AXYS CONSULTING

bhpbilliton

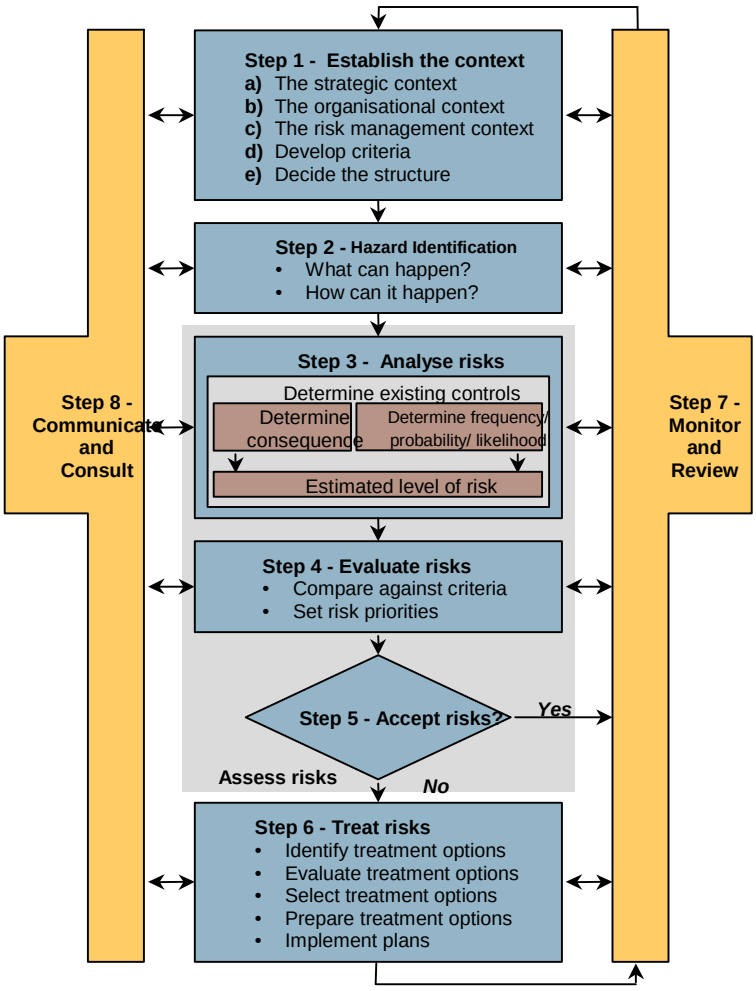
Illawarra Coal
Carbon Steel Materials

Qualitative Risk Assessment

for

DENDROBIUM MINE

Area 3B Mine Subsidence (Longwalls 9 -18)



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Section 1. Executive Summary

This analysis was commissioned by Cardno Pty Ltd to determine the risks associated with mining Area 3B (Longwalls 9-18) at Dendrobium Mine with the aim of developing the Subsidence Management Plan (SMP) for the mining of these longwalls by BHP Billiton Illawarra Coal.

This report details the methods used and the recommendations from the risk assessment which was conducted at the Cardno offices in Wollongong on March 28th of 2012.

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 responsibilities for their implementation.

Attachment 5 (Risk Treatment Schedule) provides 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: 28th March 2012

This Analysis has been verified by:
The Verification occured:

This Report has been compiled by: Shane Chiddy
The Report was compiled: 28th March 2012

Section 3. Participants

The following people participated in the Analysis:

Participant	Participant Role	Relevant Experience
Richard Walsh	BHPB Illawarra Coal Manager Subsidence Engineering	31 Years
Hank Pinkster	BHPB Illawarra Coal Manager Infrastructure	34 Years
Ellie Randall	BHPB Illawarra Coal Environmental Officer	2.5 Years
Luke Pascot	BHPB Illawarra Coal Environmental Co-ordinator	7 Years
Janine de Jong	Cardno Environmental Scientist	1 Year
Toni Stevens	Cardno Environmental Scientist	5 Years

Section 4. Purpose

In March of 2012 AXYS Consulting was commissioned to facilitate a risk assessment for Area 3B (Longwalls 9-18) at Dendrobium Mine Subsidence Management Plan (SMP) to consider the potential risk of impacts to Illawarra Coal and other key stakeholders.

This report details the methods used and the recommendations from the risk assessment which was conducted at the Cardno offices in Wollongong on March 28th of 2012.

Area 3B (Longwalls 9-18) at Dendrobium Mine will require the development and submission of a SMP, and as such this risk assessment is being performed to assist in the development of this SMP.

The aspects included in this SMP are the natural and built features required to be considered by the SMP Guidelines.

Residential houses, farms and commercial facilities are not situated within the area of this assessment.

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 Dendrobium Mine in the identification and control of risks associated with Area 3B (Longwalls 9 to 18) 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;

NSW Department of Primary Industries - Mineral Resources Guideline for application for Subsidence Management Approvals.

Section 6. Scope

The scope of this report is to identify subsidence risks from all potential sources for Area 3B (Longwalls 9-18) at Dendrobium Mine.

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

Areas for consideration include 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 Area 3B (Longwalls 9-18) at Dendrobium Mine 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 "MSEC459 - Dendrobium Area 3B - Rev A" report developed by Mine Subsidence Engineering Consultants.

2. Impacts 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 MSEC report and the Impact Assessment and the SMP.

4. Rigorous monitoring can identify anomalous subsidence which can be used to manage impacts through plans and strategies.

5. Surface features and land use remains substantially constant during the mining period.

6. BHPB IC will initiate consultation 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 of the risk being assessed.

Section 8. Facilitator Qualifications

Shane Chiddy holds an Associate Diploma in Engineering (Electrical), is an Officer of the Institution of Engineers (Australia) and is a member of the Maintenance Engineering Society of Australia (MESA) and the Mining Electrical and Mining Mechanical Engineering Society (MEMMES). 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 9 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	1.02A Rivers and creeks (Wongawilli Creek, Donalds Castle Creek)
		C	1.02B Rivers and creeks (Unnamed Creeks, Tributaries and Drainage Lines)
		D	1.03A Aquifers, known groundwater resources (for commercial extraction)
		E	1.03B Shallow Aquifers, known groundwater resources (for contribution to stored water)
		F	1.03C Deep Aquifers, known groundwater resources (does not contribute to stored water)
		G	1.04 Springs and Seeps There are no recognised Springs (greater than 1 litre per second) within the area, however there are numerous groundwater seeps identified.
		H	1.05 Sea/Lake
		I	1.06 Shorelines
		J	1.07 Natural dams
		K	1.08 Cliffs / Pagodas
		L	1.09 Steep slopes
		M	1.10 Escarpments
		N	1.11 Land prone to flooding or inundation
		O	1.12 Swamps, wetlands, water related ecosystems
		P	1.13 Threatened and protected species
		Q	1.14 National Parks
		R	1.15 State Recreation Areas
		S	1.16 State forests particularly areas zoned FMZ 1, 2 and 3
		T	1.17 Natural vegetation
		U	1.18 Areas of significant geological interest
		V	1.19 Any other feature considered significant
2	Public Utilities	A	2.01 Railways Abandoned Maldon-Dombarton Railway corridor traverses area 3B
		B	2.02 Roads (all types) and associated infrastructure
		C	2.03 Bridges
		D	2.04 Tunnels
		E	2.05 Culverts
		F	2.06 Water/gas/sewerage pipelines
		G	2.07 High pressure gas pipelines
		H	2.08 Electricity transmission lines (overhead/underground) and associated plants
		I	2.09 Telecommunication lines (overhead/underground) and associated plants

Section 9. Sub-Systems Analysed:

SUB-SYSTEM		STEP IN PROCESS	
2	Public Utilities	J	2.10 Water tanks, water and sewage treatment works
		K	2.11 Dams, reservoirs and associated works
		L	2.12 Air strips
3	Public Amenities	A	3.01 Hospitals
		B	3.02 Places of worship
		C	3.03 Schools
		D	3.04 Shopping centres
		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

Section 9. Sub-Systems Analysed:

SUB-SYSTEM		STEP IN PROCESS	
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
		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.

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.

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.

Given the Site, Company and Industry experience, it:	Factor
Could be incurred once or more during the next year.	10
Could be incurred over the next 1 to 2 year budget period.	3
Could be incurred within the 5 year Strategic Planning period.	1
Could be incurred within a 5 to 10 year time frame.	0.3
Could be incurred in the next 20-30 years.	0.1
For a system failure: This consequence hasn't happened in the industry in the last 50 years. For a natural hazard (earthquake, flood, windstorm, etc.): The predicted return period for an event of this strength/magnitude is 1 in 100 years or longer.	0.03

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	Health and Safety	Natural environment	Social / Cultural heritage	Community / Govt / Reputation / Media	Legal
1000	>US$ 1B	> 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	>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	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	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	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 significants.	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 – $100,000	Objective but reversible disability requiring hospitalisation	Minor effects on biological or physical environment.	Minor medium- term social impacts on local population. Mostly repairable.	Minor, adverse local public or media attention and complaints	Minor legal issues, non-compliances and breaches of regulation
1	<US$ 10, 000	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.

