



DONALDSON COAL PTY LIMITED

ABEL MINE

Subsidence Management Plan

**Energy Australia Powerline Management Plan
SMP Area 1 Panel 1**


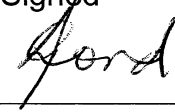
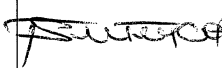

May 2010

Document Control

Description

Document No.	Abel SMP Area 1
Title	Energy Australia Powerline Management Plan Panel 1
General Description	To ensure the safety and serviceability of the Energy Australia transmission lines that may be affected by the mining of Panel 1 in SMP Area 1
Key Support Documents	Abel Mine Area 1 Subsidence Management Plan

Approvals

ORIGINATOR	Kevin Price	Brunskill Pty Limited		27/5/10
REVIEWED	Grant Lord	Position Abel Mine Surveyor	Signed 	Date 27/5/10
APPROVED	Tony Sutherland	Position Technical Services Manager – Donaldson Underground Operations	Signed 	Date 27-5-10
APPROVED	Greg Skinner	Position Area Manager- Lower Hunter Energy Australia	Signed 	Date 27/5/2010

Revisions

Version #	Date	Description	By	Checked	Approved	
					Name	Signed
1	May 2010					

The nominated Coordinator for this document is

Technical Services Manager

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1 KEY CONTACTS

Organisation	Contact Person	Phone Number
Abel Mine	Matthew Blackham – Manager of Mining Engineering	02 4015 1102
Abel Mine	Tony Sutherland – Technical Services Manager	02 4015 1105 0407 239 820
	Grant Lord – Registered Mining Surveyor	0417 257 855
Energy Australia	Greg Skinner – Area Manager – Lower Hunter	02 4934 9110 or 0407 682 077
Energy Australia Major Customer Hotline		1800 627 002
Mine Subsidence Board	Paul Gray - Area Supervisor	(02) 4908 4356

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2 INTRODUCTION

The Management Plan has been developed to manage the risks associated with surface subsidence impacts caused by the mining of SMP Area 1 Panel 1 at Abel mine.

A 132kV and an 11kV overhead Powerline are affected.

The 132KV line (9NA) originates from the Newcastle 330/132kV Substation at Killingworth and supplies the Beresfield substations. The 132kV Powerline is supported on pairs of timber poles with the pole pairs connected by a galvanised steel brace with the conductors supported by relatively flexible strings of ceramic disc insulators that will be able to tolerate some adjustment due to pole movements.

The 11kV Powerline is supported on single timber poles with the conductors supported by relatively inflexible ceramic pin insulators. Termination or angle structure use a string of disc insulators and the poles are generally supported with a ground anchor to balance tension on the pole. The 11kV line services a limited number of residential properties or rural properties in the Black Hill area.

The powerlines affected within the area shown on Figure 1.

