



WAMBO COAL PTY LTD

NORTH WAMBO UNDERGROUND MINE

EXTRACTION PLAN
LONGWALLS 8 TO 10A

APPENDIX C
BIODIVERSITY MANAGEMENT PLAN

WAMBO COAL MINE
NORTH WAMBO UNDERGROUND MINE

BIODIVERSITY MANAGEMENT PLAN
LONGWALLS 8 - 10A



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Document No.	BMP LW 8-10A
Title	Biodiversity Management Plan for North Wambo Underground Mine Longwalls 8-10A
General Description	Management of potential subsidence effects, subsidence impacts and environmental consequences on flora and fauna for mining of Longwalls 8 to 10A at the North Wambo Underground Mine
Key Support Documents	Wambo Coal Flora and Fauna Management Plan

Revisions

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Approvals

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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 North Wambo Underground Mine is a component of the approved Wambo Coal Mine. The North Wambo Underground Mine commenced in 2005 and involves extraction of coal by longwall mining methods from the Wambo Seam within Mining Lease (ML) 1402, ML 1594, Coal Lease 397 and Consolidated Coal Lease 743 (**Figure 2**).

The potential environmental impacts of the existing Wambo Coal 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*.

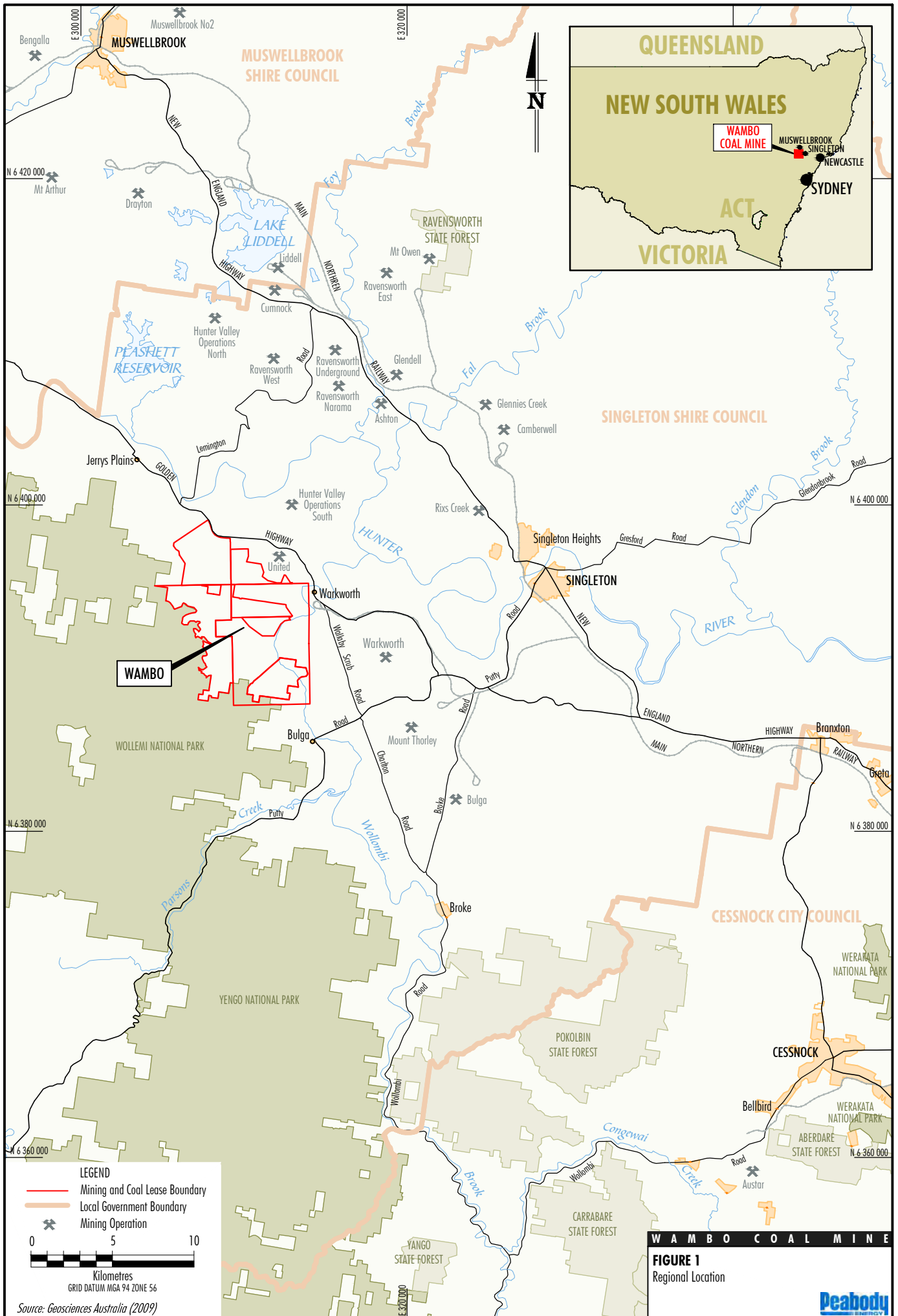
An application to modify the Development Consent (DA 305-7-2003 MOD 2) was lodged in January 2005 to facilitate the re-orientation of the North Wambo Underground Mine longwall panels and allow access to the Wambo Seam via the open cut highwall and was approved on 4 May 2005. The application was accompanied by the *Wambo Development Project – Wambo Seam Underground Mine Modification Statement of Environmental Effects* (North Wambo SEE) (WCPL, 2005).

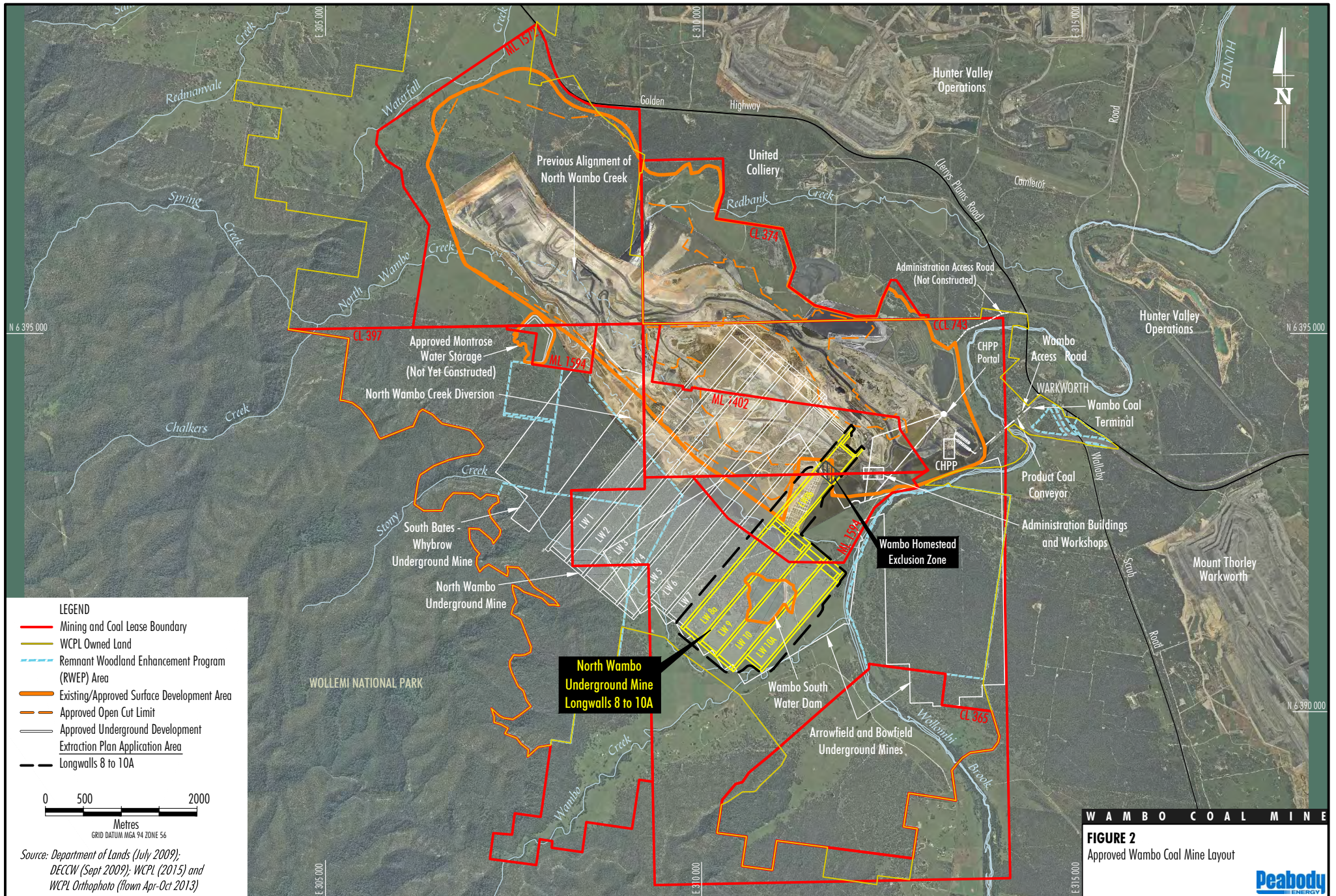
A subsequent application to modify the Development Consent (DA 305-7-2003 MOD 13) was lodged in December 2012 to allow an extension to the approved North Wambo Underground Mine to include two additional longwalls (Longwalls 9 and 10) and was approved on 8 July 2013. The application was accompanied by the *North Wambo Underground Mine Modification Environmental Assessment* (North Wambo Modification EA) (WCPL, 2012).

An application to modify the Development Consent (DA 305-7-2003 MOD 14) was lodged in September 2014 to allow a minor extension to the approved North Wambo Underground Mine to include an additional longwall (Longwall 10A). The application was accompanied by the *North Wambo Underground Mine Longwall 10A Modification Environmental Assessment* (North Wambo Longwall 10A Modification EA) (WCPL, 2014).

A Subsidence Management Plan for Longwalls 1 to 6 at the North Wambo Underground Mine (WCPL, 2006) was approved by the NSW Department of Primary Industries – Mineral Resources on 11 December 2006. An Extraction Plan for Longwalls 7 and 8 was approved by the NSW Department of Planning and Infrastructure (DP&I) for Longwall 7 on 16 May 2013 and for Longwall 8 on 24 September 2013. Subsequently, a revised Extraction Plan for Longwalls 7 to 10 was approved by the Department of Planning and Environment (DP&E) on 4 July 2014.

The approved Extraction Plan for Longwalls 7 to 10 has been revised to include the remaining longwall within the North Wambo Underground Mine extent (Longwall 10A) for a consolidated Extraction Plan for Longwalls 8 to 10A (**Figure 3**).



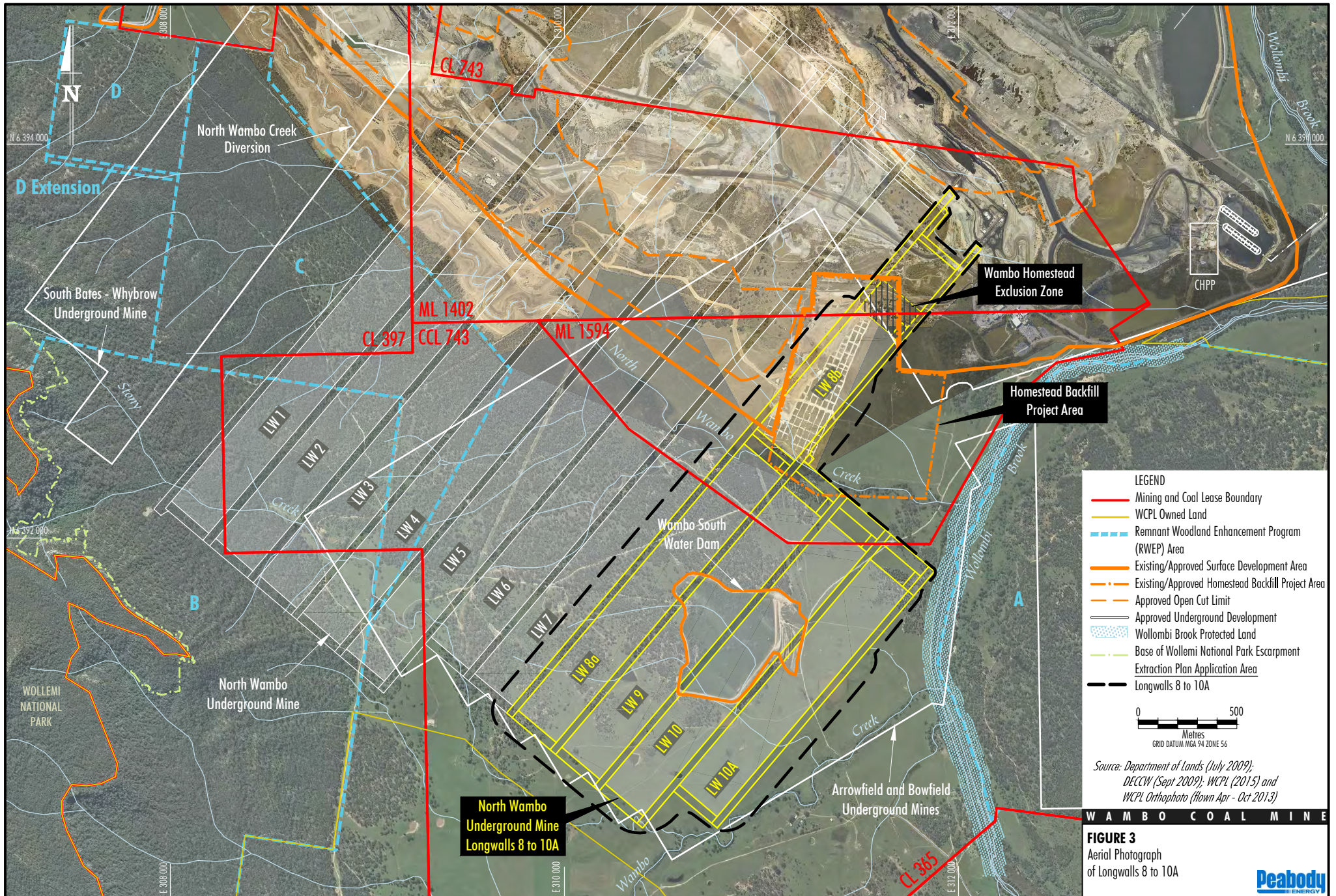


Source: Department of Lands (July 2009); DECCW (Sept 2009); WCPCL (2015) and WCPCL Orthophoto (flown Apr-Oct 2013)

WAMBO COAL MINE

FIGURE 2
Approved Wambo Coal Mine Layout





1.1 PURPOSE AND SCOPE

Purpose: This Biodiversity Management Plan for Longwalls 8 to 10A (BMP) outlines the management of potential environmental consequences of the proposed secondary workings described in the Extraction Plan on flora and fauna.

Scope: This BMP covers flora and fauna within the Longwalls 8 to 10A Application Area (**Figure 3**).

This BMP 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 North Wambo Underground Mine Longwalls 8 to 10A Extraction Plan.

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

This BMP has been prepared by WCPL, with assistance from Resource Strategies. The appointment of the team of suitably qualified and experienced experts has been endorsed by the Secretary of the DP&E.

**Table 1
Biodiversity Management Plan Requirements**

Development Consent (DA 305-7-2003) Condition	BMP Section
<p>Condition 22C(h) of Schedule 4</p> <p>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:</p> <p>...</p> <p>(h) include a:</p> <p>...</p> <ul style="list-style-type: none"> • Biodiversity Management Plan, which has been prepared in consultation with the OEH, which provides for the management of the potential impacts and/or environmental consequences of the proposed second workings on flora and fauna; <p>...</p>	<p>Management of potential impacts and/or environmental consequences on flora are addressed in Table 2.</p> <p>Performance measures relevant to biodiversity are presented in Section 2.</p> <p>Performance indicators relevant to biodiversity are presented in Section 5.</p>
<p>Condition 22D of Schedule 4</p> <p>22D. The Applicant shall ensure that the management plans required under condition 22C(h) above include:</p> <p>(a) an assessment of the potential environmental consequences of the Extraction Plan, incorporating any relevant information that has been obtained since this consent;</p> <p>(b) a detailed description of the measures that would be implemented to remediate predicted impacts; and</p> <p>(c) a contingency plan that expressly provides for adaptive management.</p>	<p>Addressed in Section 3.</p> <p>Addressed in Table 2.</p> <p>Addressed in Section 6.</p>

1.2 STRUCTURE OF THE BIODIVERSITY MANAGEMENT PLAN

This BMP forms part of WCPL's Environmental Management System for the Wambo Coal Mine. The relationship of this BMP to the Wambo Coal Mine Environmental Management System is shown on **Figure 4**.

To avoid duplication of existing Environmental Management Plans this BMP references components of the existing Wambo Coal Mine Flora and Fauna Management Plan (FFMP). The sections of the FFMP relevant to the BMP are summarised in **Table 2**. The FFMP is included as **Attachment 2**.

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

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

- Section 1** Provides an introduction to the BMP, including the purpose and scope of the BMP and the context of the BMP in relation to WCPL's Environmental Management System for the Wambo Coal Mine.
- Section 2** Describes the performance measures relevant to biodiversity.
- Section 3** Summarises the predicted subsidence impacts and environmental consequences resulting from the extraction of Longwalls 8 to 10A.
- Section 4** Describes flora and fauna monitoring that will be conducted to monitor potential impacts from the extraction of Longwalls 8 to 10A.
- Section 5** Describes how monitoring data will be used to assess the extraction of Longwalls 8 to 10A against the relevant performance indicators and performance measures.
- Section 6** Provides a Contingency Plan to manage any unpredicted impacts and their consequences.
- Section 7** Lists the documents referred to in **Sections 1 to 6** of this BMP.
- Attachment 1** Provides a Trigger Action Response Plan (TARP) for this BMP 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 FFMP.

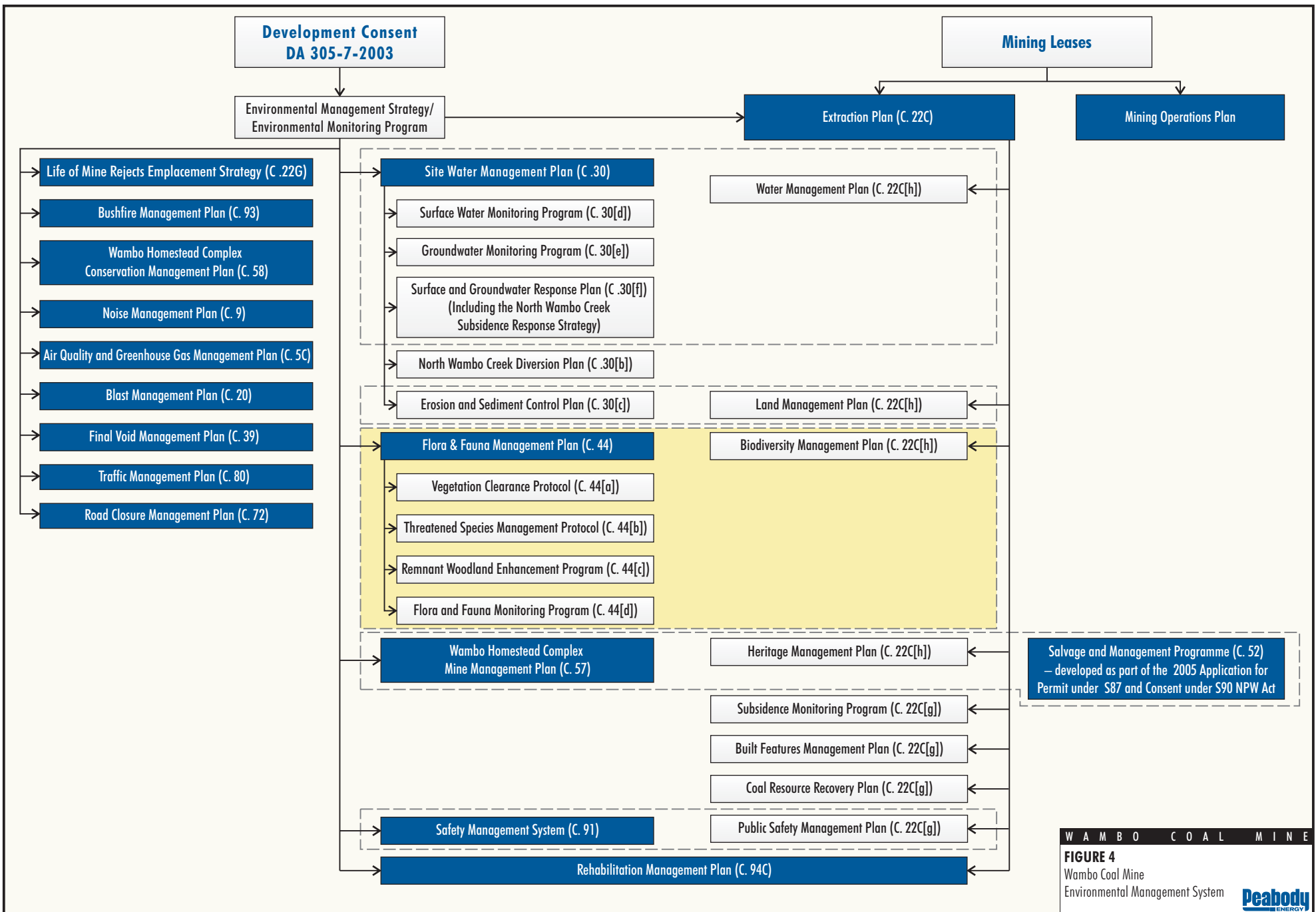


Table 2
Flora and Fauna Management Plan - Reference Summary

BMP Component	FFMP Reference	Section Description
Description of the existing environment ¹	Section 2 - Existing Environmental Baselines	Section 2 of the FFMP includes an overview of the existing environment.
Management Measures	Section 3 - Flora and Fauna Management	The objective of the flora and fauna management strategies implemented at Wambo is to minimise the potential impact of activities on flora and fauna.
	Section 3.1 - Vegetation Clearance Protocol	The Vegetation Clearance Protocol (VCP) has been developed to minimise impacts on threatened flora and fauna. The VCP is applicable across all WCPL managed land, including the Longwalls 8 to 10A Application Area.
	Section 3.2 - Threatened Species Management Protocol	The Threatened Species Management Protocol (TSMP) has been developed to minimise the potential impacts on threatened flora and fauna species. The TSMP is initiated in the event a threatened species listed under the NSW <i>Threatened Species Conservation Act, 1995</i> (TSC Act) or the Commonwealth <i>Environment Protection and Biodiversity Conservation Act, 1999</i> (EPBC Act) is identified in the mine area or surrounds. The TSMP is applicable across all WCPL managed land, including the Longwalls 8 to 10A Application Area.
	Section 3.3 - Remnant Woodland Enhancement Program	The objective of the Remnant Woodland Enhancement Program (RWEPP) is to help conserve regional biodiversity, whilst enhancing the habitat available to flora and fauna. The RWEPP consist of five areas; RWEPP Area A, B, C, D and D Extension (Figure 3 of the FFMP [Attachment 2]). There are no RWEPP Areas located within the Longwalls 8 to 10A Application Area. The RWEPP includes a monitoring program to assess potential impacts due to subsidence.
	Section 3.4 - Rehabilitation Program	The Rehabilitation Program outlines the proposed management and implementation of rehabilitation works in areas disturbed by mining. The Rehabilitation Program will apply to the Longwalls 8 to 10A Application Area where applicable.
Monitoring	Section 4 - Flora and Fauna Monitoring Program	The flora and fauna monitoring program includes two main components: monitoring of revegetation of disturbance areas; and monitoring of the RWEPP areas.
	Section 4.1 – Monitoring of Revegetation of Disturbance Areas	The monitoring of revegetation of disturbance areas includes areas subject to subsidence from underground mining. Monitoring includes visual monitoring and ecosystem function analysis.
	Section 4.2 – Monitoring Program for the RWEPP	The primary objective of the monitoring program for the RWEPP is to monitor progress of the establishment of the RWEPP and subsidence impacts on the RWEPP.
Responsibilities ¹	Section 6.0 - Responsibilities	This section summarises the FFMP responsibilities and timing of FFMP tasks.

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

2 PERFORMANCE MEASURES

This BMP has been developed to manage the potential environmental consequences of the proposed secondary workings described in the Extraction Plan on flora and fauna 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 subsidence impact performance measures listed in Tables 14A and 14B of Schedule 4 of the Development Consent (DA 305-7-2003). The performance measures specified in Table 14A of Schedule 4 of the Development Consent (DA 305-7-2003) relevant to biodiversity are listed in **Table 3**.

Table 3
Biodiversity Performance Measures

Feature	Subsidence Impact Performance Measure
Wollemi National Park	Negligible subsidence impacts. Negligible environmental consequences.
Warkworth Sands Woodland Community ¹	Minor cracking and ponding of the land surface or other impact. Negligible environmental consequences.
White Box, Yellow Box, Blakely's Red Gum Woodland/Grassy White Box Woodland Community ²	Minor cracking and ponding of the land surface or other impact. Negligible environmental consequences.
Other threatened species, populations or communities	Minor cracking and ponding of the land surface or other impact. Negligible environmental consequences.

Source: Table 14A of Schedule 4 of the Development Consent (DA 305-7-2003).

¹ The Warkworth Sands Woodland Community is mapped as Community 5 in Figure 5 of the FFMP (**Attachment 2**).

² The White Box, Yellow Box, Blakely's Red Gum Woodland/Grassy White Box Woodland Community is mapped as Communities 3 and 11 in Figure 5 of the FFMP (**Attachment 2**).

Section 5 provides a summary of the analysis of monitoring data that will be undertaken to assess the impact of Longwalls 8 to 10A against the performance measures.

3 PREDICTED SUBSIDENCE IMPACTS AND ENVIRONMENTAL CONSEQUENCES

3.1 FLORA

3.1.1 Background

Flora surveys were conducted at the Wambo Coal Mine in 2003 (Orchid Research, 2003), 2010 (FloraSearch, 2011), 2011 (FloraSearch, 2012) and 2014 (FloraSearch, 2014). Areas of remnant vegetation were systematically surveyed using quadrats, spot sampling sites and random meanders to compile a comprehensive species list and to detect threatened species which may have been present.

Remnant vegetation was dominated by eucalypt forests and woodlands, however thin strips of River Sheoak (*Casuarina cunninghamiana*) were reported to occur along North Wambo Creek, Wambo Creek, Stony Creek and Wollombi Brook and sand dune heathy woodlands were also reported to be present.

A number of tree species including Narrow-leaved Ironbark (*Eucalyptus crebra*), Grey Box (*E. moluccana*) and Bulloak (*Allocasuarina luehmannii*) were widespread and common and associated within many other species. Other dominant tree species include Spotted Gum (*Corymbia maculata*), Grey Gum (*E. punctata*), Blakely's Red Gum (*E. blakelyi*), Rough-barked Apple (*Angophora floribunda*) and Drooping Sheoak (*Allocasuarina verticillata*).

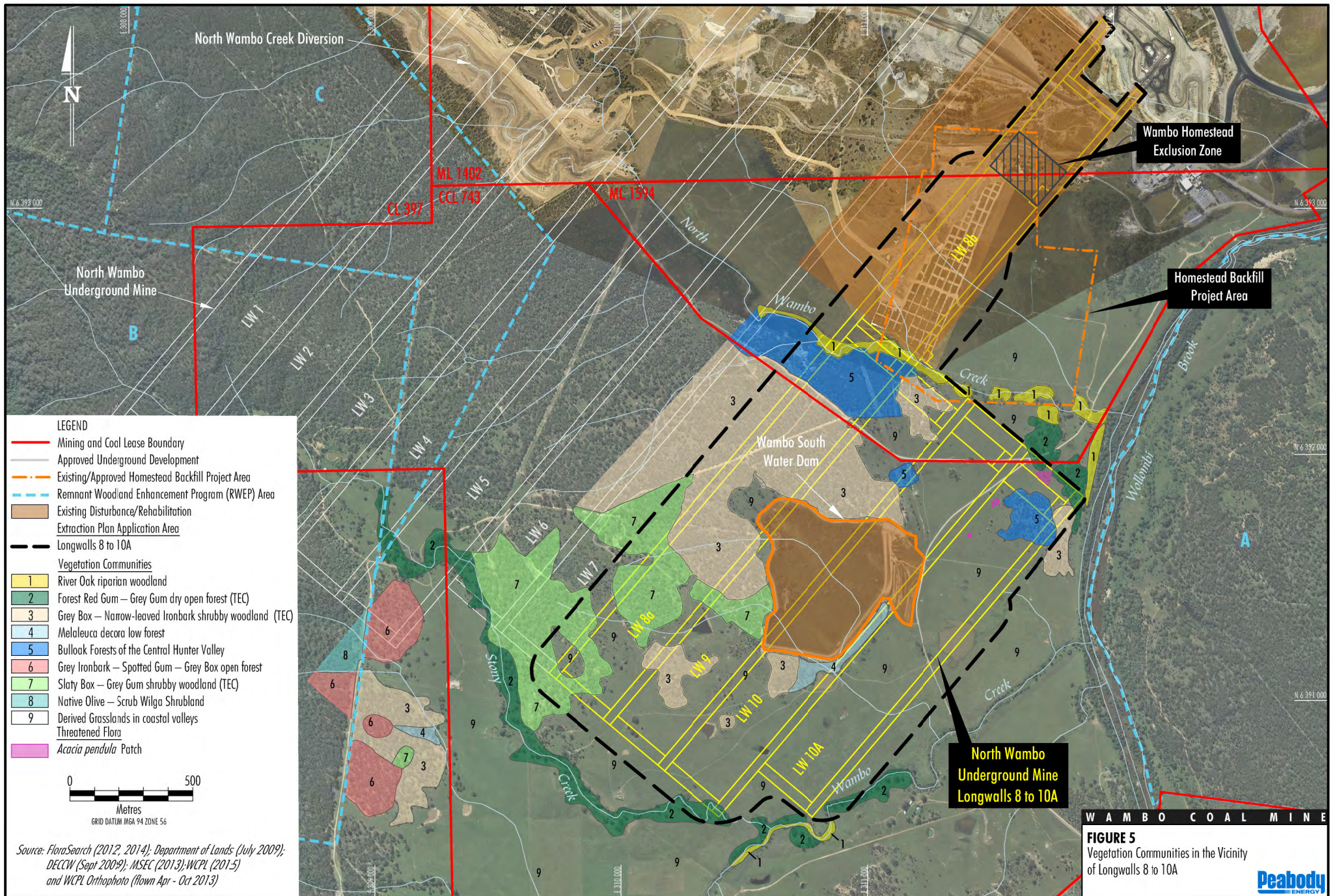
One endangered population listed in the schedules of the TSC Act was identified within vicinity of Longwalls 8 to 10A by FloraSearch (2014), namely *Acacia pendula* (with the extent of the endangered population shown on **Figure 5**).

Orchid Research (2003) recorded two threatened ecological communities in the vicinity of Wambo, namely the Warkworth Sands Woodland Endangered Ecological Community (EEC) (listed under the TSC Act) and the *White Box Yellow Box Blakely's Red Gum Woodland* (EEC under the TSC Act)/*White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (Critically Endangered Ecological Community [CEEC] under the EPBC Act).

Figure 5 presents the vegetation communities mapped in the Longwalls 8 to 10A Application Area by FloraSearch. FloraSearch has not mapped the Warkworth Sands Woodland EEC or the White Box, Yellow Box, Blakely's Red Gum Woodland/Grassy White Box Woodlands EEC/CEEC within the vicinity of the Longwalls 8 to 10A Application Area.

3.1.2 Revised Assessment of Potential Subsidence Impacts and Environmental Consequences

As described in Section 2.1 of the Extraction Plan, the magnitude of the tilt and strain predictions for Longwalls 8 to 10A are generally consistent with those presented in the Wambo Development Project EIS, the North Wambo SEE, the North Wambo Modification EA and the North Wambo Longwall 10A Modification EA. On this basis, environmental consequences on flora resulting from the extraction of Longwalls 8 to 10A will be consistent with those presented in the Wambo Development Project EIS, the North Wambo SEE, the North Wambo Modification EA and the North Wambo Longwall 10A Modification EA.



In regard to potential environmental consequences on flora, Section 4.8.1 of the Wambo Development Project EIS stated (WCPL, 2003):

Potential impacts of subsidence of relevance to flora include surface cracking, erosion and ponding of surface water in areas where isolated depressions form. Disturbance to the land surface and associated vegetation as a result of surface cracking, erosion and isolated ponding is however predicted to be minimal. Any such impacts are considered to be capable of repair through the implementation of appropriate mitigation measures.

Increased areas of ponding are expected to occur along and adjacent to the lower reaches of North Wambo Creek and Wambo Creek (Figure 4-2). Some of these areas are likely to become wetlands over time. As a result, a change in flora species composition and structure would be expected to occur as the creation of wetland habitat provides greater opportunities for wetland species.

There would be no subsidence of the adjoining Wollemi National Park escarpment or Wollombi Brook (Appendix O).

Section 4.7 of the North Wambo Longwall 10A Modification EA (WCPL, 2014) stated:

FloraSearch (Appendix E) concluded that it is unlikely that vegetation within the Modification area would be adversely affected by mine subsidence. This conclusion is supported by inspection of previously undermined areas to the west of the Modification area, which showed that despite evidence of surface cracking of the soil, the condition of the vegetation on the undermined area was not noticeably different from that on adjacent similar unmined areas and showed no signs of dieback (Appendix E).

3.1.3 Warkworth Sands Woodland Endangered Ecological Community

As summarised in **Table 3**, the Development Consent (DA 305-7-2003) includes performance measures specific to the Warkworth Sands Woodland EEC.

Mapping of the Warkworth Sands Woodland EEC (Orchid Research, 2003) indicates that the community has a patchy, yet extensive distribution on lands to the east of Wollombi Brook around Warkworth and between Wollombi Brook and Wallaby Scrub Road (see Community 5 in Figure 5 of the FFMP [**Attachment 2**]). The closest occurrence of the Warkworth Sands Woodland EEC is approximately 1,200 metres (m) east of Longwalls 8 to 10A.

In regard to potential environmental consequences on the Warkworth Sands Woodland EEC, Section 4.8.1 of the Wambo Development Project EIS stated (WCPL, 2003):

Potential impacts of underground mining activities on the Warkworth Sands Woodland primarily relate to the potential for minor surface cracking as a result of subsidence. Due to the depth of the Arrowfield and Bowfield Seams to the east of Wollombi Brook only minor surface cracking would be expected (Figure 4-2). The northern portions of the longwall panels in this area are overlain by tertiary-sands that due to their mobility would be expected to in-fill any cracks rapidly (Appendix O). As a result, it is not expected that subsidence would significantly impact the Warkworth Sands Woodland community in this area.

Section ES1.4 of the North Wambo Longwall 10A Modification EA (WCPL, 2014) stated:

The Warkworth Sands Woodland community is located outside the extent of subsidence from the Modification.

An empirical model for the Newcastle Coalfield indicates that measurable far-field displacement movements (i.e. greater than 20 millimetres [mm]) may occur for distances up to 3 to 4 times the cover depth, however far-field displacement movements outside a distance equal to one cover depth are unlikely to generate significant strains or movements to cause cracking or damage to the surface (Ditton Geotechnical Services [DgS], 2012). Mine Subsidence Engineering Consultants (MSEC) (2014b) predicts that far-field horizontal movements resulting from extraction at the North Wambo Underground Mine would be very small and could only be detected by precise surveys.

In consideration of the above and given the proximity of the Warkworth Sands Woodland EEC in relation to Longwalls 8 to 10A (i.e. approximately 1,200 m), it is very unlikely that the Warkworth Sands Woodland EEC will experience impacts resulting from the extraction of Longwalls 8 to 10A.

On this basis, monitoring of environmental consequences against performance indicators and measures relating to the Warkworth Sands Woodland EEC are not considered necessary for Longwalls 8 to 10 and therefore have not been included in **Section 5**. Monitoring relevant to the Warkworth Sands Woodland EEC will be addressed in subsequent Extraction Plans.

3.1.4 White Box, Yellow Box, Blakely's Red Gum Woodland/Grassy White Box Woodland Endangered Ecological Community/Critically Endangered Ecological Community

As summarised in **Table 3**, the Development Consent (DA 305-7-2003) includes performance measures specific to the White Box, Yellow Box, Blakely's Red Gum Woodland/Grassy White Box Woodland EEC/CEEC.

Mapping of the White Box, Yellow Box, Blakely's Red Gum Woodland/Grassy White Box Woodland EEC/CEEC (Orchid Research, 2003) indicates that the community is represented by scattered occurrences of Yellow Box (*Eucalyptus melliodora*) in small isolated groups and individuals along both sides of Wollombi Brook (see Communities 3 and 11 in Figure 5 of the FFMP [**Attachment 2**]).

Revised vegetation mapping by FloraSearch (**Figure 5**) shows there is no White Box, Yellow Box, Blakely's Red Gum Woodland/Grassy White Box Woodland EEC/CEEC within at least 750 m of Longwalls 8 to 10A.

In regard to potential environmental consequences on the White Box, Yellow Box, Blakely's Red Gum Woodland/Grassy White Box Woodland EEC, Section 4.8.1 of the Wambo Development Project EIS stated (WCPL, 2003):

Of the 21 ha mapped by Orchid Research (2003), approximately 4 ha are located above Project underground mining areas. Potential impacts of underground mining activities relate to the potential for subsidence to cause surface cracking and to alter existing surface drainage patterns which may result in isolated ponding in some areas. Disturbance to the land surface and to the Box-Gum Woodland as a result of surface cracking and ponding is however predicted to be minimal given the depth of the underground workings. Notwithstanding this, surface monitoring would be conducted to confirm the above. In the event that monitoring indicates the need for remediation, these works would be undertaken (Section 4.2.2).

Section ES1.4 of the North Wambo Modification EA stated (WCPL, 2012):

The White Box, Yellow Box, Blakely's Red Gum Woodland/Grassy White Box Woodland community is located outside the extent of subsidence from the Modification.

Similarly, Section ES1.4 of the North Wambo Modification Longwall 10A EA stated (WCPL, 2014):

The White Box, Yellow Box, Blakely's Red Gum Woodland/Grassy White Box Woodland community is located outside the extent of subsidence from the Modification.

An empirical model for the Newcastle Coalfield indicates that measurable far-field displacement movements (i.e. greater than 20 mm) may occur for distances up to 3 to 4 times the cover depth, however far-field displacement movements outside a distance equal to one cover depth are unlikely to generate significant strains or movements to cause cracking or damage to the surface (DgS, 2012). MSEC (2014b) predicts that far-field horizontal movements resulting from extraction at the North Wambo Underground Mine would be very small and could only be detected by precise surveys.

In consideration of the above and given the proximity of the White Box, Yellow Box, Blakely's Red Gum Woodland/Grassy White Box Woodland EEC/CEEC in relation to Longwalls 8 to 10A (i.e. more than 750 m), it is very unlikely that the White Box, Yellow Box, Blakely's Red Gum Woodland/Grassy White Box Woodland EEC/CEEC will experience impacts resulting from the extraction of Longwalls 8 to 10A.

