corporation and ten privately owned rural residential landholdings. 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 100 to 150 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 that are generally bounded by the previously approved SMP Area 1 to the north, the lease boundary / F3 Newcastle to Sydney Freeway / resource thickness / quality to the east, Black Hill Road for part and resource thickness / quality to the south and existing and proposed main underground development workings to the south.

Maximum subsidence predicted for the pillar extraction panels in the application area ranges between 760 mm and 1,450 mm, maximum predicted strains from 5 to 24 mm/m and tilts from 14 to 36 mm/m excluding areas nominated to be protected.

The SMP application area surface is a combination of native bushland, cleared grazing land (some previously used for poultry farms) and rural residential. Management measures are proposed to address any predicted environmental impacts, due to subsidence, for the surface above the application area.

Natural features are generally limited to Viney Creek, a Schedule 2 stream, associated tributaries and some groundwater. The only Threatened or Endangered Ecological Communities (EEC) within the SMP application area is the Lower Hunter Spotted Gum-Ironbark Forest. No adverse impacts are predicted for this EEC nor flora and fauna.

Man – made features include:

- Principal residences, Other Surface Structures and outbuildings;
- Disused, unoccupied residences;
- Transgrid 330kV power line;
- Energy Australia (EA) 132kV power line;
- Energy Australia rural 11kV and 415V domestic power lines;
- Optus fibre optic cable;
- Active and redundant Telstra copper communication cables;
- Hunter Water Corporation water pipeline;

- Permanent survey control marks;
- Buried stock and domestic water supply lines;
- Public roads and culverts (Black Hill and Taylors Road);
- Access roads and tracks;
- Cattle stockyards, holding areas and water troughs;
- Various fences, gates and cattle grids;
- Several buried and clay liner capped contaminated material areas; and
- Several small (<1ML capacity) stock watering dams.

This Subsidence Management Plan is based around monitoring of:

- Subsidence,
- Surface watercourse flows,
- Groundwater and effects of mining on aquifers,
- Flora,
- Fauna,
- Private properties and structures (including Principal Residences),
- Dams and
- Infrastructure.

by a combination of survey and measurement, monitoring (including photographic monitoring) and physical inspection.

Also addressed is the establishment of management strategies (TARPs) in response to unexpected monitoring results and mitigation remediation measures for any impacts, as part of the associated management plans.

6 OVERALL APPROACH TO SUBSIDENCE MANAGEMENT

The Mine's overall strategy for subsidence management is:

1. **Design to reduce surface impacts** - Mine design is such that predicted subsidence is not expected to result in negative surface impacts (that is, manageable levels of subsidence, tilts, strains, and cracking are expected).

2. **Identify environmental risks** – A risk assessment is undertaken to determine environmental risks.

3. **Measure baseline information** – Establish background data for the surface above the proposed mining area, including subsidence monitoring points and the monitoring of watercourse flows, groundwater, flora, fauna, water make and weather.

4. **Monitor the effects of mining** - Continue monitoring of subsidence, watercourse flows, flora and fauna, groundwater, water make and weather patterns.

5. **Regularly assess and interpret monitoring** – Monitoring data is analysed to identify any variances

6. **Re-assess impacts** – where variances are identified that are greater than predictions (i.e. trigger points are reached), additional assessment of impacts is undertaken.

7. **Identify and implement remedial actions** – if additional assessment indicates greater impacts then remedial action may be required. Stakeholder consultation will be undertaken in determining and implementing remedial actions.

8. In the event that any surface impacts due to subsidence are noted, implement agreed appropriate remediation and / or mitigation measures in consultation with the landholder and any appropriate stakeholders.

9. Provide regular progress reports to relevant parties and hold periodic consultation meetings. Such reports and consultation to include updates on all monitoring results, including any impacts and management actions.

