



Tarrawonga Mine Biodiversity Management Plan

Prepared for
Whitehaven Coal Limited



DOCUMENT TRACKING

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Contents

1	Introduction	7
1.1	Background to the Project	7
1.2	Purpose of the BMP	8
1.3	Context and Relationship with other Management Plans	10
1.4	Consultation	10
2	Potential and Known Impacts	14
3	Existing Biodiversity Values	18
3.1	Project Area	18
3.1.1	Flora	18
3.1.2	Fauna	21
3.2	“Willeroi” Offset Area	25
4	Biodiversity Management within the Project Area	31
4.1	Enhancing the Quality of Existing Vegetation and Fauna Habitat	31
4.1.1	Aim	31
4.1.2	Management Strategies	31
4.1.3	Performance / Completion Criteria	31
4.2	Restoring Native Vegetation and Fauna Habitat	32
4.2.1	Aim	32
4.2.2	Management Strategies	32
4.2.3	Performance / Completion Criteria	32
4.3	Maximising the Salvage of Resources	33
4.3.1	Aim	33
4.3.2	Management Strategies	33
4.3.3	Performance / Completion Criteria	36
4.4	Collecting and Propagating Seed	36
4.4.1	Aim	36
4.4.2	Management Strategies	36
4.4.3	Performance / Completion Criteria	37
4.5	Minimising the Impacts on Fauna	37
4.5.1	Aim	37
4.5.2	Management Strategies	37
4.5.3	Performance / Completion Criteria	39
4.6	Managing Salinity	39
4.6.1	Aim	39

4.6.2	Management Strategies	39
4.6.3	Performance / Completion Criteria	39
4.7	Controlling Weeds and Feral Pests	39
4.7.1	Aim.....	39
4.7.2	Management Strategies	39
4.7.3	Performance / Completion Criteria	40
4.8	Controlling Erosion	41
4.8.1	Aim.....	41
4.8.2	Management Strategies	41
4.8.3	Performance / Completion Criteria	42
4.9	Controlling Access.....	42
4.9.1	Aim.....	42
4.9.2	Management Strategies	42
4.9.3	Performance / Completion Criteria	42
4.10	Managing Bushfire Risk.....	42
4.10.1	Aim.....	42
4.10.2	Management Strategies	42
4.10.3	Performance / Completion Criteria	43
5	Monitoring	44
6	Risks and Contingencies.....	48
6.1	Risks to Biodiversity Management	48
6.2	Trigger Action Response Plan.....	50
6.2.1	First Tier Triggers	50
6.2.2	Second Tier Triggers	50
7	Roles and Responsibilities.....	53
8	Reporting.....	54
8.1	Incident Reporting	54
8.2	Annual Biodiversity Monitoring	54
8.3	Regular Reporting and Review.....	54
8.4	Complaint Receipt and Response Procedure	55
8.5	Response to Non-Compliances.....	55
9	Auditing	57
9.1	Annual Internal Auditing	57
9.2	Independent Audit	57
10	Review of this BMP	58

References	59
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List of Figures

Figure 3-1: Vegetation communities of the project area and surrounds (TCPL 2012)	20
Figure 3-2: Threatened fauna species recorded in the project area and surrounds (TCPL 2012)	22
Figure 3-3: Broad fauna habitat types within the project area (TCPL 2012).....	23
Figure 3-4: Vegetation communities within the biodiversity offset area (TCPL 2012)	28
Figure 3-5: Broad fauna habitat types within the biodiversity offset area (TCPL 2012).....	29
Figure 3-6: Threatened fauna species recorded in the biodiversity offset and surrounds (TCPL 2012) .	30
Figure 4-1: Recommended soil stripping depths (McKenzie Soil Management 2011).....	35

List of Tables

Table 1-1: Biodiversity Objectives of PA 11_0047	8
Table 1-2: Compliance with Schedule 3, Condition 47 PA 11_0047	9
Table 1-3: Summary of consultation in relation to the BMP development (TCPL 2014)	11
Table 2-1: Summary of known and potential impacts on biodiversity values	14
Table 2-2: Vegetation communities to be disturbed for the Project and their associated biodiversity offset values (FloraSearch 2011)	16
Table 3-1: Native vegetation communities in the Project Area	19
Table 3-2: Box-Gum woodland EEC/CEEC in the Project area.....	19
Table 3-3: Native vegetation communities in the biodiversity offset area	26
Table 3-4: EEC Associated Native vegetation communities in BOA	26
Table 4-1: Performance criteria for restoration of native vegetation and fauna habitat (TCPL 2012)	33
Table 5-1: Biodiversity monitoring requirements.....	44
Table 6-1: Potential risks to the implementation of this BMP.....	48
Table 6-2: TARP for Biodiversity Management.....	51
Table 7-1: Roles and responsibilities	53

Abbreviations

ABBREVIATION	DESCRIPTION
AEMR	Annual Environmental Management Report
AHIMS	Aboriginal Heritage Information Management System
BMP	Biodiversity Management Plan
BOA	Biodiversity Offset Area
BOS	Biodiversity Offset Strategy
CCC	Community Consultative Committee
CEEC	Critically Endangered Ecological Community
CMA	Catchment Management Authority
CoA	Conditions of Approval
DoE	Department of Environment
DPI	Department of Primary Industries
DP&E	Department of Planning and Environment
EEC	Endangered Ecological Community
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
EPBC Act	<i>Environmental Protection and Biodiversity Conservation Act 1999</i>
OEH	Office of Environment and Heritage
PA	Project Approval
ROM	Run-of-mine
RMP	Rehabilitation Management Plan
TCPL	Tarrawonga Coal Pty Ltd
TSC Act	<i>Threatened Species Conservation Act 1995</i>
WoNS	Weed of National Significance
WCL	Whitehaven Coal Limited

1 Introduction

This Biodiversity Management Plan (BMP) has been prepared for the Tarrawonga Coal Project (the Project) on behalf of Whitehaven Coal Limited (WCL). In accordance with Condition 19 Schedule 2 of MP 11_047, WCL are seeking approval of the BMP on a two stage progressive basis, being:-

Stage 1 - Project Area Biodiversity Management, and

Stage 2 – Offset Area Biodiversity Management (including integration of EEC and Threatened Fauna Implementation Plans).