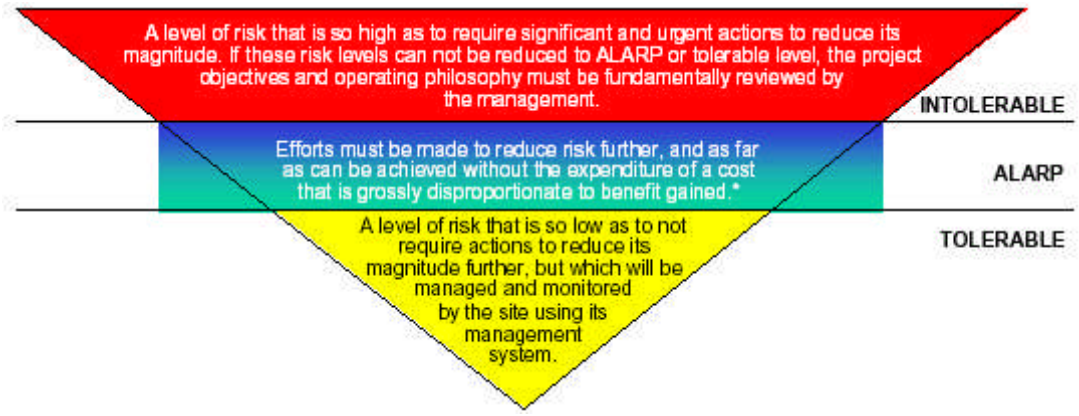
Priority	Risk Rating	Suggested Action	Suggested Timing	Authority for continued toleration of residual risk
1	>300	Cessation until the residual risk is reduced to 300 or below – unless exposure is authorised as indicated.	Immediate	BHP Billiton CEO and Board
2	91 - 300	Take action to reduce residual risk 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 managment 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

SYSTEM: Dendrobium Mine AR1297 Area 3B Mine Subsidence (Longwalls 9 -18)		**Compiled by:** Shane Chiddy **Date:** 28th March 2012	**Sheet:** 1
SUB SYSTEM: Natural Features **No:** 1		**Verified by:** **Date:**	**of:** 21

	STEP IN PROCESS		CAUSE & IMPACT	EXISTING CONTROLS	Sev	Prob	Rate	TID	TREATMENT OPTIONS	RESPONSIBLE
A	1.01 Catchment areas and declared Special Areas	1	SMP (development consent requirement) not approved. Longwall mining does not proceed.	Existing Development Consent, and associated conditions BHPB Environmental management system to ISO14001 Relevant SMP Guideines	300	0.1	30	1	Completed requirement of Development Consent and SMP Guidelines (include audit of commitments)	BHPB IC - Manager Approvals (Mining)
		2	Reduction to catchment yield, SCA legislation requirements not met.	Groundwater predictions and modelling Groundwater and Surface Water Management Plans, including Monitoring and Compliance Audits Hydrological monitoring and modelling SCA Offset provided for minor impacts	30	0.1	3	1	Revise the existing Groundwater Management Plan to include Area 3B	BHPB IC - Manager Subsidence Engineering
		3	Impact not in accordance with Neutral or Beneficial Effect Requirement under SCA legislation.	Groundwater predictions and modelling Surface water and shallow groundwater assessments Terrestrial and Aquatic Ecological Studies completed Subsidence predictions have been developed Hydrological monitoring and modelling SCA Offset provided for minor impacts	30	0.3	9	1	Review the Water Course Impact Monitoring, Management and Contingency Plan	BHPB IC - Manager Approvals (Mining)
								2	Review the Swamp Impact Monitoring, Management and Contingency Plan	BHPB IC - Manager Approvals (Mining)
								3	Review the Landscape Monitoring, Management and Contingency Plan	BHPB IC - Manager Approvals (Mining)
								4	Review the Aboriginal Heritage Plan	BHPB IC - Manager Approvals (Mining)
B	1.02A Rivers and creeks (Wongawilli Creek, Donalds Castle Creek)	1	Wongawilli Creek, water flow and quality changes, fracturing of river bed and rock bars to creeks due to mine subsidence. Flow on	Monitoring programs in place for Area 3A Remediation techniques have been developed for creeks	30	0.03	1	1	Review the Water Course Impact Monitoring, Management and Contingency Plan	BHPB IC - Manager Approvals (Mining)

Qualitative Risk Analysis. Analysis Worksheet

SYSTEM: AR1297 Dendrobium Mine Area 3B Mine Subsidence (Longwalls 9 -18)		**Compiled by:** Shane Chiddy **Date:** 28th March 2012	**Sheet:** 2
SUB SYSTEM: Natural Features **No:** 1		**Verified by:** **Date:**	**of:** 21

	STEP IN PROCESS		CAUSE & IMPACT	EXISTING CONTROLS	Sev	Prob	Rate	TID	TREATMENT OPTIONS	RESPONSIBLE
			environmental impacts result.	Subsidence predictions have been developed Mine layout minimises subsidence impact to Wongawilli Creek Baseline Monitoring programs in place for Area 3B				2 3	Complete the installation of Monitoring Equipment (Flow Gauges) Completed SMP to include consideration of Wongawilli Creek	BHPB IC - Manager Approvals (Mining) BHPB IC - Manager Approvals (Mining)
		2	Donalds Castle Creek is predominantly swamp within the SMP area and is assessed in 1.12							
C	1.02B Rivers and creeks (Unnamed Creeks, Tributaries and Drainage Lines)	1	Water flow and quality changes over the catchment area, fracturing of creek bed and rock bars to creeks due to mine subsidence. Flow on environmental impacts result.	Monitoring programs in place for Area 3A Remediation techniques have been developed for creeks Subsidence predictions have been developed Baseline Monitoring programs in place for Area 3B	30	3	90	1 2	Review the Water Course Impact Monitoring, Management and Contingency Plan Completed SMP to include consideration of Unnamed Creeks, Tributaries and Drainage Lines, and the monitoring programs	BHPB IC - Manager Approvals (Mining) BHPB IC - Manager Approvals (Mining)
D	1.03A Aquifers, known groundwater resources (for commercial extraction)	1	No Commercial groundwater extraction is present (Refer to 1.03B for implications to SCA)							
E	1.03B Shallow Aquifers, known groundwater resources (for contribution to stored water)	1	Contribution of shallow ground water resource to catchment yield. Ground water level and quality changes due to mine subsidence.	Monitoring programs in place for Area 3A Moderate depth of cover, reduced possibility of shallow aquifers flowing to mine workings or deep storage Presence of aquicludes and aquitards within the stratigraphic sequence	30	0.1	3	1 2	Completed SMP to include consideration of aquifers and the monitoring programs Revise the existing Groundwater Management Plan to include Area 3B	BHPB IC - Manager Approvals (Mining) BHPB IC - Manager Approvals (Mining)

Qualitative Risk Analysis. Analysis Worksheet

SYSTEM: Dendrobium Mine AR1297 Area 3B Mine Subsidence (Longwalls 9 -18)		**Compiled by:** Shane Chiddy **Date:** 28th March 2012	**Sheet:** 3
SUB SYSTEM: Natural Features **No:** 1		**Verified by:** **Date:**	**of:** 21

	STEP IN PROCESS		CAUSE & IMPACT	EXISTING CONTROLS	Sev	Prob	Rate	TID	TREATMENT OPTIONS	RESPONSIBLE
				Groundwater predictions and modelling						
F	1.03C Deep Aquifers, known groundwater resources (does not contribute to stored water)	1	Groundwater level and quality changes due to mine subsidence. Groundwater flows into the mine.	Monitoring programs in place for Area 3B Groundwater Management Plan for Area 3A Aquifer Interference Licence Submitted in 2003 DSC Monitoring, Contingency, Closure Plan for Area 3A Groundwater predictions and modelling	30	0.1	3	1 2 3 4	Completed SMP to include consideration of aquifers and the monitoring programs Revise the existing Groundwater Management Plan to include Area 3B Obtain Aquifer Interference Licence from NOW Revise the existing DSC Monitoring, Contingency, Closure Plan to include Area 3B	BHPB IC - Manager Approvals (Mining) BHPB IC - Manager Approvals (Mining) BHPB IC - Manager Approvals (Mining) BHPB IC - Manager Approvals (Mining)
G	1.04 Springs and Seeps There are no recognised Springs (greater than 1 litre per second) within the area, however there are numerous groundwater seeps identified.	1	Creation of springs, or reduction, enhancement or development of seeps. Resulting in water quality changes due to mine subsidence.	Subsidence predictions have been developed Baseline identification of seeps for Area 3B	1	1	1	1 2	Completed SMP and the monitoring programs Review the Landscape Monitoring, Management and Contingency Plan	BHPB IC - Manager Approvals (Mining) BHPB IC - Manager Approvals (Mining)
H	1.05 Sea/Lake	1	The area of subsidence under analysis does not include any seas or lakes and did not require further assessment.							
I	1.06 Shorelines	1	The area of subsidence under analysis does not include any shorelines and did not require further assessment.							
J	1.07 Natural dams	1	The area of subsidence under analysis does not include any natural dams and did not require further assessment.							