7 MINE DESIGN

The first step in subsidence management is to design the mine to minimise any surface impacts whilst providing safe and efficient resource recovery. For SMP Area 2 the mine design results in the following:

- Design of the pillar extraction panel layout to provide protection against adverse subsidence impacts for the SMP area while optimising resource recovery. The proposed pillar extraction panels are generally bounded by the previously approved SMP Area 1 to the north, the lease boundary / F3 Newcastle to Sydney Freeway / resource thickness / quality to the east, Black Hill Road for part and resource thickness / quality to the south and existing and proposed main underground development workings to the south.

- Maximum vertical subsidence is predicted in the range of 760 to 1,450 mm

- Three houses south of Black Hill Road and one house and associated buildings in the proposed School site within the Catholic Diocese land are the Principal Residences within the SMP application area. Protection from subsidence impact is provided to these principal residences and the Schedule 2 Viney Creek, by limiting mining to first workings only or the development of a Subsidence Control Zone (SCZ) to restrict subsidence in the area.

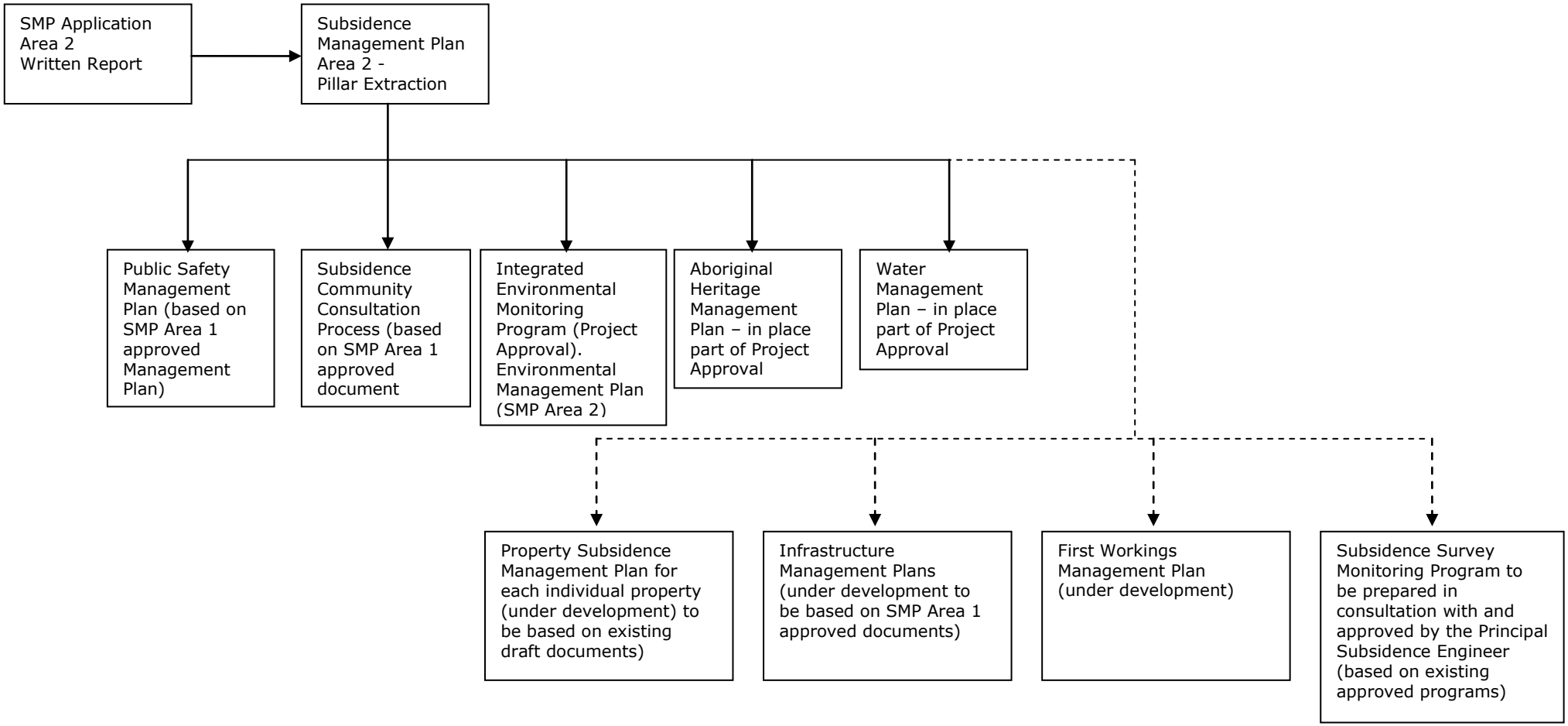
- Based on the predicted range of maximum transverse tensile strains (i.e. 5 to 19 mm/m), surface cracking widths of between 50 mm and 190 mm (based on the Upper 95% Confidence limit) could occur above Panels 14 to 26 and within the limits of extraction (i.e. goaf) beneath the SMP Area 2. The Upper 95% Confidence Limit used in these predictions considers that these values may be exceeded by 5% of the time. Therefore on a small number of occasions, the predicted crack widths may be exceeded (as has been the case with the panels extracted to date in SMP Area 1). These are generally found to be related to the presence of adverse or anomalous geological or topographical conditions. Strain concentration in near surface rock could also double the above cracks widths locally to 100 mm and 380 mm respectively.