Management procedures and protocols outlined in this BMP provide measures to manage Project area biodiversity, including management measures for annual clearing programs. This BMP has been prepared in accordance with the Project Conditions of Approval (COA) and other statutory requirements. It provides performance and completion criteria to assess the effectiveness of biodiversity management and to trigger management actions.

This BMP has been developed in consultation with key stakeholders, including the NSW Office of Environment and Heritage, the Commonwealth Department of the Environment (DoE), Forests NSW, the Tarrawonga Community Consultative Committee (CCC), the Department of Primary Industries (DPI) Catchments and Lands and the North West Local Land Services (NWLLS); comments received have been integrated into this document.

1.1 Background to the Project

The Tarrawonga Coal Mine (Tarrawonga) is an open cut mining operation located approximately 15 km north-east of Boggabri and 42 km north-northwest of Gunnedah in New South Wales. The mine is managed by Whitehaven Coal Mining Limited (WCML) for the Tarrawonga Joint Venture. Participants of the joint venture are WCML (70%) and Boggabri Coal Pty Limited (30%). Mining operations are undertaken by Tarrawonga Coal Pty Ltd (TCPL).

Tarrawonga Coal Mine commenced operations in 2006 when it was known as the “East Boggabri Coal Mine” (DA-88-4-2005). An extension within the original Mining Lease (ML) 1579 was granted in 2010 (DA 88-4-2005 MOD 1).

A further extension to mining operations (the Tarrawonga Coal Project) was proposed in 2012 and included an open cut extension to the south of ML1579 (MLA1), east within ML 1579 and ML1693 and to the north within ML1685. The extension facilitates increased production of up to 3 million tonnes per annum of ROM coal over a mine life of 17 years, and direct employment of 20 construction and 120 operational personnel. Conditional approval for this expansion was granted on 22 January 2013 by the NSW State Government (PA 11_0047) and on 11 March 2013 by the Commonwealth Government (EPBC 2011/5923).

The overall biodiversity objectives for the Project and Biodiversity Offset Areas are described in relevant Project approval conditions under both the Environmental Planning and Assessment Act 1979 (EPA Act) and the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

Table1-1 shows the biodiversity objectives of Project Approval PA 11_0047 and how/where the conditions have been addressed within this document. Biodiversity objectives of offset areas will be addressed in Stage 2 of the BMP.

Table 1-1: Biodiversity Objectives of PA 11_0047

Condition	Project Approval Requirement	Section Addressed
43(a)	For the White Box – Yellow Box – Blakely’s Red Gum Grassy Woodland Endangered Ecological Community the Proponent shall: (a) Ensure that the Biodiversity Offset Strategy and site Rehabilitation Strategy is focused on the protection, rehabilitation, re-establishment and long-term maintenance of viable stands of this community	2, 4-6
44	For all threatened species on site, the Proponent shall ensure that the Biodiversity Offset Strategy and Rehabilitation Strategy is focused on protection, rehabilitation, re-establishment and long-term maintenance of viable stands of suitable habitat for these species.	4.1, 4.2
45(a)	The Proponent shall: (a) Investigate, in conjunction with OEH and Namoi CMA, all factors likely to enhance or impede the effective long term provision of suitable habitat(s) for the following species: Speckled Warbler, Brown Treecreeper, Grey-crowned Babbler, Hooded Robin, Varied Sittella, Turquoise Parrot, Masked Owl, Yellow-bellied Sheath-tail Bat and Squirrel Glider	To be addressed in Stage 2 BMP approval

Overall biodiversity objectives of EPBC 2011/5923 are described in Conditions 1-14 and 22-27 and addressed in **Sections 4-6** of this document. EPBC 2011/5923 is provided in **Appendix A**.

1.2 Purpose of the BMP

Schedule 3, Condition 47 of the State Project Approval (PA 11_0047) requires the preparation and implementation of a BMP. This BMP describes measures to manage biodiversity within the Project Area. The BMP has been prepared in consultation with relevant agencies and authorities and addresses aspects, and relevant statements of commitments, specified for inclusion in the BMP within the Project Environmental Assessment (EA) (TCPL 2012). Additionally, in accordance with the Project Approval, the BMP has been substantially integrated with the Rehabilitation Management Plan (RMP).

Specifically, this BMP provides:

- measures to manage remnant vegetation and habitat onsite;
- performance and completion criteria;
- triggers for management;
- monitoring and reporting program; and
- risks and contingency measures.

Table 1-2 shows the requirements of Schedule 3, Condition 47 of PA 11_0047 and where the condition has been addressed within this document. Biodiversity objectives of offset areas will be addressed in Stage 2 of the BMP.

Table 1-2: Compliance with Schedule 3, Condition 47 PA 11_0047

	Project Approval Requirement	Section Addressed
(a)	Incorporate consultation with OEH, DoE, Forests NSW, the CCC, DPI Catchments and Lands and the NWLLS in the BMP	1.4
(b)	Describe the measures (short, medium and long term) to be implemented to manage the remnant vegetation and habitat on the site and in the offset area and implement the biodiversity offset strategy, including detailed performance and completion criteria	4
(c)	Detail the performance and completion criteria for evaluating the performance of the biodiversity offset strategy and for triggering remedial action	4
(d)	Describe the management measures to be implemented in order to achieve the following objectives: <ul style="list-style-type: none"> • Enhancing the quality of existing vegetation and fauna habitat • Restoring native vegetation and fauna habitat on the biodiversity offset area and rehabilitation area through focusing on assisted natural regeneration, targeted vegetation establishment and introduction of naturally scarce fauna habitat features • Maximising the salvage of resources within the approved disturbance area – including vegetative, top and sub soils and cultural heritage resources – for beneficial reuse in the enhancement of the biodiversity offset area or rehabilitated area • Collecting and propagating seed • Minimising the impacts on fauna on site, including undertaking pre-clearance surveys • Managing any potential conflicts between the proposed restoration works in the biodiversity offset area and any aboriginal heritage values (both cultural and archaeological) • Managing salinity • Controlling weeds and feral pests • Controlling erosion • Controlling access • Managing bushfire risk 	4
(e)	Provide a seasonally-based program to monitor and report on the effectiveness of the measures outlined in this BMP and the progress against the detailed performance and completion criteria	5
(f)	Identify the potential risks to the successful implementation of the biodiversity offset strategy, and include a description of the contingency measures that would be implemented to mitigate against these risks	6
(g)	Provide details of who would be responsible for monitoring, reviewing and implementing the plan	7