Qualitative Risk Analysis. Analysis Worksheet

SYSTEM: Dendrobium Mine AR1297 Area 3B Mine Subsidence (Longwalls 9 -18)		**Compiled by:** Shane Chiddy **Date:** 28th March 2012	**Sheet:** 4
SUB SYSTEM: Natural Features **No:** 1		**Verified by:** **Date:**	**of:** 21

STEP IN PROCESS		CAUSE & IMPACT		EXISTING CONTROLS	Sev	Prob	Rate	TID	TREATMENT OPTIONS	RESPONSIBLE
K	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 have been identified Monitoring programs in place for Area 3A Subsidence predictions have been developed Mine layout minimises subsidence impact (Cliffs located alongside the Wongawilli Creek)	1	0.3	0	1	Completed SMP and the monitoring programs	BHPB IC - Manager Approvals (Mining)
								2	Confirm base data used for MSEC mapping of Cliffs	BHPB IC - Manager Approvals (Mining)
								3	Review the Landscape Monitoring, Management and Contingency Plan	BHPB IC - Manager Approvals (Mining)
		2	Rock falls from cliffs due to mine subsidence. Rock fall causes injury to personnel. (Note: There were no pagodas identified in the area)	Base line assessment has been completed, cliffs have been identified Monitoring programs in place for Area 3A Subsidence predictions have been developed SCA land not accessible by the public Mine layout minimises subsidence impact (Cliffs located alongside the Wongawilli Creek) Procedure for working around Cliffs and Steep Slopes	30	0.3	9	1	Completed SMP to include Public Safety and the monitoring programs	BHPB IC - Manager Approvals (Mining)
								2	Confirm base data used for MSEC mapping of Cliffs	BHPB IC - Manager Approvals (Mining)
								3	Review the Landscape Monitoring, Management and Contingency Plan	BHPB IC - Manager Approvals (Mining)
L	1.09 Steep slopes	1	Localised instability of steep slopes due to mine subsidence. Localised impact to environment.	Base line assessment has been completed, steep slopes have been identified Subsidence predictions have been developed Limited development of colluvium	1	1	1	1	Completed SMP and the monitoring programs	BHPB IC - Manager Approvals (Mining)
								2	Review the Landscape Monitoring, Management and Contingency Plan	BHPB IC - Manager Approvals (Mining)

Qualitative Risk Analysis. Analysis Worksheet

SYSTEM: AR1297 Dendrobium Mine Area 3B Mine Subsidence (Longwalls 9 -18)		**Compiled by:** Shane Chiddy **Date:** 28th March 2012	**Sheet:** 5
SUB SYSTEM: Natural Features **No:** 1		**Verified by:** **Date:**	**of:** 21

	STEP IN PROCESS		CAUSE & IMPACT	EXISTING CONTROLS	Sev	Prob	Rate	TID	TREATMENT OPTIONS	RESPONSIBLE
L	1.09 Steep slopes	2	Surface cracking along steep slopes due to mine subsidence. Localised impact to environment and enhancement of erosion and sedimentation.	Base line assessment has been completed, steep slopes have been identified Subsidence predictions have been developed Remediation techniques are available if required Limited catchment and potential for erosion due to flow	1	1	1	1 2	Completed SMP and the monitoring programs Review the Landscape Monitoring, Management and Contingency Plan	BHPB IC - Manager Approvals (Mining) BHPB IC - Manager Approvals (Mining)
M	1.10 Escarpments	1	The area of subsidence under analysis does not include any escarpments and did not require further assessment.							
N	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. (See Rivers 1.02 and Swamps 1.12) Area within Avon Reservoir FSL is beyond the scope of this assessment.							
O	1.12 Swamps, wetlands, water related ecosystems	1	Change in swamp function, impact to swamp vegetation due to mine subsidence.	Monitoring programs in place for mining and reference areas Base line assessment has been completed, swamps have been identified Subsidence predictions have been developed Swamp Impact Monitoring, Management and Contingency Plan for Area 3A	30	3	90	1 2	Completed SMP to include swamps, wetlands, water related ecosystems and the monitoring programs Review the Swamp Impact Monitoring, Management and Contingency Plan	BHPB IC - Manager Approvals (Mining) BHPB IC - Manager Approvals (Mining)

Qualitative Risk Analysis. Analysis Worksheet

SYSTEM: AR1297 — Dendrobium Mine, Area 3B Mine Subsidence (Longwalls 9 -18)		**Compiled by:** Shane Chiddy **Date:** 28th March 2012	**Sheet:** 6
SUB SYSTEM: Natural Features **No:** 1		**Verified by:** **Date:**	**of:** 21

	STEP IN PROCESS		CAUSE & IMPACT	EXISTING CONTROLS	Sev	Prob	Rate	TID	TREATMENT OPTIONS	RESPONSIBLE
O	1.12 Swamps, wetlands, water related ecosystems	2	Change in swamp function, impacts to swamp fauna and habitat due to mine subsidence.	Monitoring programs in place for mining and reference areas Base line assessment has been completed, swamps have been identified Subsidence predictions have been developed Swamp Impact Monitoring, Management and Contingency Plan for Area 3A	30	1	30	1	Completed SMP to include swamps, wetlands, water related ecosystems and the monitoring programs	BHPB IC - Manager Approvals (Mining)
								2	Review the Swamp Impact Monitoring, Management and Contingency Plan	BHPB IC - Manager Approvals (Mining)
		3	Change in swamp function, impacts to swamp hydrology due to mine subsidence.	Monitoring programs in place for mining and reference areas Base line assessment has been completed, swamps have been identified Subsidence predictions have been developed Swamp Impact Monitoring, Management and Contingency Plan for Area 3A	30	3	90	1	Completed SMP to include swamps, wetlands, water related ecosystems and the monitoring programs	BHPB IC - Manager Approvals (Mining)
								2	Review the Swamp Impact Monitoring, Management and Contingency Plan	BHPB IC - Manager Approvals (Mining)
								3	Review the Water Course Impact Monitoring, Management and Contingency Plan	BHPB IC - Manager Approvals (Mining)
		4	Erosion of swamp due to change in geomorphology, hydrology or vegetation (die back), due to mine subsidence.	Monitoring programs in place for mining and reference areas Base line assessment has been completed, swamps have been identified Subsidence predictions have been developed Swamp Impact Monitoring, Management and Contingency Plan for Area 3A	30	3	90	1	Completed SMP to include swamps, wetlands, water related ecosystems and the monitoring programs	BHPB IC - Manager Approvals (Mining)
								2	Review the Swamp Impact Monitoring, Management and Contingency Plan	BHPB IC - Manager Approvals (Mining)
								3	Review the Water Course Impact Monitoring, Management and Contingency Plan	BHPB IC - Manager Approvals (Mining)
								4	Review the Landscape Monitoring, Management and Contingency Plan	BHPB IC - Manager Approvals (Mining)

Qualitative Risk Analysis. Analysis Worksheet

SYSTEM: AR1297 Dendrobium Mine Area 3B Mine Subsidence (Longwalls 9 -18)		**Compiled by:** Shane Chiddy **Date:** 28th March 2012	**Sheet:** 7
SUB SYSTEM: Natural Features **No:** 1		**Verified by:** **Date:**	**of:** 21

	STEP IN PROCESS		CAUSE & IMPACT	EXISTING CONTROLS	Sev	Prob	Rate	TID	TREATMENT OPTIONS	RESPONSIBLE
P	1.13 Threatened and protected species	1	Mine subsidence leads to loss of listed species or their habitat.	Base line assessment has been completed, species identified within the area Monitoring programs in place for Area 3B Past mining has not lead to significant impacts on threatened and protected Fauna species in Dendrobium Area 1 or 2 or 3A Subsidence predictions have been developed MIne plan has been designed to minimise the impacts to Wongawilli Creeks Surface and ground water impact assessments Development consent for Dendrobium Environemtnal Protection and Biodiversity Conservation Act (EPBC) approval	30	1	30	1 2 3	Completed SMP to include consideration of Threatened and protected species and the monitoring programs Review the Swamp Impact Monitoring, Management and Contingency Plan (to include threatened community) Review the Water Course Impact Monitoring, Management and Contingency Plan	BHPB IC - Manager Approvals (Mining) BHPB IC - Manager Approvals (Mining) BHPB IC - Manager Approvals (Mining)
Q	1.14 National Parks	1	The area of subsidence under analysis does not include any National Parks and did not require further assessment.							
R	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.							
S	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.							

Qualitative Risk Analysis. Analysis Worksheet

SYSTEM: Dendrobium Mine AR1297 Area 3B Mine Subsidence (Longwalls 9 -18)		**Compiled by:** Shane Chiddy **Date:** 28th March 2012	**Sheet:** 8
SUB SYSTEM: Natural Features **No:** 1		**Verified by:** **Date:**	**of:** 21

	STEP IN PROCESS		CAUSE & IMPACT	EXISTING CONTROLS	Sev	Prob	Rate	TID	TREATMENT OPTIONS	RESPONSIBLE
T	1.17 Natural vegetation	1	Mine subsidence leads to damage or loss of natural vegetation.	Base line assessment has been completed, natural vegetation is at known locations Monitoring programs in place for Area 3B Past mining has not lead to any significant impacts on natural vegetation Subsidence predictions have been developed	1	0.3	0	1 2 3 4	Completed SMP to include consideration of natural vegetation and the monitoring programs Review the Landscape Monitoring, Management and Contingency Plan Review the Swamp Impact Monitoring, Management and Contingency Plan Review the Water Course Impact Monitoring, Management and Contingency Plan	BHPB IC - Manager Approvals (Mining) BHPB IC - Manager Approvals (Mining) BHPB IC - Manager Approvals (Mining) BHPB IC - Manager Approvals (Mining)
U	1.18 Areas of significant geological interest	1	The area of subsidence under analysis does not include any areas of significant geological interest and did not require further assessment.							
V	1.19 Any other feature considered significant	1	Impact to the Wongawilli Creek Waterfall due to mine subsidence.	Significant monitoring is in place Experience with the management of Sandy Creek Waterfall	10	0.3	3	1	Prepare a Wongawilli Creek Waterfall Management Plan	BHPB IC - Manager Subsidence Engineering

Qualitative Risk Analysis. Analysis Worksheet

SYSTEM: AR1297 Dendrobium Mine Area 3B Mine Subsidence (Longwalls 9 -18)		**Compiled by:** Shane Chiddy **Date:** 28th March 2012	**Sheet:** 9
SUB SYSTEM: Public Utilities **No:** 2		**Verified by:** **Date:**	**of:** 21