On this basis, monitoring of environmental consequences against performance indicators and measures relating to the White Box, Yellow Box, Blakely's Red Gum Woodland/Grassy White Box Woodland EEC/CEEC are not considered necessary for Longwalls 8 to 10A and therefore have not been included in **Section 5**. Monitoring relevant to the White Box, Yellow Box, Blakely's Red Gum Woodland/Grassy White Box Woodland EEC/CEEC will be addressed in subsequent Extraction Plans.

3.1.5 Other Threatened Ecological Communities

The following threatened ecological communities have been recorded in the vicinity of the Longwalls 8 to 10A Application Area by FloraSearch (2012, 2014):

- *Hunter Lowland Red Gum Forest in the Sydney Basin and New South Wales North Coast Bioregions* EEC (Community 2 on **Figure 5**);
- *Central Hunter Grey Box – Ironbark Woodland in the New South Wales North Coast and Sydney Bioregions* EEC (Community 3 on **Figure 5**); and
- *Hunter Valley Footslopes Slaty Gum Woodland in the Sydney Basin Bioregion* Vulnerable Ecological Community (Community 7 on **Figure 5**).

Three patches of Hunter Valley Weeping Myall (*Acacia pendula*) have been recorded in the vicinity of Longwalls 8 to 10A. The three patches have no closely associated tree or shrub species and the ground cover comprises native grasses and forbs typical of the derived grassland paddock in which they occur (FloraSearch, 2014). FloraSearch (2014) concluded it is difficult to conclusively determine whether the Hunter Valley Weeping Myall occurrences on the Study area represent surviving relics of former *Hunter Valley Weeping Myall in the Sydney Basin Bioregion EEC* (Hunter Valley Weeping Myall Woodland EEC) or are simply surviving understorey components of former Grey Box – Narrow-leaved Ironbark woodland (Community 3 of **Figure 5**). FloraSearch (2014) concluded there is a low likelihood that the Hunter Valley Weeping Myall remnants on the Study area represent the EEC, due to the absence of nearly all characteristic species of the EEC. These patches have been conservatively considered in this BMP as a potential threatened ecological community.

In regard to potential environmental consequences on vegetation, Section 4.8.2 of the North Wambo Modification EA (WCPL, 2012) stated:

...it is unlikely vegetation within the extent of subsidence from the Modification would be adversely affected by mine subsidence. This conclusion is supported by inspection of previously undermined areas to the west of the Modification area, which showed that despite evidence of surface cracking of the soil, the condition of the vegetation on the undermined area was not noticeably different from that on adjacent similar unmined areas and showed no signs of dieback (Appendix D).

In addition, Section 5.4 of the Flora Assessment of the North Wambo Longwall 10A Modification EA (FloraSearch, 2014) stated:

...no scientific evidence of adverse surface effects on terrestrial vegetation from subsidence effects is known from underground mining anywhere in Australia. Consequently, it is unlikely the EEC would be adversely affected by mine subsidence.

It is concluded that the Modification is unlikely to significantly reduce the quality or availability of habitat for these threatened ecological communities.

3.1.6 Threatened Populations

The three patches of Hunter Valley Weeping Myall (*Acacia pendula*) recorded in the vicinity of Longwalls 8 to 10A (**Figure 5**) are considered part of the *Acacia pendula* population in the Hunter Catchment endangered population listed under the TSC Act.

The northern patch, which is outside the predicted extent of subsidence, is the largest, comprising four main groups of large trees and several more isolated trees (FloraSearch, 2014). The centre patch encompasses two well separated trees 5 to 6 m high and numerous small heavily grazed root suckers surrounding them (FloraSearch, 2014). The southern patch comprises a clump of five small trees (**Plate 1**) with four small severely grazed outliers nearby (FloraSearch, 2014).



Source: FloraSearch (2014).

Plate 1 – Southern Patch of *Acacia pendula*

In regard to potential environmental consequences on this endangered population, Section 7.2.1 of the Flora Assessment of the North Wambo Longwall 10A Modification EA (FloraSearch, 2014) concluded:

The Acacia pendula in the Hunter Catchment EP occurs in two locations on WCPL owned land; on the Modification area and approximately 2 km to the north-west of the Modification area. The north-western occurrence has been undermined by North Wambo Longwall 4 with no obvious detrimental effects on Acacia pendula (RPS in Wambo Coal, 2012). Longwall 10A is in the same coal seam at a similar depth below the surface. Accordingly, although there is potential for minor root damage caused by soil cracking, subsidence impacts are not expected to cause the deaths of any Acacia pendula plants.

...

It is concluded that the Project is unlikely to significantly impact on the Acacia pendula in the Hunter Catchment EP.

3.1.7 Threatened Species

No flora species listed in the schedules of the TSC Act or EPBC Act have been found in targeted searches or other sampling conducted over the Longwalls 8 to 10A Application Area (FloraSearch, 2014).

FloraSearch (2014) considers that two less conspicuous species, Wybong Leek Orchid, *Prasophyllum* sp. Wybong and the Illawarra Greenhood, *Pterostylis gibbosa*, (both native terrestrial orchids), although not recorded in targeted surveys may have the potential to occur within the Longwalls 8 to 10A Application Area.

In regard to potential environmental consequences on these threatened species, Section 7.1.1 of the Flora Assessment of the North Wambo Longwall 10A Modification EA (FloraSearch, 2014) concluded:

It is concluded that the Project is unlikely to significantly impact on the Wybong Leek Orchid or the Illawarra Greenhood, if they were to occur on the Modification area.

As there are no known locations of threatened species within the Longwalls 8 to 10A Application Area, monitoring of environmental consequences against performance indicators and measures relating to threatened species is not considered necessary for Longwalls 8 to 10A and therefore has not been included in **Section 5**. Notwithstanding, any disturbance in the Longwalls 8 to 10A Application Area (e.g. for remediation) will be conducted in accordance with the VCP and TSMP in the FFMP (**Attachment 2**), which includes procedures in the event that threatened flora species are identified.

3.2 FAUNA

3.2.1 Background

Avifauna, mammals, reptiles and amphibians were surveyed at the Wambo Coal Mine in 2003 (Mount King Ecological Surveys, 2003; Greg Richards and Associates, 2003), 2009 (RPS Harper Somers O'Sullivan [RPS HSO], 2009), 2010 (Biosphere Environmental Consultants, 2012), 2011 (Niche Environment and Heritage, 2012) and 2014 (Niche Environment and Heritage, 2014).

A total of 15 threatened fauna species were recorded in the vicinity of Wambo, including nine birds and six mammals (Mount King Ecological Surveys, 2003; Greg Richards and Associates, 2003; RPS HSO, 2009; Niche Environment and Heritage, 2012; Niche Environment and Heritage, 2014). These threatened fauna species are listed in **Table 4**.

Table 4
Threatened Fauna Species

Common Name	Scientific Name	Conservation Status*	
		TSC Act ¹	EPBC Act ²
Grey-crowned Babbler (eastern subspecies)	<i>Pomatostomus temporalis temporalis</i>	V	-
Little Eagle	<i>Hieraaetus morphnoides</i>	V	-
Square-tailed Kite	<i>Lophoictinia isura</i>	V	-
Gang-gang Cockatoo	<i>Callocephalon fimbriatum</i>	V	-
Glossy Black-Cockatoo	<i>Calyptorhynchus lathami</i>	V	-
Diamond Firetail	<i>Stagonopleura guttata</i>	V	-
Hooded Robin	<i>Melanodryas cucullata cucullata</i>	V	-
Masked Owl	<i>Tyto novaehollandiae</i>	V	-
Painted Honeyeater	<i>Grantiella picta</i>	V	-
Spotted Harrier	<i>Circus assimilis</i>	V	-
Little Lorikeet	<i>Glossopsitta pusilla</i>	V	-
Brown Treecreeper	<i>Climacteris picumnus victoriae</i>	V	-
Varied Sittella	<i>Daphoenositta chrysoptera</i>	V	-
Specked Warbler	<i>Chthonicola sagittata</i>	V	-
Scarlet Robin	<i>Petroica boodang</i>	V	-
Powerful Owl	<i>Ninox strenua</i>	V	-
Turquoise Parrot	<i>Neophema pulchella</i>	V	-
Squirrel Glider	<i>Petaurus norfolcensis</i>	V	-
Little Bentwing-bat	<i>Miniopterus australis</i>	V	-
Yellow-bellied Sheath-tail-bat	<i>Saccolaimus flaviventris</i>	V	-
Greater Broad-nosed Bat	<i>Scoteanax rueppellii</i>	V	-
Eastern False Pipistrelle	<i>Falsistrellus tasmaniensis</i>	V	-
Eastern Freetail-bat	<i>Mormopterus norfolkensis</i>	V	-
Large-eared Pied Bat	<i>Chalinolobus dwyeri</i>	V	V
Brush-tailed Rock Wallaby	<i>Petrogale penicillata</i>	E	V

Source: Niche Environment and Heritage (2014).

* Conservation status current as of 17 December 2014.

¹ TSC Act.

² EPBC Act.

V Vulnerable.

E Endangered.

No threatened fauna populations listed under the TSC Act have been recorded within the Longwalls 8 to 10A Application Area (Mount King Ecological Surveys, 2003; Greg Richards and Associates, 2003; RPS HSO, 2009; Niche Environment and Heritage, 2012; Niche Environment and Heritage, 2014).

3.2.2 Revised Assessment of Potential Subsidence Impacts and Environmental Consequences

As described in Section 2.1 of the Extraction Plan, the magnitude of the tilt and strain predictions for Longwalls 8 to 10A are consistent with those presented in the Wambo Development Project EIS, the North Wambo SEE, North Wambo Modification EA and the North Wambo Longwall 10A Modification EA. On this basis, environmental consequences on fauna resulting from the extraction of Longwalls 8 to 10A will be consistent with those presented in the Wambo Development Project EIS, the North Wambo SEE, the North Wambo Modification EA and the North Wambo Longwall 10A Modification EA.

3.3 AQUATIC ECOSYSTEMS

3.3.1 Background

Aquatic macroinvertebrate, fish and water quality sampling was conducted for the Wambo Development Project EIS. The sampling sites displayed considerable variation in terms of stream structure (e.g. pool/run sequence or isolated pools), stream flow and the condition of the riparian zone. The sampling found North Wambo Creek to represent minimal fish habitat with two native and one introduced fish species recorded from North Wambo Creek during the sampling.

3.3.2 Revised Assessment of Potential Subsidence Impacts and Environmental Consequences

As described in Section 2.1 of the Extraction Plan, the magnitude of the tilt and strain predictions for Longwalls 8 to 10A are consistent with those presented in the Wambo Development Project EIS, the North Wambo SEE, the North Wambo Modification EA and the North Wambo Longwall 10A Modification EA. On this basis, environmental consequences on aquatic ecosystems resulting from the extraction of Longwalls 8 to 10A will be consistent with those presented in the Wambo Development Project EIS, the North Wambo SEE, the North Wambo Modification EA and the North Wambo Longwall 10A Modification EA.

Potential impacts of the development of Longwalls 8 to 10A on the aquatic ecosystems of North Wambo Creek, Wambo Creek and Stony Creek are primarily associated with the effects of subsidence (i.e. surface cracking, ponding/flooding, erosion and alterations to surface water and groundwater regimes above the longwall panels). These potential impacts are described in detail in Section 3 of the Water Management Plan.

In regard to potential environmental consequences on the aquatic ecosystems, Section 4.10 of the Wambo Development Project EIS (WCPL, 2003) stated:

Alteration of the natural flow regimes of rivers and streams and the degradation of native riparian vegetation along watercourses are recognised as key threatening processes under the TSC Act and/or NSW Fisheries Management Act, 1994. However, any alterations to aquatic habitat as a result of the Project are unlikely to significantly alter the macroinvertebrate or fish community composition, or the conservation values of these streams given the high degree of historical disturbance to these streams.

Section 4.2.2 of the North Wambo Modification EA (WCPL, 2012) stated:

Wollombi Brook is located 450 m east of Longwall 10, at its closest point to the Modification longwall panel. At this distance, Wollombi Brook is not expected to experience any measurable tilts, curvatures or strains.

...

North Wambo Creek and Wambo Creek (also known as South Wambo Creek) are located outside the extent of the Modification longwall panels. These creeks are not expected to experience any measurable tilts, curvatures or strains resulting from the extraction of the Modification longwall panels (Appendix A).

Stony Creek is also located outside the extents of the Modification longwall panels, but it is situated immediately adjacent to the southern corner of the proposed Longwall 10. Stony Creek could experience small additional subsidence in the vicinity of the proposed longwalls, however, this is negligible when compared with the total subsidence where the creek is located directly above the longwalls in the Wambo, Arrowfield and Bowfield Seams further upstream (Appendix A).

Similarly, Section 4.2.2 of the North Wambo Longwall 10A Modification EA (WCPL, 2014) stated:

Wollombi Brook is located 125 m east of the finishing end of the proposed Longwall 10A. At this distance, the brook is predicted to experience less than 20 mm of vertical subsidence (Appendix A).

...

It is expected, therefore, that the potential subsidence impacts on the Wollombi Brook due to the extraction of the proposed Longwall 10A would be negligible.

...

North Wambo Creek is located outside the angle of draw, with the banks of the creek located at a distance of 270 m north of the finishing end of the proposed Longwall 10A. It is expected that any subsidence effects caused by the Modification would be negligible (Appendix A).

Furthermore, Section 4.8.2 of the North Wambo Longwall 10A Modification EA (WCPL, 2014) stated:

Niche (Appendix F) concluded that the Modification is unlikely to substantially alter the ecological values of the Modification area and surrounding environment, such that any terrestrial or aquatic fauna species would be significantly impacted.

Niche (Appendix F) also concluded that no threatened fauna or their habitats are likely to be significantly impacted by the Modification.

3.4 WOLLEMI NATIONAL PARK

3.4.1 Background

The visual landscape in the vicinity of the Wambo Coal Mine is dominated by the Wollemi National Park escarpment and the forested landforms that rise behind the escarpment. The escarpment rises above 600 m Australian Height Datum (AHD) and peaks at Mount Wambo (approximately 650 m AHD).

3.4.2 Revised Assessment of Potential Subsidence Impacts and Environmental Consequences

As summarised in **Table 3**, the Development Consent (DA 305-7-2003) includes performance measures specific to the Wollemi National Park.

In regard to potential environmental consequences on the Wollemi National Park escarpment, Section 4.2 of the Wambo Development Project EIS stated:

The Wollemi National Park escarpment would not be subsided by the extraction of Project longwall panels (Appendix O).

Section 4.2.2 of the North Wambo Modification EA (WCPL, 2012) stated:

The Wollemi National Park escarpment is greater than 1 km west of the Modification longwall panels at its closest point and is not expected to experience any measurable tilts, curvatures or strains (Appendix A).

Similarly, Section 4.2.2 of the North Wambo Longwall 10A Modification EA (WCPL, 2014) stated:

The Wollemi National Park Escarpment is greater than 2 km west of the proposed Longwall 10A at its closest point, and is not expected to experience any measurable tilts, curvatures or strains (Appendix A).

An empirical model for the Newcastle Coalfield indicates that measurable far-field displacement movements (i.e. greater than 20 mm) may occur for distances up to 3 to 4 times the cover depth, however far-field displacement movements outside a distance equal to one cover depth are unlikely to generate significant strains or movements to cause cracking or damage to the surface (DgS, 2012). MSEC (2014b) predicts that far-field horizontal movements resulting from the extraction at the North Wambo Underground Mine would be very small and could only be detected by precise surveys.

In consideration of the above, and given the proximity of the Wollemi National Park escarpment in relation to Longwalls 8 to 10A (i.e. more than 1 km), it is very unlikely that the Wollemi National Park escarpment will experience impacts resulting from the extraction of Longwalls 8 to 10A. Notwithstanding, given the sensitivity of the escarpment, performance indicators have been developed for the Wollemi National Park escarpment and visual monitoring will occur when Longwalls 8 to 10A are within 2 km of the Wollemi National Park escarpment.

4 FLORA AND FAUNA MONITORING

Flora and fauna monitoring conducted at the Wambo Coal Mine is detailed in the existing FFMP. This consists of (**Figure 6**):

- monitoring of the revegetation of disturbance areas through visual monitoring and Ecosystem Function Analysis;
- monitoring of the RWEPP areas through:
 - permanent flora quadrats (which record flora diversity and species abundance at both base quadrats within the RWEPP areas, and analogue/reference sites surrounding the RWEPP);
 - habitat complexity monitoring using a number of permanent transects within woodland enhancement areas;
 - terrestrial fauna monitoring (including bird surveys, and vertebrate fauna species diversity and abundance);
 - freshwater macro-invertebrate monitoring (SIGNAL A values, water quality indicators);
 - monitoring of specific enhancement initiatives (e.g. the provision of nesting/roosting boxes, weed control or feral animal control); and
- riparian zone monitoring transects (recording stability, vegetation and invasive species).

4.1 FLORA MONITORING ABOVE LONGWALLS 8 TO 10A

In order to provide greater coverage of flora monitoring for the North Wambo Underground Mine Longwalls 8 to 10A, several flora monitoring sites (S1, S2 and S3) will be monitored annually during mining of Longwalls 8 to 10A (**Figure 6**). These monitoring sites were chosen based on the ability to detect potential subsidence impacts, if any, as a result of Longwalls 8 to 10A. The latest survey of these sites was conducted by Niche Environment and Heritage in June 2014.

The flora monitoring sites above Longwalls 8 to 10A (S1, S2 and S3) will be monitored using 20 x 20 m quadrats annually in spring in accordance with the following methodology:

- Record flora species diversity (in accordance with FFMP methodology) including:
 - total number of species; and
 - number and percentage of native/introduced flora species.
- Record flora species abundance (in accordance with FFMP methodology).
- Conduct a nested flora belt transect to appraise the status of rehabilitation, where present.
- Conduct Biometric plots (Gibbons, *et al.*, 2009) using 50 x 20 m plot recording:
 - native plant species richness;
 - native overstorey cover;
 - native mid-storey cover;
 - native groundcover stratum grasses;
 - native groundcover stratum shrubs;
 - native groundcover other;
 - exotic plant cover;
 - number of trees with hollows;
 - overstorey regeneration; and
 - total length of fallen logs.

- Prepare a permanent, 50 m transect established at each site.
- Take a photograph at each plot along the 50 m transect.
- Conduct statistical data analysis on plant cover abundance and relevant Biometric plot data.

In addition to the above, WCPL will monitor the southern patch of *Acacia pendula* located within the Longwalls 8 to 10A Application Area (**Figure 6** and **Plate 1**). The patch will be monitored annually in spring from spring 2015 until 2 years following the completion of subsidence using the following methodology:

- Record the number of and condition of *Acacia pendula* trees.
- Take a photograph of the patch at the site.
- Compare the observations and photo with the condition reported in FloraSearch (2014) and previous monitoring.

5 ASSESSMENT OF PERFORMANCE INDICATORS AND MEASURES

In accordance with Condition 22C(d) of Schedule 4 of the Development Consent (DA 305-7-2003), performance indicators have been developed for the performance measures listed in **Table 3**. The proposed performance indicators are summarised in **Table 5**.

Table 5
Biodiversity Performance Measures and Performance Indicators

Performance Measure	Performance Indicator(s)
Wollemi National Park Negligible subsidence impacts. Negligible environmental consequences.	<ul style="list-style-type: none"> The performance indicators will be considered to have been exceeded if the actual angle of draw is greater than the predicted ‘worst case’¹ angle of draw. The performance indicators will be considered to have been exceeded if visual inspections identify cliff instability experienced by the Wollemi National Park escarpment.
Other Threatened Species, Populations or Communities Minor cracking and ponding of the land surface or other impact. Negligible environmental consequences.	<ul style="list-style-type: none"> The performance indicator will be considered to have been exceeded if annual monitoring at sites S1 and S2 or riparian vegetation monitoring on Wambo Creek indicates a declining trend in the condition of the vegetation community or statistically significant changes in vegetation between monitoring periods. The performance indicator will be considered to have been exceeded if visual observations of <i>Acacia pendula</i> indicate deterioration in the condition of the population.

¹ Based on an upper 95% confidence limit.

As described in **Sections 3.1.3** and **3.1.4**, monitoring of environmental consequences against performance indicators and measures relating to the Warkworth Sands Woodland EEC and the White Box, Yellow Box, Blakely’s Red Gum Woodland/Grassy White Box Woodland EEC/CEEC is not considered necessary for Longwalls 8 to 10A. Monitoring relevant to these communities will be addressed in subsequent Extraction Plans.

Monitoring conducted to inform the assessment of the extraction of Longwalls 8 to 10A against the performance indicators for the performance measures relevant to biodiversity includes:

- monitoring of subsidence in accordance with the Subsidence Monitoring Program (Appendix H of the Extraction Plan);
- monitoring in accordance with **Section 4.1** and the FFMP; and
- visual inspections as described in **Table 6** and the Subsidence Monitoring Program (Appendix H of the Extraction Plan).

The monitoring results will be used to assess the extraction of Longwalls 8 to 10A against the performance indicators and performance measures as detailed in **Table 6**. The monitoring process and subsequent assessment of performance indicators and measures is outlined in **Figure 7**.

If data analysis indicates a performance indicator has been exceeded or is likely to be exceeded, an assessment will be made against the performance measure. If a performance measure is considered to have been exceeded, the Contingency Plan will be implemented (**Section 6**). If data analysis indicates that the performance measure has not been exceeded, WCPL will continue to monitor.

**Table 6
Monitoring of Environmental Consequences against Performance Indicators and Measures**

Performance Measure	Monitoring of Environmental Consequence			Data Analysis to Assess against Performance Indicator(s)	Performance Indicator	Assessment of Performance Indicator	Assessment of Performance Measure	Relevant Management and Contingency Measure
	Site	Parameter	Frequency					
Wollemi National Park Negligible subsidence impacts. Negligible environmental consequences.	<ul style="list-style-type: none"> Longwalls 8 to 10A subsidence monitoring line(s). 	<ul style="list-style-type: none"> Ground level displacement. 	<ul style="list-style-type: none"> As per Subsidence Monitoring Program (Appendix H of the Extraction Plan). 	<ul style="list-style-type: none"> Subsidence data analysed monthly. 	<ul style="list-style-type: none"> The actual/measured angle of draw is less than or equal to the predicted 'worst case'¹ angle of draw. 	<ul style="list-style-type: none"> The performance indicators will be considered to have been exceeded if data analysis indicates the actual angle of draw is greater than the predicted 'worst case'¹ angle of draw. If data analysis indicates the performance indicators have been exceeded, an assessment will be made against the performance measure (Figure 7). 	<ul style="list-style-type: none"> The performance measure is exceeded if subsidence monitoring data and geotechnical analysis indicate development of Longwalls 8 to 10A have resulted in: <ul style="list-style-type: none"> subsidence greater than 20 mm at the Wollemi National Park; and greater than negligible environmental consequences to the Wollemi National Park. If subsidence greater than 20 mm has occurred at the Wollemi National Park, the above analysis will be peer reviewed by a specialist approved by the DP&E. 	<ul style="list-style-type: none"> Implementation of erosion and sediment control measures and stabilisation techniques. Scaling/dislodgement/removal of remaining loose rock. Measures to improve the aesthetic values if cliff instability occurs, for example planting of endemic native vegetation at the base of the escarpment. Additional monitoring (e.g. increase in monitoring frequency). Consideration of changes to longwall extraction geometry in consultation with relevant regulatory authorities.
	<ul style="list-style-type: none"> Visual inspections. 	<ul style="list-style-type: none"> Visual observations to record the Wollemi National Park escarpment cliff stability (including photographic record).² 	<ul style="list-style-type: none"> On a quarterly basis while the active longwall face is within 2 km of the Wollemi National Park escarpment. 	<ul style="list-style-type: none"> Assessment of changes in cliff stability over time. 	<ul style="list-style-type: none"> Visual inspection does not identify cliff instability experienced by the Wollemi National Park escarpment. 	<ul style="list-style-type: none"> The performance indicators will be considered to have been exceeded if visual inspections identify cliff instability experienced by the Wollemi National Park escarpment. If data analysis indicates the performance indicators have been exceeded, an assessment will be made against the performance measure (Figure 7). 		
Other Threatened Species, Populations or Communities Minor cracking and ponding of the land surface or other impact. Negligible environmental consequences.	<ul style="list-style-type: none"> S1 and S2 monitoring sites (Figure 6).³ Riparian vegetation monitoring transects on Wambo Creek (Figure 6).⁴ 	<ul style="list-style-type: none"> As per Section 4.1. As per Section 4.2.6 of the FFMP (Attachment 2). 	<ul style="list-style-type: none"> Annually as per Section 4.1. Annually as per the FFMP (Attachment 2). 	<ul style="list-style-type: none"> Statistical data analysis on plant cover abundance and relevant Biometric plot data. Review to identify trends or significant changes compared to previous monitoring. 	<ul style="list-style-type: none"> Annual monitoring at sites S1 and S2 and riparian vegetation monitoring on Wambo Creek indicates a sustained or upward trend in the condition of the vegetation community and no statistically significant changes in vegetation between monitoring periods. 	<ul style="list-style-type: none"> The performance indicators will be considered to have been exceeded if annual monitoring at sites S1 and S2 or riparian vegetation monitoring on Wambo Creek indicates a declining trend in the condition of the vegetation community or statistically significant changes in vegetation between monitoring periods. If data analysis indicates the performance indicators have been exceeded, an assessment will be made against the performance measure (Figure 7). 	<ul style="list-style-type: none"> The performance measure is exceeded if subsidence monitoring data and flora and fauna monitoring data indicate development of Longwalls 8 to 10A have resulted in: <ul style="list-style-type: none"> greater than minor cracking and ponding of the land surface or greater than other minor impact at the threatened population or community; and/or greater than negligible environmental consequences to the threatened population or community. The above analysis will be peer reviewed by a specialist approved by the DP&E. 	<ul style="list-style-type: none"> Filling of minor cracks with appropriate material (e.g. soil or mulch) to avoid the creation of drainage channels. Re-grading of isolated depressions or highpoints and revegetation. Re-grading of slopes to minimise the potential for erosion. Remediation of creek beds to minimise bank and headwater erosion. Revegetation with monitoring in accordance with Section 4.1 of the FFMP. Additional monitoring (e.g. increase in monitoring frequency). Offset in accordance with Condition 22, Schedule 4 of the Development Consent (DA 305-7-2003).
	<ul style="list-style-type: none"> Visual inspections of <i>Acacia pendula</i> patch (Figure 6). 	<ul style="list-style-type: none"> As per Section 4.1. 	<ul style="list-style-type: none"> Annually as per Section 4.1. 	<ul style="list-style-type: none"> Review to identify trends or significant deterioration compared to previous monitoring. 	<ul style="list-style-type: none"> Visual observations of <i>Acacia pendula</i> do not indicate deterioration in the condition of the population. 	<ul style="list-style-type: none"> The performance indicator will be considered to have been exceeded if visual observations of <i>Acacia pendula</i> indicate deterioration in the conditions of the population. If data analysis indicates the performance indicators have been exceeded, an assessment will be made against the performance measure (Figure 7). 		

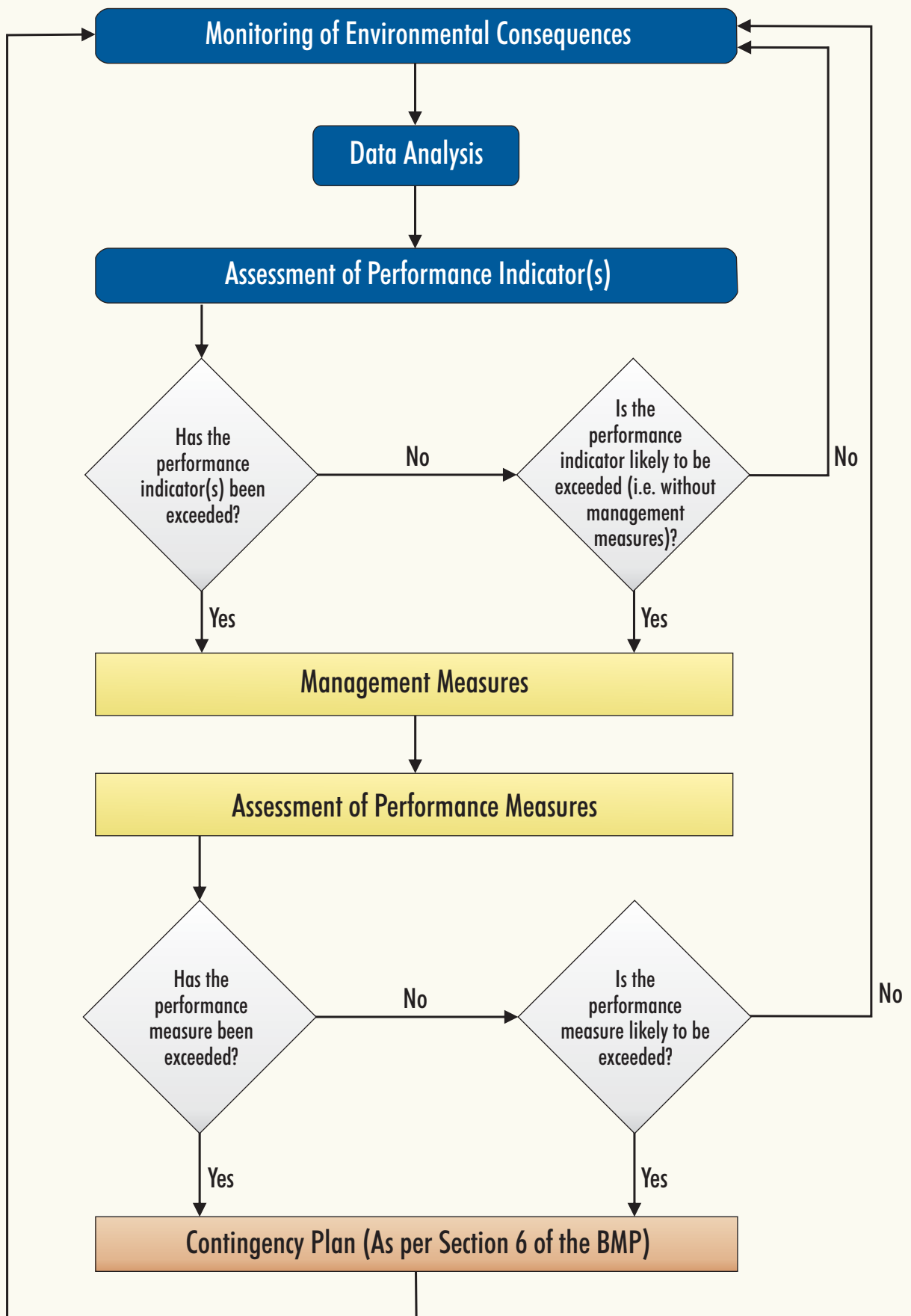
¹ Based on an upper 95% confidence limit.

² Visual inspection will be conducted from areas accessible by vehicle for signs of freshly exposed rock face or debris, or areas of significant vegetation dieback.

³ Sites S1 and S2 are located within the *Central Hunter Grey Box – Ironbark Woodland in the New South Wales North Coast and Sydney Bioregions* EEC.

⁴ Riparian vegetation monitoring transects on Wambo Creek are located within *Hunter Lowland Red Gum Forest in the Sydney Basin and New South Wales North Coast Bioregions* EEC.

CONTINGENCY MANAGEMENT



W A M B O C O A L M I N E

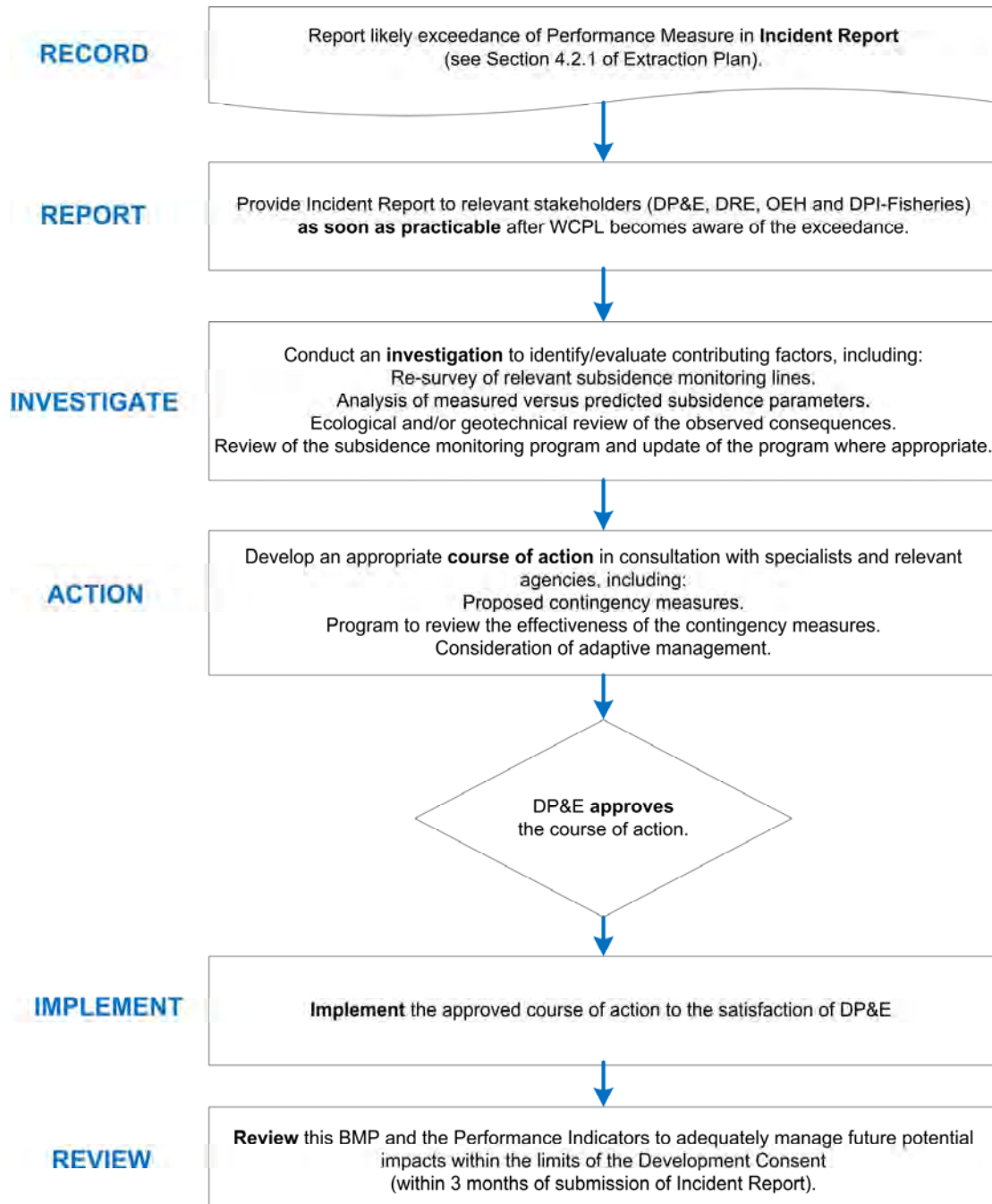
FIGURE 7

Monitoring of Environmental Consequences
against Performance Indicators
and Measures



6 CONTINGENCY PLAN

In the event the biodiversity performance measures and actions summarised in **Table 6** are considered to have been exceeded or are likely to be exceeded, in accordance with the schematic presented in **Figure 7**, WCPL will implement the following Contingency Plan:



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

7 REFERENCES

- Biosphere Environmental Consultants (2012) *Wambo Coal Mine Montrose Water Storage Modification Terrestrial Fauna Assessment*.
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ATTACHMENT 1

BIODIVERSITY MANAGEMENT PLAN
TRIGGER ACTION RESPONSE PLAN

**Table A1-1
Biodiversity Management Plan Trigger Action Response Plan**

Condition	Normal	Level 1	Level 2
	Predicted Impacts	Management Measures	Restoration/Contingency Phase
Trigger	<ul style="list-style-type: none"> Predicted impacts on flora, fauna and aquatic ecosystems, described in Section 3. 	<ul style="list-style-type: none"> Management measures implemented. (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 FFMP). 	<ul style="list-style-type: none"> If the biodiversity performance measure has been exceeded, or is likely to be exceeded.
Action	<ul style="list-style-type: none"> Conduct monitoring, consistent with Section 4.1, Table 6, the FFMP and the Subsidence Monitoring Program (Appendix H of the Extraction Plan). Assess the environmental consequences of the subsidence in accordance with Section 5. Assess the need for management measures in accordance with the FFMP. 	<ul style="list-style-type: none"> Implement management measures, as required, in accordance with the FFMP. 	<ul style="list-style-type: none"> Implement Contingency Plan described in Section 6.
Frequency	<ul style="list-style-type: none"> Frequency consistent with Section 4.1, Table 6 and the FFMP. 	<ul style="list-style-type: none"> As required, in accordance with Section 5 and the FFMP. 	<ul style="list-style-type: none"> As required, in accordance with Section 6.
Position of Decision Making	<ul style="list-style-type: none"> Environment and Community Manager. 	<ul style="list-style-type: none"> Environment and Community Manager. 	<ul style="list-style-type: none"> General Manager.

Note: FFMP refers to the Wambo Coal Pty Limited Flora and Fauna Management Plan.

ATTACHMENT 2
WAMBO COAL MINE
FLORA AND FAUNA MANAGEMENT PLAN



FLORA & FAUNA MANAGEMENT PLAN

AMENDEMENT A
June 2014

PREPARED BY
WAMBO COAL PTY LIMITED

February 2014

**Wambo Coal Pty Limited
Environmental
Management System**

**Flora and Fauna
Management Plan**


Wambo Coal Pty Limited – Flora and Fauna Management Plan

Document Control

Document No.	EMP0110
Title	Flora and Fauna Management Plan
General Description	Management of flora and fauna surrounding WCPL operations
Key Support Documents	WCPL Environmental Management System Development Consent – DA 305-7-2003, DA177-8-2004

Revisions

Rev No	Date	Description	By	Checked
0	June 05	Original Draft	Resource Strategies	JT/TS
1	22 June 05	Final Draft	Resource Strategies	JT/TS
2	August 05	Final	Resource Strategies	TS
3	October 08	Revision	Wambo Coal Pty Limited	SB
4	January 10	Revision	Wambo Coal Pty Limited	SB
5	Sept 2011	Revision	Wambo Coal Pty Limited	LC
6	March 2012	Revision	Wambo Coal Pty Limited	LC/TF
7	Feb 2014	Revision	Wambo Coal Pty Limited	TF
8	June 2014	Amendment A	Wambo Coal Pty Ltd	TF

Approver: Manager Environment and Community	Troy Favell
Date: 01/04/2014	Signature: 

The nominated Coordinator for this document is	WCPL Environment and Community Manager
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Attachment 1 Development Consent (DA 305-7-2003)

1.0 INTRODUCTION

Wambo Coal Pty Limited (WCPL) is situated approximately 15 kilometres west of Singleton, near the village of Warkworth, New South Wales (see **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.

