WAMBO COAL PTY LIMITED

SOUTH BATES (WHYBROW SEAM) UNDERGROUND MINE

EXTRACTION PLAN LONGWALLS 11 TO 13

APPENDIX B

LAND MANAGEMENT PLAN

Peabody ENERGY

WAMBO COAL PTY LIMITED
SOUTH BATES (WHYBROW SEAM) UNDERGROUND MINE

LAND MANAGEMENT PLAN
LONGWALLS 11 - 13

PREPARED BY
WAMBO COAL PTY LIMITED AND
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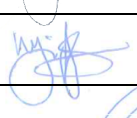
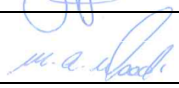
DOCUMENT CONTROL

Document No.	LMP LW11-13
Title	Land Management Plan for South Bates (Whybrow Seam) Underground Mine Longwalls 11 to 13
General Description	Management of potential subsidence effects, subsidence impacts and environmental consequences on land in general for mining of Longwalls 11 to 13 at the South Bates (Whybrow Seam) Underground Mine
Key Support Documents	Wambo Coal Mine Erosion and Sediment Control Plan

Revisions

Rev No	Date	Description	By	Checked
A	October 2015	Final for Submission	WCPL and Resource Strategies	S. Peart
B	January 2016	Incorporation of Addendum	WCPL and Resource Strategies	S. Peart

Approvals

	Name	Position	Signed	Date
Originator	S. Peart	Environment and Community Manager		29/01/2016
Checked	T. Britten	Technical Services Manager		29/01/2016
Confirmed	M. Wood	Underground Manager of Mining Engineering		29/01/2016

The nominated Coordinator for this document is	Environment and Community Manager

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1 INTRODUCTION

The Wambo Coal Mine is an open cut and underground coal mining operation located approximately 15 kilometres (km) west of Singleton, near the village of Warkworth, New South Wales (NSW) (**Figure 1**). The Wambo Coal Mine is owned and operated by Wambo Coal Pty Limited (WCPL), a subsidiary of Peabody Energy Australia Pty Limited.

The South Bates (Whybrow Seam) Underground Mine is a component of the approved Wambo Coal Mine. The South Bates (Whybrow Seam) Underground Mine is scheduled to commence in February 2016 and involves extraction of coal by longwall mining methods from the Whybrow Seam within Coal Lease (CL) 397 and Mining Lease (ML) 1594 (**Figure 2**).

The potential environmental impacts of the existing Wambo Coal Mine (including the approved South Bates [Whybrow Seam] Underground Mine) were assessed in the *Wambo Development Project Environmental Impact Statement* (the Wambo Development Project EIS) (WCPL, 2003). Development Consent DA 305-7-2003 for the Wambo Coal Mine was granted on 4 February 2004 by the then NSW Minister for Urban Affairs and Planning under Part 4 of the NSW *Environmental Planning and Assessment Act, 1979*.

Underground mining at North Wambo Underground Mine commenced in 2005 and is scheduled to be complete by early 2016 with the completion of Longwall 8b. Underground mining operations will then move to South Bates (Whybrow Seam) Underground Mine with the commencement of Longwalls 11 to 13 (approved as part of the Development Consent DA 305-7-2003).

This Land Management Plan (LMP) forms a part of the Extraction Plan being developed for the approved Longwalls 11 to 13.

1.1 PURPOSE AND SCOPE

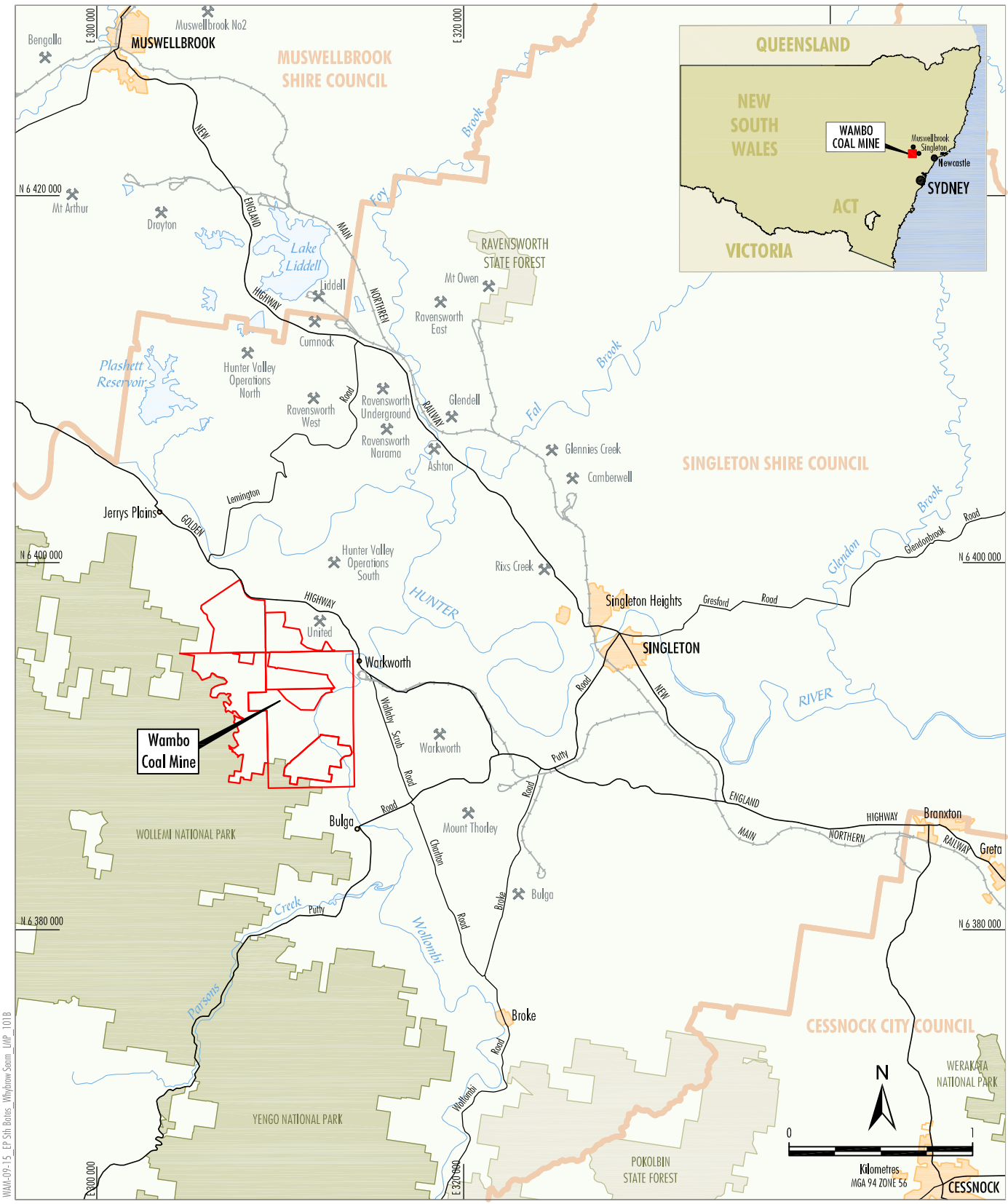
Purpose: This LMP for Longwalls 11 to 13 outlines the management of potential environmental consequences of the proposed secondary workings described in the Extraction Plan on land in general.

Scope: This LMP covers land in general within the Longwalls 11 to 13 Application Area (**Figure 2**).

This LMP has been prepared in accordance with Condition 22C(h) of Schedule 4 of the Development Consent (DA 305-7-2003) as a component of the South Bates (Whybrow Seam) Underground Mine Longwalls 11 to 13 Extraction Plan.

Management plan requirements applicable to the preparation of this LMP, and where each of these requirements is addressed within this LMP, are summarised in **Table 1**.

This LMP has been prepared by WCPL with assistance from Resource Strategies. The appointment of the team of suitably qualified and experienced experts (which includes representatives from WCPL and Resource Strategies) has been endorsed by the Secretary of the Department of Planning and Environment (DP&E).



LEGEND

- Mining and Coal Lease Boundary
- Local Government Boundary
- Mining Operation

Source: Geoscience Australia (2009)

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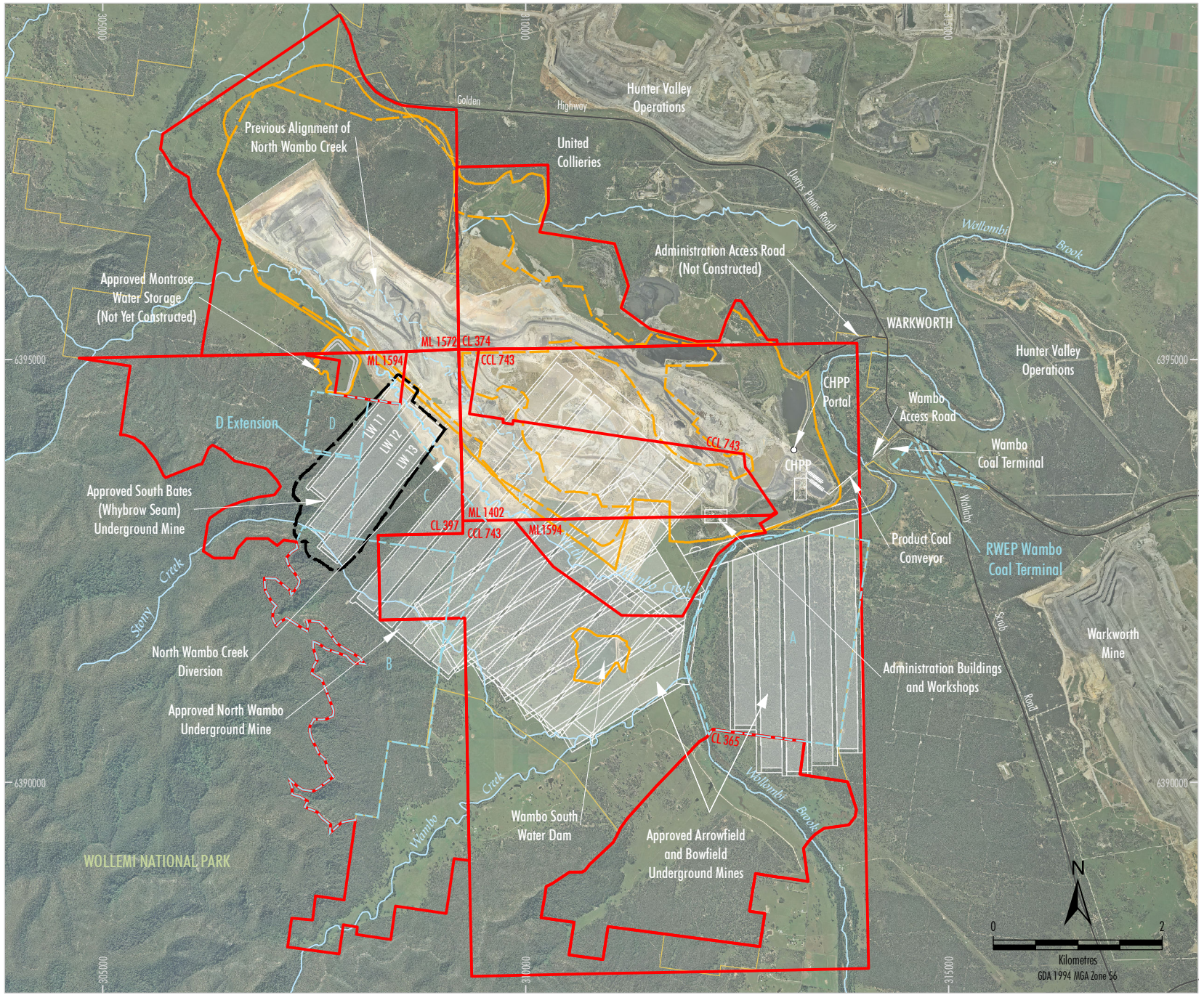
WAMBO COAL MINE

Regional Location

Figure 1



LEGEND

- Mining and Coal Lease Boundary
- WCPL Owned Land
- Existing/Approved Surface Development Area
- Approved Open Cut Limit
- Approved Underground Development
- Remnant Woodland Enhancement Program (RWEP) Area
- Extraction Plan Application Area

Source: Department of Lands (July 2009); WCPL (2015); WCPL Orthophoto (Apr-Oct 2013)

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WAMBO COAL MINE

Approved Wambo Coal Mine Layout

Figure 2

WAM-09-15_EP Sth Bates_EPA_LMP_201A

Table 1
Land Management Plan Requirements

Development Consent (DA 305-7-2003) Condition	LMP Section
Condition 22C(h) of Schedule 4 *22C. The Applicant shall prepare and implement an Extraction Plan for the second workings within each seam to be mined to the satisfaction of the Secretary. Each Extraction Plan must:* *...* *(h) include a:* *...* • *Land Management Plan, which has been prepared in consultation with any affected public authorities, to manage the potential impacts and/or environmental consequences of the proposed second workings on land in general;* *...*	Management of potential impacts and/or environmental consequences on land in general are addressed in **Table 2** and **Section 5**.
Condition 22D of Schedule 4 *22D. The Applicant shall ensure that the management plans required under condition 22C(h) above include:* *(a) an assessment of the potential environmental consequences of the Extraction Plan, incorporating any relevant information that has been obtained since this consent;* *(b) a detailed description of the measures that would be implemented to remediate predicted impacts; and* *(c) a contingency plan that expressly provides for adaptive management.*	Addressed in **Section 3**. Addressed in **Table 2** and **Section 5**. Addressed in **Section 7**.

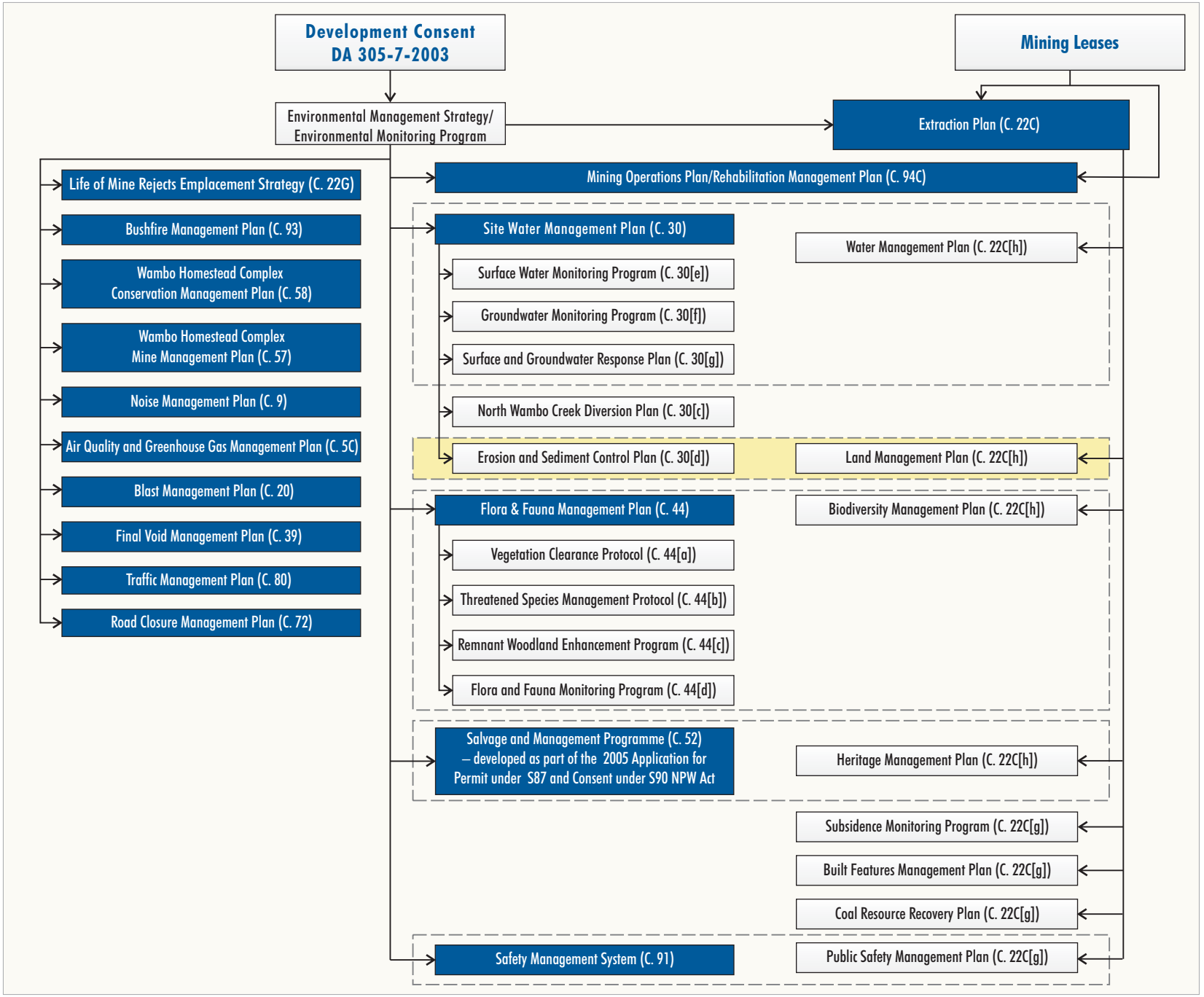
1.2 STRUCTURE OF THE LAND MANAGEMENT PLAN

This LMP forms part of WCPL's Environmental Management System for the Wambo Coal Mine. The relationship of this LMP to the Wambo Coal Mine Environmental Management System is shown on **Figure 3**.