	STEP IN PROCESS		CAUSE & IMPACT	EXISTING CONTROLS	Sev	Prob	Rate	TID	TREATMENT OPTIONS	RESPONSIBLE
A	2.01 Railways Abandoned Maldon-Dombarton Railway corridor traverses area 3B	1	The area of subsidence under analysis does not include any active railways and did not require further assessment.	MSEC have addressed potential issues with future development of the railway	10	0.03	0	1	Monitor any progress for future development of the railway	BHPB IC - Manager Infrastructure
B	2.02 Roads (all types) and associated infrastructure	1	Damage to SCA Fire Road 6A due to mine subsidence. Roads require repair.	SCA Asset Protection Plan for Area 1, 2 and 3A Subsidence predictions have been developed Road Management Plan agreed with SCA No public/private roads within Area 3B No sealed roads within Area 3B	1	0.1	0	1 2 3	Completed SMP to include consideration of roads and the monitoring programs. Revise SCA Asset Protection Plan for Area 3B Review Public Safety Management Plan to include Fire Road 6A within Area 3B	BHPB IC - Manager Approvals (Mining) BHPB IC - Manager Approvals (Mining) BHPB IC - Manager Approvals (Mining)
C	2.03 Bridges	1	The area of subsidence under analysis does not include any bridges and did not require further assessment.							
D	2.04 Tunnels	1	The area of subsidence under analysis does not include any tunnels and did not require further assessment.							
E	2.05 Culverts	1	Culverts are identified within SMP associated with Fire Road 6A and the abandoned railway corridor. These are considered within Section 2.02 Roads (all types) and 2.01 Railways.							
F	2.06 Water/gas/sewerage pipelines	1	The area of subsidence under analysis does not include any water/gas/sewerage pipelines and did not require further							

Qualitative Risk Analysis. Analysis Worksheet	SYSTEM: AR1297 Dendrobium Mine Area 3B Mine Subsidence (Longwalls 9 -18)	Compiled by: Shane Chiddy Date: 28th March 2012	Sheet: 10
	SUB SYSTEM: Public Utilities No: 2	Verified by: Date:	of: 21

	STEP IN PROCESS		CAUSE & IMPACT	EXISTING CONTROLS	Sev	Prob	Rate	TID	TREATMENT OPTIONS	RESPONSIBLE
			assessment.							
G	2.07 High pressure gas pipelines	1	The area of subsidence under analysis does not include any high pressure gas pipelines and did not require further assessment.							
H	2.08 Electricity transmission lines (overhead/underground) and associated plants	1	The area of subsidence under analysis does not include any electricity transmission lines and did not require further assessment.							
I	2.09 Telecommunication lines (overhead/underground) and associated plants	1	The area of subsidence under analysis does not include any telecommunication lines and did not require further assessment.							
J	2.10 Water tanks, water and sewage treatment works	1	The area of subsidence under analysis does not include any water tanks, water and sewage treatment works and did not require further assessment.							
K	2.11 Dams, reservoirs and associated works	1	Loss of water from Avon Reservoir due to mine subsidence. Water flows into the mine workings.	Mine layout minimises subsidence impact Groundwater predictions and modelling Dams Safety Committee Management Plans for Areas 1, 2 and 3A Subsidence predictions have been developed	30	0.03	1	1 2 3	Completed SMP to include consideration of Avon Reservoir Revise Dams Safety Committee Management Plans for Areas 3B Revise the existing Groundwater Management Plan to include Area 3B	BHPB IC - Manager Approvals (Mining) BHPB IC - Manager Approvals (Mining) BHPB IC - Manager Approvals (Mining)

Qualitative Risk Analysis. Analysis Worksheet

SYSTEM: AR1297 — Dendrobium Mine, Area 3B Mine Subsidence (Longwalls 9 -18)		**Compiled by:** Shane Chiddy **Date:** 28th March 2012	**Sheet:** 11
SUB SYSTEM: Public Utilities **No:** 2		**Verified by:** **Date:**	**of:** 21

	STEP IN PROCESS		CAUSE & IMPACT	EXISTING CONTROLS	Sev	Prob	Rate	TID	TREATMENT OPTIONS	RESPONSIBLE
K	2.11 Dams, reservoirs and associated works	2	Damage to the SCA meteorological station. Loss of data collection capabilities.	Subsidence predictions have been developed SCA Asset Protection Plan for Area 1, 2 and 3A	1	0.1	0	1	Revise SCA Asset Protection Plan for Area 3B	BHPB IC - Manager Approvals (Mining)
L	2.12 Air strips	1	The area of subsidence under analysis does not include any air strips and did not require further assessment.							

Qualitative Risk Analysis. Analysis Worksheet

SYSTEM: AR1297 — Dendrobium Mine, Area 3B Mine Subsidence (Longwalls 9 -18)		**Compiled by:** Shane Chiddy **Date:** 28th March 2012	**Sheet:** 12
SUB SYSTEM: Public Amenities **No:** 3		**Verified by:** **Date:**	**of:** 21

	STEP IN PROCESS		CAUSE & IMPACT	EXISTING CONTROLS	Sev	Prob	Rate	TID	TREATMENT OPTIONS	RESPONSIBLE
A	3.01 Hospitals	1	The area of subsidence under analysis does not include any Hospitals and did not require further assessment.							
B	3.02 Places of worship	1	The area of subsidence under analysis does not include any Places of worship and did not require further assessment.							
C	3.03 Schools	1	The area of subsidence under analysis does not include any Schools and did not require further assessment.							
D	3.04 Shopping centres	1	The area of subsidence under analysis does not include any Shopping centres and did not require further assessment.							
E	3.05 Community centres	1	The area of subsidence under analysis does not include any Community centres and did not require further assessment.							
F	3.06 Office buildings	1	The area of subsidence under analysis does not include any Office buildings and did not require further assessment.							
G	3.07 Swimming pools	1	The area of subsidence under analysis does not include any Swimming pools and did not require further assessment.							
H	3.08 Bowling greens	1	The area of subsidence under analysis does not include any Bowling greens and did not							

	STEP IN PROCESS		CAUSE & IMPACT	EXISTING CONTROLS	Sev	Prob	Rate	TID	TREATMENT OPTIONS	RESPONSIBLE
			require further assessment.							
I	3.09 Ovals and cricket grounds	1	The area of subsidence under analysis does not include any Ovals and cricket grounds and did not require further assessment.							
J	3.10 Race courses	1	The area of subsidence under analysis does not include any Race courses and did not require further assessment.							
K	3.11 Golf courses	1	The area of subsidence under analysis does not include any Golf courses and did not require further assessment.							
L	3.12 Tennis courts	1	The area of subsidence under analysis does not include any Tennis courts and did not require further assessment.							
M	3.13 Any other amenities considered significant	1	No other public amenities were Identified							

Qualitative Risk Analysis. Analysis Worksheet

SYSTEM: Dendrobium Mine AR1297 Area 3B Mine Subsidence (Longwalls 9 -18)		**Compiled by:** Shane Chiddy **Date:** 28th March 2012	**Sheet:** 14
SUB SYSTEM: Farm Land and Facilities **No:** 4		**Verified by:** **Date:**	**of:** 21

	STEP IN PROCESS		CAUSE & IMPACT	EXISTING CONTROLS	Sev	Prob	Rate	TID	TREATMENT OPTIONS	RESPONSIBLE
A	4.01 Agricultural utilisation or agricultural suitability of farm land	1	The area of subsidence under analysis does not include any agricultural utilisation and did not require further assessment.							
B	4.02 Farm buildings / sheds	1	The area of subsidence under analysis does not include any farm buildings / sheds and did not require further assessment.							
C	4.03 Gas and / or fuel storages	1	The area of subsidence under analysis does not include any Gas and / or fuel storages and did not require further assessment.							
D	4.04 Poultry sheds	1	The area of subsidence under analysis does not include any Poultry sheds and did not require further assessment.							
E	4.05 Glass Houses	1	The area of subsidence under analysis does not include any Glass Houses and did not require further assessment.							
F	4.06 Hydroponic systems	1	The area of subsidence under analysis does not include any Hydroponic systems and did not require further assessment.							
G	4.07 Irrigation systems	1	The area of subsidence under analysis does not include any Irrigation systems and did not require further assessment.							
H	4.08 Fences	1	The area of subsidence under analysis does not include any							

	STEP IN PROCESS		CAUSE & IMPACT	EXISTING CONTROLS	Sev	Prob	Rate	TID	TREATMENT OPTIONS	RESPONSIBLE
			fences and did not require further assessment.							
I	4.09 Farm dams	1	The area of subsidence under analysis does not include any farm dams and did not require further assessment.							
J	4.10 Wells, bores	1	The area of subsidence under analysis does not include any wells and bores and did not require further assessment.							
K	4.11 Any other feature considered significant	1	No other Farm Land and Facilities were Identified							

Qualitative Risk Analysis. Analysis Worksheet

SYSTEM: Dendrobium Mine AR1297 Area 3B Mine Subsidence (Longwalls 9 -18)		**Compiled by:** Shane Chiddy **Date:** 28th March 2012	**Sheet:** 16
SUB SYSTEM: Industrial, Commercial and Business Establishments **No:** 5		**Verified by:** **Date:**	**of:** 21

