



Sustainable Development

ENVIRONMENTAL MANAGEMENT  
SYSTEM

[West Cliff Area 5](#)

[Longwalls 34-36](#)

**Cliff and Steep Slopes  
Management Plan**

**September 2009**

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**bhpbilliton**

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West Cliff Area 5

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**Cliff and Steep Slopes  
Safety Management Plan**

Document No:

Responsible Officer: \_\_\_\_\_

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(Manager Environmental Approvals)

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(Manager Approvals)



*Licence Number*

*CEM 20004*

# ENVIRONMENTAL MANAGEMENT SYSTEM

## West Cliff Area 5

## Longwalls 34-36

## Cliff and Steep Slopes Safety Management Plan

**Revision 1**

**21 September 2009**

Revision	Date	Comments	Authorised
1	1 February 2010	Modified to address improvements suggested by Inspector of Coal Mines, Dept Industry & Investment NSW during meeting held 29/1/2010 and Condition 13 of the SMP Approval.	Manager Approvals
2			

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# West Cliff Area 5 Longwalls 34-36 Cliff & Steep Slopes Safety Management Plan

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**Appendix A – Plan 2 from the Variation Application for Longwall 34 20**

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## 1. Introduction

BHP Billiton Illawarra Coal (BHPBIC) is planning to extend its underground coal mining operations at West Cliff Colliery by extracting coal from the Bulli Seam using longwall mining techniques in West Cliff Area 5, Longwalls 34-36. The proposed longwalls are located immediately west of the Georges River and incorporate Mallaty, Leaf's Gully and Nepean ephemeral creeks across their eastern sections. Within the SMP Area, two Cliffs referred to as GR-CF01 and GR-CF02 are identified within the Georges River, whilst steep slopes are associated with the Georges River, Leaf's Gully Creek and Mallaty Creek. The location of these features is shown in Figure 1, which is extracted from the SMP document.

A variation to shorten the commencing end of Longwall 34 by 897m was applied for on 18/5/2009 and approved by the Department of I&I 26/5/09. Plan 2 from the Longwall 34 variation is included as Appendix A of this document and shows the revised starting position. At the time this plan was being revised an application had been submitted to shorten the finishing end of Longwall 34 by 125m. A Plan showing this layout with respect to the river systems and steep slopes is also included in Appendix A.

Extraction of coal by longwall methods results in disturbance to the surface above and adjacent to the zone of extraction. In addition to vertical subsidence, horizontal ground movements may occur. These movements are particularly important where the surface topography includes gorges, cliffs and steep slopes. These horizontal movements may be directed towards the extracted mining area, or in the direction of the principal horizontal in-situ stress. Such movements may be observed well beyond the vertical projection of the excavation. Following completion of mining of a longwall block, movement above and adjacent to the extracted area will continue for some time until maximum subsidence and horizontal movement is complete. Predictions of the movements expected for the cliffs and steep slopes are summarised in Sections 8.2 and 8.3 of the Longwall 34 to 36 SMP Application, with more detail provided in report MSEC326 (SMP Appendix A) and MSEC386 for the revised length of Longwall 34.

The standards relating to initial control actions, the surveying and inspection regime and the responses to pre-determined conditions resulting from movement are addressed in this Management Plan.

The two cliffs were identified within the general application area adjacent to the Georges River using remote sensing and field mapping techniques. Cliff GR-CF01 is located directly above the finishing end of Longwall 35 and GR-CF02 is located adjacent to the finishing end of

Longwall 36. The stability of a cliff can be affected by mining due to the differential movements that occur along the length or height of the cliff. The differential movements induce stresses within the rockmass which, if sufficiently large, can result in sections of the rock to crack and potentially result in instability. The impact of mining on cliffs can be affected by a number of factors, as are discussed in detail in the Subsidence Predictions and Impact Assessments report for Natural Features and Items of Surface Infrastructure (MSEC, 2007).

The majority of the observed cliff instabilities due to mining have occurred after the cliffs have been directly mined underneath and, therefore, have been located over the goaf. Very few (one possible event in the Cataract River associated with Longwall 302) cliff instabilities as a result of longwall mining have been observed outside mined goaf areas in the Southern Coalfield. There is also the possibility that a rock fall associated with the cliffs may occur naturally during or following the period of mining.