In accordance with the Projects Statement of Commitments this BMP addresses the following biodiversity aspects:-

- adopting land clearing strategies to minimise impacts on fauna (refer **Section 4.5.2** and **Appendix B**);
- salvaging and re-using material from the site for habitat enhancement (refer **Section 4.3.2**);

- revegetation and habitat creation along the low flow channel of the permanent Goonbri Creek alignment (refer **Section 4.2.2**);
- revegetation within the Goonbri Creek enhancement area (refer **Section 4.2.2**);
- implementing a nest box program (refer **Section 5**);
- enhancing farm dams (refer **Section 4.1.2**);
- controlling feral animals (refer **Section 5**);
- managing grazing and agricultural practices on Whitehaven-owned land (refer **Section 4.1.2**);
- managing artificial lighting (refer **Section 4.5.2**); and
- limiting vehicle speed limits (refer **Section 4.5.2**).

In addition, Schedule 5 of the Project Approval provides detail of the BMP reporting, auditing and review requirements. Compliance with these requirements is described in **Section 8**, **Section 9** and **Section 10** of this document.

1.3 Context and Relationship with other Management Plans

This BMP has been prepared using existing knowledge of biodiversity management issues within the Project area. However, it has been prepared prior to addressing all of the requirements of the State and Commonwealth approvals related to biodiversity management. These requirements include:

- Stage 2 of the Leard Forest Mining Precinct Regional Biodiversity Management Strategy (State Condition 41 and Commonwealth Condition 22)
- Revised Biodiversity Offset Strategy (State Condition 42)
- Box Gum Woodland EEC - Implementation Plan (State Condition 43)
- Threatened Fauna - Implementation Plan (State Condition 44)
- Independent verification of Offset areas (Commonwealth Condition 7)
- Offset Management Plan (Commonwealth Condition 12 to 15)
- Mine Site Rehabilitation Plan (Commonwealth Condition 23 to 26).

An independent verification of Offset areas was undertaken by Eco Logical Australia in November 2013. The verification report concluded that the offset met the relevant EPBC 2011/5923 conditions of approval. Biodiversity objectives of offset areas will be addressed in Stage 2 of the BMP.

It is envisaged that the management actions and performance and completion criteria relating to biodiversity will be further developed during the process of preparing the documents and plans above. As a result, this BMP is considered to be a 'live' document and describes where the related management plans may be refined or will provide additional detail on particular matters.

It is expected that this BMP will be reviewed and, if required, revised following the completion of the other related management plans.

Any revision of this BMP will be undertaken in consultation with key stakeholders (including OEHL, DoE, Forests NSW, the CCC, DPI Catchments and Lands and the NWLLS) and approved by DP&E (**Section 10**).

1.4 Consultation

Whitehaven undertakes extensive and ongoing consultation with the local community, and State and Commonwealth governments in relation to its mining activities, environmental approvals, and environmental management.

During the Project Approval process, extensive consultation was undertaken and feedback received regarding a number of different issues from stakeholders. Some of the issues identified through the consultation process were in relation to matters that have been addressed within this BMP.

As part of the preparation of this BMP, relevant government agencies were consulted with and their comments incorporated into the document.

Table 1-3 below provides a summary of consultation undertaken during the preparation of the Project EA and the Biodiversity Management Plan as required under Schedule 3, Condition 47 (a) of the State COA, specifically in relation to biodiversity, rehabilitation and environmental offsets. Consultation on biodiversity objectives of offset areas will be addressed in Stage 2 of the BMP.

Table 1-3: Summary of consultation in relation to the BMP development (TCPL 2014)

Agency	Date	Relevant Items Discussed	Section Addressed
NSW Department of Planning and Environment (NSW DP&E)	January 2011	Environmental impact assessment.	2
	26 July 2011	Overview of EA studies and details of specialist consultants contributing to the EA sections. Design considerations for the permanent Goonbri Creek alignment. Leard State Forest and Project biodiversity offset.	2, 3 and 5
	13 September 2011	Key findings of biological surveys and assessments. Proposed biodiversity offset strategy for the Project.	2
	November 2013	Enhancing the Quality of Existing Vegetation and Fauna Habitat Restoring Native Vegetation and Fauna Habitat Salvage Management Soil Management Protocol Weed and feral animal management Bushfire Management Regrowth management Stock Management Re-vegetation Monitoring TARPS Clearing Protocol	4-6 and Appendix B
NSW Office of Environment and Heritage (OEH)	30 March 2011	Environmental impact assessment and specialist study program. Project Application and supporting Preliminary Environmental Assessment and approval timing.	-

Agency	Date	Relevant Items Discussed	Section Addressed
	13 September 2011	<p>Key findings of the flora and fauna surveys and assessments conducted within the Project area and the proposed biodiversity offset area.</p> <p>The proposed biodiversity offset strategy for the Project.</p> <p>Biodiversity, native vegetation, threatened species, and biodiversity offsets.</p> <p>Actions that would be taken to avoid or mitigate impacts or compensate for unavoidable impacts.</p>	2 and 3-4
	3 July 2013	<p>Overall Biodiversity Objectives</p> <p>Identify vegetation communities and individual species, their habitat requirements and threats.</p> <p>Indicative timeframes of management outcomes.</p> <p>Monitoring</p> <p>Controlling weeds and feral pests</p> <p>Existing Biodiversity Values</p> <p>Biodiversity Management within Project Area (including dams and final void)</p> <p>Biodiversity Management within the Biodiversity Offset Area</p> <p>Salvaging of Cultural Heritage Resources</p>	1, 2 and 4-5
Department of Primary Industries (DPI) – Catchment and Lands	19 April 2011	<p>An aquatic ecological assessment of the area which may be directly or indirectly affected by the Project, including quantification of the extent of aquatic and riparian habitat removal and detailed maps showing the proposed realignment of waterways within the Project area.</p> <p>Threatened aquatic species assessment.</p> <p>Consideration of waterway crossing designs and their effect on the environment.</p> <p>Assessment of potential impacts on surface water and groundwater hydrology, erosion and sedimentation, and their associated impacts on aquatic ecology.</p> <p>Compensatory aquatic habitats.</p>	-
	7 October 2011	Environmental studies that have been undertaken (including aquatic ecology, surface water and biodiversity studies).	2
	31 May 2013	BMP provided to DPI for comment	-
Division of Resources and Energy (DRE) within Department of Trade and Investment, Regional Infrastructure and Services (DTIRIS).	19 April and 5 October 2011	<p>Rehabilitation.</p> <p>Fisheries and aquatic assessment including consideration of threatened species, populations and ecological communities, and waterway crossings.</p> <p>Compensatory habitats and biodiversity offsets.</p>	-