	STEP IN PROCESS		CAUSE & IMPACT	EXISTING CONTROLS	Sev	Prob	Rate	TID	TREATMENT OPTIONS	RESPONSIBLE
A	5.01 Factories	1	The area of subsidence under analysis does not include any Factories and did not require further assessment.							
B	5.02 Workshops	1	The area of subsidence under analysis does not include any Workshops and did not require further assessment.							
C	5.03 Business or commercial establishments	1	The area of subsidence under analysis does not include any Business or commercial establishments and did not require further assessment.							
D	5.04 Gas and / or fuel storages and associated plants	1	The area of subsidence under analysis does not include any Gas and / or fuel storages and associated plants and did not require further assessment.							
E	5.05 Waste storages and associated plants	1	The area of subsidence under analysis does not include any Waste storages and associated plants and did not require further assessment.							
F	5.06 Buildings, equipment and operations that are sensitive to surface movements	1	The area of subsidence under analysis does not include any Buildings, equipment and operations that are sensitive to surface movements and did not require further assessment.							
G	5.07 Surface mining (open cut) voids and rehabilitated areas	1	The area of subsidence under analysis does not include any Surface mining (open cut) voids and rehabilitated areas and did							

Qualitative Risk Analysis. Analysis Worksheet

SYSTEM: AR1297 — Dendrobium Mine, Area 3B Mine Subsidence (Longwalls 9 -18)		**Compiled by:** Shane Chiddy **Date:** 28th March 2012	**Sheet:** 17
SUB SYSTEM: Industrial, Commercial and Business Establishments **No:** 5		**Verified by:** **Date:**	**of:** 21

	STEP IN PROCESS		CAUSE & IMPACT	EXISTING CONTROLS	Sev	Prob	Rate	TID	TREATMENT OPTIONS	RESPONSIBLE
			not require further assessment.							
H	5.08 Mine infrastructure including tailings dams and emplacement areas	1	Damage to monitoring bore holes due to mine subsidence. Resulting in damage to monitoring equipment.	Subsidence predictions have been developed Mine assets, may be replaced as needed	1	0.1	0	1	None Identified	
I	5.09 Any other feature considered significant	1	No other Industrial, Commercial and Business Establishments were Identified							

Qualitative Risk Analysis. Analysis Worksheet

SYSTEM: AR1297 — Dendrobium Mine, Area 3B Mine Subsidence (Longwalls 9 -18)	**Compiled by:** Shane Chiddy **Date:** 28th March 2012	**Sheet:** 18
SUB SYSTEM: Areas of Archaeological and/or Heritage significance **No:** 6	**Verified by:** **Date:**	**of:** 21

STEP IN PROCESS		CAUSE & IMPACT		EXISTING CONTROLS	Sev	Prob	Rate	TID	TREATMENT OPTIONS	RESPONSIBLE
A	6.01 Areas of Archaeological and/or Heritage Significance	1	Impact to sites due to mine subsidence.	Base line assessment has been completed, sites identified Subsidence predictions have been developed Archaeological sites are not highly significant	10	0.3	3	1	Completed SMP to include consideration of Areas of Archaeological Significance and the monitoring programs	BHPB IC - Manager Approvals (Mining)
								2	Obtain consent under the National Parks and Wildlife Act 1974 - Section 90 (prior to the mining of Longwall 9)	BHPB IC - Manager Approvals (Mining)
								3	Review the Aboriginal Heritage Plan	BHPB IC - Manager Approvals (Mining)

Qualitative Risk Analysis. Analysis Worksheet

SYSTEM: AR1297 Dendrobium Mine Area 3B Mine Subsidence (Longwalls 9 -18)		**Compiled by:** Shane Chiddy **Date:** 28th March 2012	**Sheet:** 19
SUB SYSTEM: Items of Architectural Significance **No:** 7		**Verified by:** **Date:**	**of:** 21

STEP IN PROCESS		CAUSE & IMPACT		EXISTING CONTROLS	Sev	Prob	Rate	TID	TREATMENT OPTIONS	RESPONSIBLE
A	7.01 Items of Architectural Significance	1	The area of subsidence under analysis does not include any Items of Architectural Significance and did not require further assessment.							

Qualitative Risk Analysis. Analysis Worksheet

SYSTEM: AR1297 Dendrobium Mine Area 3B Mine Subsidence (Longwalls 9 -18)		**Compiled by:** Shane Chiddy **Date:** 28th March 2012	**Sheet:** 20
SUB SYSTEM: Permanent Survey Control Marks **No:** 8		**Verified by:** **Date:**	**of:** 21

STEP IN PROCESS		CAUSE & IMPACT		EXISTING CONTROLS	Sev	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 falsely rely on location of the marks.	Subsidence predictions have been developed Base line assessment has been completed, known survey control marks within the area	1	0.3	0	1	Completed SMP to include consideration of Permanent Survey Control Marks and the monitoring programs	BHPB IC - Manager Approvals (Mining)
								2	NSW Department of Lands are to be advised of affected survey control marks	BHPB IC - Manager Survey

Qualitative Risk Analysis. Analysis Worksheet

SYSTEM: Dendrobium Mine AR1297 Area 3B Mine Subsidence (Longwalls 9 -18)		**Compiled by:** Shane Chiddy **Date:** 28th March 2012	**Sheet:** 21
SUB SYSTEM: Residential Establishments **No:** 9		**Verified by:** **Date:**	**of:** 21

	STEP IN PROCESS		CAUSE & IMPACT	EXISTING CONTROLS	Sev	Prob	Rate	TID	TREATMENT OPTIONS	RESPONSIBLE
A	9.01 Houses	1	The area of subsidence under analysis does not include any residential houses and did not require further assessment.							
B	9.02 Flats / Unit	1	The area of subsidence under analysis does not include any Flats / Units and did not require further assessment. (Granny flats were assumed to be covered under Houses 9.01)							
C	9.03 Caravan parks	1	The area of subsidence under analysis does not include any Caravan parks and did not require further assessment.							
D	9.04 Retirement/aged care villages	1	The area of subsidence under analysis does not include any Retirement/aged care villages and did not require further assessment.							
E	9.05 Associated structures such as workshops, garages, on-site waste water systems, water or gas tanks, swimming pools and tennis courts	1	The area of subsidence under analysis does not include any associated structures such as workshops, garages, on-site waste water systems, water or gas tanks and did not require further assessment.							
F	9.06 Any other feature considered significant	1	No other Residential Establishments features were Identified							

Attachment 3

Risk Treatment Schedule
(Risk Rank Order)

Qualitative Risk Analysis Risk Treatment Schedule Risk Rank Order	ANALYSIS NUMBER: AR1297	ANALYSIS SITE AND NAME Dendrobium Mine Area 3B Mine Subsidence (Longwalls 9 -18)	AXYS CONSULTING	Sheet: 1 of: 3

Ref	Risk	Hazard	TID	Treatment Options
1C1	90	Water flow and quality changes over the catchment area, fracturing of creek bed and rock bars to creeks due to mine subsidence. Flow on environmental impacts result.	1	Review the Water Course Impact Monitoring, Management and Contingency Plan
			2	Completed SMP to include consideration of Unnamed Creeks, Tributaries and Drainage Lines, and the monitoring programs
1O1	90	Change in swamp function, impact to swamp vegetation due to mine subsidence.	1	Completed SMP to include swamps, wetlands, water related ecosystems and the monitoring programs
			2	Review the Swamp Impact Monitoring, Management and Contingency Plan
1O3	90	Change in swamp function, impacts to swamp hydrology due to mine subsidence.	1	Completed SMP to include swamps, wetlands, water related ecosystems and the monitoring programs
			2	Review the Swamp Impact Monitoring, Management and Contingency Plan
			3	Review the Water Course Impact Monitoring, Management and Contingency Plan
1O4	90	Erosion of swamp due to change in geomorphology, hydrology or vegetation (die back), due to mine subsidence.	1	Completed SMP to include swamps, wetlands, water related ecosystems and the monitoring programs
			2	Review the Swamp Impact Monitoring, Management and Contingency Plan
			3	Review the Water Course Impact Monitoring, Management and Contingency Plan
			4	Review the Landscape Monitoring, Management and Contingency Plan
1A1	30	SMP (development consent requirement) not approved. Longwall mining does not proceed.	1	Completed requirement of Development Consent and SMP Guidelines (include audit of commitments)
1O2	30	Change in swamp function, impacts to swamp fauna and habitat due to mine subsidence.	1	Completed SMP to include swamps, wetlands, water related ecosystems and the monitoring programs
			2	Review the Swamp Impact Monitoring, Management and Contingency Plan
1P1	30	Mine subsidence leads to loss of listed species or their habitat.	1	Completed SMP to include consideration of Threatened and protected species and the monitoring programs
			2	Review the Swamp Impact Monitoring, Management and Contingency Plan (to include threatened community)
			3	Review the Water Course Impact Monitoring, Management and Contingency Plan
1A3	9	Impact not in accordance with Neutral or Beneficial Effect Requirement under SCA legislation.	1	Review the Water Course Impact Monitoring, Management and Contingency Plan
			2	Review the Swamp Impact Monitoring, Management and Contingency Plan
			3	Review the Landscape Monitoring, Management and Contingency Plan
			4	Review the Aboriginal Heritage Plan
1K2	9	Rock falls from cliffs due to mine subsidence. Rock fall causes injury to personnel. (Note: There were no pagodas identified in the area)	1	Completed SMP to include Public Safety and the monitoring programs
			2	Confirm base data used for MSEC mapping of Cliffs
			3	Review the Landscape Monitoring, Management and Contingency Plan
1A2	3	Reduction to catchment yield, SCA legislation requirements not met.	1	Revise the existing Groundwater Management Plan to include Area 3B
1E1	3	Contribution of shallow ground water resource to catchment yield. Ground water level and quality changes due to mine subsidence.	1	Completed SMP to include consideration of aquifers and the monitoring programs
			2	Revise the existing Groundwater Management Plan to include Area 3B
1F1	3	Groundwater level and quality changes due to mine subsidence. Groundwater flows into the mine.	1	Completed SMP to include consideration of aquifers and the monitoring programs
			2	Revise the existing Groundwater Management Plan to include Area 3B
			3	Obtain Aquifer Interference Licence from NOW

