

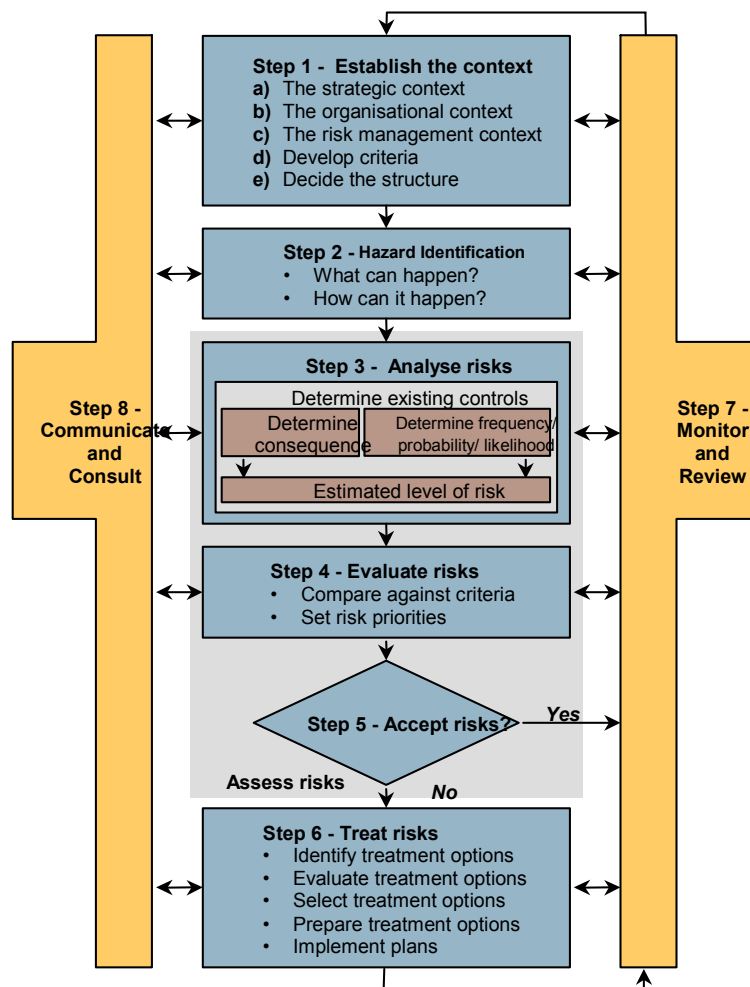
# Qualitative Risk Assessment

for

## CARDNO FORBES RIGBY

### SMP Application

### Longwalls 34 - 36 in Area 5 at West Cliff Colliery



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# Section 1. Executive Summary

This analysis was commissioned by Cardno Forbes Rigby Pty Ltd to determine the risks associated with mining Longwalls 34 to 36 at West Cliff Colliery with the aim of developing the Subsidence Management Plan (SMP) for BHPB Illawarra Coal.

This report details the methods used and the recommendations from the risk assessment which was conducted at the offices of Cardo Forbes Rigby on January 11th of 2008.

Risk ranking was undertaken in accordance the BHP Billiton Enterprise Wide Risk Management (EWRM) Standard.

In accordance with the scope, high level risk issues were considered and recorded by the risk assessment team. The reader should refer to the sections regarding the Objectives, Scope and Assumption and Limitations of this risk assessment.

Attachment 2 (Analysis Worksheets) identifies all of the hazards, existing controls, risk rankings and any new treatment options and the people responsible for their implementation.

Attachment 5 (Risk Treatment Schedule) provides a format of all the new treatment options and the people responsible for their implementation. In addition a required date and sign off is also provided.

Attachment 3 and 4 (Risk Rank Order and Consequence Order) provides all of the identified hazards and treatment options in order of highest risk to lowest risk and from highest consequence to lowest consequence. The BHPB EWRM standard does not require these reports, however to provide compliance to the Department of Primary Industries MDG1010 and MDG1014 standards they are included.

## Section 2. Analysis and Report

This Analysis was facilitated by: Shane Chiddy  
The Analysis took place: 11th January 2008

This Analysis has been verified by:  
The Verification occurred:

This Report has been compiled by: Shane Chiddy  
The Report was compiled: 11th January 2008

## Section 3. Participants

The following people participated in the Analysis:

<u>Participant</u>	<u>Participant Role</u>	<u>Relevant Experience</u>
Richard Walsh	BHPB Illawarra Coal Manager Approvals	27 Years
Bruce Blunden	BHPB Illawarra Coal Manager Environmental Approvals	15 Years
Chris McEvoy	Cardno Forbes Rigby Senior Manager / Environmental Scientist	15 Years

## **Section 4. Purpose**

In January 2008 AXYS Consulting was commissioned to facilitate a risk assessment to assist in the development of the Subsidence Management Plan (SMP) for Longwalls 34 - 36 at West Cliff Colliery, consider the potential risk of impacts to key stakeholders and Illawarra Coal.

This report details the methods used and the recommendations resulting from the risk assessment which was conducted at the Cardno Forbes Rigby offices on the 11th of January 2008.

The aspects included in this SMP includes man made features of importance such as the Upper Canal including the Nepean Tunnel and aqueducts, electricity transmission lines and the Alinta, AGL and Gorodok gas pipelines.

Natural features and heritage structure items within the area are also included .

The mining layout will impact several permanent survey control stations.

Houses are situated within the area and, for the purposes of this assessment, include associated structures, such as on-site septic waste systems, sheds, fences etc.

Rural structures located within the SMP Area include farm buildings, fences, farm dams and water bores.

Subsidence predictions have been completed for the application area and the subsidence model includes vertical and horizontal displacement predictions.

## **Section 5. Objectives**

The objectives of this assessment is to assist West Cliff Colliery in identification and control of risks associated with Longwalls 34-36 subsidence in accordance with requirements from:

BHPB Policy and Standards;

State and Commonwealth Legislation;

Evaluate and record a formal risk assessment in accordance with the BHP Billiton EWRM Standard.

## **Section 6. Scope**

The scope of this report is to identify subsidence risks from all potential sources for West Cliff Colliery proposed Longwalls 34-36.

This risk assessment is to assist in the development of the SMP.

Areas for consideration includes surface and sub-surface features as defined by Process Area List based on the NSW Department of Primary Industries - Mineral Resources Guideline for application for Subsidence Management Approvals - Appendix B.

Specifically, this report is to assess the risks associated with mining Longwalls 34-36 at West Cliff Colliery with the aim of developing the SMP, in accordance with the BHP Billiton EWRM Standard in terms of;

- Health and Safety (HS);
- Estimated Shareholder Value / Material Damage / Financial Loss (FL);
- Project Net Present Value (NPV);
- Natural Environment (NE);
- Social / Cultural / Heritage (SC);
- Community / Government Reputation / Media (R);
- Legal (L).

## **Section 7. Assumptions**

The following assumptions and limitations have been applied to this risk assessment:

1. Subsidence would generally be in accordance with predictions as identified in the report MSEC326 developed by Mine Subsidence Engineering Consultants.
2. Impact would be similar to those previously observed in comparable areas.
3. There may be isolated cases where subsidence will not occur as predicted. These cases will be taken into account in the MSEC326 report and the Impact Assessment and the SMP development.
4. Rigorous monitoring can identify anomalous subsidence which can be used to manage impacts through early intervention strategies.
5. Surface features and land use remains substantially constant during the mining period.
6. BHPB IC will initiate consultation procedures to identify any changes to surface infrastructure in the area that may be impacted.
7. Focus of this risk assessment is for the development of the SMP.
8. Risk evaluation is for the highest most likely impact on the risk being assessed.

## **Section 8. Facilitator Qualifications**

Shane Chiddy holds an Associate Diploma in Engineering (Electrical), is a Graduate Officer of the Institution of Engineers (Australia) and is a member of the Maintenance Engineering Society of Australia (MESA). He has also completed Conveyancing Law through Macquarie University and Establish the Risk Management Systems (Mine 7033 - G3) through Queensland University.

Prior to commencing his consulting career, Shane Chiddy qualified as an electrician and worked underground for 15 years. He then occupied a number of engineering roles within Rio Tinto, including such roles as electrical supervisor, Development Engineer and Senior Production Engineer. This latest role was responsible for the Longwall, underground diesel equipment and conveyors.

Additionally Shane Chiddy has been trained and accredited by John Moubray in the UK as a certified RCM II practitioner, and has conducted a number of extensive Reliability-centred Maintenance II analyses including underground and surface equipment such as Longwalls, Continuous Miners and conveying systems.. He has facilitated RCM II analysis and delivered training in the mining, defence and telecommunications industries.