Agency	Date	Relevant Items Discussed	Section Addressed
NSW Office of Water (NOW)	28 April 2011	Potential impacts on surface water and groundwater resources including, adjacent licensed water users and groundwater dependent ecosystems. Hierarchy of water resources value and dependence, including potential impacts on environmental dependence and environmental water established and maintained by water sharing plan rules.	-
	5 September 2011	Refinements to the Project since the Project Application and supporting Preliminary Environmental Assessment were lodged.	-
North West Local Land Services	7 April 2011	Diversion of Goonbri Creek including geomorphic, fauna and flora considerations. Cumulative effects of clearing Leard State Forest and proposed biodiversity offset strategy. Groundwater and surface water management including diversion of Goonbri Creek and impacts of mine waste rock emplacements and final voids. Adequacy of rehabilitation of the mine site including assessment of soil types, soil stripping, land capability, land use and final landforms.	5
	2 August 2013	Broad Management Aims Farm Management Plan Mine Site Rehabilitation Management Plan	1 and 4
Forests NSW	31 May 2013	BMP Provided to Forestry Corporation NSW for comment	
Commonwealth Department of Environment (DoE)	23 May 2011	Project declared to be a 'controlled action' for all purposes of the EPBC Act due to potential impacts on the following: listed threatened species and communities (sections 18 and 18A); and listed migratory species (sections 20 and 20A). Proposed action is to be assessed by accredited assessment under the EP&A Act pursuant to section of the EPBC Act.	-
	13 September 2011	Key findings of biological surveys and assessments. Proposed biodiversity offset strategy for the Project.	2
	31 May 2013	BMP Provided to DoE for comment	
Local Community and Affected Landholders	7 October 2011	Long-term performance of the permanent Goonbri Creek alignment, permanent flood bund and the low permeability barrier. Condition assessment of vegetation communities mapped within the Project area and proposed biodiversity offset area. Agricultural capability of the land within the proposed biodiversity offset area.	5

Agency	Date	Relevant Items Discussed	Section Addressed
Tarrawonga Community Consultative Committee	Multiple meetings	Diverting/changing the Goonbri Creek watercourse. Final land use and rehabilitation.	5

2 Potential and Known Impacts

The potential and known impacts on biodiversity values associated with the Project have been assessed and outlined in the Tarrawonga Coal Mine Environmental Assessment (TCPL 2012). These impacts are summarised in **Table 2-1**.

The Willeroi Offset Area covers an area of 1,660 ha. The offset area is 4.1 times larger than the area of native vegetation proposed to be disturbed by the Tarrawonga Coal Project. A summary of the areas of each community and their offset ratios is presented in **Table 2-2**. Biodiversity objectives of offset areas will be addressed in Stage 2 of the BMP.

Table 2-1: Summary of known and potential impacts on biodiversity values

Attribute	Impact
Fauna (Resource Strategies and Cenwest Environmental Services 2011)	<ul style="list-style-type: none"> Clearing of approximately 256 hectares (ha) of Dry Sclerophyll Forest Habitat, 55 ha of Dry Sclerophyll Forest Habitat – Cypress Monoculture Regrowth, approximately 8 ha of Grassy Woodland Habitat, approximately 15 ha of Riparian/Floodplain Habitat, 63 ha of Grassland Habitat (derived native) and 160 ha of Grassland Habitat (introduced), resulting in a loss of habitat resources and niche space needed for nesting, breeding, feeding, shelter, movement and behavioural expressions. Some disruption of woodland and forest species' movement pathways and existing connectivity with the surrounding landscape, before progressive rehabilitation commences. Likely adverse impacts on resident and other species due to clearing that could lead to a reduction in the number of individuals within a population and/or interruption of their breeding activities. Loss of habitat features such as hollow-bearing trees and logs. The re-alignment of Goonbri Creek east of the proposed open cut extent, leading to a loss of extant Riparian/Floodplain Habitat, instream habitat and the extant ephemeral pool system. However, the re-aligned section of Goonbri Creek would be designed to mitigate this loss. The potential for increased disruption to species resulting from dust, noise, artificial lighting, the potential for an increase in fire risk, increase in feral animal numbers and vehicle strike for vertebrate species.
Flora (FloraSearch 2011)	<ul style="list-style-type: none"> A loss of 397 hectares (ha) of predominantly native vegetation, including derived native grasslands. A loss of 13 ha of White Box, Yellow Box, Blakely's Red Gum Woodland EEC listed under the TSC Act, which is equivalent to the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grasslands CEEC listed under the EPBC Act. This 13ha forms part of the total 397ha removed as a consequence of the project. No significant increase in habitat fragmentation. A low potential for weed incursion into the high quality native bushland in Leard State Forest due to low soil fertility in the forest. A low likelihood of adversely affecting ground water dependent vegetation communities. Moderate potential for sporadic short term adverse effects of dust on native vegetation

	<p>close to the working open cut.</p> <ul style="list-style-type: none"> • A low risk of increased bush fire frequency. • The main potential cumulative long term impact of the Project is its contribution to the likely loss of most of the existing native vegetation on outcrop areas of the Permian Maule's Creek Formation. • A threatened flora assessment concluded that the Project has a low potential to adversely affect populations of <i>Diuris tricolor</i>, <i>Pomaderris queenslandica</i>, <i>Pultenaea setulosa</i> and <i>Thesium austral</i> that were assessed as having a moderate or high potential to occur in the study area.
Aboriginal Heritage (TCPL 2012)	The Project would result in the disturbance of 38 known Aboriginal Heritage sites and the possible disturbance of an additional site (due to its proximity to the proposed Project).
Soils (TCPL 2012)	<p>Potential impacts of the Project on soils would relate primarily to:</p> <ul style="list-style-type: none"> • Disturbance of in-situ soil resources within additional disturbance areas (e.g. extension of the open cut) • Alteration of soil structure beneath infrastructure items, hardstand areas and roads • Possible soil contamination resulting from spillage of fuels, lubricants and other chemicals; • Increased erosion and sediment movement due to exposure of soils during construction of mine infrastructure • Alteration of physical and chemical soil properties (e.g. structure, fertility, permeability and microbial activity) due to soil stripping and stockpiling operations.