An aerial photograph of WCPL, illustrating the approved extent of the open cut and underground mine operations and key infrastructure is provided on **Figure 2**. 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 ¹
Life of Mine	<ul style="list-style-type: none"> 21 years (from the date of the commencement of Development Consent [DA 305-7-2003]). 1st March 2025
Open Cut Mining	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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 104 Mt.
Subsidence commitments and management.	<ul style="list-style-type: none"> The subsidence performance measures listed in Conditions 22 and 22A of the Development Consent (DA 305-7-2003).
ROM Coal Production Rate	<ul style="list-style-type: none"> Up to 14.7 Mtpa of ROM coal.
Total ROM Coal Mined	<ul style="list-style-type: none"> 202 Mt.
Waste Rock Management	<ul style="list-style-type: none"> Waste rock deposited in open cut voids and in waste rock emplacements adjacent open cut operations.
Total Waste Rock	<ul style="list-style-type: none"> 640 million bank cubic metres (Mbcm).
Coal Washing	<ul style="list-style-type: none"> Coal handling and preparation plant (CHPP) capable of processing approximately 1,800 tonnes per hour (tph).
Product Coal	<ul style="list-style-type: none"> Production of up to 11.3 Mtpa of thermal coal predominantly for export.
CHPP Reject Management	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Approximately 27 Mt of coarse rejects and approximately 18 Mt of tailings.
Water Supply	<ul style="list-style-type: none"> 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.

Note: ¹ Development Consent DA 305-7-2003 (as modified December 2012)

In accordance with Condition 44, Schedule 4 of DA305-7-2003, WCPL are required to prepare a Flora and Fauna Management Plan (FFMP). As a result of the December 2012 modification (MOD 11)¹ to DA 305-7-2003, a review of the FFMP has been undertaken to address the new approval conditions for the management of flora and fauna. In addition, this review has also considered the transition of WCPL to owner-operator of the Open Cut operations. Notwithstanding this FFMP has been prepared in accordance with:

- Development consent DA 305-7-2003, Schedule 4, Consent Conditions 40, 41A, 44, 45, 46, 47, and 48;
- Development consent DA 305-7-2003, Schedule 6, Consent Condition 4;
- Development Consent DA 177-8-2004, Schedule 4, Consent Condition 32,33 and 34; and
- *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act) approval (EPBC 2003/1138).

The applicable consent conditions and where they are address within the corresponding sections of this FFMP are outlined in **Table 2**. All regulatory correspondence related to the FFMP is included in **Appendix F**.

¹ WCPL submitted in June 2012 an application to modify DA 305-7-2003 for the construction and operation of the Montrose Water Storage and associated supporting infrastructure under section 75W of the EP&A Act. MOD 11 was approved by the NSW DP&I 18 January 2013.



WAM-04-03 F&FWP_001C

WCPL - Flora and Fauna Management Plan

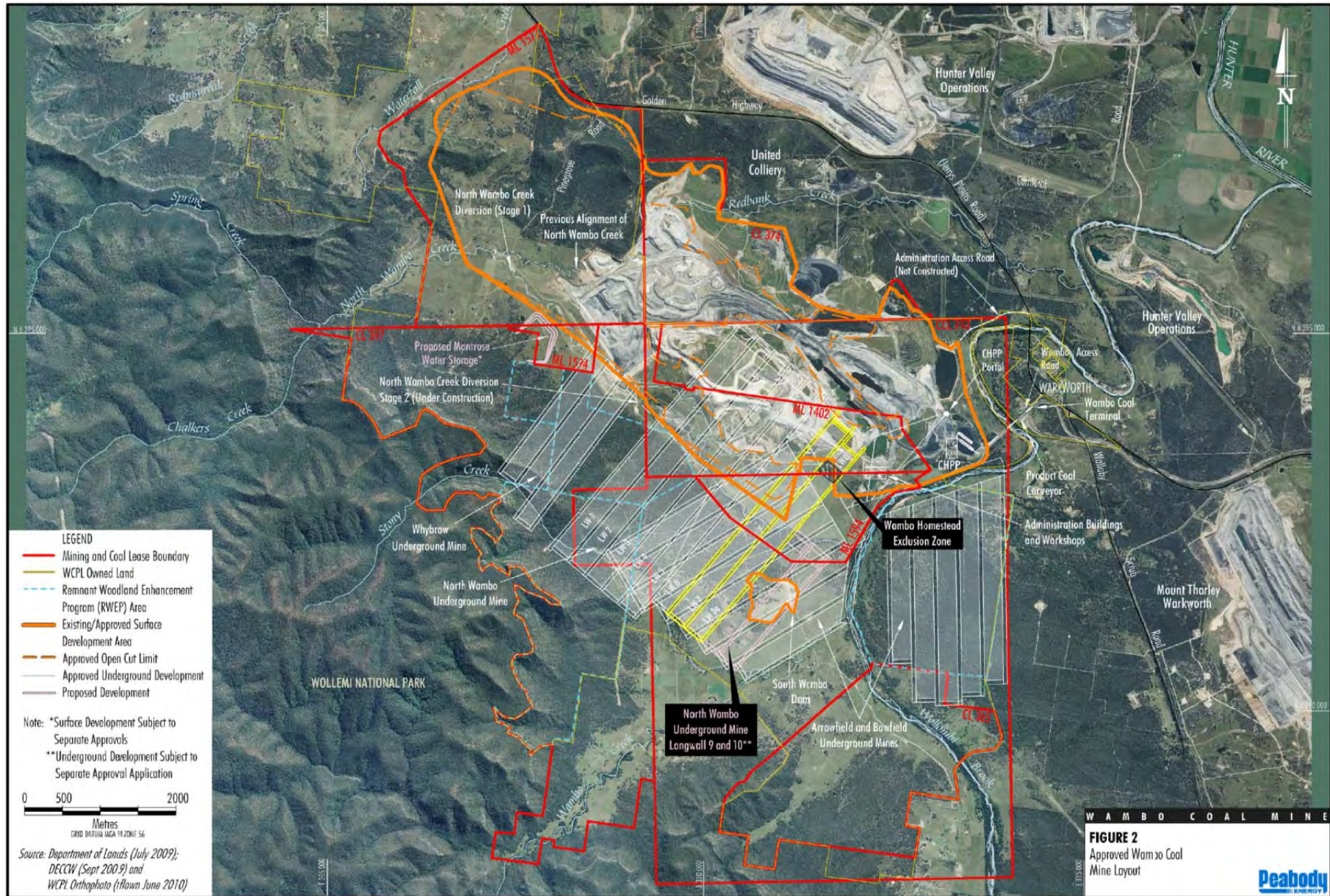


Table 2 Regulatory Requirements for the Flora and Fauna Management Plan

Schedule	Condition	DA 305-7-2003	FFMP Section																		
4	40	<p>Offset Strategy</p> <p>Within the limits of current technology and best practice flora and fauna management, as determined by the Director-General in consultation with the Hunter Coalfield Flora & Fauna Advisory Committee (<i>when established</i>), the Applicant shall implement:</p> <p>(a) the offset strategy summarised in Table 16; and</p> <p>(b) any subsequent revisions to the offset strategy, prepared in consultation with the Hunter Coalfield Flora & Fauna Advisory Committee (<i>when established</i>), and approved in writing by the Director-General; to the satisfaction of the Director-General.</p> <table border="1"> <thead> <tr> <th>Area</th> <th>Size</th> </tr> </thead> <tbody> <tr> <td>Remnant Woodland Enhancement Area A</td> <td>424 ha</td> </tr> <tr> <td>Remnant Woodland Enhancement Area B</td> <td>454 ha</td> </tr> <tr> <td>Remnant Woodland Enhancement Area C</td> <td>211 ha</td> </tr> <tr> <td>Open Cut Woodland Revegetation</td> <td>1,570 ha</td> </tr> <tr> <td>Remnant Woodland Enhancement Area D</td> <td>46 ha</td> </tr> <tr> <td>Remnant Woodland Enhancement Area D Extension</td> <td>2 ha</td> </tr> <tr> <td>Remnant Woodland Enhancement Area for the Wambo Coal Terminal</td> <td>As shown in Appendix 4</td> </tr> <tr> <td>Other Areas</td> <td>As identified under Condition 47(b)</td> </tr> </tbody> </table> <p><i>Table 16: Broad targets for Offset Strategy</i></p> <p><i>Notes:</i></p> <p>(a) <i>The areas specified in table 16 are shown in Appendix 4.</i></p> <p>(b) <i>The Director-General shall form the Hunter Coalfield Flora & Fauna Advisory Committee to:</i></p> <ul style="list-style-type: none"> • <i>provide on-going advice on the Flora and Fauna Management Plan; and</i> • <i>monitor and review the performance of the implementation of the Remnant Woodland Enhancement Program.</i> <p>(c) <i>The area of Open Cut Woodland Revegetation in Table 16 is based on the establishment of 50% woodland within the mixed woodland/pasture areas shown in the EIS, and with the agreement of the Director-General, may vary depending on the shape of the final landform and the approved mine closure plan.</i></p>	Area	Size	Remnant Woodland Enhancement Area A	424 ha	Remnant Woodland Enhancement Area B	454 ha	Remnant Woodland Enhancement Area C	211 ha	Open Cut Woodland Revegetation	1,570 ha	Remnant Woodland Enhancement Area D	46 ha	Remnant Woodland Enhancement Area D Extension	2 ha	Remnant Woodland Enhancement Area for the Wambo Coal Terminal	As shown in Appendix 4	Other Areas	As identified under Condition 47(b)	<p>Section 3.3</p> <p>Figure 3</p>
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Remnant Woodland Enhancement Area for the Wambo Coal Terminal	As shown in Appendix 4																				
Other Areas	As identified under Condition 47(b)																				
4	41	<p>Conservation Agreement</p> <p>41. By the end of November 2013, unless otherwise agreed by the Director-General, the Applicant shall:</p> <p>(a) enter into a conservation agreement/s pursuant to section 69B of the <i>National Parks and Wildlife Act 1974</i> covering all offset areas listed in Table 16 (see condition 40) and which records the Applicant's obligations under the conditions of this consent in relation to the management of these areas, and register the agreement/s pursuant to section 69F of the <i>National Parks and Wildlife Act 1974</i>; or</p> <p>(b) where OEH has advised in writing that it is of the view that any such offset area or part of such an area should not be subject to a conservation agreement for a period of time, then the Applicant shall by the same date cause to be registered against the land title(s) of the area/s a public positive covenant and/or restriction on the use of the land, in favour of the Director-General, requiring the Applicant to implement and observe all obligations under the conditions of this consent in relation to the management of these areas. The conservation agreement or the public positive covenant and/or restriction on the use of land, as the case may be, shall remain in force in perpetuity in relation to the area.</p>	<p>Section 3.3.3</p>																		
4	41A	<p>Offset Conservation</p> <p>The Applicant shall not undertake any mining operations (except approved underground mining operations) or other activities within the offset areas listed in Table 16, other than:</p> <p>(a) activities under an approved Biodiversity Management Plan, Flora & Fauna Management Plan or Heritage Management Plan;</p> <p>(b) environmental management, environmental monitoring or other monitoring required under this consent or under an approved management plan or monitoring program; and</p> <p>(c) rehabilitation activities under an approved Extraction Plan.</p>	<p>Section 3.3.3</p>																		

Schedule	Condition	DA 305-7-2003	FFMP Section
4	44	<p>Flora and Fauna Management Plan</p> <p>Before carrying out any development, the Applicant shall prepare a Flora and Fauna Management Plan for the development, in consultation with the Hunter Coalfield Flora and Fauna Advisory Committee (when established), and to the satisfaction of the Director-General. This plan must include:</p> <ul style="list-style-type: none"> (a) a Vegetation Clearance Protocol; (b) a Threatened Species Management Protocol; (c) a Remnant Woodland Enhancement Program; (d) a Flora and Fauna Monitoring Program; (e) strategies to manage any subsidence impacts in the Remnant Woodland Enhancement Areas; (f) strategies to avoid clearing of Warkworth Sands Endangered Ecological Community and minimise the extent of clearing in other ecological communities for gas drainage infrastructure in the Remnant Woodland Enhancement Areas, to the satisfaction of the Director General; (g) strategies for the minimisation of impacts of exploration activity in the Remnant Woodland Enhancement Areas; and (h) a description of who would be responsible for monitoring, reviewing, and implementing the plan. <p>By the end of March 2013, the applicant shall revise the Flora and Fauna Management Plan for the development to the satisfaction of the Director-General.</p>	<p>Section 3.1</p> <p>Section 3.2</p> <p>Section 3.3</p> <p>Section 4.0</p> <p>Section 3.3.3</p> <p>Section 3.1.2 & Section 3.3.3</p> <p>Section 6.6 & Section 7.0</p>
4	45	<p>The Vegetation Clearance Protocol shall include:</p> <ul style="list-style-type: none"> (a) the delineation of areas of remnant vegetation to be cleared; (b) progressive clearing; (c) pre-clearance surveys; (d) the identification of fauna management strategies; (e) collection of seed from the local area; (f) salvage and reuse of material from the site; and (g) control of weeds during clearing activities. 	<p>Section 3.1.1</p> <p>Section 3.1.5</p> <p>Section 3.1.3</p> <p>Section 3.1.4</p> <p>Section 3.1.6</p> <p>Section 3.1.7</p> <p>Section 3.3.3</p>
4	46	<p>The key components of the Threatened Species Management Protocol shall include:</p> <ul style="list-style-type: none"> (a) observations/surveys for threatened species (facilitated by the vegetation clearance surveys and Flora and Fauna Monitoring Program); (b) consultation with regulatory authorities; and (c) threatened species management strategies and reporting. 	<p>Section 3.2.1</p> <p>Section 3.2.3</p> <p>Section 3.2.2</p> <p>& Section 3.2.3</p>
4	47	<p>The Remnant Woodland Enhancement Program shall include:</p> <ul style="list-style-type: none"> (a) a habitat assessment of all areas listed in Table 16, to obtain additional information on existing habitat resources and characteristics of each area; (b) investigation of other areas to be included in the Program, including the <i>Acacia anuera</i> Community (Community 15) and the Southern Area; and (c) appropriate enhancement strategies to be implemented based on the habitat assessment including: <ul style="list-style-type: none"> • the fencing of remnants to exclude livestock; • control measures to minimise the occurrence of weeds; • control measures to minimise the occurrence of feral pests; • limiting vehicular traffic; • selective planting of native vegetation; and • the provision of roosting/nesting resources for fauna. 	<p>Section 3.3.1 & Section 4.2</p> <p>Section 3.3.2</p> <p>Section 3.3.3</p>
4	48	<p>The Flora and Fauna Monitoring Program shall include:</p> <ul style="list-style-type: none"> (a) a program to monitor revegetation of disturbance areas including: <ul style="list-style-type: none"> • visual monitoring to determine the need for maintenance and/or contingency measures; and • monitoring of the quality of rehabilitation using Ecosystem Function Analysis (or a similar systems based approach) through the assessment of landscape function, vegetation dynamics and habitat complexity; and 	<p>Section 4.0</p> <p>Section 4.1.1</p> <p>Section 4.1.2</p>

Schedule	Condition	DA 305-7-2003	FFMP Section												
		<p>(b) a program to monitor the effectiveness of offset strategy in accordance with the description in Table 17.</p> <table border="1"> <thead> <tr> <th>Monitoring Component</th> <th>Monitoring Description</th> </tr> </thead> <tbody> <tr> <td>Flora</td> <td>A number of permanent flora survey quadrats (of varying sizes to survey tree, shrubs and ground cover) should be established in woodland enhancement areas to obtain quantitative data on plant species diversity and abundance.</td> </tr> <tr> <td>Habitat Complexity</td> <td>Habitat complexity should be monitored using a number of permanent transects established within woodland enhancement areas. Habitat complexity parameters such as canopy cover, shrub cover, ground vegetation cover, the amount of litter, fallen logs and rocks should be surveyed.</td> </tr> <tr> <td>Terrestrial Fauna</td> <td>Terrestrial fauna surveys should be conducted to monitor the usage of enhancement areas by vertebrate fauna. Monitoring may include fauna species diversity and abundance or, alternatively, the use of indicator species to measure the effectiveness of enhancement measures.</td> </tr> <tr> <td>Aquatic Fauna</td> <td>Freshwater macro-invertebrate monitoring, including an assessment of SIGNAL A values and water quality (e.g. temperature, pH, and salinity).</td> </tr> <tr> <td>Specific Enhancement Initiatives</td> <td>Monitoring of specific enhancement initiatives (e.g. the provision of nesting/roosting boxes, weed control or feral animal control).</td> </tr> </tbody> </table> <p><i>Table 17: Flora & Fauna Monitoring Program</i></p>	Monitoring Component	Monitoring Description	Flora	A number of permanent flora survey quadrats (of varying sizes to survey tree, shrubs and ground cover) should be established in woodland enhancement areas to obtain quantitative data on plant species diversity and abundance.	Habitat Complexity	Habitat complexity should be monitored using a number of permanent transects established within woodland enhancement areas. Habitat complexity parameters such as canopy cover, shrub cover, ground vegetation cover, the amount of litter, fallen logs and rocks should be surveyed.	Terrestrial Fauna	Terrestrial fauna surveys should be conducted to monitor the usage of enhancement areas by vertebrate fauna. Monitoring may include fauna species diversity and abundance or, alternatively, the use of indicator species to measure the effectiveness of enhancement measures.	Aquatic Fauna	Freshwater macro-invertebrate monitoring, including an assessment of SIGNAL A values and water quality (e.g. temperature, pH, and salinity).	Specific Enhancement Initiatives	Monitoring of specific enhancement initiatives (e.g. the provision of nesting/roosting boxes, weed control or feral animal control).	Section 4.2 & Table 9
Monitoring Component	Monitoring Description														
Flora	A number of permanent flora survey quadrats (of varying sizes to survey tree, shrubs and ground cover) should be established in woodland enhancement areas to obtain quantitative data on plant species diversity and abundance.														
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Specific Enhancement Initiatives	Monitoring of specific enhancement initiatives (e.g. the provision of nesting/roosting boxes, weed control or feral animal control).														
4	49	<p>Annual Review</p> <p>49. The Applicant shall:</p> <p>(a) review the performance of the Flora and Fauna Management Plan annually, in consultation with the Hunter Coalfield Flora & Fauna Advisory Committee (when established); and</p> <p>(b) revise the document as necessary to take into account any recommendations from the annual review.</p>	Section 7.0												
6	4	<p>Management Plan Requirements</p> <p>The Applicant shall ensure that the management plans required under this consent are prepared in accordance with any relevant guidelines, and include:</p> <p>(a) detailed baseline data;</p> <p>(b) a description of:</p> <ul style="list-style-type: none"> • 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; <p>(c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;</p> <p>(d) a program to monitor and report on the:</p> <ul style="list-style-type: none"> • impacts and environmental performance of the Wambo Mining Complex; • effectiveness of any management measures (see c above); <p>(e) a contingency plan to manage any unpredicted impacts and their consequences;</p> <p>(f) a program to investigate and implement ways to improve the environmental performance of the Wambo Mining Complex over time;</p> <p>(g) a protocol for managing and reporting any:</p> <ul style="list-style-type: none"> • incidents; • complaints; • non-compliances with statutory requirements; and • exceedances of the impact assessment criteria and/or performance criteria; <p>and</p> <p>(h) a protocol for periodic review of the plan.</p>	<p>Section 2.0 & Figure 5 & Table 8</p> <p>Section 1.5</p> <p>Section 4.0</p> <p>Section 3.0 & Section 4.0</p> <p>Section 5.0</p> <p>Section 7.1</p> <p>Section 7.0</p> <p>Section 5.0</p> <p>Section 7.0</p>												

Violet represents January 2007 Modification
 Taupe represents December 2012 Modification

Table 2 Regulatory Requirements for the Flora and Fauna Management Plan cont...

Schedule	Condition	DA 177-8-2004	FFMP Section
4	32	Before carrying out the development, the Applicant shall prepare, and then subsequently implement, a Flora and Fauna Management Plan for the development to the satisfaction of the Director-General. This plan must include: (a) a Vegetation Clearance Protocol; and (b) Revegetation and Landscaping Plan for the area marked on the map in Appendix 3.	Section 3.1 Appendix E
4	33	The Vegetation Clearance Protocol shall include: (a) the delineation of areas of remnant vegetation to be cleared; (b) progressive clearing; (c) pre-clearance surveys; (d) the identification of fauna management strategies; (e) collection of seed from the local area; (f) salvage and reuse of material from the site; and (g) control of weeds during clearing activities.	Section 3.1.1 Section 3.1.5 Section 3.1.3 Section 3.1.4 Section 3.1.6 Section 3.1.7 Section 3.3.3
4	34	The Revegetation and Landscaping Plan shall: (a) describe the measures that would be implemented to revegetate the area marked on the map in Appendix 3 of DA 177-8-2004, including: • measures to control the occurrence of weeds; • measures to minimise the occurrence of feral pests; • selective planting of native vegetation; • the provision of roosting/nesting resources for fauna; and (b) describe the measures that would be implemented to: • landscape the new Wallaby Scrub Road/Golden Highway intersection; • maintain this landscaping during the life of the development; and (c) include a program to monitor the effectiveness of the plan during the development.	Appendix E
Condition		EPBC 2003/1138	FFMP Section
2		Prior to the commencement of the mine expansion, the person taking the action must submit for the Minister's approval a plan for managing the impacts of the mine expansion on listed threatened and migratory species. The plan must include measures to: (a) define and implement an offsets strategy that provides: • Protection in perpetuity for Remnant Woodland Enhancement Area A; and • Long-term protection of Remnant Woodland Enhancement Areas B and C; (b) define and implement a Remnant Woodland Enhancement Program that includes the fencing of remnants to exclude livestock, weed and feral animal management, restrictions on site access, and bushfire management; (c) define and implement a Vegetation Clearance Protocol that includes the delineation of areas of remnant vegetation to be cleared, progressive clearing, and the salvage and reuse of materials; (d) define and implement a Threatened Species Management Protocol that includes surveys for threatened species, the implementation of threatened species management strategies, and the development and implementation of a Flora and Fauna Monitoring Program; (e) define and implement a Project Area Rehabilitation Program that includes a progressive rehabilitation, erosion and sediment control, revegetation, and maintenance and monitoring; (f) a process to review and report annually on this plan and the offsets strategy; and (g) outline a process for stakeholder consultation. The mine expansion must not commence until the plan has been approved. The approved plan must be implemented.	Section 3.3 Section 3.3.3 Section 3.1 Section 3.2 Section 3.4 Section 5, 6 & 7 Section 5, 6 & 7

1.1 PURPOSE AND SCOPE

Purpose: The purpose of this FFMP is to describe the ecological management strategies, procedures, controls and monitoring programs that are to be implemented for the management of flora and fauna as described within the Wambo Development Project Environmental Impact Statement 2003 (2003 EIS) (hereafter referred to as the Project Area).

This FFMP also addresses the ecological requirements detailed in Development Consents (as modified) DA305-7-2003 and DA177-8-2004 and Environment Protection and Biodiversity Conservation (EPBC) Approval (EPBC 2003/1138).

Scope: This FFMP applies to all mining and associated activities undertaken with WCPL's mining authorisations and landholdings.

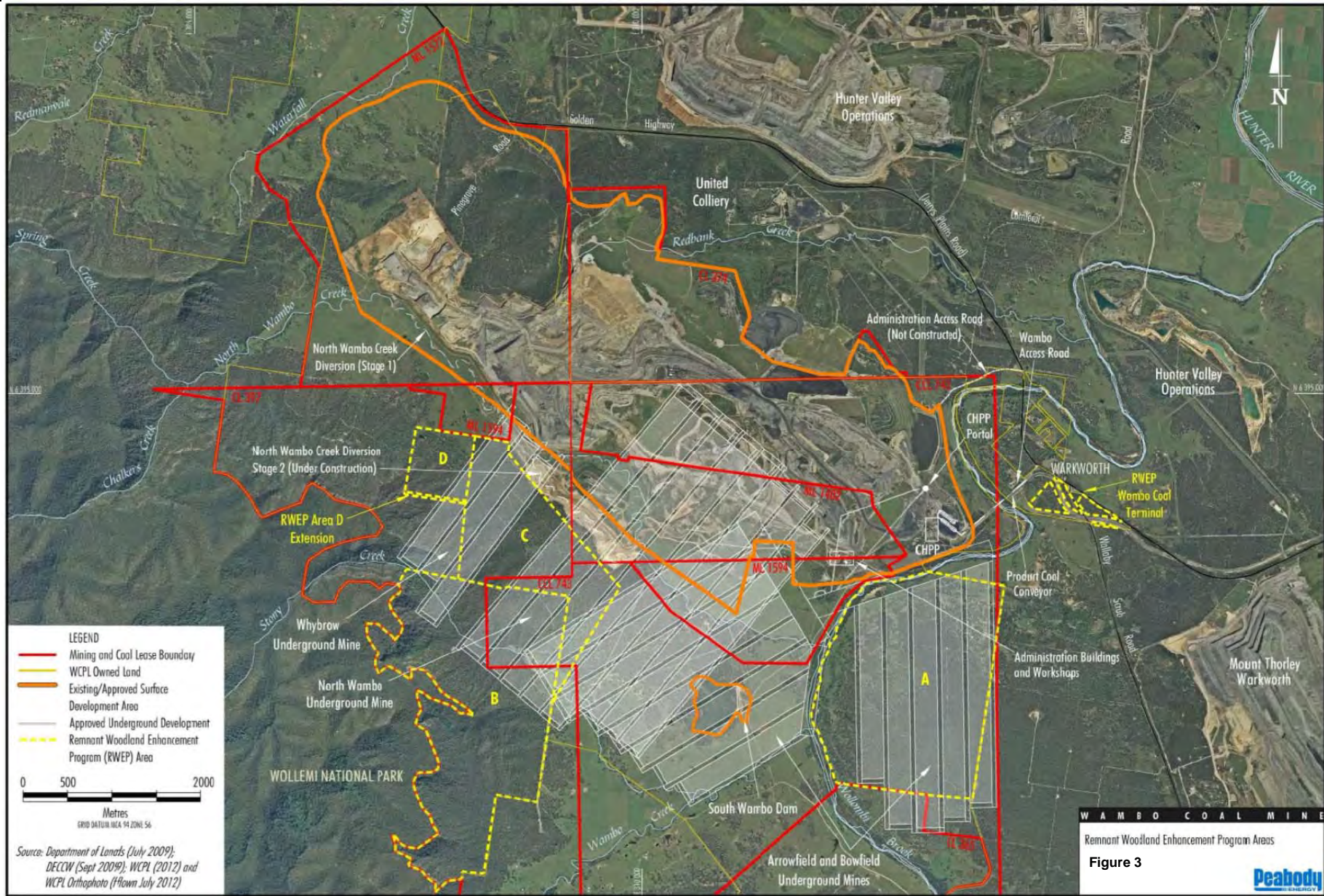
1.2 STRUCTURE OF THE FLORA AND FAUNA MANAGEMENT PLAN

This FFMP forms part of WCPL's Environmental Management System (EMS) for the Wambo Coal Mine. The relationship of this FFMP to the EMS is shown in **Figure 4**.

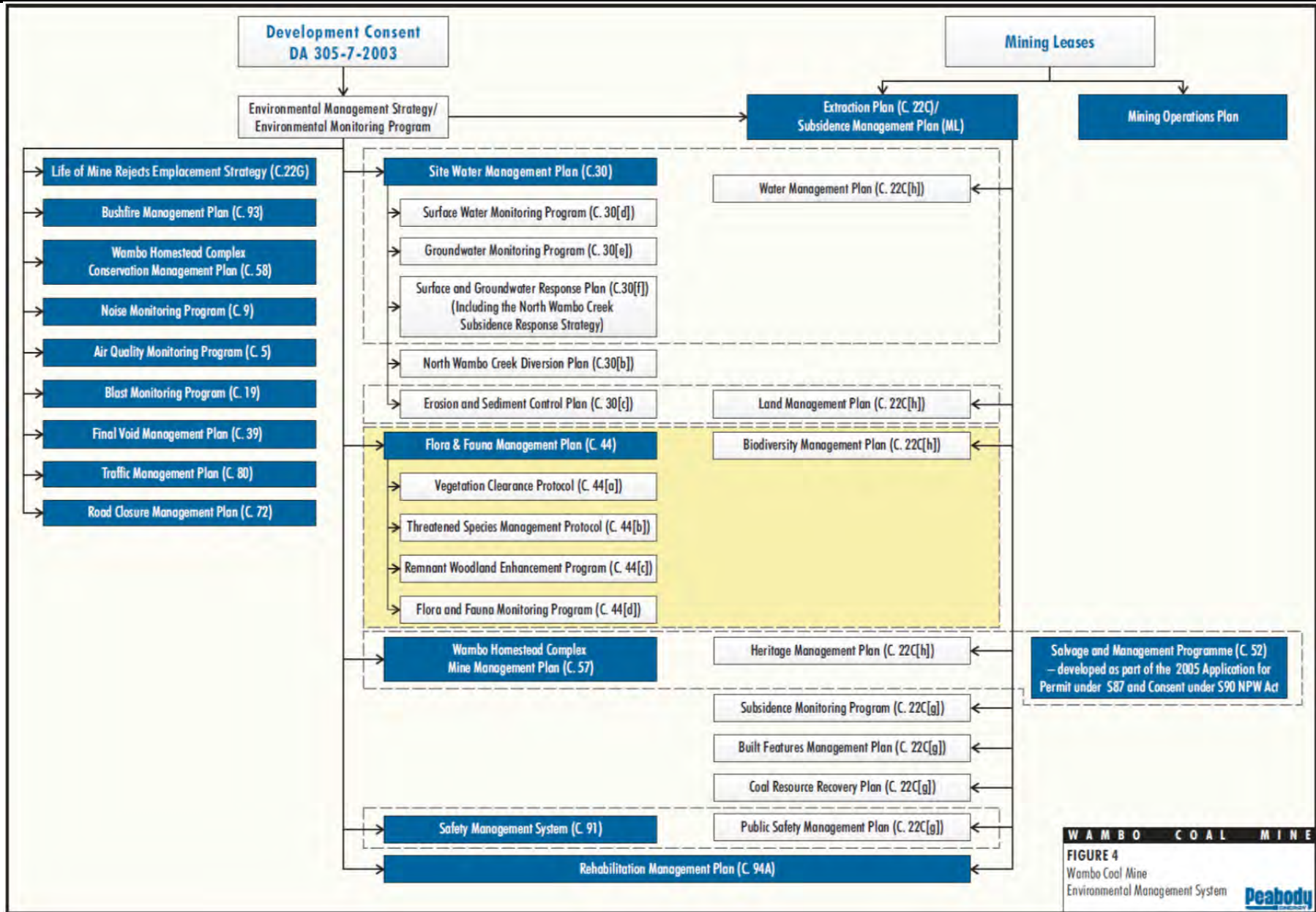
The FFMP is structured as follows:

- Section 1:** Introduction
- Section 2:** Summary of the existing environment relevant to flora and fauna management.
- Section 3:** Vegetation Clearance Protocol, Threatened Species Management Protocol, Remnant Woodland Enhancement Program and the Rehabilitation Program.
- Section 4:** Outlines the Flora and Fauna Monitoring Program.
- Section 5:** Provides details of stakeholder consultation and reporting.
- Section 6:** Provides details of reporting including who will be responsible for monitoring, reviewing and implementing the FFMP
- Section 7:** Review, Monitoring & Implementation
- Section 8:** References

WCPL - Flora and Fauna Management Plan



WCPL - Flora and Fauna Management Plan



WAMBO COAL MINE
FIGURE 4
 Wambo Coal Mine
 Environmental Management System

1.3 FLORA AND FAUNA MANAGEMENT AREAS

The majority of management measures described in this FFMP are applicable across all land owned and managed by WCPL, some measures are only relevant to either mining disturbed lands, or RWEPP land. For example, the erosion and sediment control measures are relevant across all WCPL managed land; however, the RWEPP Enhancement Program, required by development consent condition, is specific to the RWEPP areas only. **Table 3** delineates the relevance of the measures detailed in Sections 3, 4 and 5 of this FFMP. The RWEPP areas and rail loop area are shown in **Figure 2**.

Table 3 Flora and Fauna Management Areas

Flora and Fauna Management Measures, as described in FFMP (relevant FFMP Section)	Applicable or specifically relevant to:		
	All WCPL Managed Land	RWEPP and Rail Loop areas only	Mining Disturbed land only
Vegetation Clearance Protocol (3.1)	✓		
Threatened Species Management Protocol (3.2)	✓		
Remnant Woodland Enhancement Program (3.3)		✓	
Rehabilitation Program (3.4)	✓		
Monitoring of Revegetation of Disturbance Areas (4.1)			✓
Monitoring program for the RWEPP (4.2)		✓	
Stakeholder Consultation and Reporting (5.0)	✓		

1.4 STAKEHOLDER CONSULTATION

As required Condition 44, Schedule 4 of DA305-7-2003, WCPL must revise the FFMP for the development to the satisfaction of the Director-General by the end of March 2013. In consultation with the Department of Planning and Infrastructure (DP&I), WCPL have meet with the DP&I on 8 February 2013 and been provided correspondence on the 18 February 2013 to outline the submission dates for relevant management plans, including the FFMP.

As a requirement of approval (EPBC 2003/1138), the revised FFMP will also be provided to the Minister for Sustainability, Environment, Water, Population and Communities (SEWPaC).

1.5 REGULATORY REQUIREMENTS

A number of legislative instruments (both State and Federal), are relevant to this FFMP. Details of the relevance of each of the relevant pieces of legislation can be found on the website www.legislation.nsw.gov.au, however a summary of the relevance of each to this FFMP is provided below.

1.5.1 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 Infrastructure (DP&I), formerly NSW Department of Planning, on 04 February 2004. A summary of the approved Wambo Coal Mine is provided in **Table 1**.

1.5.2 Mining Act 1992

The NSW Mining Act 1992 (Mining Act) is administered by NSW Department of Trade and Investment (DTI), on behalf of the Minister for Mineral Resources and, amongst other legislative instruments, places controls on methods of exploration and mining, the disposal of mining waste, land rehabilitation, and environmental management activities. A mining lease granted under the Mining Act entitles the

leaseholder to mine coal from a deposit. WCPL currently holds several mining leases and an exploration licence (see WCPL's Mining Operations Plans) over the Project Area.

1.5.3 Native Vegetation Act 2003

The Native Vegetation Act 2003 does not apply to any clearing authorised under the Mining Act 1992, or for any designated development for which development consent has been granted under the Environmental Planning and Assessment Act 1979. However, the Native Vegetation Act 2003 will apply for land which is owned by WCPL but outside of the Project Area. Prior to any ground disturbance or clearing activities within this land, a Surface Disturbance Permit (SDP) will be completed to ensure the requirements of the Native Vegetation Act 2003 are followed.

1.5.4 Threatened Species Conservation Act 1995

The NSW TSC Act provides protection for threatened species native to NSW (excluding fish and marine vegetation). Species, populations and ecological communities listed under Schedules 1 (Endangered) and Schedules 2 (Vulnerable) are considered to be threatened in NSW.

Protection is provided by integrating the conservation of threatened species, endangered populations and EEC/CEECs into development control processes under the Environmental Planning and Assessment Act 1979 (EP&A Act).

No threatened flora species or populations listed under the TSC Act or the EPBC Act were recorded at Wambo by Orchid Research (2003). Orchid Research (2003) recorded two threatened ecological communities in the vicinity of Wambo, namely the Warkworth Sands Woodland Endangered Ecological Community (EEC) (listed in the TSC Act) and the White Box, Yellow Box, Blakely's Red Gum Woodland/Grassy White Box Woodlands EEC (listed in the TSC Act).

No threatened fauna populations listed under the TSC Act have been recorded at Wambo (Mount King Ecological Surveys, 2003; Greg Richards and Associates, 2003; RPS HSO, 2009).

This FFMP provides further detail for the mitigation measures recommended by the 2003 EIS, in order to ameliorate the impact of mining activities (as much as possible) on the threatened species, endangered populations and EEC/CEECs in the vicinity of the Project Area.

1.5.5 Fisheries Management Act 1994

The objectives of the Fisheries Management Act 1994 are to conserve, develop and share the fishery resources of New South Wales for the benefit of present and future generations.

Aquatic macroinvertebrate, fish and water quality sampling was conducted for the Wambo Development Project EIS. The sampling sites displayed considerable variation in terms of stream structure (e.g. pool/run sequence or isolated pools), stream flow and the condition of the riparian zone. The sampling found North Wambo Creek to represent minimal fish habitat with two native and one introduced fish species recorded from North Wambo Creek during the sampling.

1.5.6 Rural Fires Act 1997

The Rural Fires Act 1997 controls the management of bushfires and controlled burning in NSW. The Act requires UCML to take all practical steps to prevent bushfires and to minimise the danger of the spread of bushfires on or from land under its control (including offset and revegetation areas). WCPL have prepared an implemented a Bush Fire Management Plan (BFMP), and are in the process of seeking endorsement from the NSW Rural Fire Service.

1.5.7 National Parks and Wildlife Act 1974

The objects of the Nation Parks and Wildlife Act (NPW Act) relevant to the FFMP are as follows:

- (a) the conservation of nature, including, but not limited to, the conservation of:
 - (i) habitat, ecosystems and ecosystem processes;
 - (ii) biological diversity at the community, species and genetic levels;
 - (iii) landforms of significance, including geological features and processes; and
 - (iv) landscapes and natural features of significance including wilderness and wild rivers.

By the end of November 2013, unless otherwise agreed by the Director-General, Wambo must enter into a conservation agreement/s pursuant to section 69B of the *National Parks and Wildlife Act 1974* covering all offset areas listed in Table 16, Condition 40, Schedule 4 of DA305-7-2003. A licence may also be sought from the Office of Environment & Heritage (OEH) in the event relocation of native animals is required.

1.5.8 Environment Protection and Biodiversity Conservation Act 1999

Under the Commonwealth EPBC Act, approval from the Commonwealth Minister for DSEWPC is required for any action that may have a significant impact on matters of national environmental significance (MNES). These matters are:

- listed threatened species and ecological communities;
- migratory species protected under international agreements;
- Ramsar wetlands of international importance;
- the Commonwealth marine environment;
- World Heritage properties;
- National Heritage places;
- Great Barrier Reef Marine Park; and
- nuclear actions.

WCPL was granted approval (EPBC 2003/1138) in accordance with Environment Protection and Biodiversity Conservation Act, 1999 (EPBC Act) for the expansion of the mine on the 23 November 2004. In accordance with the approval, Wambo have prepared this FFMP to address the conditions set out in EPBC 2003/1138.

2.0 EXISTING ENVIRONMENTAL BASELINES

2.1 LANDFORMS AND LANDUSE

Landforms of the Upper Hunter region are characterised by gently sloping flood plains associated with the Hunter River and the undulating foothills, ridges and escarpments of the Mount Royal Range and Great Dividing Range. Local elevations range from approximately 60 metres (m) Australian Height Datum (AHD) at Wollombi Brook to approximately 650 m AHD at Mount Wambo within the Wollemi National Park to the south west.