The two cliffs associated with Longwalls 34-36 are located directly above and adjacent to the ends of Longwalls 35 and 36. It is predicted that at this location impacts should be less than those experienced for Dendrobium Area 1 where the ridgeline was directly undermined and more comparable with results experienced for Appin Longwalls 301-302 where a 50 metre offset was in place. Hence it is estimated 1-7% of the length of Cliffs GR-DF01 and GR-DF02 may be subject to cliff instability (MSEC, 2007).

With appropriate monitoring in place to address the Georges River cliff lines it is unlikely significant impacts will result from the extraction of Longwalls 34-36, however any should be adequately addressed by the management actions within this Plan.

Areas of steep slopes have been defined in the Longwall 34-36 SMP as having a natural gradient between 1 in 3 (ie a grade of 33% or angle to the horizontal of 18°) and 2 in 1 (ie a grade of 200% or an angle to the horizontal of 63°). These slopes were identified from 1 metre surface level contours generated by an aerial laser scan of the area.

Due to the depth of cover being greater than 500 metres it would be expected that any surface cracking within steep sloped areas, associated with Longwalls 34-36, would be of a minor nature and could be managed through monitoring and, if required, simple remediation techniques.

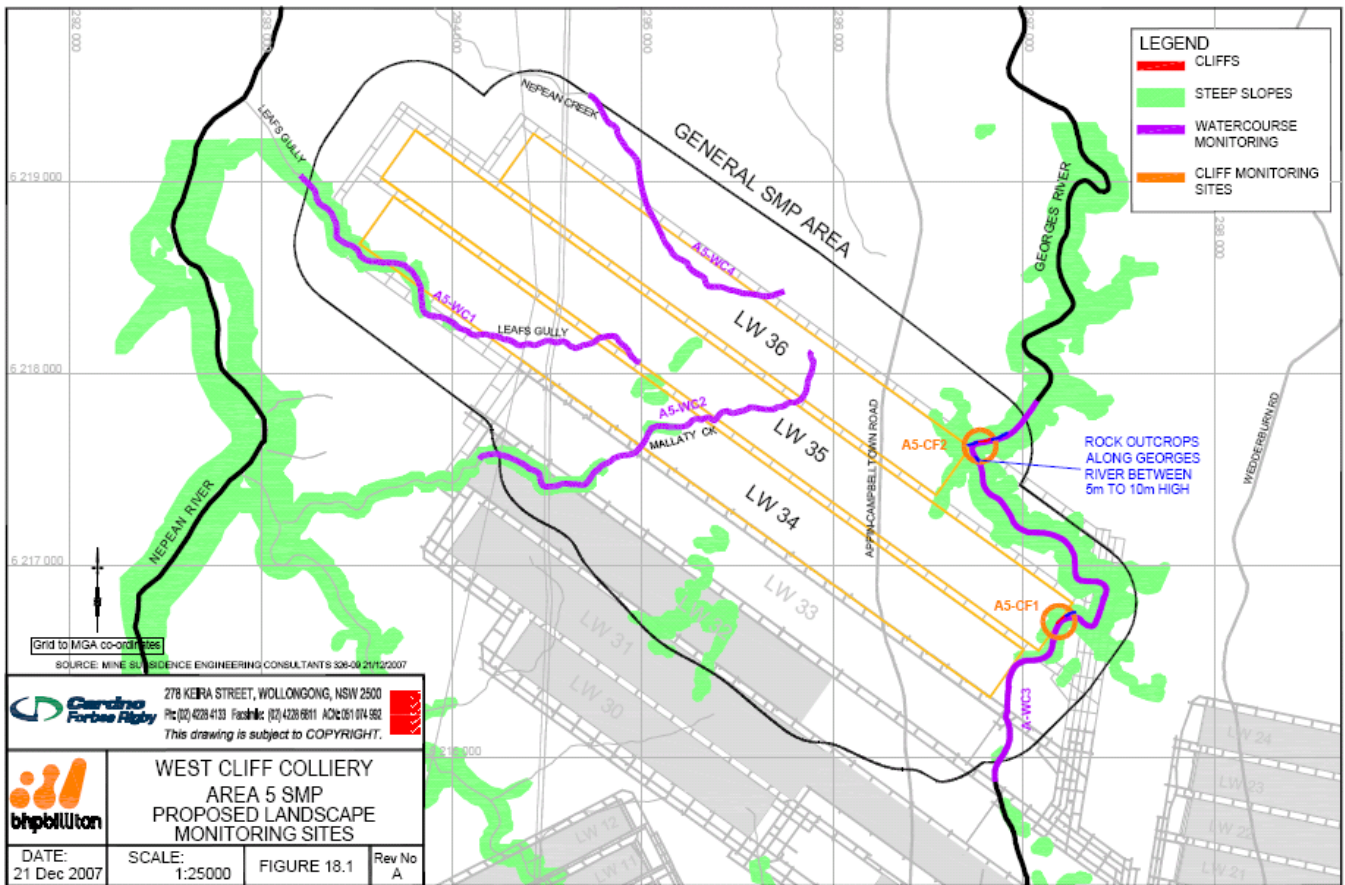


Figure 1. Location of cliffs and steep slopes.

## 1.1 Objectives

This management plan has been developed to prevent environmental impacts and personal injuries as a result of cliff and steep slope instability. This will be achieved by regular monitoring of ground movement and rock face stability in potentially unstable areas and implementing appropriate controls where necessary.

To achieve this it is necessary to define:

- the surveying locations, standards and frequencies to apply to subsidence and horizontal movement monitoring of the surface topography above, and in areas of the gorge adjacent to and potentially affected by, Longwalls 34-36,
- the standards relating to initial controls, and in particular warning signs and fences that may be needed,

- ongoing inspections of the area to monitor cliff face and edge instability,
- the responses to pre-determined conditions relating to any observed ground movement or deterioration of the cliff faces or edges, and
- responsibilities for the various actions and responses required. This may include sediment controls and revegetation to prevent soil erosion.

Ground movements, including the disturbance of cliff faces, will be regularly assessed. This will contribute to an improved understanding of the effects of mining on steep slopes, cliffs and gorges, and assist the management of the area to minimise risk to members of the public and landowners. It is anticipated that the monitoring will confirm that no mining induced instability has been generated.