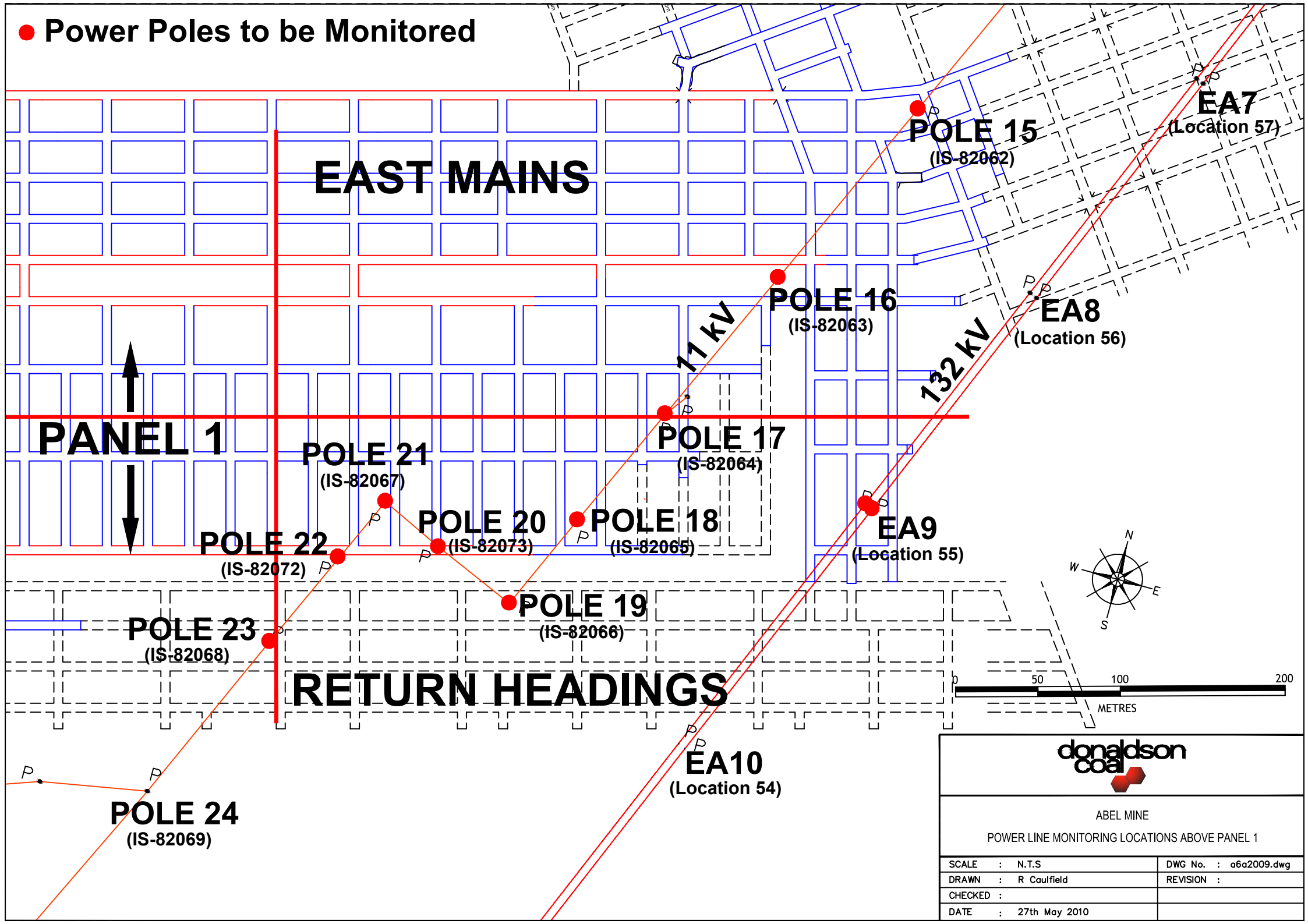
3 REFERENCE TO PLANS AND PROCEDURES

This plan forms part of the Abel SMP Area 1 Management Plan and should not be read in isolation. The following table shows the document hierarchy.

Management Plan	
Abel SMP Area 1 Subsidence Management Plan	
Containing:	
<ul style="list-style-type: none">• Background information• Identified risks• Subsidence Monitoring and Control Plan• Public Safety Management Plan• Individual Property, feature and infrastructure TARP's	
Energy Australia Powerline Management Plan Panel 1	

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● Power Poles to be Monitored



EAST MAINS

PANEL 1

POLE 21
(IS-82067)

POLE 17
(IS-82064)

POLE 15
(IS-82062)

POLE 16
(IS-82063)

EA8
(Location 56)

EA7
(Location 57)

POLE 22
(IS-82072)

POLE 20
(IS-82073)

POLE 18
(IS-82065)

EA9
(Location 55)

POLE 23
(IS-82068)

POLE 19
(IS-82066)

RETURN HEADINGS

POLE 24
(IS-82069)

EA10
(Location 54)



ABEL MINE
POWER LINE MONITORING LOCATIONS ABOVE PANEL 1

SCALE : N.T.S.	DWG No. : a6a2009.dwg
DRAWN : R Caulfield	REVISION :
CHECKED :	
DATE : 27th May 2010	

4 MANAGEMENT CONTROLS

The subsidence from the mining of Abel SMP Area 1 Panel 1 will impact on the surface including potential impacts on both powerlines.

Predictions of worst case final subsidence and impact for both the 132kV and 11kV powerlines were conducted by Ditton Geotechnical Services and provided to Energy Australia for review. The Ditton predictions for the Panel 1 area are provided below in **Table 1** and **Table 2**.

