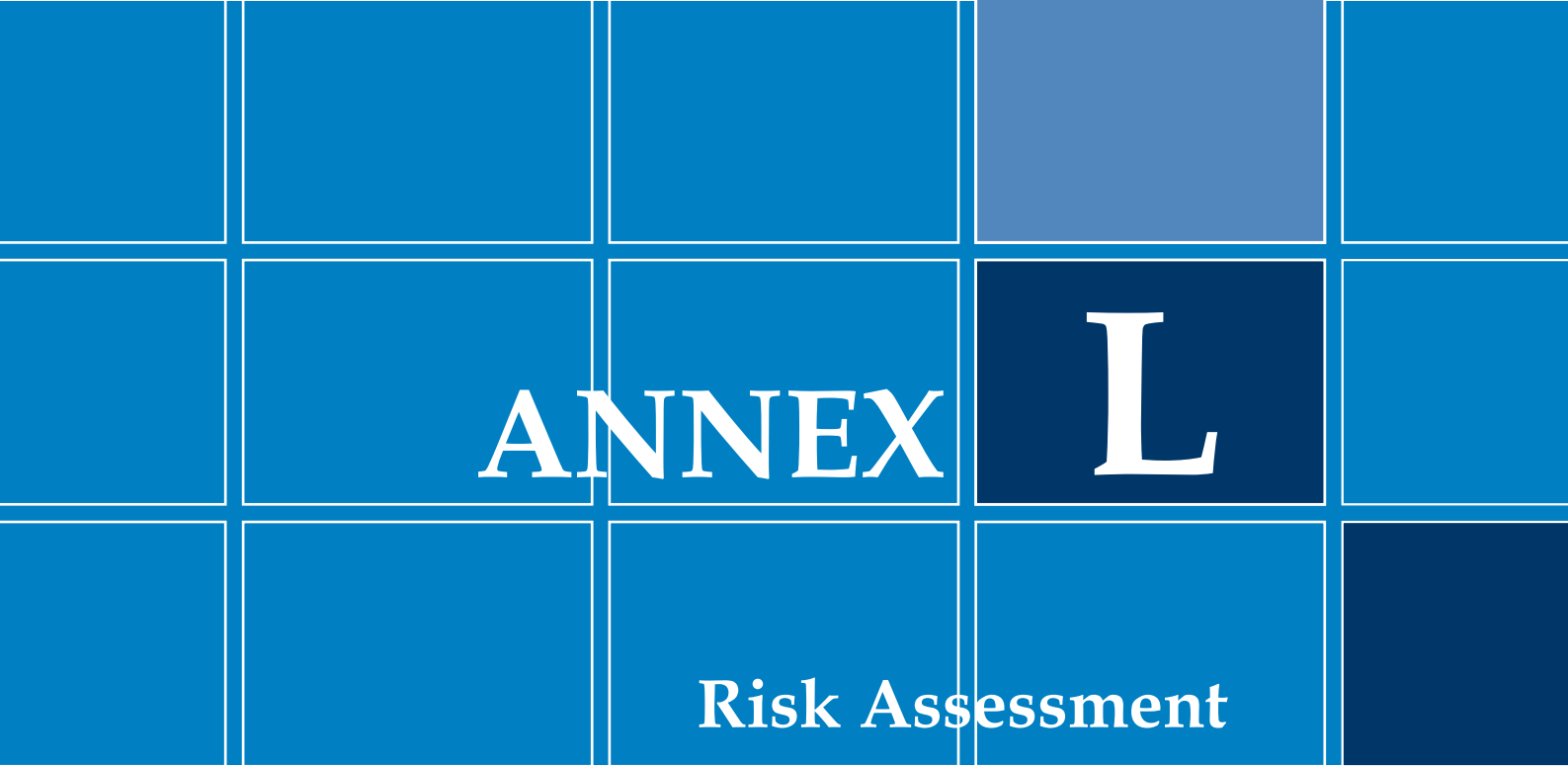


Subsidence Management Plan



**Ashton Coal
Longwall Panels 1 - 4**

Subsidence Management Plan
Written Report

Table L.1 Summary of Predicted Subsidence Impacts and Management Priorities

Element Description	Question 1	Question 2	Question 3	Question 4	Question 5	Answer	Risk	ConsType	Status Comment	Risk Notes	Risk Level
Roads - Main	Significant damage or service disruption to main roads	Damage expected to require substantial repair (once yearly)	Minor damage at most, or infrequent repair (>yearly)	Minimal damage or within normal wear and tear	Modeling and local experience confirms no damage expected	3	2	Regulators	There may be valley closure within the cutting along the New England Highway of 3mm. This has the potential to cause minor uplifting of the pavement requiring occasional repair - but is unlikely to cause danger to traffic (SCT).	RTA is a key party, though road users will be those who notice any impact. Mitigation measures are few within changing the end of the longwall. Subsidence monitoring as longwall 1 approaches the New England Highway will ensure the assumptions adopted in estimating the valley closure are valid. Survey of the New England Highway is required quarterly under the ACOL conditions of consent, and consultation has been undertaken with the RTA. Repairs are expected to be few and not unduly expensive	Class II (Moderate)
Roads - Minor	Significant damage or service disruption to local roads	Damage expected to require substantial repair (once yearly)	Minor damage at most, or infrequent repair (>yearly)	Minimal damage or within normal wear and tear	Modeling and local experience confirms no damage expected	1	4	Neighbours	Private access road through ACOL's property to Property No. 130 will be impacted. Expected to experience compression humps, cracking, localised change in grade. Secondary effects may be ponding of water (ie table drains no longer work) and falling trees due to surface cracking. The landowner is aware of the potential issues and has been in discussion with ERM and ACOL on this and other impacts. Other users of the road (ie dairy tanker) are at risk if unaware of road changes/damage. The magnitude of cracks/humps could be significant for vehicles (see also comments on impacts to grazing/general use of paddocks and local infrastructure). Cattle/sheep are most at risk of cracks rather than humps but general vehicle use would be impacted by both (ie farm equipment).	