## 1.2 Scope

This Management Plan is structured to address the cliff and steep slope management actions required by a number of Conditions within the SMP Approval for West Cliff Longwalls 34 to 36. It directly addresses Conditions 22, 15 and 13 as outlined below:

Condition 22 of the SMP Approval states *the Leaseholder must develop and implement a management plan to ensure the safety of any persons frequenting in the areas affected by any instability of steeply sloping ground and/or falling rocks from the cliff formations associated with the Upper Georges River and any other watercourses that may be affected by subsidence. This plan must be developed to the satisfaction of the District Inspector of Coal Mines and implemented before the commencement of extraction of Longwall Panel 34.*

Condition 15 of the SMP Approval requires the Leaseholder to *prepare and implement a public safety management plan to ensure public safety in any surface areas that may be affected by subsidence, to the satisfaction of the District Inspector of Coal Mines.* Other aspects of public safety are addressed in the SMP Application and other management plans addressing the man-built and natural environments.

Condition 13 was varied by I&I 23/12/09. It states in part that *the Leaseholder must not operate otherwise than in accordance with the management plan titled “West Cliff Colliery Area 5 Longwalls 34 to 36 – Subsidence Management Plan January 2008 – Revision 1, November*

*2009 – Incorporating the Georges River Management Plan” and the Environmental Management Plan identified in condition 13.1*

*The Leaseholder must not carry out longwall operations between the Georges River Trigger Point and the Georges River until an Environmental Management Plan (EMP) has been developed and approved (the Georges River Trigger Point is defined as the projected lateral distance of 400m west of the western edge of the Georges River). Such Plan is required to address clifflines.*

This Plan addresses controls and responses associated with risks to landholders, the public and personnel working within the vicinity of Longwalls 34-36 and possible instability of cliffs and steep slopes in the Georges River and ephemeral creeks. Direct overland public access is restricted to most steep sloped and cliffed areas due to private ownership. As such, public access is very limited within these areas to property owners/tenants. This Plan also applies to any person in any capacity required to carry out activities for monitoring, mitigation, or any other requirement.