His consulting experience includes the application of Reliability-centred Maintenance II and extensive Risk Management and Project Management assignments. Shane is also experienced in software development and in the development and presentation of training packages.

## Section 9. Sub-Systems Analysed:

SUB-SYSTEM		STEP IN PROCESS	
1	Natural Features	A	1.01 Catchment areas and declared Special Areas
		B	1.02 Rivers and creeks (Georges River, Nepean Creek, Leafs Gully, Mallaty Creek)
		C	1.03 Aquifers, known groundwater resources
		D	1.04 Springs
		E	1.05 Sea/lake
		F	1.06 Shorelines
		G	1.07 Natural dams
		H	1.08 Cliffs / pagodas
		I	1.09 Steep slopes
		J	1.10 Escarpments
		K	1.11 Land prone to flooding or inundation
		L	1.12 Swamps, wetlands, water related ecosystems
		M	1.13 Threatened and protected species
		N	1.14 National parks
		O	1.15 State recreation areas
		P	1.16 State forests particularly areas zoned FMZ 1, 2 and 3
		Q	1.17 Natural vegetation
		R	1.18 Areas of significant geological interest
		S	1.19 Any other feature considered significant
2	Public Utilities	A	2.01 Railways
		B	2.02 Roads (all types)
		C	2.03 Bridges
		D	2.04 Tunnels (Nepean Tunnel as part of the Upper Canal System)
		E	2.05 Culverts
		F	2.06 Water/gas/sewerage pipelines
		G	2.07 High pressure gas pipelines (High pressure gas pipelines Alinta, AGL and Gorodok)
		H	2.08 Electricity transmission lines (overhead/underground) and associated plants
		I	2.09 Telecommunication lines (overhead/underground) and associated plants
		J	2.10 Water tanks, water and sewage treatment works
		K	2.11 Dams, reservoirs and associated works
		L	2.12 Air strips
		M	2.13 SCA infrastructure including Upper Canal, Nepean Tunnel, Aqueducts, Bridges and all associated roads, flumes and culverts
3	Public Amenities	A	3.01 Hospitals
		B	3.02 Places of worship
		C	3.03 Schools
		D	3.04 Shopping centres



## Section 9. Sub-Systems Analysed:

SUB-SYSTEM		STEP IN PROCESS			
3	Public Amenities	E	3.05 Community centres		
		F	3.06 Office buildings		
		G	3.07 Swimming pools		
		H	3.08 Bowling greens		
		I	3.09 Ovals and cricket grounds		
		J	3.10 Race courses		
		K	3.11 Golf courses		
		L	3.12 Tennis courts		
		M	3.13 Any other amenities considered significant		
		4	Farm Land and Facilities	A	4.01 Agricultural utilisation or agricultural suitability of farm land
				B	4.02 Farm buildings / sheds
				C	4.03 Gas and / or fuel storages
				D	4.04 Poultry sheds
E	4.05 Glass Houses				
F	4.06 Hydroponic systems				
G	4.07 Irrigation systems				
H	4.08 Fences				
I	4.09 Farm dams				
J	4.10 Wells, bores				
K	4.11 Any other feature considered significant				
5	Industrial, Commercial and Business Establishments	A	5.01 Factories		
		B	5.02 Workshops		
		C	5.03 Business or commercial establishments		
		D	5.04 Gas and / or fuel storages and associated plants		
		E	5.05 Waste storages and associated plants		
		F	5.06 Buildings, equipment and operations that are sensitive to surface movements		
		G	5.07 Surface mining (open cut) voids and rehabilitated areas		
		H	5.08 Mine infrastructure including tailings dams and emplacement areas		
		I	5.09 Any other feature considered significant		
6	Areas of Archaeological and/or Heritage significance	A	6.01 Areas of Archaeological and/or Heritage Significance		
7	Items of Architectural Significance	A	7.01 Items of Architectural Significance		
8	Permanent Survey Control Marks	A	8.01 Permanent Survey Control Marks		
9	Residential Establishments	A	9.01 Houses		
		B	9.02 Flats / Unit		
		C	9.03 Caravan parks		

# Section 9. Sub-Systems Analysed:

SUB-SYSTEM		STEP IN PROCESS	
9	Residential Establishments	D	9.04 Retirement/aged care villages
		E	9.05 Associated structures such as workshops, garages, on-site waste water systems, water or gas tanks, swimming pools and tennis courts
		F	9.06 Any other feature considered significant

**Attachment 1**  
**Definitions and**  
**Risk Ranking Methodology**

### **Consequence**

The size and nature of the impact from an event or occurrence.

### **Exposure**

The frequency at which BHP Billiton could be exposed to consequences at the specified severity. These consequences may not manifest themselves, but there is a possibility they might.

### **Exposure factor**

Is a measure of the frequency of occurrence of the risk issue during which BHP Billiton and/or its stakeholders could be exposed to consequences at the specified level of severity.

### **Hazard**

A hazard is the intrinsic potential for an agent, activity or process to lead to an incident, or ongoing condition.

**Environment note:** The term 'hazard' is essentially equivalent to 'environmental aspect'.

### **Impact/Effect**

Impacts are specific adverse effects resulting from an incident and may be related to people, the environment, plant or property, or a combination of these.

### **Incident (or ongoing condition)**

An incident (or ongoing condition) is any occurrence that has the potential to result in adverse consequences to people, the environment, property/plant, or a combination of these.

### **Likelihood**

The chance of occurrence per unit time (normally per year) In BHP Billiton this term will be used instead of "Frequency" because it helps the user think "is it likely?"

### **Frequency**

The chance of occurrence per unit time (typically, per year).

### **Probability Factor**

Represents the chance of consequences as the specified level of severity occurring when the risk issue occurs (i.e. during the Exposure).

### **Risk**

Risk is defined as the likelihood of an impact on people, the environment, property, or a combination of these.

### **Risk Rating**

The numerical rating applied to a risk calculated as the product of a severity factor, a probability factor, and an exposure factor.

### **Severity factor**

Is a measure of the degree of consequences that are most likely to occur associated with a risk. Those consequences could either negatively impact BHP Billiton, its brand and its stakeholders or be the expected level of unrealised opportunity for gain that could be missed.

### **Risk Control Effectiveness (RCE)**

The Risk Control Effectiveness (RCE) is defined as “the actual level of control that is currently present and effective, expressed as a percentage of that reasonably achievable for that particular risk issue”  
 In practice there would always be some room for improvement in the completeness and/or effectiveness of the controls associated with a risk issue. Accordingly, a value of 100% should not normally be claimed for the Risk Control Effectiveness rating.

Description	RCE
“Just getting started” / “A lot of work still to be done”	20 – 30%
“About half way there”	50 – 60%
“Most things in pace and working, but some more still to be done”	75 – 80%
“Nothing more to be done except review and monitor the existing controls”	> 90%

### **EXPOSURE FACTOR**

Choose a description that best fits the frequency of the “window of opportunity” during which impacts of the selected type and level of severity could be incurred (experienced) by BHP Billiton or its stakeholders, taking into account the existing controls.

Frequency of the "window of opportunity"	Factor
At least once per week	10
One a month or so	3
Once or twice a year	1
One or twice every 10 years	0.3
Once or twice in a 100 years	0.1

### **PROBABILITY FACTOR**

Choose a description that best fits the chance of BHP Billiton or its stakeholders actually incurring (experiencing) impacts of the selected type and level of severity during a “window of opportunity”, taking into account the existing controls.