Mitigation measures are possible mainly through regular (daily) inspection of affected sections of road. Rigorous inspection and control measures will be required to prevent accidents. Repairs are expected to be comparatively easy given road construction (gravel/dirt) An alternative route for the duration of mining the early panels is possible by reinstating and maintaining an older road. This would still have some issues	Class IV (Critical)
Bridges	Significant damage or disruption to bridges / overpasses is anticipated	Damage expected to require substantial repair (once yearly)	Minor damage at most, or infrequent repair (>yearly)	Minimal damage or within normal wear and tear	Modeling and local experience confirms no damage expected	5	1	Regulators	Mains headings for longwall panel 4 and 5 will be below the Bowmans Creek bridge on the New England Highway. No impacts are expected.	Survey monitoring of the New England Highway corridor is required under ACOLs conditions of consent on a quarterly basis. This will identify any changes to RTA infrastructure within the highway corridor.	Class I (Low)
Pipelines (water)	Significant damage or disruption to pipelines requiring major route realignment	Damage expected to require substantial repair (once yearly) with service disruption	Minor damage at most, or infrequent repair (>yearly)	Minimal damage and no service disruption	Modeling and local experience confirms no damage expected	3	2		Ashton has mapped all water/gas pipelines that may be impacted. Potential impacts are restricted to ACOLs property and equipment with possible exception to water reticulation lines on Property No. 130.	The potential damage to the water reticulation pipes on Property No. 130 is considered likely but is readily addressed through installation of temporary flexible piping (on surface) during the first panel operation and then reburial after initial stage. Cost minimal. Damage to water tanks is considered unlikely. The ACOL pipeline runs across the later panels but can be relocated as needs later in the sequence.	Class II (Moderate)