The Plan relates specifically to the potential consequences of surface instability in the vicinity of Longwalls 34-36. Results obtained by the monitoring associated with this Plan will be used to determine ongoing monitoring requirements, appropriate controls and responses relating to potential surface instability associated with the extraction of future longwalls.

### **1.3 Limitations and Assumptions**

This Management Plan uses a combination of initial controls, ongoing monitoring, inspections and investigations and appropriate responses to identified adverse conditions to minimise risk to personnel that may enter the Nepean River valley from exposure to ground instability in the area.

While it is the intention of BHPBIC to maintain safety at all times, there are certain limitations that need to be recognised, despite the fact that mining induced cliff and slope instability is not likely in West Cliff Area 5:

- There is natural instability associated with the cliff faces and edges in the area.
- The interaction of mining induced movements on the natural instability of cliff faces and edges cannot be precisely quantified.

- Results from inspections, photographing and monitoring cliff faces and edges in more heavily vegetated areas will not be as precise as non-vegetated areas.
- In the absence of information to the contrary, the effects of mining Longwalls 34-36 will be similar in nature and magnitude to those associated with previous longwalls located in similar areas and the initial controls implemented will be based on this assumption.
- It is difficult to quantify the risks associated with rock falls and while the probability of resultant injuries may be remote, the potential consequences are severe. Controls will be implemented on this basis.
- Areas associated with cliffs and steep slopes can be rugged and relatively difficult to traverse on land with only a limited number of practical access points. With the approval of the landholder, warning signs will be prominently displayed at these locations. It is expected that observational monitoring will be undertaken from a safe proximity from the cliff or steep slope and the safest and most practical route will be used for access.
- There are no existing tracks below the two cliff lines. The Georges River is not navigable throughout the stretch of river near the cliff lines.

#### 1.4 Definitions

Nepean System	That area of the river that will potentially be affected by mining of longwalls at Appin Colliery.
I&I	Department of Industry and Investment (formerly the Department of Primary Industries Mineral Resources).
Georges River Trigger Point	Defined in Condition 13 of the Subsidence Management Plan Approval for West Cliff Area 5 Longwalls 34 to 36.
Geotechnical	The predicted reaction of the rock mass to induced stress when considering local geological characteristics such as stratigraphy, jointing, faulting and weathering.

Management Plan	This management plan, the <i>Cliff and Steep Slopes Safety Management Plan Longwalls 34-36</i> .
Public	Any person entering the associated cliff or steep sloped areas or their perimeter. It is noted that the majority of property associated with cliffs and steep slopes is privately owned.
Subsidence	Movements at the surface resulting from coal extraction, including the difference between the surface level at a point before and after a panel is mined. It is considerably less than the thickness of coal removed.
SD	BHP Billiton Illawarra Coal <i>Sustainable Development &amp; External Affairs Department</i> .

## 2. Principal Identified Hazards

A risk assessment was undertaken in preparation for Longwall 34-36 SMP. Risk assessment is Appendix G of the SMP Application. Illawarra Coal has also undertaken a review of the incidence of rockfalls associated with mining in the Southern Coalfields (reports titled Regional Cliff Study, August 2004 and Cataract River Cliff Study, October 2004).

Potential hazards applying to the cliff faces, steep slopes and edges of the Georges River and Leafs Gully and Mallaty Creek ephemeral streams include:

- ❑ Rock falls resulting in injury to persons.
- ❑ Unstable ground associated with the steep slopes, faces and edges of cliffs leading to the risk of persons falling.
- ❑ Unstable ground associated with the faces and edges of cliffs resulting in injury to persons walking through these areas.

It is considered that these represent the principal sources of risk to persons within and around the perimeter of the valley. Management of the identified hazards will be by way of:

- ❑ Initial controls appropriate to the level of risk.
- ❑ Regular monitoring and reporting on areas of potential instability, before, during and after longwall mining.
- ❑ Regular inspections and investigations.
- ❑ Action plans for response to defined events.