The Longwalls 11 to 13 Application Area is located wholly within WCPL owned land. No privately held land or public roads are located within the Longwalls 11 to 13 Application Area and therefore this LMP applies to WCPL owned land only.

To avoid duplication of existing Environmental Management Plans this LMP references components of the existing Wambo Coal Mine Erosion and Sediment Control Plan (ESCP). The sections of the ESCP relevant to the LMP are summarised in **Table 2**. The ESCP is included as **Attachment 2**.

If the ESCP is revised separately in accordance with the Development Consent (DA 305-7-2003) **Attachment 2** of this LMP will be updated with the most recent ESCP.



WAM-09-15_EP Sth Bates_Whybrow Seam_LMP_001B

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WAMBO COAL MINE

Wambo Coal Mine
Environmental Management System

Figure 3

Table 2
Erosion and Sediment Control Plan - Reference Summary

LMP Component	ESCP Reference	Section Description
Management Measures	Section 4.1.1 - Principles	Section 4.1.1 of the ESCP describes the principles for erosion and sediment control at the Wambo Coal Mine.
	Section 4.1.2 - Existing Erosion and Sediment Controls	Section 4.1.2 of the ESCP describes the existing erosion and sediment controls in place at the Wambo Coal Mine.
	Section 4.1.3 - Design Criteria	Section 4.1.3 of the ESCP describes the design criteria for existing/future erosion and sediment control structures at the Wambo Coal Mine.
	Section 4.5.4 - Sediment Fences	Sediment fencing is a temporary management measure used where flow is not concentrated such as for low gradient disturbance areas. If required, sediment fencing will be installed in accordance with Section 4.5.4 of the ESCP.
	Section 4.5.5 - Hay Bales	Hay bales are a temporary sediment control measure used to decrease the velocity of water in areas of concentrated flow. If required, hay bales will be installed in accordance with Section 4.5.5 of the ESCP.
Monitoring	Section 5 - Inspections, Monitoring and Maintenance	Section 5 of the ESCP describes the inspection, maintenance and monitoring of erosion and sediment controls at the Wambo Coal Mine.
Responsibilities[1]	Section 7 - Responsibilities	This section summarises the ESCP responsibilities and timing of ESCP tasks.

[1] Not a specific requirement of this LMP under Condition 22C(h) of Schedule 4 of the Development Consent (DA 305-7-2003).

An overview of the main text sections and attachments of this LMP is presented below:

Section 1 Provides an introduction to the LMP, including the purpose and scope of the LMP and the context of the LMP in relation to WCPL's Environmental Management System for the Wambo Coal Mine.

Section 2 Discusses performance measures listed in the Development Consent (DA 305-7-2003).

Section 3 Summarises the predicted subsidence impacts and environmental consequences resulting from the extraction of Longwalls 11 to 13.

Section 4 Describes the monitoring program that will be implemented.

Section 5 Describes the management measures that will be implemented.

Section 6 Describes how monitoring data will be used to assess environmental consequences on land in general due to the extraction of Longwalls 11 to 13.

Section 7 Provides a Contingency Plan to manage any unpredicted impacts and their consequences.

Section 8 Summaries the roles and responsibilities of this LMP.

Section 9 Lists the documents referred to in **Sections 1 to 8** of this LMP.

Attachment 1 Provides a Trigger Action Response Plan (TARP) for this LMP which is a simple and transparent snapshot of the monitoring of environmental performance and where required the implementation of management and/or contingency measures.

Attachment 2 Provides a copy of the existing ESCP.

2 PERFORMANCE MEASURES

This LMP has been developed to manage the potential environmental consequences of the proposed secondary workings described in the Extraction Plan on land in general in accordance with Condition 22C(h) of Schedule 4 of the Development Consent (DA 305-7-2003).

In accordance with Condition 22 and 22A of Schedule 4 of the Development Consent (DA 305-7-2003), WCPL must ensure that there is no exceedance of the performance measures listed in Tables 14A and 14B of Schedule 4 of the Development Consent (DA 305-7-2003).

No performance measures listed in Tables 14A and 14B of Schedule 4 of the Development Consent (DA 305-7-2003) specifically relate to land in general. The performance measure specified in Table 14A of Schedule 4 of the Development Consent (DA 305-7-2003) relating to the Wollemi National Park and associated escarpment is addressed in the Biodiversity Management Plan for Longwalls 11 to 13.

3 PREDICTED SUBSIDENCE IMPACTS AND ENVIRONMENTAL CONSEQUENCES

3.1 LAND USE

The Wambo Coal Mine is located in the Upper Hunter Valley region where landforms are characterised by gently sloping floodplains associated with the Hunter River and the undulating foothills, ridges and escarpments of the Mount Royal Range and Great Dividing Range.

Land use in the vicinity of the Wambo Coal Mine is characterised by a combination of coal mining operations, agricultural land uses and the village of Warkworth. WCPL-owned lands that are not subject to mining operations are utilised for the agistment of stock (WCPL, 2003).

The Longwalls 11 to 13 Application Area is wholly located on WCPL-owned land and land uses include the North Wambo Creek Diversion, Remnant Woodland Enhancement Program (RWEP) areas and occasionally the agistment of stock. Steep slopes, cliffs and the Wollemi National Park escarpment overlie land to the south-west of the commencing end of the Longwalls 11 to 13.

A detailed description of potential impacts on surface water resources including the North Wambo Creek Diversion and the relevant mitigation and management measures is provided in the Water Management Plan (WMP) for Longwalls 11 to 13.

Potential impacts on RWEP areas resulting from the extraction of Longwalls 11 to 13 and the relevant mitigation and management measures are provided in the Biodiversity Management Plan for Longwalls 11 to 13.

Potential impacts on agricultural activities within the Longwalls 11 to 13 Application Area include:

- possible injury to persons undertaking agricultural activities;
- possible injury to livestock caused by surface cracking; and
- loss of integrity of fences.

In regard to the potential impacts of subsidence on the land surface, Section 4.2.2 of the Wambo Development Project EIS (WCPL, 2003) stated:

> *Subsidence may result in surface cracking, increased erosion potential and the potential for ponding in areas where isolated depressions form. These impacts have been observed to occur in the existing underground mining areas at the Wambo Coal Mine. Where subsidence occurs within, or adjacent to, an existing flood plain it may result in an increase in the depth and duration of inundation during flood events*.

In addition, in relation to subsidence induced surface cracking, Section 4.2.2 of the Wambo Development Project EIS (WCPL, 2003) stated:

> *As subsidence occurs surface cracking may develop above the extracted longwall panels. Surface cracking would primarily occur across each panel (during extraction of the coal) and along the sides of each panel (after extraction of the coal). The cracks that occur across the panel would be temporary in nature and would be expected to close as the longwall extraction progresses. The cracks along the sides of the longwall panels would be expected to remain until such time as they in-fill due to natural processes (e.g. sedimentation) or are manually infilled (e.g. with soil or mulch material).*
>
> *… The greatest extent of cracking would be expected to occur over the shallower underground workings (i.e. Whybrow and Wambo Seams).*

Further, in relation to subsidence induced ponding, Section 4.2.2 of the Wambo Development Project EIS (WCPL, 2003) stated:

> *Subsidence would alter existing surface drainage patterns to some extent, which may result in areas of isolated ponding. Based on maximum subsidence predictions, isolated ponding would potentially occur in low-lying areas within the flood plains of the creeks crossing the Project underground mining areas (i.e. North Wambo, Wambo and Stony Creeks).*

Potential subsidence impacts to the land in general are predicted by Mine Subsidence Engineering Consultants (MSEC) (2015) to include surface cracking, erosion, changes in stream bed gradients, depressurisation of groundwater aquifers and ponding.

Surface cracking above the previously extracted longwalls at the North Wambo Underground Mine has been typically in the order of 25 millimetres (mm) to 50 mm, with surface cracks in some locations greater than 150 mm (MSEC, 2015). Similar incidence of surface cracking is anticipated above Longwalls 11 to 13, except over the alignment of the North Wambo Creek Diversion, where it is likely that extensive surface cracking will occur (MSEC, 2015).

Longwall mining is expected to cause an increase in ponding along the North Wambo Creek Diversion (MSEC, 2015). Potential ponding is dependent on a number of factors, including rainfall, catchment sizes, surface water runoff, permeation and evaporation and, therefore, the actual extents and depths of ponding are expected to be smaller than the topographical depressions. The maximum depth of topographical depressions in the extent of subsidence from of Longwalls 11 to 13 is expected to be approximately 1.4 metres (m) (MSEC, 2015).

A detailed description of potential impacts of ponding along the North Wambo Creek Diversion and the relevant mitigation and management measures is provided in the WMP for Longwalls 11 to 13.

3.2 LAND CAPABILITY

Land capability within the Longwalls 11 to 13 Application Area includes Class IV, VI, VII and VIII (WCPL, 2003). Class IV to VI land is considered land suitable for grazing. Class VII and VIII land is considered not suitable for rural production.

Class IV land is defined as (Cunningham *et al.*, 1988):

> *Land not capable of being regularly cultivated but suitable for grazing with occasional cultivation with soil conservation practices such as pasture improvement, stock control, application of fertiliser and minimal cultivation for the establishment or reestablishment of permanent pasture.*

Class VI land is defined as (Cunningham *et al.*, 1988):

> *Land not capable of being regularly cultivated but suitable for grazing with soil conservation practices including limitation of stock, broadcasting of seed and fertiliser, prevention of fire and destruction of vermin. This class may require some structural works.*

Class VII land is defined as (Cunningham *et al.*, 1988):

> *Land best protected by green timber.*

Class VIII land is defined as (Cunningham *et al.*, 1988):

> *Cliffs, lakes or swamps and other lands incapable of sustaining agricultural or pastoral production.*

No long-term impacts on land capability are expected to result from the extraction of Longwalls 11 to 13.

3.3 SURFACE WATER

The Wambo Coal Mine is situated adjacent to Wollombi Brook, south-west of its confluence with the Hunter River. The majority of land within WCPL mining tenements drains via Wambo Creek (also known as South Wambo Creek), Stony Creek, North Wambo Creek and Redbank Creek to Wollombi Brook, while Waterfall Creek drains directly to the Hunter River.

Subsidence resulting from the extraction of Longwalls 11 to 13 has the potential to impact on surface water resources. A detailed description of potential impacts on surface water resources and the relevant mitigation and management measures is provided in the WMP for Longwalls 11 to 13.

3.4 CLIFFS AND WOLLEMI NATIONAL PARK ESCARPMENT

The definitions of cliffs and minor cliffs used in this LMP as defined by the NSW DP&E *Standard and Model Conditions for Underground Mining* (Department of Planning and Infrastructure, 2012) are:

Cliff:	*A continuous rock face, including overhangs, having a minimum length of 20 metres, a minimum height of 10 metres and a minimum slope of 2 to 1 (>63.4 degrees).*
Minor Cliff:	*A continuous rock face, including overhangs, having a minimum length of 20 metres, heights between 5 metres and 10 metres and a minimum slope of 2 to 1 (>63.4 degrees); or a rock face having a maximum length of 20 metres and a minimum height of 10 metres.*

3.4.1 Background

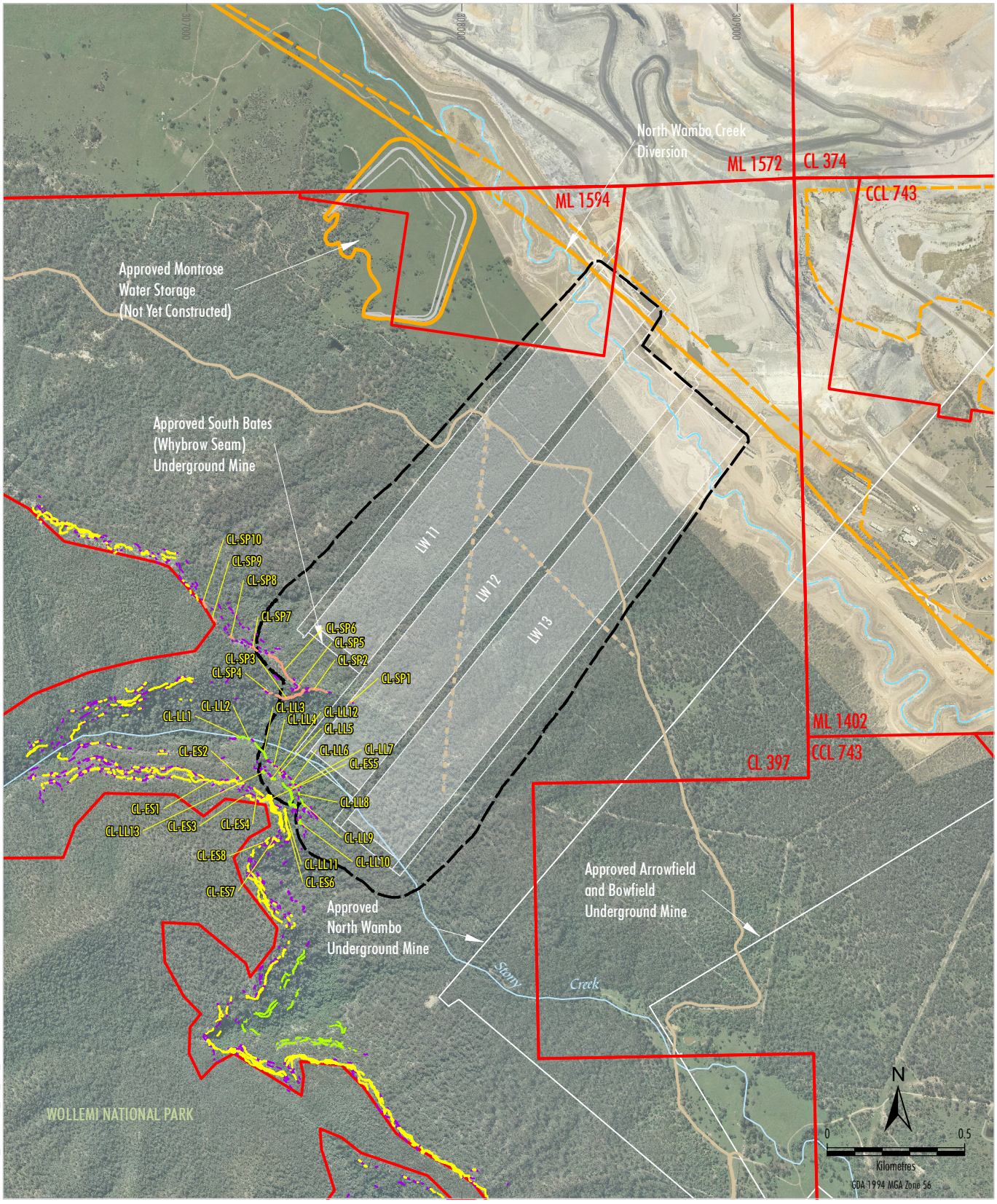
MSEC (2015) identified cliffs using Light Detection and Ranging (LiDAR) and separated them into three categories to assess the effects of subsidence on each separately: cliffs associated with the Wollemi National Park escarpment (CL-ES1 to CL-ES8), the lower levels of cliffline (CL-LL1 to CL-LL13) and the cliffs along the spur to the south-west of Longwalls 11 to 13 (CL-SP1 to CL-SP9).

A summary of the cliffs identified and assessed by MSEC (2015) is included in **Table 3**. The location of these cliffs is shown in **Figure 4**.