Element Description	Question 1	Question 2	Question 3	Question 4	Question 5	Answer	Risk	ConsType	Status Comment	Risk Notes	Risk Level
Power and Communications Infrastructure	Significant damage or disruption to power & communications	Damage expected to require substantial repair (once yearly) with service disruption	Minor damage only and no service disruption	Minimal damage no service disruption	Modeling and local experience confirms no damage expected	1	4	Regulators	Power lines (132kV) are expected to require relocating or reconstruction to prevent damage and disruption. Consultation has been undertaken with EnergyAustralia to determine options and costs. The optical fibre cable along the New England Highway is not predicted to be damaged.	ACOL have been negotiating with EnergyAustralia regarding suitable options. Rerouting works will be undertaken in two stages with the first being relocating two poles over the chain pillars of maingate1 and tailgate 1. The remainder of the route will be either reconstructed as single pole structures, or relocated outside the Application Area.	Class IV (Critical)
Mine Infrastructure	Significant work required to safeguard mine infrastructure	Substantial preventative works required (engineered reinforcements etc)	Regular preventative works required	No service disruption is expected and normal preventative maintenance only	Modeling and local experience confirms no damage expected	5	1	Ashton	Limited impacts to water supply lines from the Hunter River.	Limited impact and readily realigned. Impacts will mostly relate to later panels	Class I (Low)
River Flow and Flooding Patterns	Significant modification to flow patterns with increased flood risk	Significant changes to flow patterns and moderate flood risk	Changes to flow patterns and limited flood risk	Minor flow pattern changes	Minor and inconsequential changes to flow patterns with no increased flood risk	4	1	Local Community	Interconnection of coal seam with Glennies Creek may lead to some increased water loss from the creek following extraction. A small area of longwall panel 4 may be subject to ponding and increased flood inundation depth post-subsidence.	Bowmans Creek is potentially of greater importance as mining will eventually pass under that creek. However, that is outside the current SMP.	Class I (Low)
Farm Dam Impacts	Significant impacts to flows to farm dams (or structural impacts)	Changes reduce flows to key dams by >50% requiring new dams	Flows reduced <50% & >25% requiring supplementation	Limited impact expected and readily addressed through minor earthworks	No changes expected	4	1	Neighbours	No farm dams of significance and those that are present (nine) are readily repaired or replaced as needed.	Will need to ensure dams are emptied prior to the longwall face passing underneath. Will also need to repair dams or supply alternative water source post-subsidence to maintain the carrying capacity of the property.	Class I (Low)
Ponding on flat land	Significant ponding on flat land requiring drainage work to avoid ongoing damage	Ponding expected with loss of use/value requiring minor earthworks	Ponding expected to occur in localised areas with limited impacts	Ponding expected for limited periods or very localised areas	Ponding not expected to be an issue	4	1	Ashton	The general fall of the site with the orientation of the panels should minimise the likelihood of appreciable ponding. Some areas of ponding may develop near southern end of longwall panel 4.	Areas of ponding will be drained or remediated using earthmoving equipment as required.	Class I (Low)
Water Quality Impacts	Water quality (turbidity etc) substantially impacted (duration >1 year)	Water quality (turbidity etc) impacted (duration 6 - 12 months)	Water quality deteriorates but limited duration / intensity	Water quality impacted to minor extent and only under extreme events	Modeling and experience predicts negligible impact to water quality	3	2	Local Community	Surface cracking within the site and knickpoints may initiate erosion - in turn impacting on water quality (turbidity etc).	Water quality was raised as a major concern during community consultation. Issue of water quality and erosion can be managed by monitoring the site and remediating surface cracks and areas of erosion as they occur.	Class II (Moderate)