These control measures apply to the cliff and steep sloped areas identified in Figure 1.

### **3. Monitoring of Cliffs and Steep Slopes**

Monitoring is currently underway for West Cliff Area 5 (Longwalls 31-33) will be extended to include Longwalls 34-36.

Ground movements, including any disturbance of cliff faces, will be regularly assessed as per this Management Plan and, as outlined in detail in the Subsidence Management Plan for West Cliff Longwalls 34-36 (Revision 1), dated November 2009. Such monitoring program addresses cliff and steep slopes associated with ephemeral streams, as well as monitoring required when longwall extraction passes the Georges River Trigger Point. At such point the Georges River Management Plan becomes active and the frequency of Georges River monitoring is increased.

The cliff and steep slope monitoring program will contribute to an improved understanding of the effects of mining on steep slopes, cliffs and gorges, and assist the management of the area to minimise risk to members of the public, landholders and monitoring personnel in the area.

Results obtained from monitoring associated with this plan will be used to determine ongoing monitoring requirements, appropriate controls and responses relating to potential surface instability associated with progressive longwall extraction.

### **4. Control Procedures and Response Action Plans**

#### **4.1 Initial Control Measures**

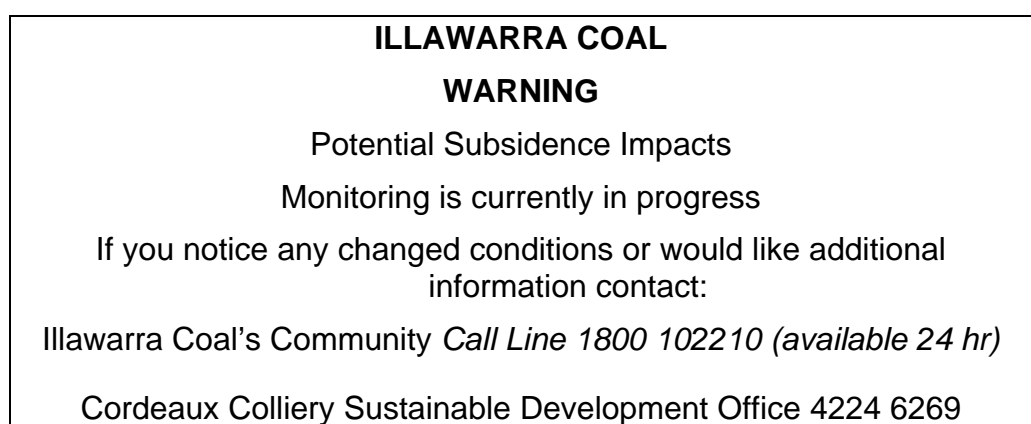
The following control measures shall be established:

- Where practical, a baseline inspection of the cliff faces and edges likely to be affected by Longwalls 34-36 will be conducted prior to mining. It will include photographing any existing deterioration to establish the natural risk associated with such locations. A file of these locations, their initial condition and photographic data shall be established for updating during the mining period.
- Any rock or cliff face identified in the baseline inspection as being at high risk of falling shall, following agreement of the landholder, be signposted to warn specifically of the danger.
- The location of all signs, fences, other remedial or warning provisions established and the location of all falls in the area potentially affected by Longwalls 34-36, or previous longwall blocks in the current area shall be marked on a Plan. This Plan shall be

maintained as the result of any remedial measures instituted during mining.

- Signs shall be prominently displayed at each key access point to the river valley, and at prominent locations within the valley warning of the potential instability associated with the cliff faces and edges. Where signs are to be installed on private property this will only be done with the agreement of the landholder.

These signs shall read as below or similar:



## 4.2 Inspections and Investigations

Inspections of the cliff faces, edges and steep slopes likely to be affected by Longwalls 34-36 will be conducted where practical. Where accessible, monthly inspections will be conducted during active subsidence for the ephemeral streams and weekly for the Georges River. During these inspections photographs will be taken of any deterioration of cliff faces with the potential to result in a major fall.