Table 3
Details of the Cliffs in the Vicinity of the Application Area

Location	ID	Overall Length (m)	Typical Height (m)	Closest Distance to Longwalls (m)
Cliffs Associated with the Wollemi National Park Escarpment	CL-ES1	250 (Discontinuous)	10 ~ 25	240
	CL-ES2	20	10	230
	CL-ES3	50	10	250
	CL-ES4	50	10 ~ 15	230
	CL-ES5	200	10 ~ 50	210
	CL-ES6	125	10 ~ 20	200
	CL-ES7	40	10 ~ 15	250
	CL-ES8	20	10	280
Lower Level Cliffs	CL-LL1	40	10	230
	CL-LL2	20	10	210
	CL-LL3	80	10 ~ 15	150
	CL-LL4	30 (Discontinuous)	10	120
	CL-LL5	20	10 ~ 15	120
	CL-LL6	20	10	110
	CL-LL7	20 (Discontinuous)	10	140
	CL-LL8	20	10	130
	CL-LL9	40	10 ~ 15	150
	CL-LL10	30	10 ~ 15	160
	CL-LL11	125	15 ~ 25	150
	CL-LL12	20	15	150
	CL-LL13	20	15	170
Cliffs Along the Spur	CL-SP1	20	10	Above Longwall 12
	CL-SP2	80	10 ~ 20	70
	CL-SP3	125	15 ~ 20	140
	CL-SP4	30 (Discontinuous)	10 ~ 15	230
	CL-SP5	30	15 ~ 20	160
	CL-SP6	150	15	190
	CL-SP7	40	10	220
	CL-SP8	25	10	290
	CL-SP9	20	10	350

Source: After MSEC (2015b).



LEGEND

- Mining and Coal Lease Boundary
- Existing/Approved Surface Development Area
- Approved Open Cut Limit
- Approved Underground Development
- Extraction Plan Application Area
- Fire Trail
- Access Track
- Minor Cliffs

Cliffs Associated with

- Wollemi National Park Escarpment
- Lower Level Cliffs
- Spur

Source: Department of Lands (July 2009); WCPL (2015); WCPL Orthophoto (Apr-Oct 2013) and MSEC (2015)

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WAMBO COAL MINE

Cliffs in the Vicinity of Longwalls 11 to 13

Figure 4

3.4.2 Revised Assessment of Subsidence Effects and Impacts

There were no specific subsidence predictions provided for cliffs in the Wambo Development Project EIS (WCPL, 2003). However, the Wambo Development Project EIS (WCPL, 2003) stated "The Wollemi National park escarpment would not be subsided by the extraction of Project longwall panels".

A summary of the subsidence effects predicted by MSEC (2015) for each of the identified cliffs is outlined in **Table 4**.

Table 4
Maximum Predicted Subsidence Effects for the Cliffs Resulting from the Extraction of Longwalls 11 to 13

Location	ID	Maximum Predicted Total Subsidence (mm)	Maximum Predicted Total Tilt (mm/m)	Maximum Predicted Total Hogging Curvature (km^{-1})	Maximum Predicted Total Sagging Curvature (km^{-1})
Cliffs Associated with the Wollemi National Park Escarpment	CL-ES1 to CL-ES8	< 20	< 0.5	< 0.01	< 0.01
Lower Level Cliffs	CL-LL1 to CL-LL13	< 20	< 0.5	< 0.01	< 0.01
Cliffs along the Spur	CL-SP1	675	6.5	0.06	0.04
	CL-SP2	200	3.0	0.04	0.01
	CL-SP3	60	1.0	0.01	< 0.01
	CL-SP4	< 20	< 0.5	< 0.01	< 0.01
	CL-SP5	50	0.5	< 0.01	< 0.01
	CL-SP6	30	0.5	0.01	< 0.01
	CL-SP7	< 20	< 0.5	< 0.01	< 0.01
	CL-SP8	< 20	< 0.5	< 0.01	< 0.01
	CL-SP9	< 20	< 0.5	< 0.01	< 0.01

Source: After MSEC (2015b).
mm/m – millimetres per metre.
km^{-1} – per kilometre.

The predicted subsidence effects for the cliffs associated with the Wollemi National Park escarpment outlined in **Table 4** are less than 20 mm (i.e. "no" vertical subsidence) (MSEC, 2015), and therefore are consistent with the predictions in the Wambo Development Project EIS.

Possible impacts on cliffs due to mine subsidence include:

- local instability due to cracking, toppling failures and erosion; and
- rock fall movements.

MSEC (2015) notes that it is difficult to assess the likelihood of cliff instabilities based upon predicted subsidence effects, as the likelihood of a cliff being unstable is dependent on a number of factors which are difficult to fully quantify. Therefore, MSEC based its assessment on case studies where longwalls have been extracted directly beneath cliffs having similar mine subsidence parameters (i.e. similar depths of cover, similar cliff sizes and proximities, etc.). It is expected that:

- the cliffs associated with the Wollemi National Park escarpment will be unlikely to experience any adverse impacts;
- the cliff above Longwall 12 (CL-SP1) could experience cliff instability, however the impact would represent a very small percentage of the total length or total face area of the cliffs along the spur; and
- the other cliffs along the spur and the lower level cliffs could possibly experience isolated and minor rock falls, however no large scale cliff failures are expected (MSEC, 2015, 2015b).

3.4.3 Assessment of Potential Environmental Consequences

Potential environmental consequences due to the cliff instability or rock fall include:

- Aesthetics. The aesthetics of the landscape could be temporarily altered by rock falls. Whilst these will typically occur due to pre-existing natural joints, they could result in the exposure of fresh rock face. However, over time, the exposed fresh rock face will weather and erode to a point where it blends with the reminder of the cliff face.
- Impacts on stream water quality, flora and fauna or their habitats, and Aboriginal cultural heritage sites. These issues are described in detail and addressed in the Water Management Plan, Biodiversity Management Plan and Heritage Management Plan for Longwalls 11 to 13 respectively.
- Public Safety. Potential risks to public safety are described in detail and addressed in the Public Safety Management Plan for Longwalls 11 to 13.

3.5 STEEP SLOPES

The definition of a steep slope used in this LMP as defined by the NSW DP&E *Standard and Model Conditions for Underground Mining* (Department of Planning and Infrastructure, 2012) is:

> *Steep Slope:* *An area of land having a gradient between 1 in 3 (33% or 18.3 degrees) and 2 in 1 (200% or 63.4 degrees).*

MSEC (2015) identified a number of steep slopes, both along the spur to the south-west of Longwalls 11 to 13, and to the south-west of Stony Creek.

3.5.1 Revised Assessment of Subsidence Effects and Impacts

There were no specific subsidence predictions provided for steep slopes in the Wambo Development Project EIS (WCPL, 2003). The Wambo Development Project EIS identified the potential for "surface cracking and erosion on slopes" along the steep slopes above the South Bates (Whybrow Seam) Underground Mine (WCPL, 2003).

A summary of the maximum subsidence effects predicted by MSEC (2015) for steep slopes is outlined in **Table 5**.

Table 5
Maximum Predicted Subsidence Effects for the Steep Slopes
Resulting from the Extraction of Longwalls 11 to 13

Location	Longwall	Maximum Predicted Total Subsidence (mm)	Maximum Predicted Total Tilt (mm/m)	Maximum Predicted Total Hogging Curvature (km^{-1})	Maximum Predicted Total Sagging Curvature (km^{-1})
Steep Slopes along the Spur	After Longwall 11	1,050	10	0.10	0.35
	After Longwall 12	1,350	14	0.20	0.50
	After Longwall 13	1,625	18	0.30	0.65
Steep Slopes South-west of Stony Creek	After Longwall 11	<20	< 0.5	< 0.01	< 0.01
	After Longwall 12	40	< 0.5	< 0.01	< 0.01
	After Longwall 13	400	4	0.10	0.10

Source: After MSEC (2015b).

For the steep slopes along the spur, tension cracks will likely form at the tops of the slopes and compression ridges at the bottoms of slopes (MSEC, 2015). These cracks and ridges may require some remediation to mitigate the risk of soil erosion.

A small portion of Longwall 13 is located directly beneath the steep slopes to the south-west of Stony Creek. The steep slopes above Longwall 13 could experience some minor surface cracking, however it is unlikely that significant cracking will occur further upslope and outside the extents of the longwalls (MSEC, 2015).

3.5.2 Assessment of Potential Environmental Consequences

If significant surface cracking is left un-remediated, it may present a soil erosion risk or a risk to ground dwelling fauna. Monitoring and remediation of surface cracking is described in **Sections 4 and 5**.

4 MONITORING

A monitoring program will be implemented to monitor the impacts and environmental performance of Longwalls 11 to 13 on land in general. Key components of the monitoring program are summarised in **Table 6**.

Table 6
Land Management Plan Monitoring Program Overview

Monitoring Component	Parameter	Timing/Frequency	Responsibility
Pre-Mining			
Visual inspection of fences.	Initial condition of fences.	Prior to secondary extraction of Longwalls 11 to 13.	Environment and Community Manager
Visual assessment and survey of ground surface.	Initial condition of ground surface.	Prior to secondary extraction of Longwalls 11 to 13.	Mine Surveyor
Visual inspection of cliffs (high definition photographic record from representative established monitoring locations).	Pre-mining condition of cliffs.	Prior to secondary extraction of Longwalls 11 to 13.	Environment and Community Manager
During Mining			
Longwalls 11 to 13 subsidence monitoring lines as described in the Subsidence Monitoring Program.	Monitoring parameters include: • subsidence; • tilt; • tensile strain; • compressive strain; and • absolute horizontal translation.	Monitoring during secondary extraction of Longwalls 11 to 13 in accordance with the Subsidence Monitoring Program.	Mine Surveyor
Visual inspection of the ground surface behind the longwall face.	Surface cracks.	Monthly inspections during secondary extraction of Longwalls 11 to 13, increased to daily inspections during secondary extraction within 100 m of the North Wambo Creek Diversion.	Mine Surveyor
Visual inspection of low lying areas (i.e. the North Wambo Creek Diversion).	Surface ponding.	Monthly inspections during secondary extraction of Longwalls 11 to 13 and/or following a significant rainfall event (i.e. 20 mm within 24 hours, midnight to midnight).	Mine Surveyor
Visual inspection of cliffs (high definition photographic record from representative established monitoring locations).	Signs of recent rock fall and/or instability.	Following completion of secondary extraction of Longwall 11. Following completion of secondary extraction of Longwall 12.	Environment and Community Manager

Table 6 (Continued)
Land Management Plan Monitoring Program Overview

Monitoring Component	Parameter	Timing/Frequency	Responsibility
Post-Mining			
Visual inspection of fences.	Condition of fences following extraction of Longwalls 11 to 13.	Following completion of secondary extraction of Longwalls 11 to 13.	Environment and Community Manager
Visual inspection of surface areas which required remediation.	Stabilisation of erosion and groundcover.	Monthly inspections until monitoring confirms stabilisations of erosion and groundcover is >60%.	Environment and Community Manager
Visual inspection of cliffs.	Photographic record from representative monitoring locations (**Figure 4**) for signs of recent rock fall and/or instability.	Following completion of secondary extraction of Longwalls 11 to 13.	Environment and Community Manager

Details of any subsidence impacts observed will be recorded in the Subsidence Impact Register and relevant assessment forms as provided in Attachment 2 of the Subsidence Monitoring Program for Longwalls 11 to 13. The Subsidence Impact Register will be maintained as an electronic spreadsheet on-site, with hard copies of assessment forms filed in a folder. The Subsidence Impact Register is discussed further in the Subsidence Monitoring Program for Longwalls 11 to 13.

5 MANAGEMENT MEASURES

A number of potential management measures are available to mitigate/remediate subsidence impacts on land in general resulting from the extraction of Longwalls 11 to 13. The requirement and methodology for any subsidence remediation techniques will be determined in consideration of:

- Potential impacts of the unmitigated impact, including potential risks to public safety and the potential for self-healing or long-term degradation.
- Potential impacts of the remediation technique, including site accessibility.

If surface crack remediation works are required in remnant vegetation areas, compact mobile equipment will be utilised, where practicable, to minimise damage to surrounding vegetation. If the remediation work requires clearing of remnant vegetation to an extent that would exceed the benefit of the remediation, the requirement for remediation will be revised. Vegetation that requires clearance will be subject to the Vegetation Clearance Protocol (refer to the Biodiversity Management Plan for Longwalls 11 to 13).

The key management measures are summarised in **Table 7**.

Table 7
Land Management Plan Key Management Measures

Management Measure	Timing/Frequency	Responsibility
Pre-Mining		
Notification to agistees of areas of longwall mining and active subsidence, and exclusion of agistment grazing from areas where surface cracking presents a reasonable risk to people and/or livestock.	Prior to commencement of secondary extraction of Longwalls 11 to 13.	Environment and Community Manager
During Mining		
Remediation of surface cracks[1] where practicable using conventional earthmoving equipment (e.g. a backhoe) including: • infilling of surface cracks with soil or other suitable materials; or • locally re-grading and re-compacting the surface.	When required during secondary extraction of Longwalls 11 to 13.	Environment and Community Manager
Stabilisation of any areas of surface cracking using erosion protection measures (e.g. vegetation planting).	When required during secondary extraction of Longwalls 11 to 13.	Environment and Community Manager
Drainage works and rehabilitation of subsidence troughs (i.e. areas of induced ponding) as necessary.	When required during secondary extraction of Longwalls 11 to 13.	Environment and Community Manager
Post-Mining		
Repair of fences prior to allowing access for agistment grazing.	Following completion of secondary extraction of Longwalls 11 to 13.	Environment and Community Manager
Measures to stabilise/mitigate impacts to rock faces/cliffs if considered beneficial and practicable in consultation with DP&E and DRE (e.g. artificial rock support, standing supports, dislodgement of remaining loose rock etc.).	Following completion of secondary extraction of Longwalls 11 to 13.	Environment and Community Manager

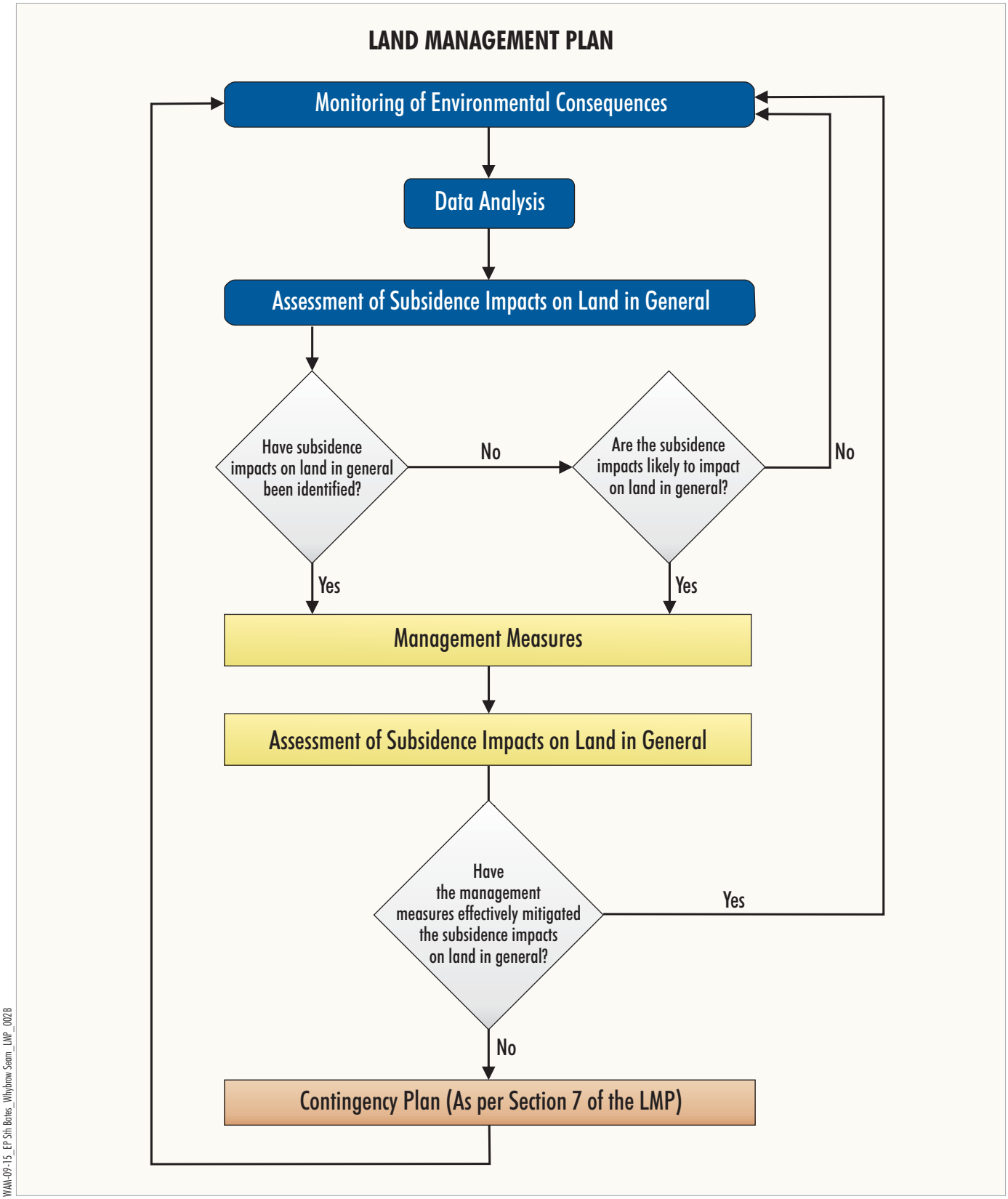
[1] Minor cracks that develop are not expected to require remediation as geomorphologic processes will result in natural filling of these cracks over time.

