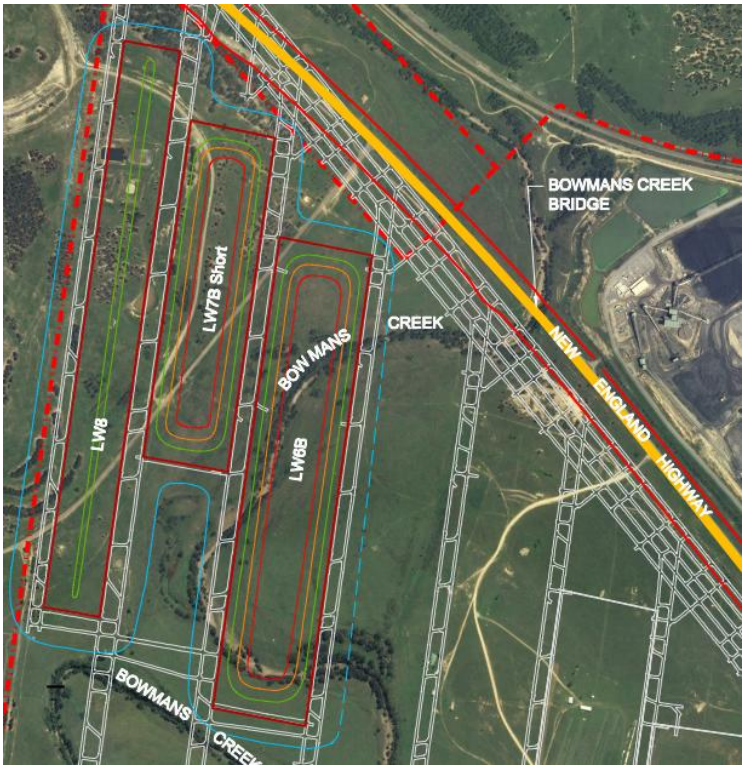
ASHTON COAL PROJECT

PIKES GULLY SEAM
LONGWALLS 6B, 7B (SHORT) & 8
BUILT FEATURES MANAGEMENT PLAN
SUMMARY DOCUMENT

This document provides a summary of the following specific management plans for the following asset owners:

Ausgrid (previously Energy Australia)
Xstrata – Ravensworth Operations
Xstrata – Ravensworth Underground Mine
Macquarie Generation
Roads and Maritime Services
Telstra
Powertel (AAPT)
Ashton Coal Operations Pty Limited

Version 30/05/2013



Ashton Coal Operations Pty Limited

Glennies Creek Road
Camberwell NSW 2330
Tel: 02 6576 1111
Fax: 02 6576 1122

Version History

Version	Status	Details	Author(s)	Authorised/Approved for Issue	
				Name/Position	Date
A	Draft	Consultation	P Fletcher & AECOM	P Fletcher	14/06/2011
B	Draft	Consultation	P Fletcher & AECOM	P Fletcher	12/08/2011
C	Final	Distribution	P Fletcher & AECOM	P Fletcher	30/08/11
D	Final	Distribution	P Fletcher & AECOM	P Fletcher	16/02/12
6/11/2012	Final	For Approval	M. Moore & AECOM	M. Moore	6/11/2012
30/05/2013	Final	Approved	M. Moore & AECOM	M. Moore	30/05/2013

Table of Contents

List of Appendices

List of Figures

List of Tables

ABBREVIATIONS

ACOL .....Ashton Coal Operations Pty Ltd
ACP .....Ashton Coal Project
AEMR ..... Annual Environmental Management Report
AMP.....Asset Management Plan
BFMP .....Built Features Management Plan
DTIRIS..... Department of Trade & Investment, Regional Infrastructure & Services
DoPI..... Department of Planning and Infrastructure
EMS .....Environmental Management Strategy
EoP.....End of Panel
MacGen ..... Macquarie Generation
PG ..... Pikes Gully Seam
RMS..... Roads & Maritime Services NSW
RavOps..... Ravensworth Operations
RUM ..... Ravensworth Underground Mine
ULD .....Upper Liddell Seam
ULLD ..... Upper Lower Liddell Seam
LB .....Lower Barrett Seam

This page has been left blank intentionally

1 INTRODUCTION

This Built Features Management Plan (BFMP) has been prepared to address predicted subsidence impacts to built features as a result of underground mining at the Ashton Coal Project (ACP).

This BFMP summarises the asset management plans (AMPs) for the following asset owners:

- Ausgrid (previously EnergyAustralia);
- Xstrata – Ravensworth Operations (RavOps);
- Xstrata – Ravensworth Underground Mine (RUM);
- Macquarie Generation (MacGen);
- NSW Roads and Maritime Services (RMS);
- Telstra;
- Powertel (AAPT); and
- Ashton Coal Operations Pty Limited (ACOL).

This BFMP has been prepared in accordance with the Development Consent conditions (as modified) (**Appendix A**), the supporting Environmental Assessment (Evans & Peck, 2009) and relevant legislation and guidelines.

The scope of this BFMP includes first and second workings in the PG Seam:

- LW6B;
- LW7B (Short); and
- LW8.

This management plan has been designed to fit within the existing EMS structure (see **Figure 1**) and supersedes existing management plans produced under previous SMPs.

This page has been left blank intentionally

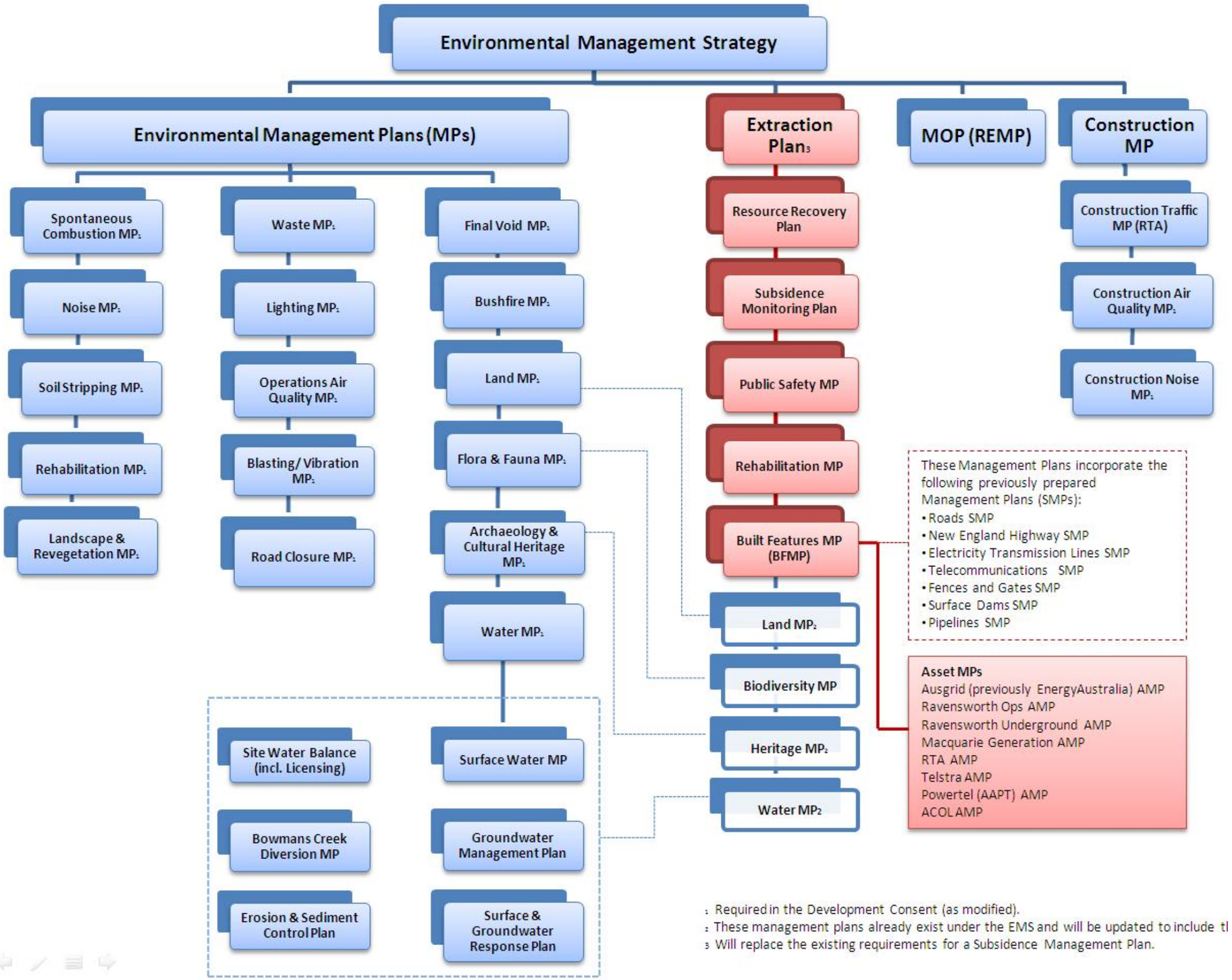


Figure 1 ACOL Environmental Management Strategy

This page has been left blank intentionally

2 LEGAL REQUIREMENTS AND GUIDELINES

This document has been prepared in accordance with the consent conditions, relevant legislation and guidelines (e.g. 'Guideline for Applications for Subsidence Management Approvals' prepared by NSW Department of Mineral Resources 2003) and in consultation with relevant government agencies and affected infrastructure owners as discussed below.

2.1 DEVELOPMENT CONSENT

The Ashton Coal Project (ACP) was approved by the Department of Planning and Infrastructure (DoPI) in October 2002 (DA 309-11-2001) and included the North East Open Cut (NEOC), an underground mine for four (4) seams, offices workshops and coal processing plant (CPP) with associated handling facilities. The Development Consent (DA 309- 11-2001) was issued under Part 4 of the *Environmental Planning & Assessment Act 1979* (EP&A Act 1979).

With respect to the underground mine, two subsequent approvals under Section 75W of Part 3A of the EP&A Act 1979 provided for the following modifications:

- Modification 4 (DA 309-11-2001 MOD 4) - approved the extraction of the western most area of coal from the uppermost seam (Pikes Gully) within the underground area, referred to as Longwall 9 (LW9 now LW8).
- Modification 6 (DA 309-11-2001 MOD 6) - approved the diversion of Bowmans Creek to enable more efficient mining of underlying coal resources by longwall extraction and included the mining of coal from the western most panel in the three lower seams. The impacts of the diversion and revised longwall mine layout are described in the Bowmans Creek Diversion Environmental Assessment (BCD EA - Evans and Peck, 2009).

The development consent (as modified) requires the preparation and approval by the DoPI of Extraction Plans (Condition 3.12) that include a consultation and assessment process to further determine the impacts and management of key features (including built features) based on the final mine design. The requirement for the preparation of Extraction Plans under MOD6 replaced a requirement for the preparation of Subsidence Management Plans (SMPs). Previously, the preparation of the SMPs had been broken into two areas for each seam, the eastern area of the underground (typically panels 1 to 4) and the western area (typically panels 5 to 8/9). Under the former SMP process, two documents have been approved as of September 2010, these include:

- SMP Longwall Panels 1-4, Pikes Gully Seam - approved March 2007, (the eastern underground area); and
- SMP Longwall and Miniwall (LW/MW) Panels 5-8, Pikes Gully Seam - approved July 2009, and varied for LW/MW9 in June 2010 and LW7A in March 2011.

This BFMP is being prepared to address changes to the final mine design associated with MOD6 and supersede (in part) the previously approved SMP for LW/MW 5 – 9.

This plan also integrates the approved management and mitigation measures for built features impacted by LW8 (currently subject to the approved SMP for LW/MW5-9). An application will be prepared and submitted to supersede the SMPs for built features with this BFMP for LW8.

The current consent conditions relevant to the management of built features are reproduced in **Appendix A**.

Of the consent conditions which apply to the ACP, Condition 3.6(b), 3.12 and 3.13 outline the requirement for the preparation of an Extraction Plan and associated framework, practices and procedures to be followed during longwall mining activity at ACP. With regards to the management of built features, Condition 3.12(g) requires that ACOL prepare a BFMP to the satisfaction of the Department of Trade and Investment, Regional Infrastructure and Services (DTIRIS) (formerly the Department of Industry & Investment) and "*which has been prepared in consultation with the owner/s of potentially affected feature/s, to manage the potential subsidence impacts and/or environmental consequences of the proposed second workings.*" (See **Appendix A** for a detailed summary of consent conditions).

In addition to the requirements under the Extraction Plan, Condition 3.10 of the development consent establishes subsidence impact performance measures relating to built features and public infrastructure. The subsidence impact performance measures relevant to Built Features are summarised in **Table 1** below (as per development consent Condition 3.10, Table 2). As discussed in **Section 3**, more detailed performance indicators have been developed for each built feature within the relevant asset management plans (AMPs).

Table 1 Subsidence Impact Performance Measures

Built Features	Performance Measure
New England Highway, including the bridge over Bowmans Creek.	• Always safe and serviceable. • Damage that does not affect safety or serviceability must be fully repairable, and must be fully repaired.
Brunkers Lane (*as a public road*)	• In accordance with the recommendations of the report prepared under Condition 7.14.
Other built features, including other public infrastructure.	• Always safe. • Serviceability should be maintained wherever practicable. Loss of serviceability must be fully compensated. • Damage must be fully repaired or replaced, or else fully compensated.
Public Safety	• No additional risk.

The development consent requires that this BFMP is prepared in consultation with the owner/s of potentially affected feature/s (refer to **Table 2**). Therefore, any substantial amendments to this document as a result of internal audits/reviews, subsequent Extraction Plan applications, or changes to the mine operations or plan, will be undertaken in consultation with the relevant stakeholders prior to implementation (refer to **Section 5.2** for Stakeholders list).

Condition 3.11 of the Development Consent includes provisions for dispute resolution between ACOL and the owner of any built features affected by mining. In the event of a dispute, the matter may be settled by the Director-General of DTIRIS, with any such settlement being final under the development consent.

3 SCOPE

3.1 DESCRIPTION OF UNDERGROUND MINING

The ACOL longwall panels are located within Mining Lease 1533 and lie south of the New England Highway. All longwall panels are oriented in a north south direction, bounded by Glennies Creek to the east, the Hunter River alluvium to the south, the New England Highway to the north, Ravensworth Mine to the west and partially overlain by Bowmans Creek in the west.

Ashton underground mine has development approval as a multiseam extraction operation. Extraction of each seam will occur in the following sequence:

- Pikes Gully Seam (PG);
- Upper Liddell Seam (ULD);
- Upper Lower Liddell Seam (ULLD); and
- Lower Barrett Seam (LB).

Mining is currently occurring within the PG Seam.

The scope of this BFMP includes the Western Panels[1], and more specifically the following first and second workings in the PG Seam:

- LW6B;
- LW7B (Short); and
- LW8.

3.2 PREDICTED SUBSIDENCE

Subsidence behaviour resulting from extraction of the PG Seam is variable based on the width of the panel, overburden depth and chain pillar barrier widths. Maximum predicted subsidence values (worst case scenarios) for extraction of PG Seam, as presented in **Table 2**, have been adopted for the purposes of this BFMP.

Table 2 Maximum Subsidence Predictions (PG Seam only) (SCT, 2011)

Panel	Maximum Subsidence (m)	Maximum Tilt (mm/m)	Maximum Strain (mm/m)
LW6B	1.6	70	30
LW7B	1.6	70	30
LW8	0.7	40	20

Extraction of the lower coal seams is not currently covered in this management plan, however, it should be noted that the values shown in **Table 2** are not the final subsidence values for the site.

3.3 SUBSIDENCE IMPACTS

Relevant subsidence impacts are described within each AMP provided as appendices to this BFMP.

[1] "Western Panels" at the ACP is being adopted by ACOL as a referring to LW 5 to 8. Where possible management plans are being developed under the ACOL EMS that will address either the "Eastern Panels" (LW1 – 4) or "Western Panels".

3.4 IDENTIFICATION OF BUILT FEATURES

The built features within the scope of this plan are indicated on **Figure 2** (existing features) and **Figure 3** (proposed features) and have been identified in consultation with neighbouring landholders and relevant public utility agencies. Each of these features has been further described within the corresponding management plan as indicated within **Table 3** and **Table 4**.

Table 3 Asset Owners Associated with the Extraction Area

Asset	Brief Description	PG LW 6B, 7B & 8 Built Features Sub-Plan
Ausgrid		
Electricity transmission lines	132kV	Appendix C
	combined 132kV and 66/11kV	
	11kV	
Xstrata – RavOps		
Electricity transmission lines	33kV	Appendix D
	Proposed 330kV	
Pipelines	315 mm PN10 PE100 pipeline	
Prescribed Dam	Narama Dam	
Roads	Relocation of Lemington Road (to be dedicated public road)	
Fences	Boundary fencing, internal fencing and gates	
Xstrata – RUM		
Underground mine workings	Underground mining activity in proximity to the ACP and No.5 Shaft (proposed)	Appendix E
MacGen		
Private roads	Brunkers Lane, Site Access Road	Appendix F
Farm buildings	Dilapidated farm shed	
Prescribed Dam	Void 5 Dam (planned for future construction) and proposed associated clean water drainage	
Sedimentation basins	Four clay-lined basins and existing clean water drainage	
	Two downstream dams	
Gas pipeline	Proposed gas pipeline and easement	
Fences	Boundary fencing, internal fencing and gates	

Asset	Brief Description	PG LW 6B, 7B & 8 Built Features Sub-Plan
RMS		
Public roads	New England Highway	Appendix G
Telstra		
Telecommunication lines	Telstra cables	Appendix H
Powertel (AAPT)		
Telecommunication lines	Sydney to Brisbane fibre optic cable	Appendix I
ACOL		
Private Roads	Ashton Access Road	Appendix J
Farm Buildings	Two rural residences (incl. various sheds)	
	Two farm sheds	
Fences	Boundary fencing, internal fencing, gates, and cattle grids	
Pipelines	Hunter River pipeline (200 mm PE80 PN8)	
	Underground borehole pump pipeline (200mm PE100 PN8)	
	Clean water line (90OD PN12.5 PE100)	
	Mine water line (250OD PN20 HDPE PE100)	
	Two tailings lines (280OD PN20 HDPE PE100)	
	Decant return (250OD PN20 HDPE PE100)	
Farm Dams	11 dams	
Proposed Goaf Gas Drainage Boreholes	Proposed Goaf Gas Drainage Boreholes. Located across MacGen and ACOL land.	Appendices F & J

Table 4 Built Features Associated with the Extraction Area

Asset	Brief Description	Ownership	PG LW 6B, 7B & 8 Specific Management Plan
Public Roads	New England Highway	RMS	Appendix G
	Proposed Lemington Road	Xstrata - RavOps / MacGen	Appendix D / Appendix F
Private Roads	Ashton Access Road	ACOL	Appendix J
	Brunkers Lane	MacGen	Appendix F
	Site Access Road	MacGen	Appendix F, Appendix J

Asset	Brief Description	Ownership	PG LW 6B, 7B & 8 Specific Management Plan
Electricity Transmission Lines	132kV	Ausgrid	Appendix C
	combined 132kV and 66/11kV	Ausgrid	Appendix C
	11kV	Ausgrid	Appendix C
	33kV	Xstrata - RavOps	Appendix D
	Proposed 330kV	Xstrata - RavOps	Appendix D
Telecommunication Lines	Sydney to Brisbane fibre optic cable	AAPT	Appendix I
	Telstra cables	Telstra	Appendix F
Gas Pipelines	Proposed gas pipeline and easement	MacGen	Appendix F
Farm Buildings	Two rural residences (incl. various lightweight sheds)	ACOL	Appendix J
	Two farm sheds	ACOL	Appendix J
	Dilapidated farm shed	MacGen	Appendix F
Fences	Fences, gates, and cattle grids.	ACOL, MacGen, Xstrata	Appendices D, E, F, J
Water / Tailings Pipelines	Hunter River pipeline (200 mm PE80 PN8)	ACOL	Appendix J
	Underground borehole pump pipeline (200 mm PE100 PN8)	ACOL	Appendix J
	315 mm PN10 PE100 pipeline	Xstrata – RavOps	Appendix D
	Clean water line (90OD PN12.5 PE100 pipeline)	ACOL	Appendix J
	Mine water line (250OD PN20 HDPE PE100 pipeline)	ACOL	Appendix J
	Two tailings lines (280OD PN20 HDPE PE100 pipelines)	ACOL	Appendix J
	Decant return (250OD PN20 HDPE PE100 pipeline)	ACOL	Appendix J
Farm Dams	11 dams	ACOL	Appendix J
Sedimentation Basins	Four clay-lined basins	MacGen	Appendix F
	Two downstream dams	MacGen	Appendix F
	Downstream clean water drainage line	MacGen	Appendix F
Prescribed Dams	Narama Dam	Xstrata	Appendices D & E
	Void 5 Ash Dam (planned for future construction) and associated proposed clean water drainage	MacGen	Appendix F
Underground mine workings	Ravensworth Underground Mine workings in the Pikes Gully Seam and No. 5 Shaft	Xstrata – RUM	Appendix E

4 OBJECTIVES

The objective of the BFMP is to provide for the adequate management of important built features within the extraction area from direct and indirect subsidence impacts.

This objective will be achieved through:

- Identifying the management strategies and processes to be adopted to reduce the identified subsidence risks;
- Describing the stakeholder consultation and engagement process to ensure any ongoing concerns regarding subsidence can be addressed;
- Outlining the proposed subsidence monitoring and reporting processes; and
- Implementing a process by which the BFMP and associated management plans can be reviewed and audited to ensure a process of feedback and continual improvement.

In accordance with Condition 3.10 of the Development Consent, ACOL will ensure that all built features and public infrastructure affected by subsidence is always maintained as safe and serviceable. ACOL commits to fully compensate asset owners if serviceability is not maintained as a result of subsidence impacts. Any subsidence damage from ACOL's mining activities will be repaired as necessary, or else replaced or fully compensated.

Detailed subsidence impact performance measures have been developed for each of the identified built features and are detailed within each AMP (see Appendices). Management measures to address subsidence impacts are summarised in **Appendix B**.

This page has been left blank intentionally

5 IMPLEMENTATION AND OPERATION

ACOL have adopted a structured and systematic approach to the management of safety, health, environment and community relations to specifically meet the needs of the operation. The policies and procedures that have been developed by ACOL are to protect the health and safety of employees, contractors, sub-contractors, visitors and the general public, to protect the environment and to ensure compliance with all relevant Acts and Regulations.

5.1 RESOURCES & RESPONSIBILITIES

To ensure adequate implementation of this management plan, the following ACOL responsibilities have been assigned to relevant ACOL personnel (see **Table 5**). It is also noted that additional responsibilities are referred to within the sub-management plans.

Table 5 Roles and Responsibilities

Roles	Responsibilities
Underground Mine Manager	• Ensure this Built Features Management Plan and associated sub-management plans are implemented and adhered to.
	• Ensure that adequate resources are available to ACOL personnel to facilitate the completion of their responsibilities under this management plan.
Technical Services Manager	• Ensure that all monitoring and reporting is carried out within the timeframes specified, checked, processed and filed appropriately.
	• Liaise with stakeholders regarding subsidence impact management.
Mine Surveyor	• Ensure that all subsidence surveys are carried out to the accuracy required, within specified timeframes and are checked, processed and filed appropriately.
Environment and Community Relations Manager	• Ensure that the ongoing community consultation processes detailed in this Built Features Management Plan are carried out.
	• Prepare, maintain and distribute a stakeholder contact register.
	• Keep documentation and undertaken reporting for the Annual Environmental Management Report (AEMR) regarding subsidence management activities on the site.
	• Ensure that audits and reviews are carried out as detailed in this Plan.
Private Landowners and Residents	• Notify Ashton of any concerns or issues related to subsidence management.
	• Provide access or permission where required for the implementation of monitoring and management actions identified under this plan.
	• Continue to participate in discussions with Ashton representatives regarding subsidence management.
Asset and Utility Owners	• AMPs have been developed in consultation with relevant stakeholders. Responsibilities, contact details and communication protocols are detailed within these plans.

5.2 COMMUNICATIONS

Each of the Asset Management Plans contained within this BFMP includes communication/notification protocols with potentially affected stakeholders.

A summary of contact details for external stakeholders are provided in **Table 6**.

Table 6 Stakeholder Consultation Details

Stakeholder	Contact Name/Position	Phone	Address
Tenants – Property No. 130	Resident	*Refer to internal contacts register*	*Refer to internal contacts register*
Landowner – Property No. 130	Landowner	*Refer to internal contacts register*	*Refer to internal contacts register*
Xstrata - RavOps	Technical Services Manager	02 6570 0700	PO Box 294 Muswellbrook NSW 2333
Xstrata - RUM	Technical Services Manager	02 6576 1500	PO Box 294 Muswellbrook NSW 2333
Telstra	Project Administration, Network Integrity Services	1800 653 935	Locked Bag 5035 Parramatta NSW 2124
MSB	District Manager	02 6572 4344	PO Box 524 Singleton NSW 2330
PowerTel (AAPT)	Asset Manager	1300 786 786	Level 11, 55 Clarence Street Sydney NSW 2000
Ausgrid	Manager, Customer Supply Upper Hunter	13 15 35	PO Box 196 Muswellbrook NSW 2333
Macquarie Generation	General Manager	02 6542 0711	Private Mail Bag 2 Muswellbrook NSW 2333
Roads and Maritime Services	Manager, Land Use Development	131 782	Locked Bag 30 Newcastle NSW 2300
Singleton Council	General Manager	Enquiries (02) 6578 7290 After Hours (02) 6572 1400	PO Box 314 Singleton NSW 2330

5.3 REPORTING

5.3.1 Annual Environmental Management Report

The Annual Environmental Management Report (AEMR) is the primary reporting tool for the ACP. The AEMR is required to be prepared under the ACP development consent and its purpose is to review the performance of the mine against the Environmental Management Strategy and the relevant Mining Operations Plans, the conditions of this consent, and other licences and approvals relating to the mine. The AEMR is required to include:

- An annual compliance audit of the performance of the project against conditions of the consent and statutory approvals; and
- Assess the development against the predictions made in the EIS and the terms and commitments.

Once finalised and approved, the AEMR will be made publicly available via ACOL's website.

5.3.2 End of Panel Report

ACOL have also committed to the ongoing preparation of End of Panel reports at the completion of each longwall under the development approval (a typical condition of a Subsidence Management approval under the Mining Lease). End of Panel reports will include:

- Summary of the subsidence monitoring results for the applicable longwall panel;
- Analysis of the monitoring results against the impact assessment criteria, predictions in the Environmental Assessment and monitoring results from previous panels;
- Discussion of any trends in the monitoring results over the life of the mine; and
- Description of actions taken to ensure adequate management of any subsidence impacts due to longwall mining.

End of Panel reports will be submitted to DoPI and DTIRIS for information.

5.3.3 SMP Status Reports

ACOL will prepare and maintain a Subsidence Management Status Report which will include:

- Current face position of the longwall being extracted;
- Summary of any subsidence management actions undertaken by ACOL in the period subsequent to the last regular submission of the status report;
- Summary of any comments, advice and feedback from consultation with stakeholders in relation to subsidence management undertaken in the reporting period and a summary of ACOL's responses;
- Summary of the observed and/or reported subsidence impacts, incidents, service difficulties, community complaints, and any other relevant information reported to ACOL in the reporting period and a summary of ACOL's response to these issues;
- Summary of subsidence development based on monitoring information compared with any defined triggers and/or the predicted subsidence (to facilitate early detection of potential subsidence impacts);
- Summary of the adequacy, quality and effectiveness of the implemented management processes based on the monitoring and consultation information summarised above; and
- Statement regarding any additional and/or outstanding management actions to be undertaken or the need for early response or emergency procedures to ensure adequate management of any potential subsidence impacts due to longwall mining.

The Subsidence Management Status Report will be updated at least every 14 days and regularly submitted (every four months) to the Principal Subsidence Engineer and the owners of affected infrastructure. The status report will also be available upon request to the Mine Subsidence Board, Director of Environmental Sustainability, Principal Subsidence Engineer and owners/operators of any affected infrastructure.

5.4 AUDIT AND REVIEW

An internal review of this BFMP and associated asset management plans will be conducted in response to:

- An incident recorded as a result of the operations that affects built features;
- A significant change in operation that may affect built features covered by this management plan;
- Statutory requirements or directions/conditions of approvals requiring such action; or
- Recommendations as a result of internal or external audits.

This BFMP may be audited (if required) under the scope of any external environmental compliance audits.

A complete review and update of the BFMP and sub plans will be undertaken prior to second workings progressing in subsequent seams.

6 REFERENCES

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

SCT (2011) **Subsidence Assessment for Longwalls 6B to 8 in the Pikes Gully Seam based on the Bowmans Creek Diversion Mine Plan**, report to Ashton Coal Mine.

This page has been left blank intentionally

Ref. No.	Asset Owner (Existing)
1	Ausgrid assets
2	Ravensworth Operations assets
3	Macquarie Generation assets
4	RTA assets
5	Telstra assets
6	Powertel (AAPT) assets
7	ACOL assets

Notes:

1. Fences and gates not shown
2. Proposed assets shown on Figure 3

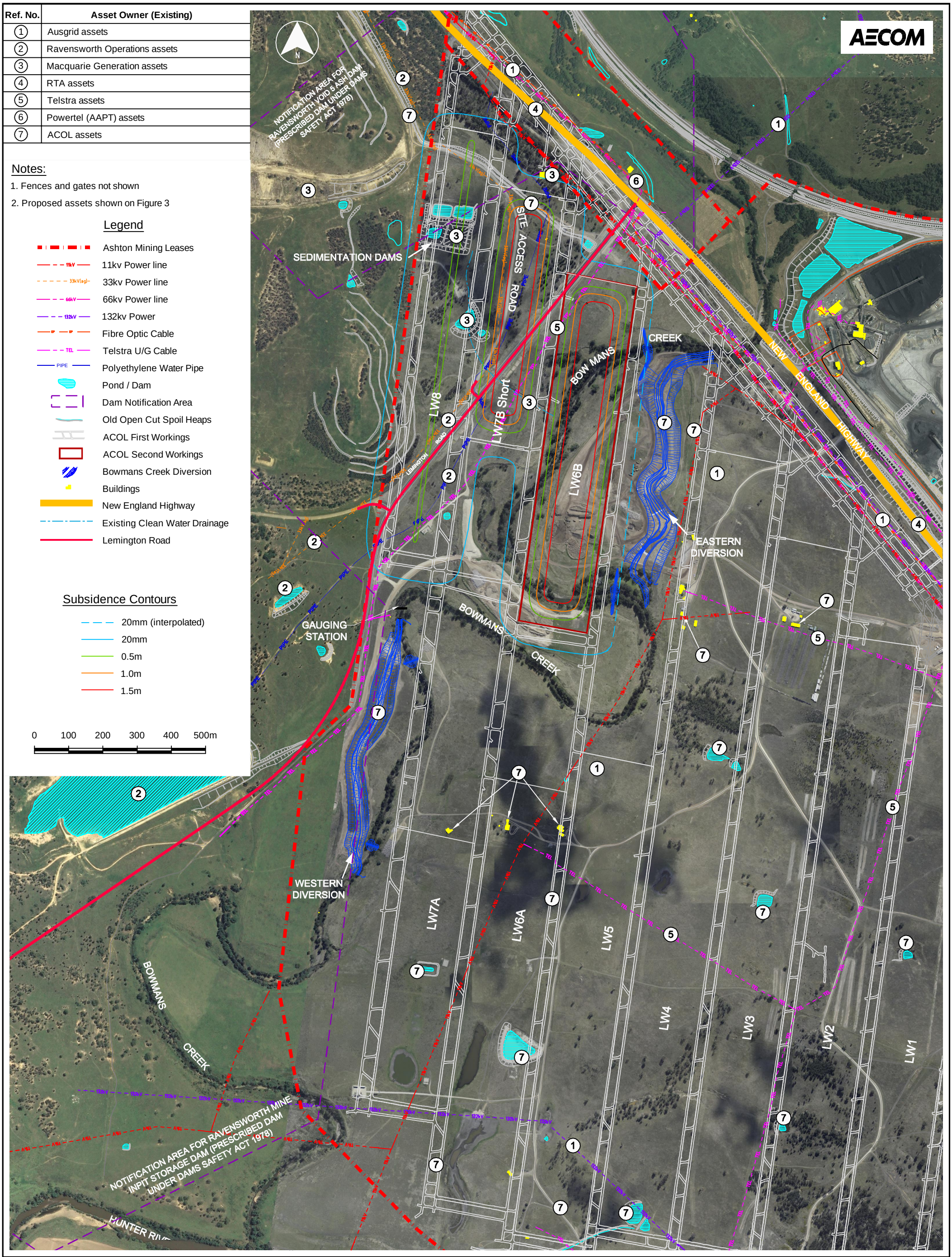
Legend

- Ashton Mining Leases
- 11kv Power line
- 33kv Power line
- 66kv Power line
- 132kv Power
- Fibre Optic Cable
- Telstra U/G Cable
- Polyethylene Water Pipe
- Pond / Dam
- Dam Notification Area
- Old Open Cut Spoil Heaps
- ACOL First Workings
- ACOL Second Workings
- Bowmans Creek Diversion
- Buildings
- New England Highway
- Existing Clean Water Drainage
- Lemington Road

Subsidence Contours

- 20mm (interpolated)
- 20mm
- 0.5m
- 1.0m
- 1.5m

0 100 200 300 400 500m



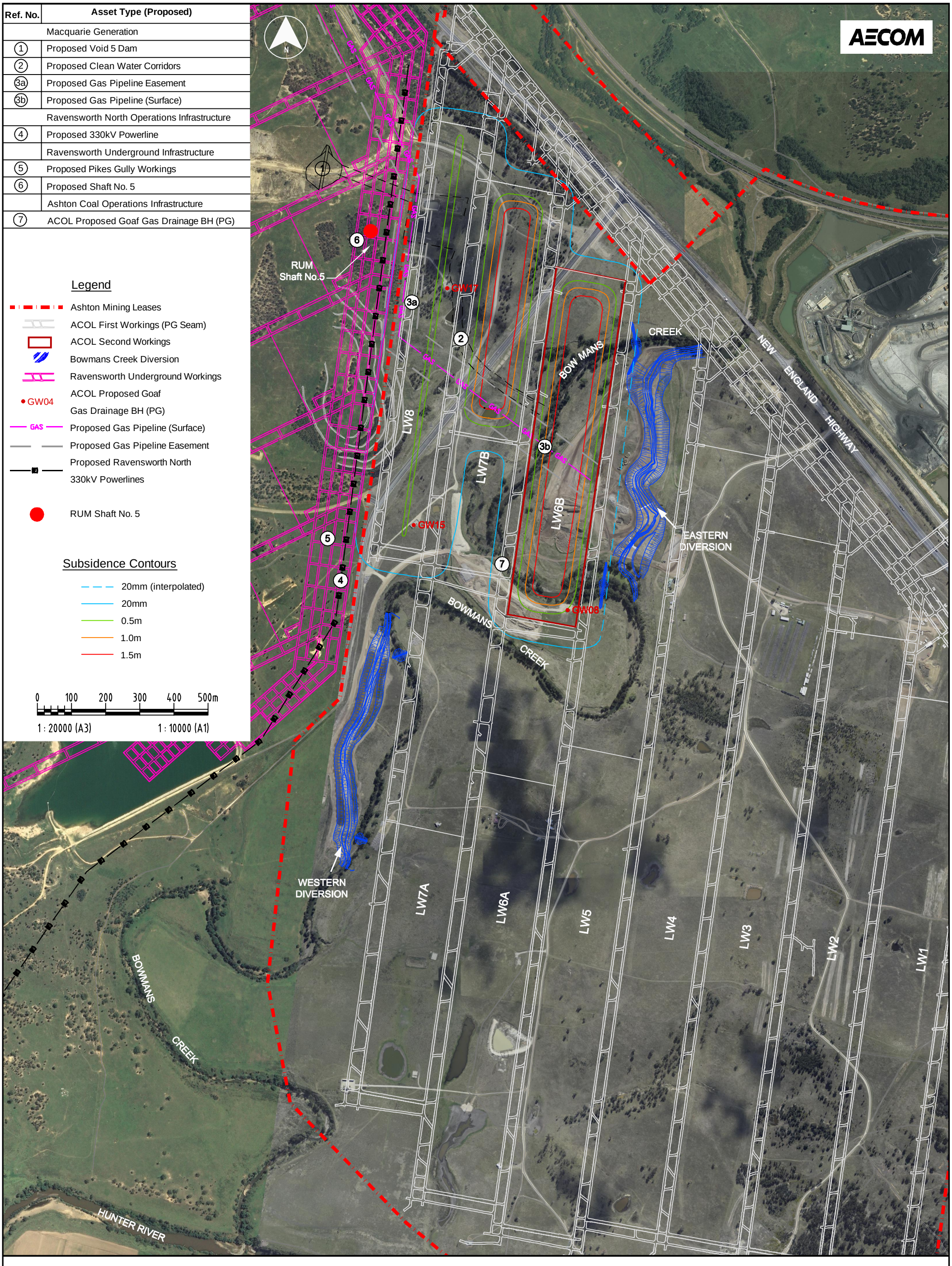
AshtonCoal

Built Features Management Plan - Existing Assets
Pikes Gully Seam LW6B, 7B Short & 8

Figure 2
Location of Existing Assets

This page has been left blank intentionally

Ref. No.	Asset Type (Proposed)
	Macquarie Generation
1	Proposed Void 5 Dam
2	Proposed Clean Water Corridors
3a	Proposed Gas Pipeline Easement
3b	Proposed Gas Pipeline (Surface)
	Ravensworth North Operations Infrastructure
4	Proposed 330kV Powerline
	Ravensworth Underground Infrastructure
5	Proposed Pikes Gully Workings
6	Proposed Shaft No. 5
	Ashton Coal Operations Infrastructure
7	ACOL Proposed Goaf Gas Drainage BH (PG)



Legend

- Ashton Mining Leases
- ACOL First Workings (PG Seam)
- ACOL Second Workings
- Bowmans Creek Diversion
- Ravensworth Underground Workings
- GW04 — ACOL Proposed Goaf Gas Drainage BH (PG)
- GAS — Proposed Gas Pipeline (Surface)
- Proposed Gas Pipeline Easement
- Proposed Ravensworth North 330kV Powerlines
- RUM Shaft No. 5

Subsidence Contours

- 20mm (interpolated)
- 20mm
- 0.5m
- 1.0m
- 1.5m

0 100 200 300 400 500m

1 : 20000 (A3) 1 : 10000 (A1)

AshtonCoal

Built Features Management Plan - Proposed Assets
Pikes Gully Seam LW6B, 7B Short & 8

Figure 3
Proposed Assets

This page has been left blank intentionally

APPENDIX A – CONSENT CONDITIONS

<table>
<tr><th>Condition number</th><th>Condition requirement</th><th>Addressed in BFMP</th></tr>
<tr><td>3.10</td><td>The Applicant shall ensure that underground mining does not cause any exceedances of the performance measures in Table 2, to the satisfaction of the Director-General of DII.</td><td rowspan="3">In each of the Asset Management Plans (Appendix C – Appendix J), objectives and targets are set in Section 4 to address performance measures in detail; and management measures are outlined in Section 5.</td></tr>
<tr><td></td><td>Table 2: Subsidence Impact Performance Measures
<table>
<tr><th>Built Features</th><th></th></tr>
<tr><td>New England Highway, including the bridge over Bowmans Creek</td><td>Always safe and serviceable.
Damage that does not affect safety or serviceability must be fully repairable, and must be fully repaired.</td></tr>
<tr><td>Brunkers Lane</td><td>In accordance with recommendations of the report prepared under condition 7.14</td></tr>
<tr><td>Other built features, including other public infrastructure</td><td>Always safe.
Serviceability should be maintained wherever practicable. Loss of serviceability must be fully compensated.
Damage must be fully repaired or replaced, or else fully compensated.</td></tr>
<tr><th>Public Safety</th><th></th></tr>
<tr><td>Public safety</td><td>No additional risk</td></tr>
</table></td></tr>
<tr><td></td><td>Notes:
1) The Applicant will be required to define more detailed performance indicators for each of these performance measures in Built Features Management Plans (see condition 3.12 below).
2) The requirements of this condition only apply to the impacts and consequences of mining operations undertaken following the date of modification 6.
3) Requirements regarding “safe” or “serviceable” do not prevent preventative or mitigatory actions being taken prior to or during mining in order to achieve or maintain these outcomes.
4) 4) Compensation required under this condition includes any compensation payable under the Mine Subsidence Compensation Act 1961 and/or the Mining Act 1992.</td></tr>
<tr><td>3.12</td><td>The Applicant shall prepare and implement an Extraction Plan for the second workings within each seam to be mined to the satisfaction of the Director-General. Each Extraction Plan must:
a) be prepared by a team of suitably qualified and experienced persons whose appointment has been endorsed by the Director-General;
b) be approved by the Director-General before the Applicant carries out any of the second workings covered by the plan;
c) include detailed plans of existing and proposed first and second workings and any associated surface development;
d) include detailed performance indicators for each of the performance measures in Tables 1 and 2;
e) provide revised predictions of the potential subsidence effects, subsidence impacts and environmental consequences of the proposed second workings, incorporating any relevant information obtained since this consent;
f) describe the measures that would be implemented to ensure compliance with the performance measures in Tables 1 and 2, and remediate any impacts and/or environmental consequences;
g) include the following to the satisfaction of DII:
• a coal resource recovery plan that demonstrates effective recovery of the available resource;
• a subsidence monitoring program to:</td><td>In each of the Asset Management Plans (Appendix C – Appendix J), potential impacts and environmental consequences are addressed in Section 3, and management measures are outlined in Section 5.</td></tr>
</table>

Condition number	Condition requirement	Addressed in BFMP
	– provide data to assist with the management of the risks associated with subsidence; – validate the subsidence predictions; and – analyse the relationship between the subsidence effects and impacts under the plan and any ensuing environmental consequences; • a Built Features Management Plan, which has been prepared in consultation with the owner/s of potentially affected feature/s, to manage the potential subsidence impacts and/or environmental consequences of the proposed second workings; • a Public Safety Management Plan to ensure public safety in the mining area; and • appropriate revisions to the Rehabilitation Management Plan required under condition 3.51; and h) include a: • Water Management Plan, which has been prepared in consultation with DECCW and NOW, which provides for the management of the potential impacts and/or environmental consequences of the proposed second workings on surface water resources, groundwater resources and flooding, and which includes: – surface and groundwater impact assessment criteria, including trigger levels for investigating any potentially adverse impacts on water resources or water quality; – a program to monitor and report groundwater inflows to underground workings; and – a program to manage and monitor impacts on groundwater bores on privately-owned land; • Biodiversity Management Plan, which has been prepared in consultation with DECCW and DII, which: – includes a program of works to ensure that overall terrestrial and aquatic biodiversity values are the same or better than existed in Bowmans Creek prior to longwall mining; – provides for the management of the potential impacts and/or environmental consequences of the proposed second workings on aquatic and terrestrial flora and fauna; • 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; • Heritage Management Plan, which has been prepared in consultation with DECCW and relevant stakeholders for Aboriginal heritage, to manage the potential environmental consequences of the proposed second workings on Aboriginal heritage sites or values; and i) include a program to collect sufficient baseline data for future Extraction Plans.	

APPENDIX B – SUMMARY OF ASSET SUBSIDENCE MANAGEMENT MEASURES

	ASSET MANAGEMENT PLAN – AUSGRID (PREVIOUSLY ENERGYAUSTRALIA)			
Item	**Action**	**Trigger/Timing**	**Responsibility**	**Reporting**
1.0	**Monitoring**			
1.1	Pre-mining baseline survey to obtain xyz coordinates along all poles and conductors. The survey is to be undertaken in accordance with the Subsidence Monitoring Program and the proposed methods therein.	Pre-mining	Ashton Mine Surveyor	Nil
1.2	Baseline photographic survey and visual assessment of all support poles and transmission lines within the (LW6B, 7B & 8) affected area.	Pre-mining	Ashton Underground Mining Engineer	Nil
1.3	Daily visual inspections of all powerlines noting their condition and line clearances. Assets to be monitored in accordance with the Subsidence Monitoring Program.	From longwall commencement until the active face is 100m past the powerline location.	Ashton Underground Mining Engineer	SMP Status Report Fortnightly Status Report
1.4	Subsidence survey monitoring of all lines for tilt, strain and line clearance. Assets to be monitored in accordance with the Subsidence Monitoring Program.	From longwall commencement until the active face is 100m past the powerline location.	Ashton Mine Surveyor	End-of-Panel Report
1.5	Monitor forecasts for wind speeds. When wind speed is greater than 70km/h cease longwall mining for the duration of the high wind speeds and if required a reassessment of the poles will be conducted.	While active face of longwall is within 100m of 132kV support poles.	Ashton Underground Mining Engineer / Ashton Environment and Community Relations Manager	Nil
2.0	**Management**			
2.1	Maintain safe access to the electricity transmission easements and infrastructure for Ausgrid personnel to undertake normal line maintenance and remediation works (if required).	Ongoing	Ashton Underground Mining Engineer	Nil
2.2	Pre- subsidence structural assessment of 132kV, 66kV and 11kV lines. Any modifications required will be subject to designs prepared / approved by Ausgrid.	Assessment to be completed prior to each longwall commencing. Modifications to be completed prior to subsidence impacts occurring.	Ashton Underground Mining Engineer	Provide copy to Ausgrid

	ASSET MANAGEMENT PLAN – AUSGRID (PREVIOUSLY ENERGYAUSTRALIA)			
Item	**Action**	**Trigger/Timing**	**Responsibility**	**Reporting**
2.3	Remediation of 11kV line by isolating lines in temporary sheaves/rollers. Poles that are braced with wire stays will be individually assessed to determine management works.	Prior to each longwall being mined.	Ashton Underground Mining Engineer	Notify Ausgrid
2.4	Install temporary rollers to 132KV line (where required).	Prior to any subsidence effects on the 132KV powerlines.	Ashton Underground Mining Engineer	Notify Ausgrid
2.5	Installation of stays to powerlines affected by subsidence and removal of rollers (where fitted).	Following completion of active subsidence.	Ashton Underground Mining Engineer	Notify Ausgrid
2.6	Repair works on 11kV, 66kV and 132kV lines in accordance with normal line maintenance procedures.	As required (i.e. either through inspections or service disruptions).	Ausgrid	Nil
2.7	Replace high-voltage clearance signage to reflect any changes/reduction in line clearance (refer to Item 1.4).	Following completion of active subsidence.	Ashton Underground Mining Engineer	Nil
2.8	Structural Assessment and Post Subsidence Inspections.	Following completion of active subsidence.	Ausgrid	Nil
3.0	**Incident Response**			
3.1	Notify Ausgrid on 13 13 88 of any fallen/damaged electrical assets and take measures to prevent potential injury.	As soon as practicable.	All ACOL personnel.	Notify Ausgrid
4.0	**Notification, Consultation & Reporting**			
4.1	Forward information to Ausgrid regarding progress of the longwall and any relevant subsidence management actions.	Fortnightly	Ashton Underground Mining Engineer	Fortnightly Status Report
4.2	Notify Ausgrid if subsidence impacts are identified.	In response to monitoring.	Ashton Underground Mining Engineer	Nil
4.3	Ausgrid to be provided with a copy of subsidence monitoring data for each longwall.	On completion of each Longwall panel once subsidence has ceased.	Ashton Underground Mining Engineer	Monitoring emails from ACOL Surveyor

ASSET MANAGEMENT PLAN – XSTRATA - RAVENSWORTH OPERATIONS					
Item	**Feature**	**Action**	**Trigger/Timing**	**Responsibility**	**Reporting**
1.0	**Monitoring**				
1.1	Private Roads	*Private roads are monitored in accordance with the Macquarie Generation Asset Management Plan*			
1.2	Fences	Visual inspection / monitoring of gates and fences on private property and ACOL boundary fences.	• Prior to commencement of mining; • Weekly visual investigations during active subsidence; and • At completion of each longwall panel.	Ashton Underground Mining Engineer	Fortnightly Report Copy provided to Rav Ops when assets impacted.
1.3	Narama Dam	Survey of established survey pegs to provide baseline data for future comparison.	Prior to secondary extraction within Prescribed Dam Notification Area.	Ashton Mine Surveyor	Copy of survey provided to Rav Ops.
1.4	Narama Dam	Survey of established survey pegs and compare with baseline data to determine any movements being experienced.	As per DSC Conditions at completion of Longwalls 7B and 8.	Ashton Mine Surveyor	Copy of survey provided to Rav Ops.
1.5	Narama Dam	Final survey to confirm no subsidence impacts.	Following completion of active subsidence.	Ashton Underground Mining Engineer	Copy of survey provided to Rav Ops.
1.6	33kV Transmission Line	Pre-subsidence survey of 33kV lines to obtain xyz coordinates and photographs of poles and lines in the affected area. The survey is to be undertaken in accordance with the Subsidence Monitoring Program and the proposed methods therein.	Prior to mining LW7B and LW8.	Ashton Mine Surveyor	Copy of survey provided to Rav Ops.