Within WCPL mining tenements elevations range from approximately 60 m to 200 m AHD, while narrow ridges to the south-east of Waterfall Creek and along the lower slopes of the Wollemi National Park landforms rise to above 200 m AHD.

Land use in the vicinity of the WCPL is characterised by a combination of coal mining operations, agricultural land uses, areas of remnant vegetation and rural residential development at Warkworth. WCPL controlled lands that are not subject to Wambo's operations are utilised for the agistment of stock (primarily cattle). Stock agistment into biodiversity offset areas (RWEP) may be approved after permission has been sought and granted from DoPI.

2.2 METEOROLOGY

A meteorological station that continuously records wind speed and direction, temperature, relative humidity, net solar radiation, rainfall and evaporation has operated at WCPL since March 1998. Long term meteorological data recorded from the Jerrys Plains weather station² is summarised in **Appendix A**.

The data presented in **Appendix A** indicate that regional temperatures are warmest from November through March and coolest from May through September. Average daily maximum temperatures peak in January at 31.7°C, while average daily minimum temperatures are lowest in July at 3.8°C.

The data presented in **Appendix A** indicate that the regional rainfall is generally lowest from May through to September and highest December through March. The annual total rainfall is 645 mm for Jerrys Plains. The average annual evaporation recorded at Scone is 1,592 mm, with monthly evaporation highest in December (220 mm) and January (217 mm) and lowest in June (48 mm) and July (59 mm).

Wind roses for the WCPL meteorological station indicate that relatively strong winds from the west-northwest are dominant during winter and spring, while winds from the south-east are more common during summer and autumn. Moderate south-easterly winds are common during the evening and night-time throughout spring, summer and autumn.

2.3 GEOLOGY

WCPL is situated within the Hunter Coalfield subdivision of the Sydney Basin, which forms the southern part of the Sydney-Gunnedah-Bowen Basin. The coal bearing rocks of the Sydney Basin are Permian in age (i.e. approximately 225 to 270 million years old) and are typically associated with low-lying gentle topography. The overlying rocks of Triassic age (ie. approximately 180 to 225 million years old) cover large parts of the Sydney Basin and tend to form prominent escarpments where they outcrop.

² Source: <http://www.bom.gov.au>

2.4 HYDROLOGY

WCPL is located within the catchment of the Hunter River, which drains some 22,000 km² of central-eastern NSW to the Pacific Ocean at Newcastle. At a local level WCPL is situated adjacent to Wollombi Brook, south-west of its confluence with the Hunter River. Wollombi Brook drains an area of approximately 1,950 km² and joins the Hunter River some 5 km north-east of the Project.

North Wambo Creek drains the mid and eastern sections of the North Wambo Underground Mine development area and flows south-east into Wollombi Brook, approximately 600 m south of WCPL. North Wambo Creek has been highly disturbed by historic and present grazing activities.

Stony Creek drains from Mount Wambo in a north-east direction and meanders across the western boundary of coal lease (CL) 397 near the south-western boundary of the North Wambo Underground Mine and passes in a south-easterly direction through the existing underground development area of WCPL to join Wambo Creek. Earthworks have been conducted to re-contour the stream channel and banks to remediate subsidence effects from previous underground mining operations at WCPL.

2.5 SOILS AND RURAL LAND USE CAPABILITY

A soils, rural land capability and agricultural suitability assessment was conducted for the Project EIS and utilised information from previous soil surveys, the Department of Land and Water Conservation (DLWC) and NSW Agriculture mapping, aerial photography and field surveys.

Major soil types identified include alluvial soils along major drainage lines, siliceous sands to the east of Wollombi Brook, yellow podzolics and yellow solodic intergrades adjacent to the alluvials on lower slopes and undulating plains, soloths on moderately elevated slopes and lithosols along the eastern boundary of the Wollemi National Park.

A rural land capability assessment was conducted in accordance with the standard NSW eight class system (Cunningham *et al.*, undated) which assesses biophysical soil properties and categorises land according to limitations such as erosion hazard, climate and slope. Seven of the eight classes were identified in the vicinity of the Wambo Coal Mine.

An agricultural suitability assessment was conducted in accordance with the five class system (Riddler, 1996), which classifies land according to its potential agricultural productivity. Based on the NSW Agriculture (1983) Agricultural Land Classification for the portion of the Singleton LGA between Bulga and Jerrys Plains, Class 2, 3, 4 and 5 agricultural lands were identified within WCPL mining tenements.

The Soil Landscapes of the Singleton 1:250,000 Sheet (Kovac and Lawrie, 1991) identifies eight soil landscapes within the mine area *eg* Bulga, Benjang, Lees Pinch, Branxton, Jerrys Plains, Wollombi, Hunter and Warkworth. The landform characteristics, lithology, typical soils and limitations of these landscapes are summarised in **Table 4**.

Table 4 Soil Landscapes of the Mine Area

Landscape	Landform	Lithology	Dominant Soils	Limitations
Bulga	Smooth slopes forming undulating rises. Local relief is 20-40 m. Elevations range from 80-160 m. Slopes up to 10 %.	Narrabeen Group and Singleton Coal Measures.	Yellow soloths, Yellow solodic.	Minor to moderate sheet erosion. Low fertility. Moderate – high erosion hazard. High soil salinity. Moderate – high structural degradation hazard.
Benjang	Rolling hills, with large open valleys and some sandstone cliffs. Local relief is 80-120 m. Elevations 240-440 m. Slopes 10-25 %.	Singleton Coal Measures.	Yellow solodic, Red solodic.	Minor to severe sheet erosion on cleared hillslopes. Low fertility. High soil salinity. High to very high erosion hazard. High structural degradation hazard.
Lees Pinch	Rolling hills to steep mountains. Elevations range from 180-800 m. Slopes to 90 %.	Narrabeen Group.	Siliceous sands.	Minor to moderate sheet and rill erosion where disturbed. High structural degradation hazard. Low fertility.
Branxton	Undulating rises to low hills and creek flats. Local relief is 10-40 m. Elevations range from 50-80 m. Slopes range from 3-5 %.	Branxton Formation and Singleton Coal Measures.	Yellow podzolic, Yellow soloths, Red podzolic, Alluvials.	High soil salinity. Tunnel and gully erosion risk. Low fertility. High structural degradation hazard.
Hunter	Level plains and river terraces. Local relief is less than 10 m. Slopes range from 0-3 %.	Quaternary Alluvium.	Alluvials, Yellow solodic, Brown soils.	Minor stream bank erosion occurs with minor sheet and gully erosion on terraces. Moderate-high erosion hazard. High structural degradation hazard.
Jerrys Plains	Undulating low hills. Relief to 60 m. Elevation 80-180 m. Slopes range from 2-10 %.	Jerrys Plains subgroup of the Whittingham Coal Measures.	Yellow soloths and solodic soils.	Poorly to imperfectly drained. Low fertility. High soil salinity. Up to very high erosion hazard.
Wollombi	Valley Flats. Relief to 20 m. Elevation 60-140 m. Slopes < 3 %.	Narrabeen Group and Quaternary alluvium.	Alluvial soils and Earthy sands.	Potential for salting hazard. Low fertility. Flood hazard. Erosion hazard.
Warkworth	Linear sand dunes 1-3 m high on old river terraces. Generally aligned north-west to south-west.	Tertiary gravel and sandstone and Quaternary alluvium.	Siliceous sands.	Moderate flood hazard. Low fertility. Moderate erosion hazard. High structural degradation hazard.

Source: Kovac and Lawrie (1991)

2.6 FLORA

Vegetation in the Hunter Valley has been significantly altered in floristics and structure since the arrival of Europeans in the early 1800's, primarily due to the clearing of vegetation for agriculture, mining, forestry and settlement (Peake, 2000; DMR, 1999).

The condition of native vegetation in the vicinity of WCPL varies, with the most disturbed areas generally occurring along watercourses and on flat and undulating areas which have been cleared for grazing. Remaining areas of remnant vegetation have been semi-cleared, subjected to historical or current stock grazing and contain open areas with regeneration of various ages.

A flora survey and assessment was conducted by Orchid Research in spring and summer 2002 for the Project EIS. Areas of remnant vegetation were systematically surveyed using quadrats and spot sampling sites to compile a comprehensive species list and to detect threatened species which may have been present. **Table 5** and provides a summary of the 16 vegetation communities recognised in the study area.

Table 5 Vegetation Communities Recognised in the Vicinity of the Wambo Coal Mine

Community Number	Scientific Names	Common Names
1	<i>Casuarina cunninghamiana</i> / <i>Angophora floribunda</i>	River Oak/Rough-barked Apple
2	<i>Eucalyptus camaldulensis</i>	River Red Gum
3	<i>E. melliodora</i> / <i>E. blakelyi</i> / <i>A. floribunda</i>	Yellow Box/Blakely's Red Gum/Rough-barked Apple
4	<i>E. tereticornis</i> / <i>Melaleuca decora</i>	Forest Red Gum/Honeymyrtle
5	<i>B. integrifolia</i> / <i>A. floribunda</i> / <i>E. blakelyi</i>	Coast Banksia/Rough-barked Apple/Blakely's Red Gum
6	<i>E. crebra</i> / <i>E. moluccana</i> / <i>Allocasuarina luehmannii</i> / <i>M. decora</i>	Narrow-leaved Ironbark/Grey Box/Bulloak/Honeymyrtle
7	<i>A. floribunda</i> / <i>E. crebra</i> / <i>E. moluccana</i> / <i>A. luehmannii</i>	Rough-barked Apple/Narrow-leaved Ironbark/Grey Box/Bulloak
8	<i>E. moluccana</i> / <i>E. crebra</i> / <i>Allocasuarina verticillata</i>	Grey Box/Narrow-leaved Ironbark/Drooping She-oak
9	<i>Corymbia maculata</i> / <i>E. crebra</i> / <i>E. moluccana</i> / <i>A. luehmannii</i> / <i>M. decora</i>	Spotted Gum/Narrow-leaved Ironbark/Grey Box/Bulloak/Honeymyrtle
10	<i>E. dawsonii</i> / <i>E. crebra</i> / <i>A. luehmannii</i> ± <i>M. decora</i>	Slaty Gum/Narrow-leaved Ironbark/Bulloak ± Honeymyrtle
11	<i>E. punctata</i> / <i>E. crebra</i> / <i>A. luehmannii</i> / <i>M. decora</i>	Grey Gum/Narrow-leaved Ironbark/Bulloak/Honeymyrtle
12	<i>E. blakelyi</i> / <i>A. floribunda</i> / <i>E. crebra</i>	Blakely's Red Gum/Rough-barked Apple/Narrow-leaved Ironbark
13	<i>E. acmenoides</i> / <i>A. floribunda</i>	White Mahogany/Rough-barked Apple
14	<i>Geijera salicifolia</i> / <i>Notelaea microcarpa</i>	Brush Wilga/Native Olive
15	<i>Acacia pendula</i> ¹	Weeping Myall
16	Not applicable	Vine Thicket (Dry Rainforest)

Source: Orchid Research (2003)

¹ The *Acacia* sp. in Community 15 was identified as *Acacia anuera* in the Wambo Development Project EIS (Orchid Research, 2003). *Acacia* expert, Terry Tame, and Travis Peak from the Hunter Catchment Management Trust re-identified this stand as *Acacia pendula* in early 2004.

Remnant vegetation is dominated by eucalypt forests and woodlands, however thin strips of River She-oak (*Casuarina cunninghamiana*) occur along North Wambo Creek, Wambo Creek, Stony Creek and Wollombi Brook and sand dune heathy woodlands are also present.

No threatened flora species or endangered populations listed in the schedules of the NSW *Threatened Species Conservation Act, 1995* (TSC Act) and/or Commonwealth *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act) have been identified in the vicinity of the Wambo Coal Mine. Two Endangered Ecological Communities have been identified, namely, the Warkworth Sands Woodland Endangered Ecological Community (listed in the TSC Act) and the White Box, Yellow Box, Blakely's Red Gum Woodland/Grassy White Box Woodlands Endangered Ecological Community (listed in both the TSC Act and EPBC Act).

2.7 FAUNA

Assessment of the fauna survey results suggest that the habitats of the WCPL mine area support a reasonable diversity of fauna species with a total of 159 fauna species recorded. The following descriptions of faunal groups are sourced from the studies conducted for the Wambo Development Project Environmental Impact Statement (2003 EIS).

For these studies, three field surveys were undertaken during spring 2002 to determine what terrestrial vertebrate species (excluding bats) occupy the WCPL area. Survey techniques were used to target threatened species previously recorded in the wider region.

A separate bat survey was conducted from 16 to 20 September 2002 to determine which bat fauna species use the area and surrounds and to target bat fauna species listed in the Schedules of the TSC Act and EPBC Act.

Mammals

Twenty-three native mammals were recorded by the surveys including the Short-beaked Echidna (*Tachyglossus aculeatus*), Yellow-footed Antechinus (*Antechinus flavipes*), Common Wombat (*Vombatus cuculla*), Squirrel Glider (*Petaurus norfolcensis*), Common Brushtail Possum (*Trichosurus vulpecula*), four macropods (Kangaroos and Wallabies) and 14 bat species. The Eastern Grey Kangaroo (*Macropus giganteus*) and Red-necked Wallaby (*Macropus rufogriseus*) were recorded in high numbers. The highest number of bat calls was recorded at waterbodies, however the majority of bat fauna utilised the wide variety of habitats available.

Avifauna

The surveys also recorded a high diversity of woodland bird species including a number of woodland birds observed to have a declining population status in NSW. In total, 117 bird species were identified.

Reptiles

The Eastern Snake-necked Turtle (*Chelodina longicollis*), Lace Monitor (*Varanus varius*), Bearded Dragon (*Pogona barbata*) and Robust Ctenotus (*Ctenotus robustus*) were the most common reptile species recorded during the surveys. In total, 15 reptile species were identified.

Amphibians

Five of the amphibians recorded by the surveys were associated with waterbodies, however, several species not closely associated within open water were also recorded, including Sudell's Frog (*Neobatrachus sudelli*), Smooth Toadlet (*Uperoleia laevigata*) and several Limnodynastes species. Four species of tree frogs were recorded by the surveys, namely, the Eastern Dwarf Tree Frog (*Litoria fallax*), Broad-palmed Frog (*Litoria latopalmata*), Rocket Frog (*Litoria nasuta*) and Peron's Tree Frog (*Litoria peronii*).

Threatened Fauna

Threatened fauna species recorded in the vicinity of WCPL are summarised in **Table 6** and included eight birds and five mammals.

Table 6 Threatened Fauna Species

Common Name	Scientific Name	Conservation Status	
		TSC Act ¹	EPBC Act ²
Square-tailed Kite	<i>Lophoictinia isura</i>	V	-
Glossy Black-cockatoo	<i>Calyptorhynchus lathami</i>	V	-
Turquoise Parrot	<i>Neophema pulchella</i>	V	-
Brown Treecreeper (eastern subspecies)	<i>Climacteris picumnus victoriae</i>	V	-
Speckled Warbler	<i>Pyrrholaemus sagittata</i>	V	-
Hooded Robin	<i>Melanodryas cucullata cucullata</i>	V	-
Grey-crowned Babbler (eastern subspecies)	<i>Pomatostomus temporalis temporalis</i>	V	-
Diamond Firetail	<i>Stagonopleura guttata</i>	V	-
Squirrel Glider	<i>Petaurus norfolcensis</i>	V	-
Yellow-bellied Sheath-tail Bat	<i>Saccolaimus flaviventris</i>	V	-
Little Bentwing Bat	<i>Miniopterus australis</i>	V	-
Large Bentwing Bat	<i>Miniopterus schreibersii</i>	V	CD
Large-eared Pied Bat	<i>Chalinolobus dwyeri</i>	V	V

Source: Greg Richards and Associates (2003); Mount King Ecological Surveys (2003)

¹ *Threatened Species Conservation Act, 1995*

² *Commonwealth Environment Protection and Biodiversity Conservation Act, 1999*

V Vulnerable

CD Conservation Dependent

Introduced Fauna

Eleven introduced species were recorded by the 2003 EIS surveys, including the House Sparrow (*Passer domesticus*), Common Starling (*Sturnus vulgaris*), Common Mynah (*Acridotheres tristis*), House Mouse (*Mus musculus*), Black Rat (*Rattus rattus*), Cat (*Felis catus*), Dog (*Canis familiaris*), Red Fox (*Vulpes vulpes*), Brown Hare (*Lepus capensis*), European Rabbit (*Oryctolagus cuniculus*) and Cow (*Bos taurus*). Introduced species control measures are detailed in **Section 3.3.3**.

3.0 FLORA AND FAUNA MANAGEMENT

The flora and fauna management strategies implemented at WCPL are described in **Section 3**. The objectives of these mitigation strategies are to minimise the potential impact from approved mining activities at WCPL on flora and fauna.

3.1 VEGETATION CLEARANCE PROTOCOL

A summary of the vegetation clearance undertaken to date (since DA 305-7-2003 was granted) as part of the open cut operations area (including development of the open cut and North Wambo Creek Diversion) is provided in **Table 7**. Approximately 198 ha of the approved 473 ha of vegetation clearance has been undertaken to date, with approximately 275 ha remaining.

A Vegetation Clearance Protocol (VCP), as part of the Surface Disturbance Procedure (see **Section 3.1.2**), has been developed to minimise impacts on both non-threatened and threatened flora and fauna (as listed under the TSC Act or the EPBC Act). A flowchart of the VCP process is presented in Figure 7. The VCP is applicable across all WCPL managed land. The key components of the VCP include the delineation of areas to be cleared of remnant vegetation, pre-clearance surveys, fauna management strategies, vegetation clearance procedures, seed collection, and salvage/reuse of materials. Procedures in relation to the salvage of Aboriginal sites prior to vegetation clearance are detailed in the Wambo Development Project – Aboriginal Heritage Research Design and Study Plan (incorporating Salvage Programme) (Navin Officer Heritage Consultants, 2005).

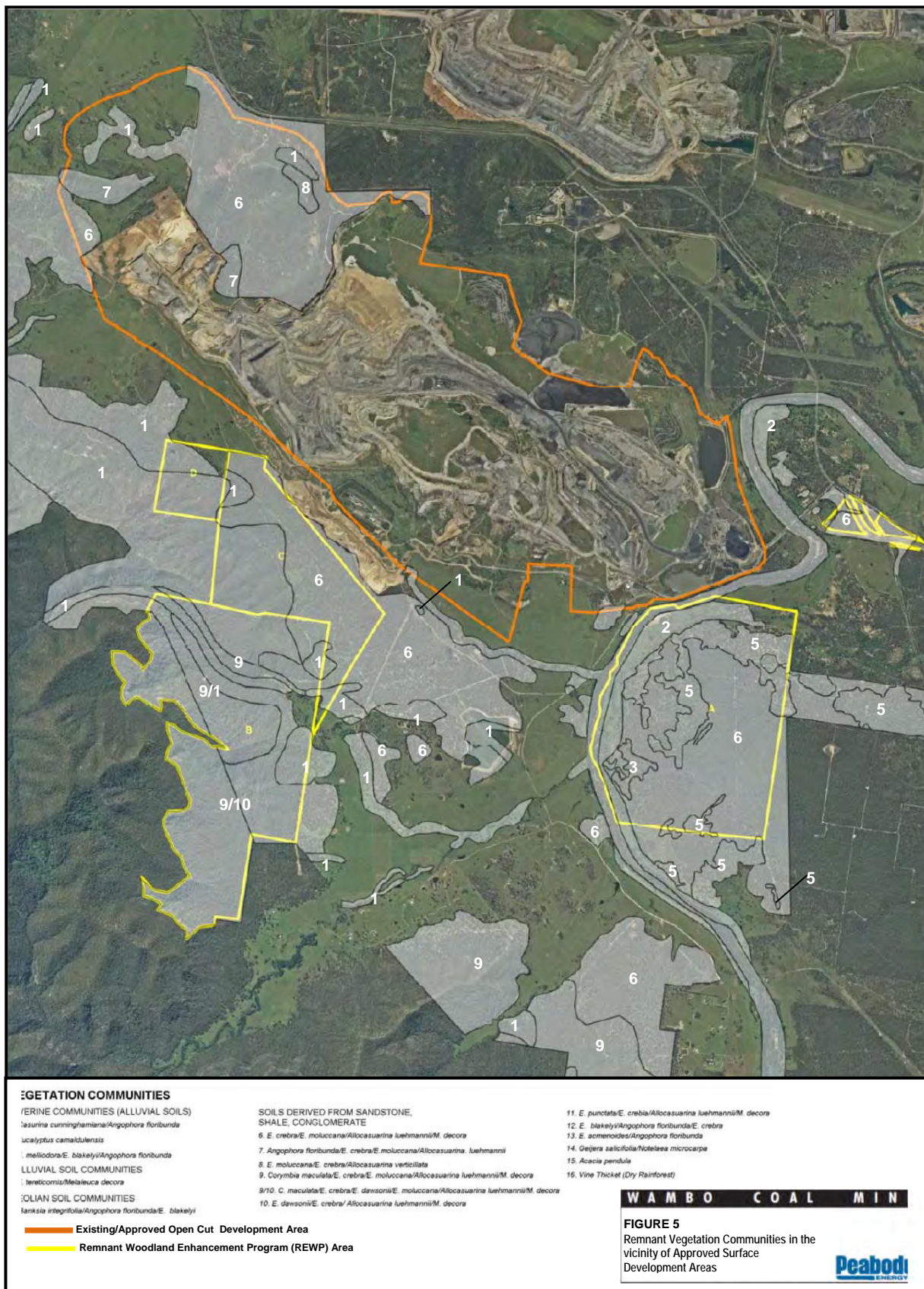
3.1.1 Delineation of Disturbance Areas

This phase involves the delineation of areas that are to be cleared of native remnant vegetation. Vegetation adjoining the proposed clearance areas will be clearly demarcated to prevent accidental damage during vegetation clearance activities or construction works. **Table 7** details the total areas of each vegetation community identified in the vicinity of WCPL at 2003 and at the end of 2012. The status of remnant vegetation communities in the vicinity of the approved surface development are shown on **Figure 5**.

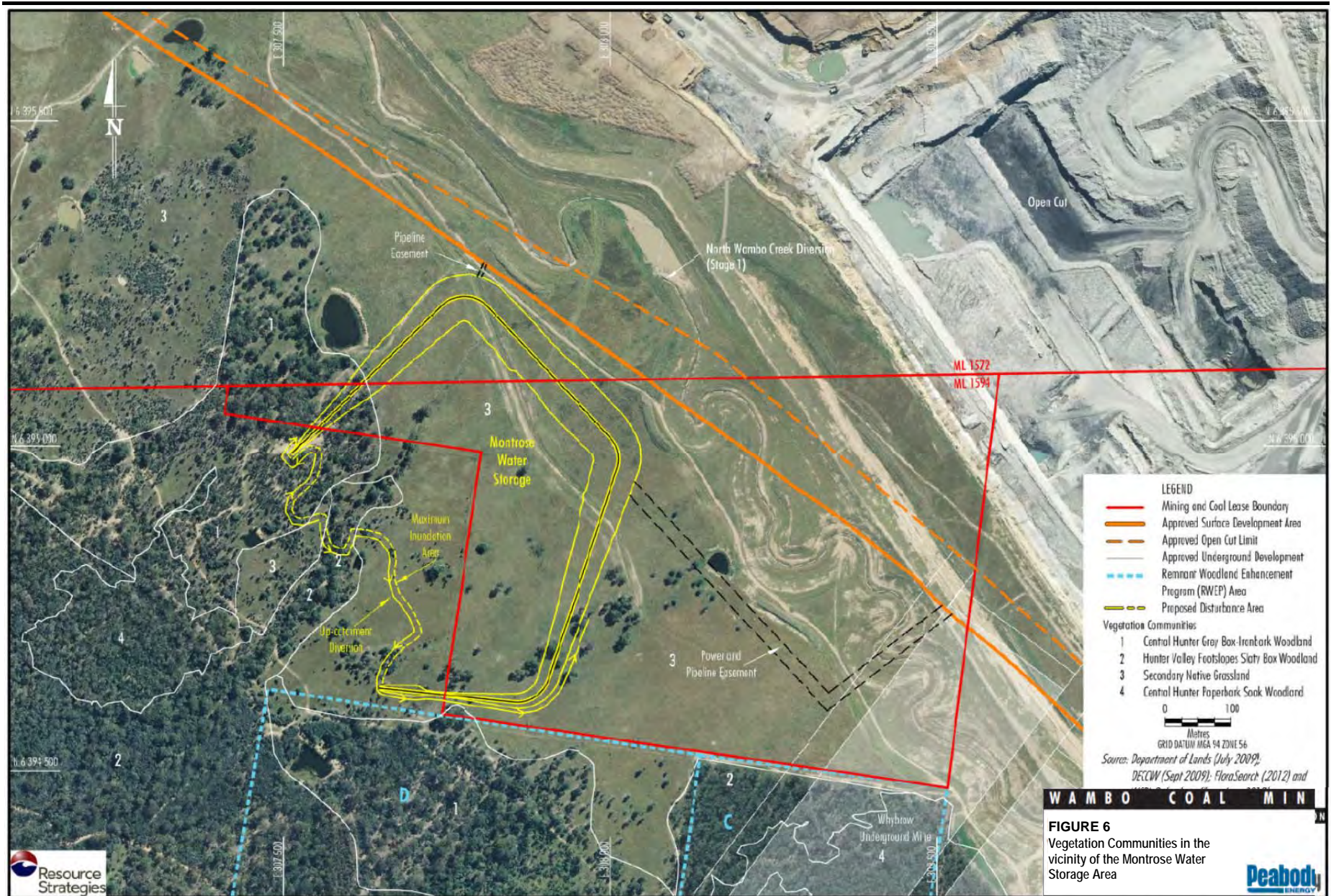
Table 7 WCPL Vegetation Clearance

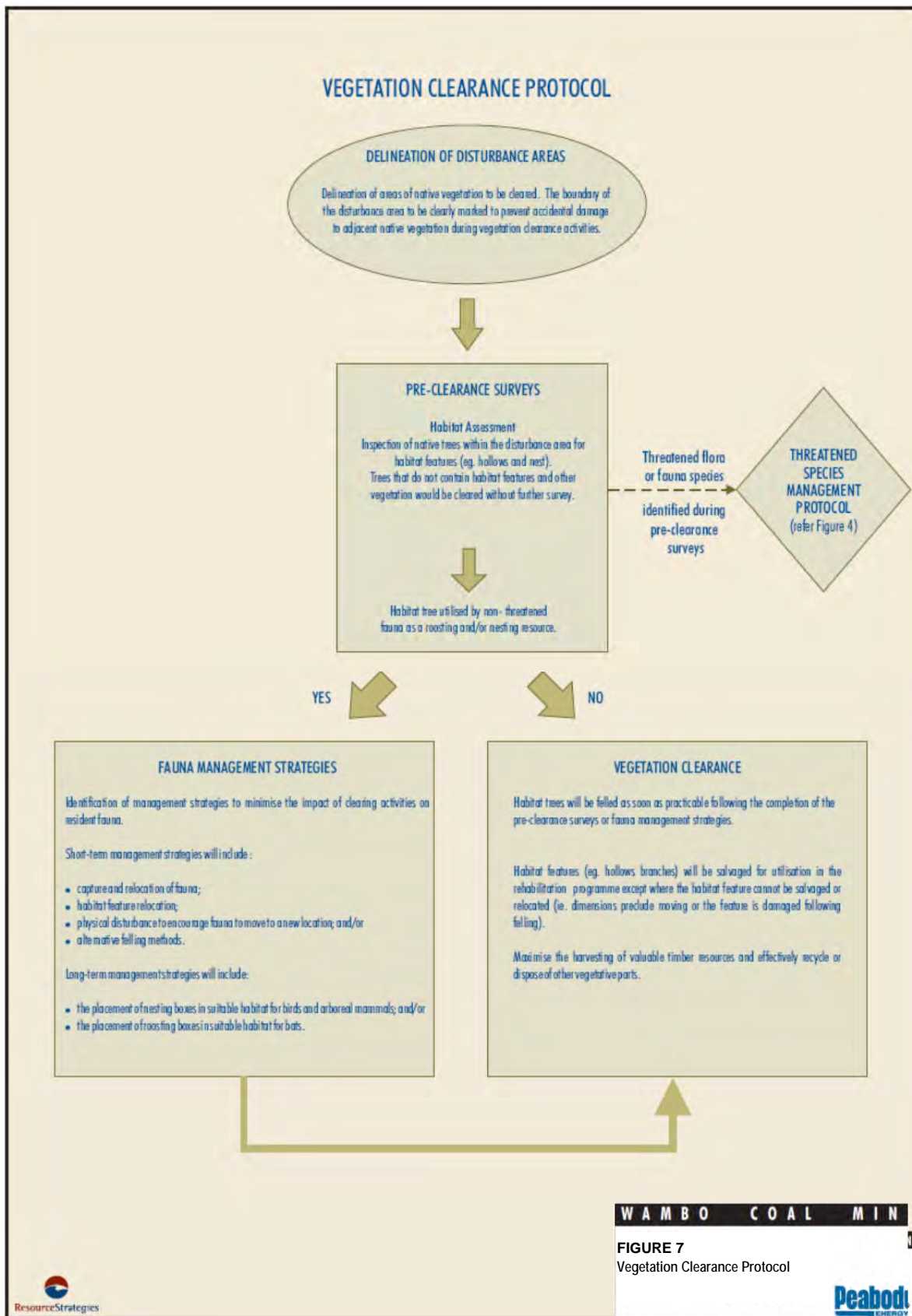
Ref No.	Vegetation Community	Total Vegetation Clearance (ha) at 2003	Total Vegetation Clearance (ha) end of 2012
1	<i>Casuarina cunninghamiana</i> / <i>Angophora floribunda</i>	22	14
2	<i>Eucalyptus camaldulensis</i>	0	0
3	<i>E. melliodora</i> / <i>E. blakelyi</i> / <i>A. floribunda</i>	0	0
4	<i>E. tereticornis</i> / <i>Melaleuca decora</i>	3	0
5	<i>Banksia integrifolia</i> / <i>A. floribunda</i> / <i>E. blakelyi</i>	1	0
6	<i>E. crebra</i> / <i>E. moluccana</i> / <i>Allocasurina luehmannii</i> / <i>M. decora</i>	383	165
7	<i>A. floribunda</i> / <i>E. crebra</i> / <i>E. moluccana</i> / <i>A. luehmannii</i>	46	19
8	<i>E. moluccana</i> / <i>E. crebra</i> / <i>A. verticillata</i>	10	0
9	<i>C. maculata</i> / <i>E. crebra</i> / <i>A. luehmannii</i> / <i>M. decora</i>	0	0
10	<i>E. dawsonii</i> / <i>E. crebra</i> / <i>A. luehmannii</i> / <i>M. decora</i>	1	<1
11	<i>E. punctata</i> / <i>E. crebra</i> / <i>A. luehmannii</i> / <i>M. decora</i>	0	0
12	<i>E. blakelyi</i> / <i>A. floribunda</i> / <i>E. crebra</i>	0	0
13	<i>E. acmenoides</i> / <i>A. floribunda</i>	0	0
14	<i>Geijera salicifolia</i> / <i>Notelaea microcarpa</i>	7	0
15	<i>Acacia aneura</i>	0	0
16	Vine Thicket (Dry Rainforest)	0	0
		473	198

Source: WCPL (2003)



WCPL - Flora and Fauna Management Plan





3.1.2 Surface Disturbance Permit

WCPL have implemented a Surface Disturbance Permit (SDP) (see **Appendix G**) procedure and checklist. The SDP requires the approval of WCPL's Environmental Department prior to any land disturbance and clearing activities taking place. The SDP aims to identify any environmental issues such as Cultural Heritage sites, flora and fauna communities, surface drainage, threatened species, and the identification of any seed or timber resources that can be salvaged, prior to any surface disturbance being permitted on:

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

Surface disturbance at WCPL includes, but no limited to:

- 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.

The following requirements must be addressed by the SDP prior to WCPL Environment and Community Manager granting approval, the requirements of the SDP include:

- A plan with proposed area for disturbance delineated;
- Pre clearance surveys completed for both ecological and heritage assessments;
- An erosion and sediment control plan;
- Topsoil management measures;
- Noise management measures;
- Dust management measures; and
- Light management measures.

3.1.3 Pre-Clearance Surveys

Pre-clearance surveys (habitat assessments) involve the inspection of potential habitat features located within proposed disturbance areas. Features with the potential to provide roosting and/or nesting resources for birds, bats and arboreal mammals (eg. hollows, openings, cracks and/or loose bark) will be identified. Trees containing such features are referred to as potential 'habitat trees'.

Habitat features such as large hollows identified during the pre-clearance surveys will be salvaged and relocated to existing areas of remnant vegetation or rehabilitation areas except where the habitat feature cannot be salvaged or relocated (i.e. the dimensions preclude moving or the feature is damaged during felling).

Weed infestations adjacent to or within the proposed disturbance area will be identified during pre-clearance surveys.

In the event that any threatened flora or fauna species are observed during the habitat assessment, the TSMP (**Section 3.2**) is initiated.

A check sheet of actions to be completed as part of a pre-clearance inspection is included in **Appendix D**.

Following the completion of pre-clearance surveys and the assessment of potential habitat trees, fauna management strategies as outlined in **Section 3.1.3**, will be reviewed as necessary, before vegetation clearance commences.

3.1.4 Fauna Management Strategies

The fauna management strategies to be implemented during the development are described below.

Short-term Management Strategies

Short-term management strategies include:

- timing of vegetation clearance to avoid nesting/breeding activities (where mine planning allows such flexibility in the timing of clearing activities);
- when fauna (particularly bats) are identified in a habitat tree, the following will be utilised to minimise the potential for injury to fauna:
 - fell surrounding non-habitat trees to encourage the colony/individuals in the habitat to move to an alternative location;
 - cause sufficient physical disturbance (i.e. shake tree with a dozer) to the tree to encourage fauna to relocate;
 - as gently as possible, fell the tree using an excavator and inspect on felling. Capture exiting fauna for later release at a suitable time;
 - relocate the habitat feature to adjacent suitable vegetation; and/or
 - block the entrance to habitat features to prevent re-entry prior to felling.
- Environmental personnel must be present during the clearing of potential or known habitat trees to determine if an additional inspection is required 24 hours after a habitat tree has been felled.

Long-term Management Strategies

Long-term management strategies identified to minimise the loss of potential habitat resources may include:

- the placement of nesting boxes in suitable habitat for birds and arboreal mammals (when necessary);
- the placement of roosting boxes in suitable habitat for bats;
- the relocation of habitat features salvaged from felled trees (eg. hollow branches) in suitable habitat; and
- the inclusion of hollow producing tree species in the rehabilitation program.

Following implementation of the short-term fauna management strategies, vegetation clearance can proceed in accordance with the vegetation clearance procedure described below. The selected fauna management strategies and results of implementation are documented in the Annual Environmental Management Report (AEMR).

The practicality of implementing each short-term and long-term management strategy will be dependent on the characteristics of the habitat tree in question and will be determined by WCPL's Environmental Department.

3.1.5 Vegetation Clearance

Vegetation Clearance

Where the removal of vegetation is necessary within:

- The approved boundary for the open cut (see **Figure 2 & Figure 5**),
- Other approved areas as prescribed by modifications to DA305-7-2003, for example MOD 11 for the Montrose Water Storage (see **Figure 6**); and
- WCPL owned land (see **Figure 2**), outside of RWEPA Areas and other vegetation communities i.e. Community 15 (see **Figure 5**).

The following vegetation clearance procedures have been implemented at WCPL, including:

- Completion of an SDP into Environmental Department for review and sign off before the commencement of works;
- Provide a clear delineation of disturbance areas on a plan to accompany the SDP;
- Use survey control to clearly delineate the area of disturbance in the field to allow Environmental Department to verify proposed works prior to development commencing;
- In areas of significant earthworks, topsoil resources will be identified, stripped and stockpiled in accordance with the SDP requirements. Soil resources will be re-spread over rehabilitation areas to make use of the potential seed bank;
- Habitat trees, as identified during pre-clearance surveys, are to be felled as soon as practicable after a negative survey result; and
- Those features identified for use in rehabilitation programs (eg. hollow branches) are to be salvaged where practical.

For further details regarding disturbance in RWEPA Areas and other sensitive areas, refer to **Section 3.2.2**.

Progressive Clearance

Land disturbance and rehabilitation will occur progressively as detailed in the 2003 EIS and the WCPL Open Cut Mining Operations Plan (MOP). The amount of disturbed land at any one time will primarily be associated with the advancing open pit and active mine waste rock emplacement areas. The general sequence of open cut mining operations will begin with vegetation clearance and soil stripping and end in progressive rehabilitation of mine waste emplacements after coal extraction is completed (see **Section 3.4.1**). Progressive rehabilitation of mine waste rock emplacements, in accordance with the MOP, will include revegetation with woodland and pasture species as described in WCPL Rehabilitation Management Plan (RMP).

3.1.6 Seed Collection

Where tree seed is available, seed collection and propagation will be ongoing over the life of the mine and will be determined by WCPL's Environmental Department. Seed collection and propagation activities will contribute to revegetation associated with the rehabilitation of waste rock dumps and other disturbance areas, when adequate seed is available. Seed collection from the local area is preferred, however may be supplemented if local provenance seed is not available.

3.1.7 Salvage and Re-use of Materials

Where practicable, clearing operations will be managed to maximise the re-use of cleared vegetative material. Unsuitable vegetative material will be mulch and stockpiled. Cleared vegetation suitable for fence posts and habitat for fauna will be set aside and salvaged. Habitat features such as logs and hollows collected during a clearance campaign may be utilised in WCPL existing rehabilitated areas or to augment habitat features for fauna in the RWEF areas (**Section 3.3.3**).

3.2 THREATENED SPECIES MANAGEMENT PROTOCOL

A Threatened Species Management Protocol (TSMP) has been developed to facilitate implementation of threatened species management strategies to minimise the potential impacts on threatened flora and fauna species. The key components of the TSMP are site observations/surveys, threatened species management strategies, consultation and reporting. A flowchart of the TSMP is presented in **Figure 9**.

3.2.1 Site Observations/Surveys

In the event a threatened species listed under the TSC Act or the EPBC Act is identified in the mine area or immediate surrounds (for example, during the preliminary or secondary habitat assessments and/or through the SPD process [Section 3.1]), the Threatened Species Management Strategies phase of the TSMP will be initiated. The NSW Office of Environment and Heritage (OEH) and/or the Department of Sustainability, Environment, Water, Population and Communities (DSEWPC)) will be notified as applicable in the event that a threatened species not previously assessed by the 2003 EIS is identified within WCPL disturbance areas.

WCPL maintain a GIS data and mapping system. In the event a threatened species listed under the TSC Act or the EPBC Act is identified in the mine area or immediate surrounds and/or through the SPD process, the spatial information recorded from such events will be added to the GIS data for reference. This information will be utilised during the SDP approval process by the Environmental Department.