These inspections shall be performed by person(s) deemed appropriate by the BHBIC Environment Field Team Coordinator and shall be conducted (as far as practical) in a standard manner each month.

An investigation shall be conducted by the Environmental Field Team Coordinator of any large fall associated with the cliff faces or edges in the area that may be affected by past or present mining in Area 5. The results of this investigation shall be used in the assessment of the relationship between ground movements, cliff face and edge deterioration and failures. A report shall be submitted to the I&I outlining the results of these inspections where impacts to the cliffs are observed. Any large rock fall will be notified to key stakeholders within 24 hours of it being identified.

Surveys prior to the commencement, during extraction, and following completion of Longwalls 34-36 will be conducted according to the schedule contained in **Table 1**.

**Table 1 - Cliff Formation and Steep Slope Management**

<b>Monitoring Proposed</b>	<b>Description</b>	<b>Timing/ Frequency</b>	<b>Reporting</b>
Baseline studies prior to mining	- Photographic record with details of site locations including cliff formations	Prior to mining. Photographic records will be prepared.	Subsidence Management Plan Application Annual Environmental Management Reports, End of Panel Reports
Monitoring during mining	- Visual observations of appropriate cliff formations - Visual observations of mining impacts on appropriate steep slopes  - Survey monitoring of the Georges River	Monthly routine inspections, weekly for Georges River when extraction is beyond GR Trigger Point As per the survey monitoring plan to be approved by the PSE.	Impact Reports Subsidence Status Reports Annual Environmental Management Reports, End of Panel Reports  Survey Results Email Distribution Subsidence Status Reports Annual Environmental Management Reports End of Panel Reports
In the event that specific impacts are identified	- Discussions with authorities and development of mitigation measures	Notification within 24 hrs Development of mitigation measures as required	Notification within 24 hrs. Impact Report as soon as is practical. Development of mitigation measures as required

*If impacts are noted, photographs will record the level of impact and where necessary, remedial action will be taken in consultation with I&I.*

The following monitoring work is proposed to assess any impacts of mining on the cliff formations in the area:

- Baseline studies to document and photograph clifflines with characteristics of natural instability that might be at risk due to mining. The monitoring will include photographing any existing deterioration or recent rock falls. A file of these locations, their initial condition and photographic evidence shall be established for updating during mining.
- Regular inspections and investigations of the condition of the relevant cliff formations will be conducted. Reports will be provided

as part of event based and annual reporting procedures to I&I. In the event that specific impacts are identified, additional monitoring and reporting will be undertaken as required. This monitoring will continue while the area is affected by active subsidence and for a period after mining until it is considered unlikely that there is any significant risk of additional cliff instability as a result of mining.

### 4.3 Reporting Procedures

Reporting will be undertaken as per Table 2:

**Table 2 – Reporting undertaken which is applicable to the Cliff and Steep Slopes Safety Management Plan**

Reporting Means	Frequency	Reported By	Reported To
Phone Call, Email, Report	Within 24 hours if development of instability occurs and/or falls of rocks along the Upper GR or other water courses affected by subsidence (Cond 16 SMP Approval)	Manager Environment	I&I*, members of the IAC and govt agency with regulatory role if requested
Subsidence Mgmt Status Report	Monthly (Cond 17 SMP Approval)	Mining Approvals Coordinator	I&I* and IAC
Survey Monitoring Results	As per Subsidence Management Plan	IC SD Survey Dept	I&I*
Impact Reports	When an impact is observed	IC SD Dept	I&I* and IAC
Annual Environmental Management Reports	Annually	West Cliff Site	I&I*, DoP, MSB, DSC, SCA, DECCW, Wollongong City Council, Wollondilly Shire Council
End of Panel Reports	End of each Longwall within 34-36 (Cond 18 SMP Approval).	IC SD Dept	I&I*, DoP, MSB, DSC, SCA, DECCW

Note: \* includes I&I NSW including Safety, Environmental and Subsidence Branches.

Where applicable, reporting of results will include the following information:

- Date of monitoring.
- Location including easting and northing positions.
- Distance the longwall has travelled from the face starting position.
- Distance from the nearest edge of the extracted longwall void to the monitoring site at the time of monitoring.
- Systematic subsidence and valley closure survey measurement data.