8 MONITORING AND MANAGEMENT

A number of monitoring programs and management strategies are already in place and others have been specifically developed to identify and manage issues identified as requiring management as a result of predicted subsidence in Abel SMP Area 2 and a review of subsidence to date in SMP Area 1.

The following **Table 1** shows an outline of the SMP process including these management plans and programs. Additional management plans and programs to be prepared prior to the commencement of the pillar extraction mining are also included.

TABLE 1- SUBSIDENCE MANAGEMENT PLAN FLOWSHEET



Note: Specific Management Plans and progress are listed. Remainder are incorporated within this document.

Descriptions of these management plans and programs are listed below.

8.1 Public Safety Management Plan

A Public Safety Management Plan (**Attachment A**) has been developed for Abel SMP Area 2, based on the approved Management Plan for SMP Area 1) and though predicted subsidence impacts should not create a situation where the public will be endangered some surface cracking is anticipated and a combination of signposting and inspections is proposed to alleviate any issues. Additionally, part of the application area is contained within land owned by The Catholic Diocese where agreed procedures are in place relating to both public access and public safety.

8.2 Subsidence Community Consultation Process

A Subsidence Community Consultation Process (**Attachment B**) has been developed for the Abel SMP Area 2 as an extension of Abel's existing processes and is based on the SMP Area 1 document.

8.3 Environmental Monitoring Program and Environmental Management Plan

An Integrated Environmental Monitoring Program **(Attachment C**) has previously been developed and approved as part of the Project Approval conditions plus an Environmental Management Plan developed and approved as part of the SMP Area 1 approval, incorporating monitoring of surface watercourses, groundwater, flora, fauna, surface features, underground water make and roads / trails.

A SMP Area 2 Environmental Management Plan (**Attachment D**) has been developed based on the SMP Area 1 document.

8.4 Aboriginal Places and Archaeological Management

Abel has an Aboriginal Heritage Management Plan (**Attachment E**) in place, developed and approved as part of the Project Approval conditions.

8.5 Surface and Groundwater Management

Abel has a Water Management Plan (**Attachment F**) in place developed and approved as part of the Project Approval conditions. This Plan includes both Surface and Groundwater Monitoring Plans and also a Surface and Groundwater Response Strategy. The type and extent of remedial measures implemented will depend largely on the nature and location of any impact. Such measures may range from continued monitoring and evaluation to physical measures such as earthworks to repair any cracking in watercourses.

There are several other areas that require a management response plan, as detailed below, and these are currently being developed.

8.6 Property Subsidence Management Plan

Individual Property Subsidence Management Plan's (PSMP's) are currently being reviewed in consultation with both major landholders within the SMP Area 1. These plans will be further reviewed for SMP Area 2 and are designed to address any impacts relating to surface cracking, soil erosion, soil slumping and land degradation, disruptions to water supply or reticulation and fencing associated with subsidence due to pillar extraction mining or subsidence monitoring. PSMPs will be prepared for, and in consultation with, the other ten private landholders prior to the commencement of pillar extraction under their respective properties.