Table 2-2: Vegetation communities to be disturbed for the Project and their associated biodiversity offset values (FloraSearch 2011)

Community Number	Vegetation Communities	Tarrawonga (Ha)	Willeroi (BOA) (Ha)	Offset Ratio (Ha)
<i>Endangered Ecological Communities</i>				
3	White Box - White Cypress Pine Grassy Woodland	5	23	4.6
3a	White Cypress Pine Regeneration	3	0	0.0
3b	White Box - White Cypress Pine Regeneration	2	0	0.0
3c	Derived Native Grassland	3	193	64.3
Total		13	216	16.6
<i>Other vegetation communities</i>				
1	White Cypress Pine - Narrow-leaved Ironbark ± White Box Shrubby Open Forest	189	128	0.7
1a	White Cypress Pine Regeneration	55	67	1.2
1b	Narrow-leaved Ironbark - White Cypress Pine ± White Box Regeneration	9	358	39.8
1c	Derived Native Grassland	25	15	0.6
Total		278	568	2.0
2	White Box - White Cypress Pine Shrubby Woodland	41	141	3.4
2a	White Cypress Pine Regeneration	0	233	-
2b	White Box - White Cypress Pine Regeneration	5	3	0.6
2c	Derived Native Grassland	0	5	-
Total			382	8.3
4	Pilliga Box - Poplar Box - White Cypress Pine Grassy Open Woodland	12	0	0.0
4c	Derived Native Grassland	33	0	0.0
Total		45	0	0.0
5	Bracteata Honey Myrtle Low Riparian Forest	15	27	1.8
Total		15	27	1.8
7	Silver-leaved Ironbark - Narrow Leaved Ironbark - White Box Shrubby Open Forest	0	157	-

Community Number	Vegetation Communities	Tarrawonga (Ha)	Willeroi (BOA) (Ha)	Offset Ratio (Ha)
7b	Narrow-leaved Ironbark - White Cypress Pine Regeneration	0	69	-
7c	Derived Native Grassland	0	34	-
Total		0	260	-
8	Yellow Box – Rough-barked Apple Grassy Woodland	0	14	-
8c	Derived Native Grassland	0	2	-
Total		0	16	-
9	River Oak – River Red Gum Riparian Forest	0	77	-
9c	Derived Native Grassland	0	12	-
Total		0	89	-
10	Rough-barked Apple Riparian Forb/Grass Open Forest	0	58	-
Total		0	58	-
TOTAL		397	1,660	4.1

3 Existing Biodiversity Values

Biodiversity values within the Project Area and the “Willeroi” Offset Area are summarised in **Section 3.1** and **3.2** respectively.

Further detail of the biodiversity values for the “Willeroi” Offset Area will be provided in Stage 2 of the BMP.

3.1 Project Area

A number of reserved areas are located in the region, including Leard State Forest, the Leard State Conservation Area, the Vickery State Forest (located approximately 10 km to the south-east) and Mount Kaputar National Park (located approximately 18 km to the north-east).

The project is situated on the southern boundary of Leard State Forest comprising MLs 1579, 1685 and 1693. The Leard State Forest is a Zone 4 community conservation area and covers a total area of 7,472 ha (*NSW Brigalow and Nandewar Community Conservation Area Act, 2005*) (TCPL 2012).

Ecological surveys that have been conducted within the locality comprise the following (from FloraSearch 2011; Resource Strategies and Cenwest Environmental Services 2011):

- Proposed East Boggabri Coal Mine – Flora Assessment of Proposed Mine Site (Geoff Cunningham Natural Resource Consultants 2005)
- Tarrawonga Coal Mine Modification - BioBanking and Threatened Species Assessment Report (Eco Logical Australia 2010)
- Continuation of Boggabri Coal Mine – Biodiversity Impact Assessment (Parsons Brinkerhoff 2010)
- Tarrawonga Coal Project - Fauna Assessment (Resource Strategies and Cenwest Environmental Services 2011)
- Proposed East Boggabri Coal Mine - Fauna Assessment (Countrywide Ecological Service 2005)
- Tarrawonga Coal Mine Modification (Appendix F) Biodiversity Assessment - BioBanking and Threatened Species Assessment Report (Eco Logical 2010)
- Maules Creek Coal Project - Ecological Assessment (Cumberland Ecology 2011).

3.1.1 Flora

A total of 363 plant species were identified during flora surveys conducted at Tarrawonga (TCPL 2012). This included 269 native species (approximately 74%) and 94 introduced species (approximately 26%).

Vegetation Communities

Six vegetation communities have been mapped as occurring within the Project Area (**Figure 3-1**). Of the vegetation communities mapped, five were identified as native vegetation communities (**Table 3-1**) and one as an anthropogenic community (cleared farmland) (TCPL 2012).

As part of the approved activities at Tarrawonga Coal mines, approximately 397 ha of native vegetation (**Table 3-1**) will be cleared. Approximately 145 ha of this area is located within the Leard State Forest, which equates to approximately 1.9% of its total area (TCPL 2012).

Table 3-1: Native vegetation communities in the Project Area

COMMUNITY NUMBER	COMMUNITY NAME	AREA (ha) ¹
1	White Cypress Pine - Narrow-leaved Ironbark ± White Box Shrubby Open Forest	278
2	White Box - White Cypress Pine Shrubby Woodland	46
3	White Box - White Cypress Pine Grassy Woodland	13
4	Pilliga Box - Poplar Box - White Cypress Pine Grassy Open Woodland	45
5	Bracteata Honey Myrtle Low Riparian Forest	15
TOTAL		397

¹ Excludes cleared land with introduced grasses

Threatened Ecological Communities

One vegetation community that occurs within the Project area, Box-Gum Woodland, is listed as an endangered ecological community (EEC) under both the NSW *Threatened Species Conservation Act, 1995* (TSC Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act). This community is listed as 'White Box-Yellow Box-Blakely's Red Gum Woodland Endangered Ecological Community' under the NSW TSC Act, and 'White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grasslands' Critically Endangered Ecological Community (CEEC) under the Commonwealth EPBC Act (TCPL 2012).