Chances of the impact actually being incurred (experienced) during a "window of opportunity"	Factor
Happens often	10
Could easily happen	3
Could happen and has occurred here or elsewhere	1
Hasn't happened yet but could	0.3
Conceivable, but only in extreme circumstances	0.1

## SEVERITY FACTOR

Choose a description that best fits the most likely degree harm, injury, loss or potential gain. Where there is more than one consequence type possible, look across the table and choose the highest level and corresponding Severity Factor. (Note: ESVA NPV and other terms are as defined in EWRM Standard No. 6)

Severity Level	Change in ESVA	Change in Project return (-NVP)	Health and Safety	Natural environment	Social / Cultural heritage	Community / Govt / Reputation / Media	Legal
1000	>US\$ 1B	>US\$ 5B	> 500 fatalities or very serious irreversible injury to 5000 persons.	Very significant impact on highly value species, habitat or eco system.	Irreparable damage to highly valued items of great cultural significance or complete breakdown of social order.	Prolonged international Condemnation.	Potential jail terms for executives and or very high fines for company. Prolonged, multiple litigation
300	US\$ 100M – US\$ 1B	US\$ 500M – US\$ 5B	>50 fatalities, or very serious irreversible injury to >500 persons	Significant impact on highly valued species, habitat, or ecosystem.	Irreparable damage to highly valued items of cultural significance or breakdown of social order.	International multi- NGO and media condemnation.	Very significant fines and prosecutions. Multiple litigation
100	US\$ 10M – US\$ 100M	US\$ 50M – US\$ 500M	Multiple fatalities, or significant irreversible effects to >50 persons	Very serious, long- term environmental impairment of ecosystem function	Very serious widespread social impacts. . Irreparable damage to highly valued items.	Serious public or media outcry (international coverage).	Significant prosecution and fines. Very serious litigation, including class actions.
30	US\$ 1M – 10M	US\$ 5M – 50M	Single fatality and/ or severe irreversible disability (> 30%) to one or more persons.	Serious medium term environmental effects.	On- going serious social issues. Significant damage to structures/ items of cultural significance.	Significant adverse national media/ public/ NGO attention.	Major breach of regulation. Major litigation.
10	US\$ 100, 000 – 1M	US\$ 50, 000 – 5M	Moderate irreversible disability or impairment (< 30%) to one or more persons.	Moderate, short- term effects but not affecting ecosystem function.	On going social issues. Permanent damage to items of cultural significant.	Attention from media and/ or heightened concern by local community. Criticism by NGOs	Serious breach of regulation with investigation or report to authority with prosecution and/ or moderate fine possible.
3	US\$ 10, 000 – \$100,000	US\$ 50, 000 – 500,000	Objective but reversible disability requiring hospitalisation	Minor effects on biological or physical environment.	Minor medium- term social impacts on local population. Mostly repairable.	Minor, adverse local public or media attention and complaints	Minor legal issues, non-compliances and breaches of regulation
1	<US\$ 10, 000	<US\$ 50, 000	No medical treatment required	Limited damage to minimal area of low significance.	Low- level repairable damage to commonplace structures.	Public concern restricted to local complaints.	Low- level legal issue.

## PRIORITY GUIDE

Once a risk rating has been calculated, the following scheme should be used to assign priority of action. It should be noted that if action is not taken within the time specified, then the continued toleration of the residual 'downside' risk should be explicitly 'signed-off'. The suggested level of seniority for sign-off is as shown below.

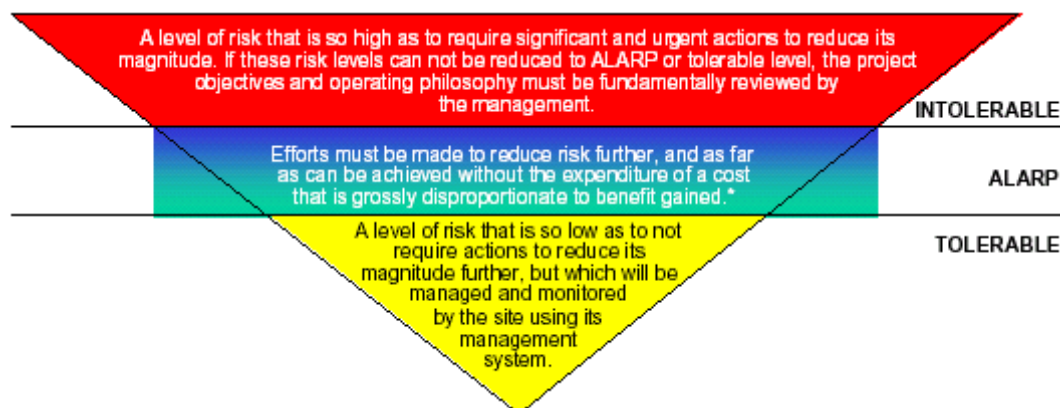
Priority	Risk Rating	Suggested Action	Suggested Timing	Authority for continued toleration of residual risk
1	>300	Cessation until the residual risk is reduced to 300 or below – unless exposure is authorised as indicated.	Immediate	BHP Billiton CEO and Board
2	91 - 300	Take action to reduce residual risk to 90 or below	Short term Normally within 1 month	President CSG
3	31 - 90	Plan to deal with in keeping with business plan.	Medium term, Normally within 3 months	Presidents direct reports
4	11 - 30	Plan in keeping with all other priorities.	Normally within 1 year.	Manager
5	< 10	Low priority. Will still require attention	Ongoing control as part of management system	Manager direct reports

The decision to tolerate a risk should be based on a consideration of:

- Whether the risk is being controlled to a level that is reasonably achievable,
- Whether it would be cost-effective to further control risk,
- The tolerability of the organisation (risk appetite) for risks of that type.

For decisions about HSEC Risks, the principles outlines in HSEC Toolkit No. T07 should be followed involving the application of the ALARP criteria given there.

Likelihood or Frequency / Probability	Consequence Severity				
	Low	Minor	Moderate	Major	Critical
Almost Certain	High 100	High 300	Extreme 1,000	Extreme 3,000	Extreme 10,000
Likely	Moderate 30	High 90	High 300	Extreme 900	Extreme 3,000
Possible	Low 10	Moderate 30	High 100	Extreme 300	Extreme 1,000
Unlikely	Low 3	Low 9	Moderate 30	High 90	Extreme 300
Rare	Low 1	Low 3	Moderate 10	High 30	High 100



**Attachment 2**  
**Analysis Worksheets**



**Qualitative  
Risk Analysis.  
Analysis Worksheet**



<b>SYSTEM:</b> AR0507	Cardno Forbes Rigby SMP Application	<b>Compiled by:</b> <b>Date:</b>	Shane Chiddy 11th January 2008	<b>Sheet:</b> <b>of:</b>	1 21
<b>SUB SYSTEM:</b> No: 1	Natural Features	<b>Verified by:</b> <b>Date:</b>			

STEP IN PROCESS	CAUSE & IMPACT	EXISTING CONTROLS	RCE	Sev	Exp	Prob	Rate	TID	TREATMENT OPTIONS	RESPONSIBLE
A 1.01 Catchment areas and declared Special Areas	1 The area of subsidence under analysis does not include any catchment areas and declared special areas and did not require further assessment.									
B 1.02 Rivers and creeks (Georges River, Nepean Creek, Leafs Gully, Mallaty Creek)	1 Water flow and quality changes to ephemeral creeks due to mine subsidence. Flow on environmental impacts result.	Monitoring programs in place  Remediation techniques have been developed for ephemeral creeks / rivers  Past mining has not lead to any significant impacts on ephemeral creeks in the area.  Subsidence predictions have been developed	75 - 80%	3	1	1	3	1	Completed SMP to include consideration of ephemeral creeks and the monitoring programs	BHPB Illawarra Coal - Manager Environment
C 1.03 Aquifers, known groundwater resources	1 Ground water level and quality changes due to mine subsidence.	Limited use of groundwater resource in the area  There are no ecological communities dependant upon the ground water  Monitoring programs in place  Past mining has not lead to any significant impacts on aquifers in the area.  No recorded inflows to West Cliff Mine in the past 30 years. Successful mining under Brennans Creek Dam  No water inflow along geological features encountered in the workings	75 - 80%	3	1	1	3	1	Completed SMP to include consideration of aquifers and the monitoring programs	BHPB Illawarra Coal - Manager Environment
D 1.04 Springs	1 Existing spring water flow and quality changes, or the creation of new springs due to mine	Base line assessment has been completed, one spring has been identified	75-80%	3	1	1	3	1	Completed SMP to include consideration of springs and the monitoring programs	BHPB Illawarra Coal - Manager Environment

**Qualitative  
Risk Analysis.  
Analysis Worksheet**



<b>SYSTEM:</b> AR0507	Cardno Forbes Rigby SMP Application	<b>Compiled by:</b> <b>Date:</b>	Shane Chiddy 11th January 2008	<b>Sheet:</b> <b>of:</b>	2 21
<b>SUB SYSTEM:</b> No: 1	Natural Features	<b>Verified by:</b> <b>Date:</b>			