3.2.2 Threatened Species Management Strategies

Management strategies will include avoiding RWEF areas, threat abatement measures, capture and release, relocation and provision of habitat resources (i.e. in the RWEF areas and WCPL rehabilitation areas). The management strategies would be determined on a case by case basis. Some examples of possible management strategies are provided below.

Avoiding RWEF Areas

As per Schedule 4 Condition 41A, WCPL shall not undertake any mining operations (except approved underground mining operations) or other activities within the offset areas as scheduled in DA 305-7-2003, other than those listed under Schedule D Condition 41A. Prior to any disturbance WCPL will seek approval from:

- The Federal Minister of DSEWPC for any proposed disturbance activities in RWEF A;
- The Director General for DP&I for any proposed disturbance activities in all RWEF Areas; and
- Ensure that proposed activities are conducted in accordance with conditions 40,41 and 41A of DA 305-7-2003

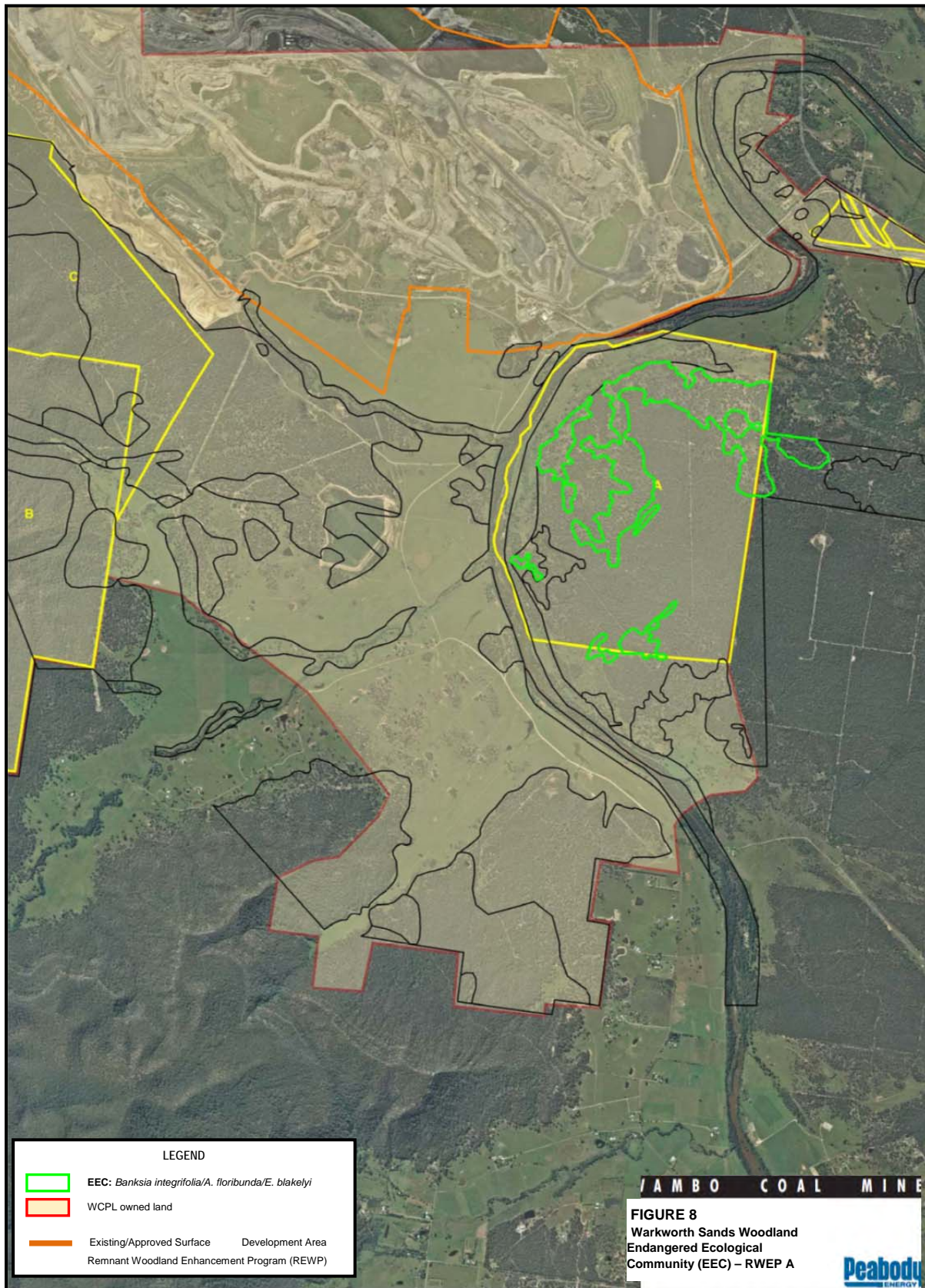
For further details regarding management strategies in RWEF refer to **Section 3.3.3**.

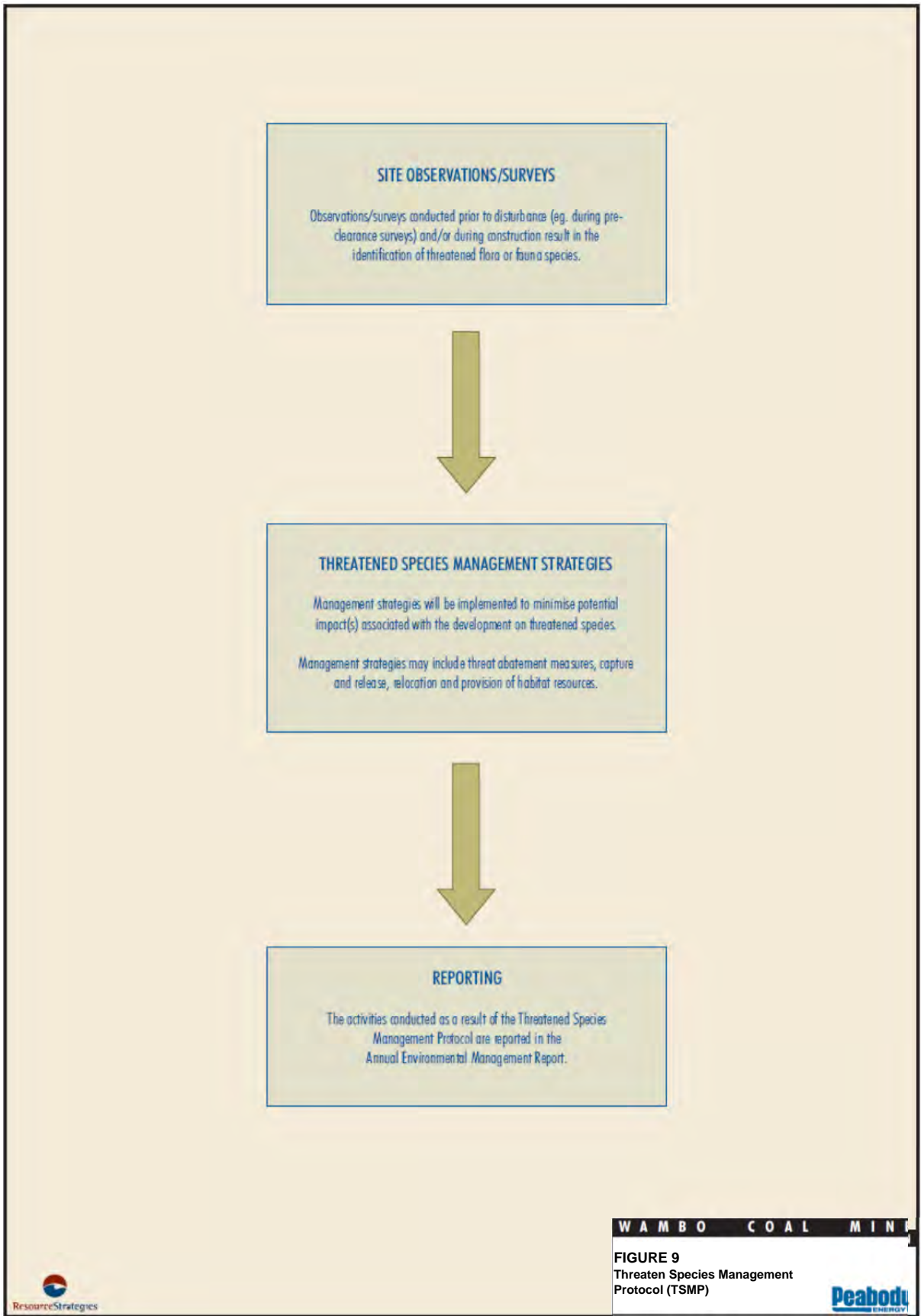
Threat Abatement

Threat abatement is the implementation of management strategies at the site to alleviate threatening processes. Actions may include the modification of disturbance areas, the scheduling of vegetation clearance activities, in consultation with an ecologist, to occur at a particular time (eg. when the hollow is not being utilised as a nesting/roosting resource by the threatened fauna species), or relocation (see below). Such strategies will be dependent on the degree of flexibility provided by mine planning.

Capture and Release

This option involves the capture and release of threatened fauna into proximal suitable habitat. Where threatened fauna is observed using a particular habitat feature, an attempt will be made utilising accepted trapping techniques by a suitably qualified and licensed ecologist, to capture the particular animal for the purpose of later release in suitable habitat.





Relocation

This option involves the relocation of roosting/nesting resources to proximal suitable habitat. For example, the Yellow-bellied Shearwater has been found to utilise a network of roosts, rather than being fixed to one roost. Hence, there is potential to relocate known roosts/nests to nearby suitable vegetation, when the roost/nest is unoccupied by the threatened species. The relocation of any species will be undertaken in consultation with an ecologist.

Provision of Habitat Resources

As outlined in **Section 3.4**, when possible, planting of selective flora species will be undertaken. Flora species that provide habitat resources (eg. foraging habitat) specific to threatened species known to occur in the Project area (eg. *Casuarina* spp. for Glossy Black-cockatoo) will be included in the revegetation works.

3.2.3 Consultation and Reporting

The activities conducted as a result of the TSMP will be undertaken under the guidance of the supervising ecologist in consultation with WCPL Environment and Community Manager (E&C Manager) or delegate. The results of the TSMP will be reported in the AEMR (**Section 5**).

3.3 REMNANT WOODLAND ENHANCEMENT PROGRAM

The objective of the RWEPP is to assist to conserve regional biodiversity, whilst enhancing the habitat available to flora and fauna. In accordance with the EPBC approval (**Section 1**), the RWEPP will provide a strategy that gives protection in perpetuity for RWEPP Area A and long-term protection of RWEPP Areas B, C and D. The four RWEPP areas are shown on **Figure 3**. The RWEPP enhancement strategies are detailed in **Section 3.3.3**.

It should be noted that DA305-7-2003 requires that RWEPP areas to be established to offset disturbance areas. Specifically, Schedule 4 Consent Condition 41 requires that these areas be the subject of a Conservation Agreement³ pursuant to section 69B of the National Parks and Wildlife Act 1974 (NPW Act) (see **Section 3.3.3**).

Orchid Research (2003) conducted surveys of RWEPP Areas A, B, and C in spring and summer 2002. The survey included:

- threatened vegetation community mapping;
- general mapping of other vegetation communities; and
- assessment of quality and habitat value of the RWEPP areas.

An additional offset area, Area D, was established in 2009 to offset vegetation cleared during the construction of the Wambo South Dam. Harper Somers O'Sullivan conducted a flora assessment of Area D in early 2009. A description of the flora values of RWEPP Areas A, B, C and D is presented in **Table 8**.

In addition to the above, those RWEPP areas identified in the *Wambo Rail Development Flora and Fauna Management Plan* (WCPL, 2004) will be managed in accordance with this FFMP.

³ The December 2012 Modification replaced the Deed of Agreement with the Minister of DP&I with a Conservation Agreement pursuant to the NPW Act.

Table 8 Flora Values of the Remnant Woodland Enhancement Areas

Remnant Woodland Enhancement Area	Baseline Assessment - Remnant Woodland Enhancement Areas Flora Values
Area A 424ha	<p>The flora values of Area A include the occurrence of:</p> <ul style="list-style-type: none"> • The Warkworth Sands Woodland endangered ecological community (listed in the TSC Act). As noted earlier, this community is considered to be the most threatened vegetation community occurring within the region due to its restricted distribution and absence within any conservation reserve. As indicated by Peake <i>et. al.</i> (2002), no areas of Warkworth Sands Woodland currently occur within a conservation reserve. While there has been patchy clearing and regeneration within this remnant, overall the community is in good condition and is considered to be capable of recovery close to its original condition if grazing is limited to minimise damage to the natural regeneration of native species. • White Box, Yellow Box, Blakely's Red Gum Woodland/Grassy White Box Woodlands (Box-Gum Woodland) endangered ecological community. This community is listed in both the TSC Act and EPBC Act. This particular stand of Box-Gum Woodland is considered to be in close to pristine condition. • Regionally significant populations of the River Red Gum (<i>Eucalyptus camaldulensis</i>) within the flood plain of Wollombi Brook. • Vegetation community 6 (<i>E. crebra</i>/<i>E. moluccana</i>/<i>A. luehmannii</i>/<i>M. decora</i>), the community that would primarily be disturbed by the open cut mining operations. • The ROTAP** species, <i>Grevillea montana</i>.
Area B 454ha	<p>The flora values of Area B include the occurrence of:</p> <ul style="list-style-type: none"> • The same dominant overstorey species that would be removed by the open cut operations (such as <i>E. crebra</i>, <i>A. luehmannii</i>, <i>M. decora</i>, <i>A. floribunda</i>, <i>G. salicifolia</i> and <i>N. microcarpa</i>). • A variety of vegetation communities, specifically vegetation communities 6, 9, 10, 3 and 14, thereby increasing Wambo's contribution to regional biodiversity.
Area C 211	<p>The flora values of Area C include the occurrence of:</p> <ul style="list-style-type: none"> • Vegetation community 6 (<i>E. crebra</i>/<i>E. moluccana</i>/<i>A. luehmannii</i>/<i>M. decora</i>), the community that would primarily be disturbed by the open cut operations. • Vegetation communities 10 and 11. Only relatively small patches of vegetation community 11 (<i>E. punctata</i>/<i>E. crebra</i>/<i>A. luehmannii</i>/<i>M. decora</i>) occur in the vicinity of Wambo. Conservation and enhancement of this patch would further contribute to regional biodiversity.
Area D* 48ha	<p>The flora values of Area D include the occurrence of:</p> <ul style="list-style-type: none"> • Vegetation communities 6 and 10. Canopy species including <i>Eucalyptus dawsonii</i> (Slaty Gum) and <i>E. crebra</i> (Narrow-leaf Ironbark); mid-storey layers containing <i>Melaleuca decora</i>, <i>Acacia binervia</i> (Coastal Myall), <i>Bursaria spinosa</i> (Native Blackthorn) and <i>Notelaea microcarpa</i> (Native Olive). • Grassland areas dominated by native and exotic grasses with areas of dense herbaceous native plants. • The ROTAP listed species, <i>Grevillea montana</i>

Note:* RWEPA Area D was established in August 2009 following a Modification approval to DA 305-7-2003 in which a water storage dam was constructed.

** Rare or Threatened Australian Plants, usually abbreviated to ROTAP, is a list of rare or threatened Australian plant taxa

Source: Greg Richards and Associates (2003); Mount King Ecological Surveys (2003); Orchid Research (2003); Harper Somers O'Sullivan (2009); Wambo (2009).

3.3.1 Habitat Assessment

Four major habitat types were recognised by Mount King Ecological Services (2003) within the mine area and surrounds, these being:

- cleared land/grassland;
- creek line and riparian habitats;
- woodland/open forest on steep hills; and
- woodland, including scattered trees, on undulating and level land.

In order to build on existing habitat data collected by Mount King Ecological Services (2003), habitat assessments will be undertaken in each of the major habitat types within the RWEF areas to obtain additional information on the habitat resources present.

3.3.2 Potential Expansion of the RWEF Areas

In 2011, the boundary of RWEF Area C was modified. This resulted in an overall increase of 18.4 ha in the size of RWEF Area C. The modified area is shown in **Figure 3**.

WCPL will investigate the practicality of expanding the RWEF areas to include Community 15 and portions of the southern area of WCPL owned land. Suitability for inclusion will be made after consideration is given to WCPL land use practises (eg. agistment of stock), the ecological value of the remnant and the mining potential in that area. Proposals for the inclusion of additional lands into the RWEF areas will be developed in consultation with the Hunter Coalfield Flora and Fauna Advisory Committee (when established).

If it is deemed suitable to include Community 15 and portions of the southern area of WCPL-owned land in the RWEF, inclusion will be made within 10 years following approval.

The *Acacia* sp. in Community 15 (located in the centre of the mine area to the west of North Wambo Creek (**Figure 5**) and covering an area of approximately 2 ha) was identified as *Acacia anuera* in the 2003 EIS (Orchid Research, 2003). *Acacia* experts Terry Tame and Travis Peake from the Hunter Catchment Management Trust re-identified this stand as *Acacia pendula* in early 2004. A second, smaller group of only five *Acacia pendula* trees was found approximately 600 m to the south (*ibid.*).

However this *Acacia* sp. in Community 15 is proving difficult to correctly identify as a function of the absence of flowers, fruit and seed. Community 15 was fenced in 2006 to exclude stock and restrict access.

The NSW Scientific Committee (2005a) has made a Final Determination to list the population of the tree *Acacia pendula* in the Hunter catchment as an Endangered Population in Part 2 of Schedule 1 of the TSC Act.

The *Acacia* sp. in Community 15 may be subject to subsidence from underground mining as assessed in the 2003 EIS. Subsidence in the *Acacia* sp. in Community 15 will be monitored in accordance with **Section 3.3.4**.

WCPL's long term goal will be to maintain and investigate if at all feasible and practicable strategies to increase the *Acacia pendula* population in the mine area. WCPL have fenced the known stands of *Acacia pendula* to exclude stock and implement weed control measures (see below). If and when available, WCPL will investigate the viability of harvesting seed from the *Acacia pendula* remnant in order to expand the current populations in the area. Collected seeds will be used to propagate tubestock for use in additional plantings proximal to the existing remnant and within the Wambo rehabilitation areas.

3.3.3 RWEF Enhancement Strategies

The RWEF includes the conservation and enhancement of areas of remnant woodland adjacent to Wollemi National Park. Conservation and enhancement of these areas will strengthen the linkages to be developed between Wollemi National Park, existing remnant woodland and woodland rehabilitation areas. Management measures include a conservation agreement, a protocol for undertaking approved mining activities, fencing, weed and feral animal control, bushfire management, restrictions to vehicular traffic and site access and provision of roosting/nesting resources.

By the November 2013, WCPL are required to enter into a conservation agreement/s pursuant to section 69B of the National Parks and Wildlife Act 1974 covering all offset areas as required by Condition 41, Schedule 4 of DA305-7-2003. The outcomes of the Conservation Agreement will be reported in the AEMR (**Section 5**).

Conservation Agreement

By the end of November 2013, unless otherwise agreed by the Director-General, WCPL shall:

- Enter into a conservation agreement/s pursuant to section 69b of the National Parks and Wildlife Act 1974 covering all offset areas listed in Table 16 (see condition 40) and which records WCPL obligations under the conditions of DA305-7-2003 in relation to the management of these areas, and register the agreement/s pursuant to section 69F of the National Parks and Wildlife Act 1974; or
- Where OEH has advised in writing that it is of the view that any such offset area or part of such an area should not be subject to a conservation agreement for a period of time, then WCPL shall by the same date cause to be registered against the land title(s) of the area/s a public positive covenant and/or restriction on the use of the land, in favour of the Director-General, requiring WCPL to implement and observe all obligations under the conditions of this consent in relation to the management of these areas. The conservation agreement or the public positive covenant and/or restriction on the use of land, as the case may be, shall remain in force in perpetuity in relation to the area.

Offset Conservation

WCPL shall not undertake any mining operations (except approved underground mining operations) or other activities within RWEF Areas, other than:

- Activities approved in the Flora & Fauna Management Plan;
- Environmental management, environmental monitoring or other monitoring required by DA305-7-2003 or under an approved management plan or monitoring program; and
- Rehabilitation activities under an approved Extraction Plan (see **Section 3.3.4**).

Approved Activities within RWEF Areas

Surface activities for gas drainage and dewatering within the RWEF areas was described and assessed as part of the Wambo Development Project in the 2003 EIS and subsequent modifications. In addition, prospecting activities are required within RWEF areas to support approved underground mining operations to further delineate resource and undertake necessary gas and geotechnical testing.

As previously noted, WCPL shall make all reasonable and practicable attempts to avoid the undertaking of the above mentioned approved mining activities within all offset areas. However, if these approved activities cannot be avoided within offset areas to allow the continuation of mining, then prior to any disturbance, WCPL will seek approval from:

- The Federal Minister of DSEWPC for any proposed disturbance activities in RWEF A; and
- The Director General for DP&I for any proposed disturbance activities in all RWEF Areas.

Fencing

The RWEF areas have historically been grazed. Uncontrolled stock access to woodland vegetation can limit the regeneration of plants and reduce middle and understorey vegetation. The perimeter of the RWEF areas A, B, C and D and Community 15 are fenced to exclude livestock which will allow the natural regeneration of native flora species. However, strategic grazing (such as pulse grazing) may be undertaken in pasture areas previously grazed to reduce any dense stands of pasture (Barlow, 1998). Grazing in RWEF areas may be utilised, given DoPI approval.

Weed Control Program

Weed species are effective competitors for resources and have the potential to exclude native species from the landscape, resulting in changes in the composition and structure of plant communities. WCPL have implemented a weed control program to limit the spread and colonisation of weeds (including noxious and environmental weeds) on RWEP and adjacent areas, as described below.

In NSW, the NSW Minister for Industry and Investments specifies noxious weeds for each local government area under the *Noxious Weeds Act, 1993*. The local council within each local government area is the primary authority with responsibility for noxious weed control in accordance with the requirements of NSW Department of Industry and Investments (DII) (NSW Agriculture). The Upper Hunter County Council (which includes Muswellbrook, Scone and Singleton council areas) is the primary authority with responsibility for weed control in the Singleton Shire.

WCPL have implemented a weed control program to limit the spread and colonisation of noxious and environmental weeds on the RWEP areas. The weed control program includes the following:

- 6 monthly surveys of RWEP areas to identify areas requiring weed management measures to be implemented;
- implementation of weed management measures (e.g. mechanical removal, application of approved herbicides in authorised areas when conditions are favourable [i.e. when light winds and dry weather prevail], biological controls where possible);
- control of noxious weeds identified on RWEP areas in accordance with the relevant control category and the relevant regional weed management plan;
- follow-up inspections to assess the effectiveness of the weed management measures implemented and the requirement for any additional management measures; and
- minimisation of the potential for the establishment of new weeds on RWEP areas by minimising the transport of weed species to and from RWEP areas (e.g. limiting vehicle access and minimising stock access).
- A recording and monitoring program to track species, actions undertaken and areas managed

Chemicals to be used in the chemical control of weed species will be evaluated with their Material Safety Data Sheet and chemical label to determine their registration for control of target species and the handling and safety requirements prior to spraying. All chemical spraying will be conducted in accordance with the *Pesticides Act 1999*. The weed control program management activities and monitoring results will be reported in the AEMR.

Pest Control Program

The Hunter Livestock Pest and Health and Pest Authorities (LPHA) is the primary authority with responsibility for implementation of pest control in the Singleton Shire in accordance with the requirements of the *Rural Lands Protection Act, 1998*.

Many animal pests pose a threat to native fauna through competition for habitat resources and direct predation. Predation by the fox and feral cat are listed in Schedule 3 of the NSW *Threatened Species Conservation Act, 1995* as key threatening processes. In addition to foxes and feral cats, wild dogs have also been found to predate on native fauna. Predation by animal pests such as the fox, feral cat and wild dog threatens a number of native fauna species including threatened species. In addition, the occurrence of rabbits has been found to influence fox abundance. Where rabbit numbers are high, fox populations generally thrive, and conversely when rabbit numbers drop, fox populations often decline (Williams *et. al*, 1995). Rabbit control is therefore also important.

WCPL have implemented a pest control program in the RWEP areas and adjacent grazing land to control the occurrence of animal pests. The pest control program includes the following:

- an annual survey of RWEF areas and adjacent grazing land to assess the status of pest populations and determine the measures to be implemented;
- implementation of pest control measures (e.g. the destruction of rabbit burrows, feral cat trapping and baiting of foxes and wild dogs);
- follow-up inspections to assess the effectiveness of control measures implemented and the requirement for any additional control measures;
- maintenance of a clean, rubbish-free environment, particularly around administration and contractor areas in order to discourage scavenging and reduce the potential for colonisation of these areas by non-endemic fauna (e.g. rodents);
- mandatory pest control for any declared pests (i.e. rabbits, pigs and wild dogs) known to occur on Wambo land;
- no domestic pets such as cats or dogs will be permitted to be brought onto the site; and
- pest control in accordance with any Pest Control Orders issued under the Rural Lands Protection Act, 1998.
- A recording and monitoring program to track species, actions undertaken and areas managed

Bushfire Management

High frequency bushfire resulting in the disruption of lifecycle processes in plants and animals, and loss of vegetation structure and composition, is listed as a threatening process in Schedule 3 of the TSC Act. A Bushfire Management Plan (BMP) is in place at WCPL.

A bushfire risk analyses has been undertaken in accordance with the BMP for the RWEF areas. Suitable fire access tracks are maintained within/around the RWEF areas. The standard protocols outlined in the BMP will be followed in the event of a bushfire. These protocols are described below. In the case of bushfire emergency and under the discretion of the NSW Rural Fire Service, emergency isolated clearing of vegetation may be required and undertaken within RWEF areas.

Bushfires Originating from Wollemi National Park:

Where a bushfire originates from the Wollemi National Park and has the potential to affect WCPL land holdings, WCPL will, if requested by the relevant authorities, provide plant, equipment and resources to the National Parks and Wildlife Service or Rural Fire Service to assist in the control and suppression of the fire. To minimise the impact to WCPL lands, fire breaks shall be established in consultation with the Rural Fire Service between Wambo assets and the fire front.

Fires Originating from Adjacent Properties:

Where a bushfire originates from adjacent landholdings and has the potential to affect WCPL landholdings, WCPL will, if requested by the relevant authorities, provide plant, equipment and resources to the Rural Fire Service or the adjacent land owners to assist in the control and suppression of the fire. To minimise the impact to WCPL lands, fire breaks shall be established in consultation with the Rural Fire Service between Wambo assets and the fire front.

Fires Originating from Wambo Mine:

Where fire originates on WCPL landholdings, the primary aims will be protection of the WCPL assets and prevention of the fire escaping to adjacent land. For minor fires, appropriate plant, equipment and resources will be dispatched immediately to suppress the fire. The most common method of fire fighting in these instances is likely to include water sprays to douse the flames, followed by appropriate mopping up procedures to ensure that the fire is fully extinguished and the chance of re-ignition is minimised.

<p>Note: The NSW Rural Fire Service have requested to be contacted regarding all fires at WCPL</p>

Restrictions on Site Access

Damage by vehicles can result in the compaction of soil (which can reduce the infiltration of water into the soil and restrict root growth, and consequently reduce natural regeneration), the spread of weeds and disturbance to vegetation. In order to reduce the degree of disturbance to the RWEF areas, vehicular access will be limited to authorised personnel only. Authorisation for vehicular entry into the RWEF areas will be determined by the WCPL's Environmental Personnel at the time of request. The RWEF areas are fenced and signposted to limit access. Locks have been placed at strategic access points to deter unauthorised entry. Not all access gates are locked due to fire trail access requirements in an emergency.

Roosting/Nesting Resources

Artificial nesting/roosting boxes for fauna, particularly threatened fauna, may be used to replace natural habitat features removed by vegetation clearance activities. **Section 3.1.4** explains how natural habitat features (e.g. hollows) will be relocated during vegetation clearance activities. If required, the number, specifications and location of additional artificial nesting/roosting boxes will be determined by a qualified ecologist during the VCP implementation. Details of any such works undertaken are reported in the AEMR.

Landform Stabilization

In addition to the measures presented in the Erosion and Sediment Control section (**Section 3.4.2**) which apply mainly to mining disturbed land, the stabilisation of landforms within the RWEF areas (especially creek lines) also assists with maintaining healthy native vegetation communities and controlling weed infestation. Programs that assist with general erosion control and landform stabilisation, such as livestock exclusion and bushfire management, have been implemented. Measures that target specific areas have also been implemented where required, such as the removal and rehabilitation of unnecessary vehicle trails, creek crossings or other in-creek structures (e.g. V-notch weirs), or the rehabilitation of concentrated areas of erosion or ground disturbance (i.e. slumping, scalding, extensive (pest) animal burrowing, subsidence cracking and erosion gullyng).

3.3.4 Subsidence Management

The main surface impact of underground coal mining is subsidence, which occurs when the ground surface above mined areas lowers (Booth *et al.*, 1998 in NSW Scientific Committee, 2005b). The Scientific Committee has made a Preliminary Determination to support a proposal to list alteration of habitat following subsidence due to longwall mining as a key threatening process in Schedule 3 of the TSC Act (NSW Scientific Committee, 2005b).

A subsidence impact assessment was undertaken by G.E. Holt and Associates (2003) for the Project EIS. Following the modification of Development Consent (DA 305-7-2003), G.E. Holt and Associates re-assessed the potential subsidence impacts of the re-orientation of the longwall panels in the NWU mine as part of the Wambo Development Project Wambo Seam Underground Mine Modification (2005 SEE).

Further subsidence impact assessments were completed in 2012 by Ditton Geotechnical Services (2012) *North Wambo Underground Mine Longwalls 7 and 8 Extraction Plan/Subsidence Management Plan – Revised Subsidence Predictions and Impact Assessment for Natural Features and Surface Infrastructure*.

NWU mine – SMP LW1-6

The NWU currently operates under an approved Subsidence Management Plan (SMP) for LW1 - 6. The SMP for First Workings was approved by the DTIRIS in October 2005 with mining commencing in November 2005. The SMP for Second Workings was lodged in March 2006 and was approved by the

DTIRIS on the 11 December 2006. This SMP covers underground mining activities until 1/11/2013 which includes longwall panels 1 through to 6 (LW 1- 6). Mitigation measures and management for potential consequences on land resources, groundwater, surface water, Aboriginal cultural heritage, European cultural heritage, flora and fauna are described in detail in the SMP for LW1 - 6.

NWU mine – SMP/Extraction Plan LW7-8

In December 2012, WCPL submitted an SMP/Extraction Plan application in accordance with Conditions 22 A-F, Schedule 3 of DA305-7-2003 for the remaining approved longwall panels LW7 - 8 at the NWU mine. The SMP/Extraction Plan Application for LW7 - 8 seeking approval prior to secondary extraction to:

- demonstrate that the subsidence impact performance measures can be achieved; and
- develop detailed mitigation measures and monitoring to manage the potential impacts and/or environmental consequences on natural and built features.

Mitigation measures and management for potential consequences on land resources, groundwater, surface water, Aboriginal cultural heritage, European cultural heritage, flora and fauna are described in detail in the SMP/Extraction Plan LW7-8.

WCPL have prepared implemented an Acacia Pendula Management Plan for LW4. Monitoring of RWEF areas overlying WCPL underground works and the *Acacia pendula* remnant referred to in **Section 3.3.2** include annual ground inspections to:

- identify any isolated surface disturbances;
- assess the level of disturbance to native vegetation and the condition of the vegetation (e.g. health and vigour of species and communities); and
- assess any changes in drainage lines or watercourses (that may be attributable to subsidence).

Bed and bank stability, and riparian vegetation health, is also monitored along those sections of onsite creek lines which are proposed for undermining (see **Section 4.2** for details).

3.4 REHABILITATION PROGRAM

WCPL rehabilitation works will be undertaken progressively over the life of the mine in accordance with the Open Cut MOP. This section outlines the proposed management and implementation of rehabilitation works in areas disturbed by mining. Rehabilitation planning is recognised as a dynamic activity requiring broad stakeholder consultation, the conduct of trials and design studies, and the preparation of appropriate management plans prior to implementation. The rehabilitation concepts are detailed in the 2003 EIS (WCPL, 2003).

3.4.1 Progressive Rehabilitation

As WCPL is developed in accordance with DA205-7-2003 and the Open Cut MOP, both land disturbance and rehabilitation will occur progressively. The amount of disturbed land at any one time will primarily be associated with the advancing open pit and active mine waste rock emplacement areas. The proposed sequence of land disturbance, resulting from open cut mining, and the related progression of land rehabilitation is outlined in the current Open Cut MOP and RMP⁴.

As an integral component of staged mining operations, rehabilitation of the mine waste rock emplacements and other areas of disturbance will be conducted progressively over the life of the mine

⁴ The RMP has been prepared to provide details of rehabilitation strategies implemented on site, and to meet the requirements of Development Consent DA-305-7-2003.

and will be scheduled to minimise the disturbed area at any point in time. Particular focus will be placed on the outer batters of the mine waste rock emplacements. Cover crops can also be applied to incomplete mine waste rock emplacement areas where they may remain inactive for an extended period. These measures will reduce the visual impact of WCPL and minimise the potential for generation of wind blown dust and sediment laden runoff.

3.4.2 Erosion and Sediment Control

In accordance with Schedule 4, Consent Condition 32, an Erosion and Sediment Control Plan (ESCP) has been developed for Wambo. As part of the ESCP, WCPL conducts monthly inspections of operational sediment control structures. The structures will be assessed for structural stability and effectiveness and appropriate remedial works will be implemented as required. Inspections of sediment control structures are also undertaken following significant rainfall events in accordance with the ESCP.

3.4.3 Revegetation

The revegetation of open cut mining disturbed areas at WCPL will establish a net increase in woodland vegetation over the life of mine (2003 EIS). The objectives of the revegetation program are in keeping with the intent of the native vegetation/biodiversity target of the *Integrated Catchment Management Plan for the Hunter Catchment 2002* (HCMT, 2002) to increase the amount of native vegetation, particularly in those landscapes that have been extensively cleared. The final distribution of woodland to be established on rehabilitated landforms will ultimately depend on the outcome of mine closure planning, including the shape of final landforms and the agreed post closure land use. In general, revegetation will comprise the following areas:

- woodland corridors;
- pasture areas; and
- riparian zone.

In recognition of the importance of vegetation corridors to regional biodiversity, rehabilitation initiatives will aim to increase the continuity of vegetation in the region through the establishment of woodland corridors. Accordingly, the rehabilitation program has been designed to establish linkages between the rehabilitation areas, existing remnant vegetation and Wollemi National Park. In doing so, WCPL will be addressing the issue of discontinuity in remnant vegetation across the Hunter Valley floor and will be contributing to the broad-scale vegetation corridor proposed to be established across the valley floor to connect Wollemi National Park with the Barrington Tops National Park. The *Synoptic Plan: Integrated Landscapes for Coal Mine Rehabilitation in the Hunter Valley of New South Wales* (DMR, 1999) indicates that this is a high priority for vegetation management in the region.

Revegetation of woodland areas, including woodland corridors, includes the use of endemic plant species which are characteristic of the vegetation communities to be disturbed within the open cut operations area.

The revegetation strategy includes the planting of the edge of the North Wambo Creek water control channel with River Oak (*Casuarina cunninghamiana*) and Rough-barked Apple (*Angophora floribunda*). A net increase in the quantity of riparian vegetation along North Wambo Creek is proposed. A selection of pasture/cover crops will be utilised in the revegetation of the North Wambo Creek riparian zone. The pasture/cover crops to be utilised in the revegetation of the North Wambo Creek riparian zone will be commercially available species commonly found in the Hunter Valley, with the exception of fast growing cover crops to be used in initial stabilisation.

Revegetation includes the use of native species with the potential to offer habitat resources for native wildlife (e.g. breeding, roosting/nesting or foraging resources), including threatened fauna species. The revegetation program includes the use of food tree species for the Glossy Black-cockatoo (e.g. *Allocasuarina*). Where possible, seed collection and propagation activities will contribute to

revegetation associated with the rehabilitation of WCPL disturbance areas (**Section 3.1.5**). Provisional revegetation species lists are presented in **Appendix C**.

3.4.4 Maintenance and Monitoring

The quality of rehabilitation will be monitored using a monitoring methodology that assesses landscape function and habitat complexity, known as Ecosystem Function Analysis (EFA). An overview of the EFA is provided in **Section 4.1.2**.

Visual monitoring of rehabilitated areas will also be conducted to ensure that revegetation is establishing and to determine the need for any maintenance and/or contingency measures. Routine monitoring of rehabilitation areas includes:

- checking soil erosion status and the effectiveness of erosion and sediment control measures (as part of the ESCP);
- monitoring mine landform runoff water quality (as part of the Surface Water Monitoring Program);
- monitoring establishment of revegetation (as part of the Flora and Fauna Monitoring Program – **Section 4**); and
- identification of the presence of weeds or feral animals (as part of the Flora and Fauna Monitoring Program – **Section 4**).

The ESCP and Surface Water Monitoring Program form part of WCPL's Site Water Management Plan.

Where rehabilitation monitoring results identify a requirement for maintenance, remedial works may include:

- repair of erosion (i.e. regrading of eroded areas);
- repair of drainage paths and de-silting of sediment control structures;
- re-seeding or re-planting;
- application of fertiliser;
- application of lime or gypsum to control pH and improve soil structure;
- bushfire management activities; and
- implementation of weed and feral animal control measures.

Monitoring and maintenance activities will be ongoing with the results assessed and utilised in rehabilitation planning.

Rehabilitation monitoring results and maintenance activities will be reported in the AEMR (see **Section 5**). The AEMR provides an annual review of rehabilitation progress and report mining lease disturbance areas, rehabilitated areas and areas undergoing rehabilitation to demonstrate that progressive rehabilitation goals are being met.

4.0 FLORA AND FAUNA MONITORING PROGRAM

The flora and fauna monitoring program includes two main components; monitoring of revegetation of disturbance areas (including areas subject to subsidence from underground mining and completed landforms within open cut mining areas) and monitoring of the RWEF areas. These two monitoring components are outlined in **Sections 4.1** and **4.2**, respectively. In the event that a threatened species listed under the NSW TSC Act or EPBC Act is identified in the mine area, or immediate surrounds, during the implementation of the flora and fauna monitoring program, the Threatened Species Management Strategies phase of the TSMP will be initiated (**Section 3.2.2**).

4.1 MONITORING OF REVEGETATION OF DISTURBANCE AREAS

WCPL will revegetate areas of WCPL to woodland, pasture and/or riparian vegetation, as described in Section 3.4.3. A number of techniques, such as visual monitoring and Ecosystem Function Analysis (EFA), will be utilised to monitor the progress of the revegetation of disturbance areas. These techniques are described below.

4.1.1 Visual Monitoring

Visual monitoring of revegetation will be undertaken to ensure vegetation is establishing and to determine the need for any maintenance and/or contingency measures (such as the requirement for supplementary plantings, erosion control and weed and animal pest control). Visual assessments allow for the rapid application of remedial actions where necessary.