6 ASSESSMENT OF MANAGEMENT MEASURES

Monitoring conducted to inform the assessment of the secondary extraction of Longwalls 11 to 13 in regard to subsidence impacts on land in general is outlined in **Section 4** of this LMP. The monitoring process and subsequent assessment of subsidence impacts on land in general is outlined in **Figure 5**.

If subsidence impacts on land in general have occurred and are not effectively mitigated by the management measures outlined in **Section 5**, the Contingency Plan outlined in **Section 7** of this LMP will be implemented.

The performance measure specified in Table 14A of Schedule 4 of the Development Consent (DA 305-7-2003) relating to the Wollemi National Park and associated escarpment is addressed in the Biodiversity Management Plan for Longwalls 11 to 13.



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Peabody ENERGY

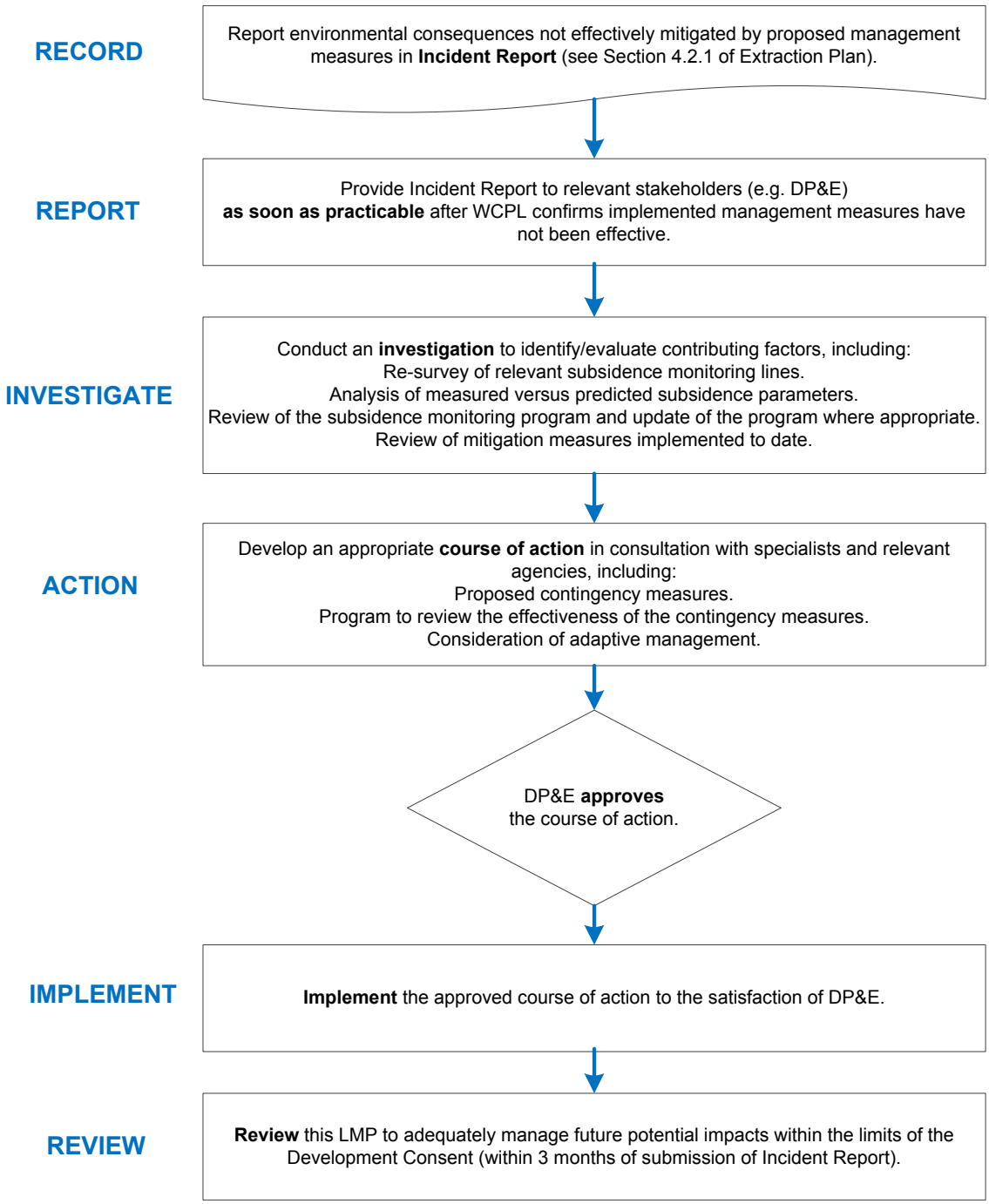
WAMBO COAL MINE

Monitoring of Environmental Consequences and Management Measures for Land in General

Figure 5

7 CONTINGENCY PLAN

In the event that impacts to land in general have occurred and are not effectively mitigated by the management measures outlined in **Section 5**, in accordance with the schematic presented in **Figure 5**, WCPL will implement the following Contingency Plan:



The framework for the various components of the LMP are summarised in the LMP TARP which is included as **Attachment 1**. The LMP TARP illustrates how the various predicted subsidence impacts, monitoring components and responsibilities are structured to achieve compliance with the relevant statutory requirements, and the framework for management and contingency actions.

8 ROLES AND RESPONSIBILITIES

Key responsibilities of WCPL personnel in relation to this LMP are summarised in **Table 8**. Responsibilities may be delegated as required.

Table 8
Land Management Plan Responsibilities Summary

Responsibility	Task
General Manager	• Ensure resources are available to WCPL personnel to facilitate the completion of responsibilities under this LMP.
Underground Mine Manager	• Ensure resources are available to WCPL personnel to facilitate the completion of responsibilities under this LMP.
Director: Technical Services and Projects	• Ensure the Subsidence Monitoring Program is implemented. • Ensure resources are available to assist the Environment and Community Manager to implement this LMP.
Environment and Community Manager	• Ensure this LMP is implemented. • Liaise with relevant stakeholders regarding subsidence impact management and related environmental consequences. • Notify agistees of areas of longwall mining and active subsidence, and ensure agistment is excluded from areas where surface cracking presents a reasonable risk to people and/or livestock. • Ensure implementation of management measures summarised in **Table 7**.
Underground Mine Engineer	• Assist to ensure the Subsidence Monitoring Program and this LMP are implemented. • Undertaken monitoring summarised in **Table 6**.
Mine Surveyor	• Undertake all subsidence monitoring to the required standard within the specified timeframes and ensure data are adequately checked, processed and recorded. • Undertake monitoring summarised in **Table 6**.

9 REFERENCES

Cunningham, G.M., Higginson, F.R., Riddler, A.H.M. and Emery, K.A. (1988) *Systems Used to Classify Rural Lands in New South Wales.* Soil Conservation Service of NSW and NSW Department of Agriculture.

Department of Planning and Infrastructure (2012) *Standard and Model Conditions for Underground Mining*.

Mine Subsidence Engineering Consultants (2015) *South Bates (Whybrow Seam) Subsidence Assessment.*

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Wambo Coal Pty Limited (2003) *Wambo Development Project Environmental Impact Statement.*

ATTACHMENT 1

LAND MANAGEMENT PLAN
TRIGGER ACTION RESPONSE PLAN

Table A1-1
Land Management Plan Trigger Action Response Plan

Condition	Normal	Level 1	Level 2
	Predicted Impacts	**Management Measures**	**Restoration/Contingency Phase**
Trigger	• Predicted impacts on land in general, described in **Section 3**.	• Crack, ponding or cliff instability presents significant risk to safety of people or livestock. • Crack is greater than 100 mm after longwall face has passed and presents long-term degradation or erosion risk. • Increased erosion or land degradation compared to past monitoring results.	• Management measures implemented to date have not effectively mitigated the subsidence impacts on land in general, for example: – observations of increased erosion or land degradation compared to past monitoring results; and – revegetation not progressing in remediated areas.
Action	• Conduct monitoring, consistent with **Table 6**, the ESCP and the Subsidence Monitoring Program (Appendix H of the Extraction Plan). • Compare results against past monitoring results in the Subsidence Impact Register. • Assess the environmental consequences of the subsidence in accordance with **Section 6**. • Assess the need for management measures in accordance with **Table 7** and the ESCP.	• Compare results against past monitoring results in the Subsidence Impact Register. • Implement management measures, as required, in accordance with the ESCP and **Table 7**. (With regard to the specific circumstances of the subsidence impact [e.g. the location, nature and extent of the impact] and the assessment of environmental consequences, in accordance with **Section 5** and the ESCP).	• Implement Contingency Plan described in **Section 7**. • Compare impacts against past monitoring results in the Subsidence Impact Register.
Frequency	• Frequency consistent with **Table 6** and the ESCP. (Including inspections of the active mining area monthly and following a significant rainfall event.)	• As required, in accordance with **Section 5** and the ESCP (monthly inspections of remediated areas), until: – monitoring confirms stabilisation of erosion; and – groundcover is >60%.	• As required, in accordance with **Section 7** (increased frequency to be determined during implementation of the Contingency Plan) until: – monitoring confirms stabilisation of erosion; and – groundcover is >60%.
Position of Decision Making	• Environment and Community Manager.	• Environment and Community Manager.	• General Manager.

Note: ESCP refers to the Wambo Coal Mine Erosion and Sediment Control Plan.

ATTACHMENT 2

WAMBO COAL MINE
EROSION AND SEDIMENT CONTROL PLAN

WAMBO COAL
EROSION AND SEDIMENT CONTROL PLAN

Document No. PA-WA-ENV-MP-509.3
September 2015

Document Control

Document No.	PA-WA-ENV-MP-509.3
Title	Erosion and Sediment Control Plan
General Description	Management of erosion and sediment impacts at WCPL
Document Owner	Environment & Community Manager

Revisions

Rev No	Date	Description	By	Checked	Signature
0	June 2005	Original Draft	Gilbert & Associates Pty Ltd	JT/TS	
1	July 2005	Revised Draft	Gilbert & Associates Pty Ltd	JT/TS	
2	July 2005	Final Draft	Gilbert & Associates Pty Ltd	JT/TS	
3	February 2006	Management Plan Consolidation	WCPL	JT/JH	
4	August 2007	Management Plan Consolidation	Hansen Bailey	SW	
5	February 2010	Consent Modification	WCPL	SB	
6	September 2014	Revision 6	WCPL	TF	
7	September 2015	New management plan format and revision	WCPL/Palaris	SP	

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LIST OF APPENDICES

1.0 Introduction

1.1 Background

The Wambo Coal Mine (the Mine) is situated approximately 15 kilometres west of Singleton, near the village of Warkworth, New South Wales (**Figure 1**). Wambo is owned and operated by Wambo Coal Pty Limited (WCPL), a subsidiary of Peabody Energy Australia Pty Limited.

A range of open cut and underground mine operations have been conducted at WCPL since mining operations commenced in 1969. Mining under the current Development Consent (DA 305-7-2003) commenced in 2004 and permits both open cut, underground operations and associated activities to be conducted.

The approved run-of-mine (ROM) coal production rate is 14.7 million tonnes per annum and all product coal is transported from WCPL by rail. A summary of the approved Wambo Coal Mine is provided in **Table 1**.

Table 1: Summary of the Approved Wambo Coal Mine

Component	Approved Wambo Coal Mine[1]
Life of Mine	21 years (from the date of the commencement of Development Consent [DA305-7-2003]). 1st March 2025
Open Cut Mining	Open cut mining at a rate of up to 8 Mtpa of ROM coal from the Whybrow, Redbank Creek, Wambo and Whynot Seams
	An estimated total open cut ROM coal reserve of 98 Mt
	Open cut mining operations under current approved MOP
Underground Mining	Underground mining of up to 7.5 Mtpa of ROM coal from the Whybrow, Wambo, Arrowfield and Bowfield Seams. Underground ROM coal reserves are estimated at 109.3 Mt.
Subsidence commitments and management.	The subsidence performance measures listed in Conditions 22 and 22A of the Development Consent (DA305-7-2003).
ROM Coal Production Rate	Up to 14.7 Mtpa of ROM coal
Total ROM Coal Mined	207.3 Mt
Waste Rock Management	Waste rock deposited in open cut voids and in waste rock emplacements adjacent open cut operations
Total Waste Rock	640 million bank cubic metres (Mbcm)
Coal Washing	Coal handling and preparation plant (CHPP) capable of processing approximately 1,800 tonnes per hour (tph)
Product Coal	Production of up to 11.3 Mtpa of thermal coal predominantly for export
CHPP Reject Management	Coarse rejects and tailings would be incorporated, encapsulated and/or capped within open cut voids in accordance with existing Wambo management practices
Total CHPP Rejects	Approximately 28.2 Mt of coarse rejects and approximately 18.6 Mt of tailings
Water Supply	Make-up water demand to be met from runoff recovered from tailings storage areas, operational areas, dewatering, licensed extraction from Wollombi Brook and Hunter River
Mining Tenements	Coal Lease (CL) 365, CL374, CL397, Consolidated Coal Lease (CCL) 743, Mining Lease (ML) 1402, ML1572, ML1594, Authorisation (A) 444, Exploration Licence (EL) 7211.

Note: [1] Development Consent DA305-7-2003 (as modified)

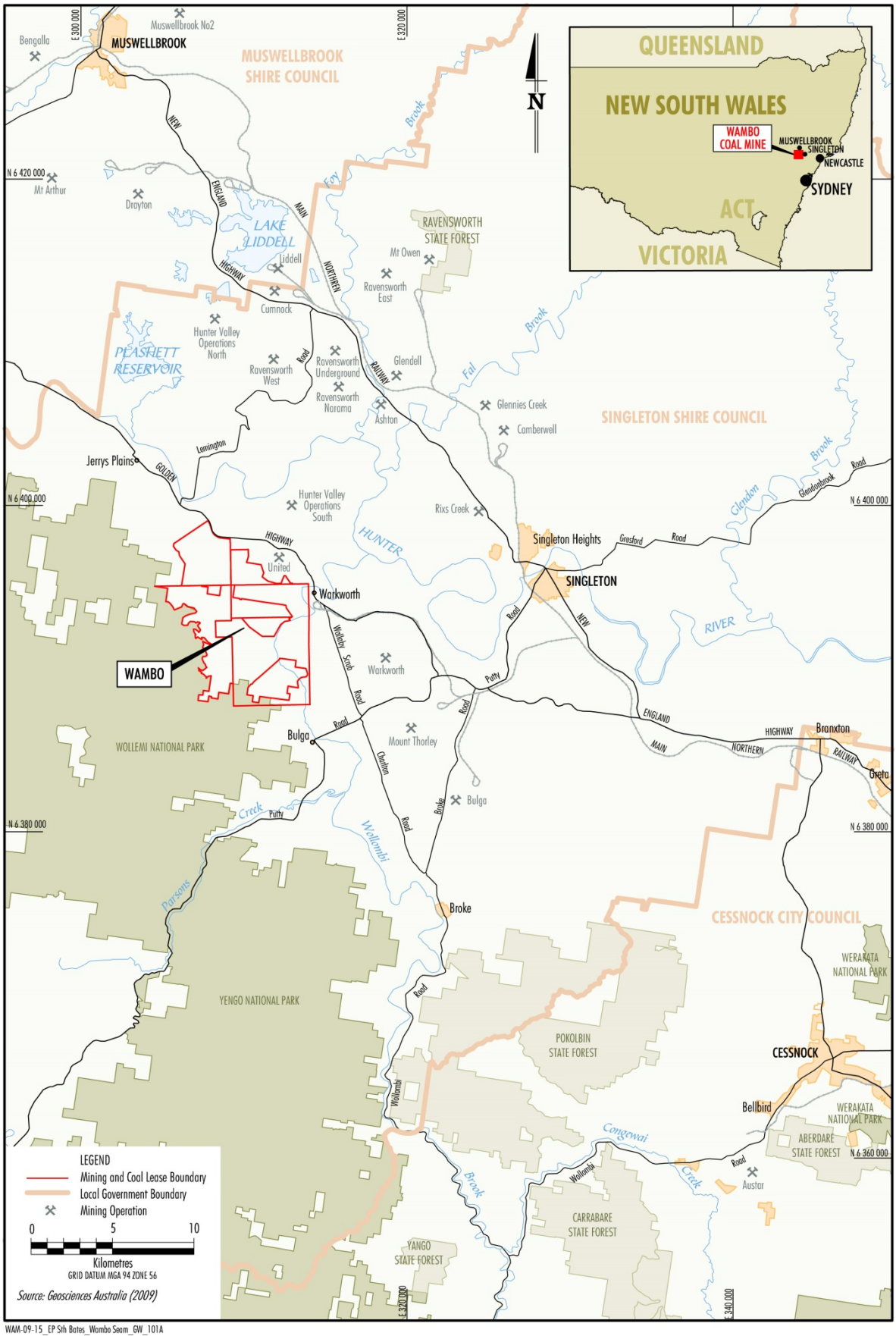

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Figure 1: Wambo Coal Regional Location

In accordance with Schedule 4, Condition 30 of DA305-7-2003, WCPL are required to prepare a Site Water Management Plan (WMP). This Erosion and Sediment Control Plan (ESCP) is a component of the WCPL Site Water Management Plan. **Figure 2** shows the components of the WCPL Site Water Management Plan. This ESCP should be read in conjunction with the other components of the WCPL Site Water Management Plan, in particular the Surface Water Monitoring Program (SWMP) and the Surface and Ground Water Response Plan (SGWRP).