8.7 Infrastructure Management Plans

Consultation is continuing with all infrastructure owners / operators to develop appropriate management plans in relation to their assets where required. This may involve mine design modifications to extraction, mitigation and/or remediation measures or possibly rerouting or replacing the infrastructure. These Management Plans will be completed and agreed with the infrastructure owners for SMP Area 2 prior to the commencement of pillar extraction under the relevant infrastructure. Infrastructure Management Plans are already in place in SMP Area 1 for Energy Australia and Hunter Water with a draft plan provided to Transgrid for review and comment. The Management Plans required for Area 2 are :

- Transgrid Management Plan;
- Energy Australia Management Plan;
- Hunter Water Management Plan;
- Optus Management Plan;
- Telstra Management Plan; and
- Public Road Management Plan

8.8 First Workings Management Plan

As per condition 9 of the Project Approval a First Workings Management Plan will be required to be developed prior to first workings under key surface features including Viney Creek.

8.9 Principal Residence Management Plan

As a condition of the Project Approval a Principal Residence Management Plan is required to be developed prior to any first workings under any principal residence.

Three houses south of Black Hill Road and one house and associated buildings in the proposed School site within the Catholic Diocese land are the Principal Residences within the SMP application area. These are either, included in a Subsidence Control Zone (SCZ) with no first workings planned in the area, or will have a Principal Residence Management Plan developed.

8.10 Dam Monitoring and Management Strategy

In accordance with the Project Approval and Statement of Commitments a Dam Monitoring and Management Strategy (DMMS) will be formulated for each dam prior to any mining occurring which will impact on the dams. The DMMS will provide for:

1. The individual inspection of each dam by a qualified engineer for:
- current water storage level;
- current water quality (EC and pH);
- wall orientation relative to the potential cracking;
- wall size (length, width and thickness);
- construction method and soil / fill materials;
- wall status (presence of rilling / piping / erosion / vegetation cover);
- potential for safety risk to people or animals;
- downstream receptors, such as minor or major streams, roads, tracks or other farm infrastructure; and
- potential outwash effects.

2. Photographs of each dam will be taken prior to and after undermining, when the majority of predicted subsidence has occurred.

3. Dam water levels, pH and EC will be monitored prior to and after undermining to assess the baseline and post mining dam water level and water quality in order to determine whether rehabilitation is required.

4. In the event that subsidence / crack development monitoring indicates a significant potential for dam wall failure, dam water will be managed in one of the following manners:

- pumped to an adjacent dam to lower the water level to a manageable height that reduces the risk of dam wall failure,
- discharged to a lower dam via existing channels if the water cannot be transferred, or
- not transferred if the dam water level is sufficiently low to pose a minor risk.

An alternate water supply will be provided to the dam owner until the dam can be reinstated.

5. In the event of subsidence damage to any dams the Company shall remediate the damage and reinstate the dam in conjunction with the Mine Subsidence Board.