Qualitative Risk Analysis Risk Treatment Schedule Risk Rank Order	ANALYSIS NUMBER: AR1297	ANALYSIS SITE AND NAME Dendrobium Mine Area 3B Mine Subsidence (Longwalls 9 -18)	AXYS CONSULTING	Sheet: 2 of: 3

Ref	Risk	Hazard	TID	Treatment Options
			4	Revise the existing DSC Monitoring, Contingency, Closure Plan to include Area 3B
1V1	3	Impact to the Wongawilli Creek Waterfall due to mine subsidence.	1	Prepare a Wongawilli Creek Waterfall Management Plan
6A1	3	Impact to sites due to mine subsidence.	1	Completed SMP to include consideration of Areas of Archaeological Significance and the monitoring programs
			2	Obtain consent under the National Parks and Wildlife Act 1974 - Section 90 (prior to the mining of Longwall 9)
			3	Review the Aboriginal Heritage Plan
1B1	1	Wongawilli Creek, water flow and quality changes, fracturing of river bed and rock bars to creeks due to mine subsidence. Flow on environmental impacts result.	1	Review the Water Course Impact Monitoring, Management and Contingency Plan
			2	Complete the installation of Monitoring Equipment (Flow Gauges)
			3	Completed SMP to include consideration of Wongawilli Creek
1G1	1	Creation of springs, or reduction, enhancement or development of seeps. Resulting in water quality changes due to mine subsidence.	1	Completed SMP and the monitoring programs
			2	Review the Landscape Monitoring, Management and Contingency Plan
1L1	1	Localised instability of steep slopes due to mine subsidence. Localised impact to environment.	1	Completed SMP and the monitoring programs
			2	Review the Landscape Monitoring, Management and Contingency Plan
1L2	1	Surface cracking along steep slopes due to mine subsidence. Localised impact to environment and enhancement of erosion and sedimentation.	1	Completed SMP and the monitoring programs
			2	Review the Landscape Monitoring, Management and Contingency Plan
2K1	1	Loss of water from Avon Reservoir due to mine subsidence. Water flows into the mine workings.	1	Completed SMP to include consideration of Avon Reservoir
			2	Revise Dams Safety Committee Management Plans for Areas 3B
			3	Revise the existing Groundwater Management Plan to include Area 3B
1K1	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 and the monitoring programs
			2	Confirm base data used for MSEC mapping of Cliffs
			3	Review the Landscape Monitoring, Management and Contingency Plan
1T1	0	Mine subsidence leads to damage or loss of natural vegetation.	1	Completed SMP to include consideration of natural vegetation and the monitoring programs
			2	Review the Landscape Monitoring, Management and Contingency Plan
			3	Review the Swamp Impact Monitoring, Management and Contingency Plan
			4	Review the Water Course Impact Monitoring, Management and Contingency Plan
2A1	0	The area of subsidence under analysis does not include any active railways and did not require further assessment.	1	Monitor any progress for future development of the railway
2B1	0	Damage to SCA Fire Road 6A due to mine subsidence. Roads require repair.	1	Completed SMP to include consideration of roads and the monitoring programs.
			2	Revise SCA Asset Protection Plan for Area 3B
			3	Review Public Safety Management Plan to include Fire Road 6A within Area 3B
2K2	0	Damage to the SCA meteorological station. Loss of data collection capabilities.	1	Revise SCA Asset Protection Plan for Area 3B
5H1	0	Damage to monitoring bore holes due to mine subsidence. Resulting in damage to monitoring equipment.	1	None Identified
8A1	0	Movement of Permanent Survey Control Marks due to mine	1	Completed SMP to include consideration of Permanent Survey Control Marks and the monitoring programs

Qualitative Risk Analysis Risk Treatment Schedule Risk Rank Order	ANALYSIS NUMBER: AR1297	ANALYSIS SITE AND NAME Dendrobium Mine Area 3B Mine Subsidence (Longwalls 9 -18)	AXYS CONSULTING	Sheet: 3 of: 3

Ref	Risk	Hazard	TID	Treatment Options
		subsidence. Surveyors falsely rely on location of the marks.	2	NSW Department of Lands are to be advised of affected survey control marks

Attachment 4

Risk Treatment Schedule
(Consequence Order)

Qualitative Risk Analysis Risk Treatment Schedule Consequence Order	ANALYSIS NUMBER: AR1297	ANALYSIS SITE AND NAME Dendrobium Mine Area 3B Mine Subsidence (Longwalls 9 -18)	AXYS CONSULTING	Sheet: 1 of: 3

Ref	Cons	Hazard	TID	Treatment Options
1A1	3E +0 2	SMP (development consent requirement) not approved. Longwall mining does not proceed.	1	Completed requirement of Development Consent and SMP Guidelines (include audit of commitments)
1A2	30	Reduction to catchment yield, SCA legislation requirements not met.	1	Revise the existing Groundwater Management Plan to include Area 3B
1A3	30	Impact not in accordance with Neutral or Beneficial Effect Requirement under SCA legislation.	1	Review the Water Course Impact Monitoring, Management and Contingency Plan
			2	Review the Swamp Impact Monitoring, Management and Contingency Plan
			3	Review the Landscape Monitoring, Management and Contingency Plan
			4	Review the Aboriginal Heritage Plan
1B1	30	Wongawilli Creek, water flow and quality changes, fracturing of river bed and rock bars to creeks due to mine subsidence. Flow on environmental impacts result.	1	Review the Water Course Impact Monitoring, Management and Contingency Plan
			2	Complete the installation of Monitoring Equipment (Flow Gauges)
			3	Completed SMP to include consideration of Wongawilli Creek
1C1	30	Water flow and quality changes over the catchment area, fracturing of creek bed and rock bars to creeks due to mine subsidence. Flow on environmental impacts result.	1	Review the Water Course Impact Monitoring, Management and Contingency Plan
			2	Completed SMP to include consideration of Unnamed Creeks, Tributaries and Drainage Lines, and the monitoring programs
1E1	30	Contribution of shallow ground water resource to catchment yield. Ground water level and quality changes due to mine subsidence.	1	Completed SMP to include consideration of aquifers and the monitoring programs
			2	Revise the existing Groundwater Management Plan to include Area 3B
1F1	30	Groundwater level and quality changes due to mine subsidence. Groundwater flows into the mine.	1	Completed SMP to include consideration of aquifers and the monitoring programs
			2	Revise the existing Groundwater Management Plan to include Area 3B
			3	Obtain Aquifer Interference Licence from NOW
			4	Revise the existing DSC Monitoring, Contingency, Closure Plan to include Area 3B
1K2	30	Rock falls from cliffs due to mine subsidence. Rock fall causes injury to personnel. (Note: There were no pagodas identified in the area)	1	Completed SMP to include Public Safety and the monitoring programs
			2	Confirm base data used for MSEC mapping of Cliffs
			3	Review the Landscape Monitoring, Management and Contingency Plan
1O1	30	Change in swamp function, impact to swamp vegetation due to mine subsidence.	1	Completed SMP to include swamps, wetlands, water related ecosystems and the monitoring programs
			2	Review the Swamp Impact Monitoring, Management and Contingency Plan
1O2	30	Change in swamp function, impacts to swamp fauna and habitat due to mine subsidence.	1	Completed SMP to include swamps, wetlands, water related ecosystems and the monitoring programs
			2	Review the Swamp Impact Monitoring, Management and Contingency Plan
1O3	30	Change in swamp function, impacts to swamp hydrology due to mine subsidence.	1	Completed SMP to include swamps, wetlands, water related ecosystems and the monitoring programs
			2	Review the Swamp Impact Monitoring, Management and Contingency Plan
			3	Review the Water Course Impact Monitoring, Management and Contingency Plan
1O4	30	Erosion of swamp due to change in geomorphology, hydrology or vegetation (die back), due to mine subsidence.	1	Completed SMP to include swamps, wetlands, water related ecosystems and the monitoring programs
			2	Review the Swamp Impact Monitoring, Management and Contingency Plan
			3	Review the Water Course Impact Monitoring, Management and Contingency Plan
			4	Review the Landscape Monitoring, Management and Contingency Plan

Qualitative Risk Analysis Risk Treatment Schedule Consequence Order	ANALYSIS NUMBER: AR1297	ANALYSIS SITE AND NAME Dendrobium Mine Area 3B Mine Subsidence (Longwalls 9 -18)	AXYS CONSULTING	Sheet: 2 of: 3