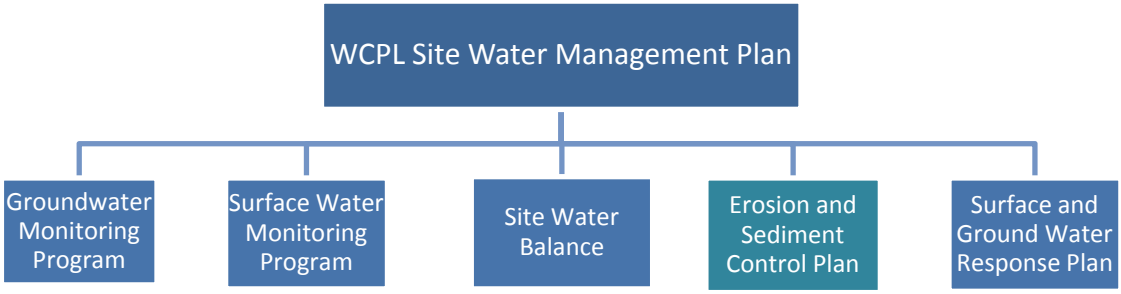


Figure 2: WCPL Site Water Management Plan

In accordance with WCPL's continuous improvement and review processes and Conditions 4 & 6, Schedule 6 of DA305-7-2003, a review of the ESCP has been undertaken to ensure that erosion and sediment impacts from the Mine are managed and minimised where possible.

1.2 Purpose

This ESCP has been developed to address the relevant requirements of relevant consent conditions and regulatory requirements. In accordance with Condition 32, Schedule 4 of DA305-7-2003, WCPL have prepared this ESCP to:

- Be consistent with the requirements of the Department of Housing's *Managing Urban Stormwater: Soils and Construction* manual;
- Identify activities that could cause soil erosion and generate sediment;
- Describe the location, function, and capacity of erosion and sediment control structures; and
- Describe measures to minimise soil erosion and the potential for the migration of sediments to downstream waters.

1.3 Scope

This ESCP applies to all surface disturbance activities undertaken within WCPL's mining authorisations and approved mining areas (**Figure 3**). This ESCP has been prepared to:

- Minimise erosion and sediment generation from disturbed areas;
- Maintain water quality in downstream water systems (primarily turbidity or sediment load, as indicated by Total Suspended Solids (TSS)); and
- Reduce the loss of valuable topsoil from land disturbed by mining activities.

This ESCP forms part of WCPL's Environmental Management System (EMS).

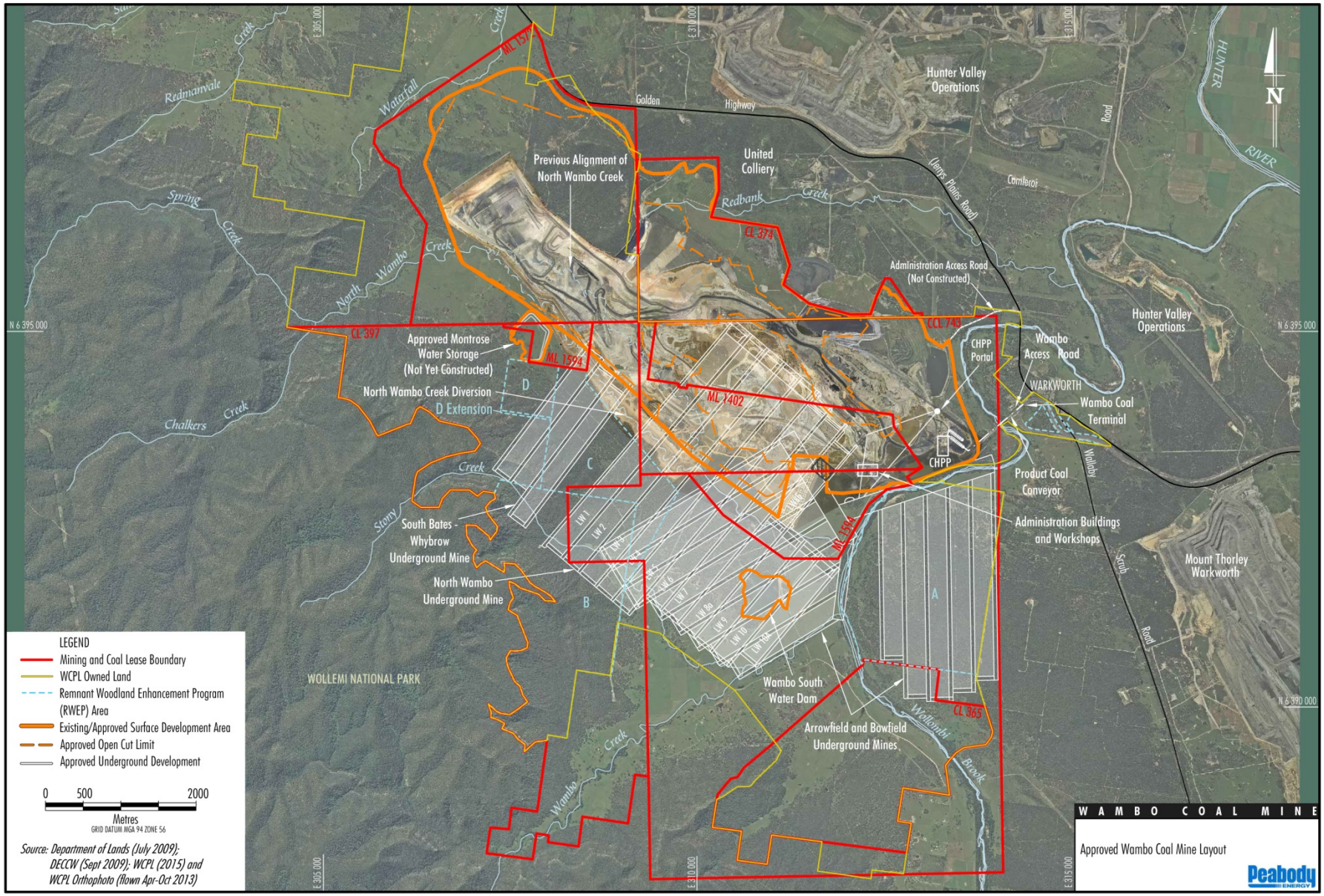


Figure 3: Approved Wambo Coal Mine Layout

1.4 Statutory Requirements

This ESCP has been prepared to address the relevant Development Approval (DA) consent conditions within DA305-7-2003 and DA177-8-2004 (**Table 2**).

1.4.1 Environmental Planning & Assessment Act 1979

WCPL received Development Consent (DA305-7-2003) in accordance with the *Environmental Planning & Assessment Act 1979* (EP&A Act) from the NSW Department of Planning and Environment (DP&E), formerly NSW Department of Planning, on 4 February 2004. Conditions within DA305-7-2003 relevant to erosion and sediment control at the Mine are summarised in **Table 2**.

WCPL received Development Consent (DA177-8-2004) in accordance with the EP&A Act from the NSW DP&E on 16 December 2004. Conditions within DA177-8-2004 relevant to erosion and sediment control at the Mine are summarised in **Table 2**.

Table 2: Development Consent Requirements for the Erosion and Sediment Control Plan

Schedule	Condition	Requirements	ESCP Section
		DA305-7-2003	
4	30	Before carrying out any development, the Applicant shall prepare a Site Water Management Plan for the development in consultation with DRE and NOW, and to the satisfaction of the Secretary. This plan must include: … (d) an Erosion and Sediment Control Plan; *By the end of October 2009, the Applicant shall revise the Site Water Management Plan in consultation with DII, DECCW, and NOW, and to the satisfaction of the Director-General.**	**This ESCP**
4	32	The Erosion and Sediment Control Plan shall include: (a) Be consistent with the requirements of the Department of Housing's Managing Urban Stormwater: Soils and Construction manual; (b) Identify activities that could cause soil erosion and generate sediment; (c) Describe the location, function, and capacity of erosion and sediment control structures; and (d) Describe measures to minimise soil erosion and the potential for the migration of sediments to downstream waters.	**Section 3.1.1** **Section 2.0** **Section 3.1.2** **Sections 3.0 and 4.0**
6	3	**Adaptive Management** The Applicant must assess and manage project-related risks to ensure that there are no exceedances of the criteria and/or performance measures in schedule 4. Any exceedance of these criteria and/or performance measures constitutes a breach of this consent and may be subject to penalty or offence provisions under the EP&A Act or EP&A Regulation. Where any exceedance of these criteria and/or performance measures has occurred, the Applicant must, at the earliest opportunity:	**Refer SGWRP**

Schedule	Condition	Requirements	ESCP Section
		(a) take all reasonable and feasible steps to ensure that the exceedance ceases and does not recur; (b) consider all reasonable and feasible options for remediation (where relevant) and submit a report to the Department describing those options and any preferred remediation measures or other course of action; and (c) implement remediation measures as directed by the Secretary, to the satisfaction of the Secretary.	
6	4	**Management Plan Requirements** The Applicant shall ensure that the management plans required under this consent are prepared in accordance with any relevant guidelines, and include: (a) detailed baseline data; (b) a description of: - the relevant statutory requirements (including any relevant consent, licence or lease conditions); - any relevant limits or performance measures/criteria; - the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the project or any management measures; (c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/ criteria; (d) a program to monitor and report on the: - impacts and environmental performance of the Wambo Mining Complex; - effectiveness of any management measures (see c above); (e) a contingency plan to manage any unpredicted impacts and their consequences; (f) a program to investigate and implement ways to improve the environmental performance of the Wambo Mining Complex over time; (g) a protocol for managing and reporting any: - incidents; - complaints; - non-compliances with statutory requirements; and - exceedances of the impact assessment criteria and/or performance criteria; and (h) a protocol for periodic review of the plan.	**N/A to the ESCP** **Section 1.4** **N/A to the ESCP** **Section 3.8** **Section 3.0** **Sections 4.0 and 6.0** **Refer SGWRP** **Section 6.2** **Section 6.4** **Section 5.0** **Refer SGWRP** **Refer SGWRP** **Section 6.1**
		DA177-8-2004	
4	17	Before carrying out any development, the Applicant shall prepare and implement a Soil and Water Management Plan for the development, to the satisfaction of the Director-General. This plan must include: (a) an Erosion and Sediment Control Plan that: - is consistent with the requirements of the Departments of Housing's Managing Urban Stormwater: Soils and Construction manual;	**This ESCP** **Section 3.1.1**

Schedule	Condition	Requirements	ESCP Section
		- identifies activities that could cause soil erosion and generate sediment; - describes the location, function and capacity of erosion and sediment control structures; and - describes measures to minimise soil erosion and the potential for the migration of sediments to downstream waters;	**Section 2.0** **Section 3.1.2** **Section 3.0**

* In September 2009, DP&E granted WCPL an extension to the submission date to 30/4/2010 to allow for DII and EPA review and comment.

1.5 Stakeholder Consultation

In accordance with Condition 30, Schedule 4 of DA 305-7-2003, this revision of the ESCP (Revision 7) has been undertaken in consultation with Department of Industry and Investment (formerly the Department of Primary Industries or DPI), Environment Protection Authority (formerly the Department of Environment, Climate Change and Water or DECCW) and NSW Office of Water (NOW), prior to submitting to the Secretary of the DP&E for approval.

This review of the ESCP (Revision 7) includes:

- Updating the format and layout of the ESCP, consistent with WCPL's current document management procedures and templates; and
- Including additional information to ensure the ESCP addresses Condition 4, Schedule 6 of DA305-7-2003.

2.0 Potential Sources and Impacts

Mining activities involve disturbance to the lands surface, which has the potential to result in erosion and sediment impacts to the surrounding natural environment. Erosion may result in increased sediment load in downstream drainage systems if appropriate control measures are not implemented. The potential sources and impacts of erosion and sedimentation are listed in **Table 3** below.

Table 3: Sources and Impacts of Erosion and Sedimentation

Impact Source	Potential Impact	Controls
Runoff from disturbed land	Pollution of clean water	Disturbance management, diversion drains, hay bales, rock structures, sediment fences, sediment dams.
Inadequate vegetative cover to stabilise soil	Increased soil erosion on disturbed and rehabilitated areas	Disturbance management, progressive rehabilitation, diversion drains, hay bales, rock structures, sediment fences, sediment dams.
Increased sedimentation of natural water systems and water bodies	Degradation of water quality (increased turbidity/TSS)	Diversion drains, hay bales, rock structures, sediment fences, sediment dams
Altered water flows from deposition of sediment	Increased erosion and sedimentation downstream	Sediment fences, hay bales, in-stream rehabilitation and stabilisation works.
Soil compaction for roads and other infrastructure	Increased runoff velocities and erosion of soils	Sediment fences, hay bales, diversion drains, infrastructure drainage design.
Subsidence impacts	Ponding along natural water systems	Subsidence monitoring and rehabilitation, diversion drains, sediment dams.
Surface cracking around subsidence areas causing increased erosion	Sediment-laden water entering natural water systems	Subsidence monitoring and rehabilitation, diversion drains, hay bales, rock structures, sediment fences, sediment dams
Alteration of flow characteristics and velocities in natural water systems	Increased erosion to stream banks	Diversion drains, hay bales, rock structures, sediment fences, sediment dams, in-stream rehabilitation and stabilisation works.
Changes in surface topography	Alteration of surface water flows	Diversion drains, contour drains, sediment fences, rock structures.
Diversion of surface water flows	Increased erosion and sedimentation	Diversion drains, hay bales, rock structures, sediment fences, sediment dams.

3.0 Erosion and Sediment Controls

3.1 Introduction

3.1.1 Principles

The following principles provide the foundation for this ESCP:

- Ensure erosion and sediment control measures are designed and constructed effectively;
- Minimise surface disturbance and restrict access to undisturbed areas;
- Progressively rehabilitate and stabilize disturbed areas;
- Maximise sediment retention onsite;
- Separate disturbed and undisturbed catchment runoff, where practicable;
- Minimise soil erosion where possible rather than applying down slope sediment controls;
- Utilise existing topography and adopt construction practices that minimise soil erosion and sediment discharge from the area;
- Integrate erosion and sediment control issues/measures into the planning phases of the mine operation;
- Choose the erosion and sediment control technique to account for site conditions such as soil, weather and construction conditions;
- Correct design of surface drains to facilitate the efficient transport of surface runoff (drains will generally be designed using trapezoidal or parabolic cross-sections);
- Construct sediment control structures, or utilize existing mine water storages, to contain runoff from disturbed areas;
- Maintain all erosion and sediment control measures in proper working order at all times; and
- Monitor the site and adjust erosion and sediment control practices to maintain the required performance standard.

The above principles take into account the general recommendations for site drainage works as specified in “Managing Urban Stormwater – Soils and Construction Volume 1” (Section of housing, 2004) and “Managing Urban Stormwater – Soils and Construction Volume 2E: Mines and Quarries” (DECCW, 2008) (Blue Book) as well as the International Erosion and Control Association (IECA) “Best Practice Erosion and Sediment Control Guidelines (IECA, 2008), as referenced in Peabody’s Erosion and Sediment Control Guideline (October 2014).