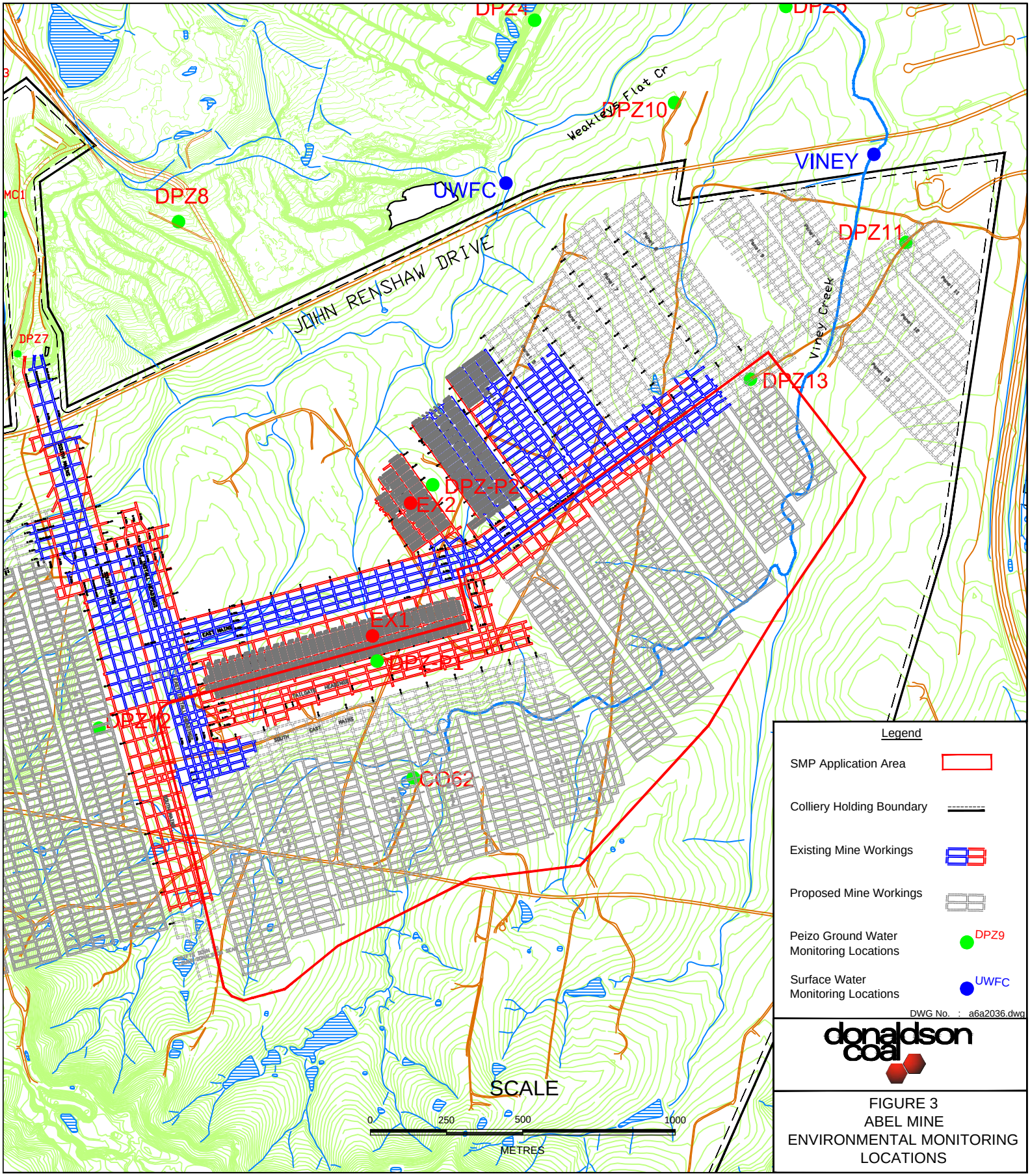


FIGURE 3
ABEL MINE
ENVIRONMENTAL MONITORING LOCATIONS

8.11 Monitoring

Detail of environmental monitoring is provided in the attached Environmental Management Plan.

8.11.1 Subsidence

Proposed – The Subsidence Survey Monitoring Programs for SMP Area 2 will be prepared in consultation with and agreed by the Principal Subsidence Engineer – Minerals and Energy following a detailed surface inspection as part of the SMP application assessment process (**refer Figure 4**). To include as a minimum:

1. One transverse subsidence line across the pillar extraction panels. The lines will be installed to at least the middle of the next adjacent panel before undermining occurs.

2. A longitudinal line extending in-bye and out-bye from each panels starting and finishing points, for a minimum distance equal to the cover depth (i.e. to an AoD of 45^{o}).

3. Depending on the location of the Principal Residence, either one or two survey lines to measure angle of draw over the proposed first workings areas running parallel and transverse to the panel centerline.

4. A minimum of 4 pegs spaced 10 m apart adjacent to or around any feature of interest (i.e. TransGrid tower, archaeological sites) to measure subsidence, tilt and strain.