Ref	Cons	Hazard	TID	Treatment Options
1P1	30	Mine subsidence leads to loss of listed species or their habitat.	1	Completed SMP to include consideration of Threatened and protected species and the monitoring programs
			2	Review the Swamp Impact Monitoring, Management and Contingency Plan (to include threatened community)
			3	Review the Water Course Impact Monitoring, Management and Contingency Plan
2K1	30	Loss of water from Avon Reservoir due to mine subsidence. Water flows into the mine workings.	1	Completed SMP to include consideration of Avon Reservoir
			2	Revise Dams Safety Committee Management Plans for Areas 3B
			3	Revise the existing Groundwater Management Plan to include Area 3B
1V1	10	Impact to the Wongawilli Creek Waterfall due to mine subsidence.	1	Prepare a Wongawilli Creek Waterfall Management Plan
2A1	10	The area of subsidence under analysis does not include any active railways and did not require further assessment.	1	Monitor any progress for future development of the railway
6A1	10	Impact to sites due to mine subsidence.	1	Completed SMP to include consideration of Areas of Archaeological Significance and the monitoring programs
			2	Obtain consent under the National Parks and Wildlife Act 1974 - Section 90 (prior to the mining of Longwall 9)
			3	Review the Aboriginal Heritage Plan
1G1	1	Creation of springs, or reduction, enhancement or development of seeps. Resulting in water quality changes due to mine subsidence.	1	Completed SMP and the monitoring programs
			2	Review the Landscape Monitoring, Management and Contingency Plan
1K1	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	Completed SMP and the monitoring programs
			2	Confirm base data used for MSEC mapping of Cliffs
			3	Review the Landscape Monitoring, Management and Contingency Plan
1L1	1	Localised instability of steep slopes due to mine subsidence. Localised impact to environment.	1	Completed SMP and the monitoring programs
			2	Review the Landscape Monitoring, Management and Contingency Plan
1L2	1	Surface cracking along steep slopes due to mine subsidence. Localised impact to environment and enhancement of erosion and sedimentation.	1	Completed SMP and the monitoring programs
			2	Review the Landscape Monitoring, Management and Contingency Plan
1T1	1	Mine subsidence leads to damage or loss of natural vegetation.	1	Completed SMP to include consideration of natural vegetation and the monitoring programs
			2	Review the Landscape Monitoring, Management and Contingency Plan
			3	Review the Swamp Impact Monitoring, Management and Contingency Plan
			4	Review the Water Course Impact Monitoring, Management and Contingency Plan
2B1	1	Damage to SCA Fire Road 6A due to mine subsidence. Roads require repair.	1	Completed SMP to include consideration of roads and the monitoring programs.
			2	Revise SCA Asset Protection Plan for Area 3B
			3	Review Public Safety Management Plan to include Fire Road 6A within Area 3B
2K2	1	Damage to the SCA meteorological station. Loss of data collection capabilities.	1	Revise SCA Asset Protection Plan for Area 3B
5H1	1	Damage to monitoring bore holes due to mine subsidence. Resulting in damage to monitoring equipment.	1	None Identified
8A1	1	Movement of Permanent Survey	1	Completed SMP to include consideration of Permanent Survey Control Marks

Qualitative Risk Analysis Risk Treatment Schedule Consequence Order	ANALYSIS NUMBER: AR1297	ANALYSIS SITE AND NAME Dendrobium Mine Area 3B Mine Subsidence (Longwalls 9 -18)		Sheet: 3 of: 3

Ref	Cons	Hazard	TID	Treatment Options
		Control Marks due to mine subsidence. Surveyors falsely rely on location of the marks.		and the monitoring programs
			2	NSW Department of Lands are to be advised of affected survey control marks

Attachment 5

Risk Treatment Schedule and Action Plan

Qualitative Risk Analysis Treatment Schedule

SYSTEM: Dendrobium Mine AR1297 Area 3B Mine Subsidence (Longwalls 9 -18)	**Compiled by:** Shane Chiddy **Date:** 28th March 2012	**Sheet:** 1
SUB SYSTEM: Natural Features **No:** 1	**Verified by:** **Date:**	**of:** 8

ID	HAZARD & EFFECTS	TID	TREATMENT	DATE REQUIRED	RESPONSIBLE OFFICER	DATE COMPLETED
1A1	SMP (development consent requirement) not approved. Longwall mining does not proceed.	1	Completed requirement of Development Consent and SMP Guidelines (include audit of commitments)	Sunday, 1 July 2012	BHPB IC - Manager Approvals (Mining)	
1A2	Reduction to catchment yield, SCA legislation requirements not met.	1	Revise the existing Groundwater Management Plan to include Area 3B	Sunday, 1 July 2012	BHPB IC - Manager Subsidence Engineering	
1A3	Impact not in accordance with Neutral or Beneficial Effect Requirement under SCA legislation.	1	Review the Water Course Impact Monitoring, Management and Contingency Plan	Sunday, 1 July 2012	BHPB IC - Manager Approvals (Mining)	
		2	Review the Swamp Impact Monitoring, Management and Contingency Plan	Sunday, 1 July 2012	BHPB IC - Manager Approvals (Mining)	
		3	Review the Landscape Monitoring, Management and Contingency Plan	Sunday, 1 July 2012	BHPB IC - Manager Approvals (Mining)	
		4	Review the Aboriginal Heritage Plan	Sunday, 1 July 2012	BHPB IC - Manager Approvals (Mining)	
1B1	Wongawilli Creek, water flow and quality changes, fracturing of river bed and rock bars to creeks due to mine subsidence. Flow on environmental impacts result.	1	Review the Water Course Impact Monitoring, Management and Contingency Plan	Sunday, 1 July 2012	BHPB IC - Manager Approvals (Mining)	
		2	Complete the installation of Monitoring Equipment (Flow Gauges)	Sunday, 1 July 2012	BHPB IC - Manager Approvals (Mining)	
		3	Completed SMP to include consideration of Wongawilli Creek	Sunday, 1 July 2012	BHPB IC - Manager Approvals (Mining)	
1C1	Water flow and quality changes over the catchment area, fracturing of creek bed and rock bars to creeks due to mine subsidence. Flow on environmental impacts result.	1	Review the Water Course Impact Monitoring, Management and Contingency Plan	Sunday, 1 July 2012	BHPB IC - Manager Approvals (Mining)	
		2	Completed SMP to include consideration of Unnamed Creeks, Tributaries and Drainage Lines, and the monitoring programs	Sunday, 1 July 2012	BHPB IC - Manager Approvals (Mining)	
1E1	Contribution of shallow ground water resource to catchment yield. Ground water level and quality changes due to mine subsidence.	1	Completed SMP to include consideration of aquifers and the monitoring programs	Sunday, 1 July 2012	BHPB IC - Manager Approvals (Mining)	
		2	Revise the existing Groundwater Management Plan to include Area 3B	Sunday, 1 July 2012	BHPB IC - Manager Approvals (Mining)	

Qualitative Risk Analysis Treatment Schedule

SYSTEM: Dendrobium Mine AR1297 Area 3B Mine Subsidence (Longwalls 9 -18)	**Compiled by:** Shane Chiddy **Date:** 28th March 2012	**Sheet:** 2
SUB SYSTEM: Natural Features **No:** 1	**Verified by:** **Date:**	**of:** 8

ID	HAZARD & EFFECTS	TID	TREATMENT	DATE REQUIRED	RESPONSIBLE OFFICER	DATE COMPLETED
1F1	Groundwater level and quality changes due to mine subsidence. Groundwater flows into the mine.	1	Completed SMP to include consideration of aquifers and the monitoring programs	Sunday, 1 July 2012	BHPB IC - Manager Approvals (Mining)	
		2	Revise the existing Groundwater Management Plan to include Area 3B	Sunday, 1 July 2012	BHPB IC - Manager Approvals (Mining)	
		3	Obtain Aquifer Interference Licence from NOW	Sunday, 23 December 2012	BHPB IC - Manager Approvals (Mining)	
		4	Revise the existing DSC Monitoring, Contingency, Closure Plan to include Area 3B	Sunday, 1 July 2012	BHPB IC - Manager Approvals (Mining)	
1G1	Creation of springs, or reduction, enhancement or development of seeps. Resulting in water quality changes due to mine subsidence.	1	Completed SMP and the monitoring programs	Sunday, 1 July 2012	BHPB IC - Manager Approvals (Mining)	
		2	Review the Landscape Monitoring, Management and Contingency Plan	Sunday, 1 July 2012	BHPB IC - Manager Approvals (Mining)	
1K1	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 and the monitoring programs	Sunday, 1 July 2012	BHPB IC - Manager Approvals (Mining)	
		2	Confirm base data used for MSEC mapping of Cliffs	Sunday, 1 April 2012	BHPB IC - Manager Approvals (Mining)	
		3	Review the Landscape Monitoring, Management and Contingency Plan	Sunday, 1 July 2012	BHPB IC - Manager Approvals (Mining)	
1K2	Rock falls from cliffs due to mine subsidence. Rock fall causes injury to personnel. (Note: There were no pagodas identified in the area)	1	Completed SMP to include Public Safety and the monitoring programs	Sunday, 1 July 2012	BHPB IC - Manager Approvals (Mining)	
		2	Confirm base data used for MSEC mapping of Cliffs	Sunday, 1 April 2012	BHPB IC - Manager Approvals (Mining)	
		3	Review the Landscape Monitoring, Management and Contingency Plan	Sunday, 1 July 2012	BHPB IC - Manager Approvals (Mining)	
1L1	Localised instability of steep slopes due to mine subsidence. Localised impact to environment.	1	Completed SMP and the monitoring programs	Sunday, 1 July 2012	BHPB IC - Manager Approvals (Mining)	
		2	Review the Landscape Monitoring, Management and Contingency Plan	Sunday, 1 July 2012	BHPB IC - Manager Approvals (Mining)	
1L2	Surface cracking along steep slopes due to mine subsidence.	1	Completed SMP and the monitoring programs	Sunday, 1 July 2012	BHPB IC - Manager Approvals (Mining)	

Qualitative Risk Analysis Treatment Schedule

SYSTEM: Dendrobium Mine AR1297 Area 3B Mine Subsidence (Longwalls 9 -18)	**Compiled by:** Shane Chiddy **Date:** 28th March 2012	**Sheet:** 3
SUB SYSTEM: Natural Features **No:** 1	**Verified by:** **Date:**	**of:** 8