In addition to these principles, activities will occur in the following order:

- Employees and contractors working on-site will complete a general site induction which will include details on erosion and sediment control and management;
- The operational manager (or delegate) will complete a Surface Disturbance Permit (see **Appendix B**) in consultation with the Wambo’s Environmental Personnel;

- As part of the Surface Disturbance Permit process, the operational manager will identify and document the potential erosion and sediment issues in consultation with the Wambo's Environmental Personnel;
- Construction of diversion drains, sediment dams and other erosion and sediment control structures, will be undertaken in accordance with design criteria discussed in **Section 3.1.4** below, as required;
- Construction of berms, levees and catch drains to collect runoff from disturbed areas and divert water to sediment dams or other mine water storages, will be undertaken in accordance with **Section 3.5.3**, as required; and
- Construction or mining activities will not commence until erosion and sediment controls are in place.

3.1.2 Erosion and Sediment Control Matrix

The decision as to which combination of erosion and sediment control measures will be adopted lies with the Site Supervisor with input from onsite Environmental personnel. The decision is based on several factors including:

- Site topography;
- Material/soil/surface/strata type;
- Current disturbance category e.g.spoil, topsoil or peripheral lands (such as haul roads, exploration tracks etc);
- Site specific constraints e,g, proximity of a local water course;
- Length of time that the area will remain at this disturbance category;
- Overall purpose of implementing erosion and sediment control at a [particular location; and
- Applicability of the erosion and sediment control measure as per **Figure 4**.

Figure 4 shows a matrix of land uses and erosion and sediment control measures developed to assist in determining which erosion and sediment control measure is applicable (Peabody, 2014). This tool for selecting appropriate erosion and sediment control measures is based on:

- The phase of the mine site (operational, non-operational or construction);
- Land use type (specific to the mining application), adjacent land usage/classification and proximity to watercourses;
- Level of priority in providing erosion and sediment control measures.

Where multiple erosion and sediment control measures can be applied to the same situation, the onsite Environmental personnel will be consulted.

3.1.3 Existing Erosion and Sediment Controls

Figure 5 provides the locations of existing erosion and sediment control structures at the Mine. The purpose and storage capacity of the main sediment control structures on-site are provided in **Table 4.**

ID	Phase (O = Operational; N = Non-operational; C=Construction)	Land use type	ESC Priority (L= low, M = Medium, H = High, HH = top priority	Drainage Control								Erosion Control						Sediment Control			
				Contour Banks	Check Dams	Grass	Cellular Confinement System	Rock Mattress	Rock Lining	Level Spreader	Rock Chutes	Cellular Confinement System	Compost Blanket	Mulching	Revegetation	Rock Mulch	Soil Binders	Check Dam Sediment Trap	Sediment Basin (QLD & NSW)	Buffer Zone	Sediment Fence
1	O	Spoil - Draining Externally	HH	✓							✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	O	Spoil - Draining Internally	M	✓	✓						✓			✓				✓	✓		✓
3	O	Spoil Topsoiled (to be revegetated)	H	✓	✓									✓	✓		✓	✓	✓	✓	✓
4	O	Spoil Topsoiled, ripped and seeded	L	✓	✓	✓												✓	✓	✓	✓
5	O	Topsoil stripping area	M	✓	✓									✓				✓	✓	✓	✓
6	O	Topsoil Stockpiles	M	✓	✓	✓							✓	✓	✓			✓	✓	✓	✓
7	O	Exploratory and access tracks	M	✓	✓	✓	✓			✓		✓		✓	✓	✓	✓	✓		✓	✓
8	O	Haul Roads	H	✓	✓	✓	✓	✓	✓	✓								✓	✓	✓	✓
9	O	Industrial Areas	L	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓
10	N	Exploration Activity	M	✓	✓	✓	✓			✓			✓	✓	✓		✓		✓	✓	✓
11	C	Land clearing (woody vegetation)	M	✓	✓					✓				✓					✓	✓	✓
12	O	Drainage channels	HH	✓	✓	✓	✓	✓	✓	✓	✓										
13	N	Licenced stream diversions / Levees	H			✓	✓	✓	✓						✓	✓					
14	C	Construction / excavation work	M	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓

Figure 4: Erosion and Sediment Control Matrix (Peabody, 2014)

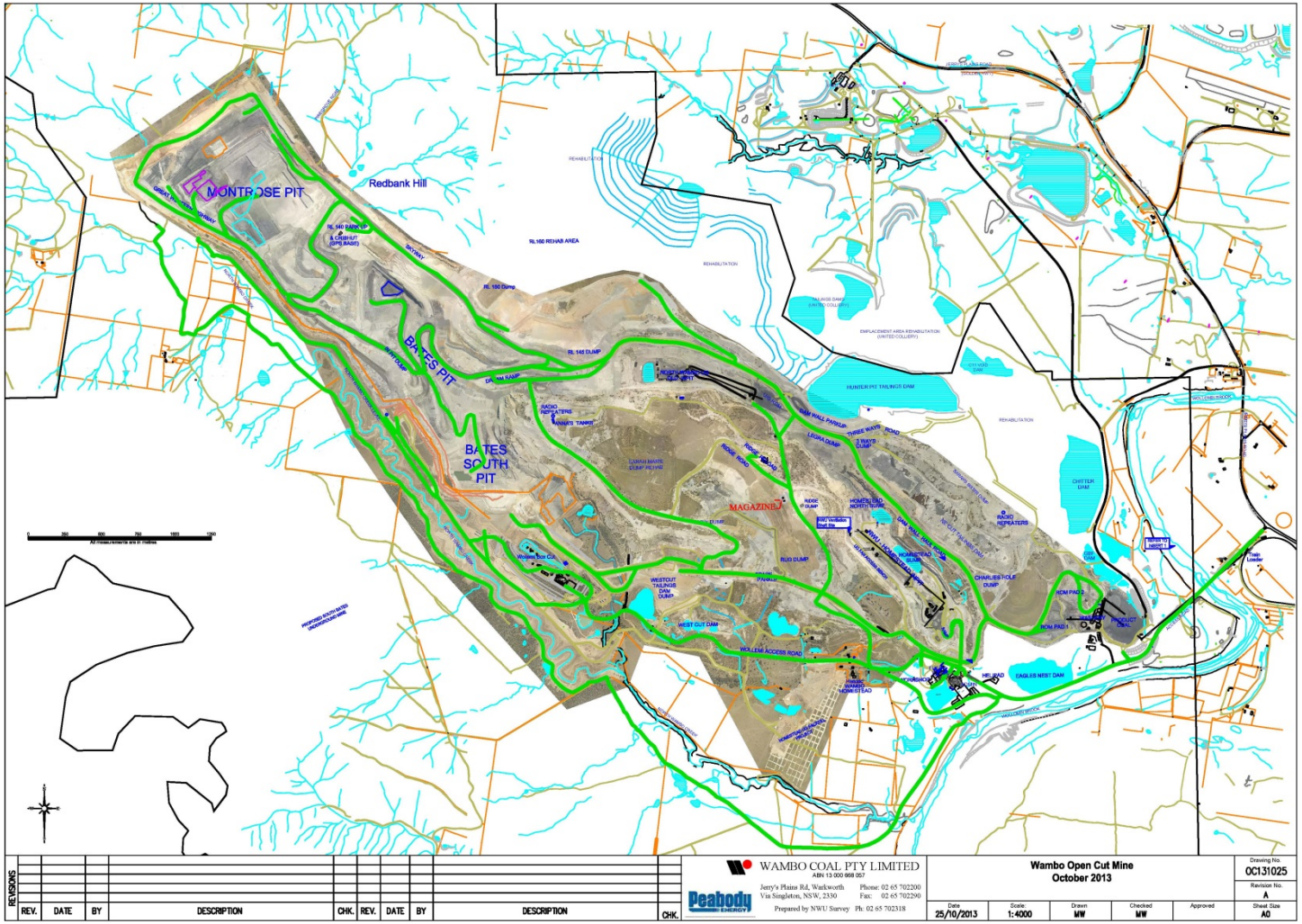


Figure 5: Wambo Coal Erosion and Sediment Control Structures

Table 4: Wambo Coal Erosion and Sediment Control Structures

Site	Purpose	Approximate Storage Capacity (ML)
Wambo Admin Dam	Clean Water Storage/Sediment Control	305
Eagles Nest Dam	Process Water	245
Gordon Below Franklin Dam	Sediment Control/Mine Water Management	82
Gordon Below Franklin Sediment Control Structures (ROM Pad Catchment)	Sediment Control	0.5
C11 Area Dam	Sediment Control/ Mine Water Management	410
Chitter Dam	Sediment Control/ Mine Water Management	988
West Cut Sediment Dam (Wollemi pump out)	Sediment Control	0.05
NWU Sump	Sediment Control	0.35
Hunter Pit	Mine Water Management	800
Homestead Pit	Mine Water Management	521
Wollemi Box cut dam	Sediment Control	0.75
Wollombi Brook Sediment control structures (Hales Crossing)	Sediment Control	0.06 (4x 0.015)
Wambo Rail Line Catchment Dams	Sediment Control	Various

3.1.4 Design Criteria

In addition to the guidelines presented in the Blue Book, sediment control structures at Wambo are constructed in accordance with design criteria summarised in **Table 5**.

Table 5: Design Criteria for Erosion and Sediment Control structures

Control Structure	Function	Design Capacity
Upslope diversion drains	Divert clean water runoff (undisturbed areas) away from disturbed areas	1 in 10 year critical duration rainfall event [Section 5.4.3(b)-(d)]
Down slope collection drains	Intercept and convey disturbed area runoff water to sediment dams	1 in 10 year critical duration rainfall event [Section 5.4.3(b)-(d)]

Control Structure	Function	Design Capacity	
Sediment dams/mine water dams	Containment of sediment-laden runoff from disturbed areas	**Settling Zone:** Capacity to store the runoff produced from the 80th percentile, 5- day rainfall event [Section 6.3.4(f)(i)]	**Sediment Storage Zone:** Two months calculated soil loss estimated using RUSLE* [Section 6.3.4(i)(ii)
Sediment Fencing	Retention/filtration of suspended sediments from water runoff	Limit flow to < 50 L/s in design 1 in 10 year critical duration rainfall event (Section 6.3.7(e))	
Hay Bales	Retention/filtration of suspended sediments	Limit flow to < 50 L/s in design 1 in 10 year critical duration rainfall event (Section 6.3.7(e))	

3.2 Construction

For activities or projects not currently approved as part of existing operations, the requirement for a project specific ESCP will be identified during the planning phase. A project specific ESCP will be devised in consultation with Wambo's Environmental Personnel. A Surface Disturbance Permit will also be required (**Appendix B**). The project ESCP will:

- Be generally consistent with the requirements for an ESCP, as detailed in Peabody's Erosion and Sediment Control Guideline (October 2014);
- Consider the objectives of this ESCP;
- Incorporate the principles of this ESCP;
- Include potential erosion and sedimentation impacts and sources ; and
- Detail the controls proposed to control those impacts.

All sediment control structures will be constructed in accordance with the design criteria provided in **Table 5** and **Section 3.1.4** in consultation with Wambo's Environmental Personnel.

3.3 Operations

3.3.1 Infrastructure Areas

Wambo has implemented erosion and sediment control measures to capture sediment movement from infrastructure areas and ensure minimal impacts on surrounding water quality. Surface runoff from these areas is either captured by mine water management system or diverted through sediment control structures prior to leaving site.

3.3.2 Land Disturbance

In accordance with the erosion and sediment control principles outlined in **Section 3.1.1**, land disturbance at Wambo will be minimised, and limited to those areas outlined in the Wambo Open Cut Mining Operations Plan (MOP). Prior to any disturbance of land, a Surface

Disturbance Permit (SDP) must be completed by the operational manager (or delegate), in consultation with Wambo's Environmental Personnel (**Appendix C**). The SDP process identifies potential erosion and sediment risks associated with proposed disturbance projects, and requires appropriate erosion and sediment control measures to be implemented prior to disturbance commencing.

3.3.3 Land Rehabilitation

Progressive rehabilitation is an essential part of Wambo's erosion and sediment control strategy. Mining disturbed land (with altered topography, surface conditions and increased catchment sizes) represents a high potential for erosion and sediment impacts. The potential for erosion and sedimentation impacts decreases substantially as disturbed land is reshaped and revegetated as part of the land rehabilitation process. In order to minimise erosion and sedimentation impacts until the rehabilitated area is suitably stable, sediment control structures (such as contour drains, drop structures and sediment control ponds) will be designed and constructed in accordance with the design criteria provided in **Table 5** and **Section 3.1.4** and Peabody's Erosion and Sediment Control Guideline (October 2014).

3.4 Clean Water Diversion

Consistent with the principles provided in **Section 3.1.1**, runoff water from undisturbed catchments will be diverted around disturbed areas, where practical. Diversion drains will be suitably designed, grassed and (if required) protected with rock armouring, geotextile fabric, or similar. Water will be discharged downstream of the disturbed area into a suitable receiving environment. Drain outlets will be appropriately designed, in consultation with Wambo's Environmental Personnel.

3.5 Mine Water Management

Runoff from disturbed areas is generally captured in the mine-water management system for operational re-use on-site. Where potentially sediment-laden runoff is not captured by the mine-water management system, sediment control structures have been installed to intercept and capture sediment prior to leaving site. The mine-water management system, and suitable sediment control structures, are outlined in the following sections.

3.5.1 Mine Water Management System

The mine-water management system collects runoff from disturbed land (such as infrastructure areas and open cut mined areas) at Wambo and retains it in mine-water dams on-site for operational re-use. Mine-water passes through a series of drains and sediment control structures prior to discharge into these dams. These structures divert water and separate sediment, enabling water re-use on-site and maintaining dam capacity. Design criteria for mine water dams and sediment control structures are provided in **Section 3.1.4** and **Appendix C**.

3.5.2 Sediment Dams

Sediment dams will be constructed to capture sediment from runoff flowing through site drains and diversions prior to its onsite re-use, or discharge from site. Design criteria for these sediment dams are provided in **Section 3.1.4** and **Appendix C.**

3.5.3 Diversion Banks / Drains

Diversion drains are used to transport mine water around the mine-water management system, or divert clean water around disturbed catchments. Drains should be designed to transport required volumes of water in a safe and stable manner, without excessive erosion of the drain or receiving environments. This will largely be achieved by excavating an

appropriate cross-sectional drain area, but may also require additional protection such as vegetation cover, rock armouring or geotextile fabric, especially in the vicinity of drain outlets. Design criteria for diversion drains are provided in **Section 3.1.4** and **Appendix C.**

3.5.4 Sediment Fences

Sediment fencing is a temporary measure used to slow the velocity of sheet runoff, allowing coarse sediment to settle out and be captured by the fence, whilst allowing the runoff water to continue. Sediment fencing is generally used where flow is not concentrated such as stockpile sites or low gradient disturbance areas. Fences should not be excessive in length and multiple parallel fences may be required if a large catchment requires management. Design criteria for sediment fencing are provided in **Table 5** and **Appendix C.**

Figure 6 below shows a sediment fence installed adjacent to the rail line. Water is diverted to this low lying area where it must filter through this sediment fencing prior to leaving site.

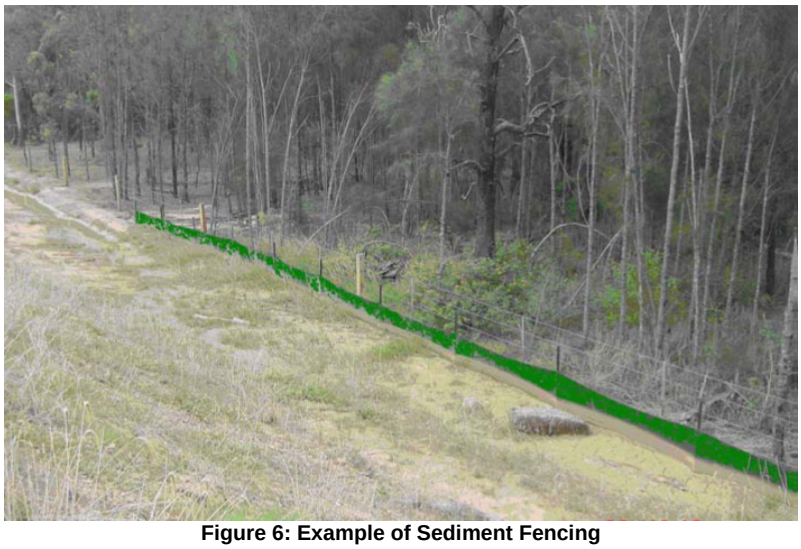


Figure 6: Example of Sediment Fencing

3.5.5 Hay Bales

Hay bales may also be used as a temporary sediment control measure. Hay bales are mainly used to decrease the velocity of water in areas of concentrated flow, such as drains or drainage lines. Hay bales should be installed at an appropriate interval (maximum 50 metres) to slow water velocity and reduce scouring. Hay bales will be secured in place with star pickets. Hay bales may also be used in conjunction with sediment fencing to further improve the efficiency of sediment control.