5. Frequency of surveys to be established in consultation with the Principal Subsidence Engineer.

6. Visual inspections and mapping of any impact to be conducted before, during and after mining.

7. The location of the extraction face should be recorded with each survey.

The survey pegs should be spaced at a minimum of 10 m apart. A minimum of two baseline surveys of subsidence and strain will be carried out before mine subsidence occurs to establish survey accuracy.

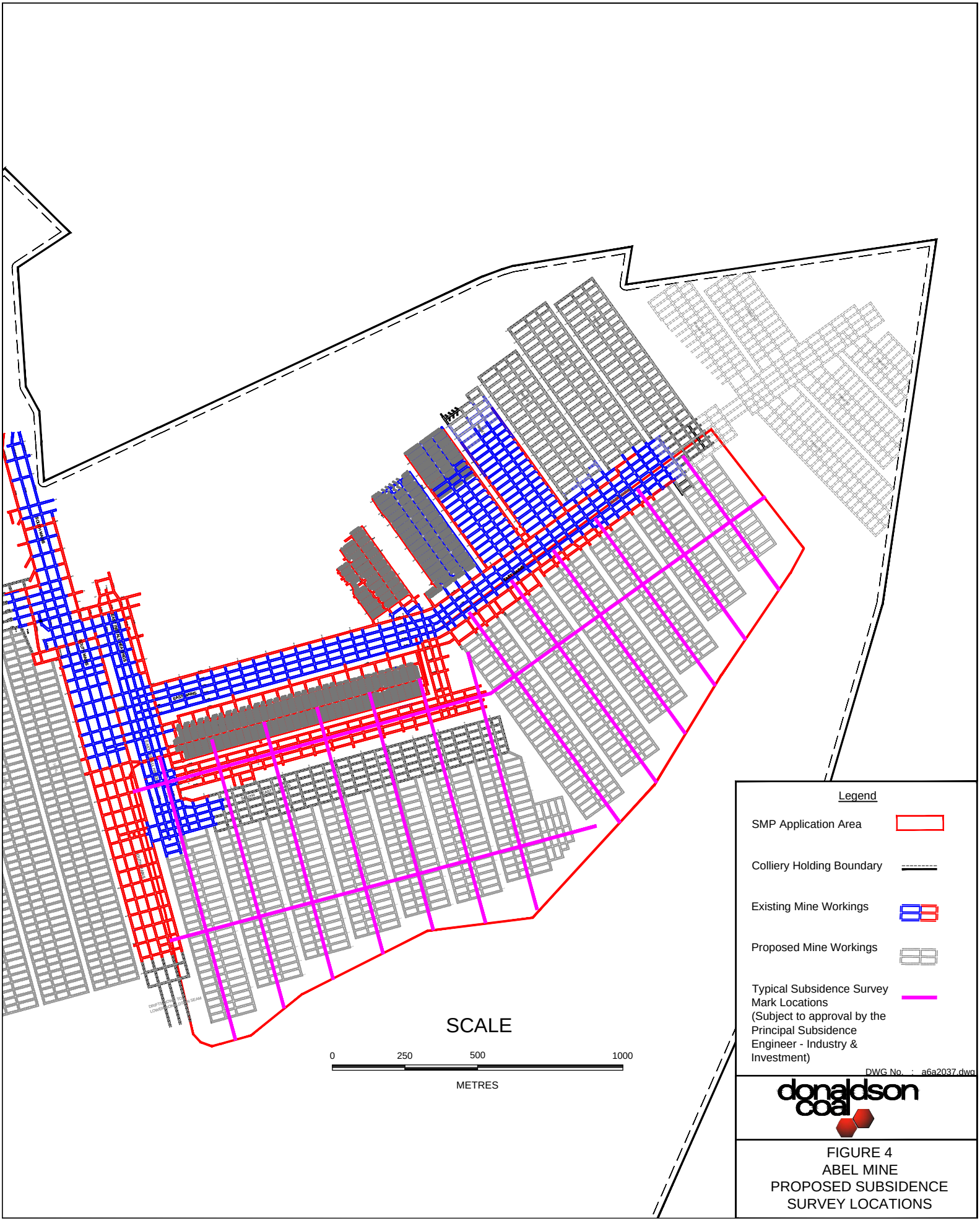

Legend
SMP Application Area
Colliery Holding Boundary
Existing Mine Workings
Proposed Mine Workings
Typical Subsidence Survey Mark Locations (Subject to approval by the Principal Subsidence Engineer - Industry & Investment)
SCALE
0
250
500
1000
METRES
DWG No. : a6a2037.dwg
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FIGURE 4
ABEL MINE
PROPOSED SUBSIDENCE SURVEY LOCATIONS