Element Description	Question 1	Question 2	Question 3	Question 4	Question 5	Answer	Risk	ConsType	Status Comment	Risk Notes	Risk Level
Groundwater Flow Patterns	Groundwater flows substantially impacted requiring relocation of water supply bores	Groundwater flows impacted (1 to 5 years) requiring interim supply	Groundwater flows impacted (<1 year) requiring interim supply	Groundwater flows reduced with minimal impact on usefulness	Modeling and experience predicts negligible impact to groundwater flows	3	2	Regulators	Specific issue relates to saturated alluviums and possible flows to Bowmans Creek (primarily). Considerable discussion around possible impacts/influence of Glennies Creek and inflows. Assumption is that inflows will be minimal (KMills and PDundon to refine estimates). No supply issue but is required to be addressed to meet the requirements of not working within a specified distance of the stream edge/saturated alluvium. No local use of groundwater. Potential impacts are more likely to be inflows to the underground workings and that is understood to be a case of equipment sizing. No offsite or non Ashton impacts are expected	Need to understand impacts on saturated alluvials and exactly where those are located. Peter Dundon to follow up on specific requirements and review consent conditions to ensure consistency and include this as part of his report.	Class II (Moderate)
Groundwater Quality	Water quality substantially impacted (duration >1 year)	Water quality impacted (duration 6 - 12 months)	Water quality deteriorates but minor inconvenience only (eg aesthetics)	Water quality impacted to minor extent but does not restrict use	Modeling and experience predicts negligible impact to water quality						
Built Heritage Impacts	Significant damage to historic/important buildings and structures requiring relocation	Damage reasonably certain requiring substantial engineering protection	Damage likely restricted to non-structural aspects requiring cosmetic repairs	Damage unlikely and readily repaired if it eventuates	Modeling of subsidence indicates no impacts (or no structures present)	0	1	Regulators	No structures of heritage importance are located within the Application Area.		Class I (Low)
Aboriginal Heritage Sites	Significant damage to important sites with limited opportunity to relocate/repair	Damage reasonably certain but protection possible	Damage likely but relocation/disturbance acceptable	Damage likely but destroying acceptable (with records made)	No sites identified and/or damage unlikely	4	2	Local Community	There are a number of artefact scatters identified within the Application Area from past studies. These are unlikely to be damaged by subsidence, however could be affected by secondary impacts such as erosion, cracking etc.	Impact assessment and management plan required. Otherwise normal controls required as specified for existing mining areas.	Class II (Moderate)
Riparian Impacts	Flow/geomorphology changes substantially affects riparian community (>1km length)	Flow/geomorphology changes substantially affects riparian community (<1km length)	Flow/geomorphology changes limited in short sections	Riparian impacts minimal and expected to regenerate without	Negligible impacts predicted/non-sensitive community present	5	1	Regulators	No impacts expected to Glennies Creek (which is subject to regulated flows from upstream lands). Bowmans Creek likely to be impacted by future panels.		Class I (Low)

Element Description	Question 1	Question 2	Question 3	Question 4	Question 5	Answer	Risk	ConsType	Status Comment	Risk Notes	Risk Level
Iconic Species Impacts (eg large trees, grasslands)	Subsidence significantly damages key habitats/iconic specimens (trees, frog habitat etc)	Subsidence substantially damages key habitats/iconic specimens (trees, frog habitat etc)	Damage limited and replacement demonstrated in similar environments	Damage unlikely and readily addressed / repaired	No damage expected/No iconic specimens present				Impacts to southern woodland through surface cracking and potentially some tree damage (ie falling over). This area provides habitat for threatened species	Works under existing management plans and for the Voluntary Conservation Area will mitigate any deterioration in habitat condition through weed control, planting, fencing etc.	Class I (Low)
Visual/Aesthetic Impacts	Significant impact to visually iconic vistas expected (eg cliffs / escarpments)	Significant impact to visually important vistas expected (localised impact)	Visual impacts expected to be limited to restricted access/low use areas	Minor impacts with restricted viewpoints only	No impacts expected	5	1	Local Community	No noticeable impacts to steep slopes near Glennies Creek and the Hunter River (minor valley closure). Some surface cracking on the Hunter River steep slopes may slightly increase the risk of slope failure due to increased infiltration of water.	Remediation of surface cracking will limit water infiltration and manage slope stability issues. Survey monitoring of Glennies Creek will identify levels of valley closure and confirm predictions as the longwall faces approaches and passes closest point.	Class I (Low)
Community Engagement Process	Little or no community consultation has occurred on subsidence aspects	Limited community consultation has occurred on subsidence aspects	Comprehensive consultation has occurred with key stakeholders in regard to subsidence aspects	Key community stakeholders have been involved in subsidence management plans	Stakeholders provide independent, positive affirmation of the subsidence management	4	2	Neighbours	Adjacent property owner is concerned especially as possible disruptions to his access and use of the farm roads that cross ACOLs property to get to his property. He has been involved from an early stage on the potential management options. General community has also had a chance to participate through two meetings, and invitation (through newspaper advertisements and Ashtons CCC newsletter) to contact ERM with any concerns	Extensive communication and discussions have been undertaken.	Class II (Moderate)
Regulatory Process Completion	Little or no consultation with regulators has occurred on subsidence aspects	Limited consultation has occurred on subsidence aspects	Comprehensive consultation has occurred with regulators in regard to subsidence aspects	Regulators have been involved in subsidence management plans	Regulators provide positive affirmation of the subsidence management approach	5	1	Regulators	This is a well defined regulatory process with a high degree of familiarity from the regulator and the company. The process is not likely to generate any specific issues.		Class I (Low)
Modeling Rigour	An 'in-house' modeling and prediction methodology has been used with no external validation	In-house' methodology used and validated by external parties and accepted by regulator	Standard methodology used and accepted by regulators	Standard methodology used; monitoring results used to update and fine tune methodology	Methodology used is recognised by technical peers, regulators and industry as 'best practice'	5	1	Regulators	Subsidence modelling processes are well recognised and understood by regulators.		Class I (Low)