**Table 1- Worst Case Subsidence Predictions for Energy Australia 132 kV
Power Poles – Panel 1**

Pole Pair and Nos	Final Sub Smax (m)	Final Tilt Tmax (mm/m)	Final Tilt Direction grid bearing	Final Ground Strain (mm/m)	Final HD Base (mm)	Final HD Top (mm)	Final Pole Pair Closure (mm)	Conductor Clearance Loss (m)
8.1		Not impacted by Panel 1						
8.2		Not impacted by Panel 1						
9.1 EA 55	0.00	0	300	1.3	47	47	-2	0
9.2 EA 55	0.00	0	300	1.0	45	45	-2	0

**Table 2- Worst Case Subsidence Predictions for Energy Australia 11 kV
Power Poles – Panel 1**

Pole No	EA Pole No-	Maximum Sub Smax (mm)	Final Tilt Tmax (mm/m)	Final Tilt Direction grid bearing	Final Ground Strain (mm/m)	Final HD Base (mm)	Final HD Top (mm)	Conductor Clearance Loss (m)
17	82064	0.960	23	232	-0.07	-1	167	0.91
18	82065	0.869	26	342	0.17	1	190	0.46
19	82066	0.055	4	347	0.25	2	31	0.23
20	82073	0.410	19	345	0.55	4	140	0.71
21	82067	1.016	28	344	0.01	0	206	0.66
22	82072	0.294	16	345	0.58	4	116	0.15

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Energy Australia have performed a site visit and constructed a profile of the land under the affected section of the 11kV and 132kV lines. This information was then used to create a 3D model of the lines using TLPro. From this model it was determined that the clearance requirements under the 11kV and 132kV lines pre-mining were met.

A structural analysis was also performed using TLPro based on the predicted subsidence level as per Table 1 and Table 2. From this it was determined that the sections of 11kV line from structures IS-82072 to IS-82065 will need to be redesigned to tolerate the predicted subsidence in that area. A length of the 132kV line will be required to be put in rollers as well as a freeing up of the crossarm from one of the H-pole set to mitigate the stresses on the structures.

Management of powerlines will be controlled by these mitigation measures, programmed and targeted inspection as well as reviewing predicted subsidence against actual subsidence.

4.1 Subsidence Monitoring of the 11kV and 132kV power lines

Monitoring of subsidence will be conducted as per the Abel Subsidence Monitoring programmes that are from time to time agreed to by the Principal Subsidence Engineer.

Stable marks will be established adjacent to power poles. Monitoring will be 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 2" for proposed monitoring point Locations.

4.2 Subsidence Inspections

Powerlines adjacent to Sealed Roads - Subsidence inspections will be carried out each week day (Monday – Friday) by mine staff. The inspections will be carried out to assess impact on the road. Observed impacts on the road may indicate an impact on the powerlines. The inspection checklist will be used for this task. (Appendix A)

Powerlines adjacent to unsealed roads - Subsidence inspections will be carried out weekly by mine staff. The inspections will be carried out to assess impact on the road. Observed impacts on the road may indicate an impact on the powerlines. The inspection checklist will be used for this task. (Appendix A)

4.3 Scope of Inspections

Regular inspections will cover a zone defined as being 200 metres behind and 100 metres in front of the current face position. The inspections will cover the full subsidence bowl out to the 26.5° angle of draw.

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Inspections will be carried out by trained persons and will follow the inspection checklist. Inspections will identify the following subsidence impacts:

- Surface cracking - edges of extraction void and start and travelling abutments particularly in rock outcrop areas.
- Surface humps (compression) - near centre of extracted panels and travelling abutment
- Step change in land surface - associated with cracking
- Damage to poles, conductors, powerlines
- Reduce ground clearances of conductors
- Tilting of poles, increased/decreased tension in conductors
- Bent crossarms or insulators

4.4 Reporting

- A monthly report detailing the outcome of inspections and subsidence monitoring data will be supplied to Energy Australia whilst mining is in the inspection zone.

Other communications will be as detailed in the Public Safety Management Plan.