8.11.2 Surface Water

This Surface Water Monitoring Plan covers the monitoring of surface waters within and adjacent to the Abel Underground Mine Area. This includes the following drainage systems:

- Blue Gum Creek, Long Gully and the Pambalong Nature Reserve,
- Viney Creek and Weakley's Flat Creek,
- Buttai Creek, and
- Four Mile Creek.

As well as the portal, surface facilities and surface water management facilities associated with the Abel Underground Mine site.

Details of monitoring and analysis are detailed in **Attachment D** – Environmental Management Plan (EMP).

7.11.3 Groundwater

The groundwater monitoring program which has been operating on the Abel project site since September 2005 will be integrated with the surface water monitoring program. The groundwater monitoring program includes:

- Monthly measurement of water levels in a representative network of piezometers.
- Quarterly sampling of all standpipe piezometers, for laboratory analysis of electrical conductivity (EC), total dissolved solids (TDS) and pH.
- Annual collection of water samples from all standpipe piezometers for laboratory analysis of a broader suite of parameters
- Weekly measurement of the volume of mine water pumped from the underground workings.
- Weekly measurement on site of the EC, TDS and pH of the mine water pumped from the underground workings.

7.11.4 Flora

Initial investigations and monitoring of Flora above the Abel Mine area was targeted at classifying the various ecosystems extant across the area based on the vegetation, floristic content and structure. The detail of these investigations is noted in the Environmental Monitoring Program and SMP Area 2 Report.

7.11.5 Fauna

The details of the investigations into Fauna above the proposed mining area is noted in the Environmental monitoring program and SMP Area 2 Report.

A summary of current monitoring, proposed additional monitoring, and trigger / response references is included in **Table 2.**

TABLE 2- SUBSIDENCE MONITORING AND MANAGEMENT RESPONSE

Item	Monitoring Program and Frequency	Actions Required	Person Responsible	Target Date	Trigger / Response
Subsidence	To be confirmed with Principal Subsidence Engineer (PSE) – NSW Department of Industry & Investment Mineral Resources	1. Consult with PSE for development of Subsidence Monitoring Program	Technical Services Manager	September 2011	See Table 2 – Public Safety Management Plan. Also to be included in Subsidence Monitoring Program
		2. Establish monitoring lines and baseline monitoring in accordance with PSE requirements over future mining area	Mine Surveyor or contract surveyor	Prior to commencement of pillar extraction	
		3. Monitor at agreed intervals	Mine Surveyor or contract surveyor	Agreed intervals from commencement of pillar extraction	

Item	Monitoring Program and Frequency	Actions Required	Person Responsible	Target Date	Trigger / Response
Surface watercourses / drainage lines	Ephemeral watercourses / drainage lines to be visually inspected for flow on a regular basis while mining in vicinity plus qualitative estimate on monthly basis. Baseline, grab, monthly, six monthly and opportunistic surface water sampling.	Inspect as noted for flow and any subsidence impact during mining. Also monitoring for flow quantity and quality at various intervals.	Environmental Manager	Monitoring ongoing	See Section 7.4 of Environmental Management Plan for detail.
Groundwater	Four groundwater monitoring bores and piezometers established. Continuous monitoring with data collection at monthly intervals. Monitoring of additional piezometers and extensometers. Monitoring weekly, monthly, three monthly and six monthly	Monitoring for both level and quality at various intervals.	Environmental Manager	Monitoring ongoing.	See Section 7.5 of Environmental Management Plan for detail.
Flora	Monitoring quadrat established. Baseline monitoring completed and ongoing program established.	Continue existing established monitoring program	Environmental Manager	Monitoring ongoing	Figure 10 Integrated Environmental Monitoring Program and Section 7.7 of Environmental Management Plan.