The monitoring report will be collated and assessed against the results of the cliff inspection and presented at the monthly SD Department Subsidence Management Meeting. If however, the findings of a particular report are deemed to warrant an immediate response the Survey Manager shall immediately notify the Manager Environment who will call a special assessment meeting at the earliest opportunity. Responses will be determined and/or confirmed at this meeting. The Manager Environment shall be responsible for the implementation of the response. All actions taken will be reported to the Mine Manager and I&I.

The frequency of surveys nominated in Table 4.1 are subject to change based on practical implications with access to the river valley. Delays may be caused, in some cases, by adverse weather conditions, flooding of the river and non-availability of satellites for GPS work. Every effort will be made to conduct surveys and inspections according to the schedules and any deviation and the reasons therefore will be recorded and advised to all parties.

#### 4.4 Response Action Plans

“Trigger” levels have been developed that relate to response actions. These trigger and response actions may change over time in response to an increase in the level of understanding of the effects of longwall mining on the gorge. **Table 3** summarises the “trigger events” and the associated actions required.

**Table 3 – Response Action Plans for Defined Events**

Level	Trigger Event	Action	Responsibility
<b>Survey Based</b>			
2	If closure across the valley exceeds predicted movements.	Increase frequency of inspections of adjacent cliff faces and edges to once every two weeks.	Manager Survey
<b>Notification Event Based</b>			

1	If identified or informed of a cliff fall considered to be significant or potentially dangerous.	Initiate an immediate investigation and report result to the I&I. Initiate appropriate remedial action after gaining agreement of the Dept I&I and landowner.	Manager Environment
2	On becoming aware of a minor fall or change in rock face conditions.	Initiate an investigation at the earliest opportunity. Take appropriate action in accordance with Plan provisions.	

**Notes:**

- (1) Appropriate action will depend on accessibility, safety of persons required to take the action, restrictions imposed by landowners or statutory bodies, the level of assessed risk to others etc. It may include the erection of signs and/or fences, intentionally collapsing strata in a controlled manner, or any other measure decided as appropriate at an assessment meeting.
- (2) Manager Environment shall be responsible for the implementation of agreed actions and shall communicate such actions to relevant Landowners.

## 5. Training

All field surveying work and analysis of results will be carried out by or under the immediate supervision of a suitably qualified Surveyors. It shall be the responsibility of the Manager Environment to ensure that all persons and organisations having responsibilities under this Plan are trained and understand their responsibilities.

The person(s) performing regular inspections of the cliff faces and edges shall be under the supervision of the Environment Field Team Coordinator and be trained in observation and reporting. The Environment Field Team Coordinator shall be satisfied that the person(s) performing the inspections are capable of meeting and maintaining this standard.

## 6. Resources Required

The General Manager Sustainable Development and External Affairs provides resources sufficient to support this Plan.

Equipment will be needed for the Control and Response provisions of this Plan. Where this equipment is of a specialised nature, it will be provided by the supplier of the relevant service. All equipment is to be appropriately maintained, calibrated and serviced as required in operation manuals.

Equipment required for this Plan includes, but is not limited to:

- Signs and signposts.

- Photographic equipment.
- Survey equipment.

It shall be the responsibility of the Manager Environment to ensure that personnel and equipment are provided as required to allow the provisions of this Plan to be implemented.

## **7. Roles and Responsibilities**

The overall responsibility for the successful implementation of this Plan resides with the Manager Approvals who shall be the Plan's authorising officer. The responsibility for co-ordination of this Plan resides with the Manager Environmental Approvals, as does the responsibility for its implementation in the field.

### **7.1 General Manager Sustainable Development and External Affairs**

- Ensure that the requisite personnel and equipment are provided to enable this Plan to be implemented effectively.

### **7.2 Manager Approvals**

- Authorise the Plan and any amendments thereto.
- Delegate, to an appropriately qualified person, the responsibility to document any changes to the Plan, recognising the potential for those changes to affect other aspects of the Plan.