4.5 Powerline Safety Issues Identified During Inspections

If any powerline safety issue is identified during inspections the person conducting the inspection shall:

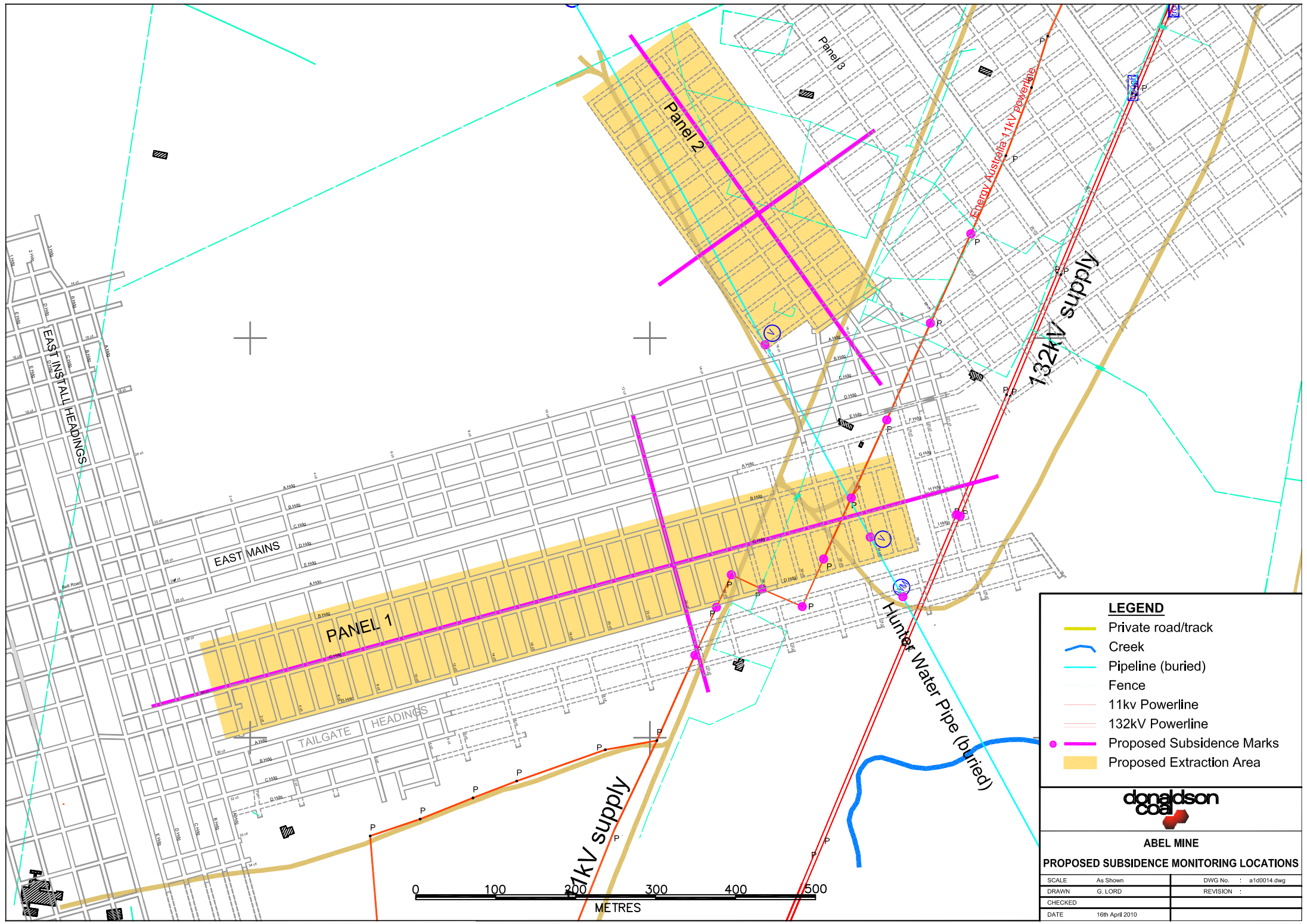
- Immediately notify Energy Australia of the findings.
- Immediately notify the Mine Manager of the findings.