The remnants of Box-Gum Woodland EEC/CEEC in the Project area have been considerably disturbed and degraded by past land use practices including clearing of trees and shrubs, cropping and heavy grazing by domestic animals. Most of the areas mapped are derived grasslands (TCPL 2012).

Approximately 13 ha of Box-Gum Woodland EEC/CEEC will be cleared for the Project (**Table 3-2**).

Table 3-2: Box-Gum woodland EEC/CEEC in the Project area

Community Number	Community Name	Area (Ha)
3	White Box - White Cypress Pine Grassy Woodland	5
3a	White Cypress Pine Regeneration	3
3b	White Box - White Cypress Pine Regeneration	2
3c	Derived Native Grassland	3
8	Yellow Box – Rough Barked Apple Grassy Woodland	0
8c	Derived Native Grassland	0
TOTAL		13

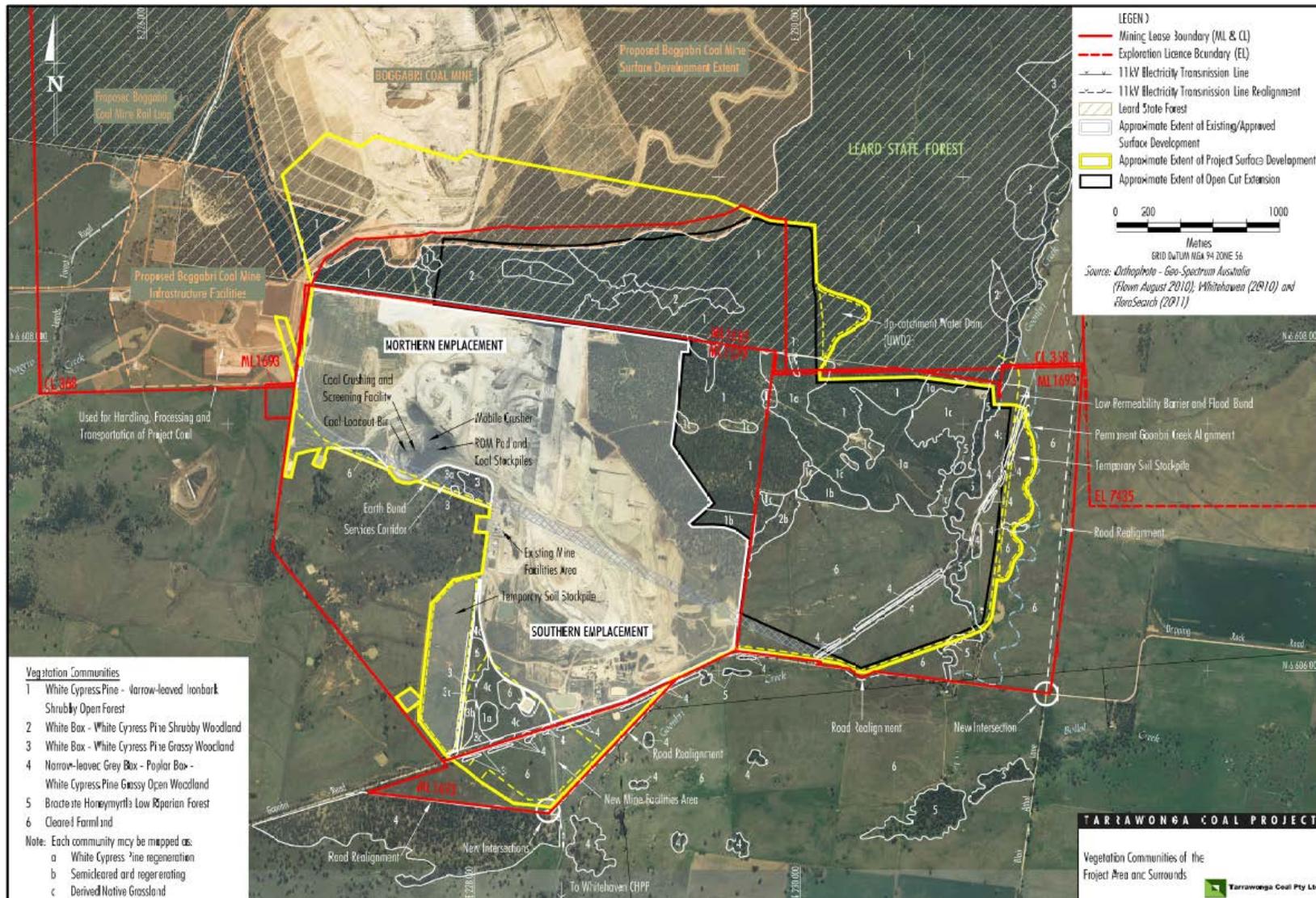


Figure 3-1: Vegetation communities of the project area and surrounds (TCPL 2012)

Threatened Flora

Targeted threatened flora surveys were undertaken in the Project area to identify potentially occurring threatened flora species, listed under the TSC Act and/or the EPBC Act. No threatened flora species were recorded, and no threatened flora populations listed under the TSC Act were considered relevant to the Project (TCPL 2012). Although no threatened flora species were recorded during these surveys, the EA considered there to be a medium to high likelihood for some species, based on habitat. In the event that threatened flora is identified during pre-clearance surveys, annual monitoring and/or chance observations notification will be made to respective agencies and mitigation measures developed to address any potential adverse impacts.

Introduced Flora and Noxious Weeds

Ninety-four introduced species have been recorded in the Project area; of these, nine are listed as noxious weeds under the *NSW Noxious Weeds Act, 1993*. These include (TCPL 2012):

- African Boxthorn (*Lycium ferocissimum*)
- Bathurst Burr (*Xanthium spinosum*)
- Blue Heliotrope (*Heliotropium amplexicaule*)
- Galvanised Burr (*Sclerolaena birchii*)
- Golden Dodder (*Cuscuta campestris*)
- Johnson grass (*Sorghum halepense*)
- Mexican Poppy (*Argemone ochroleuca*)
- Prickly Pear (*Opuntia stricta*)
- Spiny Burr grass (*Cenchrus spinifex* (syn. *C. incertus*).