ASSET MANAGEMENT PLAN – XSTRATA - RAVENSWORTH OPERATIONS					
Item	**Feature**	**Action**	**Trigger/Timing**	**Responsibility**	**Reporting**
1.7	33kV Transmission Line	Assets to be monitored in accordance with the Subsidence Monitoring Program. Subsidence monitoring and post subsidence inspection / structural assessment of 33kV lines including visual inspections noting condition, line clearance and pole tilt. Provision for leak detection if required.	• During active subsidence.	Ashton Mine Surveyor	Copy of survey provided to Rav Ops.
1.8	315 mm Diameter Pipeline	Visual inspection / monitoring of exposed sections of pipeline.	• Prior to commencement of mining; • Documented weekly visual investigations during mining; and • At completion of each longwall panel.	Ashton Underground Mining Engineer	SMP Status Report.
1.9	315 mm Diameter Pipeline	Flow monitoring to identify pipeline leakage.	• Ongoing during subsidence if pipeline is operational and flow monitoring gauges are installed.	Ashton Underground Mining Engineer	Nil
2.0	**Management**				
2.1	Private Roads	Erection of signage inside property gates, warning of potential cracks, dips, humps and providing ACOL contact number.	Prior to commencement of longwall mining in affected property.	Ashton Underground Mining Engineer	Nil
2.2	Private Roads	Erection of temporary hazard warning signs 250 metres before and 350 metres after the location of the active longwall face, including recommended speed limit.	Prior to longwall face progressing within 250 metres of access road and relocated weekly.	Ashton Underground Mining Engineer	Nil
2.3	Private Roads	Maintain access to Property No. 155 (may include repairs, temporary diversions etc) in accordance with Macquarie Generation ESMP.	Following subsidence impacts until permanent repairs of road are complete.	Ashton Underground Mining Engineer	Nil
2.4	Proposed Public Roads	Undertake and complete study required under Condition No. 7.14 with regard to location of Lemington Road.	Completed prior to June 2012.	ACOL Xstrata	Nil

ASSET MANAGEMENT PLAN – XSTRATA - RAVENSWORTH OPERATIONS					
Item	**Feature**	**Action**	**Trigger/Timing**	**Responsibility**	**Reporting**
2.5	Fences	Removal of stock from paddocks that will be subject to subsidence and relocated to unaffected or rehabilitated paddocks elsewhere on the property.	Prior to subsidence impacts.	Ashton Environment and Community Relations Manager	Nil
2.6	Fences	Repairs of damaged fences and gates.	Completion of subsidence.	Ashton Underground Mining Engineer	Fortnightly Status Report
2.7	Narama Dam	Detailed assessment of potential subsidence impacts to Narama Dam in accordance with *Dams Safety Act 1978.*	Prior to secondary extraction within Prescribed Dam Notification Area.	Ashton Underground Mining Engineer	DSC Ashton-2 Approval.
2.8	33kV Transmission Line	Structural assessment of 33kV transmission line and implement remedial works to 33kV transmission line, if required. Any modifications required will be subject to designs prepared in consultation with Ausgrid.	Assessment to be completed prior to each longwall commencing. Modifications to be completed prior to subsidence impacts occurring.	Ashton Underground Mining Engineer	Notify Ausgrid Notify Rav Ops
2.9	33kV Transmission Line	Manage mining activities in accordance with Ravensworth Operations 33kV Powerline Infrastructure TARP.	Longwall face within 50m of a 33kV power pole.	Ashton Underground Mining Engineer	Fortnightly Status Report
2.10	315 mm Diameter Pipeline	Expose pipeline and place on surface to reduce subsidence impacts and/or provision for leak detection.	Prior to subsidence if flow monitoring equipment is not installed.	Ashton Underground Mining Engineer	Fortnightly Status Report
2.11	315 mm Diameter Pipeline	In consultation with Xstrata – RavOps cease pipeline operation.	Prior to subsidence if pipeline is not exposed and flow monitoring equipment is not installed.	Xstrata Ashton Underground Mining Engineer	Fortnightly Status Report
2.12	315 mm Diameter Pipeline	Ensure pumping is stopped and notify ACOL immediately so that potential damage to the pipeline can be investigated.	If flow monitoring indicates a change to baseline.	Xstrata	Notify ACOL Fortnightly Status Report

ASSET MANAGEMENT PLAN – XSTRATA - RAVENSWORTH OPERATIONS					
Item	**Feature**	**Action**	**Trigger/Timing**	**Responsibility**	**Reporting**
2.13	315 mm Diameter Pipeline	Investigate damage to pipeline.	If flow monitoring indicates a change to baseline.	Ashton Underground Mining Engineer	Notify Xstrata Fortnightly Status Report
3.0	**Incident Response**				
3.1	Private Road	Repair road in accordance with Macquarie Generation ESMP.	As required due to subsidence impact (i.e. if identified during daily visual inspections)	Ashton Underground Mining Engineer	Fortnightly Status Report
3.2	Fences	Temporary electric fencing.	In the event that damage to a fence causes unplanned stock movements and repairs cannot be carried out immediately. Prior to extraction of each longwall panel / following damage to fence lines that renders it no longer stock proof.	Ashton Underground Mining Engineer	Fortnightly Status Report
3.3	Transmission Line	Notify Ausgrid on 13 13 88 of any fallen/damaged electrical assets and take measures to prevent potential injury. Notify Rav Ops.	If required as a result of subsidence impacts (i.e. either through inspections or service disruptions).	Ashton Underground Mining Engineer	Notify Ausgrid Notify Rav Ops
3.4	315 mm Diameter Pipeline	Repairs to pipeline as soon as practicable.	If required due to subsidence impacts.	Ashton Underground Mining Engineer	Notify Rav Ops
3.5	Narama Dam	Notify DSC.	If “significant” water inflow occurs	Ashton Underground Mining Engineer	DSC Monthly Report

ASSET MANAGEMENT PLAN – XSTRATA - RAVENSWORTH OPERATIONS					
Item	**Feature**	**Action**	**Trigger/Timing**	**Responsibility**	**Reporting**
4.0	**Notification/Consultation**				
4.1	All Features	Forward information to Xstrata regarding progress of the longwall and any relevant subsidence management actions.	Fortnightly, starting at the commencement of LW6B until LW8 is complete.	Ashton Underground Mining Engineer	Fortnightly Status Report.
4.2	All Features	Maintain and distribute a contact register of relevant stakeholders. List to include relevant procedures for contacting ACOL representative in event of access problems or incidents.	Ongoing.	Ashton Environment and Community Relations Manager	Nil
4.3	All Features	Notify Rav Ops if subsidence impacts are identified.	In response to monitoring.	Ashton Underground Mining Engineer	Consultation Records.
4.4	All Features	Rav Ops to be provided with a summary of subsidence monitoring data for each longwall.	On completion of each longwall panel once subsidence has ceased and subsidence data has been collected and processed.	Ashton Underground Mining Engineer	Email

ASSET MANAGEMENT PLAN – XSTRATA - RAVENSWORTH UNDERGROUND MINE					
Item	**Feature**	**Action**	**Trigger/Timing**	**Responsibility**	**Reporting**
1.0	**Monitoring**				
1.1	Private Roads	Visual inspection of roads to identify any subsidence impacts that could affect the safety of vehicles.	Daily during active subsidence.	Ashton Underground Mining Engineer	Fortnightly Status Report
2.0	**Management**				
2.1	LW8 – RUM Workings	Complete a groundwater and subsidence assessment to confirm that the concurrent operation of RUM workings and ACOL underground mines can be undertaken safely. (Completed prior to development consent MOD 4 - March 2010.)	Prior to commencement of LW8 secondary extraction.	Ashton Underground Mining Engineer	Copy provided to RUM
2.2	Private Roads	Erection of temporary hazard warning signs 250 metres before and 350 metres after the location of the longwall face, including recommended speed limit.	Prior to longwall face progressing within 250m of access road and relocated weekly.	Ashton Underground Mining Engineer	Nil
3.0	**Incident Response**				
3.1	Private Roads	Repair road in accordance with the Road Management Response Table (see **Section 5.1**) during subsidence, or provide temporary diversions to maintain access.	As required following daily inspection.	Ashton Underground Mining Engineer	Fortnightly Status Report
4.0	**Notification/Consultation**				
4.1	LW8 – RUM Workings	Notification as the longwall face approaches RUM to ensure that for asset management and monitoring purposes, Xstrata are aware of ACOL longwall position.	Prior to commencement of LW8.	ACOL Underground Mining Engineer	Fortnightly Status Report
4.2	LW8 – RUM Workings	Consult with RUM on a seam by seam basis regarding proposed workings regarding subsidence interactions and management. (Completed for Pikes Gully Seam.)	For each seam mined.	Ashton Underground Mining Engineer	Nil

ASSET MANAGEMENT PLAN – MACQUARIE GENERATION					
Item	**Feature**	**Action**	**Trigger/Timing**	**Responsibility**	**Reporting**
1.0	**Monitoring**				
1.1	Private Roads	Pre-mining condition assessment to document pre-subsidence condition of the road, including photographic records of any observed existing pavement fatigue or failure or similar existing damage.	Prior to subsidence impacts.	Ashton Underground Mining Engineer	Provide copy to MacGen.
1.2	Private Roads	Visual inspection of roads to identify any subsidence impacts that could affect the safety of vehicles.	Daily during active subsidence.	Ashton Underground Mining Engineer	Fortnightly Status Report
1.3	Private Roads	Post mining condition assessment of road infrastructure to confirm that any perceptible subsidence impacts have ceased and document the post-subsidence status of the road.	Once active subsidence has ceased.	Ashton Underground Mining Engineer	Fortnightly Status Report
1.4	Fences	Visual inspection / monitoring of gates and fences on MacGen property and ACOL boundary fences.	▪ Prior to commencement of mining; ▪ Weekly visual inspections during active subsidence; and ▪ At completion of each longwall panel.	Ashton Underground Mining Engineer	Fortnightly Status Report
1.5	Surface Water Dams (exc. Void 5)	Assessment of the risk of farm dams and sedimentation basins draining into underground workings or the dam wall being compromised.	Prior to longwall extraction.	Ashton Underground Mining Engineer	Fortnightly Status Report
1.6	Surface Water Dams (exc. Void 5)	Monitoring of dams and sedimentation basins to include a survey of each dam regarding shape, wall height, level of spillway depth, storage capacity and photographic record.	Prior to each longwall extraction.	Ashton Underground Mining Engineer / Surveyor	End of Panel Report
1.7	Surface Water Dams (exc. Void 5)	Monitoring of dams within the Application Area to detect any subsidence impacts that may require management. Monitor water level using markers.	Monthly inspection during active subsidence to dams.	Ashton Underground Mining Engineer / Survey Team	Fortnightly Status Report
1.8	Surface Water Dams	Monitoring of dams within the subsidence impact area to identify perceptible subsidence impacts have ceased and remediation works needed. Comprises: ▪ Photographic records. ▪ Final survey of each dam to determine post subsidence shape, wall height, level of the spillway (if present), depth and storage capacity.	Post long wall extraction.	Ashton Underground Mining Engineer / Survey Team	End-of-Panel Report

ASSET MANAGEMENT PLAN – MACQUARIE GENERATION					
Item	**Feature**	**Action**	**Trigger/Timing**	**Responsibility**	**Reporting**
1.9	Void 5 Ash Dam	Detailed assessment of potential subsidence impacts to Void 5 Ash Dam in accordance *with Dams Safety Act 1978*.	Once dam commissioned, and prior to commencement of secondary extraction of the next LW panels.	Ashton Underground Mining Engineer	In accordance with DSC Approval
1.10	Void 5 Ash Dam	Survey of established survey pegs to provide baseline data for future comparison.	Once dam commissioned, and prior to commencement of secondary extraction of the next LW panels.	Ashton Mine Surveyor	In accordance with DSC Approval
1.11	Void 5 Ash Dam	Survey of established survey pegs and compare with baseline data to determine any movements being experienced.	Once dam commissioned, at the completion of LWs 7B and 8.	Ashton Mine Surveyor	In accordance with DSC Approval
1.12	Void 5 Ash Dam	Final survey to confirm no subsidence impacts.	Following completion of active subsidence in Pikes Gully Seam.	Ashton Underground Mining Engineer	In accordance with DSC Approval
1.13	All features	Undertake an inspection of assets in conjunction with MacGen.	On completion of each longwall.	Ashton Underground Mining Engineer / Survey Team	End-of Panel Report
2.0	**Management**				
2.1	General	Ensure access agreement is in place.	Prior to requiring access to Property No. 155 and ongoing.	Ashton Underground Mining Engineer	Nil
2.2	General	Ensure compensation agreement is in place.	Prior to undermining Property No 155 and ongoing.	Ashton Underground Mining Engineer	Nil
2.3	Private Roads	Erection of signage inside property gates warning of potential cracks, dips, humps and providing ACOL contact number.	Prior to commencement of longwall mining beneath affected property.	Ashton Underground Mining Engineer	Fortnightly Status Report
2.4	Private Roads	Erection of temporary hazard warning signs 250 metres before and 350 metres after the location of the longwall face, including recommended speed limit.	Prior to longwall face progressing within 250 metres of access road and relocated weekly.	Ashton Underground Mining Engineer	Fortnightly Status Report
2.5	Buildings	Repair or demolition of dilapidated farm shed (with MacGen approval).	If farm shed is significantly impacted by effects of subsidence.	Ashton Underground Mining Engineer	Fortnightly Status Report
2.6	Surface Water Dams	Partially or completely draining farm dams and sedimentation basins.	Prior to longwall extraction. Based on results of risk based assessment.	Ashton Underground Mining Engineer	End-of-Panel Report

ASSET MANAGEMENT PLAN – MACQUARIE GENERATION					
Item	**Feature**	**Action**	**Trigger/Timing**	**Responsibility**	**Reporting**
2.7	Drainage	Maintain a free draining landscape as per development consent commitment and the Land Management Plan.	Post-subsidence	Ashton Underground Mining Engineer	End-of-Panel Report
2.8	Drainage	Maintain existing clean water drainage from sedimentation basins to Bowmans Creek.	Post-subsidence	Ashton Underground Mining Engineer	End-of-Panel Report
2.9	Fences	Removal of stock from paddocks that will be subject to subsidence and relocated to unaffected or rehabilitated paddocks elsewhere on the property.	Prior to subsidence impacts.	Ashton Environment and Community Relations Manager	Nil
2.10	Proposed Public Roads	Prepare a management plan to ensure public safety.	If Lemington Road is re-aligned with Brunkers Lane and declared a public road prior to, or during undermining.	Ashton Underground Mining Engineer & Xstrata – Ravensworth Operations	Fortnightly Status Report
2.11	Proposed ACOL gas drainage boreholes	Construct gas drainage boreholes in consultation with MacGen, in accordance with Access and Compensation Agreement, and in accordance statutory approvals (in particular the development consent, and approved Mining Operations Plan, Erosion and Sediment Control Plan and Archaeology and Cultural Heritage Management Plan).	Construction of gas wells.	Ashton Underground Mining Engineer	Nil
2.12	Private Roads	Repair road in accordance with the Road Management Response Table (see **Section 5.1**) during subsidence, or provide temporary diversions to maintain access.	As required following daily inspection.	Ashton Underground Mining Engineer	Fortnightly Status Report
2.13	Fences	Repairs of damaged fences and gates.	If damage occurs, at completion of subsidence.	Ashton Underground Mining Engineer	End of Panel Report
2.14	Surface Water Dams	Repair / remediation to dams, basins and contour banks.	Damage observed during monthly inspections.	Ashton Underground Mining Engineer	Fortnightly Status Report
2.15	Surface cracking	Repair permanent surface cracking (by filling or ripping) and revegetate in accordance with the Land Management Plan.	If damage occurs, at completion of subsidence.	Ashton Underground Mining Engineer	Nil
3.0	**Incident Response**				
3.1	Fences	Provide temporary electric fencing In the event that damage to a fence causes unplanned stock movements and repairs cannot be carried out immediately. Prior to extraction of each longwall panel / following damage to fence lines that renders it no longer stock proof.	As required.	Ashton Underground Mining Engineer	Fortnightly Status Report

ASSET MANAGEMENT PLAN – MACQUARIE GENERATION					
Item	**Feature**	**Action**	**Trigger/Timing**	**Responsibility**	**Reporting**
4.0	**Notification/Consultation**				
4.1	All Features	Maintenance and distribution of contact register of relevant stakeholders. List to include relevant procedures for contacting ACOL representative in event of access problems or for reporting road hazards.	Ongoing.	Ashton Environment and Community Relations Manager	Nil
4.2	All Features	Forward information to MacGen regarding progress of the longwall and any relevant subsidence management actions.	Fortnightly, starting at the commencement of LW6B until LW8 is complete.	Ashton Underground Mining Engineer	Fortnightly Status Report
4.3	All Features	Notify MacGen if subsidence impacts are identified.	In response to monitoring.	Ashton Underground Mining Engineer	Email
4.4	ACOL Gas Drainage	Undertake ongoing consultation with MacGen regarding the construction and maintenance of gas drainage wells above ACOL's longwall panels on Property No. 155.	Prior to construction of gas drainage wells.	Ashton Underground Mining Engineer	Nil

ASSET MANAGEMENT PLAN – ROADS AND MARITIME SERVICES				
Item	**Action**	**Trigger/Timing**	**Responsibility**	**Reporting**
1.0	**Monitoring**			
1.1.	Subsidence monitoring (survey, photographic, and visual) of the New England Highway in accordance with the Control Management Plan (**Table 6**) and Subsidence Monitoring Program.	Pre-mining: refer to **Table 6**	Ashton Mine Surveyor	Provide copy to RMS
1.2.	Install new pavement survey marks where necessary at 50m intervals along both sides of highway pavement from the eastern end of the cutting westwards to limit of mining (~2800m). Methodology to be confirmed with RMS, (i.e. drill-hole in kerbs through cutting, and survey marks i.e. star pickets installed to ground level, behind guard rail in fill areas). *Note: Previous survey marks installed have been covered by new pavement seal.*	Pre-mining: refer to **Table 6**	Ashton Mine Surveyor	Provide copy to RMS
1.3	Install infill road reserve survey marks at 50m intervals between existing highway cutting marks and road reserve marks	Pre-mining: refer to **Table 6**	Ashton Mine Surveyor	Provide copy to RMS
1.4	RMS Bridge Inspection Report *(Note last report 25th August 2011 and next due Mar-2012)*	Annually (Nominally)	RMS	Provide copy to ACOL
1.5	Annual Roadway Report *(Note last 2011 reports include Skid, Profilometry and Road cracking in MS Excel format)*	Annually (Nominally)	RMS	Provide copy to ACOL
1.6	Culvert Inspection Report	Annually (Nominally)	RMS	Provide copy to ACOL
2.0	**Management**			
2.1	Works Authorisation Deed (WAD) for mine workings under New England Highway reserve (for PG portal heading A, B & C only) dated 23/1/06.	Prior to 1st workings undermining New England Highway roadway reserve.	Ashton Underground Mining Engineer	Provide copy of Works Authorisation Deed to RMS
2.2	Maintain a 'Pothole Management Plan' for working under and adjacent to the New England Highway.	Prior to 1st workings undermining New England Highway roadway reserve.	Ashton Underground Mining Engineer	Copy to RMS from ACOL Document Management System

ASSET MANAGEMENT PLAN – ROADS AND MARITIME SERVICES				
Item	**Action**	**Trigger/Timing**	**Responsibility**	**Reporting**
2.3	Maintain an RTA-approved Control Management Plan and Risk Register (refer to **Table 5** and **Table 6** respectively).	Prior to mining (inclusive of 1st and 2nd workings).	Ashton Underground Mining Engineer	Copy to RMS from ACOL Document Management System
3.0	**Incident Response**			
3.1	Refer to ACOL Pothole Management Plan and implement controls in the Stability Control-Action-Response (SCARP) plan.	Roof fall (higher than roof bolts) or major geological structure (greater than 500mm throw) in main headings (Highway road reserve).	Ashton Underground Mining Engineer	Fortnightly Status Report
3.2	Notify the RMS and re-survey in accordance with the Control Management Plan (**Table 6**).	Visual inspection identifies that movement may have occurred or subsidence movements at survey monitoring locations in excess of 20mm - refer to **Table 6**.	Ashton Underground Mining Engineer	Notify RMS.
3.3	In consultation with the MSB, provide funds to repair any subsidence- related damage to the New England Highway road reserve.	If damage is caused to New England Highway by subsidence from longwall mining.	Ashton Underground Mining Engineer / MSB	Fortnightly Status Report
4.0	**Notification/Consultation**			
4.1	Notification to RMS as mining activity approaches within 200 metres of the New England Highway road reserve.	As mining activity approaches within 200 metres of the New England Highway road reserve.	Ashton Underground Mining Engineer	Fortnightly Status Report
4.2	Notify RMS if any subsidence impacts are identified.	In response to monitoring.	Ashton Underground Mining Engineer	Consultation Records
4.3	RMS to be provided with a copy of subsidence monitoring data.	Post-surveys	Ashton Surveyor	Email

ASSET MANAGEMENT PLAN – TELSTRA				
Item	**Action**	**Trigger/Timing**	**Responsibility**	**Reporting**
1.0	**Monitoring**			
1.1	An accredited service locator will be used to find and mark the position of all Telstra cables throughout the Mining Lease area. Ashton Surveyors will then record the position of all cables. This information will assist in locating the cables to undertake repairs (if required) and to ensure that other subsidence remediation activities do not inadvertently damage sub-surface cables.	Pre-mining (completed).	Underground Mine Engineer	Nil
1.2	Cables will be tested to confirm they are in working order.	Prior to telecommunications cable being affected by subsidence (pre-mining).	Underground Mine Engineer	Nil
1.3	Post-mining monitoring and ongoing liaison with affected stakeholders will assist to identify any subsidence-induced damage to cables and highlight if any repairs are required.	Completion of active subsidence.	Underground Mine Engineer	Nil
1.4	Where cables are not in service, a qualified contractor will be engaged to confirm the future serviceability of these cables at the completion of mining.	Completion of active subsidence.	Underground Mine Engineer	Fortnightly Status Report
2.0	**Management**			
2.1	Provide alternative data storage and transmission for NoW stream gauging station or maintain in an operational state.	Prior to telecommunications cable being affected by subsidence.	Ashton Environmental Officer	Fortnightly Status Report
3.0	**Incident Response**			
3.1	Engage a suitably qualified communications engineer/technician (in consultation with Telstra) to test and repair telecommunications infrastructure damaged by subsidence. Repairs will then be undertaken in consultation with Telstra and the affected property owner (i.e. if cables are located on, or accessed via Property No. 130, 153 or 155).	If liaison with residents indicates either total loss, degraded quality or intermittent access of communications in the subsurface cables.	Ashton Environmental Officer	Fortnightly Status Report
4.0	**Notification, Consultation & Reporting**			
4.1	Liaise with Telstra representatives to undertake subsidence monitoring of affected Telstra assets.	Pre and posting mining	Ashton Environmental Officer	Email

ASSET MANAGEMENT PLAN – TELSTRA				
Item	**Action**	**Trigger/Timing**	**Responsibility**	**Reporting**
4.2	Provide notification to Telstra representatives as the longwall face approaches Telstra assets within the site. This will ensure that for asset management purposes, Telstra are aware of potential subsidence impacts on their assets.	As longwall face approaches Telstra assets and once the longwall face has passed.	Ashton Environmental Officer	Fortnightly Status Report
4.3	Telstra to be provided with a copy of subsidence monitoring data.	Post-surveys	Ashton Environmental Officer	Email

ASSET MANAGEMENT PLAN – AAPT (POWERTEL)				
Item	**Action**	**Trigger/Timing**	**Responsibility**	**Reporting**
1.0	**Monitoring**			
1.1	An accredited service locator will be used to find and mark the position of the fibre optic cable in relation to the subsidence area. Ashton Surveyors will then record the position of all cables. This information will assist in locating the cables for future reference and to ensure that other subsidence remediation activities do not inadvertently damage sub-surface cables.	Pre-mining (completed)	Underground Mine Engineer	Nil
1.2	Monitoring will assist to identify any subsidence-induced damage to cables and highlight if any repairs are required.	Completion of active subsidence	Underground Mine Engineer	Fortnightly Status Report
2.0	**Management**			
2.1	The cable is outside the area that will be influenced by subsidence and therefore no additional management actions are currently proposed.			
3.0	**Incident Response**			
3.1	Engage a suitably qualified communications engineer/technician (in consultation with AAPT) to test and repair telecommunications infrastructure damaged by subsidence. Repairs to be undertaken in consultation with AAPT and any affected property owners (i.e. if the damaged portion of cable is located on, or accessed via private property).	Following completion of active subsidence, if liaison with AAPT indicates either total loss of communications, degraded quality or intermittent access in the fibre optic cables.	Ashton Mining Engineer	Fortnightly Status Report
4.0	**Notification, Consultation & Reporting**			
4.1	Provide notification to AAPT representatives as the longwall face approaches the fibre optic cable. This will ensure that for asset management purposes, AAPT are aware of potential subsidence impacts on their assets.	As longwall face approaches AAPT assets and once the longwall face has passed.	Ashton Mining Engineer	Fortnightly Status Report
4.2	The results of the telecommunication cable monitoring will be reported to AAPT.	At completion of each panel.	Ashton Surveyor	Email

ASSET MANAGEMENT PLAN – ASHTON COAL OPERATIONS					
Item	**Feature**	**Action**	**Trigger/Timing**	**Responsibility**	**Reporting**
1.0		**Monitoring**			
1.1	Fences	Visual inspection / monitoring of gates and fences on private property and ACOL boundary fences.	• Prior to commencement of mining; • Documented weekly visual investigations during mining; and • At completion of each longwall panel.	Ashton Underground Mining Engineer	SMP Status Report.
1.2	Tailings Pipelines	Visual inspection of exposed sections of pipeline.	• Prior to commencement of mining; • Documented weekly visual investigations during mining; and • At completion of each longwall panel.	Ashton CHPP Manager	SMP Status Report.
1.3	Tailings Pipelines	Continuous flow monitoring to identify pipeline leakage via CHPP control room.	When operating/in use	Ashton CHPP Manager	Nil
1.4	Tailings Pipelines	Additional monitoring per CHPP general monitoring.	When operating/in use	Ashton CHPP Manager	Nil
1.5	Spill Basin	Pre-mining monitoring of spill basin to include a survey regarding shape, wall height, level of spillway depth, storage capacity and photographic record.	Prior to longwall impacts.	Ashton Underground Mining Engineer / Survey Team	End-of-Panel Report
1.6	Spill Basin	Visual inspections of spill basin. Monitoring of spill basin to detect any subsidence impacts that may require management and water level monitoring.	During long wall extraction; weekly visual inspections of spill basin behind the longwall face and up to 80m in front of the longwall.	Ashton Underground Mining Engineer	SMP Status Report
1.7	Spill Basin	Final survey to determine post subsidence shape, wall height, level of spillway, depth, storage capacity, and photographic record.	Following completion of active subsidence.	Ashton Underground Mining Engineer	End-of-Panel Report

ASSET MANAGEMENT PLAN – ASHTON COAL OPERATIONS					
Item	**Feature**	**Action**	**Trigger/Timing**	**Responsibility**	**Reporting**
1.8	Bowmans Creek Diversion	Survey monitoring of potentially impacted areas of the Bowmans creek diversion high bank and block banks to detect any subsidence impacts.	• Pre mining impacts; • Periodically during mining; and • Post Mining. Survey frequency is detailed further in Table 1 of the Subsidence Monitoring Program.	Ashton Underground Mining Engineer	End-of-Panel Report
1.9	Block Banks (Bowmans Creek Diversion)	Pre-mining survey regarding shape, block bank heights and photographic record.	Prior to longwall impacts.	Ashton Underground Mining Engineer	SMP Status Report
		Visual inspection to identify potential subsidence impacts, verify the integrity of the block banks, identify cracking or surface erosion and obtain a photographic record.	Weekly during active subsidence. Following rainfall (>50mm in 24 hours)	Ashton Underground Mining Engineer	SMP Status Report
		Final survey to determine post subsidence shape, block bank height and photographic record.	Following completion of active subsidence.	Ashton Underground Mining Engineer	SMP Status Report
2.0		**Management**			
2.1	Tailings Pipelines	Ensure access agreement is in place.	Prior to requiring access to Property No. 155 (MacGen land) and ongoing.	Ashton Underground Mining Engineer	Nil
2.2	Spill Basin	Partially or completely draining spill basin.	Prior to longwall extraction. Based on results of risk based assessment.	Ashton Underground Mining Engineer	End-of-Panel Report
2.3	Proposed ACOL gas drainage boreholes	Construct gas drainage boreholes in accordance with statutory approvals (in particular the development consent, and approved Mining Operations Plan, Erosion and Sediment Control Plan and Archaeology and Cultural Heritage Management Plan).	Construction of gas wells.	Ashton Underground Mining Engineer	Nil

ASSET MANAGEMENT PLAN – ASHTON COAL OPERATIONS					
Item	**Feature**	**Action**	**Trigger/Timing**	**Responsibility**	**Reporting**
3.0		**Incident Response**			
3.1	Fences	Repairs to fences and gates as required.	If damage occurs, at completion of subsidence.	Ashton Underground Mining Engineer	End-of-Panel Report
3.2	Spill Basin	Repair/remediation to spill basin.	Any damage observed during monitoring activities.	Ashton Underground Mining Engineer	End-of-Panel Report
3.3	Tailings Pipelines	Repair	Any damage observed during monitoring activities.	Ashton Underground Mining Engineer	End-of-Panel Report
3.4	Bowmans Creek Diversion (including block banks)	Repair/remediation.	Any damage observed during monitoring activities.	Ashton Underground Mining Engineer / Environment and Community Relations Manager	End-of-Panel Report
4.0		**Notification/Consultation**			
External consultation requirements are addressed within the BFMP and relevant Asset Management Plans.					

ASSET MANAGEMENT PLAN – LEMINGTON ROAD				
Item	**Action**	**Trigger/Timing**	**Responsibility**	**Reporting**
1.0	**Monitoring in consultation with Ravensworth**			
1.1	Regular visual inspection to identify surface condition, potential safety risks and any existing surface cracks.	During the period of mining the last 50m of LW6B (see Attachment A) & prior to subsidence impacts (baseline).	ACOL	Fortnightly Status Report
1.2	Monitoring of subsidence movements along Lemington Road to provide an indication of the magnitude of ground movement and the level of impact on the road formation. This may include use of vehicle mounted GPS survey apparatus or alternatively the establishment of survey marks spaced at regular intervals on both sides of the road, with tighter spacing (SCT has suggested use of 7m spaced survey marks) over the interval between 280m and 380m from the intersection with the New England Highway, and wider spacing (SCT has suggested use of 50m centres) from 150m to 800m along the southern edge of the road. Survey to acquire data in three dimensions.	Pre and post-mining survey	ACOL	Provide a copy to relevant stakeholders. Fortnightly Status Report
2.0	**Management**			
2.1	Prepare a safety risk assessment held and coordinated by a third party in consultation with all affected stakeholders and to the satisfaction of the ACOL Mine Manager. The assessment should be informed by the Lemington Road AMP and may investigate the capacity to repair any cracks or serious unevenness that may develop. The assessment may also investigate appropriate speed restrictions to ensure that surface cracking, deterioration in ride quality, and potential pooling of water during rain events does not compromise traffic safety.	Prior to impacting Lemington Road.	ACOL	Nil
2.2	Undertake a risk assessment to ensure public safety and inform future iterations of this AMP.	Prior to impacting Lemington Road.	Ashton Underground Mining Engineer	Fortnightly Status Report. Provide a copy to relevant stakeholders.

ASSET MANAGEMENT PLAN – LEMINGTON ROAD				
Item	**Action**	**Trigger/Timing**	**Responsibility**	**Reporting**
2.3	Engage a contractor to manage subsidence impacts to Lemington Road, including traffic control, monitoring, mitigation and road maintenance. (Note Ravensworth or MSB is responsible for funding the required controls).	Prior to impacting Lemington Road.	ACOL	Nil
3.0	**Incident Response**			
3.1	Refer to ACOL public safety management plans and implement relevant and appropriate controls.	As subsidence impacts are identified during undermining of Lemington Road.	Ashton Underground Mining Engineer	Fortnightly Status Report
3.2	Remediate those sections of Lemington Road that have cracked or where compression humps have formed and pose a potential risk to public safety. Repairs may include excavation and replacement of the compacted granular road base to re-establish road grade before resurfacing, as required.	At completion of mining of LW 6B.	Ashton Underground Mining Engineer	Fortnightly Status Report
3.3	Engage a contractor to manage subsidence impacts to Lemington Road, including traffic control, monitoring, mitigation and road maintenance. (Note Ravensworth or MSB is responsible for funding the required controls).	If damage is caused to Lemington Road by subsidence from longwall mining.	Ashton Underground Mining Engineer &Ravensworth	Fortnightly Status Report
4.0	**Notification/Consultation/Reporting**			
4.1	Forward information to relevant stakeholders regarding progress of the longwall and any relevant subsidence management actions.	Fortnightly, starting at the commencement of LW6B.	Ashton Environment and Community Relations Manager / Ashton Underground Mining Engineer	Fortnightly Status Report
4.2	Notify relevant stakeholders if subsidence impacts are identified.	In response to monitoring.	Ashton Underground Mining Engineer	Email

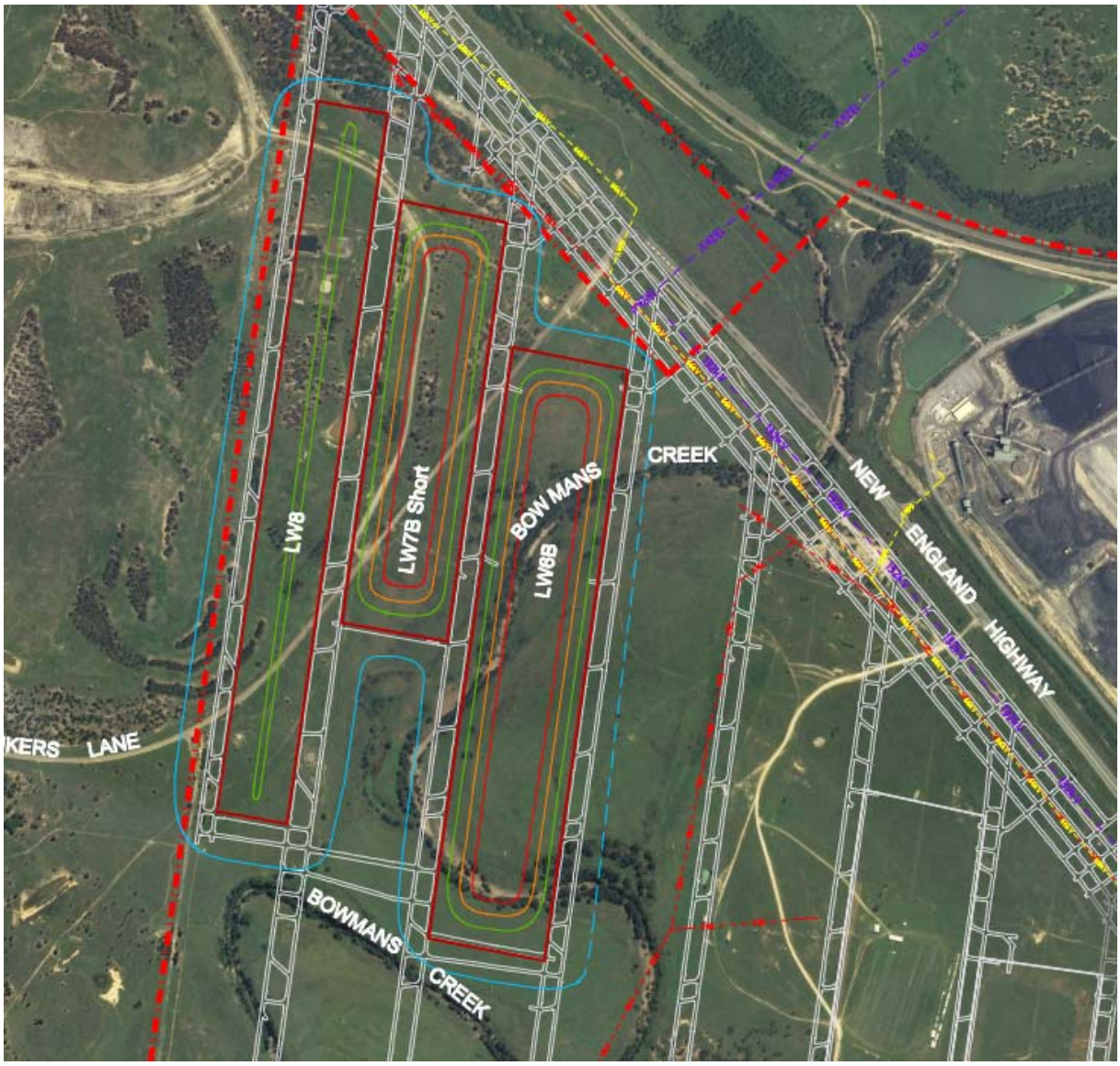
ASSET MANAGEMENT PLAN – LEMINGTON ROAD				
Item	**Action**	**Trigger/Timing**	**Responsibility**	**Reporting**
4.3	Relevant stakeholders to be provided with a copy of subsidence monitoring data.	Post-surveys	Ashton Surveyor	Email
4.4	Extraction Plan to be made publically accessible on the ACOL website.	Prior to subsidence impacts.	Ashton Environment and Community Relations Manager	Nil

This page has been left blank intentionally

ASHTON COAL PROJECT

ASSET MANAGEMENT PLAN
AUSGRID (PREVIOUSLY ENERGY AUSTRALIA) ASSETS
PG LW6B, 7B (SHORT) & 8

Version D - February 2012



Ashton Coal Operations Pty Limited

Glennies Creek Road
Camberwell NSW 2330
Tel: 02 6576 1111
Fax: 02 6576 1122

Table of Contents

Version History

Version	Status	Details	Authors	Authorised/Approved for Issue	
				Name/Position	Date
A	Draft	For consultation	P. Fletcher, AECOM	P. Fletcher	27/05/2011
B	Draft	For consultation	P. Fletcher & AECOM	P. Fletcher	05/07/2011
C	Final	For Distribution	P. Fletcher & AECOM	P. Fletcher	30/08/2011
D	Final	For Distribution	P. Fletcher & AECOM	P. Fletcher	16/02/2012

External Consultation

Org.	Nominated Rep.	Version	Date Issued	Comments
Ausgrid	Manager, Customer Supply	A	10/06/2011	
Ausgrid	Manager, Customer Supply	B	20/07/2011	

1 INTRODUCTION

This Asset Management Plan (AMP) has been prepared to identify and manage predicted subsidence impacts on Ausgrid (previously EnergyAustralia) assets associated with the Ashton Coal Project (ACP). The scope of this management plan is second workings associated with LW 6B, 7B (short) & 8 in the Pikes Gully (PG) Seam.

The Ashton Coal Environmental Management Strategy (see **Figure 1** of the Built Features Management Plan) provides the strategic context for the environmental management of the ACP. Extraction Plans form part of the Environmental Management Strategy and are required by the ACP development consent. Each Extraction Plan provides a framework for the management of subsidence impacts associated with Ashton Coal Operation Limited's (ACOL) underground mining activities. Extraction Plans detail the proposed workings, including dimensions, overburden depth and mining schedule. Impacts to man-made features are addressed through the Built Features Management Plan, under which individual Asset Management Plans detail the consultation, monitoring and management of infrastructure for each asset-owner.

This Asset Management Plan outlines ACOL's statutory requirements relating to monitoring and management of subsidence impacts on Ausgrid assets within the mining lease (ML) 1533, as well as consultation, monitoring and reporting requirements. Relevant built features have been identified in consultation with Ausgrid, and are detailed in **Section 3**. Whilst Ausgrid assets are not expected to be significantly impacted by subsidence, measures to address potential disruption to Ausgrid assets are detailed within **Section 5**. Subsidence related impacts to Ausgrid assets will be managed in consultation with Ausgrid and such measures may include:

- Maintaining safe access to easements for routine line maintenance by Ausgrid personnel;
- Undertaking pre-subsidence structural assessment of transmission lines;
- Fitting rollers to potentially affected transmission lines; and
- Undertaking repairs to transmission lines if required.

It is anticipated that these measures will ensure that Ausgrid assets are not disrupted as a result of subsidence related impacts.

2 LEGAL REQUIREMENTS AND GUIDELINES

This document has been prepared in accordance with development consent (DA 309-11-2001-i), relevant legislation and guidelines, and in consultation with relevant government agencies and affected infrastructure owners as discussed below.

2.1 DEVELOPMENT CONSENT

Condition 3.12(g) to DA 309-11-2001-i requires that ACOL prepare a BFMP to the satisfaction of the Department of Trade and Investment, Regional Infrastructure and Services (DTIRIS) (formerly the Department of Industry & Investment) "*which has been prepared in consultation with the owner/s of potentially affected feature/s, to manage the potential subsidence impacts and/or environmental consequences of the proposed second workings.*"

Condition 3.10 of the development consent establishes subsidence impact performance measures relating to built features and public infrastructure. Under the development consent, ACOL must ensure that underground mining does not cause any exceedances of

these performance measures to the satisfaction of the Director-General (Planning). The development consent performance measures, as well as more detailed performance measures developed by ACOL for Ausgrid assets are provided in **Section 4**.

The development consent also includes the following requirement relevant to electricity transmission lines, as per Condition 7.23:

> *The Applicant shall, to the satisfaction of EnergyAustralia and at its own cost, undertake the relocation and/or construction of any electrical transmission lines which may be required as a result of the development. The Applicant shall also bear any costs associated with relocation of Registered Easements for relocated or new transmission lines required as a result of the development. Such work shall be completed prior to any existing line being affected by mining activity from ACP.*

Additionally under Schedule C, Item 3 of the development consent ACOL's commitments include "*Existing surface infrastructure will be maintained to be safe, serviceable and repairable manner unless the owner agrees otherwise in writing*." and "*Damage to existing third party-owned infrastructure due to the ACOL induced subsidence will be mitigated or remediated*."

2.2 CONSULTATION REQUIREMENTS

Should significant amendments to this document be required prior to implementation, the amendments will be made in consultation with Ausgrid and to the satisfaction of DTIRIS (Minerals & Energy). Contact details of the relevant stakeholders are listed in **Table 1**.

Table 1 Relevant Stakeholders and Representatives

Organisation	Contact	Phone	Address
Ausgrid (previously EnergyAustralia)	Manager Customer Supply, Upper Hunter	13 13 67	PO Box 196 Muswellbrook NSW 2333
Mine Subsidence Board (MSB)	District Manager	(02) 6572 4344	PO Box 524 Singleton NSW 2330
DTIRIS, Minerals and Energy	Principal Subsidence Engineer	(02) 4931 6644	PO Box 344 Hunter Region Mail Centre NSW 2310

In the event of an incident or damage to Ausgrid assets, the following service number applies:

AUSGRID EMERGENCY SERVICE NUMBER 13 13 88

3 SCOPE

This management plan addresses potential subsidence impacts to Ausgrid assets potentially affected by underground mining (secondary extraction) of LW 6B, 7B (short) and 8 in the Pikes Gully (PG) seam only. The subsidence predictions, affected assets and likely subsidence impacts are summarised below.

3.1 PREDICTED SUBSIDENCE

Subsidence resulting from extraction of LW 6B, 7B (short) and 8 in the PG Seam is variable based on the width of the panel, overburden depth and chain pillar barrier widths. Maximum predicted subsidence values (worst case scenarios) for extraction of these panels, as presented in **Table** 2 have been adopted for the purposes of this management plan.

Table 2 Maximum Subsidence Predictions (PG Seam only)

Panel	Maximum Subsidence (m)	Maximum Tilt (mm/m)	Maximum Strain (mm/m)
LW6B	1.6	70	30
LW7B	1.6	70	30
LW8	0.7	40	20

Source: SCT Operations (2011) Subsidence Assessment for Ashton Coal Mine Longwalls 6B to 8 in the Pikes Gully Seam based on the Bowman's Creek Diversion Mine Plan

Future extraction of lower coal seams is not currently covered in this management plan, and the values shown in **Table 2** are not the final subsidence values for the site.