### **7.3 Manager Environment / Environmental Approvals Manager**

- Ensure regular inspections are conducted (including photographing) of areas considered to be at risk of impacts. Determine the standards by which such inspections are to be conducted and recorded.
- Ensure surveys required by this Plan are conducted and record details of instances where circumstances prevent these from taking place.
- Organise and participate in assessment meetings called to review mining impacts on cliffs or steep slopes. The Environment Field Team Coordinator and the Survey Manager would also normally attend such meetings.
- Prepare a report of all actions determined as being necessary in accordance with the Response Action Plan and distribute to stakeholders should any 'trigger' level be reached that requires a

response other than increasing frequencies of surveying and/or inspections. Maintain a record of meetings.

- Within 24 hours, respond to any queries or complaints made by members of the public in relation to mining effects.
- Organise audits and reviews and participate in the Plan Review following any audit or other milestone event.
- Address any identified non-conformances, assess improvement ideas submitted and implement if considered appropriate.
- Ensure all data, records and reports arising from the provisions of this Plan are kept for a period of at least 12 months following the completion of Longwalls 34-36.
- Arrange implementation of any agreed remedial measures to protect persons from potential falls. This would include liaison with landowners if required.

#### **7.4 Environment Field Team Coordinator**

- Instruct suitable person(s) in the required standards for inspection, recording and reporting and be satisfied that these standards are maintained.
- Investigate significant falls of ground or rock.
- Identify and report any non-conformances with Plan provisions.
- Participate in any other assessment meetings called to review the behaviour of the river valley area affected by mining.

#### **7.5 Survey Manager**

- Collate survey data and present in an acceptable form for review at assessment meetings.
- Bring to the attention of the Manager Approvals any findings indicating an immediate response may be warranted.
- Bring to the attention of the Manager Environment any non-conformances identified with the Plan provisions or ideas aimed at improving the Plan.

## **7.6 Technical Experts**

- Conduct the roles assigned to them in a competent and timely manner to the satisfaction of the Manager Environment and formally provide expert opinion as requested.

## **7.7 Person(s) Performing Cliff Face And Edge Inspections**

- Formally bring to the attention of the Environment Field Team Coordinator any non-conformances identified with the Plan, or ideas aimed at improving the Plan.
- Conduct inspections of the monitoring sites identified by the Environmental Field Team Coordinator in a safe manner.

## **8. Plan Monitoring and Corrective Action**

The ongoing effectiveness of the Management Plan requires personnel to be able to highlight non-conformances with Plan provisions and make recommendations to improve the Plan. The corrective action requirements of this Plan facilitate the continual monitoring and improvement of Plan provisions.

## **9. Communications**

The Manager Approvals shall institute subsidence management meetings during the extraction of Longwalls 34-36 for the purpose of maintaining communications necessary for the effective operation of this Plan.

Should any trigger level of ground movement be attained other than an increase in the frequency of surveying and/or inspection, the Manager Approvals shall immediately convene a meeting of all affected parties to formulate an agreed and appropriate response. The Manager Approvals shall be responsible for implementation of the agreed actions and for communication to affected Landowners.

## **10. Record Keeping and Control**

The processes defined within this Management Plan can be demonstrated as being effective in the control of hazards over the mining period. It specifically addresses hazards associated with cliff face and edge deterioration resulting from ground movement.

The following information is collected, reported and maintained to improve the understanding of the effect of subsidence on cliffs and steep slopes:

- ❑ Surveys conducted.
- ❑ Regular review of subsidence movement monitoring and inspections.
- ❑ Interpretation and assessment of the data derived from surveys and observations.
- ❑ Assessment of any response actions implemented.

## 11. Document Control

This Management Plan shall be controlled as part of the Sustainable Development Document Control System. The Manager Approvals will be responsible for maintaining document control standards for the Plan.

The monitoring, actions and adequacy of this Plan will be reviewed and reported when compiling the End of Panel Report for each Longwall. The Manager Approvals shall approve all modifications and amendments to the Plan or associated documentation.

## 12. Contacts

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## **Appendix A – Layout Plans from Variation Applications for Longwall 34**



## Plan 2 from the Application to Shorten the Finishing End of Longwall 34