Item	Monitoring Program and Frequency	Actions Required	Person Responsible	Target Date	Trigger / Response
Fauna	Monitoring locations established. Baseline monitoring completed and ongoing program established (annual survey)	Continue existing established monitoring program	Environmental Manager	Ongoing	As outlined in Table 7 Environmental Monitoring Program
General surface	Proposed : Visual inspections at weekly intervals during mining. Photographic monitoring at start and end of each panel or if changes noted on inspection.	Baseline inspection and photographic monitoring to be completed prior to extraction of each panel.	Environmental Manager or nomination.	Baseline inspection and photographic monitoring for first panel to be completed prior to September 2011.	
Fences / Roads	Proposed : Visual inspections at weekly intervals during mining. Photographic monitoring at start and end of panel or if changes noted on inspection.	Baseline inspection and photographic monitoring to be completed prior to extraction of each panel.	Environmental Manager or nomination.	Baseline inspection and photographic monitoring for first panel to be completed prior to September 2011.	

9 JUSTIFICATION OF THE MINE PLAN, MINING METHOD AND MINING SEQUENCE APPROPRIATE TO IDENTIFIED MANAGEMENT PRIORITIES

In the initial planning of the area, a number of alternative mine plans were considered and the current plan and layout was developed having regard to the lease boundaries, exploration geological data and initial environmental assessment details.

The layout of the pillar extraction panels has been designed to provide protection against subsidence impacts for most of the natural features in the area while optimising resource recovery.

Section 5.2.1 in the Written Report provides justification for the mine layout and mining sequence. Many of the justifications presented follow through to demonstrate the proposed mine plan and proposed mining schedule adequately address the key issues requiring management.

The management strategies outlined are relevant to the level of risk involved as defined in the SMP Risk Assessment. The strategies identify actions and a timeframe and resources for them to be carried out.

Donaldson maintains its commitment to a proactive role in managing the potential impacts of mine subsidence including the extensive baseline and ongoing monitoring being undertaken to assess any impacts of underground mining on fauna, flora, and groundwater in the mine lease area.

Management strategies involve mechanisms to manage situations where the actual impacts are greater than those predicted to occur. The monitoring systems proposed will identify variations at a stage early enough to enable the impacts to be mitigated.

10 ONGOING STAKEHOLDER CONSULTATION

Abel has an established Community Consultative Committee in relation to the mine operations. Ongoing consultation will be carried out with a number of stakeholders not just on subsidence related matters but on the progress of the mine and overall environmental performance.

Detail is provided in the attached Subsidence Community Consultation Process (**Attachment B**)

11 REPORTING

Results of subsidence surveys, monitoring, inspections and effectiveness of management strategies are to be reported in the four monthly Subsidence Management Status reports, part of the Subsidence Community Consultation Process, and also the Annual Environmental Management Report.

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

12 REVIEW

This plan will be reviewed as necessary including:

- In the event that landholders and/or government agencies raise issues that necessitate a review, or
- Monitoring demonstrates that impacts are such that a review is warranted.

Any review will be conducted in consultation with the Industry & Investment NSW – Minerals and Energy. In the event of the management plan being changed a copy will be sent to the relevant agencies.

13 REFERENCES

NSW Department of Mineral Resources (2003) – *Guideline for Applications for Subsidence Management Approvals*

14 ATTACHMENTS

A PUBLIC SAFETY MANAGEMENT PLAN
B SUBSIDENCE COMMUNITY CONSULTATION PROCESS
C INTEGRATED ENVIRONMENTAL MONITORING PROGRAM
D ENVIRONMENTAL MANAGEMENT PLAN
E ABEL ABORIGINAL HERITAGE MANAGEMENT PLAN
F ABEL WATER MANAGEMENT PLAN including

- Surface Water Monitoring Plan, and
- Groundwater Monitoring Plan