3.2 DESCRIPTION OF ASSETS & SUBSIDENCE IMPACTS[1]

ACOL's Mining Lease includes a number of overhead electricity transmission lines that are owned by Ausgrid. The location and voltage of each is shown in **Figure 2**. Transmission lines relevant to secondary extraction of LW 6B, 7B (short) & 8 include a 132kV and a 66/11kV (combined) transmission lines on single concrete poles, travelling parallel to the New England Highway road reserve.

Whilst not impacted by LWs 6B, 7B (short) & 8, it is noted that a 132kV transmission line supported on a combination of dual and triple timber poles traverses the southern extent of the ACOL Mining Lease in an east-west direction. This line is a major interconnector within the Ausgrid network. An 11kV transmission line on single timber poles that travels from the New England Highway, southwest across the ACOL Mine Lease with off-takes to residential dwellings, Ashton Underground Borehole Pump and the Hunter River pump (supplies ACOL) is similarly outside the scope of this management plan.

Not all transmission lines within the mining lease area are publicly-owned (Ausgrid) assets. Transmission lines owned by ACOL traverse the lease area and another private transmission line occurs in the north-west corner of the lease. This land is currently owned by Macquarie Generation and the transmission line is currently owned by Xstrata - Ravensworth Operations Pty Ltd and provides power to Ravensworth Open Cut Mine. The management of these assets are addressed in the ACOL and Ravensworth Operations AMPs respectively.

Negligible impacts are expected to the Ausgrid 132kV and 66/11kV electricity transmission lines adjacent to the New England Highway. This is due to their location above first workings and beyond the northern end of LW6B, 7B (short) & 8, outside of the subsidence zone, where tilts and strains are not expected to be significant.

[1] Potential subsidence impacts identified by SCT (2011). Report titled: 'Subsidence Assessment for Longwalls 6B to 8 in the Pikes Gully Seam based on the Bowmans Creek Diversion Mine Plan.'

4 PERFORMANCE MEASURES

ACOL will aim to ensure that all built features owned by Ausgrid affected by subsidence are always maintained as safe and serviceable where subsidence related impacts are realised. Unless other arrangements are in place, ACOL commits to fully compensate Ausgrid as the asset owner if serviceability is not maintained as a result of subsidence impacts. Any subsidence damage from ACOL's mining activities will be repaired as necessary, or else replaced or fully compensated or dealt with under the terms of an access or compensation agreement.

The subsidence impact performance measures relevant to Ausgrid assets under consent condition 3.10 are summarised in **Table 3** while more specific objectives and performance measures, developed by ACOL, are listed in **Table 4** below.

Table 3 Subsidence Impact Performance Measures

Built Features	Performance Measure
Other built features, including other public infrastructure.	• Always safe. • Serviceability should be maintained wherever practicable. Loss of serviceability must be fully compensated. • Damage must be fully repaired or replaced, or else fully compensated.
Public Safety	No Additional Risk

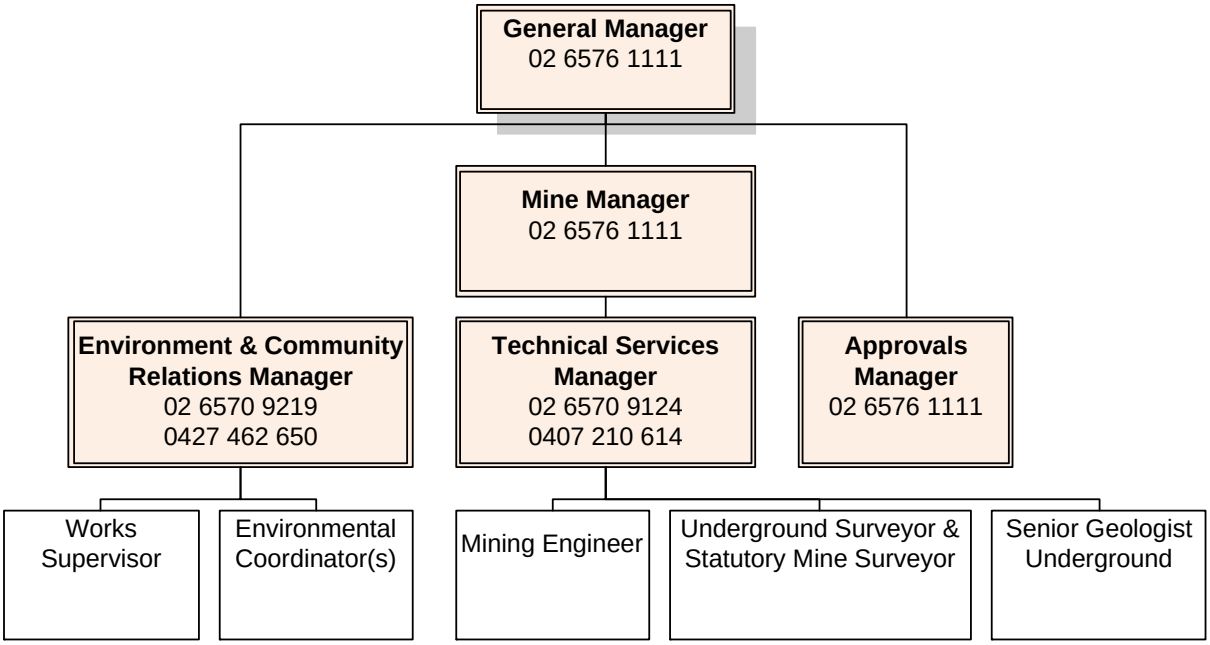
Table 4 Electricity Transmission Line Management Objectives

Objective	Performance Measure
• To ensure unplanned disruptions to power supply do not occur as a result of subsidence related damage to powerlines. • To prevent public safety hazards from damaged power lines.	• All infrastructure is assessed in consultation with Ausgrid and any required mitigation / relocation works are carried out prior to undermining. • No power shortages occur due to subsidence induced damage to power lines. • Where subsidence related impacts are realised power lines within the site remain structurally sound and serviceable at all times.

5 MANAGEMENT PLAN RESPONSIBILITIES

A summarised ACOL organisation chart, as relevant to this AMP is provided in **Figure 1**. The full organisation structure for the underground mine is contained within the Extraction Plan main document.

Figure 1 ACOL Organisation Chart - Summary Outline



This page has been left blank intentionally

6 SUBSIDENCE MANAGEMENT

The actions that ACOL undertakes to fulfil the consent conditions outlined in **Section *2*** and to meet performance measures outlined in **Section 4** are shown in **Table 5**. These actions have been categorised into Monitoring, Management, Incident Response and Notification/Consultation.

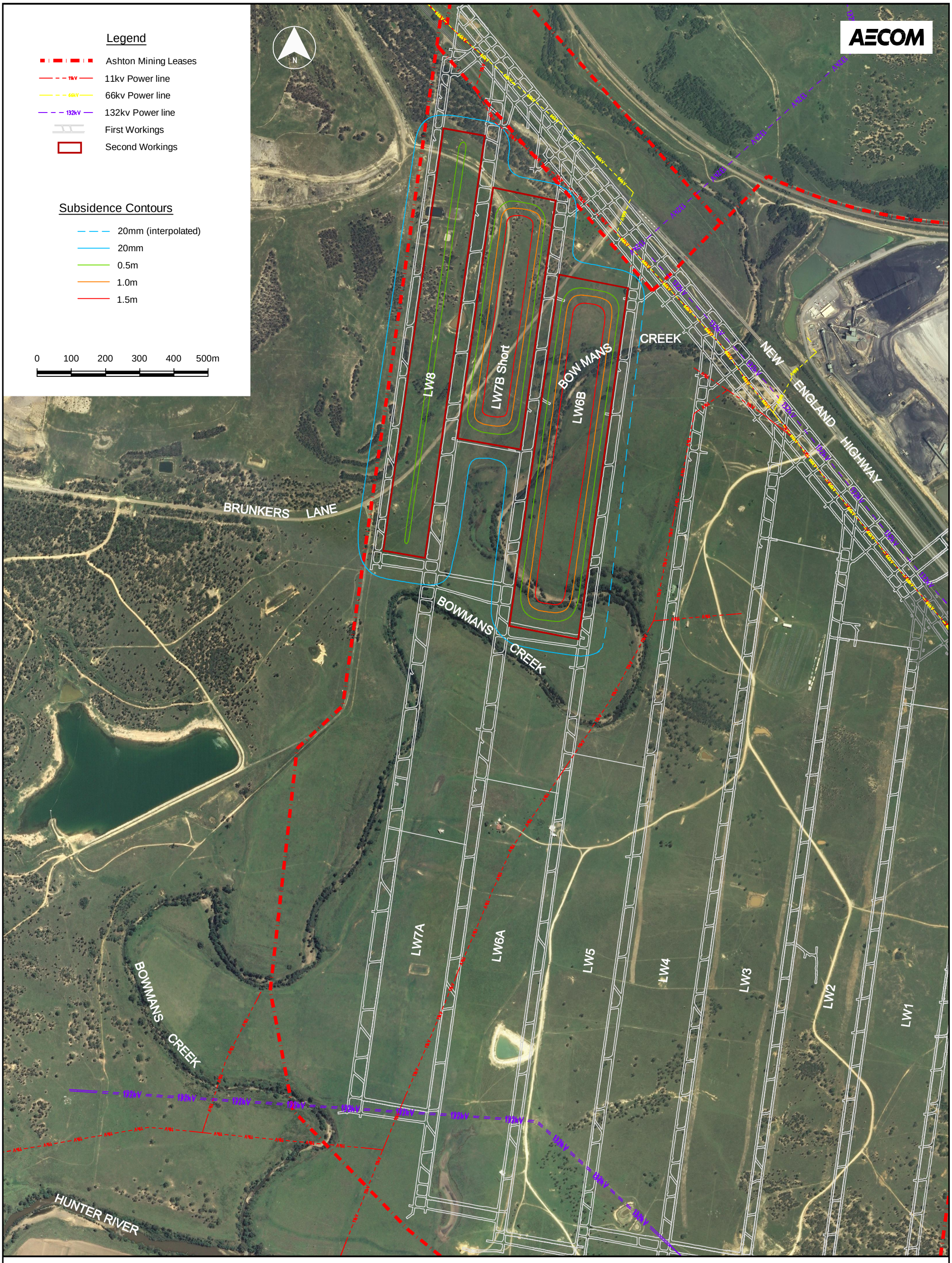
Table 5 Management, Monitoring and Responsibilities

Item	Action	Trigger/Timing	Responsibility	Reporting
1.0	Monitoring			
1.1	Pre-mining baseline survey to obtain xyz coordinates along all poles and conductors. The survey is to be undertaken in accordance with the Subsidence Monitoring Program and the proposed methods therein.	Pre-mining	Ashton Mine Surveyor	Nil
1.2	Baseline photographic survey and visual assessment of all support poles and transmission lines within the (LW6B, 7B & 8) affected area.	Pre-mining	Ashton Underground Mining Engineer	Nil
1.3	Daily visual inspections of all powerlines noting their condition and line clearances. Assets to be monitored in accordance with the Subsidence Monitoring Program.	From longwall commencement until the active face is 100m past the powerline location.	Ashton Underground Mining Engineer	SMP Status Report Fortnightly Status Report
1.4	Subsidence survey monitoring of all lines for tilt, strain and line clearance. Assets to be monitored in accordance with the Subsidence Monitoring Program.	From longwall commencement until the active face is 100m past the powerline location.	Ashton Mine Surveyor	End-of-Panel Report
1.5	Monitor forecasts for wind speeds. When wind speed is greater than 70km/h cease longwall mining for the duration of the high wind speeds and if required a reassessment of the poles will be conducted.	While active face of longwall is within 100m of 132kV support poles.	Ashton Underground Mining Engineer / Ashton Environment and Community Relations Manager	Nil

Item	Action	Trigger/Timing	Responsibility	Reporting
2.0	Management			
2.1	Maintain safe access to the electricity transmission easements and infrastructure for Ausgrid personnel to undertake normal line maintenance and remediation works (if required).	Ongoing	Ashton Underground Mining Engineer	Nil
2.2	Pre- subsidence structural assessment of 132kV, 66kV and 11kV lines. Any modifications required will be subject to designs prepared / approved by Ausgrid.	Assessment to be completed prior to each longwall commencing. Modifications to be completed prior to subsidence impacts occurring.	Ashton Underground Mining Engineer	Provide copy to Ausgrid
2.3	Remediation of 11kV line by isolating lines in temporary sheaves/rollers. Poles that are braced with wire stays will be individually assessed to determine management works.	Prior to each longwall being mined.	Ashton Underground Mining Engineer	Notify Ausgrid
2.4	Install temporary rollers to 132KV line (where required)	Prior to any subsidence effects on the 132KV powerlines.	Ashton Underground Mining Engineer	Notify Ausgrid
2.5	Installation of stays to powerlines affected by subsidence and removal of rollers (where fitted).	Following completion of active subsidence.	Ashton Underground Mining Engineer	Notify Ausgrid
2.6	Repair works on 11kV, 66kV and 132kV lines in accordance with normal line maintenance procedures.	As required (i.e. either through inspections or service disruptions).	Ausgrid	Nil
2.7	Replace high-voltage clearance signage to reflect any changes/reduction in line clearance (refer to Item 1.4).	Following completion of active subsidence.	Ashton Underground Mining Engineer	Nil

Item	Action	Trigger/Timing	Responsibility	Reporting
2.8	Structural Assessment and Post Subsidence Inspections.	Following completion of active subsidence.	Ausgrid	Nil
3.0	**Incident Response**			
3.1	Notify Ausgrid on 13 13 88 of any fallen/damaged electrical assets and take measures to prevent potential injury.	As soon as practicable.	All ACOL personnel.	Notify Ausgrid
4.0	**Notification, Consultation & Reporting**			
4.1	Forward information to Ausgrid regarding progress of the longwall and any relevant subsidence management actions.	Fortnightly	Ashton Underground Mining Engineer	Fortnightly Status Report
4.2	Notify Ausgrid if subsidence impacts are identified.	In response to monitoring.	Ashton Underground Mining Engineer	Nil
4.3	Ausgrid to be provided with a copy of subsidence monitoring data for each longwall.	On completion of each Longwall panel once subsidence has ceased.	Ashton Underground Mining Engineer	Monitoring emails from ACOL Surveyor

This page has been left blank intentionally



AshtonCoal

Ausgrid Asset Management Plan
PG LW6B, 7B Short & 8

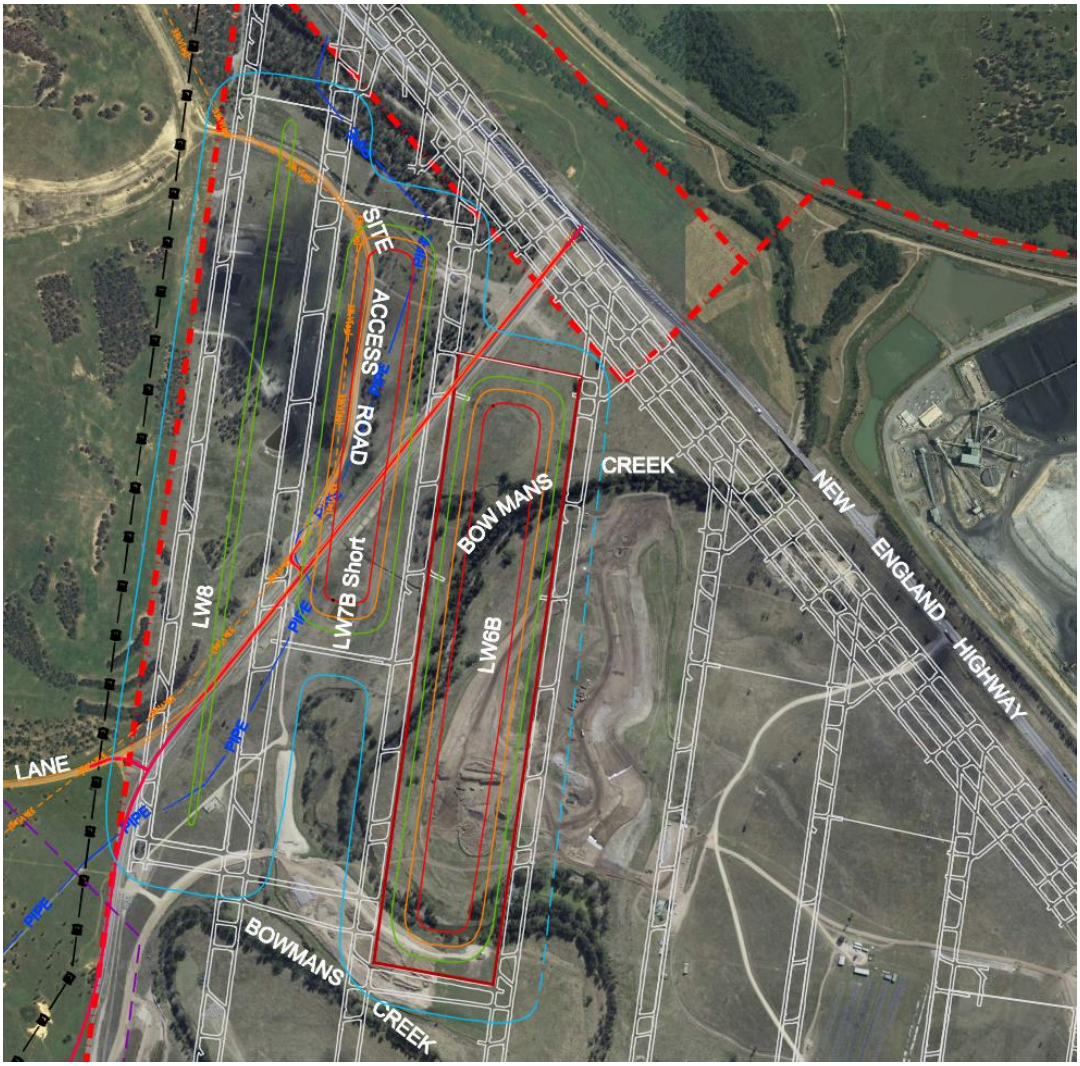
Figure 2

This page has been left blank intentionally

ASHTON COAL PROJECT

ASSET MANAGEMENT PLAN
XSTRATA - RAVENSWORTH OPERATIONS ASSETS
PG LW6B, 7B (SHORT) & 8

Version 30/05/2013



Ashton Coal Operations Pty Limited

Glennies Creek Road
Camberwell NSW 2330
Tel: 02 6576 1111
Fax: 02 6576 1122

Table of Contents

Version History

Version	Status	Details	Author(s)	Authorised/Approved for Issue	
				Name/Position	Date
A	Draft	For consultation	P Fletcher & AECOM	P Fletcher	25/5/11
B	Draft	For consultation	P. Fletcher & AECOM	P. Fletcher	19/08/2011
C	Final	For Distribution	P. Fletcher & AECOM	P. Fletcher	29/08/2011
D	Final	For Distribution	P. Fletcher & AECOM	P. Fletcher	16/02/2012
30/05/2013	Final	For Distribution	A. McGuigan & AECOM	A. McGuigan	30/05/2013

External Consultation

Org.	Nominated Rep.	Version	Date Issued	Comments
Xstrata – Ravensworth Operations Pty Ltd	Technical Services Manager	A	June 2011	
Xstrata – Ravensworth Operations Pty Ltd	Technical Services Manager	B	August 2011	

1 INTRODUCTION

This Asset Management Plan (AMP) has been prepared to identify and manage predicted subsidence impacts on Xstrata – Ravensworth Operations assets associated with the Ashton Coal Project (ACP). The scope of this management plan includes the second workings associated with LW 6B, 7B (short) & 8 in the Pikes Gully seam.

The Ashton Coal Environmental Management Strategy (see **Figure 1** of the Built Features Management Plan) provides the strategic context for the environmental management of the ACP. Extraction Plans form part of the Environmental Management Strategy and are required by the ACP development consent. Each Extraction Plan provides a framework for the management of subsidence impacts associated with Ashton Coal Operation Limited's (ACOL) underground mining activities. Extraction Plans detail the proposed workings, including dimensions, overburden depth and mining schedule. Impacts to man-made features are addressed through the Built Features Management Plan, under which individual Asset Management Plans detail the consultation, monitoring and management of infrastructure for each asset-owner.

This Asset Management Plan outlines ACOL's statutory requirements relating to monitoring and management of subsidence impacts on Xstrata – Ravensworth Operations assets as well as consultation, monitoring and reporting requirements. Relevant built features have been identified in consultation with Xstrata and are detailed in **Section 3**. Xstrata – Ravensworth Operations own several assets which traverse the Ashton Coal Operations Limited (ACOL) mining area. Measures to mitigate potential subsidence impacts on these assets are proposed in **Section 5** and include:

- Fitting of rollers to potentially affected transmission lines;
- Exposing buried sections of pipeline to reduce subsidence induced strain;
- Repair and maintenance of roads during and post subsidence; and
- Repair of fences and gates post subsidence.

It is anticipated that these measures will ensure Xstrata – Ravensworth Operations owned assets are not disrupted as a result of subsidence related impacts.

2 LEGAL REQUIREMENTS AND GUIDELINES

This document has been prepared in accordance with development consent (DA 309-11-2001-i), relevant legislation and guidelines, and in consultation with relevant government agencies and affected infrastructure owners as discussed below.

2.1 DEVELOPMENT CONSENT

Condition 3.12(g) to DA 309-11-2001-i requires that ACOL prepare a BFMP to the satisfaction of the Department of Trade and Investment, Regional Infrastructure and Services (DTIRIS) (formerly the Department of Industry & Investment) "*which has been prepared in consultation with the owner/s of potentially affected feature/s, to manage the potential subsidence impacts and/or environmental consequences of the proposed second workings.*"

Condition 3.10 of the development consent establishes subsidence impact performance measures relating to built features and public infrastructure. Under the development

consent, ACOL must ensure that underground mining does not cause any exceedances of these performance measures to the satisfaction of the Director-General (Planning).

Condition 7.14 of the development consent requires ACOL and Xstrata – Ravensworth to "*commission and implement a detailed report on a final alignment for Lemington Road"* to address issues of subsidence impacts, changes to road alignment, environmental, social and economic impacts and funding. An action plan within the report will assist in implementing the report's recommendations.

Ashton will be responsible for implementing controls to ensure road traffic safety, including the monitoring, maintenance and repairs of actual subsidence during progression of the longwall under the section of road, and Ravensworth Operations will be responsible for 100% of costs associated with these controls.

Additionally under Schedule C, Item 3 of the development consent ACOL's commitments include *"Existing surface infrastructure will be maintained to be safe, serviceable and repairable manner unless the owner agrees otherwise in writing."* and "*Damage to existing third party-owned infrastructure due to the ACOL induced subsidence will be mitigated or remediated."*

2.2 CONSULTATION REQUIREMENTS

Should significant amendments to this document be required prior to implementation, the amendments will be made in consultation with Xstrata – Ravensworth Operations and to the satisfaction of DTIRIS (Minerals & Energy). Contact details of the relevant stakeholders are listed in **Table 1**.

Table 1 Relevant Stakeholders and Representatives

Stakeholder	Contact	Phone	Address
Xstrata - Ravensworth Operations Pty Ltd	Technical Services Manager	(02) 6570 0700 (Manned 24hrs)	PO Box 294 Muswellbrook NSW 2333
Mine Subsidence Board (MSB)	District Manager	(02) 6572 4344	PO Box 524 Singleton NSW 2330
DTIRIS, Minerals and Energy	Principal Subsidence Engineer	(02) 4931 6644	PO Box 344 Hunter Regional Mail Centre, NSW 2310

3 SCOPE

This management plan addresses potential subsidence impacts to Xstrata – Ravensworth Operations assets potentially affected by underground mining (secondary extraction) of LW 6B, 7B (short) and 8 in the Pikes Gully (PG) seam only. The subsidence predictions, affected assets and likely subsidence impacts are summarised below.

3.1 PREDICTED SUBSIDENCE

Subsidence resulting from extraction of LW 6B, 7B (short) and 8 in the PG Seam is variable based on the width of the panel, overburden depth and chain pillar barrier widths. Maximum predicted subsidence values (worst case scenarios) for extraction of these panels, as presented in **Table** 2 have been adopted for the purposes of this management plan.

Table 2 Maximum Subsidence Predictions (PG Seam only)

Panel	Maximum Subsidence (m)	Maximum Tilt (mm/m)	Maximum Strain (mm/m)
LW6B	1.6	70	30
LW7B	1.6	70	30
LW8	0.7	40	20

Source: SCT Operations (2011) Subsidence Assessment for Ashton Coal Mine Longwalls 6B to 8 in the Pikes Gully Seam based on the Bowman's Creek Diversion Mine Plan, prepared for Ashton Coal Mine

Future extraction of lower coal seams is not currently covered in this management plan and the values shown in **Table 2** are not the final subsidence values for the site.

3.2 DESCRIPTION OF ASSETS & SUBSIDENCE IMPACTS [1]

Existing Xstrata - Ravensworth Operations assets potentially affected by subsidence from LW6B, 7B (short) or 8 include:

- Private access roads (not owned by Xstrata but used for access);
- 33kV electricity transmission line;
- Surface water storages (Prescribed Dam notification area);
- Boundary fencing; and
- Pipelines.

The location of each of these assets is shown in **Figure 2**.

Proposed Xstrata – Ravensworth Operations assets which, if constructed, could potentially be affected by subsidence from LW 6B, 7B (short) or 8 include:

- The relocation of Lemington Road (to be dedicated as a public road and subsequently managed by Singleton Council); and
- A 330kV electricity transmission line.

The proposed alignments of this infrastructure are also indicated in **Figure 2**.

3.2.1 Private Access Roads

The land containing these assets is owned by Macquarie Generation. A private access road (commonly referred to as Brunkers Lane) on Macquarie Generation land is a sealed private road and provides access to Property No. 153 (Xstrata - Ravensworth Operations Pty Ltd) and Property No. 155 (Macquarie Generation) from the New England Highway. Xstrata - Ravensworth Operations use this road as a rear access to their site. It is maintained by Macquarie Generation, and used by agreement as no formal Right-of-Way exists over the road. Use of Brunkers Lane is currently restricted by means of a locked gate approximately 1km along the road from its intersection with the New England Highway.

Impacts: The site access road is unlikely to remain serviceable during the period of active mining. The sealed section of Brunkers Lane as a private road is likely to require significant remedial work to maintain in a serviceable condition during the mining of LW 6B, 7B (short) and 8. Filling, regrading and resealing of the road surface is likely to be required at the completion of LWs 6B, 7B (short) and 8. Remedial work to Brunkers Lane will be undertaken in accordance with the Road Management Response Table provided in **Section 5.1**.

[1] Potential subsidence impacts identified by SCT (2011). Report titled: 'Subsidence Assessment for Longwalls 6B to 8 in the Pikes Gully Seam based on the Bowmans Creek Diversion Mine Plan.'

3.2.2 Proposed Public Roads

Ravensworth Operations is currently proposing a relocation of Lemington Road from its current location to be approximately in line with the current alignment of Brunkers Lane. Once diverted and construction is complete, the new Lemington Road will be dedicated as a public road managed by Singleton Council. Xstrata and ACOL are continuing to consult on the management of the construction of the sealed road.

Ashton will be responsible for implementing controls to ensure road traffic safety, including the monitoring, maintenance and repairs of actual subsidence during progression of the longwall under the section of road, and Xstrata - Ravensworth Operations Project will be responsible for 100% of costs associated with these controls[2].

While the interim location is in line with the current location of Brunkers Lane, the decision about the final status and location of Lemington Road will be included in an assessment report on the final alignment of Lemington Road which will be finalised before 31 March 2012 according to Consent Condition 7.14 (refer to **Section 2**).

Impacts to the future Lemington Road are similar to those described for Brunkers Lane above. Therefore, if the road becomes a public road prior to mining in that area, temporary diversions and/or continuous supervision of the site is likely to be necessary during the period of active mining. Filling, regrading and resealing of the road surface is likely to be required at the completion of LWs 6B, 7B (short) and 8.

3.2.3 Surface Water Storage

Narama Dam is located on land owned by Xstrata - Ravensworth Operations Pty Ltd and is located to the west of the ACOL Mining Lease. Narama Dam is of earth wall construction and provides water for other Xstrata mining operations as well as Mt Owen Mine. It will not be undermined by Ashton's underground mine, however it is a Prescribed Dam under the *Dam Safety Act 1978* (as the "Ravensworth Inpit Storage") and the Notification Area associated with this structure lies within the ACOL mining lease (see Figure 2).

ACOL obtained approval from DTIRIS to mine within the Narama Dam Notification Area on 19 March 2010. The DTIRIS approval is based on the Dam Safety Committee (DSC) recommendations issued 17 March 2010. Subsequent to the Ashton-1 approval, ACOL re-applied to the DSC for approval based on the modified mine plan for the Bowmans Creek Diversion (BCD). The approval included a report prepared by SCT (2011) which specifically addresses potential subsidence impacts on Narama Dam. This modified application was approved on 19 March 2011 by DTIRIS, based on the Dam Safety Committee (DSC) recommendations, and has been titled the Ashton-2 approval.

No subsidence impacts are anticipated to Narama Dam, as the toe of the Narama dam wall is approximately 430m from the nearest goaf edge of LW 8. Narama Dam subsidence monitoring is undertaken by ACOL in accordance with the 'Ashton-2 Dam Safety Committee Approval' recommendations (see **Section 5** for a summary of monitoring activities).

3.2.4 Privately Owned Electricity Transmission Line

Xstrata - Ravensworth Operations owns a 33 kV transmission line which is located on land owned by Macquarie Generation. The line runs on a single pole structure and is located over the northern end of LW 7B (short) and LW 8. It provides electricity to the Ravensworth Mine.

[2] See ACOL Consent Condition 7.15

A new 330 kV electricity transmission line is proposed by Xstrata – Ravensworth Operations. The line is designed to overlay Ravensworth Underground Mine's mains roadways and is not located over ACOL's longwall panels.

Impacts to the existing 33kV transmission line are likely to result from subsidence movements of a magnitude relative to its proximity to LW 7B (short) & 8. The transmission line is a single pole structure and therefore comparatively more resilient to subsidence movements. Subsidence impacts are expected to be adequately managed by employing rollers and/or stays (if required). ACOL has well-documented experience gained from previous longwall panel extraction at the ACP.

3.2.5 Water Pipelines

Xstrata - Ravensworth Operations own a PN10 PE100 315 mm diameter pipeline which connects the Narama Dam to Mount Owen mine. This pipeline crosses LW 7B (short) and LW 8. It is buried for most of its length, but is exposed where it passes through a culvert beneath Brunkers Lane.

Impacts: Where the PN10 PE100 315 mm diameter pipeline crosses LW7B (short) & 8, the buried sections are expected to experience the full range of subsidence movements. Whilst the predicted strains may exceed the 5-10mm/m working strains of polyethylene it is not expected that contact between the pipe and ground would be sufficiently tight to transfer all of the ground strain to the pipe. However potential for damage exists where there is good contact and subsidence movements are concentrated at large cracks or compression humps.

3.2.6 Fences and Gates

The use of fences and gates are primarily for property boundary fencing between neighbouring landholdings and along roadsides. Fences are constructed of a combination of iron and wooden posts with multiple wire strands.

Impacts: Ground tilt and subsidence is likely to cause posts to tilt in opposite directions or towards each other, causing tension and possible breakage, or sag of wires, respectively. Tilt of a gate's hinge post may result in the gate being unable to fully open or close. Damage to fences and gates may then allow stock to escape (if present).

4 PERFORMANCE MEASURES

ACOL will aim to ensure that all built features owned by Xstrata – Ravensworth Operations affected by subsidence are always maintained as safe and serviceable where subsidence related impacts are realised. Unless other arrangements are in place, ACOL commits to fully compensate Xstrata – Ravensworth Operations as the asset owner if serviceability is not maintained as a result of subsidence impacts. Any subsidence damage from ACOL's mining activities will be repaired as necessary, replaced, or fully compensated or be dealt with under the terms of an access or compensation agreement.

The subsidence impact performance measures relevant to Xstrata - Ravensworth Operations assets are summarised in **Table 3** below. Specific objectives and performance measures that have been developed for Xstrata assets affected by subsidence are summarised in **Table 4** below.

Table 3 Subsidence Impact Performance Measures

Built Features	Performance Measure
Other built features, including other public infrastructure.	• Always safe. • Serviceability should be maintained wherever practicable. Loss of serviceability must be fully compensated. • Damage must be fully repaired or replaced, or else fully compensated.
Public Safety	No Additional Risk.

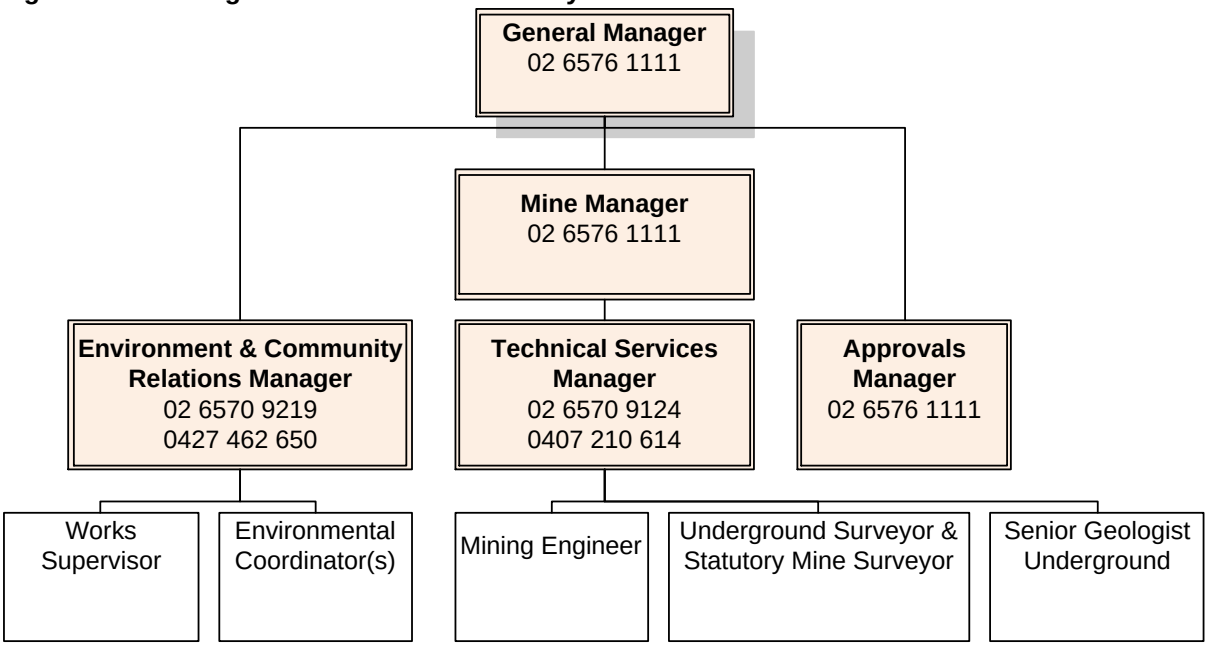
Table 4 Xstrata Asset Management Objectives

Objective	Performance Measure
General	• All existing infrastructure is assessed in consultation with Ravensworth Operations and any required mitigation / relocation works are carried out prior to undermining.
Narama Dam	
• To confirm that no perceptible impact due to subsidence movements are experienced near Xstrata – Ravensworth Operation's dams.	• Narama Dam managed as per Dam Safety Committee approval.
Water and Power Utilities	
• To ensure unplanned disruptions to water or power supply do not occur as a result of subsidence related damage to powerlines or pipelines. • To prevent public safety hazards from damaged power lines.	• No unplanned power shortages occur due to subsidence induced damage to power lines. • No unplanned interruptions to water supply occur due to subsidence induced damage to pipelines. • Where subsidence related impacts are realised power lines within the site remain structurally sound and serviceable at all times.
Roads	
• To ensure access to Property No. 155 is not disrupted as a result of subsidence. • To collaborate with Xstrata – Ravensworth on the appropriate location and (subsidence impact) management of Lemington Road.	• Subsidence Impacts to existing roads are identified and remedial works undertaken within a timeframe acceptable to Macquarie Generation. • Study required under Consent Condition 7.14 is completed within the required statutory timeframe. • Ashton will fund 50% of the cost of study required under Consent Condition 7.14 and will implement adequate controls to ensure road traffic safety. • Xstrata – Ravensworth Operations will fund 50% of the cost of the alignment study and 100%of costs associated with monitoring, maintenance and repair of subsidence impacts.

5 MANAGEMENT PLAN RESPONSIBILITIES

A summarised ACOL organisation chart, as relevant to this AMP is provided in **Figure 1**. The full organisation structure for the underground mine is contained within the Extraction Plan main document.

Figure 1 ACOL Organisation Chart - Summary Outline



This page has been left blank intentionally

6 SUBSIDENCE MANAGEMENT

The actions that ACOL undertakes to fulfil the consent conditions outlined in **Section 2** and to meet performance measures outlined in **Section** 4 are shown in **Table 5**. These suggested actions have been categorised into Monitoring, Management, Incident Response and Notification/Consultation.

Table 5 Monitoring, Management and Responsibilities

Item	Feature	Action	Trigger/Timing	Responsibility	Reporting
1.0	**Monitoring**				
1.1	Private Roads	*Private roads are monitored in accordance with the Macquarie Generation Asset Management Plan*			
1.2	Fences	Visual inspection / monitoring of gates and fences on private property and ACOL boundary fences.	Prior to commencement of mining; • Weekly visual investigations during active subsidence; and • At completion of each longwall panel.	Ashton Underground Mining Engineer	Fortnightly Report Copy provided to Rav Ops when assets impacted.
1.3	Narama Dam	Survey of established survey pegs to provide baseline data for future comparison.	Prior to secondary extraction within Prescribed Dam Notification Area	Ashton Mine Surveyor	Copy of survey provided to Rav Ops.
1.4	Narama Dam	Survey of established survey pegs and compare with baseline data to determine any movements being experienced.	As per DSC Conditions at completion of Longwalls 7B and 8.	Ashton Mine Surveyor	Copy of survey provided to Rav Ops.
1.5	Narama Dam	Final survey to confirm no subsidence impacts.	Following completion of active subsidence.	Ashton Underground Mining Engineer	Copy of survey provided to Rav Ops.
1.6	33kV Transmission Line	Pre-subsidence survey of 33kV lines to obtain xyz coordinates and photographs of poles and lines in the affected area. The survey is to be undertaken in accordance with the Subsidence Monitoring Program and the proposed methods therein.	Prior to mining LW7B and LW8.	Ashton Mine Surveyor	Copy of survey provided to Rav Ops.

Item	Feature	Action	Trigger/Timing	Responsibility	Reporting
1.7	33kV Transmission Line	Assets to be monitored in accordance with the Subsidence Monitoring Program. Subsidence monitoring and post subsidence inspection / structural assessment of 33kV lines including visual inspections noting condition, line clearance and pole tilt.	• During active subsidence.	Ashton Mine Surveyor	Copy of survey provided to Rav Ops.
1.8	315 mm Diameter Pipeline	Visual inspection / monitoring of exposed sections of pipeline.	• Prior to commencement of mining; • Documented weekly visual investigations during mining; and • At completion of each longwall panel.	Ashton Underground Mining Engineer	SMP Status Report.
1.9	315 mm Diameter Pipeline	Flow monitoring by Xstrata to identify pipeline leakage	• Ongoing during subsidence if pipeline is operational and flow monitoring gauges are installed.	Xstrata Ashton Underground Mining Engineer	Nil
2.0	**Management**				
2.1	Private Roads	Erection of signage inside property gates, warning of potential cracks, dips, humps and providing ACOL contact number.	Prior to commencement of longwall mining in affected property.	Ashton Underground Mining Engineer	Nil
2.2	Private Roads	Erection of temporary hazard warning signs 250 metres before and 350 metres after the location of the active longwall face, including recommended speed limit.	Prior to longwall face progressing within 250 metres of access road and relocated weekly.	Ashton Underground Mining Engineer	Nil
2.3	Private Roads	Maintain access to Property No. 155 (may include repairs, temporary diversions etc) in accordance with Macquarie Generation AMP.	Following subsidence impacts until permanent repairs of road are complete.	Ashton Underground Mining Engineer	Nil
2.4	Proposed Public Roads	Undertake and complete study in conjunction with Xstrata, as required under Condition No. 7.14 with regard to location of Lemington Road	Completed prior to June 2012.	ACOL Xstrata	Nil
2.5	Fences	Removal of stock from paddocks that will be subject to subsidence and relocated to unaffected or rehabilitated paddocks elsewhere on the property.	Prior to subsidence impacts.	Ashton Environment and Community Relations Manager	Nil

Item	Feature	Action	Trigger/Timing	Responsibility	Reporting
2.6	Fences	Repairs of damaged fences and gates.	Completion of subsidence.	Ashton Underground Mining Engineer	Fortnightly Status Report
2.7	Narama Dam	Detailed assessment of potential subsidence impacts to Narama Dam in accordance with *Dams Safety Act 1978.*	Prior to secondary extraction within Prescribed Dam Notification Area.	Ashton Underground Mining Engineer	DSC Ashton-2 Approval.
2.8	33kV Transmission Line	Structural assessment of 33kV transmission line and implement remedial works to 33kV transmission line, if required. Any modifications required will be subject to designs prepared in consultation with RavOps.	Assessment to be completed prior to each longwall commencing. Modifications to be completed prior to subsidence impacts occurring.	Ashton Underground Mining Engineer	Notify Ausgrid Notify Rav Ops
2.9	33kV Transmission Line	Manage mining activities in accordance with Ravensworth Operations 33kV Powerline Infrastructure TARP.	Longwall face within 50m of a 33kV power pole.	Ashton Underground Mining Engineer	Fortnightly Status Report
2.10	315 mm Diameter Pipeline	Expose pipeline and place on surface to reduce subsidence impacts and/or provision for leak detection.	Prior to subsidence if flow monitoring equipment is not installed.	Ashton Underground Mining Engineer	Fortnightly Status Report
2.11	315 mm Diameter Pipeline	In consultation with Xstrata – RavOps cease pipeline operation.	Prior to subsidence if pipeline is not exposed and flow monitoring equipment is not installed.	Xstrata Ashton Underground Mining Engineer	Fortnightly Status Report
2.12	315 mm Diameter Pipeline	Ensure pumping is stopped and notify ACOL immediately so that potential damage to the pipeline can be investigated.	If flow monitoring indicates a change to baseline.	Xstrata	Notify ACOL Fortnightly Status Report
2.13	315 mm Diameter Pipeline	Investigate damage to pipeline.	If flow monitoring indicates a change to baseline.	Ashton Underground Mining Engineer	Notify Xstrata Fortnightly Status Report
3.0	**Incident Response**				
3.1	Private Road	Repair road in accordance with Macquarie Generation ESMP.	As required due to subsidence impact (i.e. if identified during daily visual inspections)	Ashton Underground Mining Engineer	Fortnightly Status Report

Item	Feature	Action	Trigger/Timing	Responsibility	Reporting
3.2	Fences	Temporary electric fencing.	In the event that damage to a fence causes unplanned stock movements and repairs cannot be carried out immediately. Prior to extraction of each longwall panel / following damage to fence lines that renders it no longer stock proof.	Ashton Underground Mining Engineer	Fortnightly Status Report
3.3	33kV Transmission Line	Notify Ausgrid on 13 13 88 of any fallen/damaged electrical assets and take measures to prevent potential injury. Notify Rav Ops.	If required as a result of subsidence impacts (i.e. either through inspections or service disruptions).	Ashton Underground Mining Engineer	Notify Ausgrid Notify Rav Ops
3.4	315 mm Diameter Pipeline	Repairs to pipeline as soon as practicable.	If required due to subsidence impacts.	Ashton Underground Mining Engineer	Notify Rav Ops
3.5	Narama Dam	Notify DSC.	If “significant” water inflow occurs	Ashton Underground Mining Engineer	DSC Monthly Report
4.0	**Notification/Consultation**				
4.1	All Features	Forward information to Xstrata regarding progress of the longwall and any relevant subsidence management actions.	Fortnightly, starting at the commencement of LW6B until LW8 is complete.	Ashton Underground Mining Engineer	Fortnightly Status Report.
4.2	All Features	Maintain and distribute a contact register of relevant stakeholders. List to include relevant procedures for contacting ACOL representative in event of access problems or incidents.	Ongoing.	Ashton Environment and Community Relations Manager	Nil
4.3	All Features	Notify Rav Ops if subsidence impacts are identified.	In response to monitoring.	Ashton Underground Mining Engineer	Consultation Records.
4.4	All Features	Rav Ops to be provided with a summary of subsidence monitoring data for each longwall.	On completion of each longwall panel once subsidence has ceased and subsidence data has been collected and processed.	Ashton Underground Mining Engineer	Email

6.1 ROAD MANAGEMENT RESPONSE

The following table[3] has been developed to assist in implementing appropriate levels or response for a range of potential subsidence impacts to the private access roads within the Mining Lease.

Impact	Full Road Width	Half Road Width	Road Edge
Cracking > 100mm wide	HIGH	HIGH	MODERATE
Cracking 20 – 100mm wide	MODERATE	MODERATE	LOW
Cracking < 20mm wide	MODERATE	LOW	LOW
Water ponding	HIGH	MODERATE	LOW
Compression Humps	HIGH	MODERATE	LOW
Other	MODERATE	LOW	LOW

Action to be taken in accordance with the Road Management Plan

HIGH Barricade affected area and notify landowner, affected occupants/road users.
Provide alternative access around hazard until remediation works are complete.
Proceed with remediation works within 24 hours and document all actions.

MODERATE Erect warning signs on both sides of hazard.
Notify landowner, occupants/road users.
Proceed with remediation works immediately and document all actions.

LOW Proceed with remediation works promptly and document all actions.

Private Roads: Method of Remediation

Ashton Coal maintains permanent contractors onsite ("Coalroc") with road repair skills. Should subsidence effects require a rapid response (24hrs) then;

- the Supervisors would be contacted by the Underground Mining Engineer (Bruce Moffett 0400 631 023) or Bob Miller (0438 433 124) and instructions provided as to repairs required,
- Machinery to be used - a Bobcat or a mini-excavator would be utilised, both of which are maintained permanently onsite, alternately operators with a ute and trailer could do hand repairs with road gravel or similar mixes,
- Material – A supply of road gravel or similar will be maintained onsite for incidental repairs, and
- Follow-up work – where impact roads are sealed roads (generally deteriorated) Bitumen seals will be done over repaired sections. An offsite contractor will be used to apply a "2 coat" seal over the affected area.