STEP IN PROCESS		CAUSE & IMPACT	EXISTING CONTROLS	RCE	Sev	Exp	Prob	Rate	TID	TREATMENT OPTIONS	RESPONSIBLE
E	1.05 Sea/lake	1 subsidence.  The area of subsidence under analysis does not include any seas or lakes and did not require further assessment.	Monitoring programs in place  Subsidence predictions have been developed  Impact assessment has been prepared								
F	1.06 Shorelines	1 The area of subsidence under analysis does not include any shorelines and did not require further assessment.									
G	1.07 Natural dams	1 The area of subsidence under analysis does not include any natural dams and did not require further assessment.									
H	1.08 Cliffs / pagodas	1 Rock falls from cliffs due to mine subsidence. Rock fall causes localised damage to environment. (Note: There were no pagodas identified in the area)	Base line assessment has been completed, cliffs are at known locations  Monitoring programs in place  Past mining has not lead to any significant impacts on cliffs in the area.  Subsidence predictions have been developed  Small number of cliffs within the area (less than 100 Metres of cliff line within the area)	75-80%	1	1	0.1	0	1	Completed SMP to include Public Safety and the monitoring programs	BHPB Illawarra Coal - Manager Environment

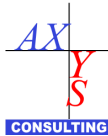
**Qualitative  
Risk Analysis.  
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<b>SYSTEM:</b> AR0507	Cardno Forbes Rigby SMP Application	<b>Compiled by:</b> <b>Date:</b>	Shane Chiddy 11th January 2008	<b>Sheet:</b> <b>of:</b>	<b>3</b> <b>21</b>
<b>SUB SYSTEM:</b> No: 1	Natural Features	<b>Verified by:</b> <b>Date:</b>			

STEP IN PROCESS		CAUSE & IMPACT	EXISTING CONTROLS	RCE	Sev	Exp	Prob	Rate	TID	TREATMENT OPTIONS	RESPONSIBLE
I	1.09 Steep slopes	1 Mass movement of steep slopes due to mine subsidence. Localised damage to environment.	Base line assessment has been completed, steep slopes are at known locations  Monitoring programs in place  Past mining has not lead to any significant impacts on steep slopes in the area.  Subsidence predictions have been developed  Private land not accessible by the public	75 - 80%	1	1	0.1	0	1	Completed SMP and the monitoring programs	BHPB Illawarra Coal - Manager Environment
J	1.10 Escarpments	1 The area of subsidence under analysis does not include any escarpments and did not require further assessment.									
K	1.11 Land prone to flooding or inundation	1 The area of subsidence under analysis does not include any land prone to flooding or inundation and did not require further assessment.									
L	1.12 Swamps, wetlands, water related ecosystems	1 The area of subsidence under analysis does not include any swamps, wetlands, water related ecosystems and did not require further assessment. (Note : Creeks have been analysed in 1.02 Rivers and Creeks)									
M	1.13 Threatened and protected species	1 Mine subsidence leads to loss of protected species or their habitat.	Base line assessment has been completed, known species within the area  Monitoring programs in place	75-80%	1	1	0.1	0	1	Completed SMP to include consideration of Threatened and protected species and the monitoring programs	BHPB Illawarra Coal - Manager Environment

**Qualitative  
Risk Analysis.  
Analysis Worksheet**



<b>SYSTEM:</b> AR0507	Cardno Forbes Rigby SMP Application	<b>Compiled by:</b> <b>Date:</b>	Shane Chiddy 11th January 2008	<b>Sheet:</b> <b>of:</b>	<b>4</b> <b>21</b>
<b>SUB SYSTEM:</b> <b>No: 1</b>	Natural Features	<b>Verified by:</b> <b>Date:</b>			

STEP IN PROCESS		CAUSE & IMPACT	EXISTING CONTROLS	RCE	Sev	Exp	Prob	Rate	TID	TREATMENT OPTIONS	RESPONSIBLE
N	1.14 National parks	1 Mine subsidence leads to impacts to Dharawal State Conservation Area	<p>Past mining has not lead to impacts on threatened and protected species in this area</p> <p>Subsidence predictions have been developed</p> <p>Mine layout avoids the Dharawal State Conservation Area, near the limit of subsidence effects</p> <p>All elevent environmental issues are considered under natural features throughout this assessment</p>	75 - 80%	1	1	0.1	0	1	Completed SMP to include consideration of Dharawal State Conservation Area	BHPB Illawarra Coal - Manager Environment
O	1.15 State recreation areas	1 The area of subsidence under analysis does not include any State recreation areas and did not require further assessment.									
P	1.16 State forests particularly areas zoned FMZ 1, 2 and 3	1 The area of subsidence under analysis does not include any State forests particularly areas zoned FMZ 1, 2 and 3 and did not require further assessment.									
Q	1.17 Natural vegetation	1 Mine subsidence leads to damage or loss of Natural vegetation.	<p>Base line assessment has been completed, Natural vegetation is at known locations</p> <p>Monitoring programs in place</p> <p>Past mining has not lead to any significant impacts on Natural vegetation</p> <p>Subsidence predictions have been developed</p>	75-80%	1	1	0.3	0	1	Completed SMP to include consideration of Natural vegetation and the monitoring programs	BHPB Illawarra Coal - Manager Environment



**Qualitative  
Risk Analysis.  
Analysis Worksheet**



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<b>SUB SYSTEM:</b> No: 2	Public Utilities	<b>Verified by:</b> <b>Date:</b>			

STEP IN PROCESS	CAUSE & IMPACT	EXISTING CONTROLS	RCE	Sev	Exp	Prob	Rate	TID	TREATMENT OPTIONS	RESPONSIBLE
A 2.01 Railways	1 The area of subsidence under analysis does not include any railways and did not require further assessment.									
B 2.02 Roads (all types)	1 Damage to roads due to anomalous mine subsidence. Roads require repair.	Monitoring programs in place Subsidence predictions have been developed Public Road Management Plan for West Cliff Longwalls 29-33 Property subsidence management plans includes private and public roads	75-80%	3	1	1	3	1	Completed SMP to include consideration of Roads (all types) and the monitoring programs 2 Impact assessment to be prepared and mitigation and monitoring programs to be developed. 3 Revise the Road management plan to include Longwalls 34-36	BHPB Illawarra Coal - Manager R&I BHPB Illawarra Coal - Manager R&I BHPB Illawarra Coal - Manager R&I
C 2.03 Bridges	1 Damage to bridges due to mine subsidence. Roads require repair.	Base line assessment has been completed, known bridges within the area Known bridges are associated with the Upper Canal Only SCA use bridges	75-80%	3	1	1	3	1	Completed SMP to include consideration of bridges (all types) and the monitoring programs 2 Impact assessment to be prepared and mitigation and monitoring programs to be developed. 3 Revise the Management Plan to include Longwalls 34-36	BHPB Illawarra Coal - Manager R&I BHPB Illawarra Coal - Manager R&I BHPB Illawarra Coal - Manager R&I
D 2.04 Tunnels (Nepean Tunnel as part of the Upper Canal System)	1 Damage to tunnel due to mine subsidence. Tunnel requires repair.	Base line assessment has been completed, known tunnels within the area Subsidence predictions have been developed Monitoring programs in place Master agreement has been developed between BHPB IC and SCA	75-80%	3	1	3	9	1	Completed SMP to include consideration of tunnels and the monitoring programs 2 Impact assessment to be prepared and mitigation and monitoring programs to be developed. 3 Revise the Management Plan to include Longwalls 34-36	BHPB Illawarra Coal - Manager R&I BHPB Illawarra Coal - Manager R&I BHPB Illawarra Coal - Manager R&I

**Qualitative  
Risk Analysis.  
Analysis Worksheet**



<b>SYSTEM:</b> AR0507	Cardno Forbes Rigby SMP Application	<b>Compiled by:</b> <b>Date:</b>	Shane Chiddy 11th January 2008	<b>Sheet:</b> 7
<b>SUB SYSTEM:</b> No: 2	Public Utilities	<b>Verified by:</b> <b>Date:</b>		<b>of:</b> 21

STEP IN PROCESS	CAUSE & IMPACT	EXISTING CONTROLS	RCE	Sev	Exp	Prob	Rate	TID	TREATMENT OPTIONS	RESPONSIBLE
E 2.05 Culverts	1 The group considered that Culverts are associated with either roads or the Upper Canal and did not require further analysis (See Roads Section 2.02 and Canals 2.13)									
F 2.06 Water/gas/sewerage pipelines	1 Damage to the 1200mm United Utilities water pipe line and associated connections due to mine subsidence.	Agreement with Macathur Water	75-80%	30	1	0.3	9	1	Completed SMP to include consideration of water pipe lines and the monitoring programs	BHPB Illawarra Coal - Manager R&I
		Management Plan for Longwalls 29-33						2	Impact assessment to be prepared and mitigation and monitoring programs to be developed.	BHPB Illawarra Coal - Manager R&I
		Monitoring programs in place Known locations of water pipe lines Proven mitigation techniques						3	Revise the Management Plan to include Longwalls 34-36	BHPB Illawarra Coal - Manager R&I
	2 Damage to the Sydney Water local distribution network water pipe line and associated connections due to mine subsidence.	Agreement with Sydney Water	75-80%	1	1	1	1	1	Completed SMP to include consideration of water pipe lines and the monitoring programs	BHPB Illawarra Coal - Manager R&I
		Management Plan for Longwalls 29-33						2	Impact assessment to be prepared and mitigation and monitoring programs to be developed.	BHPB Illawarra Coal - Manager R&I
		Monitoring programs in place Known locations of water pipe lines Proven mitigation techniques						3	Revise the Management Plan to include Longwalls 34-36	BHPB Illawarra Coal - Manager R&I
	3 There is no public reticulated sewerage and gas pipelines within the area. The sewerage and gas pipelines that are within in the area are those associated with domestic use. See Houses in Section 9.01									
G 2.07 High pressure gas pipelines	1 Damage to the Gas Pipelines	Agreement with Infrastructure	75-80%	30	1	0.3	9	1	Completed SMP to include	BHPB Illawarra