ID	HAZARD & EFFECTS	TID	TREATMENT	DATE REQUIRED	RESPONSIBLE OFFICER	DATE COMPLETED
	Localised impact to environment and enhancement of erosion and sedimentation.					
		2	Review the Landscape Monitoring, Management and Contingency Plan	Sunday, 1 July 2012	BHPB IC - Manager Approvals (Mining)	
1O1	Change in swamp function, impact to swamp vegetation due to mine subsidence.	1	Completed SMP to include swamps, wetlands, water related ecosystems and the monitoring programs	Sunday, 1 July 2012	BHPB IC - Manager Approvals (Mining)	
		2	Review the Swamp Impact Monitoring, Management and Contingency Plan	Sunday, 1 July 2012	BHPB IC - Manager Approvals (Mining)	
1O2	Change in swamp function, impacts to swamp fauna and habitat due to mine subsidence.	1	Completed SMP to include swamps, wetlands, water related ecosystems and the monitoring programs	Sunday, 1 July 2012	BHPB IC - Manager Approvals (Mining)	
		2	Review the Swamp Impact Monitoring, Management and Contingency Plan	Sunday, 1 July 2012	BHPB IC - Manager Approvals (Mining)	
1O3	Change in swamp function, impacts to swamp hydrology due to mine subsidence.	1	Completed SMP to include swamps, wetlands, water related ecosystems and the monitoring programs	Sunday, 1 July 2012	BHPB IC - Manager Approvals (Mining)	
		2	Review the Swamp Impact Monitoring, Management and Contingency Plan	Sunday, 1 July 2012	BHPB IC - Manager Approvals (Mining)	
		3	Review the Water Course Impact Monitoring, Management and Contingency Plan	Sunday, 1 July 2012	BHPB IC - Manager Approvals (Mining)	
1O4	Erosion of swamp due to change in geomorphology, hydrology or vegetation (die back), due to mine subsidence.	1	Completed SMP to include swamps, wetlands, water related ecosystems and the monitoring programs	Sunday, 1 July 2012	BHPB IC - Manager Approvals (Mining)	
		2	Review the Swamp Impact Monitoring, Management and Contingency Plan	Sunday, 1 July 2012	BHPB IC - Manager Approvals (Mining)	
		3	Review the Water Course Impact Monitoring, Management and Contingency Plan	Sunday, 1 July 2012	BHPB IC - Manager Approvals (Mining)	
		4	Review the Landscape Monitoring, Management and Contingency Plan	Sunday, 1 July 2012	BHPB IC - Manager Approvals (Mining)	
1P1	Mine subsidence leads to loss of listed species or their habitat.	1	Completed SMP to include consideration of Threatened and protected species and the monitoring programs	Sunday, 1 July 2012	BHPB IC - Manager Approvals (Mining)	
		2	Review the Swamp Impact Monitoring, Management and Contingency Plan (to include threatened community)	Sunday, 1 July 2012	BHPB IC - Manager Approvals (Mining)	
		3	Review the Water Course Impact Monitoring, Management and Contingency Plan	Sunday, 1 July 2012	BHPB IC - Manager Approvals (Mining)	
1T1	Mine subsidence leads to	1	Completed SMP to include consideration of natural vegetation and	Sunday, 1 July 2012	BHPB IC - Manager	

Qualitative Risk Analysis Treatment Schedule

SYSTEM: AR1297 Dendrobium Mine Area 3B Mine Subsidence (Longwalls 9 -18)		**Compiled by:** Shane Chiddy **Date:** 28th March 2012	**Sheet:** 4
SUB SYSTEM: Natural Features **No:** 1		**Verified by:** **Date:**	**of:** 8

ID	HAZARD & EFFECTS	TID	TREATMENT	DATE REQUIRED	RESPONSIBLE OFFICER	DATE COMPLETED
	damage or loss of natural vegetation.		the monitoring programs		Approvals (Mining)	
		2	Review the Landscape Monitoring, Management and Contingency Plan	Sunday, 1 July 2012	BHPB IC - Manager Approvals (Mining)	
		3	Review the Swamp Impact Monitoring, Management and Contingency Plan	Sunday, 1 July 2012	BHPB IC - Manager Approvals (Mining)	
		4	Review the Water Course Impact Monitoring, Management and Contingency Plan	Sunday, 1 July 2012	BHPB IC - Manager Approvals (Mining)	
1V1	Impact to the Wongawilli Creek Waterfall due to mine subsidence.	1	Prepare a Wongawilli Creek Waterfall Management Plan	Sunday, 1 July 2018	BHPB IC - Manager Subsidence Engineering	

Qualitative Risk Analysis Treatment Schedule

SYSTEM: AR1297 Dendrobium Mine Area 3B Mine Subsidence (Longwalls 9 -18)		**Compiled by:** Shane Chiddy **Date:** 28th March 2012	**Sheet:** 5
SUB SYSTEM: Public Utilities **No:** 2		**Verified by:** **Date:**	**of:** 8

ID	HAZARD & EFFECTS	TID	TREATMENT	DATE REQUIRED	RESPONSIBLE OFFICER	DATE COMPLETED
2A1	The area of subsidence under analysis does not include any active railways and did not require further assessment.	1	Monitor any progress for future development of the railway	Sunday, 23 December 2012	BHPB IC - Manager Infrastructure	
2B1	Damage to SCA Fire Road 6A due to mine subsidence. Roads require repair.	1	Completed SMP to include consideration of roads and the monitoring programs.	Sunday, 1 July 2012	BHPB IC - Manager Approvals (Mining)	
		2	Revise SCA Asset Protection Plan for Area 3B	Sunday, 1 July 2012	BHPB IC - Manager Approvals (Mining)	
		3	Review Public Safety Management Plan to include Fire Road 6A within Area 3B	Sunday, 1 July 2012	BHPB IC - Manager Approvals (Mining)	
2K1	Loss of water from Avon Reservoir due to mine subsidence. Water flows into the mine workings.	1	Completed SMP to include consideration of Avon Reservoir	Sunday, 1 July 2012	BHPB IC - Manager Approvals (Mining)	
		2	Revise Dams Safety Committee Management Plans for Areas 3B	Sunday, 1 July 2012	BHPB IC - Manager Approvals (Mining)	
		3	Revise the existing Groundwater Management Plan to include Area 3B	Sunday, 1 July 2012	BHPB IC - Manager Approvals (Mining)	
2K2	Damage to the SCA meteorological station. Loss of data collection capabilities.	1	Revise SCA Asset Protection Plan for Area 3B	Sunday, 1 July 2012	BHPB IC - Manager Approvals (Mining)	

Qualitative Risk Analysis Treatment Schedule

SYSTEM: AR1297 — Dendrobium Mine, Area 3B Mine Subsidence (Longwalls 9 -18)	**Compiled by:** Shane Chiddy **Date:** 28th March 2012	**Sheet:** 6
SUB SYSTEM: Industrial, Commercial and Business Establishments **No:** 5	**Verified by:** **Date:**	**of:** 8

ID	HAZARD & EFFECTS	TID	TREATMENT	DATE REQUIRED	RESPONSIBLE OFFICER	DATE COMPLETED
5H1	Damage to monitoring bore holes due to mine subsidence. Resulting in damage to monitoring equipment.	1	None Identified			

Qualitative Risk Analysis Treatment Schedule

SYSTEM: Dendrobium Mine AR1297 Area 3B Mine Subsidence (Longwalls 9 -18)	**Compiled by:** Shane Chiddy **Date:** 28th March 2012	**Sheet:** 7
SUB SYSTEM: Areas of Archaeological and/or Heritage significance **No:** 6	**Verified by:** **Date:**	**of:** 8

ID	HAZARD & EFFECTS	TID	TREATMENT	DATE REQUIRED	RESPONSIBLE OFFICER	DATE COMPLETED
6A1	Impact to sites due to mine subsidence.	1	Completed SMP to include consideration of Areas of Archaeological Significance and the monitoring programs	Sunday, 1 July 2012	BHPB IC - Manager Approvals (Mining)	
		2	Obtain consent under the National Parks and Wildlife Act 1974 - Section 90 (prior to the mining of Longwall 9)	Sunday, 1 July 2012	BHPB IC - Manager Approvals (Mining)	
		3	Review the Aboriginal Heritage Plan	Sunday, 1 July 2012	BHPB IC - Manager Approvals (Mining)	

Qualitative Risk Analysis Treatment Schedule

SYSTEM: AR1297 — Dendrobium Mine, Area 3B Mine Subsidence (Longwalls 9 -18)	**Compiled by:** Shane Chiddy **Date:** 28th March 2012	**Sheet:** 8
SUB SYSTEM: Permanent Survey Control Marks **No:** 8	**Verified by:** **Date:**	**of:** 8

ID	HAZARD & EFFECTS	TID	TREATMENT	DATE REQUIRED	RESPONSIBLE OFFICER	DATE COMPLETED
8A1	Movement of Permanent Survey Control Marks due to mine subsidence. Surveyors falsely rely on location of the marks.	1	Completed SMP to include consideration of Permanent Survey Control Marks and the monitoring programs	Sunday, 1 July 2012	BHPB IC - Manager Approvals (Mining)	
		2	NSW Department of Lands are to be advised of affected survey control marks	Sunday, 23 December 2012	BHPB IC - Manager Survey	

Attachment 9

Revisions

Document Revision History

Revision	Date	Modification Decription
1	28-Mar-12	Released for comments
2	29-Mar-12	Changes made after review from client