SITE SAFETY STANDARDS

Doc No: 4.6.2.2

RISK ASSESSMENT POTHOLE MANAGEMENT

Note: This document is uncontrolled when printed and is valid only on day of print

<i>version</i>	<i>issue date</i>	<i>section modified</i>	<i>reason for modification</i>	<i>modified by</i>
1	12.10.05		original	M. Cook
Approved by		Signature		
Print Date			Page	
27/10/2006 10:16:00 AM			1 of 8	
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APPENDIX A – Ashton Coal RISK MATRIX

Loss Type		Hazard Effect/ Consequence				
		1 Insignificant	2 Minor	3 Moderate	4 Major	5 Catastrophic
(P) Harm to People		Slight injury or health effects – first aid/ minor medical treatment level	Minor injury or health effects – restricted work or minor lost workday case	Serious bodily injury or health effects – major lost workday case/ permanent disability	Single fatality, permanent total disabilities.	Multiple fatalities
(E) Environmental Impact		Environmental nuisance	Material environmental harm	Serious environmental harm	Major environmental harm	Extreme environmental harm
(A) Asset Damage & Other Consequential Losses		Slight damage <\$0.01M No disruption to operation	Minor damage \$0.01M to\$0.1M. Brief disruption to operation	Local damage \$0.1M to\$1.0M. partial shutdown	Major damage \$1.0M to\$10.0M. Partial loss of operation	Extreme damage > \$10.0M. Substantial or total loss of operation
(R) Impact on Reputation		Slight impact – public awareness may exist but no public concern	Limited impact – some local public concern	Considerable impact – regional public concern	National impact – national public concern	International impact – international public attention
Likelihood	Likelihood Examples (use only as a guide)	Risk Rating				
A (Almost certain)	Likely that the unwanted event could occur several times per year at this location	15 (M)	10 (H)	6 (H)	2 (Ex)	1 (Ex)
B (Likely)	Likely that the unwanted event could occur several times per year in the Australian mining industry; or could happen annually	19 (M)	14 (M)	9 (H)	4 (Ex)	3 (Ex)
C (Possible)	The unwanted event could well have occurred in the Australian mining industry at some time in the past 10 years	22 (L)	18 (M)	13 (H)	8 (H)	5 (Ex)
D (Unlikely)	The unwanted event has happened in the Australian mining industry at some time; or could happen in 50 years	24 (L)	21 (L)	17 (M)	12 (H)	7 (H)
E (Rare)	The unwanted event has never been known to occur in the Australian mining industry; or is highly unlikely that it could ever occur	25 (L)	23 (L)	20 (M)	16 (M)	11 (H)