**Qualitative  
Risk Analysis.  
Analysis Worksheet**



<b>SYSTEM:</b> AR0507	Cardno Forbes Rigby SMP Application	<b>Compiled by:</b> <b>Date:</b>	Shane Chiddy 11th January 2008	<b>Sheet:</b> 9
<b>SUB SYSTEM:</b> No: 2	Public Utilities	<b>Verified by:</b> <b>Date:</b>		<b>of:</b> 21

STEP IN PROCESS	CAUSE & IMPACT	EXISTING CONTROLS	RCE	Sev	Exp	Prob	Rate	TID	TREATMENT OPTIONS	RESPONSIBLE
K 2.11 Dams, reservoirs and associated works	1 There are no Dams, reservoirs and associated works within the area. The assets that are within in the area are those associated with rural use. See Houses in Section 9.01									
L 2.12 Air strips	1 The area of subsidence under analysis does not include any air strips and did not require further assessment.									
M 2.13 SCA infrastructure including Upper Canal, Nepean Tunnel, Aqueducts, Bridges and all associated roads, flumes and culverts	1 Damage to the SCA infrastructure including Upper Canal due to mine subsidence. Resulting in - reduced or loss of supply - reduced water quality - damage to heritage structures, repairs required	Subsidence predictions have been developed  Master agreement has been developed between BHPB IC and SCA  Management Plan for Longwalls 31-33  Monitoring programs in place  Successful mitigation techniques have been used in the past  Mine layout avoids the Upper Canal	50-60%	30	1	0.3	9	1  2  3	Completed SMP to include consideration of SCA infrastructure including Upper Canal and the monitoring programs  Impact assessment to be prepared and mitigation and monitoring programs to be developed.  Revise the Management Plan to include Longwalls 34-36	BHPB Illawarra Coal - Manager R&I  BHPB Illawarra Coal - Manager R&I  BHPB Illawarra Coal - Manager R&I





**Qualitative  
Risk Analysis.  
Analysis Worksheet**



<b>SYSTEM:</b> AR0507	Cardno Forbes Rigby SMP Application	<b>Compiled by:</b> <b>Date:</b>	Shane Chiddy 11th January 2008	<b>Sheet:</b> <b>of:</b>	12 21
<b>SUB SYSTEM:</b> No: 4	Farm Land and Facilities	<b>Verified by:</b> <b>Date:</b>			

STEP IN PROCESS	CAUSE & IMPACT	EXISTING CONTROLS	RCE	Sev	Exp	Prob	Rate	TID	TREATMENT OPTIONS	RESPONSIBLE
A 4.01 Agricultural utilisation or agricultural suitability of farm land	1 Changes to Agricultural utilisation due to mine subsidence. Subsidence considered highly unlikely to affect grazing in the area. No further analysis required.									
B 4.02 Farm buildings / sheds	1 Damage to Farm buildings / sheds due to mine subsidence. Farm buildings / sheds require repair.	Subsidence predictions have been developed Monitoring programs in place Property subsidence management plans have been developed Low density of Farm buildings / sheds Structural inspections have been conducted	75 - 80%	1	1	0.3	0	1	Completed SMP to include consideration of Farm buildings / sheds and the monitoring programs 2 Land owner review of Property Subsidence Management Plans (PSMP) and issue final documents 3 Monitoring and manage throughout mining as per the Property Subsidence Management Plans (PSMP)	BHPB Illawarra Coal - Community Relations Coord. BHPB Illawarra Coal - Community Relations Coord. BHPB Illawarra Coal - Community Relations Coord.
C 4.03 Gas and / or fuel storages	1 The area of subsidence under analysis does not include any significant Gas and / or fuel storages and did not require further assessment. Small gas and / or fuel storage are covered in the Property Subsidence Management Plans (PSMP)									
D 4.04 Poultry sheds	1 Damage to Inghams Poultry sheds due to mine subsidence. Poultry sheds require repair.	Inghams Management Plan for Longwalls 29-33 Subsidence predictions have been developed Existing monitoring of Inghams Poultry sheds	75-80%	1	1	0.3	0	1	Completed SMP to include consideration of Inghams Poultry sheds and the monitoring programs 2 Revise the Management Plan to include Longwalls 34-36	BHPB Illawarra Coal - Manager R&I BHPB Illawarra Coal - Manager R&I



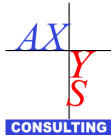








**Qualitative  
Risk Analysis.  
Analysis Worksheet**

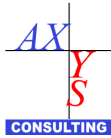


<b>SYSTEM:</b> AR0507	Cardno Forbes Rigby SMP Application	<b>Compiled by:</b> <b>Date:</b>	Shane Chiddy 11th January 2008	<b>Sheet:</b> <b>of:</b>	17 21
<b>SUB SYSTEM:</b> No: 6	Areas of Archaeological and/or Heritage significance		<b>Verified by:</b> <b>Date:</b>		

STEP IN PROCESS		CAUSE & IMPACT	EXISTING CONTROLS	RCE	Sev	Exp	Prob	Rate	TID	TREATMENT OPTIONS	RESPONSIBLE	
A	6.01 Areas of Archaeological and/or Heritage Significance	1 Damage to Archaeological and/or Heritage Significant sites due to mine subsidence. (Heritage aspects of the Upper Canal are dealt with in Section 2.13)	Base line assessment has been completed, known sites within the area  Subsidence predictions have been developed  Similar mining operations has not lead to any significant impacts in the area.	75-80%	3	1	1	3	1	1 2 3	Completed SMP to include consideration of Areas of Archaeological and/or Heritage Significance and the monitoring programs  Apply for Section 90 'consent to destroy' for 5 Aboriginal sites and implement Management Plan  Monitoring European Heritage sites through the Subsidence Management Plans (SMP)	BHPB Illawarra Coal - Manager Environment  BHPB Illawarra Coal - Manager Environment  BHPB Illawarra Coal - Manager Environment



**Qualitative  
Risk Analysis.  
Analysis Worksheet**



<b>SYSTEM:</b> AR0507	Cardno Forbes Rigby SMP Application	<b>Compiled by:</b> <b>Date:</b>	Shane Chiddy 11th January 2008	<b>Sheet:</b> <b>of:</b>	19 21
<b>SUB SYSTEM:</b> No: 8		<b>Verified by:</b> <b>Date:</b>			

STEP IN PROCESS	CAUSE & IMPACT	EXISTING CONTROLS	RCE	Sev	Exp	Prob	Rate	TID	TREATMENT OPTIONS	RESPONSIBLE
A 8.01 Permanent Survey Control Marks	1 Movement of Permanent Survey Control Marks due to mine subsidence. Surveyors rely on false location of the marks.	Subsidence predictions have been developed  Base line assessment has been completed, known sites of the survey control marks within the area	75-80%	1	1	0.3	0	1	1 Completed SMP to include consideration of Permanent Survey Control Marks and the monitoring programs  2 Liase with Land and Property Information (LPI) untill mining has ceased and Permanent Survey Control Marks can be re-established	BHPB Illawarra Coal - Manager R&I  BHPB Illawarra Coal - Manager R&I