[3] Previously part of the Roads Management Plan in the LW/MW 5-9 SMP.

This page has been left blank intentionally

6.2 LONGWALL UNDERMINING OF RAVENSWORTH OPERATIONS 33KV POWERLINE INFRASTRUCTURE TARP

	Normal	Level 1	Level 2
Trigger	Longwall face within 50m of a power pole and: • Wind speed is below 10m/s; and • No significant rainfall recorded in previous 48hours. • Poles in a 'pre-undermining state' ie: relatively straight. • Corrective action/ Rollers installed.	Longwall face within 50m of a power pole and: • Wind speed is >10m/s but <20m/s; and • Significant rainfall (nominal >30mm/day) has occurred but not lasted more than 48hours; or • Poles visually tilting but not posing a safety risk; or • Evaluation by an industry specialist (ie Powerserve).	Longwall face within 50m of a power pole and: • Wind speed is >20m/s; and • Significant rainfall (Nominal >30mm/day) has occurred and lasted more than 48hours; or • Poles tilting and potentially posing a safety risk or operational risk to Ravensworth Operations;

Actions	• Continue monitoring surface infrastructure in accordance with the approved SMP*.
	• Continue longwall extraction
	• Monitor daily wind speed predictions and rainfall data to estimate if trigger levels will be exceeded.
	
	(* SMP = Subsidence Management Plan)
		• Continue monitoring surface infrastructure in accordance with the approved SMP.
		• Continue longwall extraction
		• Review potential to STOP/suspend LW mining – ie Geotechnical/ Ventilation/ Safety.
		• Photograph powerlines.
		• Monitor daily wind speed predictions and rainfall data to estimate if trigger levels will be exceeded.
		• Industry specialist to evaluate powerlines and provide any corrective actions if required.
		• Communicate predictions with: ACOL Technical Services Manager, ACOL Manager of Mining Engineering, ACOL Longwall Co-ordinator. and Ravensworth Operations Technical Services Manager.
			• If the Installed corrective actions (as assessed by an industry specialist) are adequate, continue mining as per Level 1 actions and in consultation with Ravensworth Operations.
			• If the installed corrective actions (as assessed by an industry specialist) are **NOT** adequate:
			  ○ STOP longwall extraction in a controlled manner.
			  ○ Communicate windspeed and rainfall predictions with Technical Services Manager, Manager of Mining Engineering, Longwall Co-ordinator.
			  ○ Continue monitoring surface infrastructure in accordance with the approved SMP.
			  ○ Photograph powerlines.
			  ○ Monitor daily wind speed predictions and rainfall data to estimate if trigger levels will be exceeded.
			• Trigger to restart LW Mining – ie Code Yellow is to occur in consultation with Ravensworth Operations.

Responsibilities	**Mining Engineer:** Perform visual monitoring in accordance with approved SMP. Monitor weather conditions whilst undermining power lines daily and communicate results with stakeholders. **Technical Services Manager:** Ensure appropriate monitoring is being undertaken.	**Mining Engineer:** As per normal TARP responsibilities. **Technical Services Manager:** As per normal TARP responsibilities; review potential to shut down longwall should Level 2 triggers be approached with Longwall Co-ordinator and Manager of Mining Engineering. Contact Industry specialist for evaluation of the powerline.	**Mining Engineer:** As per normal TARP responsibilities. **Technical Services Manager:** As per normal TARP responsibilities; communicate directives to ACOL personnel and management for longwall shutdown/ restart requirements. **Longwall co-ordinator:** Systematically shut down/ restart longwall following notification from the Technical Services Manager.

This page has been left blank intentionally

Legend

- Ashton Mining Leases
- 33kv Power line
- Narama Dam
- Dam Notification Area
- First Workings
- Second Workings
- 315mm PN10 PE100 Pipeline
- Proposed 330kV Powerlines
- Private Roads
- Lemington Road

Subsidence Contours

- 20mm (interpolated)
- 20mm
- 0.5m
- 1.0m
- 1.5m

0 100 200 300 400 500m

AECOM

SITE ACCESS ROAD
CREEK
BOW MANS
NEW ENGLAND HIGHWAY
LW8
LW7B Short
LW6B
PIPE
BRUNKERS LANE
BOWMANS CREEK
NARAMA DAM
LW7A
LW6A
LW5
LW4
LW3
LW2
LW1
NOTIFICATION AREA FOR RAVENSWORTH MINE INPIT STORAGE DAM (PRESCRIBED DAM UNDER DAMS SAFETY ACT 1978)
HUNTER RIVER

AshtonCoal

Ravensworth Operations Asset Management Plan
PG LW6B, 7B Short & 8

Figure 2

This page has been left blank intentionally

ASHTON COAL PROJECT

ASSET MANAGEMENT PLAN
XSTRATA – RAVENSWORTH UNDERGROUND MINE
PG LW6B, 7B (SHORT) & 8

Version D – February 2012

Ashton Coal Operations Pty Limited

Glennies Creek Road
Camberwell NSW 2330
Tel: 02 6576 1111
Fax: 02 6576 1122

Table of Contents

Version History

Version	Status	Details	Author(s)	Authorised/Approved for Issue	
				Name/Position	Date
A	Draft	For Consultation	P Fletcher, AECOM	P Fletcher	27/05/2011
B	Draft	For Consultation	P. Fletcher & AECOM	P. Fletcher	11/08/2011
C	Final	For Distribution	P. Fletcher & AECOM	P. Fletcher	11/08/2011
D	Final	For Distribution	P. Fletcher & AECOM	P. Fletcher	16/02/2012

External Consultation

Org.	Nominated Rep.	Version	Date Issued	Comments
Ravensworth Underground Mine (Xstrata)	Technical Services Manager	A	05/06/2011	
Ravensworth Underground Mine (Xstrata)	Technical Services Manager	B	17/08/2011	

1 INTRODUCTION

This Asset Management Plan (AMP) has been prepared to identify and manage predicted subsidence impacts on Xstrata – Ravensworth Underground assets associated with the Ashton Coal Project (ACP). The scope of this management plan is second workings associated with LW 6B, 7B (short) & 8 in the Pikes Gully (PG) Seam.

The Ashton Coal Environmental Management Strategy (see **Figure 1** of the Built Features Management Plan) provides the strategic context for the environmental management of the ACP. Extraction Plans form part of the Environmental Management Strategy and are required by the ACP development consent. Each Extraction Plan provides a framework for the management of subsidence impacts associated with Ashton Coal Operation Limited's (ACOL) underground mining activities. Extraction Plans detail the proposed workings, including dimensions, overburden depth and mining schedule. Impacts to man-made features are addressed through the Built Features Management Plan, under which individual Asset Management Plans detail the consultation, monitoring and management of infrastructure for each asset-owner.

This Asset Management Plan outlines ACOL's statutory requirements relating to monitoring and management of subsidence impacts on Xstrata – Ravensworth Underground assets within the mining lease (ML1533), as well as consultation, monitoring and reporting requirements. Relevant built features have been identified in consultation with Xstrata – Ravensworth Underground, and are detailed in **Section 3**.

ACOL's LW8 lies closest to the RUM workings which at their closest point are approximately 40 metres apart. No mining subsidence impacts to RUM's existing underground workings are predicted under the scope of this management plan. However, it is noted that the subsidence predictions summarised in this report are not the final subsidence values for the site (ACOL is an approved multi-seam operation). Therefore, this management plan provides for ongoing communications between ACOL and RUM regarding subsidence and provides a framework for the future assessment of potential subsidence impacts to RUM assets.

2 LEGAL REQUIREMENTS AND GUIDELINES

This document has been prepared in accordance with development consent (DA 309-11-2001-i), relevant legislation and guidelines, and in consultation with relevant government agencies and affected infrastructure owners as discussed below.

2.1 DEVELOPMENT CONSENT

Condition 3.12(g) to DA 309-11-2001-i requires that ACOL prepare a BFMP to the satisfaction of the Department of Trade and Investment, Regional Infrastructure and Services (DTIRIS) (formerly the Department of Industry & Investment) "*which has been prepared in consultation with the owner/s of potentially affected feature/s, to manage the potential subsidence impacts and/or environmental consequences of the proposed second workings.*"

Condition 3.10 of the development consent establishes subsidence impact performance measures relating to built features and public infrastructure. Under the development consent, ACOL must ensure that underground mining does not cause any exceedances of these performance measures to the satisfaction of the Director-General. The development consent

performance measures, as well as more detailed performance measures developed by ACOL for RUM assets are provided in **Section 4**.

Additionally under Schedule C, Item 3 of the development consent ACOL's commitments include:

- *Existing surface infrastructure will be maintained to be safe, serviceable and repairable manner unless the owner agrees otherwise in writing*;
- *Damage to existing third party-owned infrastructure due to the ACOL induced subsidence will be mitigated or remediated*
- *Subsidence will be monitored and managed in accordance with approved Extraction Plans (or equivalent), the development of which will be informed by…*
    - *Consultation with the owner(s)/operator(s) of the Ravensworth Underground Mine on a seam by seam basis.*
- *Subsidence and groundwater experts will be used to assess the western longwall (LW8) to ensure concurrent operation of the RUM and ACOL underground mines can be undertaken safely.*

2.2 CONSULTATION REQUIREMENTS

Should significant amendments to this document be required prior to implementation, the amendments will be made in consultation with RUM, and to the satisfaction of DTIRIS (Minerals and Energy). Contact details of the relevant stakeholders are listed in **Table 2**.

Table 1 Relevant Stakeholders and Representatives

Organisation	Contact	Phone	Address
Ravensworth Underground Mine (Xstrata)	Technical Services Manager	(02) 6576 1500	PO Box 294 Muswellbrook NSW 2333
Mine Subsidence Board (MSB)	District Manager	(02) 6572 4344	PO Box 524 Singleton NSW 2330
DTIRIS, Minerals and Energy	Principal Subsidence Engineer	(02) 4931 6644	PO Box 344 Hunter Region Mail Centre NSW 2310

3 SCOPE

This management plan addresses potential subsidence impacts to RUM assets potentially affected by underground mining (secondary extraction) of LW 6B, 7B (short) and 8 in the Pikes Gully (PG) seam only. The subsidence predictions, affected assets and likely subsidence impacts are summarised below.

3.1 PREDICTED SUBSIDENCE

Subsidence resulting from extraction of LW 6B, 7B (short) and 8 in the PG Seam is variable based on the width of the panel, overburden depth and chain pillar barrier widths. Maximum predicted subsidence values (worst case scenarios) for extraction of these panels, as presented in **Table 2** have been adopted for the purposes of this management plan.

Table 2 Maximum Subsidence Predictions (PG Seam only)

Panel	Maximum Subsidence (m)	Maximum Tilt (mm/m)	Maximum Strain (mm/m)
LW6B	1.6	70	30
LW7B	1.6	70	30
LW8	0.7	40	20

Source: SCT Operations (2011) Subsidence Assessment for Ashton Coal Mine Longwalls 6B to 8 in the Pikes Gully Seam based on the Bowman's Creek Diversion Mine Plan

Future extraction of lower coal seams is not currently covered in this management plan, and the values shown in **Table 2** are not the final subsidence values for the site.

3.2 DESCRIPTION OF ASSETS & SUBSIDENCE IMPACTS[1]

3.2.1 Underground Mine

Xstrata have an approved and operating underground coal mine immediately to the west of ACOL's underground workings and mining is currently being carried out in the Pikes Gully seam. ACOL's LW8 lies closest to the RUM workings which at their closest point are approximately 40 metres apart. RUM also plan to construct Shaft No. 5 above their mains headings, adjacent to ACOL's LW8. The location of each of these assets is shown in **Figure 2**.

No subsidence impacts to RUM existing underground workings are predicted as a result of ACOL's operations associated with LW6B, 7B (short) or 8 in the Pikes Gully Seam.

3.2.2 Private Access Road

Two private access roads, Brunkers Lane and "Site Access Road", are on Property No. 155 (owned by MacGen) and will be impacted during extraction of LW 6B, 7B (short) and 8. MacGen maintains Brunkers Lane as a sealed private roadway and recently upgraded the road and New England Highway intersection.

Xstrata - Ravensworth Underground Mine make use of Brunkers Lane to access the surface area above their underground mine. The site access road is also used by ACOL to access the void for tailings emplacement. ACOL has a general maintenance responsibility for the access road. Future use of this road may include heavy construction traffic during the construction phase of the Void 5 Ash Dam[2] and Xstrata – Ravensworth Underground infrastructure (i.e. Shaft No. 5).

Impacts: The site access road is unlikely to remain serviceable during the period of active mining in the second and subsequent seams as it is located over LW 7B where the overburden depth would be approximately 145 m.

The sealed section of Brunkers Lane as a private road is likely to require significant remedial work to maintain in a serviceable condition during the mining of LW 6B, 7B (short) and 8. Filling, regrading and resealing of the road surface is likely to be required at the completion of LWs 6B, 7B (short) and 8. Remedial work to Brunkers Lane will be undertaken in accordance with the Road Management Response Table provided in **Section 5.1**.

[1] Potential subsidence impacts identified by SCT (2011). Report titled: 'Subsidence Assessment for Longwalls 6B to 8 in the Pikes Gully Seam based on the Bowmans Creek Diversion Mine Plan.'
[2] DSC Name: Ravensworth Void 5 Dam (also known as Void 5 Ash Dam)

4 PERFORMANCE MEASURES

ACOL will aim to ensure that all existing built features owned by Xstrata (RUM) affected by subsidence are always maintained as safe and serviceable where subsidence related impacts are realised. Unless other arrangements are in place, ACOL commits to fully compensate Xstrata (RUM) as the asset owner if serviceability is not maintained as a result of subsidence impacts. Any subsidence damage from ACOL's mining activities will be repaired as necessary, or else replaced or fully compensated or be dealt with under the terms of an access or compensation agreement.

The subsidence impact performance measures relevant to RUM assets under Consent Condition 3.10 are summarised in **Table 3** while more specific objectives and performance measures, developed by ACOL, are listed in **Table 4** below.

Table 3 Subsidence Impact Performance Measures

Built Features	Performance Measure
Other built features, including other public infrastructure.	• Always safe. • Serviceability should be maintained wherever practicable. Loss of serviceability must be fully compensated. • Damage must be fully repaired or replaced, or else fully compensated.
Public Safety	No Additional Risk.

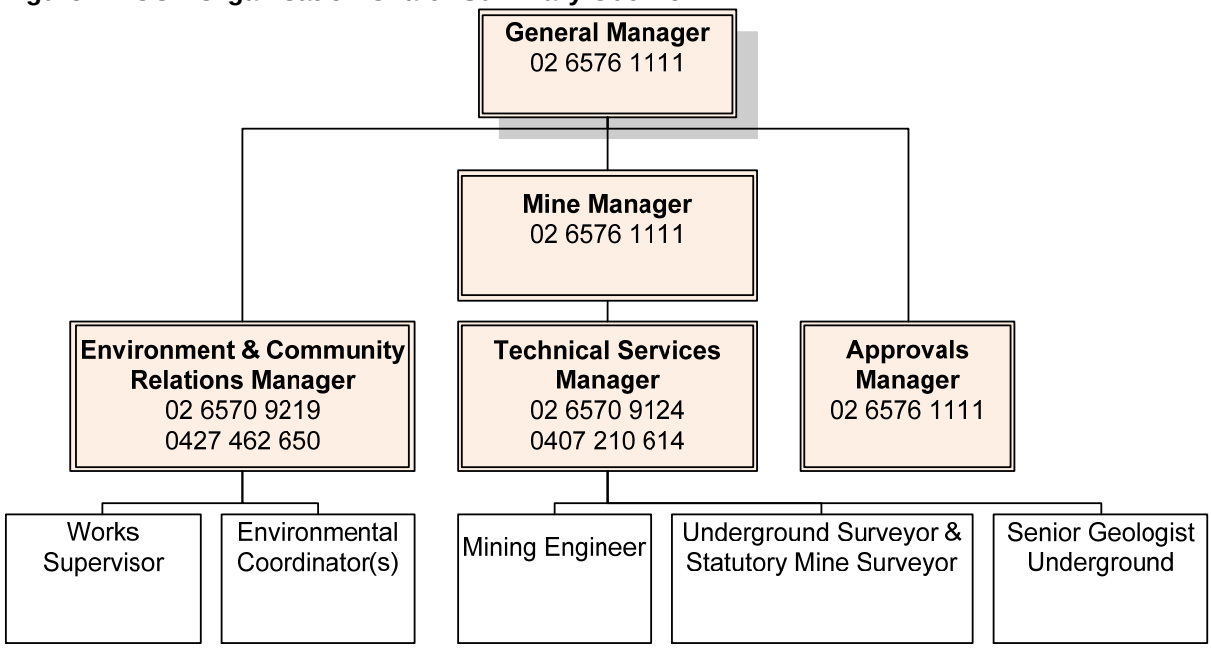
Table 4 Xstrata (RUM) Asset Management Objectives

Objective	Performance Measure
• To provide relevant information to RUM regarding ACOLs activities and provide appropriate communication channels between the two organisations with respect to management of mining subsidence impacts.	• Maintain communications between RUM and ACOL during mining operations, including consultation.
• To ensure the safety of RUM's operations is not affected by subsidence resulting from ACOL's activities.	• All statutory planning and mine safety approvals are in place with respect to ACOLs underground mining operations.

5 MANAGEMENT PLAN RESPONSIBILITIES

A summarised ACOL organisation chart, as relevant to this AMP is provided in **Figure 1**. The full organisation structure for the underground mine is contained within the Extraction Plan main document.

Figure 1 ACOL Organisation Chart - Summary Outline



This page has been left blank intentionally

6 SUBSIDENCE MANAGEMENT

The actions that ACOL undertakes to fulfil the consent conditions outlined in **Section 2** and to meet performance measures outlined in **Section 4** are shown in **Table 5**. These actions have been categorised into Monitoring, Management, Incident Response and Notification/Consultation.

Table 5 Monitoring, Management and Responsibilities

Item	Feature	Action	Trigger/Timing	Responsibility	Reporting
1.0	**Monitoring**				
1.1	Private Roads	Visual inspection of roads to identify any subsidence impacts that could affect the safety of vehicles.	Daily during active subsidence.	Ashton Underground Mining Engineer	Fortnightly Status Report
2.0	**Management**				
2.1	LW8 – RUM Workings	Complete a groundwater and subsidence assessment to confirm that the concurrent operation of RUM workings and ACOL underground mines can be undertaken safely. (Completed prior to development consent MOD 4 - March 2010.)	Prior to commencement of LW8 secondary extraction	Ashton Underground Mining Engineer	Copy provided to RUM
2.2	Private Roads	Erection of temporary hazard warning signs 250 metres before and 350 metres after the location of the longwall face, including recommended speed limit.	Prior to longwall face progressing within 250m of access road and relocated weekly.	Ashton Underground Mining Engineer	Nil
3.0	**Incident Response**				
3.1	Private Roads	Repair road in accordance with the Road Management Response Table (see **Section 5.1**) during subsidence, or provide temporary diversions to maintain access.	As required following daily inspection.	Ashton Underground Mining Engineer	Fortnightly Status Report
4.0	**Notification/Consultation**				
4.1	LW8 – RUM Workings	Notification as the longwall face approaches RUM to ensure that for asset management and monitoring purposes, Xstrata are aware of ACOL longwall position.	Prior to commencement of LW8.	ACOL Underground Mining Engineer	Fortnightly Status Report

Item	Feature	Action	Trigger/Timing	Responsibility	Reporting
4.2	LW8 – RUM Workings	Consult with RUM on a seam by seam basis regarding proposed workings regarding subsidence interactions and management. (Completed for Pikes Gully Seam.)	For each seam mined.	Ashton Underground Mining Engineer	Nil

6.1 ROAD MANAGEMENT RESPONSE

The following table[3] has been developed to assist in implementing appropriate levels or response for a range of potential subsidence impacts to the private access roads within the Mining Lease.

Impact	Full Road Width	Half Road Width	Road Edge
Cracking > 100mm wide	HIGH	HIGH	MODERATE
Cracking 20 – 100mm wide	MODERATE	MODERATE	LOW
Cracking < 20mm wide	MODERATE	LOW	LOW
Water ponding	HIGH	MODERATE	LOW
Compression Humps	HIGH	MODERATE	LOW
Other	MODERATE	LOW	LOW

Action to be taken in accordance with the Road Management Plan

HIGH Barricade affected area and notify landowner, affected occupants/road users.
Provide alternative access around hazard until remediation works are complete.
Proceed with remediation works within 24 hours and document all actions.

MODERATE Erect warning signs on both sides of hazard.
Notify landowner, occupants/road users.
Proceed with remediation works immediately and document all actions.

LOW Proceed with remediation works promptly and document all actions.

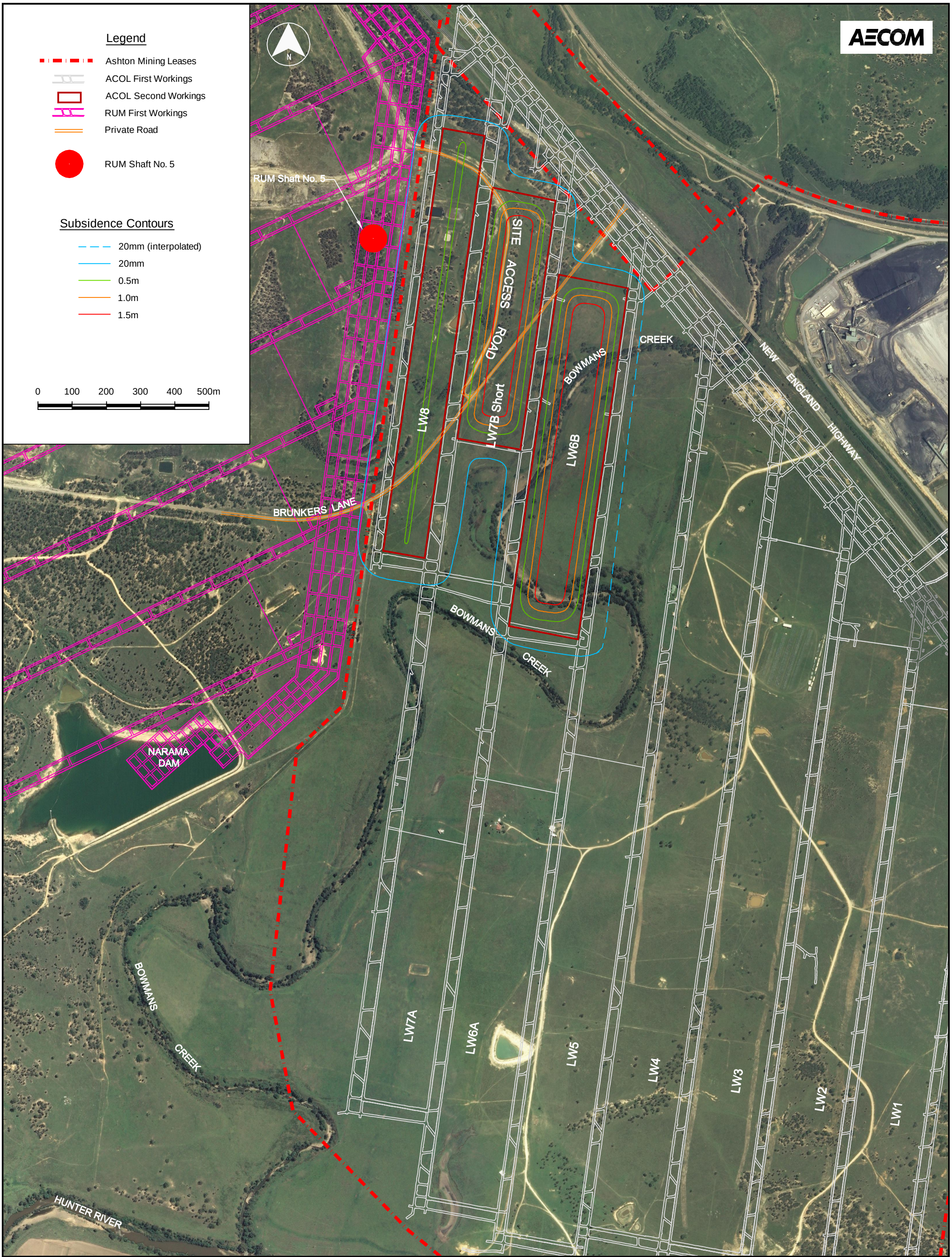
Private Roads: Method of Remediation

Ashton Coal maintains permanent contractors onsite ("Coalroc") with road repair skills. Should subsidence effects require a rapid response (24hrs) then;

- the Supervisors would be contacted by the Underground Mining Engineer (Bruce Moffett 0400 631 023) or Bob Miller (0438 433 124) and instructions provided as to repairs required,
- Machinery to be used - a Bobcat or a mini-excavator would be utilised, both of which are maintained permanently onsite, alternately operators with a ute and trailer could do hand repairs with road gravel or similar mixes,
- Material – A supply of road gravel or similar will be maintained onsite for incidental repairs, and
- Follow-up work – where impact roads are sealed roads (generally deteriorated) Bitumen seals will be done over repaired sections. An offsite contractor will be used to apply a "2 coat" seal over the affected area.

[3] Previously part of the Roads Management Plan in the LW/MW 5-9 SMP.

This page has been left blank intentionally



AshtonCoal

Ravensworth Underground Mine Asset Management Plan

PG LW6B, 7B Short & 8

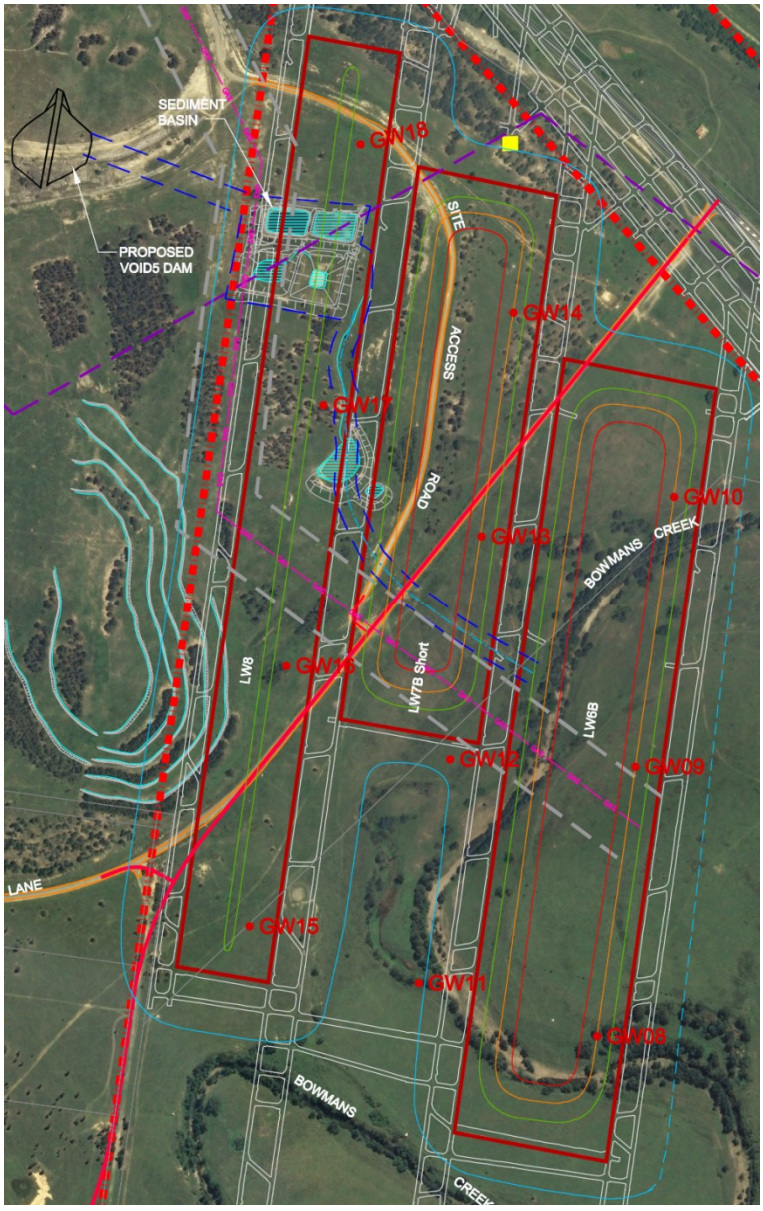
Figure 2

This page has been left blank intentionally

ASHTON COAL PROJECT

ASSET MANAGEMENT PLAN
MACQUARIE GENERATION
PG LW6B, 7B (SHORT) & 8

Version D – February 2012



Ashton Coal Operations Pty Limited

Glennies Creek Road
Camberwell NSW 2330
Tel: 02 6576 1111
Fax: 02 6576 1122

Table of Contents

Version History

Version	Status	Details	Author(s)	Authorised/Approved for Issue	
				Name/Position	Date
A	Draft	For consultation	P Fletcher, AECOM	P Fletcher	14/6/2011
B	Draft	For consultation	P Fletcher, AECOM	P. Fletcher	12/08/2011
C	Final	For distribution	P. Fletcher & AECOM	P. Fletcher	29/08/2011
D	Final	For distribution	P. Fletcher & AECOM	P. Fletcher	17/02/2012

External Consultation

Org.	Nominated Rep.	Version	Date Issued	Comments
Macquarie Generation	Operations Manager	A	15/06/2011	
Macquarie Generation	Operations Manager	B	17/08/2011	

1 INTRODUCTION

This Asset Management Plan (AMP) has been prepared to identify and manage predicted subsidence impacts on Macquarie Generation (MacGen) assets associated with the Ashton Coal Project (ACP). The scope of this management plan is second workings associated with LW 6B, 7B (short) & 8 in the Pikes Gully (PG) Seam.

The Ashton Coal Environmental Management Strategy (see **Figure 1** of the Built Features Management Plan) provides the strategic context for the environmental management of the ACP. Extraction Plans form part of the Environmental Management Strategy and are required by the ACP development consent. Each Extraction Plan provides a framework for the management of subsidence impacts associated with Ashton Coal Operation Limited's (ACOL) underground mining activities. Extraction Plans detail the proposed workings, including dimensions, overburden depth and mining schedule. Impacts to man-made features are addressed through the Built Features Management Plan, under which individual Asset Management Plans detail the consultation, monitoring and management of infrastructure for each asset-owner.

This Asset Management Plan outlines ACOL's statutory requirements relating to monitoring and management of subsidence impacts on MacGen assets within mining lease (ML) 1533, as well as consultation, monitoring and reporting requirements. Relevant built features have been identified in consultation with MacGen, and are detailed in **Section 3**. Whilst MacGen assets are not expected to be significantly impacted by subsidence, measures to address potential disruption to MacGen assets are detailed within **Section 5**. Subsidence related impacts to MacGen assets will be managed in consultation with MacGen and such measures may include:

- Partial or complete draining of sedimentation basins and rehabilitation dams immediately prior to undermining and post-subsidence repair;
- Repair and maintenance of MacGen owned roads during and post subsidence;
- Repair of fences and gates post subsidence; and
- ACOL will continue to consult with MacGen over possible interactions of subsidence affects on proposed future MacGen assets such as the Void 5[1] Ash Dam and associated clean water drainage, plus proposed MacGen surface gas pipeline to Liddell Powerstation[2].

It is anticipated that these measures will ensure that MacGen assets are not disrupted as a result of subsidence related impacts.

2 LEGAL REQUIREMENTS

This document has been prepared in accordance with development consent (DA 309-11-2001-i), relevant legislation and guidelines, and in consultation with relevant government agencies and affected infrastructure owners as discussed below.

ACOL and MacGen have an access agreement in place[3], most recently updated in May 2011. ACOL and MacGen are in discussion with regard to a compensation agreement.

2.1 DEVELOPMENT CONSENT

[1] DSC Name: Ravensworth Void 5 Dam (also known as Void 5 Ash Dam)
[2] As approved 20/07/2009 under delegation by the Department of Planning and Infrastructure (DoPI)
[3] Document titled 'Deed of Variation relating to Agreement for Disposal of Tailings'

Condition 3.12(g) to DA 309-11-2001-i requires that ACOL prepare a BFMP to the satisfaction of the Department of Trade and Investment, Regional Infrastructure and Services (DTIRIS) (formerly the Department of Industry & Investment), *"which has been prepared in consultation with the owner/s of potentially affected feature/s, to manage the potential subsidence impacts and/or environmental consequences of the proposed second workings."*

Condition 3.10 of the development consent establishes subsidence impact performance measures relating to built features and public infrastructure. Under the development consent, ACOL must ensure that underground mining does not cause any exceedances of these performance measures to the satisfaction of the Director-General (Planning). The development consent performance measures, as well as more detailed performance measures developed by ACOL for MacGen assets are provided in **Section 4**.

Condition 4.3 of the development consent requires ACOL to provide compensatory water supply to MacGen if the water entitlements are impacted as a result of the development. This compensatory water supply must be a long-term solution that is equivalent to the loss attributed to the development and be supplied within 24 hours of the loss being identified.

Additionally under Schedule C, Item 3 of the development consent ACOL's commitments include *"Existing surface infrastructure will be maintained to be safe, serviceable and repairable manner unless the owner agrees otherwise in writing"* and "*Damage to existing third party-owned infrastructure due to the ACOL induced subsidence will be mitigated or remediated."*

2.2 CONSULTATION REQUIREMENTS

Should significant amendments to this document be required prior to implementation, the amendments will be made in consultation with MacGen and to the satisfaction of DTIRIS (Minerals & Energy). Contact details of the relevant stakeholders are listed in **Table 1**.

Table 1 Relevant Stakeholders and Representatives

Organisation	Representative	Phone	Address
Macquarie Generation	Operations Manager	(02) 6542 0711	Private Mail Bag 2 Muswellbrook NSW 2333
Mine Subsidence Board (MSB)	District Manager	(02) 6572 4344	PO Box 524 Singleton NSW 2330
Department of Trade and Investment, Regional Infrastructure and Services (DTIRIS), Minerals and Energy	Principal Subsidence Engineer	(02) 4931 6644	PO Box 344 Hunter Regional Mail Centre, NSW 2310

3 SCOPE

This management plan addresses potential subsidence impacts to MacGen assets potentially affected by underground mining (secondary extraction) of LW 6B, 7B (short) and 8 in the Pikes Gully (PG) seam only. The subsidence predictions, affected assets and likely subsidence impacts are summarised below.

3.1 PREDICTED SUBSIDENCE

Subsidence resulting from extraction of LW 6B, 7B (short) and 8 in the PG Seam is variable based on the width of the panel, overburden depth and chain pillar barrier widths. Maximum

predicted subsidence values (worst case scenarios) for extraction of these panels are presented in **Table 2**.

Table 2 Maximum Subsidence Predictions (PG Seam only)

Panel	Maximum Subsidence (m)	Maximum Tilt (mm/m)	Maximum Strain (mm/m)
LW6B	1.6	70	30
LW7B	1.6	70	30
LW8	0.7	40	20

Source: SCT Operations (2011) Subsidence Assessment for Ashton Coal Mine Longwalls 6B to 8 in the Pikes Gully Seam based on the Bowman's Creek Diversion Mine Plan, prepared for Ashton Coal Mine,

Future extraction of lower coal seams is not currently covered in this management plan and the values shown in **Table 2** are not the final subsidence values for the site.

3.2 DESCRIPTION OF ASSETS & SUBSIDENCE IMPACTS [4]

MacGen owns a section of land in the north western corner of the ACP (Lot 2 DP 1089848), referred to by ACOL as "Property No. 155" (MacGen land). Part of this MacGen owned land is a rehabilitated section of the former Ravensworth open cut void. MacGen owns a number of built features in relation to this property that have the potential to be impacted by subsidence from underground mining at the ACP (refer to **Figure 2**) including:

- Private Roads;
- Surface water storages;
- Fences;
- Farm Buildings (dilapidated sheds);
- Proposed public roads (by Xstrata – Ravensworth Operations);
- Proposed Ravensworth Void 5 Ash Dam and associated clean water drainage;
- Proposed surface gas pipeline to Liddell Powerstation; and
- Proposed Goaf Gas Drainage Boreholes (by ACOL – interaction only).

The MacGen land also contains built features that are owned by ACOL. These include a tailings pipeline and decant return pipeline which currently deliver tailings from ACOL's surface operations to Void 4 Ash Dam. Additionally ACOL have proposed a number of goaf gas drainage boreholes to be situated on MacGen land and are consulting with MacGen on proposed locations.

Other assets situated on MacGen land include an Xstrata - Ravensworth Operations owned PN10 PE100 315 mm diameter pipeline which connects the Narama Dam to Mt Owen Mine. Impacts to Xstrata – Ravensworth Operations assets are discussed in the respective Asset Management Plan.

3.2.1 Private Roads

Two private access roads, Brunkers Lane and "Site Access Road", are on Property No. 155 and will be impacted during extraction of LW 6B, 7B (short) and 8. MacGen maintains Brunkers Lane as a sealed private roadway and recently upgraded the road and New England Highway intersection.

Xstrata - Ravensworth Operations make use of Brunkers Lane as a rear access to their site. The site access road is also used by ACOL to access the void for tailings emplacement. ACOL has a general maintenance responsibility for the access road. Future use of this road

[4] Potential subsidence impacts identified by SCT (2011). Report titled: 'Subsidence Assessment for Longwalls 6B to 8 in the Pikes Gully Seam based on the Bowmans Creek Diversion Mine Plan.'

may include heavy construction traffic during the construction phase of the Void 5 Ash Dam and Xstrata – Ravensworth Underground infrastructure.

Impacts: The site access road is unlikely to remain serviceable during the period of active mining.

The sealed section of Brunkers Lane as a private road is likely to require significant remedial work to maintain in a serviceable condition during the mining of LW 6B, 7B (short) and 8. Filling, regrading and resealing of the road surface is likely to be required at the completion of LWs 6B, 7B (short) and 8. Remedial work to Brunkers Lane will be undertaken in accordance with the Road Management Response Table provided in **Section 5.1**.

3.2.2 Fences

Fences and associated gates traverse Property No. 155 to divide the landholdings into paddocks, as boundary fencing and along roadsides, including the New England Highway. The fences are constructed using a combination of iron and wooden posts with multiple wire strands.

Impacts: Ground tilt and subsidence is likely to cause posts to tilt in opposite directions or towards each other, causing tension and possible breakage, or sag of wires, respectively. Damage to fences and gates may allow stock to escape (if present).

3.2.3 Buildings

A small dilapidated farm shed is situated on Property No. 155 adjacent to LW 6B. Consultation with MacGen indicates there are no plans to maintain this shed. Assessment of this structure by Umwelt[5] for the Ravensworth North Project indicated that this building is not a listed heritage item and is of low to nil local heritage significance.

Impacts: The current structural stability of this building is poor, and some minor subsidence impacts are expected as a result of subsidence movements.

3.2.4 Surface Water Storages

There are four clay-lined sedimentation basins and two downstream rehabilitation dams located on Property No. 155 over LW 8 at overburden depths of approximately 150m. The proposed run-off line for these water storages is Bowmans Creek.

Impacts: Subsidence movements are expected to cause temporary and permanent tensile cracking in the clay lined sedimentation ponds and downstream dams with differential settlement across the two western ponds and the downstream dams. Remedial work will be required to restore the dam volumes and overflow levels to their pre-mining condition. Resealing of cracks is also likely to be necessary to ensure the integrity of the dams.

3.2.5 Proposed Public Roads (Non MacGen Asset)

Ravensworth Operations is preparing to construct the relocation of Lemington Road from its current location to be approximately in line with the current alignment of Brunkers Lane. Once diverted and construction is complete, the new Lemington Road will be dedicated as a public road managed by Singleton Council. Xstrata, MacGen and Council have a tripartite agreement regarding the road's construction.

Ashton is responsible for implementing controls to ensure road traffic safety, including the monitoring, maintenance and repairs of actual subsidence during progression of the longwall

[5] Umwelt (January 2010) *Ravensworth Operations Project, Historical Heritage Assessment*

under the section of road, and Ravensworth Operations will be responsible for 100% of costs associated with these controls[6].

While the interim location of the public road is in line with the current location of Brunkers Lane, the decision about the final status and location of Lemington Road will be included in a report on the final alignment of Lemington Road which will be finalised before 31 March 2012 according to ACOL Consent Condition 7.14 (refer to **Section 2**) and corresponding Xstrata – Ravensworth Operations Project Consent Conditions[7].

Impacts to the future Lemington Road are similar to those described for Brunkers Lane above. Therefore, if the road becomes a public road prior to mining in that area, temporary diversions and/or continuous supervision of the site is likely to be necessary during the period of active mining. Repair and maintenance of the road surface is likely to be required at the completion of LWs 6B, 7B (short) and 8.

3.2.6 Proposed Void 5 Ash Dam

The Void 5 Ash Dam is planned by MacGen and will be situated west of the northern end of the extraction area on MacGen land. This dam is outside the ACOL Mining Lease (ML1533) and associated underground mining subsidence area however, the Void 5 Ash Dam is prescribed under the *Dam Safety Act 1978* and the Notification Area overlaps the LW6B, 7B short &8 extraction area. (The dam will be undermined by the Ravensworth Underground Mine.)

Impacts: Once constructed, the toe of the proposed Void 5 Ash Dam will be approximately 260m from the goaf edge of LW 8. The dam has been designed to accommodate the potential for low level subsidence movements and there is not expected to be any subsidence related impact on the dam[8].

3.2.7 Proposed Gas Pipeline Easement

MacGen has approval to construct a pipeline across its land on ML 1533 for the collection and transportation of coal seam gas from surrounding mines to the Liddell power station. To accommodate the proposal an easement is proposed which would allow for construction and maintenance of this asset.

Impacts: MacGen has indicated that it has no immediate plans to construct this pipeline. Therefore it will not be impacted by subsidence from mining of LW6B, 7B (short) & 8 in the PG Seam. The easement will remain in place.

3.2.8 Proposed Goaf Gas Drainage Boreholes (Non MacGen Assets)

Ashton is in consultation with MacGen, to construct approved goaf gas drainage boreholes within the extraction area. These boreholes will, if constructed, be situated on MacGen owned land and located generally as shown on **Figure 2**.

Impacts: Proposed ACOL goaf gas drainage boreholes will be designed to accommodate subsidence impacts and will not be significantly affected by mining of LW6B, 7B (short) & 8 in the PG Seam. Impacts to MacGen land associated with the boreholes includes ground disturbance of approximately 0.05ha at each borehole location associated with the:

[6] See ACOL Consent Condition 7.15
[7] See 09_0176
[8] SCT (February 2011) *Subsidence Impacts on Narama Dam and Ravensworth Void 5 Dam: updated with mine layout to accommodate Bowmans Creek Diversion*

- Establishment of a 20m x 15m (approx.) level pad surfaced with road base material at each well location;
- Drilling a 300mm diameter borehole and installing associated equipment;
- Erecting a 1.8m high perimeter security fence and lockable gate around the pad and well head; and
- Temporarily installing pump apparatus, associated piping and support infrastructure on the secured pad area at the active well head (this equipment will be relocated to each successive well head in line with the advancing longwall face.)

4 PERFORMANCE MEASURES

ACOL will aim to ensure that all built features owned by MacGen affected by subsidence are always maintained as safe and serviceable where subsidence related impacts are realised. Unless other arrangements are in place, ACOL commits to fully compensate MacGen as the asset owner if serviceability is not maintained as a result of subsidence impacts. Any subsidence damage from ACOL's mining activities will be repaired as necessary, or else replaced, fully compensated or dealt with under the terms of an access or compensation agreement.

The subsidence impact performance measures relevant to MacGen assets under consent condition 3.10 are summarised in **Table 3** while more specific objectives and performance measures, developed by ACOL, are listed in **Table 4** below.

Table 3 Subsidence Impact Performance Measures

Built Features	Performance Measure
Other built features, including other public infrastructure.	• Always safe. • Serviceability should be maintained wherever practicable. Loss of serviceability must be fully compensated. • Damage must be fully repaired or replaced, or else fully compensated.
Public Safety	No additional risk.

Table 4 MacGen Asset Management Objectives

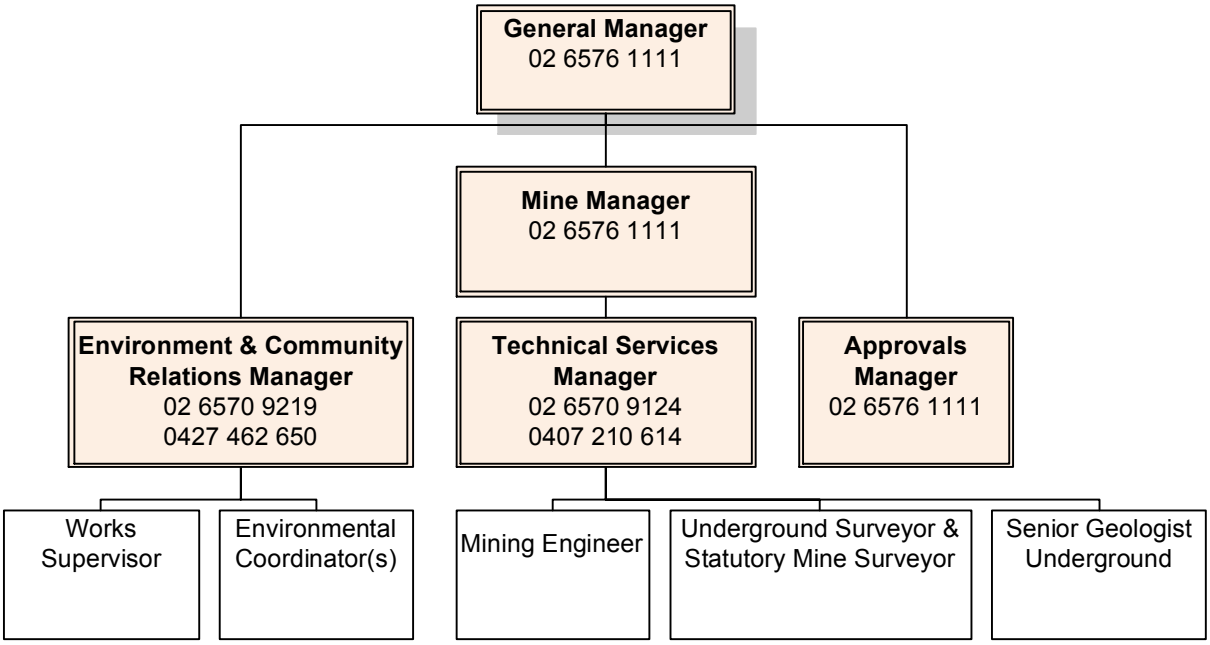
Objective	Performance Measure
Private Roads	
• To ensure access to MacGen land (Property No. 155) is not disrupted as a result of subsidence.	• Roads are monitored during mining and any temporary works required are provided to maintain access. • Subsidence Impacts to existing roads are identified and remedial works undertaken within a timeframe acceptable to MacGen.
Proposed Public Roads	
• To collaborate with Xstrata – Ravensworth on the appropriate location and (subsidence impact) management of Lemington Road.	• Study required under Consent Condition 7.14 is completed within the required statutory timeframe.