None of the noxious weeds recorded were abundant within the Project area, although Prickly Pear was widespread. Bathurst Burr, Blue Heliotrope and Galvanised Burr were relatively common in Community 6, Cleared Farmland (TCPL 2012).

Critical Habitat

No critical habitat occurs within the locality of the Project as designated by the Register of Critical Habitat held by the Commonwealth Minister, Register for Critical Habitat as held by the Secretary of OEH, the Register of Critical Habitat held by the Secretary of the DPI (Fisheries or Aquaculture Branch) or identified within the *Narrabri Local Environment Plan 1992* (Narrabri LEP) (TCPL 2012).

Groundwater Dependent Flora

One vegetation community (Community 5 – Bracteata Honey Myrtle low riparian forest) that is considered groundwater dependant occurs along the 3 km long portion of Goonbri Creek that is located within the proposed open cut extension as per the EA and project approval. Approximately 15 ha of the community would be cleared during mining operations (TCPL 2012). This vegetation community also occurs to the north and south of the Project area. Condition 34 specifies performance objectives associated with the Goonbri Creek Diversion and Low Permeability Barrier. The EA also commits to restore/implement management measures for 3.2km section of creek line downstream of the realignment.

3.1.2 Fauna

A total of 190 vertebrate fauna species were recorded by Cenwest Environmental Services in 2011 in the Project area and immediate surrounds, including 181 native species (comprising one fish, 11 amphibians, 25 reptiles, 120 bird species and 24 mammal species), as well as nine introduced species. Goonbri Creek only recorded 1 species, which was exotic. Fauna values within the Project area are displayed in **Figure 3-2** and **Figure 3-3** and described in the following sections (TCPL 2012).

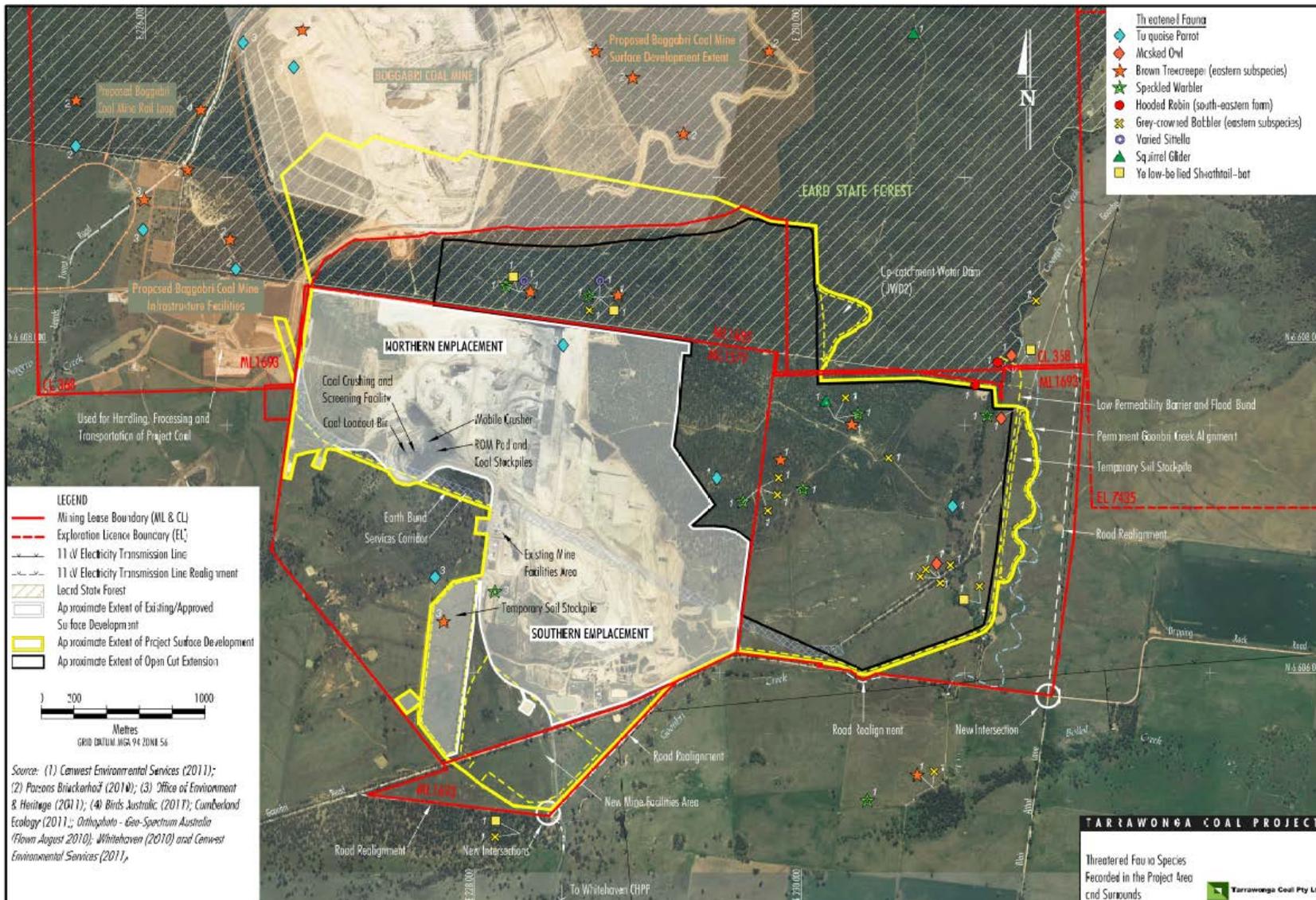


Figure 3-2: Threatened fauna species recorded in the project area and surrounds (TCPL 2012)