4.1.2 Ecosystem Function Analysis

The quality of rehabilitation will be monitored using EFA, a method developed by the Commonwealth Scientific and Industrial Research Organisation. EFA provides indicators of revegetation/rehabilitation success and allows the assessment of ecosystem sustainability through the plotting of development trajectories. EFA aims to measure the progression of revegetation/rehabilitation towards a self-sustaining ecosystem through the assessment of landscape function, vegetation dynamics and habitat complexity.

EFA consists of a number of permanent transects being established in areas of revegetation, along with corresponding transects in adjacent undisturbed areas to provide reference/analogue sites. The reference/analogue sites should represent as close as possible the slope, aspect and proposed vegetation characteristics of the revegetation areas. The information obtained will be used to track the revegetation progress, predict self-sustainable values and compare the revegetation and reference sites.

EFA monitoring is currently undertaken across sections of the open cut rehabilitated areas and the sections along North Wambo Creek Diversion (NWCD). EFA transects are monitored annually either in autumn or spring following the commencement of revegetation. Monitoring frequency will be subject to annual review. Monitoring data will be reviewed and remedial management strategies will be implemented where necessary. WCPL will expand the number of EFA transects to cover Stage 3 of the NCWD works and open cut rehabilitation as required.

4.2 MONITORING PROGRAM FOR THE RWEF

The primary objective of this component of the flora and fauna monitoring program is to monitor the impacts of RWEF establishment. In accordance with Schedule 4, Consent Condition 48(b) (see **Table 9**) key components of the monitoring program (i.e. flora, habitat complexity, terrestrial fauna), along with specific enhancement initiatives, are described below.

Table 9 RWEF Monitoring Program

Monitoring Component	Monitoring Description	FFMP Section
Flora	A number of permanent flora survey quadrats (of varying sizes to survey tree, shrubs and ground cover) should be established in woodland enhancement areas to obtain quantitative data on plant species diversity and abundance.	Section 4.2.1
Habitat Complexity	Habitat complexity should be monitored using a number of permanent transects established within woodland enhancement areas. Habitat complexity parameters such as canopy cover, shrub cover, ground vegetation cover, the amount of litter, fallen logs and rocks should be surveyed.	Section 4.2.3
Terrestrial Fauna	Terrestrial fauna surveys should be conducted to monitor the usage of enhancement areas by vertebrate fauna. Monitoring may include fauna species diversity and abundance or, alternatively, the use of indicator species to measure the effectiveness of enhancement measures.	Section 4.2.2
Aquatic Fauna	Freshwater macro-invertebrate monitoring, including an assessment of SIGNAL A values and water quality (e.g. temperature, pH, and salinity).	Section 4.2.2
Specific Enhancement Initiatives	Monitoring of specific enhancement initiatives (e.g. the provision of nesting/roosting boxes, weed control or feral animal control).	Section 4.2.4

4.2.1 Flora

A number of permanent flora survey quadrats have been established in RWEF areas to obtain quantitative data on plant species diversity and abundance.

Table 9 describes the survey parameters, methodology and the units of measurement used in the survey. The following details are also recorded for each quadrat: GPS position, landform, physiography, soil characteristics, disturbance, vegetation community structure and general comments. As part of the general comments, particular note should be made of premature vegetation dieback, or senescence, in the vicinity of monitoring quadrats (with specific mention of *Eucalyptus Melliodora* and *Banksia integrifolia* subspecies *integrifolia* dieback).

Survey quadrats have been established in RWEF areas to observe evidence of change in species diversity and abundance of each vegetation community, following RWEF establishment. Quadrats are located within each vegetation community type present in each RWEF area (**Figure 10**).

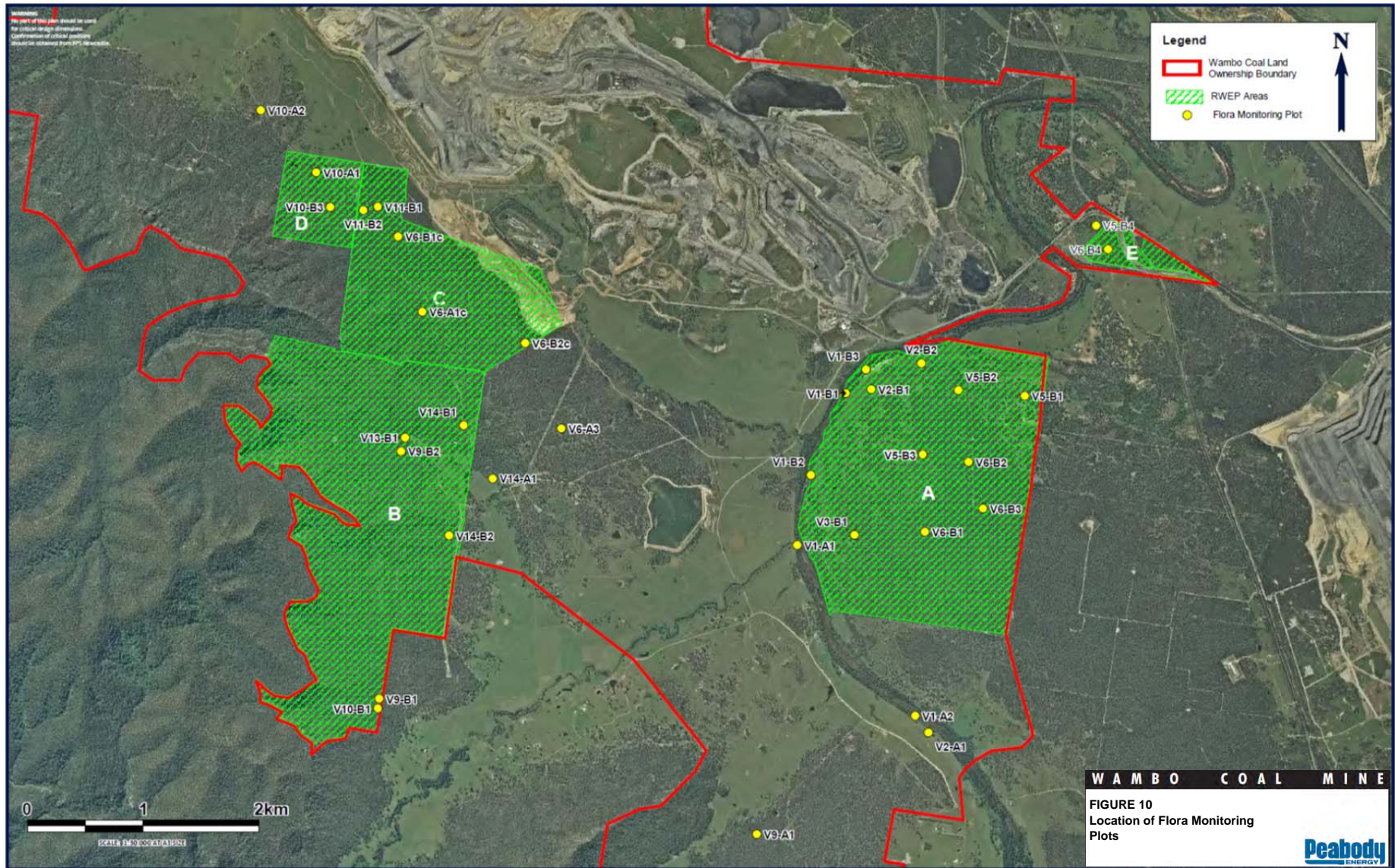
Analogue/reference flora survey quadrats have been established in locations surrounding the RWEF areas. These analogue sites provide comparative data, so that the long term trends following RWEF establishment can be determined. Analogue sites have been established for each vegetation community type present within the RWEF areas. Analogue site location was selected to ensure site topographic characteristics reflect those of corresponding vegetation community types within the RWEF areas.

The flora survey schedule is as follows:

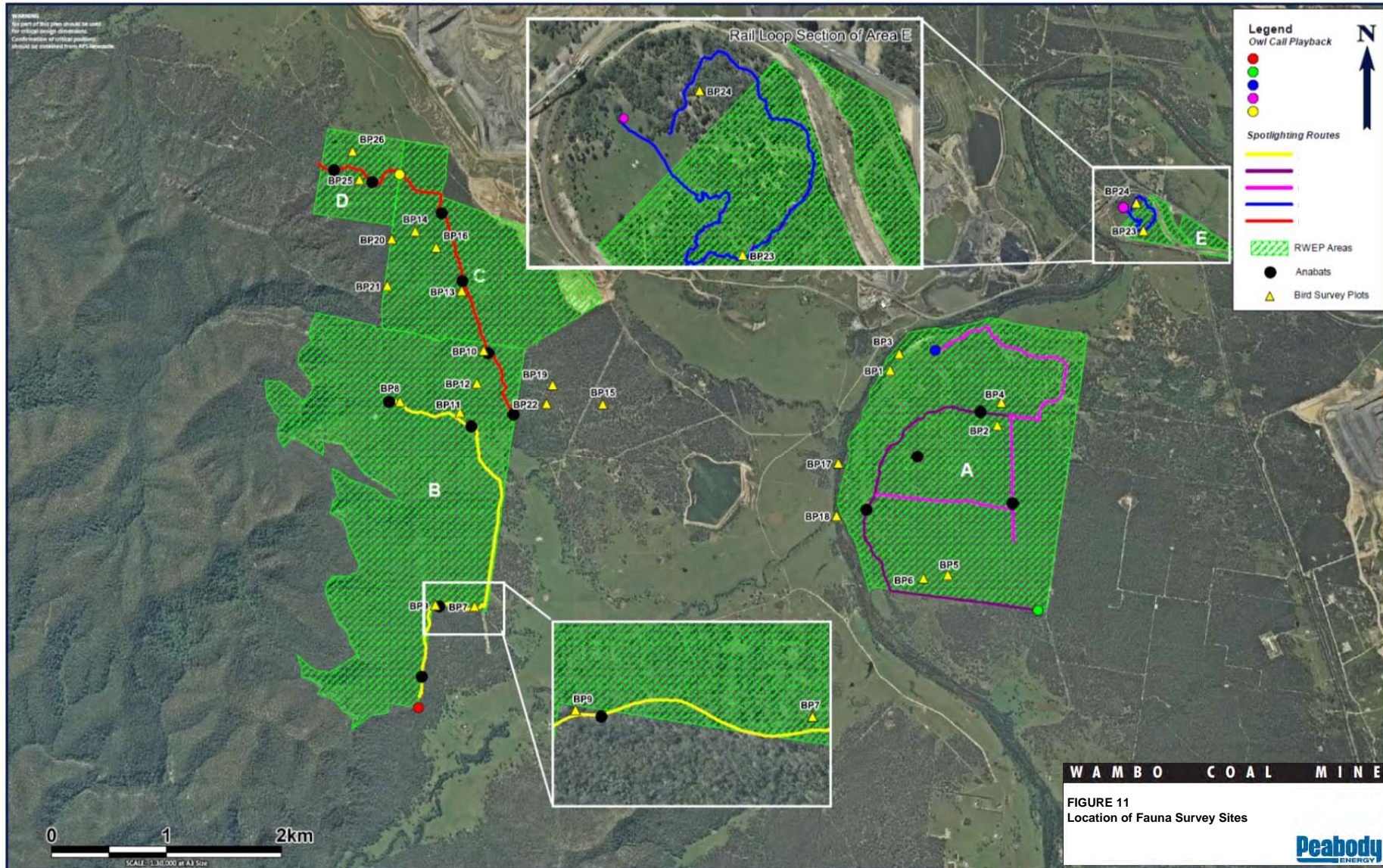
- The baseline flora survey quadrat sampling was conducted during the first year of operations.
- Monitoring of the flora survey quadrats within the RWEF areas is conducted annually during spring.
- Monitoring of analogue sites will be conducted every three years following baseline monitoring until mine relinquishment.

The above schedule will be subject to annual review through the AEMR and modified as appropriate.

WCPL - Flora and Fauna Management Plan



WCPL - Flora and Fauna Management Plan



WAMBO COAL MINE

FIGURE 11
Location of Fauna Survey Sites



4.2.2 Terrestrial & Aquatic Fauna

WCPL current fauna monitoring program monitors the usage of RWEF areas by vertebrate fauna (see **Figure 11**). The fauna monitoring program includes two main components; sampling of vertebrate fauna species diversity and abundance, and the use of avifauna as indicator species. Monitoring programs for vertebrate fauna species diversity and abundance, and the use of avifauna as indicator species, are described below.

Vertebrate Fauna Species Diversity and Abundance

Terrestrial fauna surveys are conducted to sample fauna species diversity and abundance in the RWEF areas.

Systematic sampling sites have been established in the RWEF areas to monitor amphibians, reptiles, birds and mammals. The survey techniques used at sampling sites are described in **Table 10**.

Survey sites have been established to provide a representation of the change in vertebrate fauna species diversity and abundance in RWEF Areas A, B, C and D.

Three survey sites have been established in each major habitat type present within each RWEF areas (**Figure 11**). These habitats include:

- creek line and riparian habitats;
- woodland/open forest on steep hills; and
- woodland, including scattered trees, on undulating and level land.

Corresponding survey sites will also be established in areas of equivalent habitat type adjacent to the RWEF areas to provide reference/analogue sites. These analogue sites will provide comparative data so that the long term effects of the RWEF can be determined.

Where the analogue fauna survey sites are located on private land, agreement needs to be reached with the relevant landholder for ongoing access. Where agreement cannot be reached alternative sites or means of survey will be investigated.

Vertebrate fauna species diversity and abundance will be monitored at Years 1, 5, 10, 15, 20, 25 and 30. The actual total period over which monitoring will occur will be dependent on the ultimate mine life.

For the years that the terrestrial fauna surveys are not undertaken, the following survey techniques may be used in conjunction with the habitat complexity surveys:

- spotlighting;
- herpetological searches;
- bird surveys;
- opportunistic observations;
- tracks and traces; and
- estimation of relative abundance.

Survey techniques are described in **Table 10**. Survey design was determined within the first 12 months of the current WCPL consent and may be reviewed by WCPL in conjunction with the relevant authorities.

4.2.5 Subsidence Impacts

RWEP areas overlying existing underground workings or proposed underground mining areas are subject to annual subsidence monitoring inspections. These inspections:

- identify any isolated surface disturbances;
- assess the level of disturbance to native vegetation and the condition of the vegetation (e.g. health and vigour of species and communities); and
- assess any changes in drainage lines or watercourses (that may be attributable to subsidence).

The details regarding subsidence inspections, mitigation measures and management for potential consequences for flora and fauna are described in detail in the SMP for LW1 – 6 and SMP/Extraction Plan Application for LW7 – 8.

4.2.6 Riparian Monitoring

Riparian assessments are undertaken along sections of North Wambo Creek, North Wambo Creek Diversion, South Wambo Creek and Stoney Creek to give an overall rating of creek health and stability. Two types of monitoring are undertaken as part of the program: *Bed and Bank Stability Monitoring* and *Riparian Vegetation Monitoring*.

Bed and Bank Stability Monitoring

Bed and bank stability monitoring is undertaken by surveying consultants who undertake replicate surveys of the three creeks to measure areas of significant erosion and identify changes related to creek bed condition and water flow. A written assessment is completed, detailing any areas of significant erosion, bare soil and subsidence along each creek line.

Riparian Vegetation Monitoring

Two types of transect are assessed for sections of the three creeks, consisting of:

- Cross sectional – A marked single line transect across the width of the stream from bank to bank, also referred to as ‘transects’; and
- Longitudinal – An unmarked transect along the length of the creek between two transects, also referred to as ‘sections’.

Transect and section locations are established along those sections of the three creeks situated above underground workings, plus at least one site beyond each end of the underground workings.

The effects of subsidence and erosion on riparian vegetation are monitored by repetitive sampling of established permanent transects by assessing:

- The current erosion status of transects and sections;
- Photographing each transect site & any areas of significant erosion or subsidence impacts; and
- Quantifying vegetative structure and species composition for each transect by:

Visual assessment of riparian vegetation characteristics, is also undertaken using a field check sheet. Riparian vegetation components assessed include:

- Overstorey characteristics;
- Understorey characteristics;
- Ground cover characteristics;
- Introduced species presence;
- Feral animal activity;
- Surface Stability;
- Riparian microhabitat presence; and
- Disturbance levels.

5.0 REPORTING

WCPL is required to prepare and submit an Annual Environmental Management Report (AEMR) in accordance with the NSW Trade & Investment – Division of Resources and Energy (DRE), *Guidelines to the Mining, Rehabilitation and Environmental Management Process (Guidelines No. EDG03)*. The AEMR is an annual report submitted to relevant government authorities and made available to the public. The AEMR summarises environmental management activities for the previous reporting period and planned activities for the subsequent period, including management measures and monitoring programs as described in this FFMP.

Accordingly, activities prescribed in the FFMP are subject to public and regulatory review. Outcomes of FFMP activities are communicated through the Community Consultative Committee (CCC) and will also be communicated to the Hunter Coalfield Flora and Fauna Advisory Committee (when established).

The preparation of the AEMR, also satisfy's the Annual Review (AR) requirements under Development Applications (DA) 305-7-2003 and 177-8-2004. The AEMR also satisfy's the reporting requirements for Environment Protection Licence 529, approval under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC 2003/1138) and approved Subsidence Management Plans (SMPs). **Table 11** outlines Wambo's annual reporting and incident reporting requirements from DA305-7-2003, DA177-8-2004 and other approvals.

WCPL must notify at the earliest opportunity, the Director-General of DP&I and any other relevant agencies of any incident that has caused, or threatens to cause, material harm to the environment. For any other incident associated with the project, WCPL shall notify the Director-General and any other relevant agencies as soon as practicable, after becoming aware of the incident. Within 7 days of the date of the incident, WCPL must to provide the Director-General and any relevant agencies with a detailed report on the incident, and such further reports as may be requested.

WCPL operate a 24hr community enquiries line (02) 6570 2245 and a blasting information line (02) 8250 52 05. In addition, WCPL maintain a community email wambocommunity@peabodyenergy.com to received community complaints. All community complaints received by WCPL are managed in accordance with Community Complaints Procedure.

Table 11 Annual Reporting & Incident Reporting Requirements

Annual Review Reporting Requirements
Schedule 6 - DA 305-7-2003
<p>Annual Review</p> <p>5. By the end of March each year, the Applicant shall submit an annual review of the environmental performance of the development to the satisfaction of the Director-General. This review must:</p> <ul style="list-style-type: none"> (a) describe the development (including any rehabilitation) that was carried out in the previous calendar year, and the development that is proposed to be carried out over the current calendar year; (b) include a comprehensive review of the monitoring results and complaints records of the development over the previous calendar year, which includes a comparison of these results against: <ul style="list-style-type: none"> • the relevant statutory requirements, limits or performance measures/criteria; • the monitoring results of previous years; and • the relevant predictions in the EIS; (c) identify any non-compliance over the previous calendar year, and describe what actions were (or are being) taken to ensure compliance; (d) identify any trends in the monitoring data over the life of the development; (e) identify any discrepancies between the predicted and actual impacts of the development, and analyse the potential cause of any significant discrepancies; and (f) describe what measures will be implemented over the current calendar year to improve the environmental performance of the development. <p>10. The Applicant shall notify at the earliest opportunity, the Director-General and any other relevant agencies of any incident that has caused, or threatens to cause, material harm to the environment. For any other incident associated with the project, the Applicant shall notify the Director-General and any other relevant agencies as soon as practicable after the Applicant becomes aware of the incident. Within 7 days of the date of the incident, the Applicant shall provide the Director-General and any relevant agencies with a detailed report on the incident, and such further reports as may be requested.</p>

Table 11 Annual Reporting & Incident Reporting Requirements cont..

Annual Review Reporting Requirements
Schedule 6 - DA 177-8-2004
<p>Annual Reporting</p> <p>4. Within 1 year of the date of this consent, and annually thereafter, the Applicant shall submit an AEMR on the development to the Director-General and relevant agencies. This report must:</p> <ul style="list-style-type: none"> (a) identify the standards and performance measures that apply to the development; (b) include a summary of the complaints received during the last year, and compare this to the complaints received in previous years; (c) include a summary of the monitoring results on the development during the last year; (d) include an accurate record of the amount of product coal transported on the development over the last year on a weekly basis (e) include an analysis of these monitoring results against the relevant: <ul style="list-style-type: none"> • impact assessment criteria; • monitoring results from previous years; and • predictions in the SEE; (f) identify any trends in the monitoring over the life of the development; (g) identify any non-compliance during the last year; and, if necessary, (h) describe what actions were, or are being taken, to ensure compliance.
EPBC 2003/1138
3(d) a process to review and report annually on this plan ⁵ .

Table 12 FFMP Reporting Framework

Report	Frequency	Distribution	Responsibility for Report Preparation
Incident Report	Provide detailed report within 7 days	<ul style="list-style-type: none"> • DP&I (Director General) • DRE (Director – Environmental Sustainability) • OEH/EPA (General Contact) 	Environment and Community Manager
Annual Review (AEMR)	Annually (end of March each year)	<ul style="list-style-type: none"> • DP&I (Director General) • DRE (Director – Environmental Sustainability) • OEH/EPA (General Contact) • NoW (Mines Assessment and Planning) • SEWPaC (Director – Approvals & Audit Section) • Singleton Shire Council (General Manager) • CCC Members 	Environment and Community Manager
3 year Review	3 years after approved plan	<ul style="list-style-type: none"> • DP&I (Director General) • DRE (Director – Environmental Sustainability) • OEH/EPA (General Contact) • NoW (Mines Assessment and Planning) • SEWPaC (Director – Approvals & Audit Section) 	Environment and Community Manager

⁵ WCMP have prepared to the satisfaction of the Minister for Department of Sustainability, Environment, Water, Population and Communities a Flora and Fauna Management Plan

6.0 RESPONSIBILITIES

Table 13 below summarises responsibilities documented in the FFMP. Responsibilities may be delegated as required.

Table 13 Flora and Fauna Management Plan Responsibilities

No	Task	Timing	Responsibility for implementation	Responsibility for Completion
1	Vegetation Clearance Protocol.	When vegetation clearance is required.	Senior Environmental Advisor	Environment and Community Manager
2	Threatened Species Management Protocol.	As required. Whenever threatened species found.	Senior Environmental Advisor	Environment and Community Manager
3	Remnant Woodland Enhancement Program.	Ongoing	Senior Environmental Advisor	Environment and Community Manager
4	Rehabilitation Program.	On a progressive basis.	Senior Environmental Advisor	Environment and Community Manager
5	Flora and Fauna Monitoring Program.	Annually	Senior Environmental Advisor	Environment and Community Manager
6	Conservation Agreement	30 November 2013	Environment and Community Manager	Environment and Community Manager

Table 14 summarises the expected timing (i.e. commencement and frequency) of tasks documented in the FFMP.

Table 14 Timing of Flora and Fauna Management Plan Tasks

Task	Commencement	Frequency
General		
Seed Collection	Ongoing throughout the Project Life, subject to availability each year	On a progressive basis, when possible.
Weed Surveys of Disturbance Area	During pre-clearance survey	Ongoing over the life of the mine.
Weed Control of Disturbance Area	During pre-clearance survey and in accordance with SDP	Ongoing over the life of the mine.
RWEP		
Fencing	Annual review for repair of existing fence lines and removal of old fence lines where appropriate	Repairs / Removal as required. Removal of old fence lines to be completed by December 31 2015
Weed Survey	Within 12 months.	6 monthly surveys.
Weed Control	Within 12 months.	Bi annual / and as required
Pest Survey	Within 12 months.	Annual.
Pest Control	Within 12 months.	Ongoing/as required.
Provision of roosting/nesting resources	Within 5 years.	As required.
Rehabilitation Program		
Revegetation	In accordance with Open Cut MOP and RMP.	On a progressive basis, annual (subject to review).

7.0 REVIEW, MONITORING AND IMPLEMENTATION

The performance of the flora and fauna management and monitoring programs outlined in the FFMP is to be reviewed annually by the Environment and Community Manager.

A three year review shall be undertaken of FFMP in consultation with DP&I and other relevant stakeholders.

The Environment and Community Manager at WCPL will be responsible for the implementation of the flora and fauna management, monitoring programs outlined in the FFMP as well as the implementation of any recommendations as a result of revisions to the FFMP and/or as a result from consultation. Any revisions to the FFMP as a result of the annual review will be submitted to the Minister for DSEWPC and the Director General for DP&I for approval.

7.1 ADAPTIVE MANAGEMENT

Applicable risks to achieving the outcomes of the FFMP are summarised in the Trigger Action Response Plan (TARP) in **Table 15**. The FFMP TARP illustrates how the various flora and fauna management tasks, management measures and responsibilities are structured to achieve compliance with the relevant statutory requirements, and the framework for management and contingency actions.

Table 15 – FFMP Trigger Action Response Plan

Flora & Fauna Management Task	Risk Factor	TARP Code	FFMP 'Achieved'	FFMP 'Not Achieved'
Vegetation Clearance Protocol.	Unauthorised clearing	Trigger	An approved SDP in place, and visual inspection confirms clearance within approved area by WCPL E&C Department.	No approved SDP in place and/or clearance exceeds the boundary as provided in the SDP. Confirmed by WCPL E&C Department.
		Action	No action required, continue to comply with SDP requirements.	Cease activity immediately. E&C Manager to undertake full investigation of incident. Additional flora/fauna assessments may be required to determine impacts. Report incident in accordance with Section 5 of FFMP. Undertake remedial works as required.
		Responsible Persons	E & C Manager	E & C Manager Projects Manager
Threatened Species Management Protocol.	Impacts to threaten species identified as a result of WCPL activities	Trigger	WCPL activities have no impacts of threaten species as confirmed by annual flora and fauna monitoring program. Compliance with SDP.	WCPL activities have impacted on a threaten species as confirmed by annual flora and fauna monitoring program.
		Action	No action required. Continue to comply with SDP requirements. Continue to monitor flora and fauna annually in accordance with FFMP.	Cease activity immediately. E&C Manager to undertake full investigation of incident. Complete flora and fauna assessment to determine impacts. Report incident in accordance with Section 5 of FFMP. Undertake remedial works in consultation with ecologist and regulators.
		Responsible Persons	E & C Manager	E & C Manager Projects Manager

Flora & Fauna Management Task	Risk Factor	TARP Code	FFMP 'Achieved'	FFMP 'Not Achieved'
Remnant Woodland Enhancement Program.	Undertaking of activities not approved as identified in FFMP	Trigger	WCPL undertake approved activities within RWEF as described in Section 3.3.3 of the FFMP in consultation with relevant government departments.	WCPL undertake activities within RWEF that are not approved as described in Section 3.3.3 of the FFMP. No consultation with relevant government departments is undertaken as required by the FFMP.
		Action	No action required, continue to comply with SDP requirements and regulatory requirements as a result of consultation.	Cease activity immediately. E&C Manager to undertake full investigation of incident. Complete flora and fauna assessment to determine impacts. Report incident in accordance with Section 5 of FFMP. Undertake remedial works in consultation with ecologist and regulators.
		Responsible Persons	E & C Manager	E & C Manager Projects Manager
Rehabilitation Program	EFA monitoring indicates a move away from a self sustaining ecosystem	Trigger	EFA monitoring indicates rehabilitation sites progressing to self sustaining ecosystem when compared to analogue sites.	EFA monitoring indicates rehabilitation sites moving away from a self sustaining ecosystem when compared to analogue sites.
		Action	No action. Continue to undertake EFA monitoring as described in FFMP.	Implement actions and or recommendations as provided in annual EFA monitoring reports.
		Responsible Persons	E & C Manager	E & C Manager Projects Manager
Flora and Fauna Monitoring Program	WCPL activities impact on flora and fauna species	Trigger	Annual monitoring suggest that current management practices or mining activity was not having any effect on the flora species within the RWEF areas of Wambo Coal Mine.	Annual monitoring suggest that current management practices or mining activity was having any effect on the flora species within the RWEF areas of Wambo Coal Mine.
		Action	No action. Continue to undertake monitoring as described in FFMP.	E&C Manager to undertake investigation to determine mitigating factors that may have contributed to impacts in consultation with ecologist. Report outcomes in accordance with Section 5 of FFMP.
		Responsible Persons	E & C Manager	E & C Manager

8.0 REFERENCES

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APPENDIX A

METEOROLOGICAL DATA SUMMARY

Monthly Climate Statistics for 'JERRYS PLAINS POST OFFICE' [061086]

Created on [27 Jun 2012 18:45:15 GMT+00:00]

061086 JERRYS PLAINS POST OFFICE

Commenced: 1884

Last Record: 2012

Latitude: 32.50 Degrees South

Longitude: 150.91 Degrees East

Elevation: 90 m

State: NSW

Statistic Element	January	February	March	April	May	June	July	August	September	October	November	December	Annual	No. Years	Start Year	End Year
Mean maximum temperature (Degrees C) for years 1907 to 2012	31.7	30.9	28.9	25.3	21.3	18	17.4	19.4	22.9	26.2	29.1	31.2	25.2	105	1907	2012
Highest temperature (Degrees C) for years 1957 to 2012	44.6	45.5	42.8	38.9	30	26.1	26	31	36.2	41	44.9	45.6	45.6	55	1957	2012
Date of Highest temperature for years 1957 to 2012	12-Jan-07	2-Feb-06	14-Mar-98	4-Apr-86	24-May-58	5-Jun-58	24-Jul-90	21-Aug-95	25-Sep-80	21-Oct-88	19-Nov-68	25-Dec-57	25-Dec-57	N/A	1957	2012
Lowest maximum temperature (Degrees C) for years 1957 to 2012	17.8	18	16.5	15.2	11.6	8.9	8.3	8.3	12.8	14.1	15.4	16.7	8.3	55	1957	2012
Date of Lowest maximum temperature for years 1957 to 2012	17-Jan-86	24-Feb-04	2-Mar-87	17-Apr-83	27-May-87	26-Jun-59	7-Jul-57	10-Aug-61	5-Sep-75	3-Oct-66	5-Nov-96	25-Dec-62	10-Aug-61	N/A	1957	2012
Decile 1 maximum temperature (Degrees C) for years 1957 to 2011	24.6	24.4	23.5	20.8	17.5	15.1	14.4	15.6	17.8	19.9	21.7	24		54	1957	2011
Decile 9 maximum temperature (Degrees C) for years 1957 to 2011	38	36.6	33.7	29.8	25	21	20.2	23.3	27.8	31.7	35.2	36.7		54	1957	2011
Mean number of days >= 30 Degrees C for years 1957 to 2012	17.4	13.8	9.8	2.8	0	0	0	0	1.4	5.5	10.5	15.8	77.1	55	1957	2012
Mean number of days >= 35 Degrees C for years 1957 to 2012	7.3	4.4	2	0.1	0	0	0	0	0.1	0.8	3.3	5.7	23.7	55	1957	2012
Mean number of days >= 40 Degrees C for years 1957 to 2012	1.3	0.7	0.1	0	0	0	0	0	0	0	0.5	0.8	3.4	55	1957	2012
Mean minimum temperature (Degrees C) for years 1907 to 2012	17.2	17.1	15	11	7.4	5.3	3.8	4.4	7	10.3	13.2	15.7	10.6	105	1907	2012
Lowest temperature (Degrees C) for years 1957 to 2012	7.7	6.5	4.5	0.6	-1.8	-3	-4.5	-3	-0.6	1	3	5	-4.5	55	1957	2012
Date of Lowest temperature for years 1957 to 2012	9-Jan-04	21-Feb-88	28-Mar-84	27-Apr-78	29-May-87	30-Jun-86	4-Jul-71	1-Aug-98	6-Sep-81	18-Oct-84	23-Nov-08	19-Dec-60	4-Jul-71	N/A	1957	2012
Highest minimum temperature (Degrees C) for years 1957 to 2012	27.8	26.2	22.7	21.1	17.8	17.2	15.3	15.3	19.2	20.6	30	27.8	30	55	1957	2012
Date of Highest minimum temperature for years 1957 to 2012	26-Jan-82	6-Feb-11	14-Mar-83	1-Apr-59	11-May-63	5-Jun-58	25-Jul-90	30-Aug-99	23-Sep-03	28-Oct-67	30-Nov-59	26-Dec-57	30-Nov-59	N/A	1957	2012
Decile 1 minimum temperature (Degrees C) for years 1957 to 2011	13.4	13.4	10.7	6.4	3.2	0.9	-0.6	0.4	2.8	5.6	8.8	11.4		54	1957	2011
Decile 9 minimum temperature (Degrees C) for years 1957 to 2011	21.1	20.9	19.2	16.4	13.3	10.6	8.9	10	12.2	15.4	17.8	20		54	1957	2011
Mean number of days <= 2 Degrees C for years 1957 to 2012	0	0	0	0.2	1.6	5.7	8.8	8.3	1.5	0.1	0	0	27.2	55	1957	2012
Mean number of days <= 0 Degrees C for years 1957 to 2012	0	0	0	0	0.4	1.8	4.6	2.6	0.2	0	0	0	9.6	55	1957	2012
Mean rainfall (mm) for years 1884 to 2012	76.7	72.8	58.8	44.3	40.8	48.1	43.5	36.5	42	52.2	61.1	67.9	645.1	126	1884	2012
Highest rainfall (mm) for years 1884 to 2012	226.3	340.4	264.3	172.2	314.3	288.4	231.6	206.9	156.1	170	222	233.1	1191.2	126	1884	2012
Date of Highest rainfall for years 1884 to 2012	1895	1955	1893	1964	1913	1950	1904	1952	1903	1972	2007	1887	1950	N/A	1884	2012
Lowest rainfall (mm) for years 1884 to 2012	0	0	0	0	0	2.3	0.3	0	0	1.4	1	0	234.2	126	1884	2012
Date of Lowest rainfall for years 1884 to 2012	1903	1940	1909	1980	1957	1953	1972	1982	1980	1988	1915	1884	1888	N/A	1884	2012
Decile 1 monthly rainfall (mm) for years 1884 to 2012	24.1	9.4	10.6	5	5.9	9.6	8.1	6.9	9.1	10.4	13	15.8	428.3	126	1884	2012
Decile 5 (median) monthly rainfall (mm) for years 1884 to 2012	64.3	49.6	47	32.3	29.9	31.1	35.1	30.9	34.2	49.3	50.1	57	650.8	126	1884	2012
Decile 9 monthly rainfall (mm) for years 1884 to 2012	159.6	166.3	115	95.9	84	101.1	90.8	68.6	81.8	95.6	122.2	136.3	826.6	126	1884	2012
Highest daily rainfall (mm) for years 1884 to 2012	97.3	139.7	132.1	86.6	99.1	190.8	137.2	65.3	67.3	68.6	82	108	190.8	127	1884	2012
Date of Highest daily rainfall for years 1884 to 2012	21 Jan 1895	29-Feb-04	10 Mar 1893	22-Apr-64	14-May-13	18-Jun-30	9-Jul-04	27-Aug-37	17-Sep-09	2-Oct-16	30-Nov-07	26 Dec 1887	18-Jun-30	N/A	1884	2012
Mean number of days of rain for years 1800 to 3000	7.9	7.5	7.5	6.4	6.5	7.7	7.1	7	6.6	7.6	7.7	7.7	87.2	126	1884	2012
Mean number of days of rain >= 1 mm for years 1884 to 2012	6.5	6	5.8	4.9	4.9	5.5	5.2	5.2	5.2	5.9	6.2	6.4	67.7	127	1884	2012
Mean number of days of rain >= 10 mm for years 1884 to 2012	2.6	2.2	1.8	1.3	1.2	1.4	1.3	1	1.4	1.7	1.9	2.2	20	127	1884	2012
Mean number of days of rain >= 25 mm for years 1884 to 2012	0.8	0.8	0.6	0.4	0.3	0.3	0.3	0.2	0.3	0.4	0.5	0.7	5.6	127	1884	2012
Mean daily wind run (km) for years 1957 to 1972	276	255	236	200	197	186	231	228	227	256	262	270	235	13	1957	1972
Mean daily solar exposure (MJ/(m²m)) for years 1990 to 2012	24.5	21.4	18.6	15	11.4	9.7	10.7	14.1	18	21.4	23.6	25.4	17.8	22	1990	2012
Mean number of clear days for years 1957 to 2010	7.3	5.6	7.4	9.1	8.5	8.4	10.5	12.1	11.1	8.7	7.2	7.5	103.4	53	1957	2010
Mean number of cloudy days for years 1957 to 2010	11.3	11.2	10.8	9.5	10.3	10.7	8.4	7.7	7.7	10.5	10.7	10.8	119.6	53	1957	2010
Mean daily evaporation (mm) for years 1957 to 1972	7.1	6	5	4	2.9	2	2.3	2.6	3.7	5.3	6.5	6.6	4.5	10	1957	1972
Mean 9am temperature (Degrees C) for years 1940 to 2010	23.4	22.7	21.2	18	13.6	10.6	9.4	11.4	15.3	19	21.1	23	17.4	69	1940	2010
Mean 9am wet bulb temperature (Degrees C) for years 1940 to 2010	19.3	19.3	17.9	15	11.6	9	7.7	9	11.9	14.5	16.3	18.1	14.1	64	1940	2010
Mean 9am dew point temperature (Degrees C) for years 1957 to 2010	16.9	17.3	15.7	12.8	9.7	7.2	5.7	6.2	8.3	10.5	12.8	14.8	11.5	45	1957	2010
Mean 9am relative humidity (%) for years 1940 to 2010	67	72	72	72	77	80	78	71	65	59	60	61	70	60	1940	2010
Mean 9am cloud cover (okas) for years 1907 to 2010	4.2	4.4	4	3.6	3.9	4	3.5	3.1	3.1	3.6	3.9	4	3.8	103	1907	2010
Mean 9am wind speed (km/h) for years 1957 to 2010	9.6	9	8.8	8.6	9	9.4	10.6	11	11.7	10.9	10.5	9.9	9.9	53	1957	2010
Mean 3pm temperature (Degrees C) for years 1956 to 2010	29.8	28.9	27.2	24.1	20.1	17.1	16.4	18.2	21.2	24.2	26.9	29	23.6	54	1956	2010
Mean 3pm wet bulb temperature (Degrees C) for years 1956 to 2010	21.1	21.1	19.6	17.1	14.6	12.2	11.2	12.1	14.1	16.2	18	19.7	16.6	50	1956	2010
Mean 3pm dew point temperature (Degrees C) for years 1957 to 2010	15.6	16.3	14.4	11.7	9.3	7.2	5.7	5.4	6.9	9	11.1	13.1	10.5	45	1957	2010
Mean 3pm relative humidity (%) for years 1957 to 2010	47	50	49	49	52	54	51	45	43	42	42	42	47	45	1957	2010
Mean 3pm cloud cover (oktas) for years 1957 to 2010	4.6	4.8	4.5	4.3	4.3	4.3	4	3.8	4	4.4	4.6	4.5	4.3	53	1957	2010
Mean 3pm wind speed (km/h) for years 1957 to 2010	13.2	13	12.4	11.3	11	11.5	13	14.3	14.7	14.1	14.2	14.2	13.1	52	1957	2010