Objective	Performance Measure
Surface Water Storages	
• To avoid dam water flow into underground workings. • To prevent dam wall failures and avoid safety hazards. • To ensure that after mining, dams are similar in function, condition and storage capacity to that which existed prior to mining. • Maintain existing drains	• Dams above underground workings are assessed prior to mining. • Dams are monitored for damage and repairs • Sedimentation basins are remediated following subsidence movements. • No off-site sediment release • Flow maintained in drains
Proposed Void 5 Ash Dam	
• To comply with requirements of the *Dam Safety Act*.	• Continue to consult with MacGen and DSC regarding the progress/status of the Void 5 Ash Dam. • Any statutory requirements and approvals are obtained when required.

5 MANAGEMENT PLAN RESPONSIBILITIES

A summarised ACOL organisation chart, as relevant to this AMP is provided in **Figure 1**. The full organisation structure for the underground mine is contained within the Extraction Plan main document.

Figure 1 ACOL Organisation Chart - Summary Outline



6 SUBSIDENCE MANAGEMENT

The actions that ACOL undertakes to fulfil the consent conditions outlined in **Section 2** and to meet performance measures outlined in **Section 4** are shown in **Table 5**. These suggested actions have been categorised into Monitoring, Management, Incident Response and Notification/Consultation.

Table 5 Monitoring, Management and Responsibilities

Item	Feature	Action	Trigger/Timing	Responsibility	Reporting
1.0	Monitoring				
1.1	Private Roads	Pre-mining condition assessment to document pre-subsidence condition of the road, including photographic records of any observed existing pavement fatigue or failure or similar existing damage.	Prior to subsidence impacts.	Ashton Underground Mining Engineer	Provide copy to MacGen.
1.2	Private Roads	Visual inspection of roads to identify any subsidence impacts that could affect the safety of vehicles.	Daily during active subsidence.	Ashton Underground Mining Engineer	Fortnightly Status Report
1.3	Private Roads	Post mining condition assessment of road infrastructure to confirm that any perceptible subsidence impacts have ceased and document the post-subsidence status of the road.	Once active subsidence has ceased.	Ashton Underground Mining Engineer	Fortnightly Status Report
1.4	Fences	Visual inspection / monitoring of gates and fences on MacGen property and ACOL boundary fences.	▪ Prior to commencement of mining; ▪ Weekly visual inspections during active subsidence; and ▪ At completion of each longwall panel.	Ashton Underground Mining Engineer	Fortnightly Status Report
1.5	Surface Water Dams (exc. Void 5)	Assessment of the risk of farm dams and sedimentation basins draining into underground workings or the dam wall being compromised.	Prior to longwall extraction.	Ashton Underground Mining Engineer	Fortnightly Status Report
1.6	Surface Water Dams (exc. Void 5)	Monitoring of dams and sedimentation basins to include a survey of each dam regarding shape, wall height, level of spillway depth, storage capacity and photographic record.	Prior to each longwall extraction.	Ashton Underground Mining Engineer / Surveyor	End of Panel Report

Item	Feature	Action	Trigger/Timing	Responsibility	Reporting
1.7	Surface Water Dams (exc. Void 5)	Monitoring of dams within the Application Area to detect any subsidence impacts that may require management. Monitor water level using markers.	Weekly inspection during active subsidence to dams.	Ashton Underground Mining Engineer / Survey Team	Fortnightly Status Report
1.8	Surface Water Dams	Monitoring of dams within the subsidence impact area to identify perceptible subsidence impacts have ceased and remediation works needed. Comprises: ▪ Photographic records. ▪ Final survey of each dam to determine post subsidence shape, wall height, level of the spillway (if present), depth and storage capacity.	Post long wall extraction.	Ashton Underground Mining Engineer / Survey Team	End-of-Panel Report
1.9	Void 5 Ash Dam	Detailed assessment of potential subsidence impacts to Void 5 Ash Dam in accordance *with Dams Safety Act 1978*.	Once dam commissioned, and prior to commencement of secondary extraction of the next LW panels.	Ashton Underground Mining Engineer	In accordance with DSC Approval
1.10	Void 5 Ash Dam	Survey of established survey pegs to provide baseline data for future comparison.	Once dam commissioned, and prior to commencement of secondary extraction of the next LW panels.	Ashton Mine Surveyor	In accordance with DSC Approval
1.11	Void 5 Ash Dam	Survey of established survey pegs and compare with baseline data to determine any movements being experienced.	Once dam commissioned, at the completion of LWs 7B and 8.	Ashton Mine Surveyor	In accordance with DSC Approval
1.12	Void 5 Ash Dam	Final survey to confirm no subsidence impacts.	Following completion of active subsidence in Pikes Gully Seam.	Ashton Underground Mining Engineer	In accordance with DSC Approval
1.13	All features	Undertake an inspection of assets in conjunction with MacGen.	On completion of each longwall.	Ashton Underground Mining Engineer / Survey Team	End-of Panel Report

Item	Feature	Action	Trigger/Timing	Responsibility	Reporting
2.0	Management				
2.1	General	Ensure access agreement is in place.	Prior to requiring access to Property No. 155 and ongoing	Ashton Underground Mining Engineer	Nil
2.2	General	Ensure compensation agreement is in place	Prior to undermining Property No 155 and ongoing	Ashton Underground Mining Engineer	Nil
2.3	Private Roads	Erection of signage inside property gates warning of potential cracks, dips, humps and providing ACOL contact number.	Prior to commencement of longwall mining beneath affected property.	Ashton Underground Mining Engineer	Fortnightly Status Report
2.4	Private Roads	Erection of temporary hazard warning signs 250 metres before and 350 metres after the location of the longwall face, including recommended speed limit.	Prior to longwall face progressing within 250 metres of access road and relocated weekly.	Ashton Underground Mining Engineer	Fortnightly Status Report
2.5	Buildings	Repair or demolition of dilapidated farm shed (with MacGen approval).	If farm shed is significantly impacted by affects of subsidence.	Ashton Underground Mining Engineer	Fortnightly Status Report
2.6	Surface Water Dams	Partially or completely draining farm dams and sedimentation basins.	Prior to longwall extraction. Based on results of risk based assessment.	Ashton Underground Mining Engineer	End-of-Panel Report
2.7	Drainage	Maintain a free draining landscape as per development consent commitment and the Land Management Plan.	Post-subsidence	Ashton Underground Mining Engineer	End-of-Panel Report
2.8	Drainage	Maintain existing clean water drainage from sedimentation basins to Bowmans Creek	Post-subsidence	Ashton Underground Mining Engineer	End-of-Panel Report
2.9	Fences	Removal of stock from paddocks that will be subject to subsidence and relocated to unaffected or rehabilitated paddocks elsewhere on the property.	Prior to subsidence impacts.	Ashton Environment and Community Relations Manager	Nil
2.10	Proposed Public Roads	Prepare a management plan to ensure public safety.	If Lemington Road is re-aligned with Brunkers Lane and declared a public road prior to, or during undermining.	Ashton Underground Mining Engineer & Xstrata – Ravensworth Operations	Fortnightly Status Report

Item	Feature	Action	Trigger/Timing	Responsibility	Reporting
2.11	Proposed ACOL gas drainage boreholes	Construct gas drainage boreholes in consultation with MacGen, in accordance with Access and Compensation Agreement, and in accordance statutory approvals (in particular the development consent, and approved Mining Operations Plan, Erosion and Sediment Control Plan and Archaeology and Cultural Heritage Management Plan).	Construction of gas wells	Ashton Underground Mining Engineer	Nil
2.12	Private Roads	Repair road in accordance with the Road Management Response Table (see **Section 5.1**) during subsidence, or provide temporary diversions to maintain access.	As required following daily inspection.	Ashton Underground Mining Engineer	Fortnightly Status Report
2.13	Fences	Repairs of damaged fences and gates.	If damage occurs, at completion of subsidence.	Ashton Underground Mining Engineer	End of Panel Report
2.14	Surface Water Dams	Repair / remediation to dams, basins and contour banks.	Damage observed during monthly inspections.	Ashton Underground Mining Engineer	Fortnightly Status Report
2.15	Surface cracking	Repair permanent surface cracking (by filling or ripping) and revegetate in accordance with the Land Management Plan.	If damage occurs, at completion of subsidence.	Ashton Underground Mining Engineer	Nil
3.0	**Incident Response**				
3.1	Fences	Provide temporary electric fencing In the event that damage to a fence causes unplanned stock movements and repairs cannot be carried out immediately. Prior to extraction of each longwall panel / following damage to fence lines that renders it no longer stock proof.	As required.	Ashton Underground Mining Engineer	Fortnightly Status Report
4.0	**Notification/Consultation**				
4.1	All Features	Maintenance and distribution of contact register of relevant stakeholders. List to include relevant procedures for contacting ACOL representative in event of access problems or for reporting road hazards.	Ongoing.	Ashton Environment and Community Relations Manager	Nil
4.2	All Features	Forward information to MacGen regarding progress of the longwall and any relevant subsidence management actions.	Fortnightly, starting at the commencement of LW6B until LW8 is complete.	Ashton Underground Mining Engineer	Fortnightly Status Report

Item	Feature	Action	Trigger/Timing	Responsibility	Reporting
4.3	All Features	Notify MacGen if subsidence impacts are identified.	In response to monitoring.	Ashton Underground Mining Engineer	Email
4.4	ACOL Gas Drainage	Undertake ongoing consultation with MacGen regarding the construction and maintenance of gas drainage wells above ACOL's longwall panels on Property No. 155	Prior to construction of gas drainage wells.	Ashton Underground Mining Engineer	Nil

This page has been left blank intentionally

6.1 ROAD MANAGEMENT RESPONSE

The following table[9] has been developed to assist in implementing appropriate levels or response for a range of potential subsidence impacts to the private access roads within the Mining Lease.

Impact	Full Road Width	Half Road Width	Road Edge
Cracking > 100mm wide	HIGH	HIGH	MODERATE
Cracking 20 – 100mm wide	MODERATE	MODERATE	LOW
Cracking < 20mm wide	MODERATE	LOW	LOW
Water ponding	HIGH	MODERATE	LOW
Compression Humps	HIGH	MODERATE	LOW
Other	MODERATE	LOW	LOW

Action to be taken in accordance with the Road Management Plan

HIGH Barricade affected area and notify landowner, affected occupants/road users.
Provide alternative access around hazard until remediation works are complete.
Proceed with remediation works within 24 hours and document all actions.

MODERATE Erect warning signs on both sides of hazard.
Notify landowner, occupants/road users.
Proceed with remediation works immediately and document all actions.

LOW Proceed with remediation works promptly and document all actions.

Private Roads: Method of Remediation

Ashton Coal maintains permanent contractors onsite ("Coalroc") with road repair skills. Should subsidence effects require a rapid response (24hrs) then;

- the Supervisors would be contacted by the Underground Mining Engineer (Bruce Moffett 0400 631 023) or Bob Miller (0438 433 124) and instructions provided as to repairs required,
- Machinery to be used - a Bobcat or a mini-excavator would be utilised, both of which are maintained permanently onsite, alternately operators with a ute and trailer could do hand repairs with road gravel or similar mixes,
- Material – A supply of road gravel or similar will be maintained onsite for incidental repairs, and
- Follow-up work – where impact roads are sealed roads (generally deteriorated) Bitumen seals will be done over repaired sections. An offsite contractor will be used to apply a "2 coat" seal over the affected area.

[9] Previously part of the approved Roads Management Plan in the LW/MW 5-9 SMP.

This page has been left blank intentionally

Legend

- Ashton Mining Leases
- Pond / Dam / Sediment Basin
- Existing Clean Water Drainage
- Private Roads (existing)
- Proposed Lemington Road Alignment
- Old Open Cut Spoil Heaps
- Dam Notification Area
- First Workings
- Second Workings
- Macquarie Generation Building
- Proposed Gas Pipeline Easement
- GAS — Proposed Gas Pipeline (Surface)
- Proposed Clean Water Drainage Corridors
- GW14 — ACOL Proposed Goaf Gas Drainage BH (indicative location)
- Cadastre

Subsidence Contours

- 20mm (interpolated)
- 20mm
- 0.5m
- 1.0m
- 1.5m

0 50 100 150 200 250m

AECOM

N

SEDIMENT BASIN

PROPOSED VOID5 DAM

GW18 GW17 GW16 GW15 GW14 GW13 GW12 GW11 GW10 GW09 GW08

SITE ACCESS ROAD

LW8 LW7B Short LW6B

BOWMANS CREEK

BRUNKERS LANE

BOWMANS CREEK

AshtonCoal

MacGen Asset Management Plan
PG LW6B, 7B Short & 8

Figure 2

This page has been left blank intentionally

ASHTON COAL PROJECT

ASSET MANAGEMENT PLAN
ROADS AND MARITIME SERVICES
(PREVIOUSLY ROADS AND TRAFFIC AUTHORITY)
PG LW 6B, 7B (SHORT) & 8, ULD LW1-8

Version Date: 06/11/2012

Ashton Coal Operations Pty Limited

Glennies Creek Road
Camberwell NSW 2330
Tel: 02 6576 1111
Fax: 02 6576 1122

Table of Contents

Version History

Version	Status	Details	Authors	Authorised/Approved for Issue	
				Name/Position	Date
06/11/2012	Draft	For Consultation & Approval	A. McGuigan & AECOM	A. McGuigan Technical Services Manager	06/11/2012
01/08/2012	Final	Approved	P. Fletcher & AECOM	P. Fletcher Technical Services Manager	01/08/2012
17/07/2012	Draft	For Approval	P. Fletcher & AECOM	P. Fletcher Technical Services Manager	17/07/2012
16/02/2012	Final	For Distribution	P. Fletcher & AECOM	P. Fletcher Technical Services Manager	16/02/2012
21/12/2011	Draft	For Consultation	P. Fletcher & AECOM	P. Fletcher Technical Services Manager	21/12/2011
29/08/2011	Final	For Distribution	P. Fletcher & AECOM	P. Fletcher Technical Services Manager	29/08/2011
11/08/2011	Draft	For Consultation	P. Fletcher & AECOM	P. Fletcher Technical Services Manager	11/08/2011
28/06/2011	Draft	For Consultation	P. Fletcher, AECOM	P. Fletcher Technical Services Manager	28/06/2011

External Consultation

Org.	Nominated Rep.	Date Issued	Comments
Roads & Maritime Services	Manager, Land Use Development	19/06/2012	
Roads & Maritime Services	Manager, Land Use Development	21/12/2011	
Roads & Traffic Authority	Manager, Land Use Development	18/08/2011	
Roads & Traffic Authority	Manager, Land Use Development	15/06/2011	

This page has been left blank intentionally

1 INTRODUCTION

This Asset Management Plan (AMP) has been prepared to identify and manage predicted subsidence impacts on NSW Roads and Maritime Services (RMS) (previously Roads and Traffic Authority) assets associated with the Ashton Coal Project (ACP). The scope of this management plan includes first and second workings associated with LW 6B, 7B (short) & 8 in the Pikes Gully Seam, first workings associated with LW 1-3 in the Upper Liddell Seam and second workings associated with Longwall (LW) 1 to 8 in the Upper Liddell (ULD) Seam.

The Ashton Coal Environmental Management Strategy (see **Figure 1** of the Built Features Management Plan) provides the strategic context for the environmental management of the ACP. Extraction Plans form part of the Environmental Management Strategy and are required by the ACP development consent. Extraction Plans provide a framework for the management of subsidence impacts associated with ACOL's underground mining activities. Each Extraction Plan details the proposed workings, including dimensions, overburden depth and mining schedule. Impacts to man-made features are addressed through the Built Features Management Plan, under which individual AMPs detail the proposed consultation, monitoring and management of infrastructure for each asset-owner.

This AMP outlines ACOL's statutory requirements relating to monitoring and management of subsidence impacts on RMS assets within the mining lease (ML) 1529 and 1533, as well as the consultation, monitoring and reporting requirements. Relevant built features have been identified in consultation with the RMS, and are detailed in **Section 3**. Whilst RMS assets are not expected to be directly impacted by subsidence under the scope of this management plan, monitoring and reporting measures are detailed in **Section 6**.

No secondary extraction is proposed beneath the New England Highway and the mine plan currently ensures that the angle of draw associated with both the PG and ULD Seam does not extend into the road reserve. Therefore, the New England Highway will not be impacted by secondary extraction of these longwall panels.

ULD first workings provide access, services and ventilation to the underground mine and are located beneath the New England Highway and road reserve for all of the above longwall panels. First workings are designed to remain long-term stable; however a Pothole Management Plan has been developed by ACOL to address the unlikely event of an underground roof collapse and associated subsidence pothole at the surface.

2 LEGAL REQUIREMENTS AND GUIDELINES

This document has been prepared in accordance with the consent conditions, relevant legislation and guidelines, and in consultation with relevant government agencies and affected infrastructure owners as discussed below.

2.1 DEVELOPMENT CONSENT

Condition 3.12(g) requires that ACOL prepare a BFMP to the satisfaction of the Department of Trade and Investment, Regional Infrastructure and Services (DTIRIS) *"which has been prepared in consultation with the owner/s of potentially affected feature/s, to manage the potential subsidence impacts and/or environmental consequences of the proposed second workings."*

Condition 3.10 of the development consent establishes subsidence impact performance measures relating to built features and public infrastructure. Under the development consent, ACOL must ensure that underground mining does not cause any exceedances of these performance measures to the satisfaction of the Director-General. The development consent performance measures, as well as measures specifically developed by ACOL for RMS assets are provided in **Section 4**.

Section 7 of the development consent provides for the management of ACOL's impacts to transport and utilities. Conditions relevant to RMS assets and management of subsidence are provided below:

7.8 The Applicant shall obtain RMS approval under Section 138 of the Roads Act for all works within the New England Highway road reserve.

7.9 The Applicant shall execute a Works Authorisation Deed with the RMS for the proposed works on State Highway No. 9 New England Highway. The Works Authorisation Deed must be executed prior to commencement of any activity within the Highway road reserve.

7.10 The Applicant shall bear all costs associated with the design, survey, approval, construction, maintenance, monitoring, rehabilitation and removal of all mine related infrastructure and works affecting the New England Highway road reserve.

7.11 The Applicant shall pay to the RMS the cost incurred by the RMS of making good any damage to the New England Highway, and its associated structures, caused by activities associated with this consent. Provided however that the amount to be paid by the Applicant as aforesaid shall be reduced by such sum of money, if any, may be paid to the RMS from the Mine Subsidence Compensation Fund constituted under the Mine Subsidence Compensation Act, 1961, in the form of a claim for compensation for the same damage.

7.12 Activities associated with this consent shall not restrict in any way the ability of the RMS and its contractors to access and/or undertake works to Bowmans Creek Bridge and its underside.

7.13 Any adjustments or alterations to activities associated with this consent resulting from improvements/upgrade of the New England Highway shall be the responsibility of the Applicant and at no cost to the RMS.

Additionally under Schedule C, Item 3 of the development consent ACOL's commitments include "*Existing surface infrastructure will be maintained to be safe, serviceable and repairable manner unless the owner agrees otherwise in writing."* and "*Damage to existing third party-owned infrastructure due to the ACOL induced subsidence will be mitigated or remediated."*

2.2 CONSULTATION REQUIREMENTS

Should significant amendments to this document be required prior to, or during implementation, the amendments will be made in consultation with the RMS, and to the satisfaction of DTIRIS (Division of Resources and Energy). Contact details of the relevant stakeholders are listed in **Table 1**.

Table 1 Relevant Stakeholders and Representatives

Organisation	Contact	Phone	Address
Roads and Marine Services (RMS)	Manager, Land Use Development	131 782	59 Darby St, Newcastle NSW 2300 (Locked Bag 30)
Mine Subsidence Board (MSB)	District Manager	(02) 6572 4344	PO Box 524 Singleton NSW 2330
DTIRIS, Division of Resources and Energy	Principal Subsidence Engineer	(02) 4931 6644	PO Box 344 Hunter Region Mail Centre NSW 2310

RMS Emergency Contact: Traffic Management Centre 131 700

3 ASSETS & IMPACTS

This management plan addresses potential subsidence impacts to RMS assets potentially affected by underground mining (second workings) of LW 6B, 7B (short) and 8 in the Pikes Gully (PG) Seam, first workings associated with LW 1 to 3 in the Upper Liddell (ULD) seam and secondary extraction of LW 1 to 8 in the ULD Seam. The expected subsidence, affected RMS assets and potential subsidence impacts are summarised below.

3.1 PREDICTED SUBSIDENCE

Subsidence behaviour resulting from extraction of LW 6B, 7B (short) and 8 in the PG Seam and LW 1 to 8 in the ULD Seam is variable based on the width of the panel, overburden depth and chain pillar barrier widths. Predictions of likely subsidence, tilts and strains have been prepared by SCT Operations Pty Ltd (2011) for PG LW 6B, 7B & 8 and are presented in **Table 2**. Predictions for secondary extraction of the ULD Seam are based on a conservative empirical approach and are presented in **Table 3** and **Table 4.** A discussion of the methods used to identify subsidence predictions is provided in the ULD 1-8 Extraction Plan main document which will be publically accessible via the ACOL website prior to commencement of longwall extraction in LW1.

Table 2 Incremental Maximum Subsidence Predictions (from mining the PG Seam only)

Panel	Maximum Incremental Subsidence (m)	Maximum Incremental Tilt (mm/m)	Maximum Incremental Strain (mm/m)
LW6B	1.6	70	30
LW7B	1.6	70	30
LW8	0.7	40	20

Source: SCT Operations (2011) *Subsidence Assessment for Ashton Coal Mine Longwalls 6B to 8 in the Pikes Gully Seam based on the Bowman's Creek Diversion Mine Plan*, prepared for Ashton Coal Mine,

For the ULD LW1-3, predicted subsidence associated with first workings is anticipated to be nil or negligible (before longwall extraction) and the mains beneath the New England Highway are designed to remain long-term stable both during and after longwall extraction (refer to Strata Engineering: *Stability of First Workings Associated with the Drivage of Longwalls 1 to 3, Upper Liddell Seam,* 2011).

Table 3 Maximum Incremental Subsidence Predictions (ULD Seam only)

Panel	Maximum Incremental Subsidence (m)	Maximum Incremental Tilt (mm/m)	Maximum Incremental Strain (mm/m)
LW1	2.9	183	73
LW2	2.5	139	55
LW3	2.5	119	48
LW4B[1]	2.4	110	44
LW5	2.5	76	30
LW6B[1]	2.8	101	41
LW7B	3.0	91	36
LW8	3.4	98	39

Source: 'Subsidence Assessment of Upper Liddell Seam, Longwalls 1-8 Extraction Plan' SCT (2011)

[1] Note: Valley closure over Bowmans Creek bridge predicted between 10-11mm.

Table 4 Cumulative Maximum Subsidence Predictions (from mining both the PG and ULD Seams only)

Panel	Cumulative Maximum Subsidence (m) (85% of combined seam thickness)	Maximum Tilt (mm/m)	Maximum Strain (mm/m)
LW1	4.4	235	94
LW2	4.0	189	76
LW3	4.0	162	65
LW4A	3.9	128	51
LW4B	3.9	151	60
LW5	4.0	103	41
LW6A	4.0	100	40
LW6B	4.3	132	53
LW7A	4.0	89	36
LW7B	4.5	116	47
LW8	4.4	107	43

Source: Subsidence Assessment of Upper Liddell Seam, Longwalls 1-8 Extraction Plan' SCT (2011)

Future extraction of lower coal seams is not currently covered in this management plan and it should be noted that the values shown in **Table 2** and **Table 3** are not the final subsidence values for the site.

3.2 DESCRIPTION OF ASSETS & SUBSIDENCE IMPACTS[2]

The RMS owns and manages the New England Highway (State Road No. 9) road reserve which traverses through the north-western corner of the ACP (see **Figure 2** and **Figure 3**). Within the ACP, the New England Highway comprises:

- a single northbound travel lane,
- two southbound travel lanes,
- the road reserve,
- a bridge over Bowmans Creek,
- drainage structures (box culverts); and
- cutting and fill embankments.

The New England Highway and Bowmans Creek bridge lie north of the proposed longwall panels. Mains headings, which provide, access, services and ventilation to the longwall panels are located beneath the New England Highway and road reserve. The mains headings are aligned approximately in parallel with the highway.

No significant impacts to RMS owned assets are expected as a result of proposed mining in the ULD Seam. The New England Highway and associated features are expected to be substantially protected from the impacts of mining subsidence (SCT 2011[1]). The protective barriers provided to the New England Highway from the longwall panels are expected to be

[2] Potential subsidence impacts identified by SCT (2011). Report titled: 'Subsidence Assessment for Longwalls 6B to 8 in the Pikes Gully Seam based on the Bowmans Creek Diversion Mine Plan.' and 'Subsidence Assessment for Upper Liddell Seam, Longwalls 1-8 Extraction Plan'

sufficient to provide a high level of protection to the section of the New England Highway that traverses the north-western corner of the ACP as, generally, the road reserve lies outside the 26.5° angle of draw for the proposed mining in the PG and ULD Seam (SCT 2011).

SCT (2011) observes that at its closest point the New England Highway road reserve is 82m from the northeast corner of LW7B and narrowly encroaches on half depth. This is not expected to be significant as the area is located beyond the north eastern corner end of the LW7B panel where ground movements are reduced by corner effects and distance from the goaf edge. All other sections of the road reserve are beyond half depth.

Mains beneath the highway are designed to remain long-term stable both before and after longwall extraction and therefore the potential for a massive roof failure resulting in surface impacts is negligible (Strata Engineering, 2011). However, a risk-based Pothole Management Plan has been developed by ACOL to address the unlikely event of an underground roof collapse and associated subsidence pothole at the surface.

Bowmans Creek Bridge is expected to experience minor valley closure in the range of 10-11mm. However no perceptible impacts to the bridge are expected as a result of ACOL mining activity in the ULD Seam.

4 PERFORMANCE MEASURES

ACOL will aim to ensure that all built features and public infrastructure affected by subsidence is always maintained as safe and serviceable where subsidence related impacts are realised. ACOL commits to fully compensate asset owners if serviceability is not maintained as a result of subsidence impacts. Any subsidence damage from ACOL's mining activities will be repaired as necessary, or else replaced or fully compensated.

The subsidence impact performance measures relevant to RMS assets under consent condition 3.10 are summarised in **Table 5** while objectives and performance measures, developed by ACOL, are listed in **Table 6**.

Table 5 Subsidence Impact Performance Measures – Consent Requirements

Built Features	Performance Measure
Other built features, including other public infrastructure.	• Always safe. • Serviceability should be maintained wherever practicable. Loss of serviceability must be fully compensated. • Damage must be fully repaired or replaced, or else fully compensated.
Public Safety	No Additional Risk.

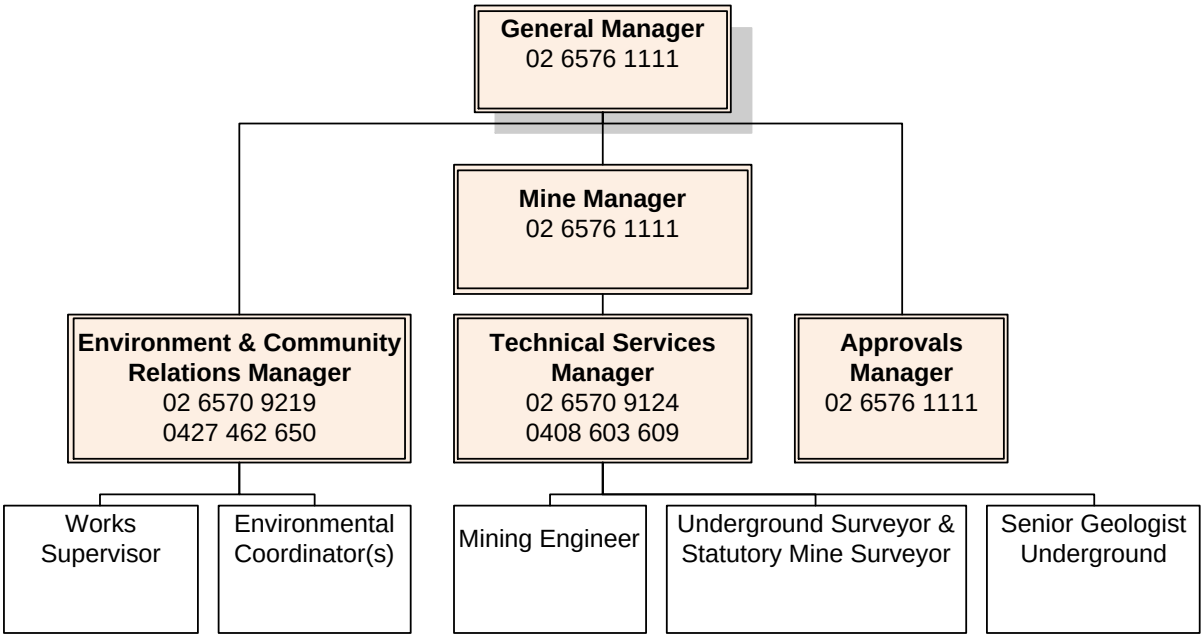
Table 6 ACOL-developed Objectives and Performance Measures

Objective	Performance Measures
• To prevent damage to the New England Highway. • To prevent public safety hazards resulting from subsidence damage to the New England Highway. • To ensure the New England Highway is maintained as safe and serviceable (as it relates to impacts from subsidence). • To monitor and remediate subsidence induced impacts to roads.	• Mine plan is designed to provide sufficient barriers and controls to prevent subsidence related impacts to the New England Highway. • First workings are designed to remain long-term stable. • Subsidence monitoring of the New England Highway to confirm negligible subsidence related movement. • No road hazards or disruptions to traffic occur as a result of subsidence impacts. • All subsidence related damage is identified and remediated as soon as practicable.

5 MANAGEMENT PLAN RESPONSIBILITIES

A summarised ACOL organisation chart, as relevant to this AMP is provided in **Figure 1**. The full organisation structure for the underground mine is contained within the Extraction Plan main document.

Figure 1 ACOL Organisation Chart – Summary Outline



6 SUBSIDENCE MANAGEMENT

The actions that ACOL undertakes to fulfil the consent conditions outlined in **Section 2** and to meet performance measures outlined in **Section 4** are outlined in the relevant tables below. These actions have been categorised into Monitoring (**Table 7**), Management (**Table 7**), Incident Response (**Table 9**) and Notification, Consultation and Reporting (**Table 9**).

A Control Management Plan is provided in **Table 10** which has been developed in conjunction with the RMS.

A Risk Register is provided as **Table 12** followed by the associated Lookup Tables.

Table 7 Monitoring Actions

Item	Action	Trigger/Timing	Responsibility	Reporting
1.0	Monitoring			
1.01	Subsidence monitoring (survey, photographic, and visual) of the New England Highway in accordance with the Control Management Plan (**Table 11**) and Subsidence Monitoring Program.	Pre-mining: refer to **Table 11**	Ashton Mine Surveyor	Provide copy to RMS
1.02	Install new pavement survey marks where necessary at 50m intervals along both sides of highway pavement from the eastern end of the cutting westwards to limit of mining (~2800m). Methodology to be confirmed with RMS, (i.e. drill-hole in kerbs through cutting, and survey marks i.e. star pickets installed to ground level, behind guard rail in fill areas). *Note: Previous survey marks installed have been covered by new pavement seal.*	Pre-mining: refer to **Table 11**	Ashton Mine Surveyor	Provide copy to RMS
1.03	Install infill road reserve survey marks at 50m intervals between existing highway cutting marks and road reserve marks.	Pre-mining: refer to **Table 11**	Ashton Mine Surveyor	Provide copy to RMS
1.04	RMS Bridge Inspection Report. *(Note last report 25August 2011 and next due Mar-2012)*	Annually (Nominally)	RMS	Provide copy to ACOL
1.05	Annual Roadway Report *(Note last 2011 reports include Skid, Profilometry and Road cracking in MS Excel format).*	Annually (Nominally)	RMS	Provide copy to ACOL
1.06	Culvert Inspection Report.	Annually (Nominally)	RMS	Provide copy to ACOL

Table 8 Management Actions

Item	Action	Trigger/Timing	Responsibility	Reporting
1.0	Management			
1.01	Works Authorisation Deed (WAD) for mine workings under New England Highway reserve (for PG portal heading A, B & C only) dated 23/1/06.	Prior to 1st workings undermining New England Highway roadway reserve.	Ashton Underground Mining Engineer	Provide copy of Works Authorisation Deed to RMS.
1.02	Maintain a 'Pothole Management Plan' for working under and adjacent to the New England Highway.	Prior to 1st workings undermining New England Highway roadway reserve.	Ashton Underground Mining Engineer	Copy to RMS from ACOL Document Management System.
1.03	Maintain an RMS-approved Control Management Plan and Risk Register (refer to **Table 11** and **Table 12** respectively).	Prior to mining (inclusive of 1st and 2nd workings).	Ashton Underground Mining Engineer	Copy to RMS from ACOL Document Management System.

Table 9 Incident Response Actions

Item	Action	Trigger/Timing	Responsibility	Reporting
1.0	Incident Response			
1.01	Refer to ACOL Pothole Management Plan and implement controls in the Stability Control-Action-Response (SCARP) plan.	Roof fall (higher than roof bolts) or major geological structure (greater than 500mm throw) in main headings (Highway road reserve).	Ashton Underground Mining Engineer	Fortnightly Status Report
1.02	Notify the RMS and re-survey in accordance with the Control Management Plan (**Table 11**).	Visual inspection identifies that movement may have occurred or subsidence movements at survey monitoring locations in excess of 20mm - refer to **Table 11**.	Ashton Underground Mining Engineer	Notify RMS.
1.03	In consultation with the MSB, provide funds to repair any subsidence- related damage to the New England Highway road reserve.	If damage is caused to New England Highway by subsidence from longwall mining.	Ashton Underground Mining Engineer / MSB	Fortnightly Status Report

Table 10 Notification, Consultation and Reporting Actions

Item	Action	Trigger/Timing	Responsibility	Reporting
1.0	Notification/Consultation			
1.01	Notification to RMS as mining activity approaches within 200 metres of the New England Highway road reserve.	As mining activity approaches within 200 metres of the New England Highway road reserve.	Ashton Underground Mining Engineer	Fortnightly Status Report
1.02	Notify RMS if any subsidence impacts are identified.	In response to monitoring.	Ashton Underground Mining Engineer	Consultation Records
1.03	RMS to be provided with a copy of subsidence monitoring data	Post-surveys	Ashton Surveyor	Email

Table 11 Control Management Plan

EVENT / Hazard CODE	MITIGATION	FUNCTION	HOW	WHEN
PRE-MINING ACTIVITES				
ROAD PAVEMENT – Pre-Mining Activities				
H1, H2 H3, H4, H5	Survey pavement edges to Bowmans Bridge (~1400m)	AC	Level survey at 25m interval on both edges of pavement (Northbound & Southbound) from eastern end of cutting to Bowmans Creek Bridge (approx 1600m) (see Survey Monitoring Plan in **Appendix A**).	Prior to LW1 being 300m from end.
H1, H2 H3, H4, H5	Survey pavement edges from Bowmans Bridge (~1500m) to western limit of mining (~2800m).	AC	Level survey at 50m intervals on both edges of pavement (north and southbound) from western edge of Bowmans Bridge (~1500m) to western extent of mining activities (~2800m).	A minimum of 100m in advance of mining in NW Mains Headings.
H1, H2 H3, H4, H5	Precondition Survey	RMS	Photo survey of existing pavement condition.(see report G3840 - 2 April 2007).	Completed April 2007

EVENT / Hazard CODE	MITIGATION	FUNCTION	HOW	WHEN
ROAD RESERVE – Pre-Mining Activities				
H1, H2 H3, H4, H5, H6,H7,H8,H9,H10	Survey of Road Reserve west of Bowmans Bridge (~1500m) to western extent of mining (~2800m).	AC	Survey at 50m intervals from existing E series marks (~1500m) approximately parallel to edge of northbound road pavement to western extent of mining activities (~2800m).	A minimum of 100m in advance of mining in NW Mains Headings.
DRAINAGE STRUCTURES – Pre-Mining Activities				
H6	Survey top of drainage pits and invert levels.	AC	Level survey of drainage pits (see Survey Monitoring Plan in **Appendix A**).	Prior to LW1 being 300m from end.
H6	Pre-condition Survey	RMS	CCTV survey of existing condition. (see report by Aqua Assets 24/04/07).	Completed April 2007.
H6	Drainage Culverts ~Ch 1900m and under entrance to Brunkers Lane.	AC	Level survey of Invert of culvert on both sides of roadway.	A minimum of 100m in advance of mining in NW Mains Headings.
CUTTING – Ch 0m to ~Ch 450m – Pre-Mining Activities				
H7, H8	Survey Mark Installation	AC	X,Y,Z co-ordinates on evenly spaced points on the top of the each side of the cut batter to measure movement and assess closure of the cutting.	Prior to LW1 being 300m from end.
H7,H8	Survey Line from LW1 to Cutting	AC	Install survey line from finish position of LW1 to perpendicular to cutting (LW1 XL8).	Prior to LW1 being 300m from end.
H7, H8	Precondition Survey	RMS	Photo survey of existing cutting condition.(see report G3840 - 2 April 2007).	Completed April 2007.
FILL EMBANKMENT – Pre-Mining Activities				
H9	Survey pavement edges.	AC	Level survey at 25m interval on both edges of pavement (Northbound & Southbound) from southern end of cutting to Bowmans Creek Bridge (approx 1600m) (see Survey Monitoring Plan in **Appendix A**).	Prior to LW1 being 300m from end.

EVENT / Hazard CODE	MITIGATION	FUNCTION	HOW	WHEN
H9	Survey Centrelines from LW1, 2, 3 & 4.	AC	Install baseline survey centrelines for each longwall (CH0 to CH400 for LW1 and CH0 to Ch300 for LW2, LW3 and LW4).	Prior to each LW being 300m from end.
H9	Survey first workings monitoring points (E series).	AC	Level survey of E series existing monitoring points.	Prior to each LW being 300m from end.
H9	Visual Inspection	AC	General Visual Inspection of fill embankment between Cutting and Bridge. Due to vegetation it is difficult to carryout detailed photo inspection.	ASAP
BOWMANS BRIDGE – Pre-Mining Activities				
H10	Survey Mark installation	AC	Survey marks installed on each outside edge of bridge abutment deck at both abutments (both sides). Survey marks installed at all out piers (both sides) (see Survey Monitoring Plan and Bridge Layout Plan in **Appendix A**).	Prior to LW3 and LW4 being 300m from end of completion.
H10	Precondition Survey	RMS	Level 2 Bridge inspection with photographic records of the current condition (See report dated 7 May 07 by RMS).	Completed in May 2007
DURING-MINING ACTIVITIES				
ROAD PAVEMENT – During-Mining Activities				
H1, H2 H3, H4, H5	Periodic visual inspection of Northbound and Southbound pavement.	RMS Ops	Visual inspection is part of existing Highway inspection program. If survey monitoring triggers movement then a Weekly damage and public safety report from Hunter Road Services to AC will be provided.	Weekly if the end of the LW1, LW2, LW3 and LW4 centrelines has a reading >20mm movement (i.e. CH400 for LW1 and CH300 for LW2,LW3 and LW4).

EVENT / Hazard CODE	MITIGATION	FUNCTION	HOW	WHEN
H1, H2 H3, H4, H5	Survey pavement edges to edge of Bowmans Bridge (Ch 0m to Ch ~1400m) (ULD 1st Workings Development).	AC	Survey at 50m intervals on both edges of pavement (Northbound & Southbound) from eastern end of cutting to Bowmans Creek Bridge (approx 1600m) (see Survey Monitoring Plan in **Appendix A**).	Weekly if the end of the LW1, LW2, LW3 and LW4 centrelines has a reading >20mm movement (i.e. CH400 for LW1 and CH300 for LW2, LW3 and LW4). Or Movement in the XYZ of >20mm in the Cutting Survey Points or Road reserve Marks in vicinity of ULD Mains to 23ct have subsided >20mm.
H1, H2 H3, H4, H5	Survey pavement edges from Bowmans Bridge (~1500m) to western limit of mining (~2800m) (PG LW6B, 7B (short) & LW8 Extraction).	AC	Level survey at 50m intervals on both edges of pavement (north and southbound) from western edge of Bowmans Bridge (~1500m) to western extent of mining activities (~2800m).	Prior to completion of LW4, Or If at least 3 consecutive road reserve survey marks have a reading of >20mm.
ROAD RESERVE – During-Mining Activities				
H1, H2 H3, H4, H5, H6,H7,H8,H9,H10	Survey of Road Reserve west of Bowmans Bridge (~1500m) to western extent of mining (~2800m) (PG LW6B, 7B (short) & LW8 Extraction).	AC	Survey at 50m intervals from existing E series road reserve marks (~1500m) approximately parallel to edge of northbound road pavement to western extent of mining activities (~2800m).	At 3 monthly intervals over areas of active mining, Or If the end centreline survey marks of the adjacent longwall that finish within 200m of the road reserve has a subsidence reading >20mm .
H1, H2 H3, H4, H5, H6,H7,H8,H9,H10	Survey of Road Reserve west of cutting to Bowmans bridge (ULD 1st workings development).	AC	Survey at 50m intervals from western limit of cutting to Bowmans bridge.	If periodic visual inspections of fill embankment or road pavement indicate possible abnormal movement.

EVENT / Hazard CODE	MITIGATION	FUNCTION	HOW	WHEN
DRAINAGE STRUCTURES – During-Mining Activities				
H6	Survey top of drainage pits. (ULD 1st workings development).	AC	Survey top of drainage pits in cutting. (see Survey Monitoring Plan in **Appendix A**).	Weekly if the end of the LW1, LW2, LW3 and LW4 centrelines has a reading >20mm movement (i.e. CH400 for LW1 and CH300 for LW2,LW3 and LW4), Or Movement in the XYZ of >20mm in the Cutting Survey Points.
H6	Periodic visual inspection of drainage structures from surface. (ULD 1st workings development).	RMS Ops	Visual inspection is part of existing Highway inspection program. If survey monitoring triggers movement then a CCTV inspection of the drainage structure will be carried out by RMS. If damage is identified a weekly damage and public safety report from Hunter Road Services to AC will be provided.	Weekly if the end of the LW1, LW2, LW3 and LW4 centrelines has a reading >20mm movement (i.e. CH400 for LW1 and CH300 for LW2, LW3 and LW4), Or Movement in the XYZ of >20mm in the Cutting Survey Points.
H6	Drainage Culverts ~Ch 1900m and at entrance of Brunkers Lane to New England Highway. (PG LW6B, 7B (short) & LW8 Extraction).	AC	Level survey of Invert of culvert on both sides of roadway.	If 3 consecutive road reserve marks that are within a radius of 200m of culvert have a subsidence reading of >20mm.
CUTTING – Ch 0m to ~Ch 450m – During-Mining Activities				
H7, H8	Survey monitoring (ULD 1st workings development).	AC	a) X,Y,Z co-ordinates on evenly spaced points on the top of the each side of the cut batter to measure movement and assess closure of the cutting. b) Survey Line perpendicular to Highway to cutting from eastern corner of LW1 (LW1 XL8). (see Survey Monitoring Plan in **Appendix A**).	Weekly when LW1 is 200m from the end of completion. Monitoring ceases 3 weeks after completion of LW1 subject to no movement occurring. This process is the same for LW2, Or If periodic visual Inspections of cutting indicate possible abnormal movement

EVENT / Hazard CODE	MITIGATION	FUNCTION	HOW	WHEN
H7, H8	Periodic visual inspection of cutting face. (ULD 1st workings development).	RMS Ops	Visual inspection is part of existing Highway inspection program. If survey monitoring triggers movement then a detailed visual inspection of the cutting will be carried out by RMS. If damage is identified a weekly damage and public safety report from Hunter Road Services to AC will be provided.	Weekly when LW1 is 200m from the end of completion. Monitoring ceases 3 weeks after completion of LW1 subject to no movement occurring. This process is the same for LW2.
H7,H8	Appraisal of Cut batters (ULD 1st workings development)	RMS / AC	Formal geotechnical inspection.	In excess of 20 mm of XYZ movement at points on top of Cut batter.
FILL EMBANKMENT – During-Mining Activities				
H9	Survey pavement edges (ULD 1st workings development)	AC	Survey at 50m interval on both edges of pavement (Northbound & Southbound) from eastern end of cutting to Bowmans Creek Bridge (approx 1600m) (see Survey Monitoring Plan in **Appendix A**).	Weekly if the end of the LW1, LW2, LW3 and LW4 centrelines has a reading >20mm movement (i.e. CH400 for LW1 and CH300 for LW2, LW3 and LW4), Or Road reserve survey marks have a reading of >20mm movement
H9	Periodic visual inspection (ULD 1st workings development)	RMS Ops	Visual inspection is part of existing Highway inspection program. If survey monitoring triggers movement then a Weekly damage and public safety report from Hunter Road Services to AC will be provided.	Weekly if the end of the LW1, LW2, LW3 and LW4 centrelines has a reading >20mm movement (i.e. CH400 for LW1 and CH300 for LW2, LW3 and LW4).
BOWMANS BRIDGE – During-Mining Activities				
H10	Survey Monitoring (PG LW6B, 7B (short) & LW8 Extraction)	AC	Survey monitoring of marks both abutments and marks installed at all piers (see Survey Monitoring Plan and Bridge Layout Plan in **Appendix A).**	Weekly when LW3, LW4 and MW5 are 200m from the end and continuing for 3 weeks after mining of LW3,LW4 and MW5 ceases or until movement ceases, Or If periodic visual Inspections of bridge deck by RMS indicate possible abnormal movement.