## **Attachment 3**

### **Risk Treatment Schedule (Risk Rank Order)**


Qualitative Risk Analysis Risk Treatment Schedule		ANALYSIS NUMBER: AR0507	ANALYSIS SITE AND NAME Cardno Forbes Rigby SMP Application		Sheet: 1 of: 2
Ref	Risk	Hazard	TID	Treatment Options	
2D1	9	Damage to tunnel due to mine subsidence. Tunnel requires repair.	1	Completed SMP to include consideration of tunnels and the monitoring programs	
			2	Impact assessment to be prepared and mitigation and monitoring programs to be developed.	
			3	Revise the Management Plan to include Longwalls 34-36	
2F1	9	Damage to the 1200mm United Utilities water pipe line and associated connections due to mine subsidence.	1	Completed SMP to include consideration of water pipe lines and the monitoring programs	
			2	Impact assessment to be prepared and mitigation and monitoring programs to be developed.	
			3	Revise the Management Plan to include Longwalls 34-36	
2G1	9	Damage to the Gas Pipelines (Alinta EGP, AGL and Gorodok) due to mine subsidence.	1	Completed SMP to include consideration of gas pipe lines and the monitoring programs	
			2	Impact assessment to be prepared and mitigation and monitoring programs to be developed.	
2M1	9	Damage to the SCA infrastructure including Upper Canal due to mine subsidence. Resulting in - reduced or loss of supply - reduced water quality - damage to heritage structures, repairs required	1	Completed SMP to include consideration of SCA infrastructure including Upper Canal and the monitoring programs	
			2	Impact assessment to be prepared and mitigation and monitoring programs to be developed.	
			3	Revise the Management Plan to include Longwalls 34-36	
9A1	9	Damage to Houses and property improvements due to mine subsidence. Houses and property improvements require repair. Owners emotional stress associated with uncertainty of events.	1	Completed SMP to include consideration of Houses and the monitoring programs	
			2	Complete the Property subsidence management plans (PSMP)	
			3	Land owner review of Property Subsidence Management Plans (PSMP) and issue final documents	
			4	Monitoring and manage throughout mining as per the Property Subsidence Management Plans (PSMP)	
1B1	3	Water flow and quality changes to ephemeral creeks due to mine subsidence. Flow on environmental impacts result.	1	Completed SMP to include consideration of ephemeral creeks and the monitoring programs	
1C1	3	Ground water level and quality changes due to mine subsidence.	1	Completed SMP to include consideration of aquifers and the monitoring programs	
1D1	3	Existing spring water flow and quality changes, or the creation of new springs due to mine subsidence.	1	Completed SMP to include consideration of springs and the monitoring programs	
2B1	3	Damage to roads due to anomilous mine subsidence. Roads require repair.	1	Completed SMP to include consideration of Roads (all types) and the monitoring programs	
			2	Impact assessment to be prepared and mitigation and monitoring programs to be developed.	
			3	Revise the Road management plan to include Longwalls 34-36	
2C1	3	Damage to bridges due to mine subsidence. Roads require repair.	1	Completed SMP to include consideration of bridges (all types) and the monitoring programs	
			2	Impact assessment to be prepared and mitigation and monitoring programs to be developed.	
			3	Revise the Management Plan to include Longwalls 34-36	
6A1	3	Damage to Archaeological and/or Heritage Significant sites due to mine subsidence. (Heritage aspects of the Upper Canal are dealt with in Section 2.13)	1	Completed SMP to include consideration of Areas of Archaeological and/or Heritage Significance and the monitoring programs	
			2	Apply for Section 90 'consent to destroy' for 5 Aboriginal sites and implement Management Plan	
			3	Monitoring European Heritage sites through the Subsidence Management Plans (SMP)	

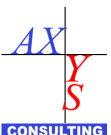
Qualitative Risk Analysis Risk Treatment Schedule		ANALYSIS NUMBER: AR0507	ANALYSIS SITE AND NAME Cardno Forbes Rigby SMP Application		Sheet: 2 of: 2
Ref	Risk	Hazard	TID	Treatment Options	
2F2	1	Damage to the Sydney Water local distribution network water pipe line and associated connections due to mine subsidence.	1	Completed SMP to include consideration of water pipe lines and the monitoring programs	
			2	Impact assessment to be prepared and mitigation and monitoring programs to be developed.	
			3	Revise the Management Plan to include Longwalls 34-36	
2H1	1	Damage to Electricity transmission lines due to mine subsidence. Transmission lines requires repair. (Includes Transgrid 330kV, Integral 66kV, 11kV and domestic supplies, the SCA power lines which will be included in the canal assessment 2.13)	1	Completed SMP to include consideration of Electricity transmission lines and the monitoring programs	
			2	Impact assessment to be prepared and mitigation and monitoring programs to be developed.	
2I1	1	Damage to Telstra Local Network and Fibreoptic telecommunication lines due to mine subsidence. Telecommunication lines require repair.	1	Completed SMP to include consideration of Telecommunication lines and the monitoring programs	
			2	Impact assessment to be prepared and mitigation and monitoring programs to be developed.	
			3	Revise the Management Plan to include Longwalls 34-36	
1H1	0	Rock falls from cliffs due to mine subsidence. Rock fall causes localised damage to environment. (Note: There were no pagodas identified in the area)	1	Completed SMP to include Public Safety and the monitoring programs	
1I1	0	Mass movement of steep slopes due to mine subsidence. Localised damage to environment.	1	Completed SMP and the monitoring programs	
1M1	0	Mine subsidence leads to loss of protected species or their habitat.	1	Completed SMP to include consideration of Threatened and protected species and the monitoring programs	
1N1	0	Mine subsidence leads to impacts to Dharawal State Conservation Area	1	Completed SMP to include consideration of Dharawal State Conservation Area	
1Q1	0	Mine subsidence leads to damage or loss of Natural vegetation.	1	Completed SMP to include consideration of Natural vegetation and the monitoring programs	
4B1	0	Damage to Farm buildings / sheds due to mine subsidence. Farm buildings / sheds require repair.	1	Completed SMP to include consideration of Farm buildings / sheds and the monitoring programs	
			2	Land owner review of Property Subsidence Management Plans (PSMP) and issue final documents	
			3	Monitoring and manage throughout mining as per the Property Subsidence Management Plans (PSMP)	
4D1	0	Damage to Inghams Poultry sheds due to mine subsidence. Poultry sheds require repair.	1	Completed SMP to include consideration of Inghams Poultry sheds and the monitoring programs	
			2	Revise the Management Plan to include Longwalls 34-36	
8A1	0	Movement of Permanent Survey Control Marks due to mine subsidence. Surveyors rely on false location of the marks.	1	Completed SMP to include consideration of Permanent Survey Control Marks and the monitoring programs	
			2	Liase with Land and Property Information (LPI) until mining has ceased and Permanent Survey Control Marks can be re-established	



## **Attachment 4**

### **Risk Treatment Schedule (Consequence Order)**

Qualitative Risk Analysis Risk Treatment Schedule		ANALYSIS NUMBER: AR0507	ANALYSIS SITE AND NAME Cardno Forbes Rigby SMP Application		Sheet: 1 of: 2
Consequence Order					
Ref	Cons	Hazard	TID	Treatment Options	
2F1	30	Damage to the 1200mm United Utilities water pipe line and associated connections due to mine subsidence.	1	Completed SMP to include consideration of water pipe lines and the monitoring programs	
			2	Impact assessment to be prepared and mitigation and monitoring programs to be developed.	
			3	Revise the Management Plan to include Longwalls 34-36	
2G1	30	Damage to the Gas Pipelines (Alinta EGP, AGL and Gorodok) due to mine subsidence.	1	Completed SMP to include consideration of gas pipe lines and the monitoring programs	
			2	Impact assessment to be prepared and mitigation and monitoring programs to be developed.	
2M1	30	Damage to the SCA infrastructure including Upper Canal due to mine subsidence. Resulting in - reduced or loss of supply - reduced water quality - damage to heritage structures, repairs required	1	Completed SMP to include consideration of SCA infrastructure including Upper Canal and the monitoring programs	
			2	Impact assessment to be prepared and mitigation and monitoring programs to be developed.	
			3	Revise the Management Plan to include Longwalls 34-36	
9A1	30	Damage to Houses and property improvements due to mine subsidence. Houses and property improvements require repair. Owners emotional stress associated with uncertainty of events.	1	Completed SMP to include consideration of Houses and the monitoring programs	
			2	Complete the Property subsidence management plans (PSMP)	
			3	Land owner review of Property Subsidence Management Plans (PSMP) and issue final documents	
			4	Monitoring and manage throughout mining as per the Property Subsidence Management Plans (PSMP)	
1B1	3	Water flow and quality changes to ephemeral creeks due to mine subsidence. Flow on environmental impacts result.	1	Completed SMP to include consideration of ephemeral creeks and the monitoring programs	
1C1	3	Ground water level and quality changes due to mine subsidence.	1	Completed SMP to include consideration of aquifers and the monitoring programs	
1D1	3	Existing spring water flow and quality changes, or the creation of new springs due to mine subsidence.	1	Completed SMP to include consideration of springs and the monitoring programs	
2B1	3	Damage to roads due to anomalous mine subsidence. Roads require repair.	1	Completed SMP to include consideration of Roads (all types) and the monitoring programs	
			2	Impact assessment to be prepared and mitigation and monitoring programs to be developed.	
			3	Revise the Road management plan to include Longwalls 34-36	
2C1	3	Damage to bridges due to mine subsidence. Roads require repair.	1	Completed SMP to include consideration of bridges (all types) and the monitoring programs	
			2	Impact assessment to be prepared and mitigation and monitoring programs to be developed.	
			3	Revise the Management Plan to include Longwalls 34-36	
2D1	3	Damage to tunnel due to mine subsidence. Tunnel requires repair.	1	Completed SMP to include consideration of tunnels and the monitoring programs	
			2	Impact assessment to be prepared and mitigation and monitoring programs to be developed.	
			3	Revise the Management Plan to include Longwalls 34-36	
2H1	3	Damage to Electricity transmission lines due to mine subsidence. Transmission lines requires repair. (Includes Transgrid 330kV, Integral 66kV, 11kV and domestic supplies, the SCA power lines which will be included in the canal assessment 2.13)	1	Completed SMP to include consideration of Electricity transmission lines and the monitoring programs	
			2	Impact assessment to be prepared and mitigation and monitoring programs to be developed.	