Figure 7 below shows a combination of hay bales and re seeding to reduce water flow and minimise scouring.

Figure 7: Hay Bales in Water Catch Drain

3.6 Topsoil Management

Topsoil will be stripped in accordance with the Wambo Coal Surface Disturbance Procedure. Erosion and sediment control measures, as identified in the completed SDP, will be implemented prior to topsoil removal.

Once topsoil is stripped, it will either be placed directly onto shaped overburden and seeded or will be stockpiled for later use. If stockpiling is required, stockpiles will be managed in accordance with the Topsoil Stockpile Management Procedure.

3.7 Surface Cracking Management

Regular monitoring of ground subsidence and associated surface cracking is undertaken in accordance with the requirements of the North Wambo Underground Subsidence Management Plan (SMP). Should surface cracking be identified as presenting a safety or environmental hazard (including erosion hazard), the area will be repaired and rehabilitated in accordance with SMP commitments. Sediment control measures may be required to minimise impacts until the area is suitably stabilised.

3.8 Performance Indicators

The performance indicators in **Table 6** will be used to assess the performance of the Mine against the predicted impacts.

Table 6: Performance Indicators

Performance Indicator	Number
Number of complaints received relating to erosion and sediment control	Nil
Number of reportable environmental incidents relating to erosion and sediment control	Nil

WCPL will report on progress against these performance indicators in the Annual Review (**Section 6.2**). In the event that a complaint is received relating to erosion and sediment control, it will be handled in accordance with the complaints management protocol (**Section 5.0**). Contingency plans for unpredicted erosion and sediment control impacts are discussed in the SGWRP.

4.0 Inspections, Monitoring and Maintenance

Sediment control structures will be inspected on a monthly basis, or following rainfall events 20 mm/day* (midnight to midnight), as recorded by the Wambo Meteorological Station. If no rain is received for at least a 24 hour period, any subsequent rain event 20 mm/day will trigger a new inspection. The sediment control structures will be inspected for capacity, structural integrity and effectiveness by Wambo's Environmental Personnel.

Any overflow water from sediment control structures will be tested of for pH, EC and total suspended solids (TSS), and compared to water quality criteria provided in the Wambo Surface Water Monitoring Program (SWMP), to assess the effectiveness of the sediment control structures.

Details of inspections and monitoring results will be recorded on the erosion and sediment structure inspection sheet. Any required maintenance work will be scheduled following the inspection.

Wambo's Sediment Control Structure Inspection Checklist is included in **Appendix D**.

5.0 Community Complaint Response

All erosion and sediment control related community complaints received by WCPL will be recorded within the Community Complaints Register. The E&C Manager will investigate the complaint, which will include, where possible, contacting the complainant within 24 hours to discuss the complaint. A review of the effectiveness of the corrective or preventative actions will be conducted within a month of the complaint and the relevant work procedures updated if required.

Preliminary investigations will commence as soon as practicable upon receipt of a complaint to establish if WCPL is responsible. All efforts will be made to determine the likely causes contributing to the complainants concerns.

WCPL will attempt to address the complainants concerns such that a mutually acceptable outcome is achieved. However, if required, the Independent Dispute Resolution Process would be referred to (**Appendix A**).

Details of all community complaints will be included in the Monthly Environment Monitoring Report. WCPL will retain a copy of the Community Complaints Register for at least four years. The E&C Manager will ensure the latest Community Complaints Register is posted on the WCPL website.

6.0 Review and Reporting

6.1 Review

A complete review of the ESCP will occur:

- Every two years
- When there are changes to consent or licence conditions related to any aspect of this ESCP
- Where there are significant changes to erosion and sediment control structures, as illustrated in **Figure 5** or listed in **Table 4**
- Following significant erosion and sediment control related incidents at WCPL
- Following an independent environmental audit which requires ESCP review; or
- If there is a relevant change in technology, practice or legislation.

The revised ESCP will be re-submitted to the Secretary for approval as required by Condition 30, Schedule 4 of DA305-7-2003.

6.2 Annual Review

Prior to the end of March each year, WCPL will review the environmental performance of the Mine and submit an Annual Review report to the DP&E. This report will:

- Describe the development (including any rehabilitation) that was carried out in the past year, and the development that is proposed to be carried out over the next year
- Include a comprehensive review of the monitoring results and complaints records of the Project over the past year, which includes a comparison of these results against the:
    - Relevant statutory requirements, limits or performance measures/criteria
    - Monitoring results of previous years; and
    - Relevant predictions in the EA;
- Identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance
- Identify any trends in the monitoring data over the life of the Project
- Identify any discrepancies between the predicted and actual impacts of the Project, and analyse the potential cause of any significant discrepancies; and
- Describe what measures will be implemented over the next year to improve the environmental performance of the Project.

6.3 Website Updates

A comprehensive summary of any monitoring results relevant to this ESCP will be made publicly available at WCPL website:

http://www.peabodyenergy.com/content/404/australia-mining/new-south-wales/wambo-mine)

Information on the website will be updated regularly as required by DA305-7-2003.

WCPL will also ensure that any information relevant to the management of erosion and sediment control is uploaded to the website (and kept up to date). This includes:

- Current statutory approvals
- Approved strategies, plans or programs required under the DA305-7-2003
- A community complaints register
- Minutes of Community Consultative Committee (CCC) meetings
- Annual Reviews
- A copy of any Independent Audits and WCPL's response to any recommendations in any audit; and
- Any other matter required by the Secretary.

6.4 Reportable Environmental Incidents

All reportable incidents will be reported via the EPA's Environmental Line on **131 555** by the E&C Manager in accordance with WCPL's Pollution Incident Response Management Plan (PIRMP).

In accordance with the PIRMP, WCPL must notify all relevant authorities of incidents causing or threatening material harm to the environment immediately after the person becomes aware of the incident in accordance with the requirements of *Part 5.7* of the *POEO Act.*

For all other incidents that do not cause threatening material harm to the environment associated with the Project, WCPL will notify the Secretary and any other relevant agencies as soon as practicable after WCPL becomes aware of the incident.

Within 7 days of the date of the incident, WCPL will provide the Secretary and any relevant agencies with a detailed report on the incident to include:

- The cause, time and duration of the event
- Where possible the type, volume and concentration of every pollutant discharged as a result of the event
- The name, address and business hours telephone number of employees or agents of the licensee who witnessed the event
- The name, address and business hours telephone number of every other person (of whom the licensee is aware) who witnessed the event, unless the licensee has been unable to obtain that information after making reasonable effort
- Action taken by the licensee in relation to the event, including any follow-up contact with any complainants
- Implement remediation measures as directed by the Secretary, to the satisfaction of the Secretary
- Details of any measure taken or proposed to be taken to prevent or mitigate against a recurrence of such an event; and
- Any other relevant matters.

7.0 RESPONSIBILITIES

Table 7 below summarises responsibilities documented in the ESCP. Responsibilities may be delegated as required.

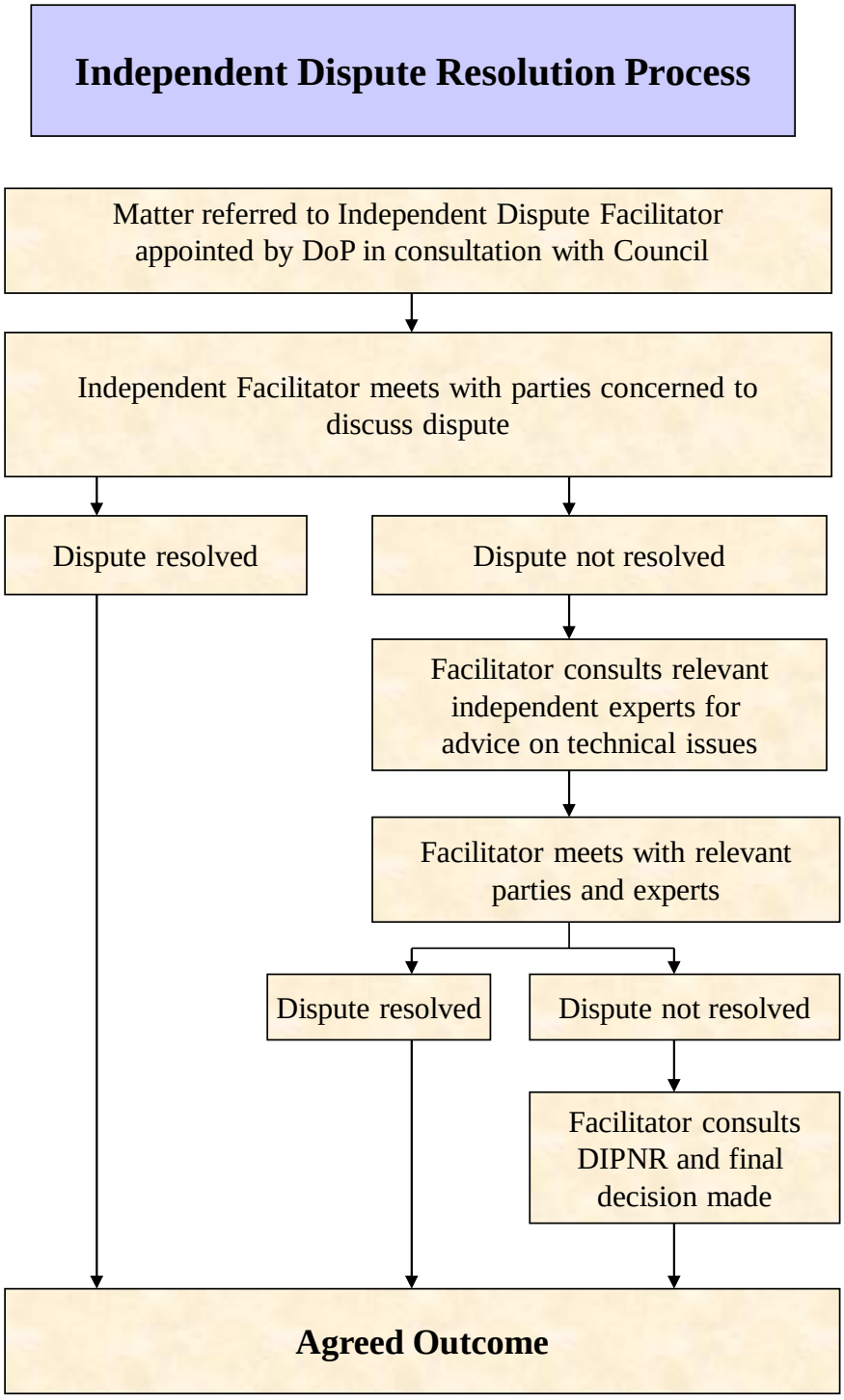
Table 7: Erosion and Sediment Control Plan Responsibilities

No	Task	Responsibility	Timing
1	Conduct environmental training for all contractors and site employees (as part of the site induction)	Site Training Coordinator (or delegate)	Pre start/then every two years.
2	Submit Disturbance Permit prior to disturbance in consultation with Environmental Advisor.	Operational Managers and supervisors	Prior to general construction/mining activities
3	Identify project specific potential erosion and sediment impacts	Environmental Advisor	Prior to general construction/mining activities
4	Facilitate the design and implementation of control measures described in this ESCP	Operational Managers/ Environmental Advisor	Prior to general construction/mining activities
5	Inspect sediment and erosion control structures	Environmental Advisor	Monthly, and following rainfall events 20mm/day
6	Maintain erosion and sediment control structures	Operational Managers	As required
7	Review ESCP in accordance with **Section 6.0**.	Environmental Advisor	As required under **Section 6.0**.
8	Notify government departments if an incident occurs in accordance with **Section 6.4**	E&C Manager	As required
9	Submit updated ESCP to DP&E.	E&C Manager	As required
10	Erosion and sediment control related complaints to be responded to in accordance with **Section 5.0**	E&C Manager	As required
11	Annual Review to include relevant monitoring results, complaints, mitigation measures undertaken and a review of the monitoring undertaken	E&C Manager	Annually
12	Regulator review to be undertaken of the ESCP	E&C Manager	As required
13	Prepare investigation reports and implementation of corrective actions in accordance with **Section 6.4**	E&C Manager	As required

8.0 References

- Development Consent (DA305-7-2003)
- Development Consent (DA177-8-2004)
- Wambo Development Project Environmental Impact Statement (EIS), July 2003
- Resource Strategies Pty Ltd (2003) Wambo Coal Mine Project Environmental Impact Statement. Report prepared for Wambo Coal Pty Ltd
- Wambo Environment Protection Licence (529)
- Environmental Planning and Assessment Act 1979
- Environment Protection and Biodiversity Conservation Act 1999
- Barclay Mowlem Construction Limited (2005) Soil and Water Quality Management Plan Wambo Coal Rail Construction Project.
- DECCW NSW (2008) Managing Urban Stormwater – Soils and Construction Volume 2E. Mines and Quarries. NSW Government, Parramatta, March.
- Landcom (2004) Managing Urban Stormwater – Soils and Construction Volume 1. 4th ed., NSW Government, Parramatta, March.
- Peabody Energy Australia (2014), Erosion and Sediment Control Guideline. October 2014, Version 1.
- Resource Strategies (2003) Wambo Development Project – Environmental Impact Statement, prepared for Wambo Coal Pty Limited.
- Resource Strategies (2006a) Modification Statement of Environmental Effects, prepared for Wambo Coal Pty Limited.
- Resource Strategies (2006b) North Wambo Underground Subsidence Management Plan, prepared for Wambo Coal Pty Limited.

APPENDIX A
INDEPENDENT DISPUTE RESOLUTION PROCESS


Independent Dispute Resolution Process
Matter referred to Independent Dispute Facilitator appointed by DoP in consultation with Council
Independent Facilitator meets with parties concerned to discuss dispute
Dispute resolved
Dispute not resolved
Facilitator consults relevant independent experts for advice on technical issues
Facilitator meets with relevant parties and experts
Dispute resolved
Dispute not resolved
Facilitator consults DIPNR and final decision made
Agreed Outcome

APPENDIX B
WAMBO COAL SURFACE DISTURBANCE PERMIT

Surface Disturbance Permit

SDP Number: (Env. Services only)	

Section 1 - Area of Operations

Open Cut	☐	Rail	☐
Underground	☐	CHPP	☐
Wambo General	☐	Other (e.g. RWEP Areas)	☐

Section 2 – SDP Proponent

Job Coordinator / Proponent: ***(Name & Signature)***			
Proponent's Manager: ***(Name & Signature)***			
Area Manager *(The Manger for the area of operation where the works will be undertaken)*: ***(Name & Signature)***			
Project Name/ Type / Description & Location:			
How long will the project take (including any rehabilitation works)	Start Date:	End Date:	
Plan or Map Attached: *(If available, please provide Environmental Personnel with electronic data)*			
GIS Coordinates (Provide Coordinates for disturbance)	E:	N:	

Section 4 – Environment and Approvals

(to be completed by Environmental Personnel)

Is the proposed activity within Wambo Land Ownership and Property Boundaries:	Yes/ No
Have all the required project approvals been obtained for proposed activity. *(If yes please attached to this SDP)*	Yes/ No
Does the proposed activity require approval from government departments?	Yes/ No
Is the proposed activity consistent with Wambo's:	
• Land Management Practices	Yes/ No
• Mining Tenements	Yes/ No
• Development Consent (DA305-7-2003 &DA177-8-2004)	Yes/ No
• EPA Licence Premise Boundary (EPL 529):	Yes/ No
• Mining Operations Plan Limits:	Yes/ No

• Relevant Environmental Management Plans: **E.g. Flora & Fauna Management Plan (FFMP), Erosion and Sediment Control Management Plan (ESCP)**	Yes/ No
Has a site inspection been completed by Environmental Personnel (If Yes please add comments/findings at the end of this section):	Yes/ No
Flora/fauna restriction (described within EMP, Licence or Development Consent) **E.g. All proposed activities with WCPL RWEP Areas must be in accordance with WCPL Flora & Faun Management Plan**	Yes/ No
Is a pre clearance flora and fauna survey required? (If yes, please attach to this document).	Yes/ No
Have all likely drainage impacts been identified? **An appropriate erosion and sediment control plan must be supplied**	Yes/ No
Are there any monitoring sites within the area (eg. blast, groundwater, surface water, dust, noise, flora/fauna, Aboriginal and European heritage)	Yes/ No
Is the proposed activity within a Rehabilitated area (If Yes, the Rehabilitation specialist is to be notified):	Yes/ No
Are there any Services (electricity easements, pipelines, etc):	Yes/ No
Are there likely to be dust impacts:	Yes/ No
Are there likely to be noise impacts:	Yes/ No
Are there other known issues such as lighting:	Yes/ No
Will fencing or pegging be required:	Yes/ No
Has the WCPL Archaeological database been consulted	Yes/No
Will the proposed activity be within 40m of a riparian zone? **No disturbance shall be allowed within 40m from the top of the upper bank of a defined Creek line, stream or defined natural water course, unless otherwise authorised by a Peabody Wambo Coal Environmental representative –**	Yes/No

General
Comments/ Conditions

Special
Comments/ Conditions

Section 5 – SDP Approval

This SDP is valid until:			
	Name:	**Signature:**	**Date:**
Job Coordinator / Proponent:			
Environmental Personnel			
Environment & Community Manager	Troy Favell		

Section 6– SDP Completion *(to be completed by the Proponent)*

Works associated with this SDP were completed on:

Project Coordinator/Advocate: (Please return a signed copy of the completed SDP to Environmental Services)	**Name:**	**Signature:**	**Date:**

Section 7– SDP Compliance Report

(to be completed by the Environmental Personnel)

During Project *(the project may be audited against conditions detailed within this SDP)*

SDP compliance inspection undertaken By: *(Name & Role)*		Date:	

Project Completion *(at the end of the project a compliance inspection may be undertaken)*

	Name:	**Signature:**	**Date:**
The Final SDP Compliance Report Completed:			

Please attach any additional SDP Compliance Inspection documentation (e.g photos) to this document.