EVENT / Hazard CODE	MITIGATION	FUNCTION	HOW	WHEN
H10	Periodic visual inspection of Bridge Deck (PG LW6B, 7B (short) & LW8 Extraction)	RMS	Visual inspection is part of existing Highway inspection program. If survey monitoring triggers movement then a Weekly damage and public safety report from Hunter Road Services to AC will be provided.	Weekly when LW3 and LW4 is 200m from the end continuing for 3 weeks after mining of LW3 and LW4 ceases or until movement ceases.
POST-MINING ACTIVITIES				
ROAD PAVEMENT – Post-Mining Activities				
H1, H2 H3, H4, H5	Survey pavement edge to edge of Bowmans Bridge (Ch 0m to Ch ~1400m)	AC	Level survey at 25m interval on both edges of pavement (Northbound & Southbound) from southern end of cutting to Bowmans Creek Bridge (approx 1500m) (see Survey Monitoring Plan in **Appendix A**).	At the completion of Longwall 4.
H1, H2 H3, H4, H5	Survey pavement edges from Bowmans Bridge (~1500m) to western limit of mining (~2800m)	AC	Survey at 50m intervals on both edges of pavement (north and southbound) from western edge of Bowmans Bridge (~1500m) to western extent of mining activities (~2800m).	Within 3 months of completion of longwall extraction in the Pikes Gully Seam and only If 3 or more consecutive road reserve marks adjacent to longwalls 6B, 7B (short) & 8 have measure >20mm of subsidence.
H1, H2 H3, H4, H5	Post Condition survey of Pavement	RMS	Post condition survey to be completed with any mining related damage to be assessed and repaired by RMS at cost of AC/MSB.	At the completion of Longwall 4 or straight after damage causing risk to safety of motorists.
ROAD RESERVE – Post-Mining Activities				
H1, H2 H3, H4, H5, H6,H7,H8,H9,H10	Survey of Road Reserve west of Bowmans Bridge (~1500m) to western extent of mining (~2800m)	AC	Survey at 50m intervals from existing E series marks (~1500m) approximately parallel to edge of northbound road pavement to western extent of mining activities (~2800m).	Within 3 months of completion of longwall extraction in the Pikes Gully Seam and only if the end centreline survey marks on adjacent longwalls 6B, 7B (short) & 8 have measured >20mm of subsidence.
DRAINAGE STRUCTURES – Post-Mining Activities				
H6	Survey top of drainage pits	AC	Level survey of drainage pits (see Survey Monitoring Plan in **Appendix A**).	At the completion of Longwall 4 and continuing on a monthly basis until movement has ceased.

EVENT / Hazard CODE	MITIGATION	FUNCTION	HOW	WHEN
H6	Post-condition Survey	RMS	Post CCTV condition survey to be completed with any mining related damage to be assessed and repaired by RMS at cost of AC/MSB.	At the completion of Longwall 4 or straight after damage causing risk to safety of motorists.
H6	Drainage Culverts ~Ch 1900m and at entrance of Brunkers Lane to New England Highway	AC	Level survey of Invert of culvert on both sides of roadway.	Within 3 months of completion of longwall extraction in the Pikes Gully Seam and only if the end centreline survey marks on adjacent longwalls 6B, 7B (short) & 8 have measured >20mm of subsidence.
CUTTING – Ch 0m to ~Ch 450m – Post-Mining Activities				
H7, H8	Survey	AC	Survey X,Y,Z co-ordinates on 3 evenly spaced points on the top of the each side of the cut batter to measure movement and assess closure of the cutting (see Survey Monitoring Plan in **Appendix A**).	At the completion of Longwall 4 and continuing on a monthly basis until movement has ceased.
H7, H8	Post mining -condition Survey	RMS	Post condition survey to be completed with any mining related damage to be assessed and repaired by RMS at cost of AC/MSB.	At the completion of Longwall 4 and/or straight after damage causing risk to safety of motorists.
H7, H8	Post mining – condition assessment	AC	Post mining - condition assessment of the cuttings including reconnaissance survey of the ground behind the cuttings and mapping of tension cracks that could be associated with mining, particularly on the south side of the New England Highway. Survey to be carried out to a minimum distance from the face of the cutting equal to twice the cutting depth.	At the completion of Longwall 101 and 102 and continuing on a monthly basis until movement has ceased.
FILL EMBANKMENT – Post-Mining Activities				
H9	Survey pavement edge	AC	Level survey at 25m interval on both edges of pavement (Northbound & Southbound) from southern end of cutting to Bowmans Creek Bridge (approx 1500m). (see Survey Monitoring Plan in **Appendix A**).	At the completion of Longwall 4.
H9	Visual assessment	RMS	Visual assessment of the embankment to be completed with any mining related damage to be assessed and repaired by RMS at cost of AC/MSB.	At the completion of Longwall 4 and/or straight after damage causing risk to safety of motorists.

EVENT / Hazard CODE	MITIGATION	FUNCTION	HOW	WHEN
BOWMANS BRIDGE – Post-Mining Activities				
H10	Survey	AC	Survey marks installed on each side of bridge deck at both abutments. Survey marks installed at all piers (see Survey Monitoring Plan and Bridge Layout Plan in **Appendix A**).	At the completion of Longwall 4 and continuing on a monthly basis until movement has ceased.
H10	Post - condition Survey	RMS	Post condition survey to be completed with any mining related damage to be assessed and repaired by RMS at cost of AC/MSB.	At the completion of Longwall 4 and/or straight after damage causing risk to safety of motorists.

Table 12 Risk Register With General Mitigation - Subsidence Impacts On H9 New England Highway

Asset	Failure type	Event/Hazard	Code	INFRASTRUCTURE			FUNCTION			SAFETY			COMMENTS	MITIGATION MEASURES
				F	C	R	F	C	R	F	C	R		
Pavement	Excessive ground movement	Rapid pavement failure leading to hump of step >50mm	H1	D	1	L	D	2	L	D	1	L	If this were to occur it is likely to spread over a few metres and would be of minimal safety concern.	Weekly visual and Survey monitoring/RMS ops to carryout repairs once identified
		Cracking>50mm	H2	D	1	L	D	1	L	D	1	L	Wide longitudinal cracking is of greater concern than wide transverse cracking, due to the potential effects on motorcycles	Weekly visual and Survey monitoring/RMS ops to carryout repairs once identified
		Loss of sight distance	H3	F	3	L	F	3	L	F	3	L	Considering the existing road geometry and subsidence predictions the likelihood of reduced stopping sight distance is barely credible	Weekly visual and Survey monitoring and survey monitoring/RMS ops to carryout repairs once identified
		Crossfall changes	H4	D	2	L	D	2	L	D	2	L	Considering the subsidence predictions the likelihood of crossfall changes is remote	Weekly visual monitoring and survey monitoring/RMS ops to carryout repairs once identified
		Ponding	H5	D	1	L	D	2	L	D	2	L	Considering the subsidence predictions the likelihood of crossfall changes is remote	Weekly visual monitoring and survey monitoring/RMS ops to carryout repairs once identified
Drainage Structures	Excessive ground movement	Cracking of RC Pipes	H6	D	1	L	D	1	L	E	1	L	Cracking of pipes may result in sink hole forming. The likelihood of this occurring is remote	Weekly visual monitoring/RMS ops to carryout repairs once identified
		Pipe Joint displacement	H6	D	1	L	D	1	L	E	1	L	Pipe Joint displacement may result in sink hole forming. The likelihood of this occurring is remote	Weekly visual monitoring/RMS ops to carryout repairs once identified
		Cracking of Pits	H6	D	1	L	D	1	L	E	1	L	Cracking of pits would have minimal impact on either function or safety	Weekly visual monitoring/RMS ops to carryout repairs once identified
		Kerb cracking/buckling	H6	D	1	L	D	1	L	E	1	L	This would have minimal impact on either function or safety	Weekly visual monitoring/RMS ops to carryout repairs once identified
Cutting	Excessive ground movement	Cracking of shotcrete	H7	D	2	L	D	1	L	E	1	L	Cracking of shotcrete would have minimal impact on function and safety. The likelihood of this occurring is remote	Weekly visual monitoring/RMS ops to carryout repairs once identified
		Cracking/stepping of concrete surface drains (i.e. bench, table and cut drains)	H7	D	1	L	D	1	L	E	1	L	This would have minimal impact on either function or safety	If survey triggers occur then monthly inspections to be carried out by RMS ops
	Closure of cutting due to ground movement	Slope effects	H8	D	2	L	D	2	L	D	2	L	Considering the subsidence predictions the likelihood of collapse is remote	Weekly visual monitoring and survey monitoring to be carried out. Survey monitoring to assess closure of cutting will identify if there are impacts on the cutting/RMS ops to carryout repairs once identified
Fill embankments	Excessive ground movement	Cracks, water, instability.	H9	D	2	L	D	2	L	E	2	L	This would have minimal impact on either function or safety.	Survey monitoring will identify if the embankments will be effected. Movement is identified by survey then weekly visual monitoring will commence
		Effects on embankment	H9	E	2	L	E	2	L	E	1	L	Considering the subsidence predictions the likelihood of collapse is remote	Survey monitoring will identify if the embankments will be effected. Movement is identified by survey then weekly visual monitoring will commence. RMS Ops will be carryout emergency works if collapse occurs
Bowmans Bridge	Destructive movements in bridges	Differential horizontal movements and/or tilts over a period of time causing excessive stresses and damage to structure	H10	D	1	L	D	1	L	D	1	L	This would have minimal impact on either function or safety.	Weekly Visual and Survey monitoring will be carried out to assess movement

Risk Matrix Legend

L	-	LOW
M	-	MODERATE
H	-	HIGH
E	-	EXTREME

This page has been left blank intentionally

LOOK UP TABLE

FREQUENCY

Level	Descriptor	Alt. Description	Description	Chance %	Frequency
0	**Absolutely Certain**	Definite	This event will occur – known to occur now *-Will occur several (many) times each year and many times (constantly) during this project*	99.99	Several times each year
A	**Almost Certain**	Frequent	This even is expected to occur in most circumstances *-Expected to occur more than once during the duration of this project (LW 701 to 704)*	95	1 / year
B	**Likely**	Probable	This event will probably occur in most circumstances *- Expected to occur once during the duration of the project*	10	at least 1 / 10 years
C	**Possible**	Occasional	This even might (should) occur at some time *- Not likely to occur in the life of project, but it is possible*	1	at least 1 / 100 years
D	**Unlikely**	Remote	This event could occur at some time *- Unlikely (very) to occur in life of project*	0.1	at least 1 / 1,000 years
E	**Rare**	Very Unlikely	This event may occur in exceptional circumstances *- Examples of this have occurred historically, but it is not anticipated for this project*	0.01	at least 1 / 10,000 years
F	**Hypothetical**	Barely credible	Theoretically possible but never occurred to date (anywhere in the world) *- Often applied to natural events*	1.00E-03	Every Million years

LOOK UP TABLE

CONSEQUENCES

Level	Descriptor	Infrastructure			Function			Safety / Societal Cost
		Pavement etc	Bridges	Cost	Access	Speed	Political	
1	**Insignificant**	Minor damage	Minor repairable damage	< $50k	Some loss in condition	No traffic effect	No political impact	No injuries or health effects
2	**Minor**	Noticeable damage	Damage that will deteriorate if not repaired quickly	< $100k	On lane closed for <half day. One planned lane closure < 1 day	Speed reduction for < 1month – 80 kph	Minimal political impact (brief press coverage	First aid treatment or minor damage to vehicles
3	**Moderate**	Significant Damage	Significant Damage	< $ 1 M	One lane closed for < 1 day	Speed reduction for > 1 month – 80 kph < 1 day – 40 kph	Political impact (press coverage)	Medical treatment required
4	**Major**	Extensive damage	Major damage – restricted speed	< $10 M	One land closed for > 1 day	Speed reduction for < 1 month – 40 kph	Significant political impact (extensive negative press coverage	Extensive injuries or one to two permanent disabilities
5	**Catastrophic**	Loss of use of carriageway	Extensive damage. One carriageway closed until repaired	< $50 M	One carriageway closed for > 1 day or both carriageways for < 2 day	Speed reduction for > 1 month – 40 kph	Major political impact (Commission of Enquiry)	Single fatality or severe permanent disabilities to several people
6	**Untenable**		Total failure of bridge or closed until repaired	> $ 50M	Both carriageways closed for > 2 days	Speed restriction for > 12 months – 40 kph		Multiple fatalities

LOOK UP TABLE

RISK MATRIX

	Consequences					
LIKELIHOOD	1 (Insignificant)	2 (Minor)	3 (Moderate)	4 (Major)	5 (Catastrophic)	6 (Unthinkable)
(Multiple	H	E	E	E	E	E
A (Almost Certain)	H	H	E	E	E	E
B (Likely)	M	H	H	E	E	E
C (Possible)	L	M	H	E	E	E
D (Unlikely)	L	L	M	H	E	E
E (Rare)	L	L	M	H	H	E
F (Hypothetical)	L	L	L	M	H	H

Low	Low risk; managed by routine procedures
Moderate	Moderate risk; requires above normal attention
High	High risk; ALARP must be applied
Extreme	Extreme risk; not acceptable and must be reduced

This page has been left blank intentionally

AECOM

Legend

- Ashton Mining Leases
- New England Highway
- New England Highway Road Reserve
- First Workings (PG Seam)
- Second Workings (PG Seam)

Subsidence Contours

- 20mm (interpolated)
- 20mm
- 0.5m
- 1.0m
- 1.5m

0 100 200 300 400 500m

N

BOWMANS CREEK BRIDGE

NEW ENGLAND HIGHWAY

PG LW8

PG LW7B Short

PG LW6B

BOW MANS CREEK

BRUNKERS LANE

BOWMANS CREEK

PG LW7A

PG LW6A

PG LW5

PG LW4

PG LW3

PG LW2

PG LW1

BOWMANS CREEK

HUNTER RIVER

AshtonCoal

RMS Asset Management Plan
PG LW6B, 7B Short & 8

Figure 2

This page has been left blank intentionally

AECOM

Legend

- Ashton Mining Leases
- New England Highway
- New England Highway Road Reserve
- ACOL First Workings (ULD)
- ACOL Second Workigs (ULD)
- Pikes Gully First Workings
- Culverts
- Creek/Water
- Proposed Bowmans Creek Diversion

Incremental Subsidence Contours

- 20mm
- 0.1m
- 0.5m
- 1.0m
- 1.5m
- 2.0m
- 3.0m

Subsidence contours are based on empirical estimates and reflect predicted incremental subsidence contours for extraction of the ULD seam only.

0 150 300

1 : 15000 (A3)

CULVERTS

BOWMANS CREEK BRIDGE

SITE ACCESS RD

BRUNKERS LANE

CREEK

BOWMANS

NEW ENGLAND HIGHWAY

CULVERTS

ULD LW8

ULD LW7B

ULD LW6B

PROPOSED EASTERN DIVERSION

ULD LW4B

BOWMANS CREEK

PROPOSED WESTERN DIVERSION

ULD LW7A

ULD LW6A

ULD LW5

ULD LW4A

ULD LW3

ULD LW2

ULD LW1

CAD REF:\\AUNTL1FPW01\PROJECTS\60219842_EXTRACTION_PLAYS\CADD\S3 WORKING\DRG\RMS ASSETS.DWG

LAST MODIFIED:12/1/2011 2:28 PM

AshtonCoal

RMS Asset Management Plan
Upper Liddell Seam LW 1- 8

Figure 3

This page has been left blank intentionally

APPENDIX A – SUBSIDENCE MONITORING PLANS

Drawings Enclosed:

- Drawing No. A-3041 'Ashton Underground Mine, Subsidence Marks, Longwall 6B-8 Monitoring Program'
- Drawing No. B-3001 'New England Highway Road Reserve & Cutting, Proposed Subsidence Monitoring – ULD Seam'
- Bowmans Creek Bridge Layout.

This page has been left blank intentionally

LW8 CL2
LW7B Short CL2
LW7B (Short)
LW7B Short CL1
LW8 CL1
LW6B CL2
LW6B CL1
LW 8
LW 6B
XL 13
120.0
200.0
110.0
210.0
140.0
130.0
90.0
200m Offset to Road Reserve
33kV Power
Brunkers Lane
Telstra Cable
Buried ACOL Pipelines
Bowmans Bridge
33kV Power Rav. Ops.
318000
318500
6406000

LEGEND
- Proposed Subsidence Line
- Existing Subsidence Station
- Existing Workings
- Proposed Workings
- Powerline (11kV, 33kV, 66kV, 132kV)
- Surface Contour
- Depth of cover - Pikes Gully Seam
- Telstra Cable (Buried)
- Ravensworth Pipeline

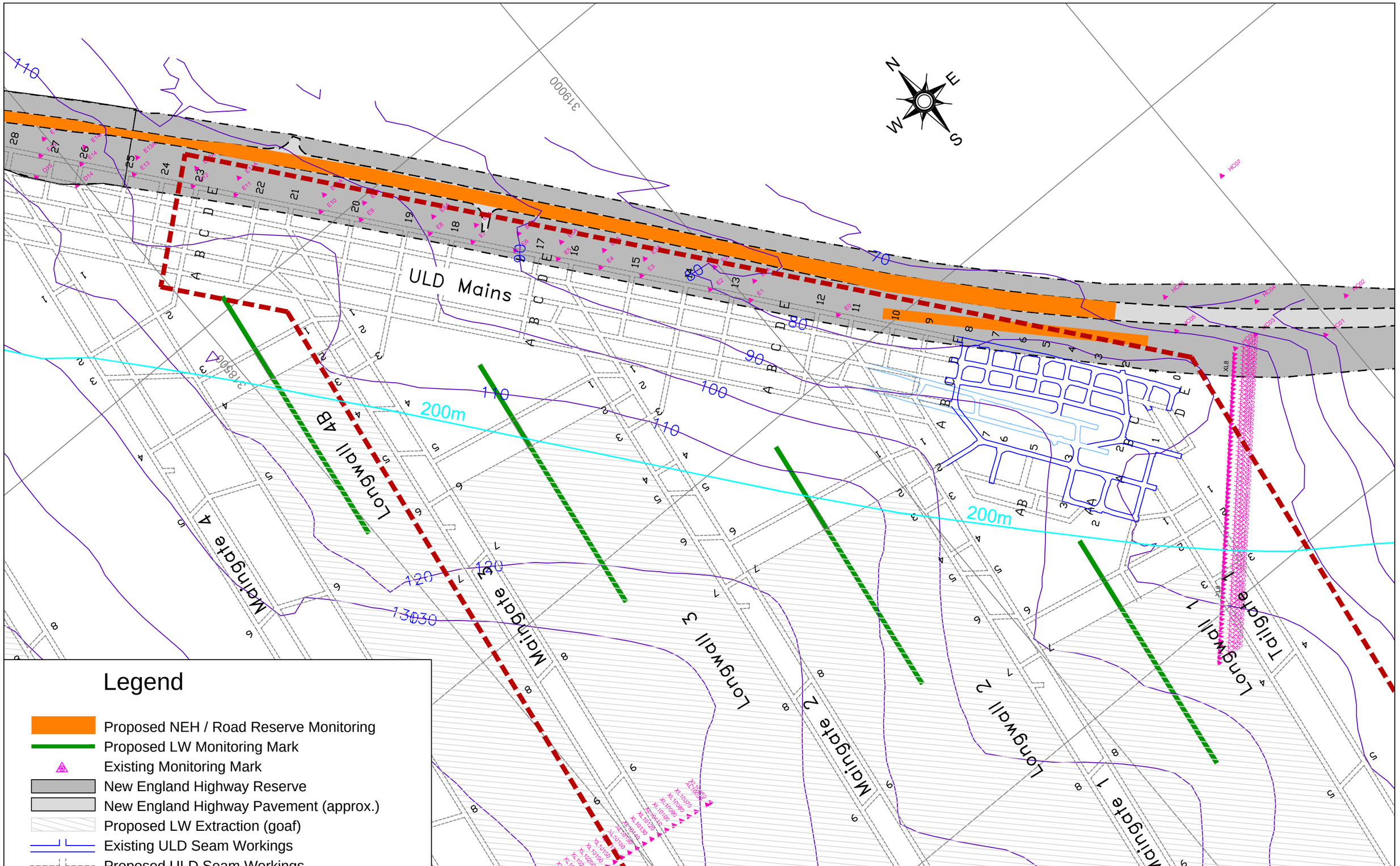
AshtonCoal
PO Box 699 Singleton NSW 2330
Phone 61+ 02 6576 1111 Fax 61+ 02 6576 1122

ASHTON UNDERGROUND MINE
SUBSIDENCE MARKS
LW6B to LW8 - MONITORING PROGRAM

Drawing No.	Revision No.
A–3041	4

Date	Scale:	Drawn	Checked	Approved	Sheet Size
29/08/11	1:2500	JIP			A1

This page has been left blank intentionally



Legend

- Proposed NEH / Road Reserve Monitoring
- Proposed LW Monitoring Mark
- Existing Monitoring Mark
- New England Highway Reserve
- New England Highway Pavement (approx.)
- Proposed LW Extraction (goaf)
- Existing ULD Seam Workings
- Proposed ULD Seam Workings
- Existing Inter-seam Drift Roadways
- 126 Depth of Cover Contours (10m interval)
- First Workings Approval Boundary
- 200m offset from Road Reserve

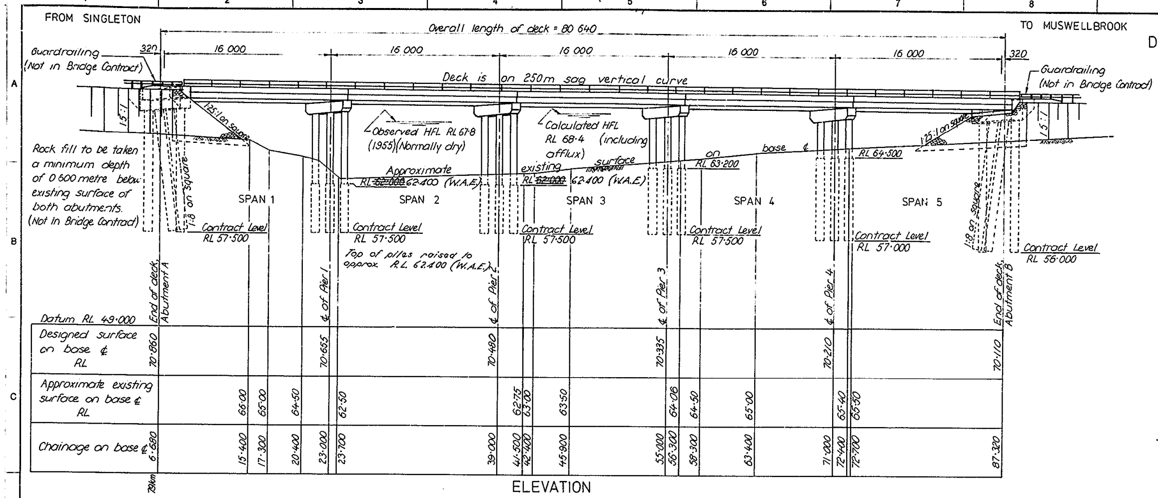
AshtonCoal
PO Box 699 Singleton NSW 2330
Phone 61+ 02 6576 1111 Fax 61+ 02 6576 1122

ASHTON UNDERGROUND MINE
New England Highway, Road Reserve & Cutting
Proposed Subsidence Monitoring - ULD Seam

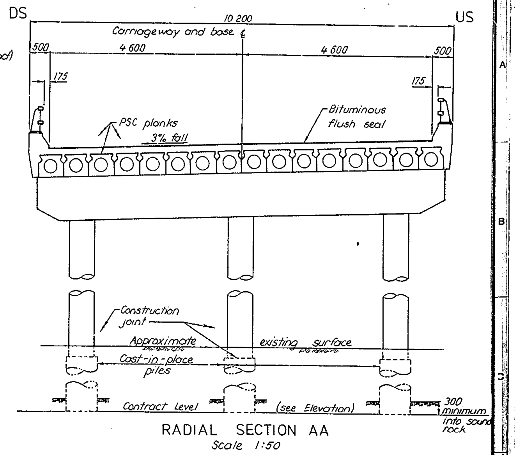
Drawing No.	Revision No.
B–3001	1

Date	Scale:	Drawn	Checked	Approved	Sheet Size
28/06/11	1:4000	JIP	PF		A3

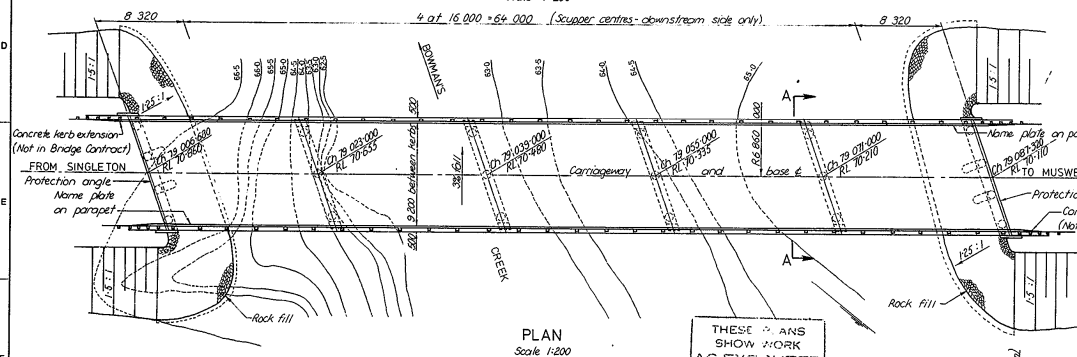
This page has been left blank intentionally



ELEVATION
Scale 1:200

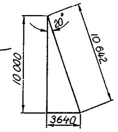


RADIAL SECTION AA
Scale 1:50



PLAN
Scale 1:200

THESE PLANS SHOW WORK AS EXECUTED



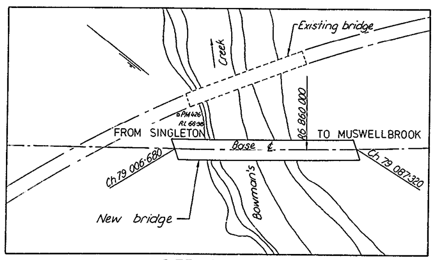
SKEW DIAGRAM
Not to scale

SCHEDULE OF DRAWINGS

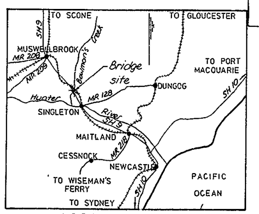
Sheet No	Title
1	General Arrangement
2	Bore Details
3	Piles - Layout and Details
4	Abutment A
5	Abutment B
6	Piers
7	Precast Pre-tensioned Concrete Plank
8	Deck - Setting Out Data
9	Deck
10	Deck - Details
11	Traffic Barrier Railing
12	Bar Shapes Diagram and Steel List

GENERAL NOTES

Scales as shown.
Dimensions are in millimetres.
Chainages and reduced levels are in metres.
Reduced levels are related to the Australian Height Datum.
The Bridge Contract does not include any works in the approaches, flush seal or the demolition of the existing bridge.
~~US denotes upstream.~~
DS denotes downstream.

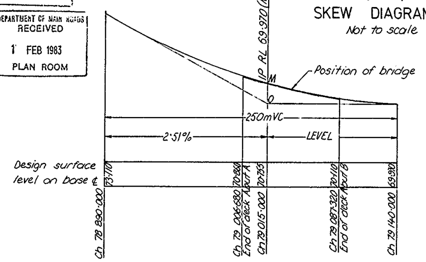


SITE PLAN
Scale 1:1000



LOCALITY PLAN
Scale 1:1 500 000
Bridge site is 16.1 kilometres north of Singleton which is 253 km from Sydney by road and 238 km by rail.

DEPARTMENT OF MAIN ROADS RECEIVED 1 FEB 1983 PLAN ROOM



VERTICAL ALIGNMENT
Not to scale

WORK AS EXECUTED
Engineer
Date 24.1.83

SET No. 8

DEPARTMENT OF MAIN ROADS, N.S.W.

STATE HIGHWAY No 9 — SHIRE OF SINGLETON

BRIDGE OVER BOWMAN'S CREEK
16.1km NORTH OF SINGLETON

GENERAL ARRANGEMENT

REGN. No. OF PLANS 0009 402 BC 0917
DESIGN LOADING: NAASRA 1976
SHEET No. 1 — No. OF SHEETS 12

CHIEF ENGINEER (BRIDGES) DATE 14-7-80
APPROVED ENGINEER-IN-CHIEF DATE 14-7-80

REDUCTION RATIO 21.2x

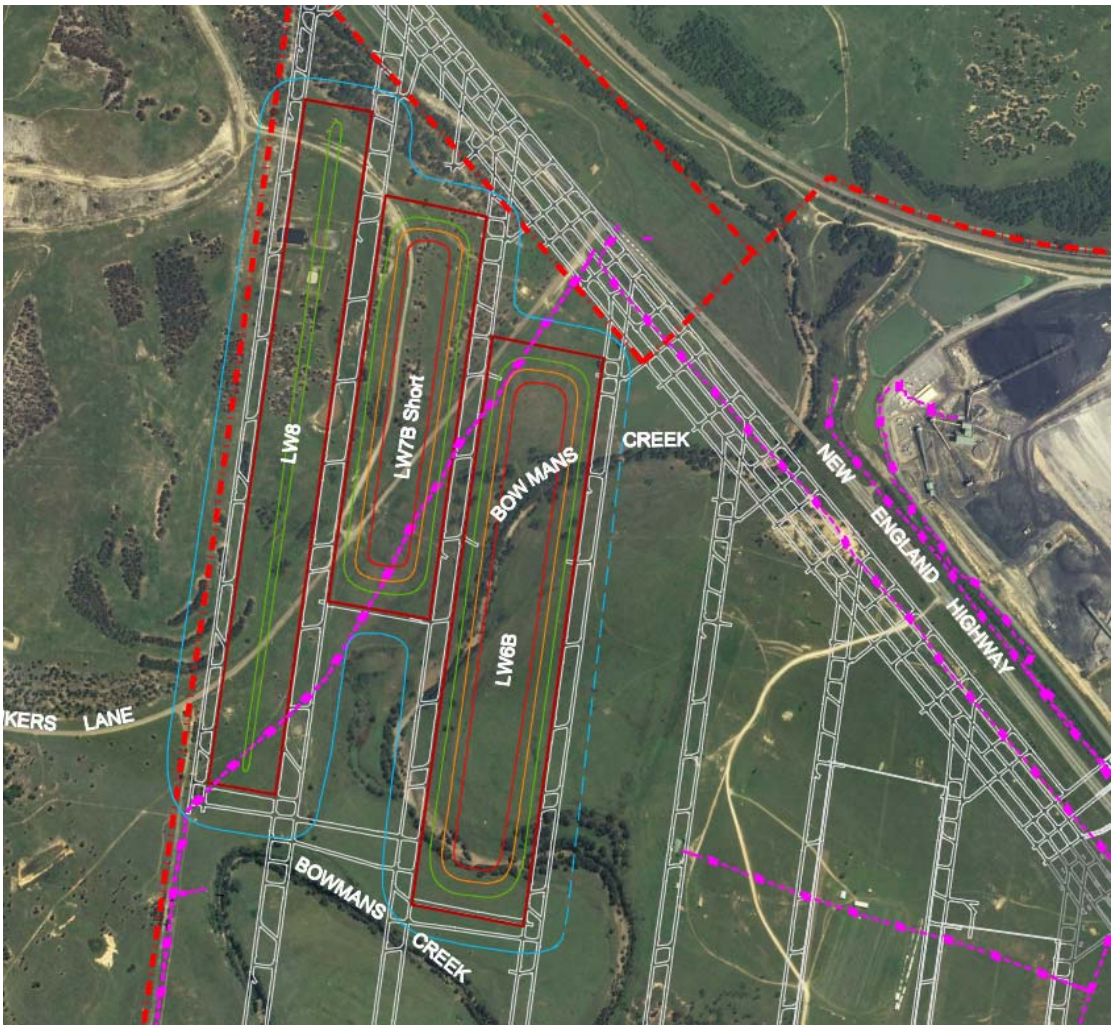
MICROBOX

This page has been left blank intentionally

ASHTON COAL PROJECT

ASSET MANAGEMENT PLAN
TELSTRA ASSETS
PG LW 6B, 7B (SHORT) & 8

Version C – February 2012



Ashton Coal Operations Pty Limited

Glennies Creek Road
Camberwell NSW 2330
Tel: 02 6576 1111
Fax: 02 6576 1122

Table of Contents

Version History

Version	Status	Details	Authors	Authorised/Approved for Issue	
				Name/Position	Date
A	Draft	For Consultation	P. Fletcher & AECOM	P. Fletcher	20/05/2011
B	Final	For Distribution	P. Fletcher & AECOM	P. Fletcher	30/08/11
C	Final	For Distribution	P. Fletcher & AECOM	P. Fletcher	16/02/2012

External Consultation

Org.	Nominated Rep.	Version	Date Issued	Comments
Telstra	Project Administration, Network Integrity Services	A	07/07/2011	

1 INTRODUCTION

This Asset Management Plan (AMP) has been prepared to identify and manage predicted subsidence impacts on Telstra assets associated with the Ashton Coal Project (ACP). The scope of this management plan is second workings associated with LW 6B, 7B (Short) & 8 in the Pikes Gully (PG) Seam.

The Ashton Coal Environmental Management Strategy (see **Figure 1** of the Built Features Management Plan) provides the strategic context for the environmental management of the ACP. Extraction Plans form part of the Environmental Management Strategy and are required by the ACP development consent. Each Extraction Plan provides a framework for the management of subsidence impacts associated with Ashton Coal Operation Limited's (ACOL) underground mining activities. Extraction Plans detail the proposed workings, including dimensions, overburden depth and mining schedule. Impacts to man-made features are addressed through the Built Features Management Plan, under which individual Asset Management Plans detail the consultation, monitoring and management of infrastructure for each asset-owner.

This Asset Management Plan outlines ACOL's statutory requirements relating to monitoring and management of subsidence impacts on Telstra assets within the mining lease (ML) 1533, as well as consultation, monitoring and reporting requirements. Relevant built features have been identified in consultation with Telstra, and are detailed in **Section 3**. Whilst Telstra assets are not expected to be significantly impacted by subsidence, measures to address potential disruption to electricity infrastructure are detailed within **Section 5**.

Precautionary management measures include:

- If required, undertaking repairs to telephone lines as a result of mine subsidence.

It is anticipated that these measures will mitigate potential service disruption as a result of subsidence related impacts.

2 LEGAL REQUIREMENTS AND GUIDELINES

This document has been prepared in accordance with the development consent (DA 309-11-2001-i), relevant legislation and guidelines, and in consultation with relevant government agencies and affected infrastructure owners as discussed below.

2.1 DEVELOPMENT CONSENT

Condition 3.12(g) to DA-309-11-2001-i requires that ACOL prepare a BFMP to the satisfaction of the Department of Trade and Investment, Regional Infrastructure and Services (DTIRIS) (formerly the Department of Industry & Investment) "*which has been prepared in consultation with the owner/s of potentially affected feature/s, to manage the potential subsidence impacts and/or environmental consequences of the proposed second workings.*"

Condition 3.10 of the development consent establishes subsidence impact performance measures relating to built features and public infrastructure. Under the development consent, ACOL must ensure that underground mining does not cause any exceedances of these performance measures to the satisfaction of the Director-General (Planning).

The development consent also includes the following requirement relevant to telecommunications, as per Condition 7.24:

> *The Applicant shall, to the satisfaction of telecommunications providers and at its own cost, or by agreement with relevant parties, undertake the relocation of any telecommunications cables which may be required as a result of the development.*

Additionally under Schedule C, Item 3 of the development consent ACOL's commitments include "*Damage to existing third party-owned infrastructure due to the ACOL induced subsidence will be mitigated or remediated."*

2.2 CONSULTATION REQUIREMENTS

Should significant amendments to this document be required prior to implementation, the amendments will be made in consultation with Telstra and to the satisfaction of DTIRIS (Minerals & Energy). Contact details of the relevant stakeholders are listed in **Table 1**.

Table 1 Relevant Stakeholders and Representatives

Organisation	Contact	Phone	Address
Telstra	Project Administration, Network Integrity Services	1800 653 935	Locked Bay 5035 Parramatta NSW 2124
Mine Subsidence Board	District Manager	(02) 6572 4344	PO Box 524 Singleton NSW 2330
DTIRIS, Minerals and Energy	Principal Subsidence Engineer	(02) 4931 6644	PO Box 344 Hunter Region Mail Centre NSW 2310
Xstrata – Ravensworth Operations	Technical Services Manager	(02) 6570 0700	PO Box 524 Singleton NSW 2330
Macquarie Generation	Operations Manager	(02) 6542 0711	Private Mail Bag 2 Muswellbrook NSW 2333

3 SCOPE

This management plan addresses potential subsidence impacts to Telstra assets potentially affected by underground mining (secondary extraction) of LW 6B, 7B (Short) and 8 in the Pikes Gully (PG) seam only. The subsidence predictions, affected assets and likely subsidence impacts are summarised below.

3.1 PREDICTED SUBSIDENCE

Subsidence resulting from extraction of LW 6B, 7B (Short) and 8 in the PG Seam is variable based on the width of the panel, overburden depth and chain pillar barrier widths. Maximum predicted subsidence values (worst case scenarios) for extraction of these panels, as presented in **Table** 2 have been adopted for the purposes of this management plan.

Table 2 Maximum Subsidence Predictions (PG seam only)

Panel	Maximum Subsidence (m)	Maximum Tilt (mm/m)	Maximum Strain (mm/m)
LW6B	1.6	70	30
LW7B	1.6	70	30
LW8	0.7	40	20

Source: SCT Operations (2011) Subsidence Assessment for Ashton Coal Mine Longwalls 6B to 8 in the Pikes Gully Seam based on the Bowman's Creek Diversion Mine Plan

Future extraction of lower coal seams is not currently covered in this management plan and the values shown in **Table 2** are not the final subsidence values for the site.

3.2 DESCRIPTION OF ASSETS & SUBSIDENCE IMPACTS[1]

The Mining Lease area is traversed by a number of underground telecommunication cables owned and serviced by Telstra as shown in **Figure 2**. These provide telecommunications services access to the following:

- NoW Stream Gauging Station on Bowman's Creek ; and
- Property No. 153 (Xstrata - Ravensworth Operations Pty Ltd).

It is noted that an additional line through Property No. 155 previously serviced the NoW gauging station and provides future connection for subdivided blocks that form part of the south eastern extent of the Ravensworth Operations Pty Ltd lease.

Impacts will be limited to a single Telstra line which crosses LW6B, 7B (Short) & 8 (see **Figure 2**). To date, mining has not impacted the serviceability of the Telstra cables. Telstra cables are expected to remain serviceable throughout mining activities associated with LW6B, 7B (Short) & 8. Technical advice by SCT (2011) suggests that buried multi-core cables can accommodate strains up to about 20mm/m. Mining subsidence in LW 6B is predicted to result in strains potential in exceedance of this tolerance threshold. However, Telstra cables are expected to remain serviceable throughout mining activities associated with LW6B, 7B (Short) & 8.

4 PERFORMANCE MEASURES

ACOL will aim to ensure that all built features owned by Telstra affected by subsidence are always maintained as safe and serviceable where subsidence related impacts are realised. Unless other arrangements are in place, ACOL commits to fully compensate Telstra as the asset owner if serviceability is not maintained as a result of subsidence impacts. Any subsidence damage from ACOL's mining activities will be repaired as necessary, or else replaced or fully compensated or be dealt with under the terms of an access or compensation agreement.

The subsidence impact performance measures relevant to Telstra assets under consent condition 3.10 are summarised in **Table 4** while more specific objectives and performance measures, developed by ACOL, are listed in **Table 5** below.

[1] Potential subsidence impacts identified by SCT (2011). Report titled: 'Subsidence Assessment for Longwalls 6B to 8 in the Pikes Gully Seam based on the Bowmans Creek Diversion Mine Plan.'

Table 3 Subsidence Impact Performance Measures

Built Features	Performance Measure
Other built features, including other public infrastructure.	• Always safe. • Serviceability should be maintained wherever practicable. Loss of serviceability must be fully compensated. • Damage must be fully repaired or replaced, or else fully compensated.
Public Safety	No additional risk.

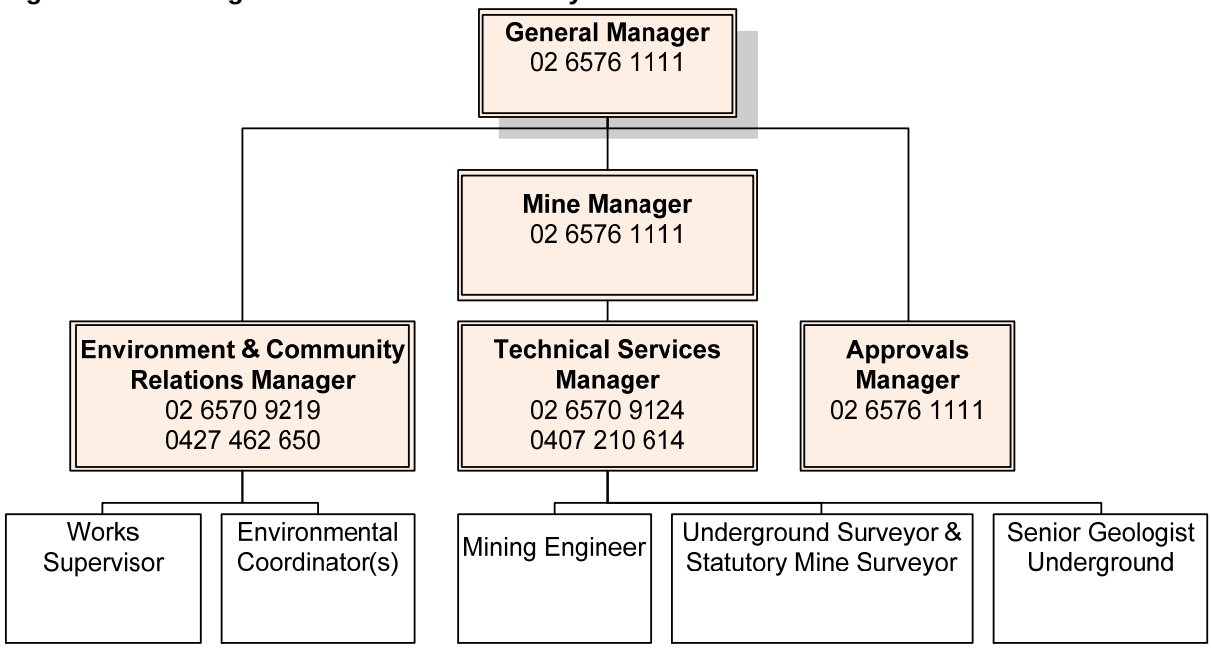
Table 4 Telstra Asset Management Objectives

Objective	Target
• To minimise telecommunications disruptions to local residents, companies or the wider community.	• Damage to underground Telstra cables is repaired following subsidence.

5 MANAGEMENT PLAN RESPONSIBILITIES

A summarised ACOL organisation chart, as relevant to this AMP is provided in **Figure 1**. The full organisation structure for the underground mine is contained within the Extraction Plan main document.

Figure 1 ACOL Organisation Chart - Summary Outline



This page has been left blank intentionally

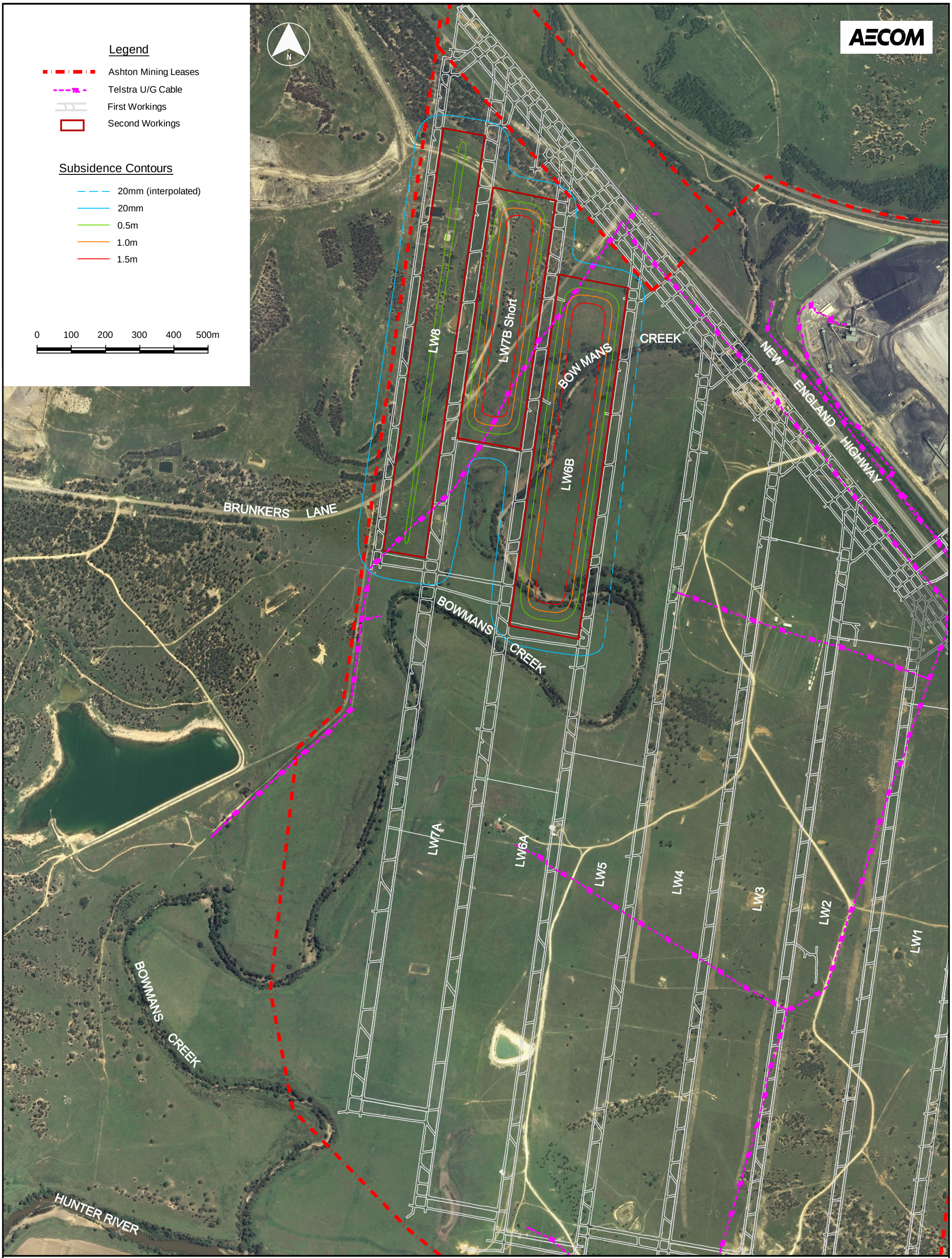
6 SUBSIDENCE MANAGEMENT

The actions that ACOL undertakes to fulfil the consent conditions outlined in **Section *2*** and to meet performance measures outlined in **Section 4** are shown in **Table 6**. These suggested actions have been categorised into Monitoring, Management, Incident Response and Notification/Consultation.