4.6 Remediation of Powerline Safety Issues

If any public safety issue is identified during inspections or other public safety issue is identified during assessment of monitoring or inspection results that person shall:

- Immediately contact Energy Australia and advise the identified impact
- Arrange for Energy Australia to effect immediate repairs if necessary
- Liaise with Mine Management and Mine Subsidence Board to arrange long term repairs.

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LEGEND

- Private road/track
- Creek
- Pipeline (buried)
- Fence
- 11kv Powerline
- 132kv Powerline
- Proposed Subsidence Marks
- Proposed Extraction Area



ABEL MINE

PROPOSED SUBSIDENCE MONITORING LOCATIONS

SCALE	As Shown	DWG No.	: a1d0014.dwg
DRAWN	G. LORD	REVISION	:
CHECKED			
DATE	16th April 2010		

5 RESPONSIBILITIES

5.1 *Abel Manager of Mining Engineering*

- Promptly notify the District Inspector of Coal Mines of any identified public safety issue.

5.2 *Abel Technical Services Manager*

- Authorise the Plan and any amendments thereto.
- Ensure that the requisite personnel and equipment are provided to enable this Plan to be implemented effectively.
- Inform the Manager of Mining Engineering of impacts requiring notification to Industry & Investment NSW (Mine Safety Operations).
- Liase with officers of Energy Australia and remediation consultants and contractors as required.

5.3 *Abel Registered Mining Surveyor*

- Ensure that subsidence inspections are conducted to the required schedule and that the persons conducting the inspection are trained in the requirements of this plan and understand their obligations.
- Review and assess subsidence monitoring results and inspection checklists
- Promptly notify Technical Services Manager of any identified public safety issue.
- Ensure all reporting is carried out.

5.4 *Abel Survey Team Member (conducting Subsidence inspections)*

- Conduct the subsidence inspection within the applicable subsidence zone to the standard required and using the subsidence inspection checklist
- Take actions to remediate any public safety issue identified during inspections.
- Where actions are beyond their capabilities immediately attempt to notify the landowner or infrastructure owner and Technical Services Manager

5.5 *Energy Australia*

- Arrange repairs as necessary

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6 TRAINING

All personnel who conduct inspections will be trained in the requirements of the Abel SMP Area 1 Subsidence Management Plan and the Energy Australia Powerline Management Plan Panel 1.

Training will be conducted on the identification of the various subsidence impacts detailed in Public Safety Management Plan and will include any safety aspects of those inspections.

7 AUDIT AND REVIEW

7.1 *Audit*

The requirements of the Energy Australia Powerline Management Plan Panel 1 are to be audited following the completion of extraction of Panel 1.

7.2 *Review*

A review of this plan will be undertaken:

- If the mine design criteria are changed.
- Following each audit.
- Prior to the commencement of extraction of Panel 2.

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APPENDIX A - INSPECTION CHECKLIST

SUBSIDENCE INSPECTION CHECKLIST – POWERLINE		
Date		
Abel Panel Number		
Face Position (Pillar No / Panel row)		
Inspection Zone Start (Panel row -200m)		
Inspection Zone End (Panel row +100m)		
Area Inspected		
INSPECTION ITEM	CHECKED	COMMENTS
Surface cracking		
Surface humps (compression)		
Step change in road pavement		
Damage to poles, crossarms, insulators and conductors. Eg leaning poles, increased sag in conductors, reduced ground clearance		
Other		

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SUBSIDENCE INSPECTION CHECKLIST - POWERLINE

Where to Inspect

200 metres behind and 100 metres in front of the current face position.

Cover the full subsidence bowl out to the 26.5° angle of draw.

What to look for

- Surface cracking - edges of extraction void and start and travelling abutments particularly in rock outcrop areas.
- Surface humps (compression) - near centre of extracted panels and travelling abutment
- Step change in land surface - associated with cracking
- Damage to poles, conductors, powerlines
- Any effect that may cause a safety risk. – If unsure report immediately.
- Low hanging conductors

Actions if there is damage to the road

- Immediately notify the:
 - Manager of Mining Engineering
 - Technical Services Manager or Registered Mining Surveyor
 - Energy Australia

If repairs or remediation work is required these will be undertaken by Energy Australia.

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