Section 8 - Figure

Section 8 – Attach Pre - clearance survey here *(if required as part of the SDP application)*

Surface Disturbance Procedure

Purpose

The purpose of this procedure is to detail the environmental controls that need to be addressed prior to any surface disturbance being permitted on:

- Wambo owned land.
- United owned land covered by Wambo's mining lease.
- Privately owned land where the disturbance is subject to agreement with the landowner.

Surface disturbance includes:

- Felling trees on undisturbed or rehabilitated land.
- Pushing up or removing topsoil on any land whether undisturbed or rehabilitated.
- Dumping over any undisturbed or rehabilitated land.
- Construction of any earthworks across undisturbed or rehabilitated land.

Surface disturbance does not include the following:

- Maintenance of existing infrastructure.
- Maintenance of bushfire trails.
- Maintenance of drains.
- Maintenance of garden and car park areas.
- Maintenance of clearance for existing powerlines.
- Activities on un-rehabilitated previously disturbed areas.

This procedure will be a checklist of items that need some management to ensure that minimal environmental impact will occur from mining or disturbance on site. Further detail on the background to this procedure can be obtained from the Environmental Management Plans that have been developed by Wambo.

Areas to be Addressed

The person managing the task needs to ensure each of the following areas is addressed and adequate controls are put in place. This will assist in the processing of the permit.

While the person managing this disturbance is responsible for addressing each of these areas, the Environmental Department is available to provide assistance and advice.

Application can be made for a staged approach to the disturbance. However, surface disturbance should not occur more than 6 months prior to the area being required.

- **Area Description**

The area to be disturbed needs to be delineated. The level of delineation needs to be proportional to the environmental risk. Survey controls needs to be placed in the field and a plan of the proposed disturbed area has to be attached to the checklist. A copy of the plan must be held in the office for audit purposes and a copy has to

be provided to the personnel undertaking the work in the field. This should reduce the potential for disturbance to be carried out in a non approved area. Should any disturbance occur outside of the approved area, an incident form and corresponding investigation will be required.

- **Statutory Requirements**

All statutory requirements need to be met. This should include reference to MOP boundaries, DC boundaries, lease and authorisation conditions, land ownership, management plans. If required, relevant government agencies need to be notified. For example DPI and DoP must be notified of exploration activities in EL's.

- **Pre Disturbance Flora and Fauna Assessments**

No disturbance of RWEP Areas can proceed until consultation with appropriate government authority has been undertaken (refer to FFMP). Flora and fauna assessment is required prior to any disturbance. The level of the assessment required will be determined after initial investigations of the area that needs to be disturbed are undertaken. These assessments may be comprehensive and may need to be undertaken by external consultants. Consequently, there may be a number of weeks between an application to disturb being lodged and an approval to disturb being granted.

During pre-disturbance surveys, habitat trees and seed collection trees may be identified. These trees will be handled differently to the normal clearing process. Habitat trees potentially house native fauna and also provide a source of habitat features (hollows) which have to be collected for use on rehabilitated surfaces. Seed collection trees provide a source of seed for natural rehabilitation.

The area should be cleared initially of all vegetation except for the habitat trees. Once the non habitat vegetation has been cleared and removed from the area, the habitat trees should be felled. They should be left where they fall. At that time, recovery of features such as hollows should commence. After the hollows have been recovered, the remaining parts of the habitat trees can be treated as normal vegetation and pushed up with the other material. These surveys may identify threatened flora and fauna species, which will need to be managed and may restrict disturbance to certain months of the year.

- **Archaeological and European Heritage Assessment**

Archaeological and European Heritage surveys were completed during EIS development. Aboriginal artefacts have been salvaged for all areas of the open cut in the five year MOP foot print. However, mining or disturbance outside those areas cannot begin until the possible artefact recovery has been completed. There are requirements for handling European Heritage items prior to any disturbance taking place. As with the pre-disturbance flora and fauna surveys, these steps will add time to the process and can be in the order of 3 months.

- **Water Management and Erosion and Sedimentation Control**

Once the area is cleared, any rain / water that comes in contact with or is captured in the area must be treated. Generally, the water falling into the pit cannot leave site.

Plans will be developed to manage erosion and sediment control, surface water and groundwater. The water management strategy for this area will be discussed with Wambo personnel to ensure they fit with site water management plans.

- **Topsoil Removal**

The MOP defines topsoil stripping depths. All topsoil must be recovered for Wambo to accomplish rehabilitation to the agreed standards. Thus, every endeavour should be made to ensure that topsoil is recovered. Direction should be obtained from Wambo as to where the topsoil, once moved, should be placed. Preference should be given to placing topsoil on areas available for rehabilitation. Topsoil depths will be determined at the time of removal.

- **Noise**

Noise management is important as Wambo have neighbours that are particularly sensitive to this type of intrusion into their lives. This can be accomplished by considering location of neighbours, reducing the area disturbed, managing tree cover near the disturbed area and disturbing areas at an appropriate time during the day / year. A strategy to manage noise must be developed.

- **Dust Generation**

Dust management is important as Wambo have neighbours that are particularly sensitive to this type of intrusion into their lives. This can be accomplished by reducing the area disturbed, managing tree cover near the disturbed area, disturbing areas at an appropriate time during the year and under favourable weather conditions, and utilising water carts as appropriate. A strategy to manage dust must be developed.

- **Lighting**

Light management is important as Wambo have neighbours that are particularly sensitive to this type of intrusion into their lives. This can be accomplished by clearing during daylight hours only. A strategy to manage lighting must be developed.

- **Other Issues**

Other issues may need to be considered as part of the disturbance work that are outside the scope and purpose of this checklist. These may include but not limited to power lines, pipe lines, underground services and working on steep grades. Approval of this documentation does not negate the requirement to complete other work permits if applicable. Should there be any potential for underground services to be impacted by the work being done, a "Permit to Dig" may need to be established.

- **Rehabilitation of Disturbed Areas**

All disturbed areas of the mine have to be rehabilitated. Depending on the area there may be considerable time between disturbance and rehabilitation. When and how the rehabilitation is to be performed needs to be addressed.

APPENDIX C

USE AND DESIGN OF SEDIMENT CONTROL STRUCTURES

Diversion Banks and Drains

The purpose of diversion structures is to intercept water runoff (either clean or mine water) and to divert it at low velocities either around disturbed land or into sediment control\ structures for treatment. To minimise the level of erosion, the velocity of runoff water can be reduced by implementing controls such as hay bales and rock structures which are described below.

Design and dimensions of diversion banks and drains in relation to slope are shown below.

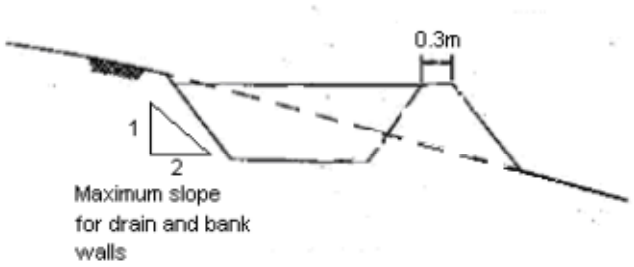


Figure C-1
Diversion Bank and Drain Design Dimensions

Sediment Dams

There are two types of sediment dams, those that are for temporary use (less than 6 months), and those that are larger and expected to be used for a longer period of time.

Small, temporary sediment dams are used to capture water and sediment runoff from disturbed areas to allow the sediment to settle and the clean water to evaporate or released from the system. These temporary dams are constructed to treat runoff water from rehabilitation or disturbed land for sediment until vegetation establishes.

Typical design is shown below.

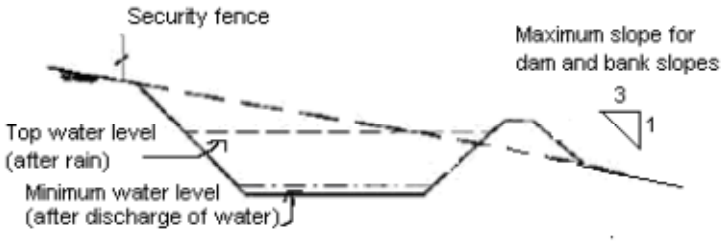


Figure C-2
Temporary Sediment Dam Design

Larger, long term sediment dams are used to intercept sediment laden runoff. The sediment is retained in the dam while the water is allowed to be released from a pipe outlet wrapped in the same geotextile fabric used for sediment fencing.

The typical design is shown below.

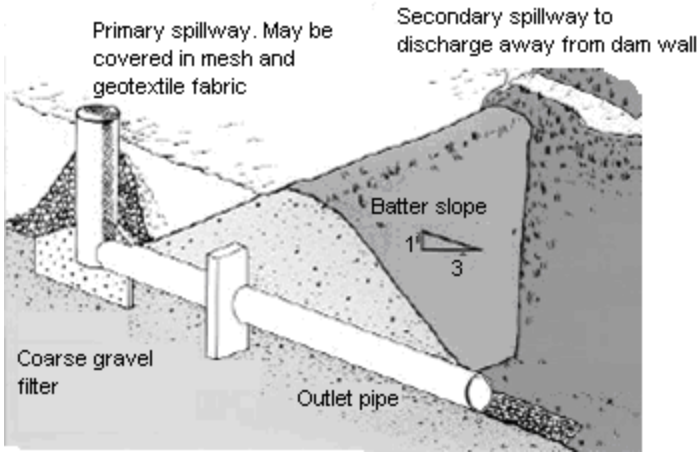


Figure C-3
Large, Long Term Sediment Dam Design*

Sediment Fences
Sediment fences are used to intercept sheet flow runoff from disturbed areas containing sediment. Sheet flow is flow which is parallel to the sediment fence, not hitting the fence directly. Green geotextile fabric made specifically for sediment fencing is pegged at least every 3 m and the bottom of the cloth is buried 150 mm into the ground. Black geotextile fabric is a weed mat, and is not an effective sediment control. Green textile fabric is designed to capture the sediment in runoff, but allow the clean water through the fabric at a rate which will not destroy the sediment structure.

Design is shown below.

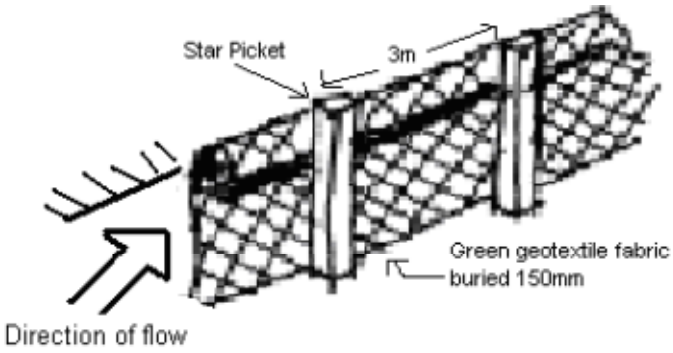


Figure C-4
Sediment Fence Design

Hay Bales and Rock Structures
Hay bales and rock structures are used on drainage lines or upstream of other controls (such as sediment dams), and often in conjunction with sediment fences to minimise erosion. Hay bales are used in areas where a temporary form of control is required until vegetation establishes to provide natural erosion and sediment control.

The typical design is shown below.

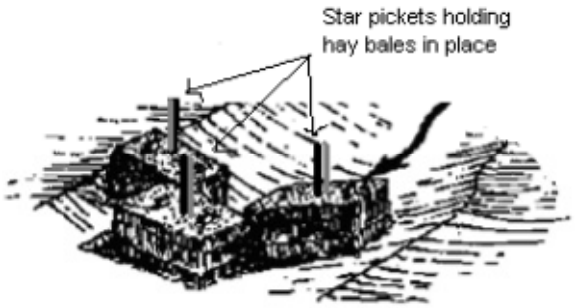


Figure C-5
Use of Hay Bales in Diversion Drain

Rock structures can also be used in areas where temporary control is required, but can also be used as a permanent erosion and sediment control. The rocks receive the initial force of the flow and disperse it, slowing down the flow and therefore minimising the erosion potential, similar to the hay bales. Rock structures can be used in two ways, one is at the outlet of pipes or culverts where the rocks are simply placed under and around the outlet, and the other is in a kind of embankment wrapped in geotextile fabric at intervals to slow the flow further.

Designs are shown below.

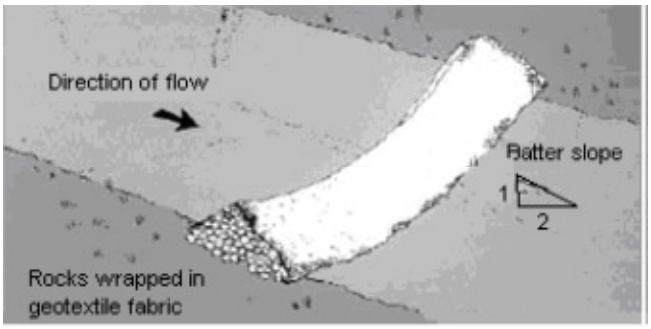


Figure C-6
Rock Structure as an Embankment*

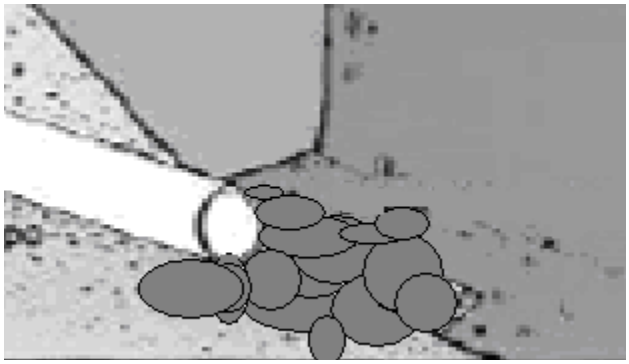


Figure C-7
Rock Structure at the Outlet of Pipe

*Referenced from Environment ACT, Erosion and Sediment Control During Land Development, Canberra, 1998.

APPENDIX D

SEDIMENT CONTROL STRUCTURE INSPECTION CHECKLIST

Wambo Coal Sediment Control Structure Inspection Checklist
Rainfall in last 24 hrs*:
Date of Inspection:
*During consecutive days of rain, a new inspection is only required after 48 hours of no rain following the first

Site	Purpose	Has the structure been inspected?	Inspected by (initial)	Comments/ Remedial works required
Wambo Admin Dam	Clean Water Storage/Sediment Control	Y/N		
Eagles Nest Dam	Process Water	Y/N		
Gordon Below Franklin Dam	Sediment Control/Mine Water Management	Y/N		
C11 Area Dam	Sediment Control/Mine Water Management (decommissioning commenced 2009)	Y/N		
West Cut Dam	Sediment Control/Mine Water Management (decommissioning commenced 2009)	Y/N		
West Cut Sedimentation Dam (Wollemi Pump Out)	Sediment Control	Y/N		
NWU Sump	Sediment Control	Y/N		
Hunter Pit	Mine Water Management			
Homestead Pit	Mine Water Management			
Wollemi Box Cut Dam	Sediment Control			
Wollombi Brook Sediment control structures (Hales Crossing)	Sediment Control			
Wambo Rail Line Catchment Dams	Sediment Control			
Western Drain	Sediment Control			
Wombat Drain	Sediment Control			
Kangaroo Drain	Sediment Control			
Milk Can Drain	Sediment Control			
North Wambo Creek Diversion				
South DAM	Mine Water Management	Y/N		
Chitter Dam	Mine Water Management	Y/N		

Name	Signed	Date