Table 5: Monitoring, Management and Responsibilities

Item	Action	Trigger/Timing	Responsibility	Reporting
1.0	**Monitoring**			
1.1	An accredited service locator will be used to find and mark the position of all Telstra cables throughout the Mining Lease area. Ashton Surveyors will then record the position of all cables. This information will assist in locating the cables to undertake repairs (if required) and to ensure that other subsidence remediation activities do not inadvertently damage sub-surface cables.	Pre-mining (completed).	Underground Mine Engineer	Nil
1.2	Cables will be tested to confirm they are in working order.	Prior to telecommunications cable being affected by subsidence (pre-mining).	Underground Mine Engineer	Nil
1.3	Post-mining monitoring and ongoing liaison with affected stakeholders will assist to identify any subsidence-induced damage to cables and highlight if any repairs are required.	Completion of active subsidence.	Underground Mine Engineer	Nil
1.4	Where cables are not in service, a qualified contractor will be engaged to confirm the future serviceability of these cables at the completion of mining.	Completion of active subsidence.	Underground Mine Engineer	Fortnightly Status Report
2.0	**Management**			
2.1	Provide alternative data storage and transmission for NoW stream gauging station or maintain in an operational state.	Prior to telecommunications cable being affected by subsidence.	Ashton Environmental Officer	Fortnightly Status Report

Item	Action	Trigger/Timing	Responsibility	Reporting
3.0	**Incident Response**			
3.1	Engage a suitably qualified communications engineer/technician (in consultation with Telstra) to test and repair telecommunications infrastructure damaged by subsidence. Repairs will then be undertaken in consultation with Telstra and the affected property owner (i.e. if cables are located on, or accessed via Property No. 130, 153 or 155).	If liaison with residents indicates either total loss, degraded quality or intermittent access of communications in the subsurface cables.	Ashton Environmental Officer	Fortnightly Status Report
4.0	**Notification, Consultation & Reporting**			
4.1	Liaise with Telstra representatives to undertake subsidence monitoring of affected Telstra assets.	Pre and posting mining	Ashton Environmental Officer	Email
4.2	Provide notification to Telstra representatives as the longwall face approaches Telstra assets within the site. This will ensure that for asset management purposes, Telstra are aware of potential subsidence impacts on their assets.	As longwall face approaches Telstra assets and once the longwall face has passed.	Ashton Environmental Officer	Fortnightly Status Report
4.3	Telstra to be provided with a copy of subsidence monitoring data.	Post-surveys	Ashton Environmental Officer	Email



AshtonCoal

Telstra Asset Management Plan
PG LW6B, 7B Short & 8

Figure 2

This page has been left blank intentionally

ASHTON COAL PROJECT

ASSET MANAGEMENT PLAN
AAPT (POWERTEL) ASSETS
PG LW 6B, 7B (SHORT) & 8

Version C – February 2012

Ashton Coal Operations Pty Limited

Glennies Creek Road
Camberwell NSW 2330
Tel: 02 6576 1111
Fax: 02 6576 1122

Table of Contents

Version History

Version	Status	Details	Authors	Authorised/Approved for Issue	
				Name/Position	Date
A	Draft	For consultation	P. Fletcher & AECOM	P. Fletcher	20/05/2011
B	Final	For Distribution	P. Fletcher & AECOM	P. Fletcher	30/08/2011
C	Final	For Distribution	P. Fletcher & AECOM	P. Fletcher	16/02/2012

External Consultation

Org.	Nominated Rep.	Version	Date Issued	Comments
AAPT (Powertel)	Asset Manager	A	June 2011	

1 INTRODUCTION

This Asset Management Plan (AMP) has been prepared to identify and manage predicted subsidence impacts on AAPT (PowerTel) assets associated with the Ashton Coal Project (ACP). The scope of this management plan includes first and second workings associated with LW 6B, 7B (short) & 8 in the Pikes Gully (PG) Seam.

The Ashton Coal Environmental Management Strategy (see **Figure 1** of the Built Features Management Plan) provides the strategic context for the environmental management of the ACP. Extraction Plans form part of the Environmental Management Strategy and are required by the ACP development consent. Each Extraction Plan provides a framework for the management of subsidence impacts associated with Ashton Coal Operation Limited's (ACOL) underground mining activities. Extraction Plans detail the proposed workings, including dimensions, overburden depth and mining schedule. Impacts to man-made features are addressed through the Built Features Management Plan, under which individual Asset Management Plans detail the consultation, monitoring and management of infrastructure for each asset-owner.

This Asset Management Plan outlines ACOL's statutory requirements relating to monitoring and management of AAPT assets within mining lease (ML) 1533, as well as consultation, monitoring and reporting requirements. Relevant built features have been identified in consultation with AAPT, and are detailed in **Section 3**.

AAPT assets consist of a single fibre optic cable located parallel to the New England Highway road reserve. The cable will not experience subsidence impacts due to its distance from the long wall panels and current overburden depth.

Whilst AAPT assets are not expected to be significantly impacted by subsidence, measures to address potential disruption to this asset are detailed within **Section 5**. These measures include appropriate incident response to repair cable using a suitably qualified communications engineer or technician in consultation with AAPT.

2 LEGAL REQUIREMENTS AND GUIDELINES

This document has been prepared in accordance with development consent (DA 309-11-2001-i), relevant legislation and guidelines, and in consultation with relevant government agencies and affected infrastructure owners as discussed below.

2.1 DEVELOPMENT CONSENT

Condition 3.12(g) to DA 309-11-2001-i requires that ACOL prepare a BFMP to the satisfaction of the Department of Trade and Investment, Regional Infrastructure Services (DTIRIS – formerly Industry & Investment NSW) "*which has been prepared in consultation with the owner/s of potentially affected feature/s, to manage the potential subsidence impacts and/or environmental consequences of the proposed second workings.*"

Condition 3.10 of the development consent establishes subsidence impact performance measures relating to built features and public infrastructure. Under the development consent, ACOL must ensure that underground mining does not cause any exceedances of these performance measures to the satisfaction of the Director-General (Planning). The

development consent performance measures, as well as more detailed performance measures developed by ACOL for AAPT assets are provided in **Section 4**.

The development consent also includes the following requirement relevant to telecommunications, as per Condition 7.24:

> *The Applicant shall, to the satisfaction of telecommunications providers and at its own cost, or by agreement with relevant parties, undertake the relocation of any telecommunications cables which may be required as a result of the development.*

Additionally under Schedule C, Item 3 of the development consent ACOL's commitments include "*Existing surface infrastructure will be maintained to be safe, serviceable and repairable manner unless the owner agrees otherwise in writing."* and "*Damage to existing third party-owned infrastructure due to the ACOL induced subsidence will be mitigated or remediated."*

2.2 CONSULTATION REQUIREMENTS

Should significant amendments to this document be required prior to implementation, the amendments will be made in consultation with AAPT and to the satisfaction of DTIRIS (Minerals & Energy). Contact details of the relevant stakeholders are listed in **Table 1**.

Table 1 Stakeholders and Representatives

Organisation	Contact	Phone	Address
AAPT	Asset Manager	(02) 9009 3072	Level 11, 55 Clarence Street, Sydney NSW 2000
Mine Subsidence Board	District Manager	(02) 6572-4344	PO Box 524 Singleton NSW 2330
DTIRIS, Minerals & Energy	Principal Subsidence Engineer	(02) 4931 6644	PO Box 344 Hunter Region Mail Centre NSW 2310

3 SCOPE

This management plan addresses potential subsidence impacts to AAPT assets potentially affected by underground mining (secondary extraction) of LW 6B, 7B (short) and 8 in the Pikes Gully (PG) seam only. The subsidence predictions, affected assets and likely subsidence impacts are summarised below.

3.1 PREDICTED SUBSIDENCE

Subsidence resulting from extraction of LW 6B, 7B (short) and 8 in the PG Seam is variable based on the width of the panel, overburden depth and chain pillar barrier widths. Subsidence movement at the location of the fibre optic cable associated with mining in the PG (Pikes Gully) Seam are expected to be small in magnitude and of a general body nature that is not expected to impact on the fibre optic cable (SCT 2011)[1]. Subsidence contours shown in **Figure 2** indicate that the AAPT fibre optic cable is beyond the expected extent of discernable subsidence impacts. Maximum predicted subsidence values (worst case scenarios) for extraction of these panels are presented in **Table** 2.

Table 2 Maximum Subsidence Predictions (PG seam only)

Panel	Maximum Subsidence (m)	Maximum Tilt (mm/m)	Maximum Strain (mm/m)
LW6B	1.6	70	30
LW7B	1.6	70	30
LW8	0.7	40	20

Source: SCT Operations (2011) Subsidence Assessment for Ashton Coal Mine Longwalls 6B to 8 in the Pikes Gully Seam based on the Bowman's Creek Diversion Mine Plan (Report # ASH3687)

Future extraction of lower coal seams is not currently covered in this management plan and the values shown in **Table 2** are not the final subsidence values for the site.

3.2 DESCRIPTION OF ASSETS & SUBSIDENCE IMPACTS[1]

Consultation with AAPT (PowerTel) indicates that a fibre optic telecommunications cable is located adjacent to the New England Highway road reserve (**Figure 2**). The fibre optic cable runs adjacent to the northern end of LW 6B where the overburden depth is approximately 120m. This cable is a major telecommunications link between Sydney and Brisbane.

Impacts: The fibre optic cable will not be affected by mine subsidence associated with LW6B, 7B short & 8. The location of this cable has been surveyed and marked. It is located over the development headings and is unlikely to experience any vertical subsidence or differential movements.

4 PERFORMANCE MEASURES

ACOL will aim to ensure that all built features owned by AAPT affected by subsidence are always maintained as safe and serviceable where subsidence related impacts are realised. Any subsidence damage from ACOL's mining activities will be repaired as necessary, or else replaced or fully compensated or be dealt with under the terms of an access or compensation agreement.

The subsidence impact performance measures relevant to AAPT assets under Consent Condition 3.10 are summarised in **Table 3** while more specific objectives and performance measures, developed by ACOL, are listed in **Table 4** below.

Table 3 Subsidence Impact Performance Measures

Built Features	Performance Measure
Other built features, including other public infrastructure.	Always safe. Serviceability should be maintained wherever practicable. Loss of serviceability must be fully compensated. Damage must be fully repaired or replaced, or else fully compensated.
Public Safety	No additional risk.

Specific objectives and performance outcomes that have been developed for AAPT assets affected by subsidence are summarised in **Table 4** below.

[1] Potential subsidence impacts identified by SCT (2011). Report titled: 'Subsidence Assessment for Longwalls 6B to 8 in the Pikes Gully Seam based on the Bowmans Creek Diversion Mine Plan.'

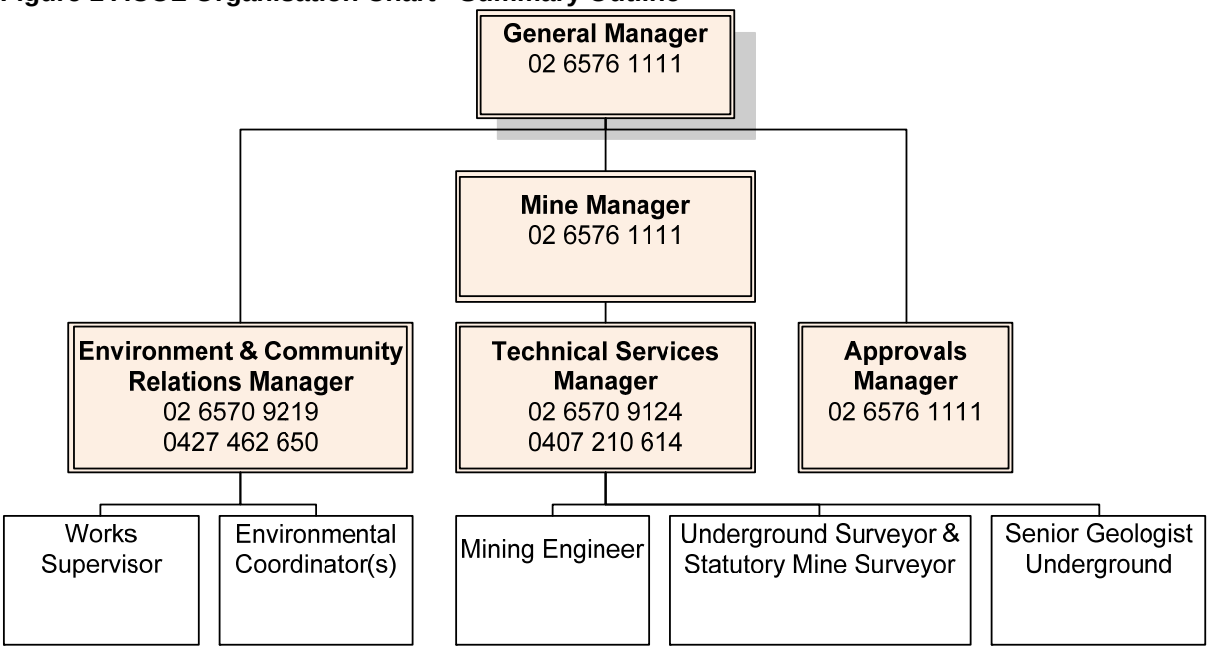
Table 4 AAPT Asset Management Objectives

Objective	Target
• To maintain serviceability at all times.	• No subsidence at or around fibre optic cable. • No damage to fibre optic cable.

5 MANAGEMENT PLAN RESPONSIBILITIES

A summarised ACOL organisation chart, as relevant to this AMP is provided in **Figure 1**. The full organisation structure for the underground mine is contained within the Extraction Plan main document.

Figure 1 ACOL Organisation Chart - Summary Outline



This page has been left blank intentionally

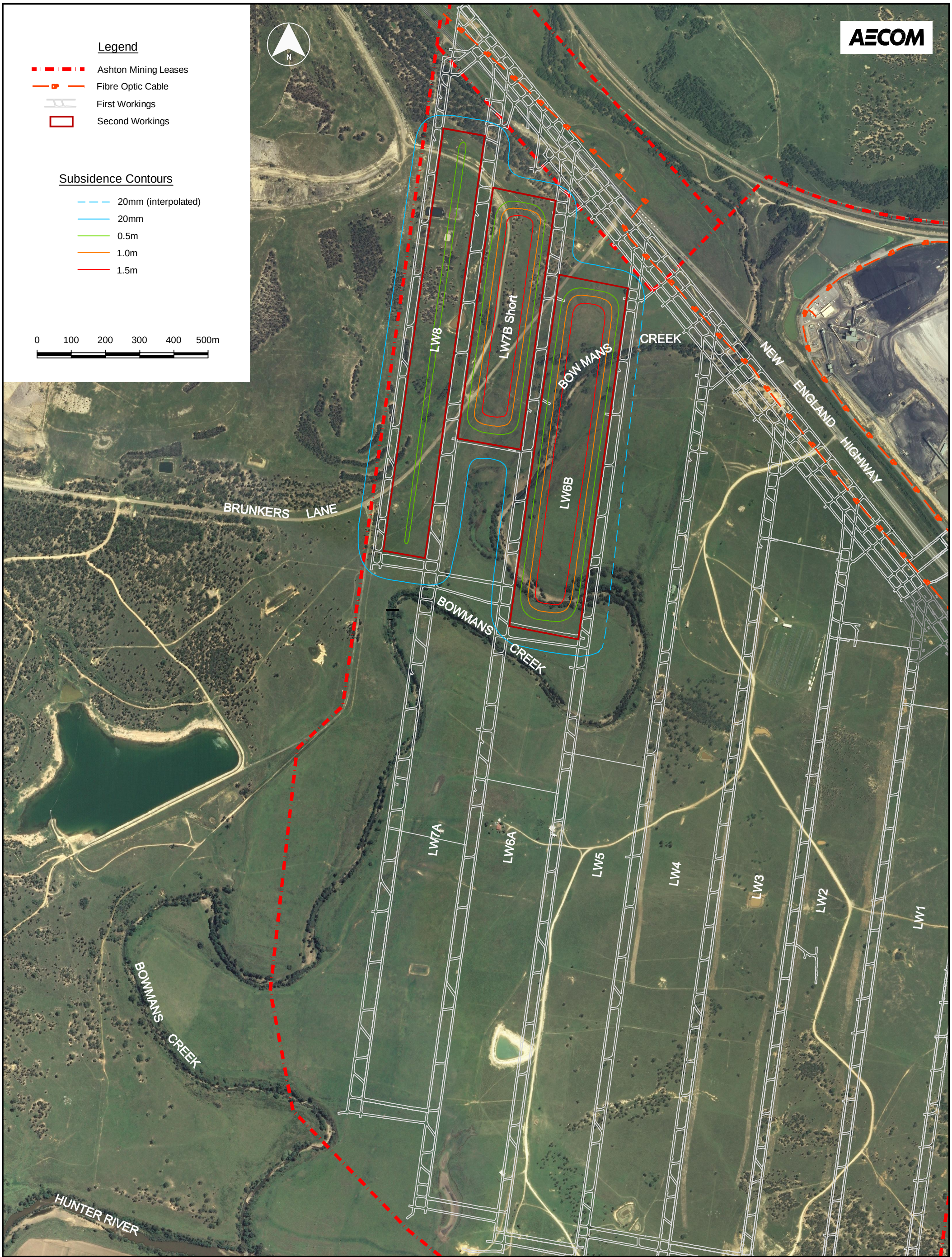
6 SUBSIDENCE MANAGEMENT

The actions that ACOL undertakes to fulfil the consent conditions outlined in **Section 2** and to meet performance measures outlined in **Section 4** are shown in **Table 5**. These actions have been categorised into Monitoring, Management, Incident Response and Notification/Consultation.

Table 5: Monitoring, Management and Responsibilities

Item	Action	Trigger/Timing	Responsibility	Reporting
1.0	**Monitoring**			
1.1	An accredited service locator will be used to find and mark the position of the fibre optic cable in relation to the subsidence area. Ashton Surveyors will then record the position of all cables. This information will assist in locating the cables for future reference and to ensure that other subsidence remediation activities do not inadvertently damage sub-surface cables.	Pre-mining (completed)	Underground Mine Engineer	Nil
1.2	Monitoring will assist to identify any subsidence-induced damage to cables and highlight if any repairs are required.	Completion of active subsidence.	Underground Mine Engineer	Fortnightly Status Report
2.0	**Management**			
2.1	The cable is outside the area that will be influenced by subsidence and therefore no additional management actions are currently proposed.			
3.0	**Incident Response**			
3.1	Engage a suitably qualified communications engineer/technician (in consultation with AAPT) to test and repair telecommunications infrastructure damaged by subsidence. Repairs to be undertaken in consultation with AAPT and	Following completion of active subsidence, if liaison with AAPT indicates either total loss of communications, degraded quality or intermittent access in the fibre optic cables.	Ashton Mining Engineer	Fortnightly Status Report

Item	Action	Trigger/Timing	Responsibility	Reporting
	any affected property owners (i.e. if the damaged portion of cable is located on, or accessed via private property).			
4.0	**Notification, Consultation & Reporting**			
4.1	Provide notification to AAPT representatives as the longwall face approaches the fibre optic cable. This will ensure that for asset management purposes, AAPT are aware of potential subsidence impacts on their assets.	As longwall face approaches AAPT assets and once the longwall face has passed.	Ashton Mining Engineer	Fortnightly Status Report
4.2	The results of the telecommunication cable monitoring will be reported to AAPT.	At completion of each panel.	Ashton Surveyor	Email



AshtonCoal

AAPT (PowerTel) Asset Management Plan
PG LW6B, 7B Short & 8

Figure 2

This page has been left blank intentionally

ASHTON COAL PROJECT

ASSET MANAGEMENT PLAN
ASHTON COAL ASSETS
PG LW6B, 7B (SHORT) & 8

Version 23/05/2013

Ashton Coal Operations Pty Limited

Glennies Creek Road
Camberwell NSW 2330
Tel: 02 6576 1111
Fax: 02 6576 1122

Table of Contents

Version History

Version	Status	Details	Authors	Authorised/Approved for Issue	
				Name/Position	Date
A	Final	For Distribution	P. Fletcher & AECOM	P. Fletcher	30/08/2011
B	Final	For Distribution	P. Fletcher & AECOM	P. Fletcher	17/02/2012
23/05/2013	Final	For Distribution	A. McGuigan & AECOM	A. McGuigan	23/05/2013

1 INTRODUCTION

This Asset Management Plan (AMP) has been prepared to identify and manage predicted subsidence impacts on Ashton Coal Operations Limited's (ACOL) assets associated with the Ashton Coal Project (ACP). The scope of this management plan is second workings associated with LW 6B, 7B (Short) & 8 in the Pikes Gully (PG) Seam.

The Ashton Coal Environmental Management Strategy (see Figure 1 of the Built Features Management Plan) provides the strategic context for the environmental management of the ACP. Extraction Plans form part of the Environmental Management Strategy and are required by the ACP development consent. Each Extraction Plan provides a framework for the management of subsidence impacts associated with Ashton Coal Operation Limited's (ACOL) underground mining activities. Extraction Plans detail the proposed workings, including dimensions, overburden depth and mining schedule. Impacts to man-made features are addressed through the Built Features Management Plan, under which individual Asset Management Plans detail the consultation, monitoring and management of infrastructure for each asset-owner.

This Asset Management Plan outlines ACOL's statutory requirements relating to monitoring and management of subsidence impacts on ACOL assets within mining lease (ML) 1533, as well as consultation, monitoring and reporting requirements. Relevant built features have been identified in consultation with ACOL staff, and are detailed in **Section 3**. Whilst ACOL assets are not expected to be significantly impacted by subsidence, measures to address potential subsidence impacts are detailed within **Section 6**.

Management measures include:

- Survey monitoring of the Bowmans Creek Diversion;
- Continuous flow monitoring of potentially affected sections of pipeline;
- Draining of a spill basin potentially affected by subsidence based on the results of a risk based assessment; and
- Repairs to gates and fences as required.

It is anticipated that these measures will ensure that ACOL assets are not disrupted as a result of subsidence related impacts.

2 LEGAL REQUIREMENTS AND GUIDELINES

This document has been prepared in accordance with development consent (DA 309-11-2001-i), relevant legislation and guidelines, and in consultation with relevant government agencies and affected infrastructure owners as discussed below.

2.1 DEVELOPMENT CONSENT

Condition 3.12(g) to DA 309-11-2001-MOD6 requires that ACOL prepare a BFMP to the satisfaction of the Department of Trade and Investment, Regional Infrastructure and Services (DTIRIS) (formerly the Department of Industry & Investment) "*which has been prepared in consultation with the owner/s of potentially affected feature/s, to manage the potential subsidence impacts and/or environmental consequences of the proposed second workings.*"

Condition 3.10 of the development consent establishes subsidence impact performance measures relating to built features and public infrastructure. Under the development consent, ACOL must ensure that underground mining does not cause any exceedances of these performance measures to the satisfaction of the Director-General (Planning).

Additionally under Schedule 3, Item 3 of the development consent ACOL's commitments include "*Existing surface infrastructure will be maintained to be safe, serviceable and repairable manner unless the owner agrees otherwise in writing.*"

2.2 CONSULTATION REQUIREMENTS

Should significant amendments to this document be required prior to implementation, the amendments will be made in consultation with ACOL management staff and to the satisfaction of DTIRIS (Minerals & Energy). Contact details of the relevant stakeholders are listed in **Table 1**.

Table 1 Consultation Requirements

Organisation	Contact	Phone	Address
ACOL	Underground Mine Manager	(02) 6576 1111	Glennies Creek Road Camberwell, NSW 2330
Mine Subsidence Board	District Manager	(02) 6572 4344	PO Box 524 Singleton NSW 2330
DTIRIS, Minerals and Energy	Principal Subsidence Engineer	(02) 4931 6644	PO Box 344 Hunter Region Mail Centre NSW 2310

3 SCOPE

This management plan addresses potential subsidence impacts to ACOL assets potentially affected by underground mining (secondary extraction) of LW 6B, 7B (Short) and 8 in the Pikes Gully (PG) seam only. The subsidence predictions, affected assets and likely subsidence impacts are summarised below.

3.1 PREDICTED SUBSIDENCE

Subsidence resulting from extraction of LW 6B, 7B (Short) and 8 in the PG Seam is variable based on the width of the panel, overburden depth and chain pillar barrier widths. Maximum predicted subsidence values (worst case scenarios) for extraction of these panels, as presented in **Table 2** have been adopted for the purposes of this management plan.

Table 2 Maximum Subsidence Predictions (PG Seam only)

Panel	Maximum Subsidence (m)	Maximum Tilt (mm/m)	Maximum Strain (mm/m)
LW6B	1.6	70	30
LW7B	1.6	70	30
LW8	0.7	40	20

Source: SCT Operations (2011) Subsidence Assessment for Ashton Coal Mine Longwalls 6B to 8 in the Pikes Gully Seam based on the Bowman's Creek Diversion Mine Plan

Future extraction of lower coal seams is not currently covered in this management plan and values shown in **Table 2** are not the final subsidence values for the site.

3.2 DESCRIPTION OF ASSETS AND SUBSIDENCE IMPACTS[1]

ACOL assets located within the ACOL underground subsidence impact zone are depicted in **Figure 2** and include:

- Bowmans Creek Diversion;
- Fences and associated structures;
- Tailings Pipelines;
- Spill Basin; and
- Goaf Gas Drainage Boreholes.

Monitoring, Management, Incident Response and Notification/Consultation in relation to each of these assets are outlined within **Section 6**.

3.2.1 Bowmans Creek Diversion

From November 2012 surface water flow will be diverted into the constructed creek (eastern) diversion. This will prevent low flows from entering the excised creek section above LW6B. The redirection of water will be controlled by a block bank which will initially be constructed to a height equivalent to the 6 month ARI flow height level. This will enable flows greater than the 6 month ARI flow level to be divided between the exercised section and the constructed diversion, which will act to slow flow velocities in the diverted channel, minimising scour and erosion of the constructed channel during the initial operating phase of the diversion.

However, if during the undermining of the excised creek section there is a significant increase in mine inflows then the block bank will be constructed to the full height. This procedure was fully described in the BCD EA.

Impacts: The eastern creek diversion channel has been designed and constructed to lie generally beyond the limits of subsidence for LW6B and will therefore be unaffected by subsidence. However, block banks and land areas adjacent to the high bank of the constructed diversion channel are expected to experience vertical subsidence generally under 20mm although up to 0.1m in some locations (SCT 2011). Hence there is potential for minor tensile cracking to occur in these areas as a result of subsidence movements, which may require some repair following subsidence.

3.2.2 Fences

The use of fences and gates are primarily for property boundary fencing between neighbouring landholdings and along roadsides. Fences are constructed of a combination of iron and wooden posts with multiple wire strands.

Impacts: Ground tilt and subsidence is likely to cause posts to tilt in opposite directions or towards each other, causing tension and possible breakage, or sag of wires, respectively. Tilt of a gate's hinge post may result in the gate being unable to fully open or close. Damage to fences and gates may then allow stock to escape (if present).

3.2.3 Tailings Pipelines

A group of ACOL owned polyethylene pipes cross from Ravensworth Final Void #4 East to the ACOL Coal Handling Preparation Plant (CHPP). These pipelines allow for tailings

[1] Potential subsidence impacts identified by SCT (2011). Report titled: 'Subsidence Assessment for Longwalls 6B to 8 in the Pikes Gully Seam based on the Bowmans Creek Diversion Mine Plan.'

transfer and water reclamation from Void 4. The pipelines traverse MacGen owned land passing across the northern extent of LW8 and 7B before passing beneath Lemington Road and continuing to the CHPP (see **Figure 2**). The pipes are exposed within an open containment trench on MacGen land and are managed under an existing access agreement. Pipelines on ACOL land are buried within a shallow trench from Lemington Road to Bowmans Creek where they pass in close proximity of the northern extent of LW6B.

Impacts: Exposed lengths of pipeline are not expected to be affected as a result of subsidence movements beyond minor effects on sediment accumulation within the pipe as a result of grade changes.

Buried sections of pipeline in proximity of LW6B are expected to experience the full range of subsidence movements relative to their proximity to the goaf (see **Figure 2**). Whilst the predicted strains may exceed the 5-10mm/m working strains of polyethylene, it is not expected that contact between the pipe and ground would be sufficiently tight to transfer all of the ground strain to the pipe. Whilst potential for damage exists where there is good contact and subsidence movements are concentrated at large cracks or compression humps, it is noted that similarly buried pipelines over LW1-7 have not been adversely affected by mine subsidence. Continuous flow monitoring is undertaken to identify pipeline leakage via the CHPP.

3.2.4 Spill Basin

A spill basin is located along the North West side of Lemington Road and is designed to collect water resulting from a tailings pipeline spill event and a 20 year stormwater event.

Impacts: The spill basin borders the area of predicted subsidence impacts. Subsidence impacts at this location are expected to reach a maximum of 20mm. However there is potential for permanent and temporary tensile cracking to occur as a result of subsidence movements and some repair following subsidence may be required.

3.2.5 Goaf Gas Drainage Boreholes

Ashton has approval to construct three goaf gas drainage boreholes within the extraction area of LW6B (DA 309-11-2001-I MOD7). However, it has since been determined that only one gas bore will be required to be constructed for LW6B. This will be located in the southeast corner of the longwall panel on ACOL owned land (see **Figure 2**). Site access will be via the realigned Lemington Road.

Impacts: Proposed ACOL goaf gas drainage boreholes have been designed to accommodate subsidence impacts and will not be significantly affected by mining of LW6B in the Pikes Gully Seam.

4 PERFORMANCE MEASURES

ACOL will aim to ensure that all built features owned by ACOL affected by subsidence are always maintained as safe and serviceable where subsidence related impacts are realised. Any subsidence damage from ACOL's mining activities will be repaired as necessary, or else replaced, fully compensated or dealt with under the terms of an access or compensation agreement.

The subsidence impact performance measures relevant to ACOL assets under Consent Condition 3.10 are summarised in **Table 3** while more specific objectives and performance measures, developed by ACOL, are listed in **Table 4** below.

Table 3 Subsidence Impact Performance Measures

Built Features	Performance Measure
• Other built features, including other public infrastructure.	• Always safe. • Serviceability should be maintained wherever practicable.
• Public Safety	• No Additional Risk

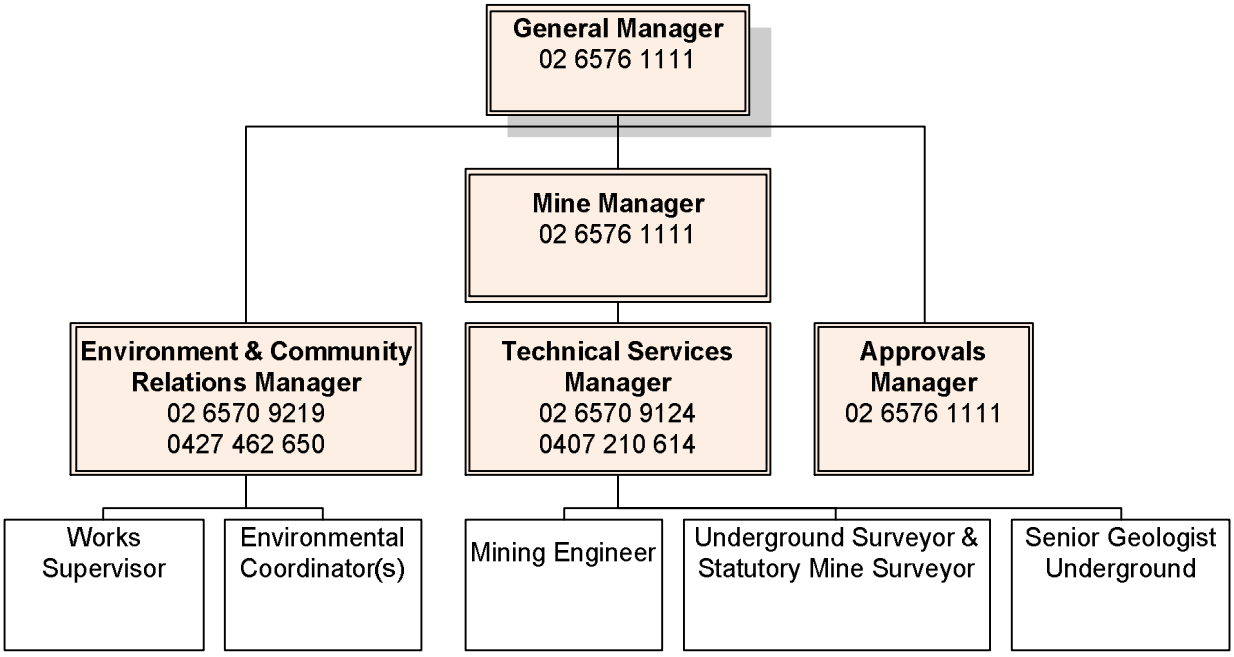
Table 4 ACOL Asset Management Objectives

Objective	Target
• To ensure unplanned disruptions to ACOL operations do not occur as a result of subsidence related damage to roads, water storages, pipelines, buildings and/or powerlines • To avoid public safety hazards from damaged infrastructure.	• All infrastructure is assessed regularly and any required mitigation / relocation works are carried out prior to undermining. • No disruptions occur due to subsidence induced damage to infrastructure.

5 MANAGEMENT PLAN RESPONSIBILITIES

A summarised ACOL organisation chart, as relevant to this AMP is provided in **Figure 1**. The full organisation structure for the underground mine is contained within the Extraction Plan main document.

Figure 1 ACOL Organisation Chart - Summary Outline



6 MANAGEMENT, MONITORING AND RESPONSIBILITIES

The actions that ACOL undertakes to fulfil the consent conditions outlined in **Section *2*** and to meet performance measures outlined in **Section 4** are shown in **Table 5**. These actions have been categorised into Monitoring, Management, Incident Response and Notification/Consultation.

Table 5 Management, Monitoring and Responsibilities

Item	Feature	Action	Trigger/Timing	Responsibility	Reporting
1.0		**Monitoring**			
1.1	Fences	Visual inspection / monitoring of gates and fences on private property and ACOL boundary fences.	• Prior to commencement of mining; • Documented weekly visual investigations during mining; and • At completion of each longwall panel.	Ashton Underground Mining Engineer	SMP Status Report.
1.2	Tailings Pipelines	Visual inspection of exposed sections of pipeline.	• Prior to commencement of mining; • Documented weekly visual investigations during mining; and • At completion of each longwall panel.	Ashton CHPP Manager	SMP Status Report.
1.3	Tailings Pipelines	Continuous flow monitoring to identify pipeline leakage via CHPP control room.	When operating/in use	Ashton CHPP Manager	Nil
1.4	Tailings Pipelines	Additional monitoring per CHPP general monitoring.	When operating/in use	Ashton CHPP Manager	Nil
1.5	Spill Basin	Pre-mining monitoring of spill basin to include a survey regarding shape, wall height, level of spillway depth, storage capacity and photographic record.	Prior to longwall impacts.	Ashton Underground Mining Engineer / Survey Team	End-of-Panel Report

Item	Feature	Action	Trigger/Timing	Responsibility	Reporting
1.6	Spill Basin	Visual inspections of spill basin. Monitoring of spill basin to detect any subsidence impacts that may require management and water level monitoring.	During long wall extraction; weekly visual inspections of spill basin behind the longwall face and up to 80m in front of the longwall.	Ashton Underground Mining Engineer	SMP Status Report
1.7	Spill Basin	Final survey to determine post subsidence shape, wall height, level of spillway, depth, storage capacity, and photographic record.	Following completion of active subsidence.	Ashton Underground Mining Engineer	End-of-Panel Report
1.8	Bowmans Creek Diversion	Survey monitoring of potentially impacted areas of the Bowmans creek diversion high bank and block banks to detect any subsidence impacts.	• Pre mining impacts; • Periodically during mining; and • Post Mining. Survey frequency is detailed further in Table 1 of the Subsidence Monitoring Program.	Ashton Underground Mining Engineer	End-of-Panel Report
1.9	Block Banks (Bowmans Creek Diversion)	Pre-mining survey regarding shape, block bank heights and photographic record.	Prior to longwall impacts.	Ashton Underground Mining Engineer	SMP Status Report
		Visual inspection to identify potential subsidence impacts, verify the integrity of the block banks, identify cracking or surface erosion and obtain a photographic record.	Weekly during active subsidence. Following rainfall (>50mm in 24 hours)	Ashton Underground Mining Engineer	SMP Status Report
		Final survey to determine post subsidence shape, block bank height and photographic record.	Following completion of active subsidence.	Ashton Underground Mining Engineer	SMP Status Report

Item	Feature	Action	Trigger/Timing	Responsibility	Reporting
2.0		**Management**			
2.1	Tailings Pipelines	Ensure access agreement is in place.	Prior to requiring access to Property No. 155 (MacGen land) and ongoing.	Ashton Underground Mining Engineer	Nil
2.2	Spill Basin	Partially or completely draining spill basin.	Prior to longwall extraction. Based on results of risk based assessment.	Ashton Underground Mining Engineer	End-of-Panel Report
2.3	Proposed ACOL gas drainage boreholes	Construct gas drainage boreholes in accordance with statutory approvals (in particular the development consent, and approved Mining Operations Plan, Erosion and Sediment Control Plan and Archaeology and Cultural Heritage Management Plan).	Construction of gas wells.	Ashton Underground Mining Engineer	Nil
3.0		**Incident Response**			
3.1	Fences	Repairs to fences and gates as required.	If damage occurs, at completion of subsidence.	Ashton Underground Mining Engineer	End-of-Panel Report
3.2	Spill Basin	Repair/remediation to spill basin.	Any damage observed during monitoring activities.	Ashton Underground Mining Engineer	End-of-Panel Report

Item	Feature	Action	Trigger/Timing	Responsibility	Reporting
3.3	Tailings Pipelines	Repair.	Any damage observed during monitoring activities.	Ashton Underground Mining Engineer	End-of-Panel Report
3.4	Bowmans Creek Diversion (including block banks)	Repair/remediation.	Any damage observed during monitoring activities.	Ashton Underground Mining Engineer / Environment and Community Relations Manager	End-of-Panel Report
4.0		**Notification/Consultation**			
External consultation requirements are addressed within the BFMP and relevant Asset Management Plans.					

Legend

- Ashton Mining Leases
- Road
- Pipeline Overflow
- First Workings (PG Seam)
- Second Workings
- House/Buildings
- Fences
- Pipeline
- ACOL Goaf
- GW04 — Gas Drainage BH (PG)
- Lemington Road

Subsidence Contours

- 20mm (interpolated)
- 20mm
- 0.5m
- 1.0m
- 1.5m

0 100 200 300 400 500m

1 : 20000 (A3) 1 : 10000 (A1)

AECOM

N

Pipeline Overflow

GW17

GW15

GW08

CREEK

BOW MANS

NEW ENGLAND HIGHWAY

LW8

LW7B Short

LW6B

EASTERN DIVERSION

BOWMANS CREEK

LW7A

LW6B

LW5

LW4

LW3

LW2

LW1

NARAMA DAM

WESTERN DIVERSION

BOWMANS CREEK

HUNTER RIVER

AshtonCoal

ACOL Assets Management Plan
PG LW6B, 7B Short & 8

Figure 2

This page has been left blank intentionally

ASHTON COAL PROJECT

ASSET MANAGEMENT PLAN
LEMINGTON ROAD
PIKES GULLY SEAM
LW 6B

Version Date: 23/08/2013

FINAL

Extraction Plan PG LW 6B

Ashton Coal Operations Pty Limited

Glennies Creek Road
Camberwell NSW 2330
Tel: 02 6576 1111
Fax: 02 6576 1122

Table of Contents

Version History

Version	Status	Details	Authors	Authorised/Approved for Issue	
				Name/Position	Date
23/08/2013	Draft	For Consultation & Approval	ACOL & AECOM	M. Moore / Approvals Manager	23/08/2013
23/08/2013	Final	Modified after stakeholder consultation	A.M°Guigan	D.Gibson	23/08/2013

1 INTRODUCTION

This Asset Management Plan (AMP) has been prepared to identify and manage predicted subsidence impacts to the new alignment of Lemington Road resulting from extraction of longwall 6B (LW6B) in the Pikes Gully Seam at the Ashton Coal Project (ACP). The scope of this management plan includes that part of Lemington Road and associated assets potentially affected by LW6B.

The Ashton Coal Environmental Management Strategy (see **Figure 1** of the Built Features Management Plan) provides the strategic context for the environmental management of the ACP. Extraction Plans form part of the Environmental Management Strategy and are required by the ACP development consent. Each Extraction Plan provides a framework for the management of subsidence impacts associated with Ashton Coal Operation Limited's (ACOL) underground mining activities. The Extraction Plans detail the proposed workings, including dimensions, overburden depth and a proposed mining schedule. Impacts to man-made features are addressed through the Built Features Management Plan, under which individual AMPs detail the proposed consultation, monitoring and management of infrastructure for each asset-owner.

This AMP outlines ACOL's statutory requirements relating to subsidence management of Lemington Road within mining lease (ML) 1533, as well as consultation, monitoring and reporting requirements. The new alignment of Lemington Road was constructed by Xstrata – Ravensworth Operations Pty Ltd (Ravensworth) as part of the adjacent Ravensworth Operations Project. The realigned road has been constructed over the alignment of a private access road known previously as Brunkers Lane. (Note the Mine Subsidence Board has approved the road realignment for Pikes Gully extraction, see **Attachment A**).

Public traffic commenced using the new alignment of Lemington Road in August 2012 and Brunkers Lane is now defunct. Lemington Road now traverses the northwest corner of ML 1533 on land currently owned by Macquarie Generation[1]. That section of the road that traverses LW6B is expected to incur subsidence impacts; albeit that these impacts are expected as a result of the final 50m of LW6B panel extraction (SCT 2012).

It is acknowledged that at the time of writing this AMP, ACOL and Ravensworth are finalising an agreement that sets out the responsibilities and requirements of both parties for the maintenance and repair (or reinstatement or relocation, as may be required) of Lemington Road, resulting from subsidence from ACOL's approved mine plan; to ensure the long term serviceability and safety of the road. This AMP compliments the requirements of the draft agreement.

[1] Note that at the time of preparation of this AMP the ownership and responsibility for the new alignment of Lemington Road had not been transferred to Singleton Council

2 LEGAL REQUIREMENTS

This document has been prepared in accordance with the conditions of development consent DA 309-11-2001-i for the ACP and in consultation with relevant government authorities, land owners and affected infrastructure owners, as discussed below.

In May 2011, ACOL entered into an agreement with Macquarie Generation for the carrying out of longwall mining and associated surface activities in that part of the mining lease encompassed by Macquarie Generation owned land.

2.1 ACOL DEVELOPMENT CONSENT

Condition 3.10 to Schedule 2 of the development consent establishes subsidence impact performance measures relating to built features and public infrastructure. Under the development consent, ACOL must ensure that underground mining does not cause any exceedances of these performance measures to the satisfaction of the Director-General (DP&I). The development consent performance measures, as well as more detailed performance measures developed by ACOL for Lemington Road are provided in **Section 0** of this AMP.

Condition 3.12(g) to Schedule 2 of DA 309-11-2001-i requires that ACOL prepare a BFMP to the satisfaction of the Department of Trade and Investment, Division of Resources and Energy (DRE):

> *"which has been prepared in consultation with the owner/s of potentially affected feature/s, to manage the potential subsidence impacts and/or environmental consequences of the proposed second workings."*

Conditions 7.14 and 7.15 to Schedule 2 of DA 309-11-2001-i set out specific requirements relating to Lemington Road:

7.14 The Applicant shall, together with the owner of the Ravensworth Operations Project, commission and implement a detailed report on a final alignment for Lemington Road, to the satisfaction of the Director-General. The report shall be prepared by an independent person/s whose appointment has been approved by the Director-General, and must:

a) be commissioned by 30 June 2011 and be finalised by 31 March 2012;

b) be prepared in consultation with Council, the RTA, MSB and Macquarie Generation;

c) consider predicted subsidence impacts associated with the proposed extraction by the Applicant of each seam that it is permitted to extract within the underground mining area (including as to whether a stacked or offset panel alignment is employed), and proposed management of these subsidence impacts (including the safety of the public and other road users);

d) assess any need for the final realignment to vary from the interim realignment, including consideration of the most appropriate status for the final alignment (i.e. public or private road) and most appropriate timing of construction;

e) identify a preferred option for the final alignment of Lemington Road;

f) assess the environmental, social and economic impacts associated with the realignment options, particularly the preferred option;

g) determine the most appropriate responsibility for funding ongoing maintenance of the realigned roadway, including costs associated with repair of any future subsidence-related impacts on the roadway; and

h) include an action plan for implementation of its recommendations, including any variation to the interim alignment and the funding of monitoring and management costs.

If so directed by the Director-General, the Applicant shall, together with the owner of the Ravensworth Operations Project, commission and implement additional reports following extraction of each seam that the Applicant is permitted to extract. Each such additional report shall review the impacts of previous subsidence on Lemington Road/Brunkers Lane, review existing measures to monitor and manage subsidence impacts, and recommend appropriate monitoring and management measures to address future subsidence impacts (including any continuing need to realign Lemington Road), to the satisfaction of the Director-General.

The Applicant shall fund 50% of the costs of reports prepared under this condition and shall implement the recommendations of such reports, to the satisfaction of the Director-General.

Any dispute over the interpretation or implementation of reports prepared under this condition shall be determined by the Director-General, whose decision shall be final.

7.15 The Applicant shall be responsible for implementing controls to ensure road traffic safety (including monitoring, maintenance and repairs of subsidence impacts) during any longwall extraction which may cause subsidence impacts to Brunkers Lane/Lemington Road.

Note: The responsibility for implementing controls exists notwithstanding that funding of these controls may come from other parties, such as the owner of the Ravensworth Operations Project or the MSB.

2.2 RAVENSWORTH OPERATIONS PROJECT APPROVAL

Conditions 44 to 47 of Schedule 3 to the Ravensworth Operations Project Approval (09_0176) sets out Ravensworth's requirements relating to Lemington Road:

Road and Intersection Construction

44. The Proponent shall:

i) realign Lemington Road and its intersection with the mine access road to the satisfaction of Council, prior to mining within 200 metres of the existing road alignment;

j) upgrade the realigned Lemington Road / New England Highway intersection to the satisfaction of the RTA, prior to commissioning the realigned Lemington Road;

k) upgrade the RCT access road / Liddell Station Road intersection to the satisfaction of Council, prior to the commencement of construction associated with the RCT/RCHPP; and

l) construct the conveyor bridge over the New England Highway to the satisfaction of the RTA.