APPENDIX B

NOXIOUS WEEDS RELEVANT TO THE FLORA AND FAUNA MANAGEMENT PLAN

Noxious Weeds in the Upper Hunter County Council Control Area

Common Name	Scientific Name	Class	Common Name	Scientific Name	Class
African boxthorn	<i>Lycium ferocissimum</i>	4	Lantana	<i>Lantana species</i>	5
African feathergrass	<i>Pennisetum macrourum</i>	5	Leafy elodea	<i>Egeria densa</i>	5
African olive	<i>Olea europaea subspecies cuspidata</i>		Long-leaf willow primrose	<i>Ludwigia longifolia</i>	5
African turnipweed	<i>Sisymbrium runcinatum</i>	5	Mexican feather grass	<i>Nassella tenuissima</i>	1
African turnipweed	<i>Sisymbrium thellungii</i>	5	Mexican poppy	<i>Argemone mexicana</i>	5
Alligator weed	<i>Alternanthera philoxeroides</i>	2	Miconia	<i>Miconia species</i>	1
Anchored water hyacinth	<i>Eichhornia azurea</i>	1	Mimosa	<i>Mimosa pigra</i>	1
Annual ragweed	<i>Ambrosia artemisiifolia</i>	5	Mintweed	<i>Salvia reflexa</i>	4
Arrowhead	<i>Sagittaria montevidensis</i>	5	Mossman River grass	<i>Cenchrus echinatus</i>	5
Artichoke thistle	<i>Cynara cardunculus</i>	5	Mother-of-millions	<i>Bryophyllum species and hybrids</i>	3
Athel pine	<i>Tamarix aphylla</i>	5	Nodding thistle	<i>Carduus nutans</i>	4
Bathurst/ Hunter/ Californian/ cockle burr	<i>Xanthium species</i>	4	Noogoora burr	<i>Xanthium species</i>	4
Bear-skin fescue	<i>Festuca gautieri</i>	5	Onion grass	<i>Romulea species</i>	5
Black knapweed	<i>Centaurea nigra</i>	1	Oxalis	<i>Oxalis species and varieties</i>	5
Blackberry	<i>Rubus fruticosus aggregate species</i>	4	Pampas grass	<i>Cortaderia species</i>	4
Bridal creeper	<i>Asparagus asparagoides</i>	5	Parthenium weed	<i>Parthenium hysterophorus</i>	1
Broomrapes	<i>Orobanche species</i>	1	Paterson's curse, Vipers bugloss, Italian bugloss	<i>Echium species</i>	4
Burr ragweed	<i>Ambrosia confertiflora</i>	5	Pond apple	<i>Annona glabra</i>	1
Cabomba	<i>Cabomba caroliniana</i>	5	Prickly acacia	<i>Acacia nilotica</i>	1
Cape tulip	<i>Moraea species</i>	4	Prickly pear	<i>Cylindropuntia species</i>	4
Cayenne snakeweed	<i>Stachytarpheta cayennensis</i>	5	Prickly pear	<i>Opuntia species except O. ficus-indica</i>	4
Chilean needle grass	<i>Nassella neesiana</i>	4	Red rice	<i>Oryza rufipogon</i>	5
Chinese violet	<i>Asystasia gangetica subspecies micrantha</i>	1	Rhus tree	<i>Toxicodendron succedaneum</i>	4
Clockweed	<i>Gaura parviflora</i>	5	Rubbervine	<i>Cryptostegia grandiflora</i>	1
Columbus grass	<i>Sorghum x alnum</i>	4	Sagittaria	<i>Sagittaria platyphylla</i>	5
Corn sowthistle	<i>Sonchus arvensis</i>	5	Salvinia	<i>Salvinia molesta</i>	2
Dodder	<i>Cuscuta species</i>	5	Sand oat	<i>Avena strigosa</i>	5
East Indian hygrophila	<i>Hygrophila polysperma</i>	1	Scotch broom	<i>Cytisus scoparius</i>	4
English broom	<i>Cytisus scoparius</i>		Senegal tea plant	<i>Gymnocoronis spilanthoides</i>	1
Espartillo	<i>Achnatherum brachychaetum</i>	5	Serrated tussock	<i>Nassella trichotoma</i>	3
Eurasian water milfoil	<i>Myriophyllum spicatum</i>	1	Siam weed	<i>Chromolaena odorata</i>	1
Fine-bristled burr grass	<i>Cenchrus brownii</i>	5	Silver-leaf nightshade	<i>Solanum elaeagnifolium</i>	4
Fountain grass	<i>Pennisetum setaceum</i>	5	Smooth-stemmed turnip	<i>Brassica barrelieri subspecies oxyrrhina</i>	5
Gallon's curse	<i>Cenchrus biflorus</i>	5	Soldier thistle	<i>Picnoman acarna</i>	5
Galvanised burr	<i>Sclerolaena birchii</i>	4	Spiny burrgrass	<i>Cenchrus incertus</i>	4
Giant Parramatta grass	<i>Sporobolus fertilis</i>	3	Spiny burrgrass	<i>Cenchrus longispinus</i>	4
Glaucous starthistle	<i>Carthamus glaucus</i>	5	Spotted knapweed	<i>Centaurea maculosa</i>	1
Golden dodder	<i>Cuscuta campestris</i>	4	St. John's wort	<i>Hypericum perforatum</i>	4
Golden thistle	<i>Scolymus hispanicus</i>	5	Star thistle	<i>Centaurea calcitrapa</i>	4
Green cestrum	<i>Cestrum parqui</i>	3	Sweet briar	<i>Rosa rubiginosa</i>	4
Harrisia cactus	<i>Harrisia species</i>	4	Texas blueweed	<i>Helianthus ciliaris</i>	5
Hawkweed	<i>Hieracium species</i>	1	Tree-of-heaven	<i>Ailanthus altissima</i>	4
Hemlock	<i>Conium maculatum</i>	4	Water caltrop	<i>Trapa species</i>	1
Horsetail	<i>Equisetum species</i>	1	Water hyacinth	<i>Eichhornia crassipes</i>	2
Hygrophila	<i>Hygrophila costata</i>	2	Water lettuce	<i>Pistia stratiotes</i>	1

Common Name	Scientific Name	Class	Common Name	Scientific Name	Class
Hymenachne	<i>Hymenachne amplexicaulis</i>	1	Water soldier	<i>Stratiotes aloides</i>	1
Italian bugloss	<i>Echium species</i>		Willows	<i>Salix species</i>	5
Johnson grass	<i>Sorghum halepense</i>	4	Witchweed	<i>Striga species</i>	1
Karoo thorn	<i>Acacia karroo</i>	1	Yellow burrhead	<i>Limnocharis flava</i>	1
Kochia	<i>Bassia scoparia</i>	1	Yellow nutgrass	<i>Cyperus esculentus</i>	5
Lagarosiphon	<i>Lagarosiphon major</i>	1			

Source: NSW Department of Primary Industries (2010)

1: The plant must be eradicated from the land and the land must be kept free of the plant. The weeds are also "notifiable" and a range of restrictions on their sale and movement exist.

2: The plant must be eradicated from the land and the land must be kept free of the plant. The weeds are also "notifiable" and a range of restrictions on their sale and movement exist.

3: The plant must be fully and continuously suppressed and destroyed.

4: The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority.

5: The weeds are "notifiable" and a range of restrictions on their sale and movement exists.

APPENDIX C

PROVISIONAL REVEGETATION SPECIES LISTS

Provisional Species List for Woodland Corridors

Scientific Name	Common Name
Trees	
Bulloak	<i>Allocasuarina luehmanii</i>
Drooping Sheoak	<i>Allocasuarina verticillata</i>
Rough-barked Apple	<i>Angophora floribunda</i>
Narrow-leaved Ironbark	<i>Eucalyptus crebra</i>
Slaty Gum	<i>Eucalyptus dawsonii</i>
Grey Box	<i>Eucalyptus moluccana</i>
A Honeymyrtle	<i>Melaleuca decora</i>
Native Olive	<i>Notelaea microcarpa</i>
Brush Wilga	<i>Geijera salicifolia</i>
Shrubs	
Fern-leaf Wattle	<i>Acacia filicifolia</i>
Hickory Wattle	<i>Acacia implexa</i>
Cooba	<i>Acacia salicina</i>
Fan Wattle	<i>Acacia amblygona</i>
Sickle Wattle	<i>Acacia falcate</i>
Western Silver Wattle	<i>Acacia decora</i>
A Grevillea	<i>Grevillea montana</i>
-	<i>Hibbertia linearis</i>
A Cough Bush	<i>Cassinia quinquefaria</i>
Grasses and Herbs	
Blue Flax Lily	<i>Dianella revoluta</i>
Many-flowered Matrush	<i>Lomandra multiflora</i>
Tall Windmill Grass	<i>Chloris venticosa</i>
Wire Lily	<i>Laxmannia gracilis</i>
Rough Saw-sedge	<i>Gahnia aspera</i>
Threeawn Speargrass	<i>Aristida vagans</i>
A Wallaby Grass	<i>Austrodanthonia</i> sp.
Speargrass	<i>Austrostipa scabra</i> ssp. <i>falcata</i>
Barbwire Grass	<i>Cymbopogon refractus</i>

Source: WCPL (2003)

Provisional Species List for Pasture Areas

Common Name	Scientific Name
Bunderra Wallaby Grass	<i>Austrodanthonia</i>
Ringed Wallaby Grass	<i>A. caespitosa</i>
Hume Wallaby Grass	<i>A. richardsonii</i> cv. Hume
Taranna Wallaby Grass	<i>A. richardsonii</i> cv. Taranna
Smallflower Wallaby Grass	<i>A. setacea</i>
Plains Grass	<i>Austrostipa aristiglumis</i> or <i>A. bigeniculata</i>
Speargrass	<i>A. scabra</i>
Slender Bamboo Grass	<i>A. verticillata</i>
Shorthair Plumegrass	<i>Dichelachne micrantha</i>
Common Wheatgrass	<i>Elymus scaber</i>
Blown Grass	<i>Lachnagrostis filiformis</i>
Wiregrass	<i>Aristida ramosa</i>
Redgrass/Pitted Bluegrass	<i>Bothriochloa macra/decipiens</i>
Windmill Grass	<i>Chloris truncata</i>
Tall Windmill Grass	<i>Chloris ventricosa</i>
Barbed Wire Grass	<i>Cymbopogon refractus</i>
Queensland Bluegrass	<i>Dichanthium sericeum</i>
Cotton Panic Grass	<i>Digitaria brownii</i>
Umbrella Grass	<i>Digitaria divaricatissima</i>
Early Spring Grass	<i>Eriochloa pseudoacrotricha</i>
Native Millet	<i>Panicum decompositum</i>
Hairy Panic	<i>Panicum effusum</i>

Source: DLWC (2003) in WCPL (2003)

APPENDIX D

FIELD CHECKLIST FOR TASKS DESCRIBED IN THE FLORA AND FAUNA
MANAGEMENT PLAN

Field Checklist for Tasks Described in the Flora and Fauna Management Plan

Flora and Fauna Management	Section Reference	Task	Task Completed
Vegetation Clearance Protocol			
Delineation of disturbance areas	Section 3.1.1	Vegetation adjoining clearance areas marked to prevent accidental damage.	Yes/no
Pre-clearance Surveys (habitat assessments)	Section 3.1.2	Weeds adjacent to or within disturbance area identified.	Yes/no
		Potential habitat features identified.	Yes/no
		Habitat features salvaged and relocated.	Yes/no
		If threatened flora/fauna observed, TSMP initiated.	Yes/no
Fauna Management Strategies (if necessary)	Section 3.1.3	Timing to avoid nesting/breeding activities.	Yes/no
		When fauna found in tree, see Section 3.1.3.	Yes/no
		Nesting boxes placed.	Yes/no
		Roosting boxes placed.	Yes/no
Vegetation Clearance	Section 3.1.4	Disturbance areas delineated.	Yes/no
		Topsoil resources identified, stripped, and stockpiled, if applicable.	Yes/no
		Habitat trees felled soon as possible after negative survey result.	Yes/no
		Features identified for use in rehabilitation programs salvaged.	Yes/no
		Harvestable timber collected.	Yes/no
Weed Management Strategies	Section 3.1.7	Weed management measures implemented.	Yes/no
		Follow up inspections conducted.	Yes/no
Threatened Species Management Protocol			
Site Observations/Surveys	Section 3.2.1	If threatened species listed under TSC Act or EPBC Act not previously assessed by 2003 EIS identified, NSW Department of Environment and Climate Change/DEWHA notified.	Yes/no

APPENDIX E

RAIL LOOP REVEGETATION AND LANDSCAPE PLAN

Review of Landscape Amelioration Treatments for the Springwood Property

Wambo Development Project

Rail and Train Loading Infrastructure

Prepared by

Peter Haack

BLArch, Dip App Sci, Registered Landscape Architect, AAILA, MEIANZ, MPLA



*7th Floor,
460 Collins Street,
Melbourne, Victoria, 3000.*

1.1 EVIDENCE OF EXPERT'S EXPERTISE TO MAKE THE REPORT

Peter Haack has extensive experience in the preparation of visual and landscape impact assessment studies on a range of major infrastructure projects throughout Australia, as well as presenting expert evidence to Planning Appeals, Hearings and Panels. He has not been involved in the preparation of the EIS for the Wambo Development Project, or the SEE for the Rail and Train Loading Infrastructure.

1.2 INTRODUCTION

Wambo Coal Pty Limited (WCPL) has received a number of complaints from a Mr Hawkes with respect to visual issues relating to their constructed rail infrastructure. WCPL wished to appoint an independent visual expert in accordance with the consent condition.

1.3 PROJECT BRIEF

A verbal briefing was given to review the amelioration works undertaken and provide recommendations on measures to minimise visual impacts on the Springwood property.

The basis for the review of the visual issues was the document "Proposed Alterations To The Wambo Development Project Rail And Train Loading Infrastructure Statement Of Environmental Effects June 2004" (Refer to Appendix B).

Relevant consent condition

28. If a landowner in the Warkworth Village requests the Applicant in writing to investigate ways to minimise the visual impact of the development on his/her dwelling or land, the Applicant shall:

- (a) within 14 days of receiving this request, commission a suitably qualified, experienced and independent person, whose appointment has been approved by the Director-General, to investigate ways to minimise the visual impacts of the development on the landowner's dwelling or land; and*
- (b) give the landowner a copy of the visual impact mitigation report within 14 days of receiving this report.*

If both parties agree on the measures that should be implemented to minimise the visual impact of the development, then the Applicant shall implement these measures to the satisfaction of the Director-General.

If the Applicant and the landowner disagree on the measures that should be implemented to minimise the visual impact of the development, then either party may refer the matter to the Director-General for resolution.

If the matter cannot be resolved within 21 days, the Director-General shall refer the matter to an Independent Dispute Resolution Process (see Appendix 2).

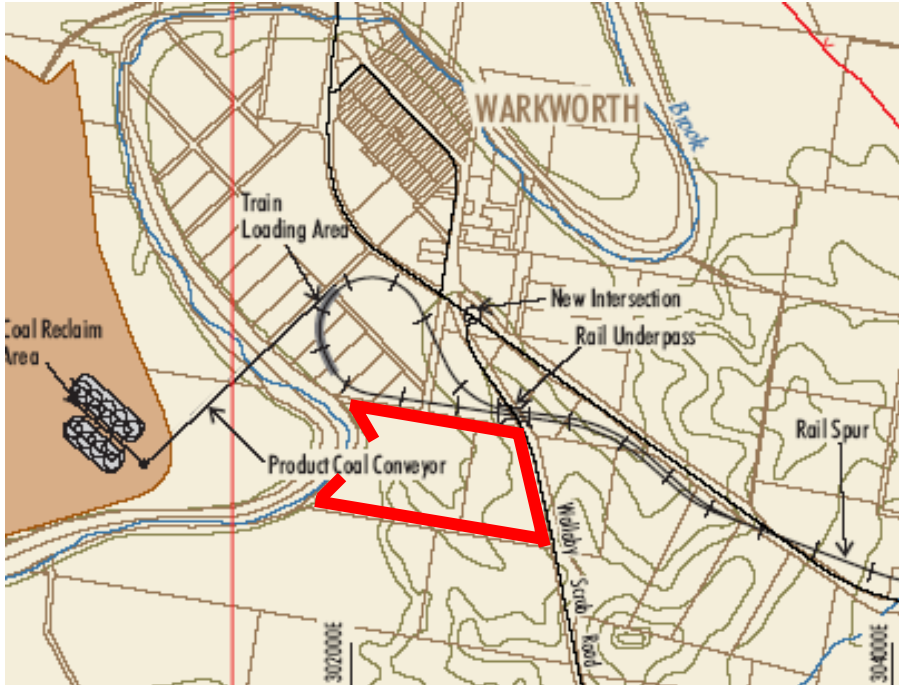


Figure 1 – Property Location

1.4 SITE VISIT DETAILS

Site Visit: 11:10 to 12.30pm Tuesday 14th March 2006

Attendees: Don Hawkes (Family Representative of Land owner), Gavin Heydon (Wambo Coal), Peter Haack (EDAW)

Additional Meeting: 2.00 to 2.30pm – Ross Hawkes (Property Owner) at Newcastle.

1.5 DATA – BASIS OF ASSESSMENT

The base data utilised for the assessment was supplied by Wambo Mining – Refer to Appendix A

1.6 LAND USE

The Springwood property is primarily used for grazing activities. There is no permanent residence present, although the owners use the property for weekly overnight stays.

1.7 EXISTING VEGETATION

The railway line is separated from the Springwood property by an Energy Australia (EA) easement. The southern boundary of the easement is generally well vegetated with indigenous trees, primarily *Eucalyptus* sp. and *Allocasuarina* sp., which provide effective screening of much of the railway where it is in cut or close to grade. However, where the railway line is elevated above ground level on fill, the vegetation provides partial screening to views.



Figure 2 – Vegetation providing partial screening in area of highest fill.

Careful management of any existing vegetation by EA will be required to ensure the ongoing amelioration benefits are maintained.

The paddock closest to the railway line is generally devoid of vegetation.



Figure 3 – Eight year old revegetation area on the Springwood property.

A small block of vegetation adjacent to Wallaby Scrub Road was planted in approximately 1998 as part of a Wambo Coal and local school initiative (Don Hawkes pers.com.). Follow up maintenance was not undertaken and there has been a high attrition rate, although the established vegetation, comprised of mainly upper storey species, has performed well.

Any revegetation work will require follow up to ensure problem weeds and insects are managed and that a sufficient success rate is achieved.

1.8 THE RAIL SPUR DEVELOPMENT

The railway line has been constructed immediately adjacent to an EA easement that abuts the northern boundary of the Springwood property. The grade line lengths adjacent to the Springwood property are as follows:

- Cut – approx 220 metres
- Fill – approx 300 metres – maximum height above adjacent Hawkes property ground level is 5 metres. (It should be noted that a screening bund currently is adjacent to 100 metres of the length of fill that is only slightly elevated.)
- At Grade – approx 75 metres

A double rail line adjoins the property boundary to the north east, forming a loop to the north west of the Springwood property with only one line adjacent in this location.

1.9 THE COAL CONVEYOR

An additional issue identified by Mr Don Hawkes, was the reflectivity of the roof of the Coal Conveyor on the main Wambo site. Reflection was occurring off the roof of the conveyor primarily on the section between the Bin and the Take Up Tower, where the alignment changed angle and sloped up hill.

1.10 DESIGN CONSISTENCY WITH SEE

The rail alignment is being constructed in accordance with the SEE. Some localised visual bunding work not indicated in the SEE is being constructed along the railway line near the historically significant old Springwood homestead to ameliorate impacts.



Figure 4 - Visual bund being constructed near old homestead. It will be important to shape the bund so that its surface profile is rounded and slightly irregular so that it is compatible with the surrounding landscape forms.

1.11 LOCATION OF VISUALLY SENSITIVE SITES

In rural agricultural areas, visual impact assessment methodologies normally define rural residences as sites of higher sensitivity. Rural land used for production purposes is generally assessed as having a low level of visual sensitivity.

The SEE assessed the Springwood residence as a site of sensitivity and noted that due to its location, screened from views to the railway line by topography and vegetation, that it would not be adversely impacted by the proposed works. My visit to the site corroborates this finding. The main building / shed complex, which is used as accommodation for overnight stays, is located in a gully, generally separated by vegetation and dunal landform from the railway development.

The access track to the property runs parallel to the rail line until a gully, where it diverges and heads in a southerly direction. It is from this location that there are views to the most elevated extent of fill. (Refer to Figure 2).

1.12 POSSIBLE AMELIORATION OPTIONS

Railway Line

The preferred amelioration treatments are outlined in figures 5 and 6.

Screen Planting

Screen planting would require ongoing monitoring and maintenance to ensure its effectiveness. Indigenous grass species and sterile cover crop grasses would provide rapid amelioration of the raw appearance of filled embankment earthworks. However, assuming that trees cannot be planted on the structural fill of the embankment, only shrub and ground cover species, growth of taller screening trees planted at the toe of the embankment would take a number of years to commence screening of the full height abutments and trains.

Note: Trees can ameliorate views, but not noise. Noise impacts are not a consideration of this report as they have been dealt with separately within the SEE.

Screen planting is considered the most effective treatment in locations of lower sensitivity but where amelioration treatments are still warranted.

Plywood visual screen

Generally, noise walls are only used where there is an acoustic issue, as they are potentially as much of a visual intrusion in themselves, even if painted green. They would normally be constructed in conjunction with screen planting to soften their appearance.

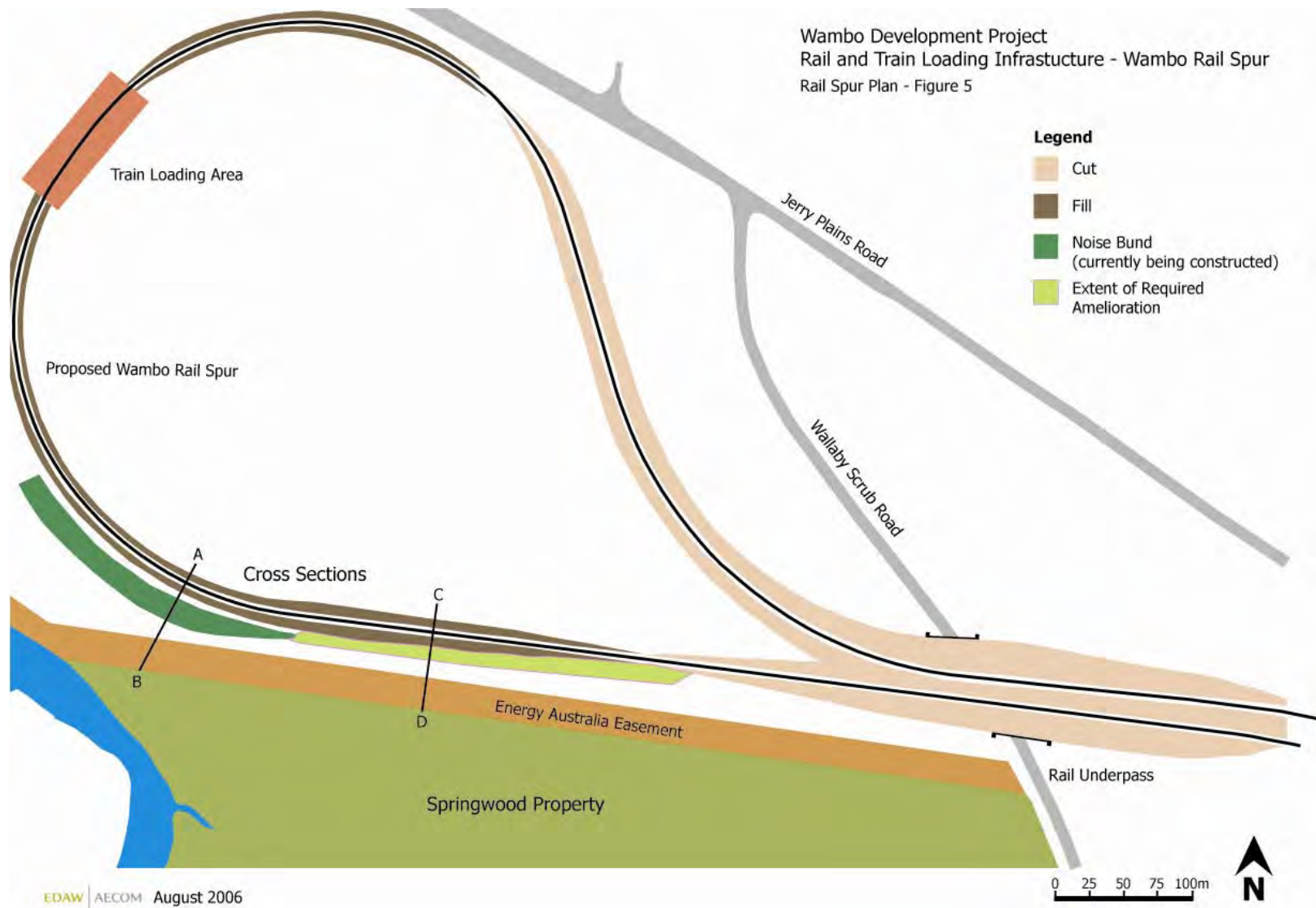
Bunding and Planting

Where space allows, bunding in conjunction with planting is the most effective way to ameliorate visual impacts on highly sensitive viewpoints. The bunds provide immediate visual screening and rapid establishment of surface vegetation provide integration with the landscape setting. Bunds should be constructed so that they are complimentary with the surrounding landform, with regular slopes and angular transitions rounded and irregular.

Bunding would normally only be considered where there are significant visual impacts on a high sensitivity location such as a place of residence.

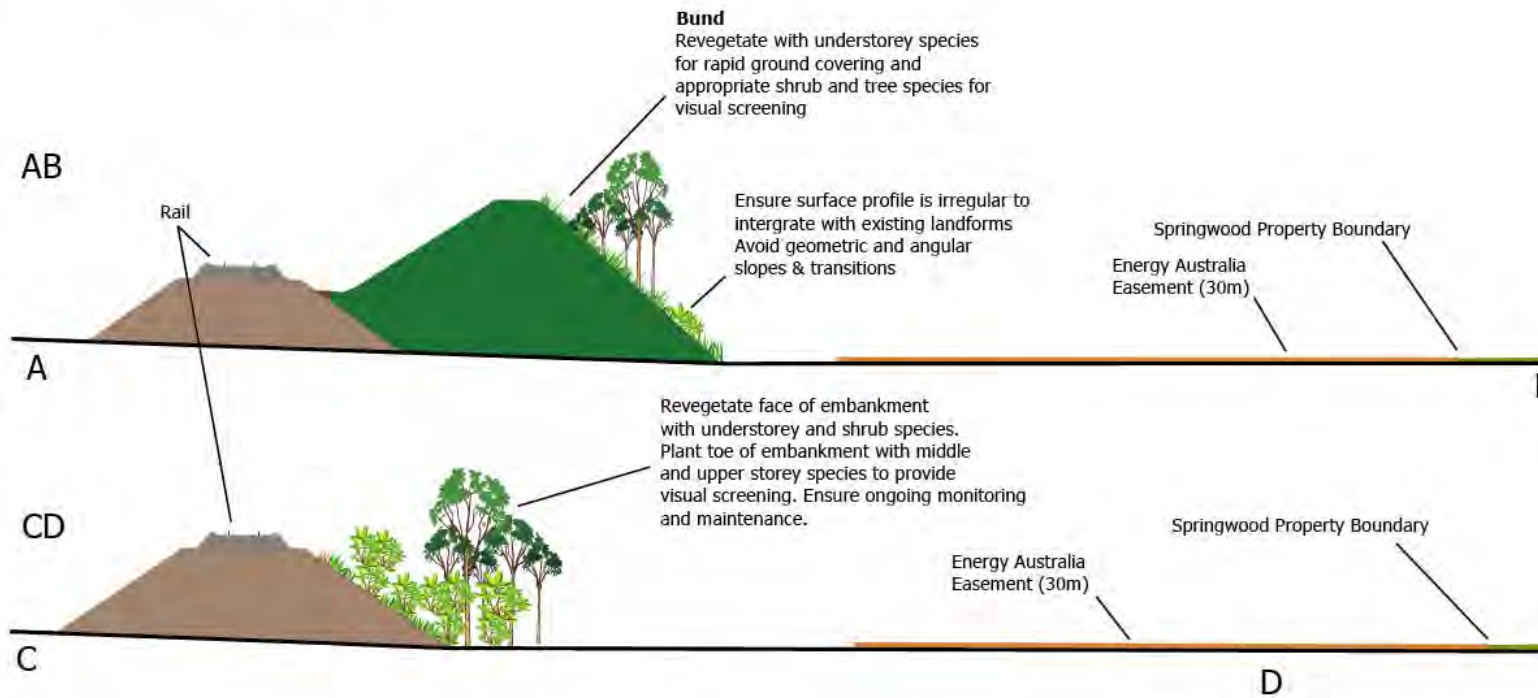
Coal Conveyor

The roof of the coal conveyor, extending from the Bin to the Take Up Tower, should be painted in a non reflective paint of a colour to match to the existing green colour used on the other main structures on site.



Wambo Development Project Rail and Train Loading Infrastructure - Wambo Rail Spur

Cross Sections - Figure 6



EDAW | AECOM August 2006



1.13 REVIEW OF POST RAIL LOOP CONSTRUCTION AMELIORATION ACTIONS UNDERTAKEN BY WAMBO COAL

Subsequent to the construction of the rail loop, Wambo Coal has constructed a screening bund and has undertaken the planting of tree and shrub species along the length of the rail line adjacent to the Springwood property.

1.13.1 Planting Species

The screen planting comprises of a mixture of indigenous tree, shrub and ground cover species, (Refer to Appendix C) planted in the areas as indicated in Figure 7. This mixture will ensure that coverage of the ground surface and closure of the canopy are achieved so that views from the Springwood property to trains on the rail loop are screened. (Refer to Figure 8 and 9)



Figure 7 – Location of amelioration planting showing locations of sections



Figure 8 – Planting undertaken on screening bund



Figure 9 – Planting undertaken on batter slope

1.13.2 Planting Densities

The planting has been undertaken at an average density of 1 plant per 3 square metres. This equates to planting at approximately 2 metre centres.

1.13.3 Assumed Growth Rates

It has been assumed that plant growth rates will be relatively slow due to the climatic conditions. However, vegetation planting on areas of fill, particularly south facing filled batter slopes will grow at a faster rate than normal due to the relative ease of root penetration and reduction in heat load from the sun. (Refer to Figures 10 to 16).

Assumed growth rates for trees are:

Year 0 – 300 mm high (Trees planted as tubestock)

Year 1 – 800 mm high

Year 2 – 1300 mm high

Year 3 – 1800 mm high

Year 5 – 2500 mm high

Year 7 – 3500 mm high

Year 10 – 5000 mm high

Year 15 – 8500 mm high

It is also assumed that as the upper storey tree species grow, the shrub species will correspondingly fill the void beneath their canopies.