Qualitative Risk Analysis Risk Treatment Schedule		ANALYSIS NUMBER: AR0507	ANALYSIS SITE AND NAME Cardno Forbes Rigby SMP Application		Sheet: 2 of: 2
Ref	Cons	Hazard	TID	Treatment Options	
2I1	3	Damage to Telstra Local Network and Fibreoptic telecommunication lines due to mine subsidence. Telecommunication lines require repair.	1 2 3	1 Completed SMP to include consideration of Telecommunication lines and the monitoring programs 2 Impact assessment to be prepared and mitigation and monitoring programs to be developed. 3 Revise the Management Plan to include Longwalls 34-36	
6A1	3	Damage to Archaeological and/or Heritage Significant sites due to mine subsidence. (Heritage aspects of the Upper Canal are dealt with in Section 2.13)	1 2 3	1 Completed SMP to include consideration of Areas of Archaeological and/or Heritage Significance and the monitoring programs 2 Apply for Section 90 'consent to destroy' for 5 Aboriginal sites and implement Management Plan 3 Monitoring European Heritage sites through the Subsidence Management Plans (SMP)	
1H1	1	Rock falls from cliffs due to mine subsidence. Rock fall causes localised damage to environment. (Note: There were no pagodas identified in the area)	1	1 Completed SMP to include Public Safety and the monitoring programs	
1I1	1	Mass movement of steep slopes due to mine subsidence. Localised damage to environment.	1	1 Completed SMP and the monitoring programs	
1M1	1	Mine subsidence leads to loss of protected species or their habitat.	1	1 Completed SMP to include consideration of Threatened and protected species and the monitoring programs	
1N1	1	Mine subsidence leads to impacts to Dharawal State Conservation Area	1	1 Completed SMP to include consideration of Dharawal State Conservation Area	
1Q1	1	Mine subsidence leads to damage or loss of Natural vegetation.	1	1 Completed SMP to include consideration of Natural vegetation and the monitoring programs	
2F2	1	Damage to the Sydney Water local distribution network water pipe line and associated connections due to mine subsidence.	1 2 3	1 Completed SMP to include consideration of water pipe lines and the monitoring programs 2 Impact assessment to be prepared and mitigation and monitoring programs to be developed. 3 Revise the Management Plan to include Longwalls 34-36	
4B1	1	Damage to Farm buildings / sheds due to mine subsidence. Farm buildings / sheds require repair.	1 2 3	1 Completed SMP to include consideration of Farm buildings / sheds and the monitoring programs 2 Land owner review of Property Subsidence Management Plans (PSMP) and issue final documents 3 Monitoring and manage throughout mining as per the Property Subsidence Management Plans (PSMP)	
4D1	1	Damage to Inghams Poultry sheds due to mine subsidence. Poultry sheds require repair.	1 2	1 Completed SMP to include consideration of Inghams Poultry sheds and the monitoring programs 2 Revise the Management Plan to include Longwalls 34-36	
8A1	1	Movement of Permanent Survey Control Marks due to mine subsidence. Surveyors rely on false location of the marks.	1 2	1 Completed SMP to include consideration of Permanent Survey Control Marks and the monitoring programs 2 Liase with Land and Property Information (LPI) until mining has ceased and Permanent Survey Control Marks can be re-established	

## **Attachment 5**

### **Risk Treatment Schedule and Action Plan**

**Qualitative  
Risk Analysis  
Treatment Schedule**



<b>SYSTEM:</b> AR0507	Cardno Forbes Rigby SMP Application	<b>Compiled by:</b> <b>Date:</b>	Shane Chiddy 11th January 2008	<b>Sheet:</b> <b>of:</b>	1 7
<b>SUB SYSTEM:</b> <b>No: 1</b>	Natural Features	<b>Verified by:</b> <b>Date:</b>			

ID	HAZARD & EFFECTS	TID	TREATMENT	DATE REQUIRED	RESPONSIBLE OFFICER	DATE COMPLETED
1B1	Water flow and quality changes to ephemeral creeks due to mine subsidence. Flow on environmental impacts result.	1	Completed SMP to include consideration of ephemeral creeks and the monitoring programs	Friday, 11 January 2008	BHPB Illawarra Coal - Manager Environment	
1C1	Ground water level and quality changes due to mine subsidence.	1	Completed SMP to include consideration of aquifers and the monitoring programs	Friday, 11 January 2008	BHPB Illawarra Coal - Manager Environment	
1D1	Existing spring water flow and quality changes, or the creation of new springs due to mine subsidence.	1	Completed SMP to include consideration of springs and the monitoring programs	Friday, 11 January 2008	BHPB Illawarra Coal - Manager Environment	
1H1	Rock falls from cliffs due to mine subsidence. Rock fall causes localised damage to environment. (Note: There were no pagodas identified in the area)	1	Completed SMP to include Public Safety and the monitoring programs	Friday, 11 January 2008	BHPB Illawarra Coal - Manager Environment	
1I1	Mass movement of steep slopes due to mine subsidence. Localised damage to environment.	1	Completed SMP and the monitoring programs	Friday, 11 January 2008	BHPB Illawarra Coal - Manager Environment	
1M1	Mine subsidence leads to loss of protected species or their habitat.	1	Completed SMP to include consideration of Threatened and protected species and the monitoring programs	Friday, 11 January 2008	BHPB Illawarra Coal - Manager Environment	
1N1	Mine subsidence leads to impacts to Dharawal State Conservation Area	1	Completed SMP to include consideration of Dharawal State Conservation Area	Friday, 11 January 2008	BHPB Illawarra Coal - Manager Environment	
1Q1	Mine subsidence leads to damage or loss of Natural vegetation.	1	Completed SMP to include consideration of Natural vegetation and the monitoring programs	Friday, 11 January 2008	BHPB Illawarra Coal - Manager Environment	

**Qualitative  
Risk Analysis  
Treatment Schedule**



<b>SYSTEM:</b> AR0507	Cardno Forbes Rigby SMP Application	<b>Compiled by:</b> <b>Date:</b>	Shane Chiddy 11th January 2008	<b>Sheet:</b> <b>of:</b>	2 7
<b>SUB SYSTEM:</b> No: 2	Public Utilities	<b>Verified by:</b> <b>Date:</b>			