Note: The Lemington Road realignment works include the closure of the existing alignment to public traffic.

Lemington Road Realignment

45. *The Proponent shall construct the Lemington Road realignment in a manner that can reasonably withstand the subsidence impacts resulting from the Ashton underground coal mine (for mining operations approved under DA309-11-2001, as modified up to and including any approval to DA309-11-2001 Mod 6), to the satisfaction of the MSB.*

46. *Unless the Proponent and the owner of the Ashton underground mine agree otherwise, the Proponent shall pay Ashton's reasonable costs associated with the monitoring and management of subsidence related impacts on the realigned Lemington Road resulting from the Ashton underground coal mine (for mining operations approved as above), to the satisfaction of the Director-General.*

If there are any disputes in relation to the implementation of this condition, then any party may refer the matter to the Director-General for resolution.

Lemington Road Realignment Review

47. *The Proponent shall, together with the owner of the Ashton underground coal mine, commission and implement a detailed report on a final alignment for Lemington Road, to the satisfaction of the Director-General. The report shall be prepared by an independent person is whose appointment has been approved by the Director-General, and must:*

    a) *be commissioned by 30 June 2011 and be finalised by 31 March 2012;*

    b) *be prepared in consultation with Council, the RTA, MSB and Macquarie Generation;*

    c) *consider predicted subsidence impacts associated with the proposed extraction by the Ashton underground coal mine (for mining operations approved under DA309-11-2001, as modified up to and including DA309-11-2001 Mod 6) of each seam that it is permitted to extract within the underground mining area (including as to whether a stacked or offset panel alignment is employed), and proposed management of these subsidence impacts (including the safety of the public and other road users);*

    d) *assess any need for the final realignment to vary from the interim realignment, including consideration of the most appropriate status for the final alignment (i.e. public or private road) and most appropriate timing of construction;*

    e) *identify a preferred option for the final alignment of Lemington Road;*

    f) *assess the environmental, social and economic impacts associated with the realignment options, particularly the preferred option;*

    g) *determine the most appropriate responsibility for funding ongoing maintenance of the realigned roadway, including costs associated with repair of any future subsidence-related impacts on the roadway; and*

    h) *include an action plan for implementation of its recommendations, including any variation to the interim alignment and the funding of monitoring and management costs.*

    If so directed by the Director-General, the Proponent shall, together with the owner of the Ashton underground coal mine, commission and implement additional reports following extraction of each seam that the owner of the Ashton underground coal mine is permitted to extract (for mining operations approved under DA309-11-2001, as modified up to and including DA309-11-2001 Mod 6). Each such additional report shall review the

impacts of previous subsidence on Lemington Road/Brunkers Lane, review existing measures to monitor and manage subsidence impacts, and recommend appropriate monitoring and management measures to address future subsidence impacts (including any continuing need to realign Lemington Road), to the satisfaction of the Director-General.

The Proponent shall fund 50% of the costs of reports prepared under this condition and shall implement the recommendations of such reports, to the satisfaction of the Director-General.

Any dispute over the interpretation or implementation of reports prepared under this condition shall be determined by the Director-General, whose decision shall be final.

Notes:
1) *The owner of the Ashton underground coal mine will be expected to fund the other 50 percent of report costs and to have similar responsibilities regarding implementation.*
2) *Stacked or offset panel alignments for the Upper Liddell, Upper Lower Liddell and Lower Barrett seams are shown in the plans to DA309-11-2001.*

2.3 MONITORING, MANAGEMENT, MITIGATION & RESPONSIBILITIES

While ACOL is responsible for implementing controls to ensure road traffic safety (including monitoring, maintenance and repairs of subsidence impacts) during any longwall extraction which may cause subsidence impacts to Lemington Road, Ravensworth is responsible for:

- Constructing the road to reasonably withstand subsidence impacts (as approved by DA 309-11-2001-i); and
- Paying reasonable costs incurred by ACOL associated with the monitoring, management, maintenance and repair of subsidence related impacts to Lemington Road, resulting from longwall extraction at the ACP.

ACOL will continue to consult with Ravensworth to ensure both parties meet their respective Lemington Road management responsibilities associated with the extraction of PG LW6B.

3 CONSULTATION REQUIREMENTS

Should significant amendments to this document be required prior to implementation, the amendments will be made in consultation with Ravensworth (as the current road owner), Singleton Council (as the likely future road and land owner), Macquarie Generation (as the current land owner), and to the satisfaction of DRE. Matters may be referred to the Director-General (DP&I) for resolution in the event of a dispute between stakeholders listed under the ACOL development consent and Ravensworth project approval. Contact details of these relevant stakeholders are listed in **Table 1**.

Table 1 Relevant Stakeholders and Representatives

ORGANISATION	CONTACT	PHONE	ADDRESS
Xstrata - Ravensworth Operations Pty Ltd	Environment & Community Relations Manager	(02) 6570 0700 (Manned 24hrs)	PO Box 294 Muswellbrook NSW 2333
Singleton Council	Manager Works	Enquiries (02) 6578 7290 After Hours (02) 6572 1400	PO Box 314 Singleton NSW 2330
Macquarie Generation	Commercial Manager	(02) 6542 0711	Private Mail Bag 2 Muswellbrook NSW 2333
Mine Subsidence Board (MSB)	District Manager	(02) 6572 4344	PO Box 524 Singleton NSW 2330
Department of Trade and Investment, Division of Resources and Energy (DRE)	Principal Subsidence Engineer	(02) 4931 6644	PO Box 344 Hunter Region Mail Centre NSW 2310
Department of Planning & Infrastructure (DP&I)	Manager Mining Projects	(02) 9228 6308	GPO Box 39, Sydney NSW 2001

4 ASSETS AND IMPACTS

4.1 DESCRIPTION OF ASSETS

Lemington Road has been realigned over the alignment of Brunkers Lane (refer to **Figure 1**) on Macquarie Generation owned land and traverses over the north-western corner of LW6B. Since August 2012 the road has been used to convey public traffic. However, at the time of preparing this AMP, the road has not yet fully been handed over to Singleton Council, and currently does not formally form part of the council managed public road system. This AMP only relates to that part of Lemington Road impacted by subsidence associated with extraction of LW6B in the PG Seam.

4.2 PREDICTED IMPACTS

Subsidence impacts were considered for PG Seam LW 6B - 8 by SCT (2011) and presented in a technical report dated February 2011. This assessment showed that subsidence resulting from extraction of LW6B is variable based on the width of the panel, overburden depth and chain pillar barrier widths. The predicted maximum incremental subsidence values (worst case scenarios) for extraction of LW6B is presented in **Table 2**. This assessment considered impacts to Brunkers Lane but not the realigned Lemington Road.

Table 2 Maximum Subsidence Predictions (from mining the PG Seam only) (SCT 2011)

PANEL	MAXIMUM SUBSIDENCE (M)	MAXIMUM TILT (MM/M)	MAXIMUM STRAIN (MM/M)
LW6B	1.6	70	30

LW6B is the only remaining longwall block within the PG Seam to be extracted at the ACP that undermines part of the new Lemington Road. The two previous mined longwall blocks (LW7B and 8) were completed prior to the road being finalised.

Consequently, the subsidence assessment for LW6B has been updated to consider the potential subsidence impacts to the new alignment of Lemington Road (SCT, 2012) (refer **Attachment B**). The subsidence effects associated with that part of the panel underlying Lemington Road are summarised in and are generally consistent with the findings in the original 2011 assessment.

Table 3 Subsidence Movements Predicted at North-western Corner of LW6B (SCT 2012)

SUBSIDENCE PARAMETER	MAGNITUDE AND LOCATION
Subsidence on Diagonal from panel corner (m)	0.06 at corner, 0.2 at 30m, 0.5 at 60m
Tilt (mm/m)	29 at 50m from corner
Horizontal movement (m)	0.15m at 50m from corner
Strain (mm/m)	4.9 in tension at 26m from corner, 6.3 in compression at 65m from corner

Note: Subsidence prediction locations are internal to the panel boundary.

Future extraction of lower coal seams is not covered in this management plan, and the values shown in **Table 2** and are not the final subsidence values for the site. Key subsidence impacts associated with extraction of LW6B on Lemington Road are expected to include:

- Vertical Subsidence
- Tensile Strains
- Surface Cracking
- Minor Subsidence Movements

The predicted extent and orientation of subsidence effects on the road are directly related to the alignment of the road with respect to the orientation of the longwall panel.

Vertical Subsidence of up to 200-300mm is anticipated as a result of secondary extraction of LW6B. Because the road traverses diagonally across the north-western corner of the panel there is likely to be 50-100mm more subsidence on the south-bound lane than the north-bound lane, with largest strains and tilts expected to occur across the road. Vertical subsidence is expected to cause deterioration in ride quality and could lead to pooling of water during rain events.

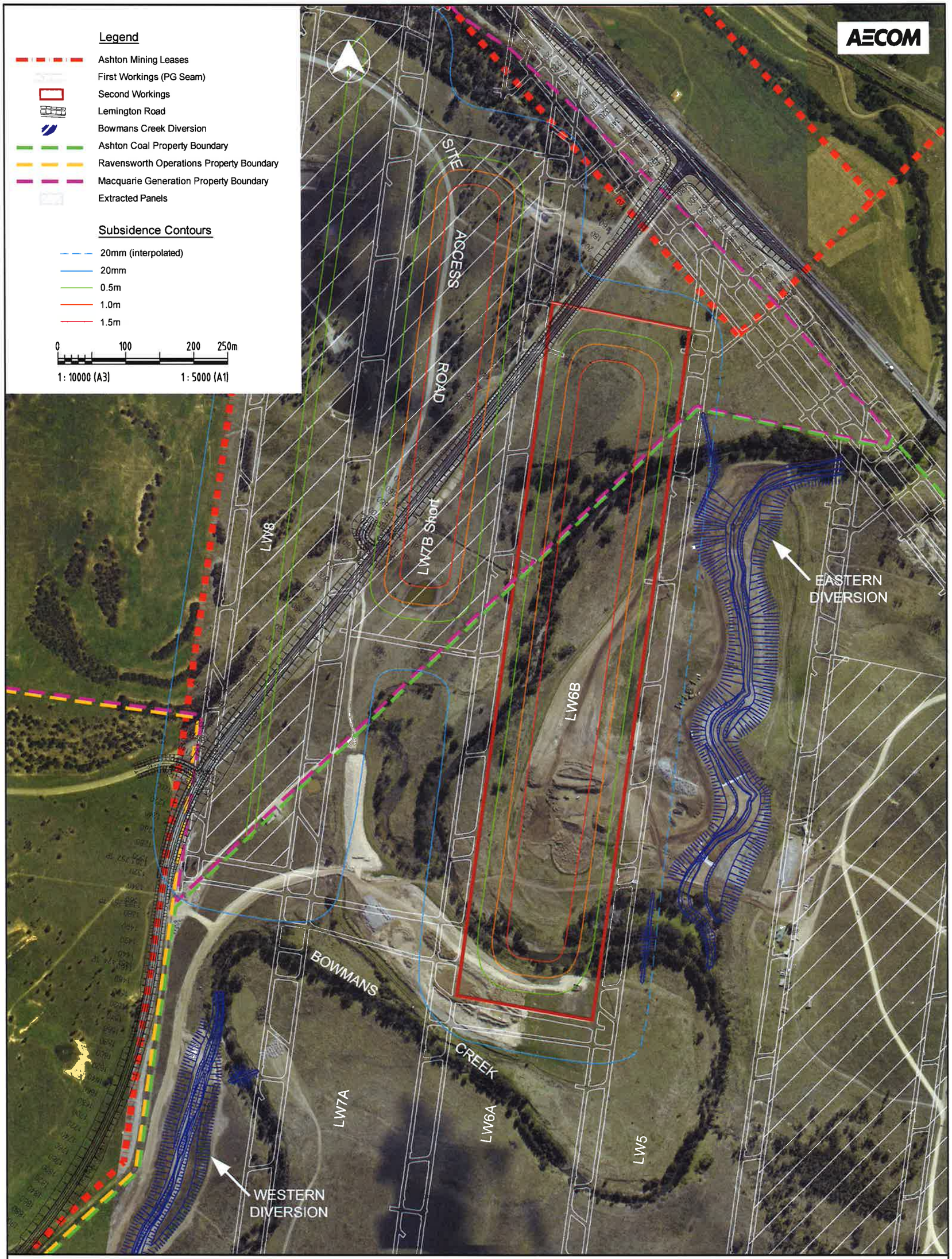
Tensile Strains at maximum of about 5mm/m are expected to be sufficient to allow water ingress and fines migration to accelerate deterioration of the road formation. Maximum tilts both across the road and along the road are also expected to occur between 290m and 320m from the road's intersection with the New England Highway.

Surface Cracking is expected to be perceptible with cracks likely to curve around the edge of the LW panel. Cracks of up to approximately 30mm wide are expected to develop on the road surface in the interval between 290m and 320m from the intersection with the New England Highway; once LW6B is within about 30m of finishing and during the period that the longwall supports are removed. Surface cracks of up to 50-100mm wide may also occur within the (proposed) road reserve on the southern side of the road between about 280m and 380m from the New England Highway. These impacts are likely to be relatively easily repaired with some infilling.

Minor Subsidence Movements of less than about 60mm are expected on the road between 180-280m and 370-800m from the intersection with the New England Highway. These movements are expected to reduce with distance and will become difficult to measure in practice by 650m distance from the New England Highway intersection.

Further information detailing the expected levels of subsidence relative to distance along the Lemington Road alignment are presented in **Attachment A**.

This page has been left blank intentionally



AshtonCoal

Lemington Road Asset Management Plan
Pikes Gully Seam LW6B

Figure 1

This page has been left blank intentionally.

Performance Measures

ACOL will ensure that Lemington Road is maintained as safe and serviceable during and immediately following longwall extraction and until any realised subsidence effects have stabilised[2]. Any subsidence damage from ACOL's mining activities will be managed in a manner consistent with the consent conditions (refer **Section 2**) and in accordance with the detailed objectives and management commitments developed by ACOL and listed in **Table 4**.

Table 4 Additional ACOL Management Commitments

OBJECTIVE	MANAGEMENT COMMITMENTS*
▪ To prevent public safety hazards resulting from subsidence damage to Lemington Road. ▪ To consult with relevant stakeholders so that access along Lemington Road is not disrupted as a result of subsidence. ▪ To consult with Ravensworth and other relevant stakeholders so that ACOL (or its agents) can monitor and remediate subsidence induced impacts to roads.	▪ ACOL will implement adequate controls to ensure road traffic safety. ▪ ACOL will continue to consult with Ravensworth (and MSB) so that all subsidence related damage is identified and remediated as soon as practicable to prevent public safety hazards resulting from subsidence damage to Lemington Road.

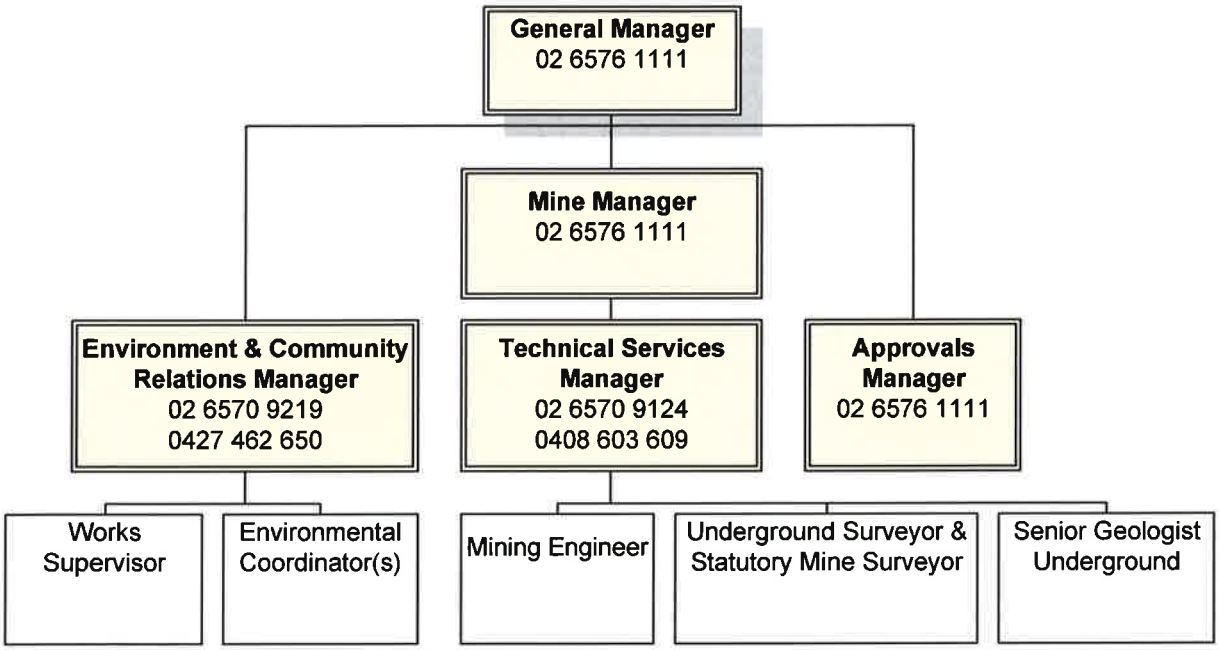
* Ravensworth will fund 50% of the cost of the alignment study and 100% of costs associated with monitoring, maintenance and repair of subsidence impacts.

[2] Note Ravensworth will be responsible for ensuring any repair works required to address subsidence impacts (other than maintenance and repair works described in this AMP) that may be necessary from time to time to maintain the road in a good and long term trafficable condition to the reasonable satisfaction of the Council.

5 MANAGEMENT PLAN RESPONSIBILITIES

A summarised ACOL organisation chart, as relevant to this AMP is provided in **Figure 2**. The full organisation structure for the ACOL underground mine is contained within the Extraction Plan main document.

Figure 2 Organisation Chart – Summary Outline



A summary of all stakeholders, roles and responsibilities is provided in **Table 5** below:

Table 5 Stakeholders, Roles & Responsibilities – Summary Outline

STAKEHOLDER	ROLES/RESPONSIBILITIES
DP&I	Dispute Resolution/Approval of EP
DTIRIS	Approval of this AMP
Ravensworth	Payment of ACOL's reasonable costs
MSB	Part payment of costs of Lemington Road repair
MacGen	Current Landowner
Singleton Council	Potential Asset/Land owner
RMS	New England Highway intersection owner

6 SUBSIDENCE MONITORING, MANAGEMENT, MITIGATION & REPORTING

The actions that ACOL will undertake to fulfil the consent conditions outlined in **Section 2** and to meet the performance measures and management commitments outlined in **Section 0** of this AMP are outlined below. These actions have been categorised into Monitoring (**Table 6**), Management (**Table 7**), Incident Response (**Table 8**) and Notification, Consultation and Reporting (**Table 9**).

Table 6 Monitoring Actions

ITEM	ACTION	TRIGGER/TIMING	RESPONSIBILITY	REPORTING
1.0	**Monitoring in consultation with Ravensworth**			
1.1	Daily documented visual inspection incorporating photography to check signage, identify surface condition, potential safety risks and any existing surface cracks or edge failure.	Prior to subsidence impacts (baseline) & during the period of mining the last 100m of LW6B.	ACOL	Fortnightly Status Report
1.2	Daily drive over to identify change to road camber, ride conditions, humps, surface cracking			
1.3	Monitoring of subsidence movements along Lemington Road in accordance with the Subsidence Monitoring Program to provide an indication of the magnitude of ground movement and the level of impact on the road formation. This will include the establishment of survey marks spaced at regular intervals on both sides of the road, with 7m spacing over the interval between 280m and 380m from the intersection with the New England Highway, and 50m spacing 200m either side of the goaf edge. Survey to acquire data in three dimensions.	Pre and post-mining survey	ACOL	Provide a copy to relevant stakeholders. Fortnightly Status Report

Table 7 Management Actions

ITEM	ACTION	TRIGGER/TIMING	RESPONSIBILITY	REPORTING
2.0	**Management**			
2.1	Prepare a safety risk assessment held and coordinated by a third party in consultation with all affected stakeholders and to the satisfaction of the ACOL Mine Manager. The assessment should be informed by the Lemington Road AMP and may investigate the capacity to repair any cracks or serious unevenness that may develop. The assessment may also investigate appropriate speed restrictions to ensure that surface cracking, deterioration in ride quality, and potential pooling of water during rain events does not compromise traffic safety.	Prior to impacting Lemington Road.	ACOL	Nil
2.2	Erection of signage directly off New England Highway and 200m prior to subsidence impact area warning of potential cracks, dips, humps and providing ACOL contact number. Works on road to be as per the Traffic Management Plan (TMP) and the Traffic Control Plans (TCPs) developed by a licensed traffic control contractor.	200m before undermining Lemington Road until completion of subsidence activities.	Ashton Underground Mining Engineer	Fortnightly Status Report
2.3	Erection of temporary electronic hazard warning signs including speed limit of 60km.	50m before undermining Lemington Road until completion of subsidence activities.	Ashton Underground Mining Engineer	Fortnightly Status Report
2.4	Notify: Public notification – newspaper, website Stakeholders	As subsidence impacts are identified during undermining of Lemington Road.	Ashton community relations manager	
2.5	Engage a contractor to manage subsidence impacts to Lemington Road, including traffic control, monitoring, mitigation and road maintenance.	Prior to impacting Lemington Road	ACOL	Nil

Table 8 Incident Response Actions

ITEM	ACTION	TRIGGER/TIMING	RESPONSIBILITY	REPORTING
3.0	**Incident Response**			
3.1	Refer to ACOL TARP and implement relevant and appropriate controls.	In accordance with TARP as subsidence impacts are identified during undermining of Lemington Road.	Ashton Underground Mining Engineer	Fortnightly Status Report
3.2	Remediate those sections of Lemington Road that have cracked or where compression humps have formed and pose a potential risk to public safety as determined from inspection with response as per the TARP. Develop TMP and TCP with licensed traffic control contractor.	In accordance with TARP	Ashton Underground Mining Engineer	Fortnightly Status Report

Table 9 Notification, Consultation and Reporting Actions

ITEM	ACTION	TRIGGER/TIMING	RESPONSIBILITY	REPORTING
4.0	**Notification/Consultation/Reporting**			
4.1	Forward information to relevant stakeholders regarding progress of the longwall and any relevant subsidence management actions.	Fortnightly, starting at the commencement of LW6B.	Ashton Environment and Community Relations Manager / Ashton Underground Mining Engineer	Fortnightly Status Report
4.2	Notify relevant stakeholders if actions are triggered by the TARP.	In response to monitoring.	Ashton Underground Mining Engineer	Email
4.3	Relevant stakeholders to be provided with a copy of subsidence monitoring data	Post-surveys	Ashton Surveyor	Email
4.4	Extraction Plan to be made publically accessible on the ACOL website.	Prior to subsidence impacts.	Ashton Environment and Community Relations Manager	Nil

6.1 LEMINGTON ROAD TRIGGER ACTION RESPONSE PLAN (TARP)

The following table has been developed to assist in implementing appropriate levels of response for a range of potential subsidence impacts to Lemington road within ACOL's Mining Lease.

	Level 1	Level 2	Level 3
Triggers	Pavement: No cracking Ride: no noticeable change in longitudinal grade or carriageway crossfall. No affect on vehicle traffic directional stability at 60 km/h speed restriction Shoulder of road: Cracks up to 25mm wide	Pavement: Cracks of less than 25mm Ride: no noticeable change in longitudinal grade, but local changes in carriageway crossfall affecting traffic directional stability Shoulder of road: Cracks up to 100mm wide or up to 50mm vertical displacement	Pavement: Cracks of greater than 25mm Road grade causing change in vehicle trajectory Shoulder of road: Cracks over 100mm wide or greater than 50mm vertical displacement
Monitoring	Daily	Twice daily	Twice daily, in conjunction with constant attendance by Traffic management crew
Response	Nil required	Within 48hrs: Repair cracks or pavement damage by infilling Control traffic in accordance with TCP when conducting works	Within 24hrs Repair cracks or pavement damage by infilling Control traffic by use of Stop/Go when conducting works
Sign message	Active subsidence next 400m	Subsidence damaged pavement next 400m	Subsidence damaged pavement next 400m
Speed Limit	60km/h (NEH to 400m from NEH)	60km/h (NEH to 400m from NEH)	40km/h (NEH to 400m from NEH)
Notification	Notification of subsidence in newspaper and on website prior to impacting road	As per Level 1 plus: Notify RavOps and Singleton Council	As per Level 1 plus: Notify RavOps and Singleton Council

Remediation Approach:

Road repair contractors to be identified based on their capacity to facilitate immediate repairs (if required), using suitable equipment and materials, including as appropriate:

- Machinery such as a Bobcat, mini-excavator or appropriate alternative to be made available during period of impact to effect repairs.
- A supply of road gravel or similar material to be made available during period of impact to expedite carrying out of repairs (major or minor).
- Bitumen seal to be done over repaired sections once PG LW6B subsidence has stabilised. An offsite contractor may be used to apply a "2 coat" seal over the affected area.

Ravensworth (or other third party such as MSB) will be responsible for 100% of costs associated with the implementation of these controls (as per condition 7.15 to Schedule 2 of DA 309-11-2001-i and condition 46 to Schedule 3 of 09_0176, refer to **Section 2**).

7 REFERENCES

SCT (2011) **Subsidence Assessment for Ashton Coal Mine Longwalls 6B to 8 in the Pikes Gully Seam based on the Bowman's Creek Diversion Mine Plan**, prepared for Ashton Coal Mine, Strata Control Technology Operations Pty Ltd, Wollongong, NSW, Australia.

SCT (2012) **Subsidence Assessment for Lemington Road,** prepared for Ashton Coal Mine, Strata Control Technology Operations Pty Ltd, Wollongong, NSW, Australia.

Attachment A – Mine Subsidence Board Road Approval

This page has been left blank intentionally.

In reply please send to: Newcastle Head Office

Our reference: FN01-00074S0

Your reference:

Contact: Greg Cole-Clark (02) 4908 4395

SINGLETON COUNCIL
ATTN – GENERAL MANAGER
CNR QUEEN STREETAND CIVIC AVENUE
SINGLETON NSW 2330

31 August 2011

Dear Mr Greensill

BUILDING / DEVELOPMENT APPLICATION No. TBA11-18418S1
LEMINGTON ROAD REALIGNMENT

The Members of the Mine Subsidence Board have approved this application subject to the following conditions. The conditions are based on advice provided by Ravensworth Operations through their discussions with Singleton Council. The Mine Subsidence Board has been advised the Lemington Road realignment will only be designed for mine subsidence impacts from the Pikes Gully Seam and the road will be removed or relocated prior to mine subsidence impacts from extraction of lower coal seams by the Coal Lease Holder.

The conditions of approval for the proposed development are;

1) The Lemington Road realignment shall be designed for mine subsidence which may result from mining in the Pikes Gully Seam such that it remains safe, serviceable and any damage would be minor, localised and readily repairable.

   The road is to be designed so it does not require regrading and specific attention is to be given to the sub grade and drainage.

   Details of the geotechnical information developed and utilised for the design are to be forwarded to the Mine Subsidence Board.

2) Final drawings, to be submitted prior to commencement of construction, are to contain certification by a qualified structural engineer to the effect that any improvement constructed to meet the design parameters developed in Item 1 will be safe and serviceable following mine subsidence from the Pikes Gully Seam and any damage would be minor, localised and readily repairable.

Standard (Auto) BAs

MINE SUBSIDENCE BOARD

NEWCASTLE
Ground Floor
NSW Government Offices
117 Bull Street
Newcastle West 2302
PO Box 488G Newcastle 2300
Telephone: (02) 4908 4300
Facsimile: (02) 4929 1032
DX 4322 Newcastle West

PICTON
100 Argyle Street
Picton 2571
PO Box 40 Picton 2571
Telephone: (02) 4677 1967
Facsimile: (02) 4677 2040
DX 26053 Picton

SINGLETON
The Central Business Centre
Unit 6, 1 Pitt Street
Singleton 2330
PO Box 524 Singleton 2330
Telephone: (02) 6572 4344
Facsimile: (02) 6572 4504

WYONG
Suite 3 Feldwin Court
30 Hely Street
Wyong 2259
PO Box 157 Wyong 2259
Telephone: (02) 4352 1646
Facsimile: (02) 4352 1757
DX 7317 Wyong

HEAD OFFICE
PO Box 488G
Newcastle 2300
Telephone: (02) 4908 4395
Facsimile: (02) 4929 1032

Quality System
Quality Endorsed Company
ISO 9001:2008
Lic 12871
Standards Australia

Email
mail@minesub.nsw.gov.au

Web
www.minesub.nsw.gov.au

24 Hour Emergency Service
Free Call 1800 248 083

3) Upon completion of construction, work as executed certification by a qualified structural engineer is to be forwarded to the Board confirming construction was in accordance with the plans submitted.

4) a) Provision shall be made by the infrastructure owner, at no cost to the Board, for the removal or relocation of this development prior to mine subsidence impacts of mining activities by the Coal Lease Holder in the Upper Liddell, Lower Liddell and Barrett seams.

b) Prior to commencement of construction, the infrastructure owner is to confirm arrangements will be made to remove or relocate the road.

c) A copy of arrangements to relocate the road, including any agreements entered into with Ravensworth Operations, is to be forwarded to the Mine Subsidence Board.

d) The Mine Subsidence Board's approval will need to be sought for the relocated road.

It is important to note that under this approval only mining impacts on the Lemington Road realignment from mining the Pikes Gully Seam are covered by the *Mine Subsidence Compensation Act 1961.*

The approval will lapse unless there has been substantial commencement within a period of 2 years from the date of this letter.

Please do not hesitate to contact the Acting District Manager, Mr Richard Pickles (0265724344), if we can be of further assistance.

Yours faithfully

Greg Cole-Clark
Chief Executive Officer

cc: Acting District Manager - Mr Richard Pickles

Attachment B – Subsidence Assessment for Lemington Road (SCT 2012)

This page has been left blank intentionally.

SCT Operations Pty Ltd
ABN 23 078 328 953
www.sct.gs

HEAD OFFICE
Cnr Kembla & Beach Streets Wollongong NSW 2500 Australia
PO Box 824 Wollongong NSW 2520 Australia
Telephone: + 61 2 4222 2777 Fax: + 61 2 4226 4884
Email: sctnsw@sct.gs

MACKAY OFFICE
Telephone/Fax: +61 7 4952 5717
Email: p.cartwright@sct.gs

BENDIGO OFFICE
Telephone: +61 3 5443 5941
Email: s.macgregor@sct.gs

12 September 2012

Michael Moore
Approvals Manager
Ashton Coal Operations Pty Limited
PO Box 699
SINGLETON NSW 2330

Dear Michael,

SUBSIDENCE ASSESSMENT FOR LEMINGTON ROAD

As requested, please find herein our assessment of the subsidence impacts on Lemington Road expected as a result of mining Longwall 6B and strategies to manage the subsidence that occurs.

1. INTRODUCTION

SCT Operations Pty Ltd (SCT) undertook a subsidence assessment for Ashton Coal Operations Pty Limited (ACOL) as part of the Subsidence Management Plan (SMP) assessment for Longwalls 6-8. This assessment is presented in SCT Report ASH3687 dated 10 November 2010. Since the preparation of that report, Brunkers Lane has been upgraded with the construction of a new road, now known as Lemington Road. Longwalls 7B and 8 were mined before and during the construction of Lemington Road and subsidence from these panels did not impact on the finished road. However, ACOL now propose to mine Longwall 6B and the changed status of Lemington Road requires reassessment of the subsidence impacts and the management of these impacts consistent with this changed status. This letter report presents our assessment of the subsidence impacts from proposed mining of Longwall 6B and strategies to manage these impacts.

The geometry of Longwall 6B and the nominal mining height used in the SMP assessment for Longwalls 6-8 have not changed, so the subsidence magnitudes estimated in SCT Report ASH3687 also remain unchanged. This report presents an updated assessment of subsidence impacts based on the recent construction and changed status of Lemington Road.

2. SITE DESCRIPTION

Figure 1 shows a plan of the site and the location of the recently constructed Lemington Road relative to the proposed layout for Longwall 6B.

Figure 2 shows two photographs of Lemington Road looking northeast toward the intersection with the New England Highway and in the opposite direction.

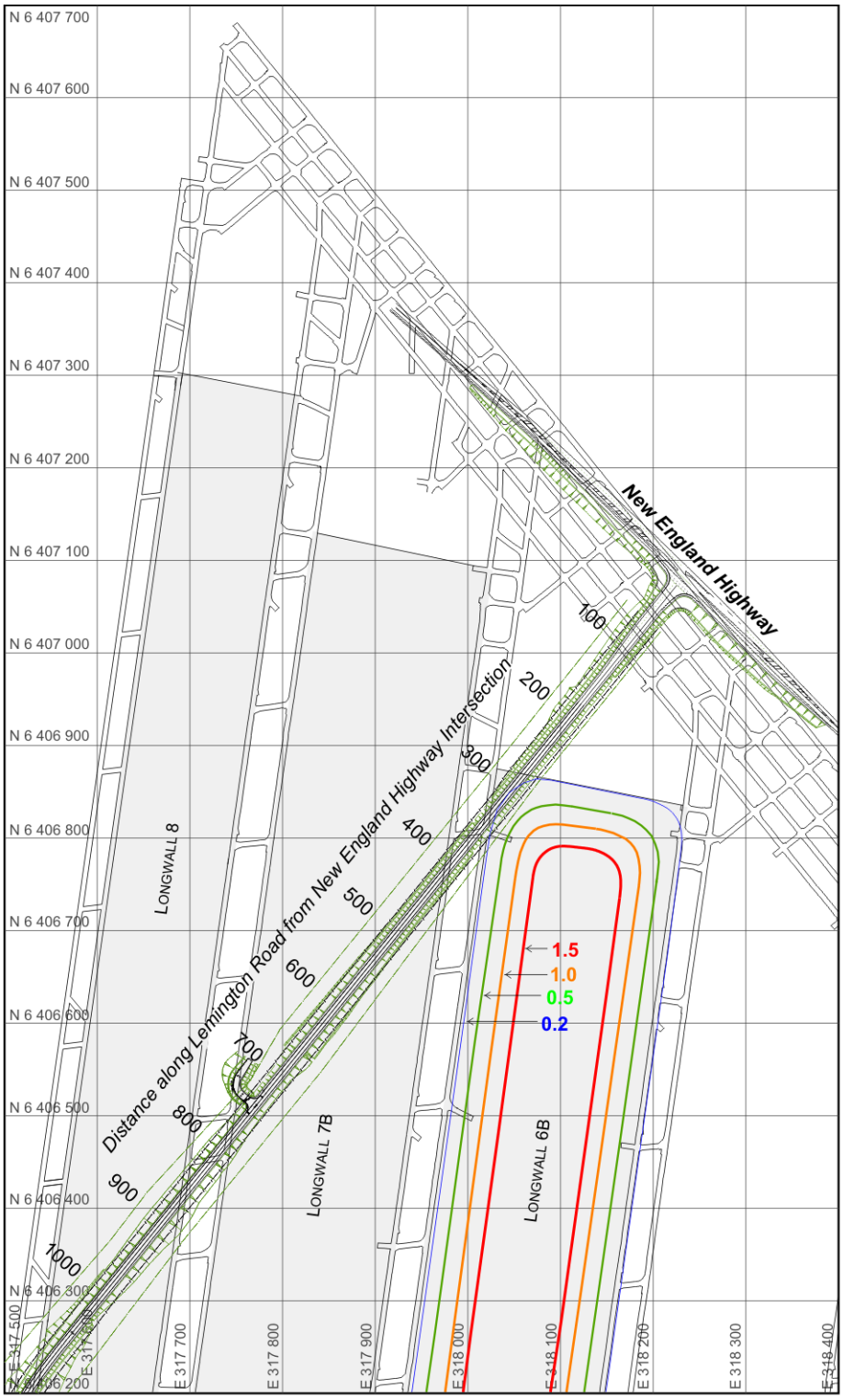


Figure 1: Site plan showing expected subsidence from Longwall 6B.

a) Lemington Road looking north east.

b) Lemington Road looking south west.

Figure 2: Photographs looking north east and south west along Lemington Road.

The road has been constructed on a formation that appears to be only slightly above pre-mining ground levels (AECOM 2011) but appears to have been increased in height to compensate for the subsidence that has occurred. The road surface is tarsealed. There is a culvert that drains the landform on the north-western side of the road formation outside the area of significant subsidence influence from Longwall 6B.

The width of Longwall 6B is nominally 216m. The chain pillars between panels are nominally 25m wide (rib to rib) on the eastern side of the panel and 30m (rib to rib) on the western side of the panel with cut-throughs at a nominal spacing of 150m centres. The mining section is nominally 2.4m and this height has been used to estimate the magnitude of subsidence. The overburden depth to the Pikes Gully (PG) Seam ranges 120-140m in the area of interest.

The northern corner of Longwall 6B passes under the road reserve for Lemington Road. The road surface is located between 28m to 35m from the corner of the panel. The road reserve extends from directly above the corner of the panel on the northern side of the road to 49m from the panel corner on the southern side.

The section of Lemington Road directly mined under by Longwall 6B extends from approximately 275m to 355m from the intersection of Lemington Road and the New England Highway. The section likely to be affected by subsidence movements from Longwall 6B extends from 180m to 800m from the New England Highway.

3. SUBSIDENCE PREDICTIONS

Subsidence predictions for Lemington Road are based on subsidence behaviour observed over previous longwall panels at Ashton Underground Coal Mine over solid goaf edges and general experience of overburden strata bridging about panel corners at other sites.

Table 1 presents a summary of the maximum subsidence parameters expected in the vicinity of the northern corner of Longwall 6B on a diagonal line from the panel corner where strains and tilts are expected to be at a maximum.

Table 1: Subsidence Movements Predicted at Northern Corner of Longwall 6B

Subsidence Parameter	Magnitude and Location
Subsidence on Diagonal from Panel Corner (m)	0.06 at corner, 0.2 at 30m, 0.5 at 60m
Tilt (mm/m)	29 at 50m from corner
Horizontal Movement (m)	150mm at 50m from corner
Strain (mm/m)	4.9 in tension at 26m from corner, 6.3 in compression at 65m from corner

Figure 3 shows a profile of the subsidence expected along the centreline of Lemington Road as a result of mining Longwall 6B. There is likely to be 50-100mm more subsidence on the south-bound lane compared to the north-bound lane, with largest strains and tilts expected to occur across the road so that any cracks that form are likely to be along the line of the road and curving around to follow the outline of the panel.

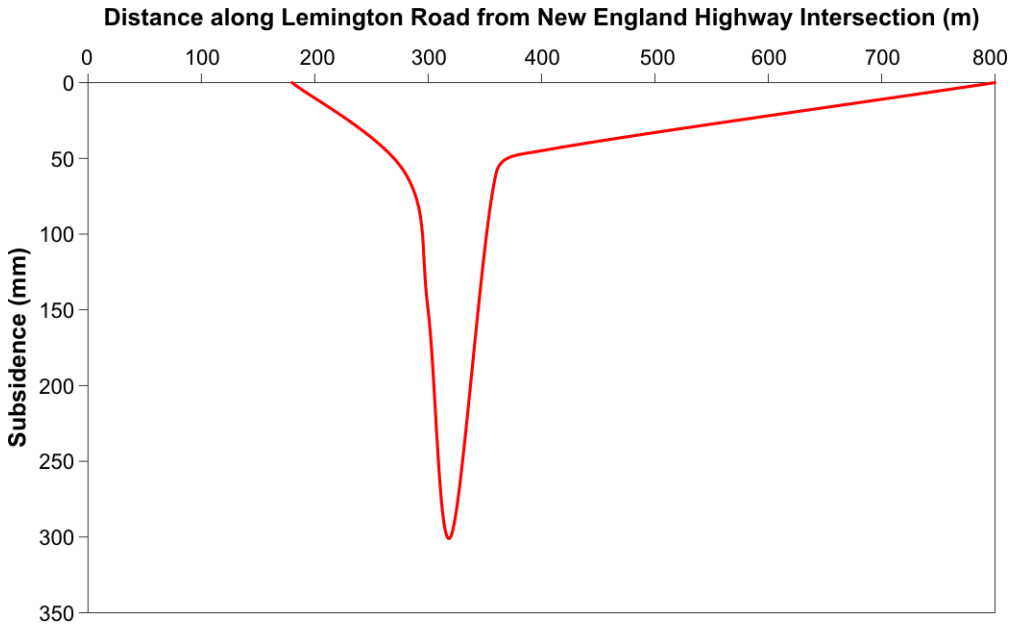


Figure 3: Subsidence expected along road alignment.

At 130m overburden depth, subsidence is expected to be less than 60mm directly above the corner of a single panel, less than 200mm at 30m diagonally out from the corner, and less than 500mm at 60m from the corner, giving a slightly gentler subsidence profile than would be experienced over a linear goaf edge. The road is located between 28m and 35m from the panel corner, so maximum subsidence is expected to be between 200mm and 300mm along the road.

Subsidence parameters were measured on the centreline of the finish line of Longwall 7B (7B CL4) at an overburden depth of 137m and these measurements provide a site specific estimate of the maximum subsidence parameters than can be expected. These values were measured on pegs spaced at a nominal spacing of 10m. The standard peg spacing used for comparison of tilt and strain is 1/20th depth or approximately 7m. The measured tilts and strains have been increased for prediction purposes proportionally to peg spacing. These measurements indicate maximum tilt of 29mm/m at approximately 45m from the goaf edge, maximum strain of 4.9mm/m in tension at 26m from the goaf edge, and maximum strain in compression of 6.3mm/m at 65m from the goaf edge.

Slightly lower values of strain and tilt are expected as a result of overburden bridging across the corner of the panel, but the estimates over a linear goaf edge provide an upper bound suitable for management purposes.

The road is located between 28m and 35m from the goaf edge so maximum tensile strains of up to about 5mm/m are expected across the road at 305m from the New England Highway. Maximum tilt across the road is expected to be less than 15-20mm/m (1.5-2%) at the same location.

Tilts along the road are difficult to estimate from available monitoring data but are estimated as likely to reach peaks of 5-10mm/m. There may also be some low level compressive strain along the line of the road, but there are no previous observations of strain in this direction on which to base estimates.

Horizontal displacements on the road alignment are expected to be less than about 120mm toward the goaf, but this means that one or more cracks of up to about 30mm wide may occur on the road surface. These cracks are likely to remain open once mining is complete or until such times as they are repaired.

Since Longwall 7B has already been mined, there is likely to be some additional compression of strata over the chain pillar between Longwall 6B and Longwall 7B. A review of the incremental subsidence associated with mining Longwall 6A indicates that over the previous panel there is an approximately linear subsidence profile that extends most of the way across the previous panel. Strata compression above the chain pillar is likely to cause additional subsidence along the section of Lemington Road over most of Longwall 7B

Allowing for the angle of the road to the panel, low level subsidence is expected to affect a relatively long section of the road. Less than about 60mm is expected at 360m from the New England Highway tapering to zero at about 800m. In practice, subsidence will be difficult to measure beyond about 650m.

Low level subsidence is also expected north of Longwall 6B ranging from 60mm at 280m from the New England Highway to less than 20mm at 220m and effectively zero subsidence at 180m.

4. IMPACT ASSESSMENT

SCT understand Lemington Road has been constructed on an unbound compacted earth sub-base, overlain with compacted granular material, and a tarseal chip surface coat.

Experience of subsidence impacts on road surfaces at other sites reported by Buys (2012) indicates that tensile strains in excess of about 2mm/m become apparent as cracks on the road surface and compressive strains in excess of about 2-3mm/m become apparent as compression humps that affect ride quality. Drainage of the road surface starts to be affected when tilts

increase above about 10mm/m (1%) because the camber of the road is reduced to almost zero and water tends to accumulate.

Anticipated maximum tensile strains of 5mm/m are expected to cause perceptible cracking of the road surface. These cracks are likely to curve around the edge of the panel and occur in the interval between 290m and 320m from the intersection with the New England Highway once Longwall 6B is within about 30m of finishing and during the period that the longwall supports are removed. Maximum tilts both across the road and along the road are also expected to occur in this section of the road.

Minor subsidence movements are expected on the road between 180m and 800m from the intersection with the New England Highway but outside of the section between 280m and 370m these movements are expected to be less than about 60mm and imperceptible for all practical purposes.

Cracks of up to 50-100mm wide may also occur within the road reserve on the southern side of the road between about 280m and 380m from the New England Highway, but these are likely to be relatively easily repaired with some infilling.

5. RECOMMENDED MANAGEMENT STRATEGIES

There are two aspects to managing the subsidence impacts. The first relates to the period of subsidence and the second relates to reconstructing the road.

During the period of mining the last 50m of Longwall 6B, regular inspection of the road surface is recommended. The management plan should include the capacity to repair any cracks or serious unevenness that may develop and impose appropriate speed restrictions to ensure that surface cracking, deterioration in ride quality, and potential pooling of water during rain events does not compromise traffic safety.

Once mining is complete, there is likely to be a requirement to dig up those sections of the road that have cracked or where compression humps have formed and relay the compacted granular road base back to grade before resurfacing the road. The strain levels predicted are expected to be sufficient to allow water ingress and fines migration to accelerate deterioration of the road formation.

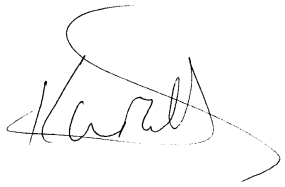
Monitoring of the subsidence movements along the road is recommended during mining of Longwall 6B to provide an indication of the magnitude of ground movement and the level of impact on the road formation. Regular survey monitoring is probably not warranted. A pre-mining and post-mining survey of marks is likely to be sufficient.

One approach to getting this information would involve survey marks spaced at about 7m on both sides of the road over the interval between 280m and 380m from the intersection with the New England Highway, and at 50m centres from 150m to 800m along the southern edge of the road. The survey marks should need to be surveyed in three dimensions. Chaining between pins is not necessary. Ideally the marks would be located on the edge of the seal, but marks set back 3-4m from the edge of the tarseal to reduce the hazards for surveyors would still be effective. The marks are only required to be in place for about 3-4 weeks during the last 50m of mining Longwall 6B and take off of the longwall supports.

The purpose of the surveying is to get profiles of subsidence (to 10mm), horizontal position (to 10mm), strain (to better than 0.5mm/m), and tilt (to better than 1mm/m) along and across the road. There may be alternative survey strategies that are suitable to more easily obtain this information at the resolutions required.

If you have any queries or require further clarification of any of these issues, please do not hesitate to contact me directly.

Regards



Ken Mills
Senior Geotechnical Engineer

Reference: Buys H. 2012 Personal Communication