Risk Rating	Risk Level	Guidelines for Risk Control Barriers
1 to 5	(E) – Extreme	Immediate intervention required from senior management, do not proceed with activity. 2 HARD BARRIERS + 2 SOFT BARRIERS
6 to 13	(H) – High	Imperative to eliminate or reduce risk by introduction of controls, do not proceed with activity until reviewed by senior management 2 HARD BARRIERS
14 to 20	(M) – Medium	Corrective action to be determined, do not proceed without authorisation 1 HARD BARRIER + 1 SOFT BARRIER
21 to 25	(L) – Low	Safe to continue activity once hazards minimised 2 SOFT BARRIERS

Catastrophic Risks

APPENDIX C – RISK ASSESSMENT PRO-FORMA:

Task:	The purpose of this Risk Assessment is to determine the risk of a pothole forming under the New England highway due to Aston's underground mine workings It is understood that for a pothole to form, a roof fall must occur underground. With this reasoning the relevant hazard is that of an underground roof fall in the workings underneath the New England highway's roadway reserve.								
Date:	3/1/06								
Facilitator:	Mark Cook								
Assessors:	J.Grebert, B.Wesley, T.Collingwood, A.Barrett								
Hazard	Sub Hazard	Potential Consequences	Existing Controls	Loss P,E,A,R	C	L	Risk Rating	Potential Controls	Person Responsible
Roof Fall	Water Ingress	Pothole to surface	Exploration data does not indicate any excess water	P	4	D	12H	TARP pothole management: notification of internal/external stakeholders	JG,BW
			Mine Inspection system	E	4	D	12H	Communication of TARP	
			No old workings identified from inrush search	A	4	D	12H	Design of roof support to civil criteria by external experts	
			Strata Management system and monitoring	R	4	D	12H	Review support on discovery of water	JG
			Geotech assessment on potholes WRT depth of cover					Surplus supply of secondary support hardware	U/M, Deputy, Store

Hazard	Sub Hazard	Potential Consequences	Existing Controls	Loss P,E,A,R	C	L	Risk Rating	Potential Controls	Person Responsible
Roof Fall	Geological structure/change in strata conditions	Pothole to surface	Exploration data does not indicate any major geological hazards	P	5	D	7H	TARP pothole management: notification of internal/external stakeholders	JG,BW
			Mine Inspection system	E	3	D	17M	Communication of TARP	
			Strata Management system and monitoring	A	4	D	12H	Design of roof support to civil criteria by external experts	
			Geotech assessment on potholes WRT depth of cover	R	4	D	12H	Review support on discovery of unexpected geological hazard	
			Geological data from Artesian pit O/C extraction					Surplus supply of secondary support hardware	
Roof Fall	Unsupported roof over time	Pothole to surface	Strata Management system and monitoring	P	4	D	12H	Drivage being bolted to the face prior to any shutdown	U/M, Dep
			Mine Inspection system	E	4	D	12H		
			Geotech assessment of roof strata	A	4	D	12H		
			Hand bolters available in case of CM breakdown	R	4	D	12H		

Hazard	Sub Hazard	Potential Consequences	Existing Controls	Loss P,E, A,R	C	L	Risk Rating	Potential Controls	Person Responsible
Roof Fall	Poor bolt installation	Pothole to surface	Strata Management plan/support rules/monitoring	P	5	D	7H	TARP pothole	JG,BW
			Equipment Maintenance	E	2	D	21L	Tool box talk prior to undermining roadway reserve	U/M, Dep
			Competent trained personnel, reading/installation of telltales, correct installation of roof/cable bolts	A	4	D	12H		
			Audits by bolt supplier on routine basis	R	4	D	12H		
			Correctly stored and maintained supplies eg chemicals in refrigerated container						
			Engineering standards						
			Mine inspection system						
			Supervision of installation by officials						
			TARP strata control						