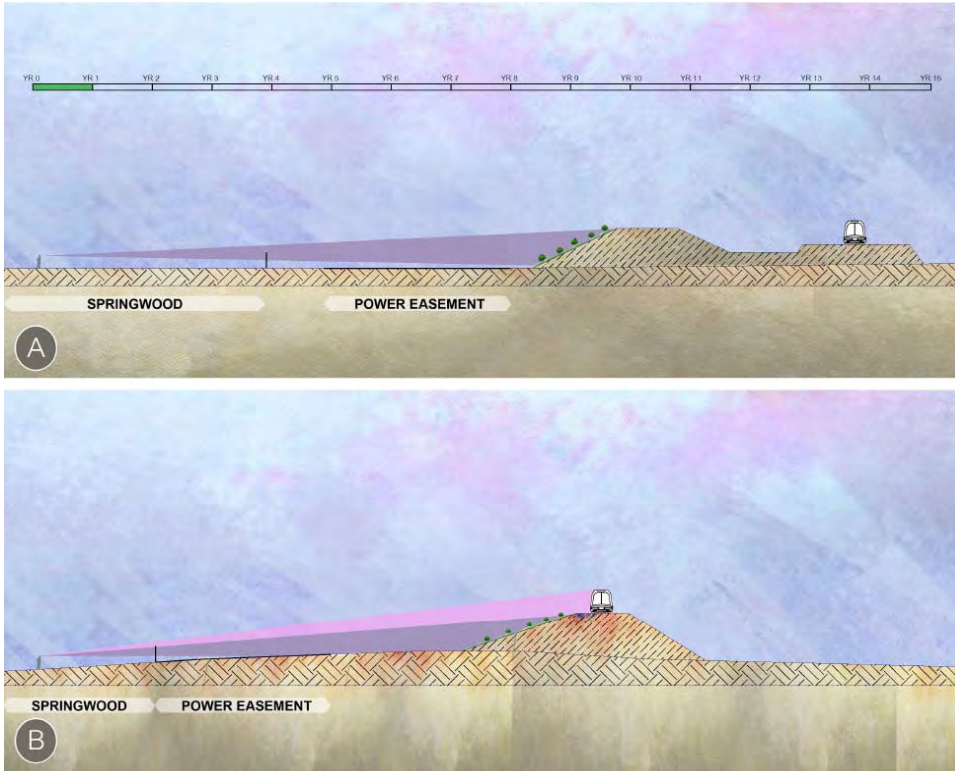


Figure 10 – Year 1 for Bund and Batter Slope

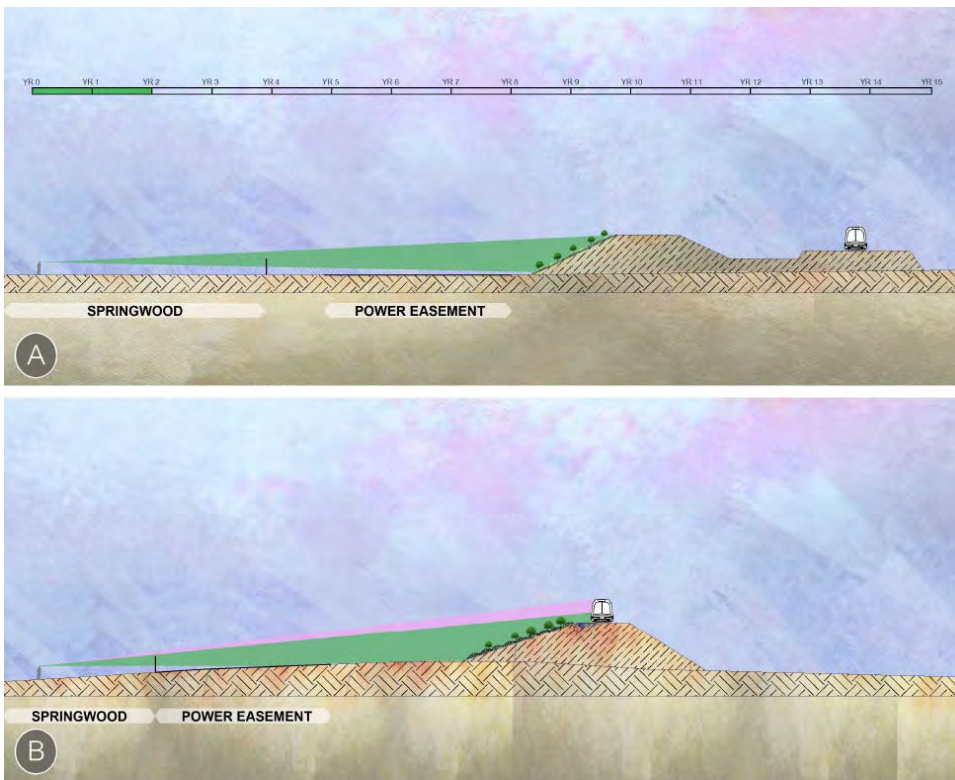


Figure 11 – Year 2 for Bund and Batter Slope

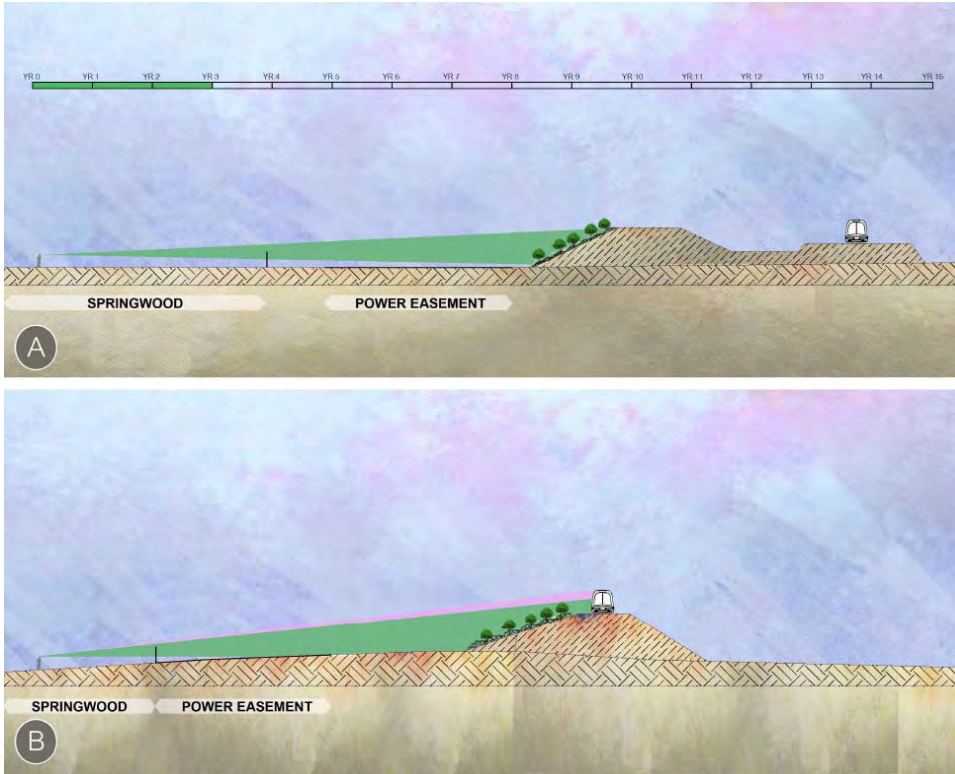


Figure 12 – Year 3 for Bund and Batter Slope

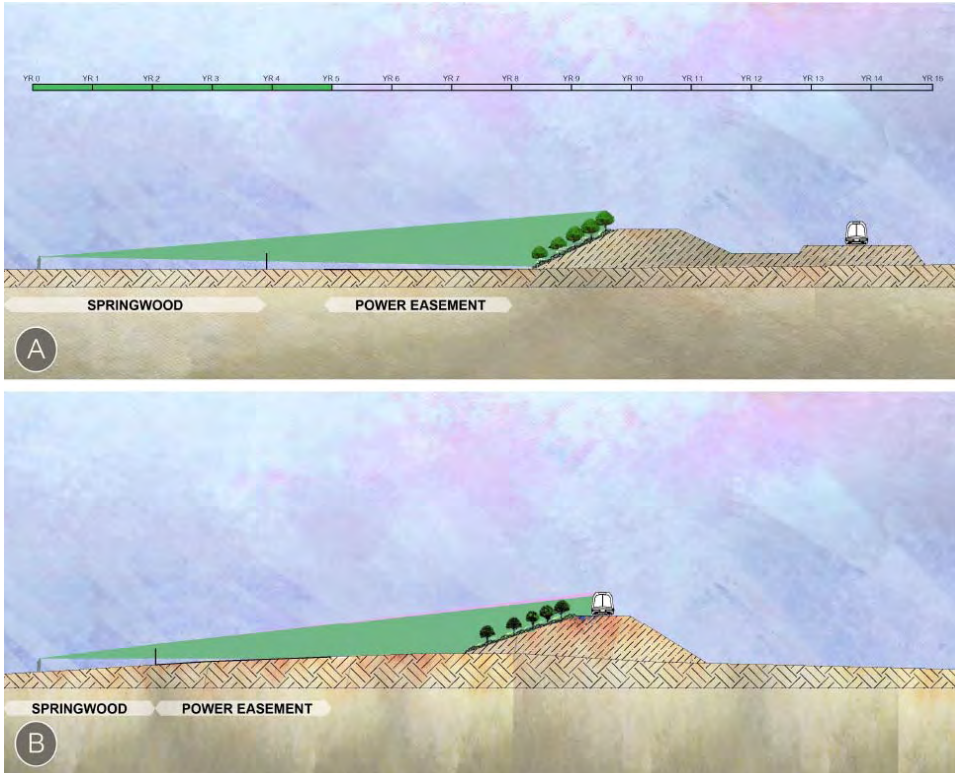


Figure 13 – Year 5 for Bund and Batter Slope

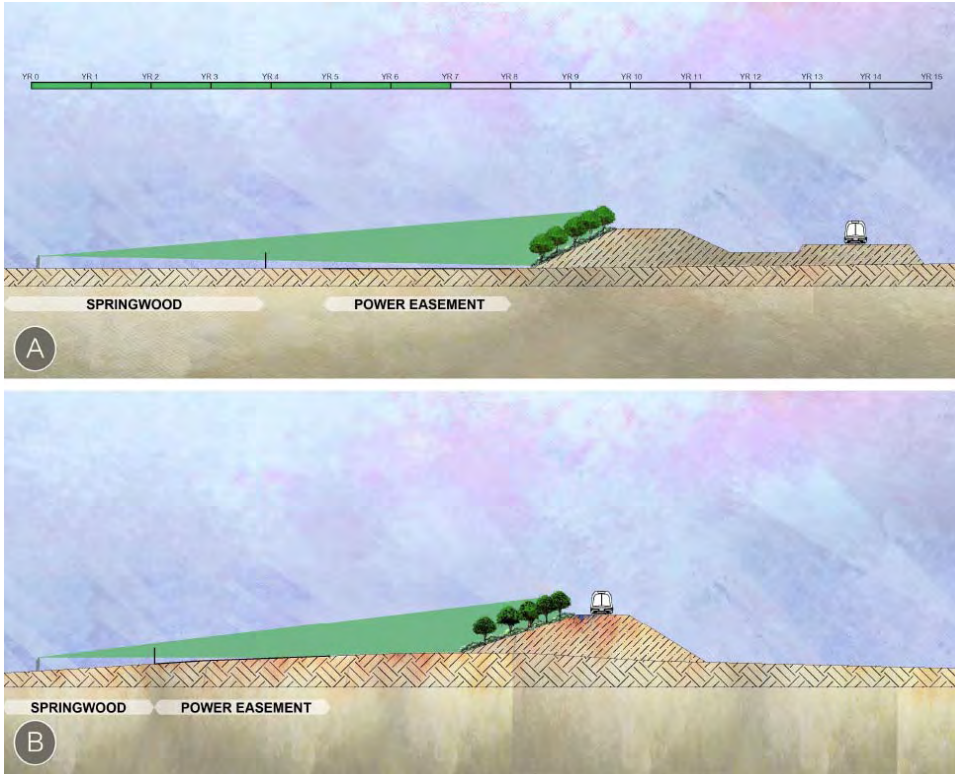


Figure 14 – Year 7 for Bund and Batter Slope

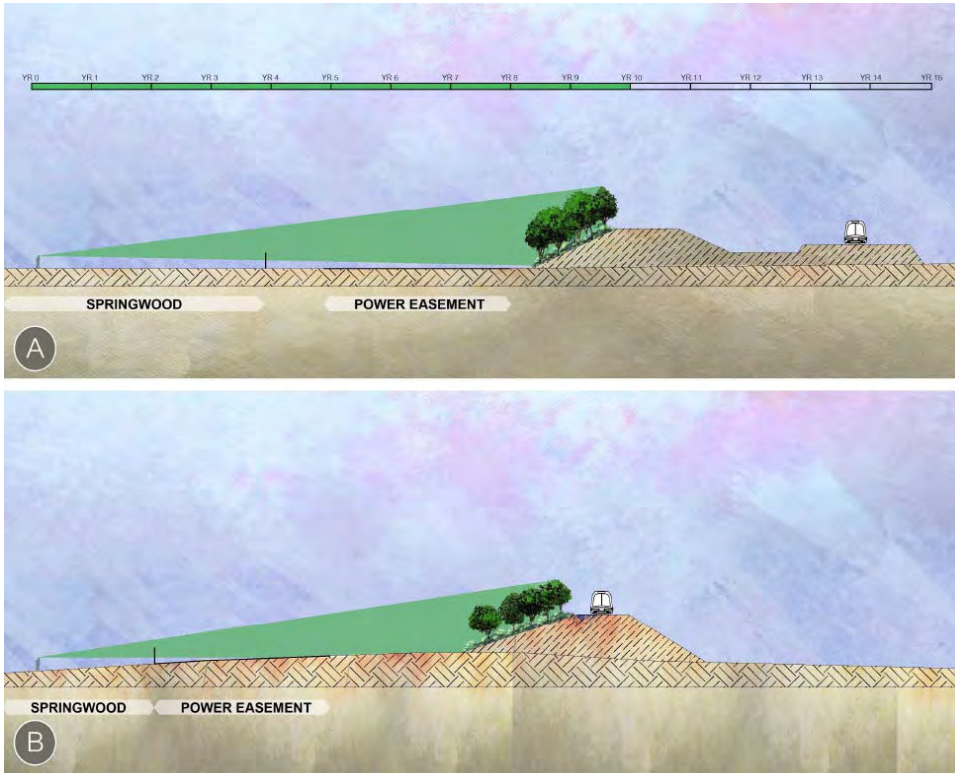


Figure 15 – Year 10 for Bund and Batter Slope

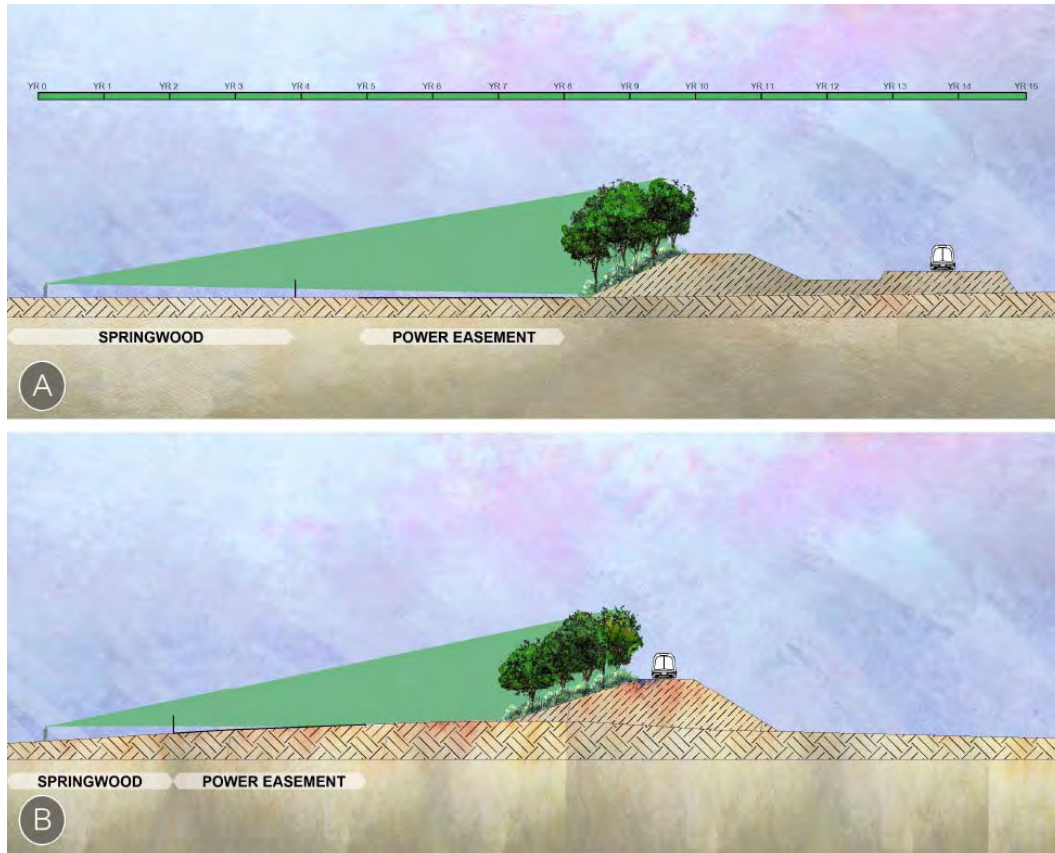


Figure 16 – Year 15 for Bund and Batter Slope

1.14 CONCLUSION

Based on my consideration of the issues and possible solutions, I believe that the most effective method of ameliorating views, which would not fall under the normal classification of high sensitivity, is well planned, managed and maintained planting of indigenous species.

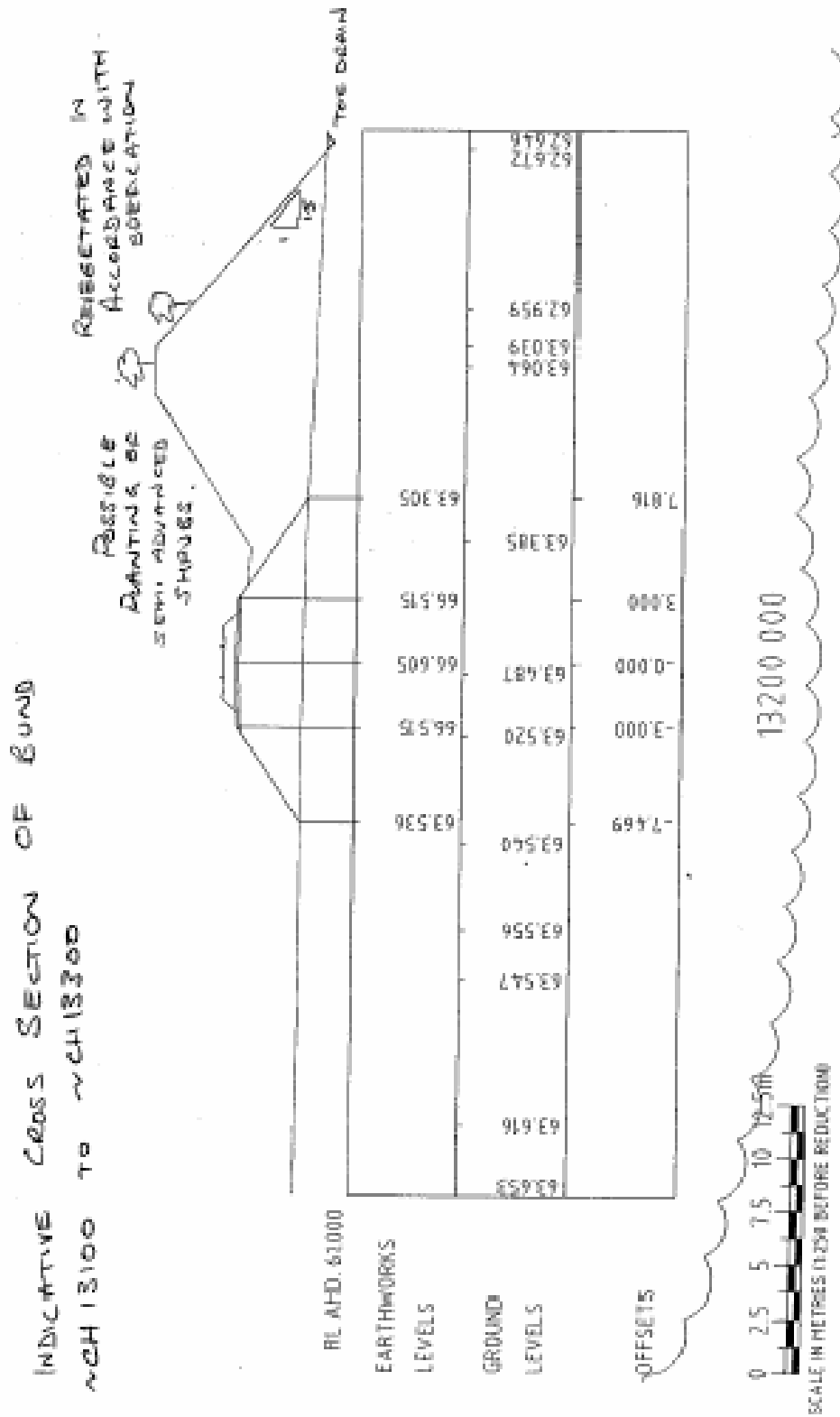
Sufficient space is not present to allow bunding to occur in locations where the railway line is most elevated on fill, without intruding on the powerline easement or impacting on existing screening vegetation. Solid barriers walls are considered to be an intrusive element within the landscape also.

It is my opinion that the amelioration works undertaken by Wambo Coal will start to ameliorate the views to trains on the section of the rail loop where batter planting only has occurred in year 3, and start to significantly ameliorate views within 5 to 7 years. After 7 years, views to trains on the loop will be almost completely screened.

The section of constructed screening bund already screens the trains on the rail loop. Once the raw appearance of mulch on the bund is covered with establishing vegetation, the appearance will progressively become more natural. This is likely to occur over a period of 2 to 3 years.

The roof of the coal conveyor, extending from the Bin to the Take Up Tower, should be painted in a non reflective paint of a colour to match to the existing green colour used on the other main structures on site.

APPENDIX A – BASE MAPPING (SOURCE: WAMBO COAL PTY LTD)



APPENDIX B - EXTRACT FROM: PROPOSED ALTERATIONS TO THE WAMBO DEVELOPMENT PROJECT RAIL AND TRAIN LOADING INFRASTRUCTURE STATEMENT OF ENVIRONMENTAL EFFECTS JUNE 2004

4.2 VISUAL

4.2.1 Approved Project

The potential environmental impacts and mitigation measures for the Approved Project in relation to visual aspects are outlined below (as extracted from Sections 4.3 and 4.8.2 of the EIS).

Potential Impacts

Visual Landscape Impacts

The Synoptic Plan: Integrated Landscapes for Coal Mine Rehabilitation in the Hunter Valley of New South Wales (DMR, 1999) identifies land clearing, modification of landforms, mine infrastructure and night-lighting as potential causes of visual impacts arising from coal mining. Elements of the Project considered to have the potential to impact on the visual landscape include:

- *realignment of Wallaby Scrub Road;*
- *construction and operation of a rail spur (including underpass beneath the Golden Highway), rail loop and train load-out bin; and*
- *lighting associated with night-time operations.*

Following the exhaustion of coal reserves, mining infrastructure including administration areas, CHPP and rail infrastructure would be removed and the land beneath rehabilitated.

Visual Impacts

The Upper Hunter region covers an area of approximately 18,000 km² with a diverse visual character, including mining (approximately 147 km²) and associated infrastructure (DUAP, 1997). Regionally significant visual features such as the landforms of the Wollemi National Park, Wollombi Brook and Hunter River would not be affected by the Project.

Golden Highway – East of Wollombi Brook

Views of the Project from this section of the Golden Highway would include the realignment of Wallaby Scrub Road, the rail spur, rail spur underpass, train load-out bin and rail operations. Vegetation clearance associated with the construction of these items would reduce the screening effect of roadside vegetation, enabling partial views of the rail spur, train load-out bin and rail operations to the west.

The visual contrast between the rail spur, rail spur underpass, train load-out bin, rail operations and the surrounding landscape, and the proximity of these items to this section of the Golden Highway is expected to be similar to the many existing views of rail and other industrial infrastructure along the highway.

Wallaby Scrub Road

Views of the Project from Wallaby Scrub Road would be similar to those of the Wambo Coal Mine. The realignment of the intersection of Wallaby Scrub Road and the Golden Highway would provide limited views of the Project rail spur through roadside vegetation.

Warkworth

In general, views from dwellings within Warkworth would not be altered by the Project. Limited views of the train load-out bin may be available above existing vegetation. Dwellings within Warkworth to the north of the Golden Highway may have views of rail operations and the Project rail spur as it crosses the Hunter River flood plain to the south-east.

Figure 4-6 [in the EIS] simulates the view from the easement immediately beside St. Philips Anglican Church looking toward the Project rail spur. This easement has an uninterrupted view over the Wollombi Brook flood plain and represents the easternmost view point in Warkworth. Views from this location would include rail operations and the Project rail spur as it passes westward from behind vegetation on the banks of Wollombi Brook to cross under the Golden Highway. The rail spur underpass would be obscured from view by gently rising topography as it approaches the Golden Highway. Coal trains would be visible on the rail spur at an average frequency of approximately four per day.

Rural Dwellings/Properties

Views from rural dwellings/properties in the vicinity of the Project would include mine waste rock emplacements, open cut mining operations, the water control system and other items of Project infrastructure.

Night-Lighting

The glow produced by night-lighting at the Wambo Coal Mine is visible at nearby dwellings and along transport routes, while direct views of mobile machinery lights and operational lighting are available from some exposed positions. Project night-lighting would be similar to that used at the existing Wambo Coal Mine.

The glow above operational areas contrasts with the night sky. This effect is exacerbated during overcast conditions and would decrease with distance as the light disperses.

Mitigation Measures

Measures that would be employed to mitigate potential visual impacts include... design and construction of Project infrastructure in a manner that minimises visual contrasts.

The following additional measures would be investigated and, where feasible, implemented for locations assessed as having a high potential visual impact:

- *implementation of landscaping works in consultation with affected rural residents; and/or*
- *placement and maintenance of visual screens between Project infrastructure and the viewing location.*

Project Design

Project infrastructure, such as the train load-out bin, would be coloured to minimise the contrast with the surrounding environment.

Progressive Rehabilitation

Progressive rehabilitation of mine waste rock emplacements and other areas of disturbance would be undertaken in order to reduce the contrast between Project landforms and the surrounding environment. This would include partial rehabilitation with selected grass species with a particular focus on the outer batters of mine waste rock emplacements.

Landscaping Works

Landscaping works, including the installation of bunds at appropriate locations and the planting of selected flora species to screen Project views, would be investigated for rural dwellings identified in Section 4.3.3 as having a high potential visual impact. Where practicable, these works would then be implemented in consultation with the affected landholder.

Visual Screening

Planting of selected flora species would be undertaken in order to increase the degree of visual screening at locations where the visual impact has been assessed as high.

Planting and monitoring of screening vegetation to provide a functional visual barrier would also be considered at the following locations (as suggested by the Project CCC) ...Between the Project rail spur (Wollombi Brook to the Golden Highway) and St. Philips Anglican Church, and some dwellings in Warkworth.

The planting and monitoring of screening vegetation would be undertaken on WCPL owned land wherever possible. Planting and monitoring of screening vegetation outside WCPL land would be undertaken, where practicable, subject to agreement by the relevant landholder.

Night-Lighting

Night-lighting would be restricted to the minimum required for operational and safety requirements and would be directed away from incoming views. All lighting above natural topographic screens would be directed downwards.

4.2.2 Altered Project

As discussed in Section 2.3, the Altered Project would not include any changes to the coal reclaim area, product coal conveyor and rail load out bin.

A discussion of the visual implications of the altered rail alignment and road crossings is provided from relevant viewpoints below:

- **Golden Highway East of Warkworth** – the altered rail alignment would reduce visual impacts looking north from the Golden Highway as there will no longer be views of the rail spur or the Golden Highway rail underpass. To the south of the Golden Highway there would be increased views of the rail loop due to the increased length of loop in proximity to the highway (Figure 3).
- **Warkworth Residences North of the Golden Highway** – views of the rail spur from Warkworth residences would be significantly reduced by the relocation of the rail line to the south side of the Golden Highway;
- **St Philips Church** – views of the rail spur from the St Philips church would be significantly reduced by the relocation of the rail line to the other side of the Golden Highway.
- **Henderson Residence** – views of the rail spur from the Henderson's residence would be significantly reduced by the relocation of the line to the south side of the Golden Highway;
- **Wallaby Scrub Road** – the altered rail alignment would necessitate the construction of two underpasses beneath the realigned section of Wallaby Scrub Road. Views of the rail line and associated embankments would be available from these split level crossings. Views of this nature are typical of road/rail intersections in the region.
- **Hawkes Property** – the altered rail alignment would result in an increased length of rail loop adjacent to the northern boundary of the Hawkes property in comparison to the Approved Project (Figure 3). Existing screening vegetation located near this property boundary, along with the lowered elevation of the trains due to this section of rail being in a cutting, is anticipated to partially screen the rail activities from the Hawkes residence. However, there may be locations where construction clearing or gaps in the vegetation result in the visibility of trains operating on the parts of the new alignment. Coal trains would be operating on the rail spur at an average frequency of approximately four per day.

Night lighting impacts associated with train movements on the rail infrastructure are expected to remain generally unchanged south of the Golden Highway and significantly reduced to the north of the highway.

In conclusion, the potential visual impacts of the Altered Project would be similar in nature to the impacts of the Approved Project and no significant additional visual impacts have been identified.

Mitigation measures that would be implemented to minimise the potential for excessive clearing of screening vegetation would be implemented (Section 4.8.2 of the EIS), viz.:

Mitigation measures relevant to vegetation clearance activities include the following:

- *Wherever practicable, existing native vegetation would be retained and vegetation clearance avoided.*
- *A vegetation clearance protocol would be developed to minimise the impact of Project vegetation clearance activities on flora. As a component of the Protocol, vegetation adjoining proposed clearance areas would be delineated and clearly marked or fenced to prevent accidental damage.*

The visual mitigation measures described above for the Approved Project (ie. progressive rehabilitation, landscaping works and visual screening) would also be implemented to address the potential visual impacts of the Altered Project.

APPENDIX C – PLANT SPECIES LIST – WAMBO SCREEN PLANTING

Wambo Rail Development – Revegetation and Landscaping Plan

Provisional Species List

Scientific Name	Common Name
Trees	
<i>Allocasuarina luehmanii</i>	Bulloak
<i>Allocasuarina verticillata</i>	Drooping Sheoak
<i>Angophora floribunda</i>	Rough-barked Apple
<i>Eucalyptus crebra</i>	Narrow-leaved Ironbark
<i>Eucalyptus dawsonii</i>	Slaty Gum
<i>Eucalyptus moluccana</i>	Grey Box
<i>Melaleuca decora</i>	A Honeymyrtle
<i>Notelaea microcarpa</i>	Native Olive
<i>Geijera salicifolia</i>	Brush Wilga
Shrubs	
<i>Acacia filicifolia</i>	Fern-leaf Wattle
<i>Acacia implexa</i>	Hickory Wattle
<i>Acacia salicina</i>	Cooba
<i>Acacia amblygona</i>	Fan Wattle
<i>Acacia falcata</i>	Sickle Wattle
<i>Acacia decora</i>	Western Silver Wattle
<i>Grevillea montana</i>	A Grevillea
<i>Hibbertia linearis</i>	-
<i>Cassinia quinquefaria</i>	A Cough Bush
Grasses and Herbs	
<i>Dianella revoluta</i>	Blue Flax Lily
<i>Lomandra multiflora</i>	Many-flowered Matrush
<i>Chloris ventricosa</i>	Tall Windmill Grass
<i>Laxmannia gracilis</i>	Wire Lily
<i>Gahnia aspera</i>	Rough Saw-sedge
<i>Aristida vagans</i>	Threeawn Speargrass
<i>Austrodanthonia</i> sp.	A Wallaby Grass
<i>Austrostipa scabra</i> ssp. <i>falcata</i>	Speargrass
<i>Cymbopogon refractus</i>	Barbwire Grass

Source: Resource Strategies (2003)

WAM-07/2.7/APPENDIX A-C/15 December, 2004

APPENDIX F

REGULATORY CORRESPONDENCE



13 JUN 2008

Contact: Colin Phillips
Phone: (02) 9228 6483
Fax: (02) 9228 6466
Email: colin.phillips@planning.nsw.gov.au

Ms Sarah Bailey
Environment & Community Manager
Wambo Coal Pty Ltd
PMB 1
SINGLETON NSW 2330

Our ref: S02/02197-27

Dear Ms Bailey

Wambo Coal Mine – Revised Flora and Fauna Management Plan

I refer your letter to Mr Howard Reed, dated 30 April 2008, requesting approval of the revised Flora and Fauna Management Plan required by condition 49 (b) of schedule 4 of Wambo Coal Mine's consent (DA 305-7-2003).

The Department has reviewed this plan and considers that it fulfils the requirements of the mine's consent. Accordingly, the Director-General has approved Wambo Coal Mine's revised Flora and Fauna Management Plan.

If you have any queries on this matter, please contact Colin Phillips on 9228 6483.

Yours sincerely

3.6.08

Mike Young
A/Director
Major Development Assessment
as Delegate for the Director-General



Australian Government

Department of the Environment and Water Resources

Ms Sarah Withell
Environment and Community Manager
Wambo Coal Pty Ltd
Private Mail Bag 1
SINGLETON NSW 2330

Date
20 August 2007
EPBC Ref
2003/1138
EPBC contact
Kat Dunstan
02 6274 1688
kat.dunstan@environment.gov.au

Dear Ms Withell

Approval of Addendum to the *Wambo Development Project - Flora and Fauna Management Plan, Wambo Coal Mine (2003/1138)*

I refer to your letter of 20 July 2007 requesting the Departments approval of an Addendum to the *Wambo Development Project - Flora and Fauna Management Plan (FFMP)*.

We have carefully considered your request to construct a dewatering borehole, water pipe and access track within Area B of the Remnant Woodland Enhancement Programme (RWEF). As stated in the FFMP, the objective of the RWEF areas are to help conserve regional diversity, whilst enhancing the habitat available to flora and fauna.

The activity outlined in the proposed Addendum will result in the loss of approximately 1 ha of potential foraging habitat of the Swift Parrot, a species listed as endangered under the *Environment Protection and Biodiversity Conservation Act 1999*. However I have also taken into consideration that the proposed borehole would reduce or eliminate the need for WCPL personnel to enter hazardous areas of the mine.

I inform you that the Addendum to the FFMP has been approved as attached.

If you require any further information please contact Kat Dunstan on (02) 6274 1688 or email kat.dunstan@environment.gov.au.

Yours sincerely

Tim Kahn
Director - Mining and Nuclear Section
Environment Assessment Branch



Department of
Infrastructure, Planning and Natural Resources

Mining & Extractive Industries
Major Development Assessment

Phone: (02) 9228 6487

Fax: (02) 9228 6466

Email: david.kitto@dpnr.nsw.gov.au

Level 4 Western Gallery
23-33 Bridge Street
GPO Box 89
SYDNEY NSW 2001

Our Reference: S02/ 02197

Mr Tony Sutherland
Wambo Coal Pty Ltd
PMB 1
SINGLETON NSW 2330

Dear Mr Sutherland

Wambo Coal Mine
Environmental Monitoring Programs & Management Plans

Thank you for forwarding the following documents required under the development consent (DA 305-7-2003) for the Department's consideration:

- Air Quality Monitoring Programme (Condition 5 of Schedule 4);
- Landowner Notification Procedure – Air Quality (Condition 3 of Schedule 5); and
- ~~Flora and Fauna Management Plan (Condition 4 of Schedule 4).~~

The Department has reviewed these documents and is satisfied they address the requirements set out in the relevant conditions of the development consent. Consequently, I would like to advise you that the Director-General has approved these documents.

Please contact me if you have any enquiries about the approval.

Yours sincerely

DLitto 13/9/05

David Kitto
Manager
Mining & Extractive Industries
Major Development Assessment

As delegate for the Director-General

APPENDIX G

SURFACE DISTURBANCE PERMIT (SDP)



Surface Disturbance Permit

SDP Number: (Env. Services only)	
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Section 1 - Area of Operations

Open Cut	<input type="checkbox"/>	Rail	<input type="checkbox"/>
Underground	<input type="checkbox"/>	CHPP	<input type="checkbox"/>
Wambo General	<input type="checkbox"/>	Other	<input type="checkbox"/>

(e.g. RWEPA Areas)

Section 2 – SDP Proponent

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



<ul style="list-style-type: none"> 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 <i>(If Yes please add comments/findings at the end of this section):</i>	Yes/ No
Flora/fauna restriction (described within EMP, Licence or Development Consent) E.g. All proposed activities with WCPL RWEPA 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			
Manager <i>(The Manger responsible for the area of the operation where the works will be undertaken):</i>			

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

Works associated with this SDP were completed on:

Project Coordinator/Advocate: <i>(Please return a signed copy of the completed SDP to Environmental Services)</i>	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: <i>(Name & Role)</i>		Date:	
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Project Completion *(at the end of the project a compliance inspection may be undertaken)*

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

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 RWEF 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 H

Biodiversity Offset Management Plan – Reference Summary Table

Amendment A – Appendix H

Best Practice Guidelines for Biodiversity Offset Management Plans Reference Summary

DP&E Guidelines for Biodiversity Offset Management Plans	Where addressed in the Wambo Coal Flora & Fauna Management Plan (now referred to as the Biodiversity Management Plan)
INTRODUCTION	Section 1
Background	Section 1
Statutory Requirements	Section 3.3
Requirements of the Plan	Section 3.3
Objectives of the BOMP	Section 1.1 & Section 3.3
Roles and Responsibilities	Section 6
LOCATION AND SETTING OF BIODIVERSITY OFFSET AREA(S)	
Biodiversity Offset Areas	Section 3.3 & Figure 3
Land Tenure and Land Uses	Section 3.3.3
Land Security	Section 3.3.3
BASELINE ENVIRONMENT	Section 3.3
Landuse History	Section 2.1
Climatic Information	Section 2.2
Landform, Geology, Soils and Erosion	Section 2.3, 2.5
Vegetation Communities, Threaten and Migratory Species	Section 2.6 (Table 5), 2.7 (Table 6) and figure 6
Introduced Species	Section 2.6 & 2.7
BOA MANAGEMENT ZONE STRATIFICATION	Section 3.3 & Figure 3
LAND MANAGEMENT STRATEGIES & COMPLETION CRITERIA	Section 3.3
Disease Management and Hygiene	Section 3.0
Cultural Heritage Management	N/A
Fencing, Gates and Signage	Section 3.3.3
Access Tracks	Section 3.3.3
Waste Management and Conflicting Uses	Appendix I
Erosion, Sedimentation and Soil Management	Section 3.3.3 & 3.4.2
Stock Management	Section 3.3.3

Seed Collection and Propagation	Section 3.1.6
Habitat Augmentation	Section 3.1.4 & 3.3.3
Revegetation and Regeneration	Section 3.4.3
Translocation of Native Species	Section 3.2.2
Weed Management	Section 3.3.3
Vertebrate Pest Management	Section 3.3.3
Fire Management	Section 3.3.3
FLORA AND FAUNA MONITORING	Section 4
BOMP IMPLEMENTATION COSTS & CONSERVATION BOND	Appendix J
REPORTING AND DOCUMENTATION REQUIREMENTS	Section 5
BOMP REVIEW AND PROCESS IMPROVEMENT	Section 7 & 7.1

APPENDIX I

Biodiversity Offset Management Plan – Action Schedule 2014-2017

Amendment A: Appendix I

Biodiversity Offset Management Action Schedule 2014-2017

All Actions to be reported in the Annual Environmental Management Report

Year	Domain A	Domain B	Domain C	Domain D	Rail Loop
2014	<ul style="list-style-type: none"> • 6 monthly Weed Audit & Weed Management Program • Continue with Feral animal control program • Identify and implement program for future Removal of Remanent Fence infrastructure • Design Nest Box implementation & Monitoring Program* • Design Seed Collection & Propagation 	<ul style="list-style-type: none"> • 6 monthly Weed Audit & Weed Management Program • Continue with Feral animal control program • Identify and implement program for future Removal of Remanent Fence infrastructure • Design Nest Box implementation & Monitoring Program • Design Seed Collection & Propagation 	<ul style="list-style-type: none"> • 6 monthly Weed Audit & Weed Management Program • Continue with Feral animal control program • Identify and implement program for future Removal of Remanent Fence infrastructure • Design Nest Box implementation & Monitoring Program • Design Seed Collection & Propagation 	<ul style="list-style-type: none"> • 6 monthly Weed Audit & Weed Management Program • Continue with Feral animal control program • Identify and implement program for future Removal of Remanent Fence infrastructure • Design Nest Box implementation & Monitoring Program • Design Seed Collection & Propagation 	<ul style="list-style-type: none"> • 6 monthly Weed Audit & Weed Management Program • Continue with Feral animal control program • Identify and implement program for future Removal of Remanent Fence infrastructure • Design Nest Box implementation & Monitoring Program • Design Seed Collection & Propagation

	Program	Program	Program	Program	Program
2015	<ul style="list-style-type: none"> • 6 monthly Weed Audit & Weed Management Program • Continue with Feral animal control program • Implement staged remnant Fence removal program • Implement Stage Nest Box installation & monitoring program* • Implement Seed Collection & propagation program • Audit / Identify internal access tracks which can be rehabilitated 	<ul style="list-style-type: none"> • 6 monthly Weed Audit & Weed Management Program • Continue with Feral animal control program • Implement staged remnant Fence removal program • Implement Stage Nest Box installation & monitoring program* • Implement Seed Collection & propagation program • Audit / Identify internal access tracks which can be rehabilitated 	<ul style="list-style-type: none"> • 6 monthly Weed Audit & Weed Management Program • Continue with Feral animal control program • Implement staged remnant Fence removal program • Implement Stage Nest Box installation & monitoring program* • Implement Seed Collection & propagation program • Audit / Identify internal access tracks which can be rehabilitated 	<ul style="list-style-type: none"> • 6 monthly Weed Audit & Weed Management Program • Continue with Feral animal control program • Implement staged remnant Fence removal program • Implement Stage Nest Box installation & monitoring program* • Implement Seed Collection & propagation program • Audit / Identify internal access tracks which can be rehabilitated 	<ul style="list-style-type: none"> • 6 monthly Weed Audit & Weed Management Program • Continue with Feral animal control program • Implement staged remnant Fence removal program • Implement Stage Nest Box installation & monitoring program* • Implement Seed Collection & propagation program • Audit / Identify internal access tracks which can be rehabilitated
2016	<ul style="list-style-type: none"> • 6 monthly Weed Audit & Weed Management Program • Continue with Feral animal 	<ul style="list-style-type: none"> • 6 monthly Weed Audit & Weed Management Program • Continue with Feral animal 	<ul style="list-style-type: none"> • 6 monthly Weed Audit & Weed Management Program • Continue with Feral animal 	<ul style="list-style-type: none"> • 6 monthly Weed Audit & Weed Management Program • Continue with Feral animal 	<ul style="list-style-type: none"> • 6 monthly Weed Audit & Weed Management Program • Continue with Feral animal

	<p>control program</p> <ul style="list-style-type: none"> • Implement staged remnant Fence removal program • Implement Stage Nest Box installation & monitoring program* • Implement Seed Collection & propagation program • Rehabilitate identified internal access tracks which are no longer required • Investigate and Develop Management plan for the enhancement of Biodiversity Offset Areas through connectivity corridors between Wollombi Brook, North Wambo Creek, South 	<p>control program</p> <ul style="list-style-type: none"> • Implement staged remnant Fence removal program • Implement Stage Nest Box installation & monitoring program* • Implement Seed Collection & propagation program • Rehabilitate identified internal access tracks which are no longer required • Investigate and Develop Management plan for the enhancement of Biodiversity Offset Areas through connectivity corridors between Wollombi Brook, North Wambo Creek, South 	<p>control program</p> <ul style="list-style-type: none"> • Implement staged remnant Fence removal program • Implement Stage Nest Box installation & monitoring program* • Implement Seed Collection & propagation program • Rehabilitate identified internal access tracks which are no longer required • Investigate and Develop Management plan for the enhancement of Biodiversity Offset Areas through connectivity corridors between Wollombi Brook, North Wambo Creek, South 	<p>control program</p> <ul style="list-style-type: none"> • Implement staged remnant Fence removal program • Implement Stage Nest Box installation & monitoring program* • Implement Seed Collection & propagation program • Rehabilitate identified internal access tracks which are no longer required • Investigate and Develop Management plan for the enhancement of Biodiversity Offset Areas through connectivity corridors between Wollombi Brook, North Wambo Creek, South 	<p>control program</p> <ul style="list-style-type: none"> • Implement staged remnant Fence removal program • Implement Stage Nest Box installation & monitoring program* • Implement Seed Collection & propagation program • Rehabilitate identified internal access tracks which are no longer required
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	Wambo and Stony Creek	Wambo and Stony Creek	Wambo and Stony Creek	Wambo and Stony Creek	
2017	<ul style="list-style-type: none"> • 6 monthly Weed Audit • Continue with Feral animal control program • Implement staged remnant Fence removal program • Implement Stage Nest Box installation & monitoring program* • Implement Seed Collection & propagation program • Implement Management plan for the enhancement of Biodiversity Offset Areas through connectivity corridors between Wollombi Brook, North Wambo Creek, South 	<ul style="list-style-type: none"> • 6 monthly Weed Audit • Continue with Feral animal control program • Implement staged remnant Fence removal program • Implement Stage Nest Box installation & monitoring program* • Implement Seed Collection & propagation program • Implement Management plan for the enhancement of Biodiversity Offset Areas through connectivity corridors between Wollombi Brook, North Wambo Creek, South 	<ul style="list-style-type: none"> • 6 monthly Weed Audit • Continue with Feral animal control program • Implement staged remnant Fence removal program • Implement Stage Nest Box installation & monitoring program* • Implement Seed Collection & propagation program • Implement Management plan for the enhancement of Biodiversity Offset Areas through connectivity corridors between Wollombi Brook, North Wambo Creek, South 	<ul style="list-style-type: none"> • 6 monthly Weed Audit • Continue with Feral animal control program • Implement staged remnant Fence removal program • Implement Stage Nest Box installation & monitoring program* • Implement Seed Collection & propagation program • Implement Management plan for the enhancement of Biodiversity Offset Areas through connectivity corridors between Wollombi Brook, North Wambo Creek, South 	<ul style="list-style-type: none"> • 6 monthly Weed Audit • Continue with Feral animal control program • Implement staged remnant Fence removal program • Implement Stage Nest Box installation & monitoring program* • Implement Seed Collection & propagation program

	Wambo and Stony Creek	Wambo and Stony Creek	Wambo and Stony Creek	Wambo and Stony Creek	
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**Wambo Coal is investigating and has expressed interest with University Institutions for postgraduate research opportunities with regards to the Nest Box monitoring program.*

ATTACHMENT 1

DEVELOPMENT CONSENT (DA 305-7-2003)

Refer to NSW Department of Planning and Environment website for latest version:
<http://majorprojects.planning.nsw.gov.au/page/>