ID	HAZARD & EFFECTS	TID	TREATMENT	DATE REQUIRED	RESPONSIBLE OFFICER	DATE COMPLETED
2B1	Damage to roads due to anomilous mine subsidence. Roads require repair.	1	Completed SMP to include consideration of Roads (all types) and the monitoring programs	Friday, 11 January 2008	BHPB Illawarra Coal - Manager R&I	
		2	Impact assessment to be prepared and mitigation and monitoring programs to be developed.	Sunday, 1 June 2008	BHPB Illawarra Coal - Manager R&I	
		3	Revise the Road management plan to include Longwalls 34-36	Sunday, 1 June 2008	BHPB Illawarra Coal - Manager R&I	
2C1	Damage to bridges due to mine subsidence. Roads require repair.	1	Completed SMP to include consideration of bridges (all types) and the monitoring programs	Friday, 11 January 2008	BHPB Illawarra Coal - Manager R&I	
		2	Impact assessment to be prepared and mitigation and monitoring programs to be developed.	Sunday, 1 June 2008	BHPB Illawarra Coal - Manager R&I	
		3	Revise the Management Plan to include Longwalls 34-36	Sunday, 1 June 2008	BHPB Illawarra Coal - Manager R&I	
2D1	Damage to tunnel due to mine subsidence. Tunnel requires repair.	1	Completed SMP to include consideration of tunnels and the monitoring programs	Friday, 11 January 2008	BHPB Illawarra Coal - Manager R&I	
		2	Impact assessment to be prepared and mitigation and monitoring programs to be developed.	Sunday, 1 June 2008	BHPB Illawarra Coal - Manager R&I	
		3	Revise the Management Plan to include Longwalls 34-36	Sunday, 1 June 2008	BHPB Illawarra Coal - Manager R&I	
2F1	Damage to the 1200mm United Utilities water pipe line and associated connections due to mine subsidence.	1	Completed SMP to include consideration of water pipe lines and the monitoring programs	Friday, 11 January 2008	BHPB Illawarra Coal - Manager R&I	
		2	Impact assessment to be prepared and mitigation and monitoring programs to be developed.	Sunday, 1 June 2008	BHPB Illawarra Coal - Manager R&I	
		3	Revise the Management Plan to include Longwalls 34-36	Sunday, 1 June 2008	BHPB Illawarra Coal - Manager R&I	
2F2	Damage to the Sydney Water local disrtibution network water pipe line and associated connections due to mine subsidence.	1	Completed SMP to include consideration of water pipe lines and the monitoring programs	Friday, 11 January 2008	BHPB Illawarra Coal - Manager R&I	
		2	Impact assessment to be prepared and mitigation and monitoring programs to be developed.	Sunday, 1 June 2008	BHPB Illawarra Coal - Manager R&I	
		3	Revise the Management Plan to include Longwalls 34-36	Sunday, 1 June 2008	BHPB Illawarra Coal - Manager R&I	
2G1	Damage to the Gas Pipelines (Alinta EGP, AGL and Gorodok)	1	Completed SMP to include consideration of gas pipe lines and the monitoring programs	Friday, 11 January 2008	BHPB Illawarra Coal - Manager R&I	

**Qualitative  
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ID	HAZARD & EFFECTS	TID	TREATMENT	DATE REQUIRED	RESPONSIBLE OFFICER	DATE COMPLETED
2H1	due to mine subsidence. Damage to Electricity transmission lines due to mine subsidence. Transmission lines requires repair. (Includes Transgrid 330kV, Integral 66kV, 11kV and domestic supplies, the SCA power lines which will be included in the canal assessment 2.13)	2	Impact assessment to be prepared and mitigation and monitoring programs to be developed.	Sunday, 1 June 2008	BHPB Illawarra Coal - Manager R&I	
		1	Completed SMP to include consideration of Electricity transmission lines and the monitoring programs	Friday, 11 January 2008	BHPB Illawarra Coal - Manager R&I	
2I1	Damage to Telstra Local Network and Fibreoptic telecommunication lines due to mine subsidence. Telecommunication lines require repair.	2	Impact assessment to be prepared and mitigation and monitoring programs to be developed.	Sunday, 1 June 2008	BHPB Illawarra Coal - Manager R&I	
		1	Completed SMP to include consideration of Telecommunication lines and the monitoring programs	Friday, 11 January 2008	BHPB Illawarra Coal - Manager R&I	
2M1	Damage to the SCA infrastructure including Upper Canal due to mine subsidence. Resulting in - reduced or loss of supply - reduced water quality - damage to heritage structures, repairs required	2	Impact assessment to be prepared and mitigation and monitoring programs to be developed.	Sunday, 1 June 2008	BHPB Illawarra Coal - Manager R&I	
		3	Revise the Management Plan to include Longwalls 34-36	Sunday, 1 June 2008	BHPB Illawarra Coal - Manager R&I	
		1	Completed SMP to include consideration of SCA infrastructure including Upper Canal and the monitoring programs	Friday, 11 January 2008	BHPB Illawarra Coal - Manager R&I	
		2	Impact assessment to be prepared and mitigation and monitoring programs to be developed.	Sunday, 1 June 2008	BHPB Illawarra Coal - Manager R&I	
		3	Revise the Management Plan to include Longwalls 34-36	Sunday, 1 June 2008	BHPB Illawarra Coal - Manager R&I	

**Qualitative  
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<b>SUB SYSTEM:</b> No: 4		<b>Verified by:</b> <b>Date:</b>			

ID	HAZARD & EFFECTS	TID	TREATMENT	DATE REQUIRED	RESPONSIBLE OFFICER	DATE COMPLETED
4B1	Damage to Farm buildings / sheds due to mine subsidence. Farm buildings / sheds require repair.	1	Completed SMP to include consideration of Farm buildings / sheds and the monitoring programs	Friday, 11 January 2008	BHPB Illawarra Coal - Community Relations Coord.	
		2	Land owner review of Property Subsidence Management Plans (PSMP) and issue final documents	Sunday, 1 June 2008	BHPB Illawarra Coal - Community Relations Coord.	
		3	Monitoring and manage throughout mining as per the Property Subsidence Management Plans (PSMP)	Sunday, 1 June 2008	BHPB Illawarra Coal - Community Relations Coord.	
4D1	Damage to Inghams Poultry sheds due to mine subsidence. Poultry sheds require repair.	1	Completed SMP to include consideration of Inghams Poultry sheds and the monitoring programs	Friday, 11 January 2008	BHPB Illawarra Coal - Manager R&I	
		2	Revise the Management Plan to include Longwalls 34-36	Sunday, 1 June 2008	BHPB Illawarra Coal - Manager R&I	



**Qualitative  
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<b>SUB SYSTEM:</b> No: 6		<b>Verified by:</b> <b>Date:</b>			

ID	HAZARD & EFFECTS	TID	TREATMENT	DATE REQUIRED	RESPONSIBLE OFFICER	DATE COMPLETED
6A1	Damage to Archaeological and/or Heritage Significant sites due to mine subsidence. (Heritage aspects of the Upper Canal are dealt with in Section 2.13)	1	Completed SMP to include consideration of Areas of Archaeological and/or Heritage Significance and the monitoring programs	Friday, 11 January 2008	BHPB Illawarra Coal - Manager Environment	
		2	Apply for Section 90 'consent to destroy' for 5 Aboriginal sites and implement Management Plan	Monday, 1 June 2009	BHPB Illawarra Coal - Manager Environment	
		3	Monitoring European Heritage sites through the Subsidence Management Plans (SMP)	Monday, 1 June 2009	BHPB Illawarra Coal - Manager Environment	

**Qualitative  
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<b>SUB SYSTEM:</b> No: 8		<b>Verified by:</b> <b>Date:</b>			

ID	HAZARD & EFFECTS	TID	TREATMENT	DATE REQUIRED	RESPONSIBLE OFFICER	DATE COMPLETED
8A1	Movement of Permanent Survey Control Marks due to mine subsidence. Surveyors rely on false location of the marks.	1	Completed SMP to include consideration of Permanent Survey Control Marks and the monitoring programs	Sunday, 1 June 2008	BHPB Illawarra Coal - Manager R&I	
		2	Liase with Land and Property Information (LPI) untill mining has ceased and Permanent Survey Control Marks can be re-established	Sunday, 1 June 2008	BHPB Illawarra Coal - Manager R&I	

**Qualitative  
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<b>SUB SYSTEM:</b> No: 9		<b>Verified by:</b> <b>Date:</b>			

ID	HAZARD & EFFECTS	TID	TREATMENT	DATE REQUIRED	RESPONSIBLE OFFICER	DATE COMPLETED
9A1	Damage to Houses and property improvements due to mine subsidence. Houses and property improvements require repair. Owners emotional stress associated with uncertainty of events.	1	Completed SMP to include consideration of Houses and the monitoring programs	Sunday, 1 June 2008	BHPB Illawarra Coal - Community Relations Coord.	
		2	Complete the Property subsidence management plans (PSMP)	Sunday, 1 June 2008	BHPB Illawarra Coal - Community Relations Coord.	
		3	Land owner review of Property Subsidence Management Plans (PSMP) and issue final documents	Sunday, 1 June 2008	BHPB Illawarra Coal - Community Relations Coord.	
		4	Monitoring and manage throughout mining as per the Property Subsidence Management Plans (PSMP)	Monday, 1 June 2009	BHPB Illawarra Coal - Community Relations Coord.	

**Attachment 9**  
Revisions

# Document Revision History

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Revision	Date	Modification Description
1	11-Jan-08	Release

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