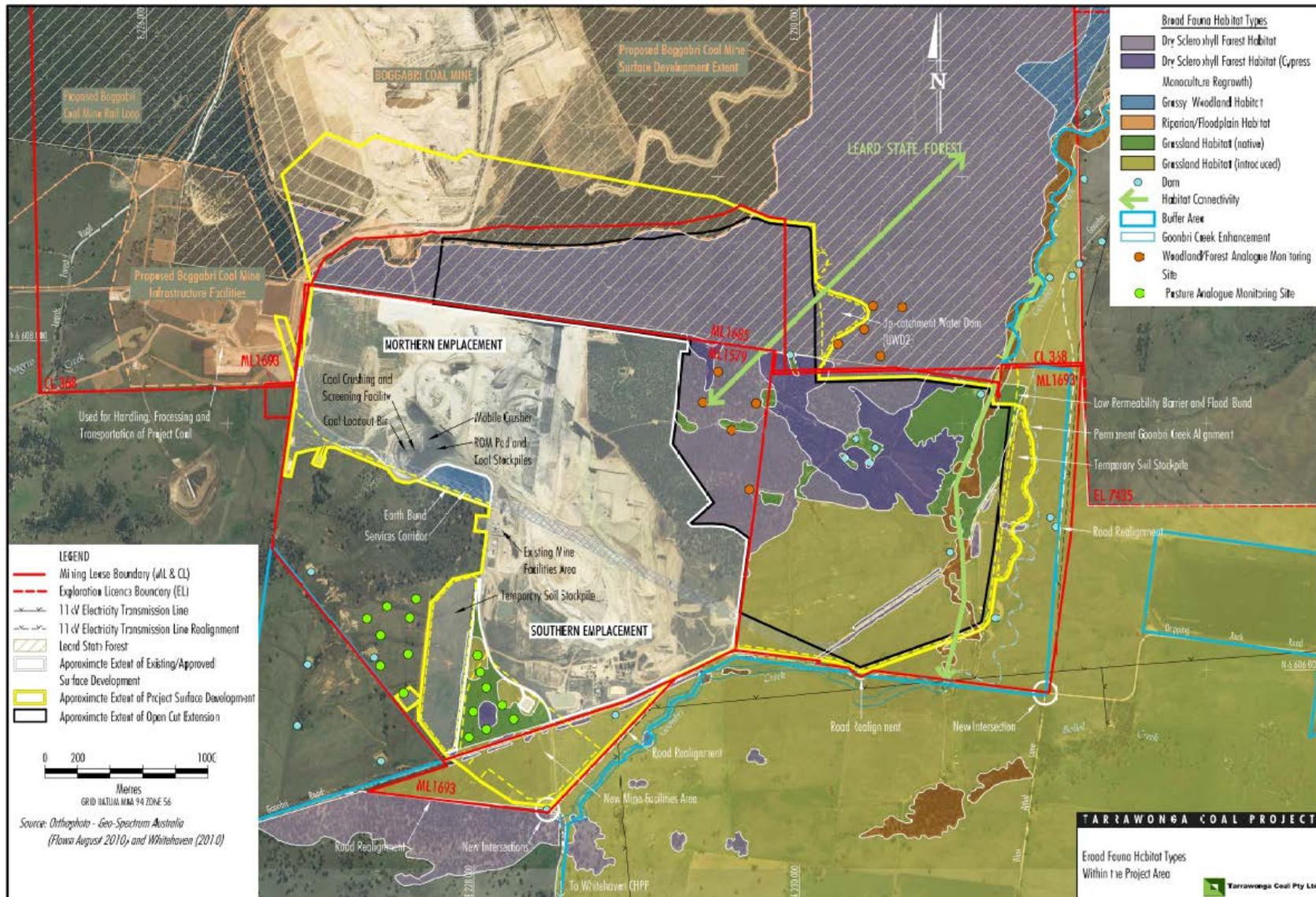


Figure 3-3: Broad fauna habitat types within the project area (TCPL 2012)

Fauna Habitat

Six broad fauna habitat types were identified in the Project area (TCPL 2012):

- Dry Sclerophyll Forest Habitat - The upper slopes, and an area south of ML 1685, contain dry sclerophyll forest habitat in reasonably mature formation, although it has previously been cleared and/or logged
- Dry Sclerophyll Forest Habitat (Cypress Monoculture Regrowth) - The dry sclerophyll forest habitat grades into this habitat type further down the slopes. It is dominated by White Cypress Pine (*Callitris glaucophylla*) with less habitat complexity than the dry sclerophyll forest habitat
- Grassy Woodland Habitat - A small area of this habitat type occurs near the existing mine facilities area
- Riparian/Floodplain Habitat - This habitat type occurs along the upper sections of Goonbri Creek in the Project area, to the north of ML 1693, and along other creeks in the locality
- Grassland Habitat - Agricultural land dominates the plains to the south and south-east where there has been almost a complete removal of tree and shrub cover. These lands mainly comprise introduced grassland habitat but some less-cultivated areas contain derived native grassland
- Farm Dams - A number of farm dams are located within the Project area and the immediate surrounds. These provide habitat resources for a range of vertebrate species.

Threatened Ecological Communities

The Aquatic Ecological Community in the Natural Drainage System of the Lowland Catchment of the Darling River EEC (Lowland Catchment of the Darling River EEC) is listed under the NSW *Fisheries Management Act, 1994* and includes *all native fish and aquatic invertebrates within all natural creeks, rivers, streams and associated lagoons, billabongs, lakes, anabranches, flow diversions to anabranches and floodplains of the Darling River within NSW* (TCPL 2012).

The Namoi River catchment is included in the listing of the Lowland Catchment of the Darling River EEC. Goonbri Creek is the nearest watercourse to the Project; the lower reaches traverse the Project area as an incised channel owing to the existence of a low landscape gradient (TCPL 2012).

Threatened Fauna

Nine threatened fauna species listed under the TSC Act have been recorded in the Project area. These comprise seven birds, one glider and one bat (**Figure 3-2**) (TCPL 2012):

- Turquoise Parrot (*Neophema pulchella*)
- Masked Owl (*Tyto novaehollandiae*)
- Brown Treecreeper (eastern subspecies) (*Climacteris picumnus victoriae*)
- Speckled Warbler (*Pyrrholaemus sagittatus*)
- Hooded Robin (south-eastern form) (*Melanodryas cucullata cucullata*)
- Grey-crowned Babbler (eastern subspecies) (*Pomatostomus temporalis temporalis*)
- Varied Sittella (*Daphoenositta chrysoptera*)
- Squirrel Glider (*Petaurus norfolcensis*)
- Yellow-bellied Sheath-tail-bat (*Saccolaimus flaviventris*).

The Black-chinned Honeyeater (eastern subspecies) (*Melithreptus gularis gularis*) was also recorded in the immediate surrounds during the surveys. All of these species, and eleven other threatened vertebrate fauna species, have been previously recorded within Leard State Forest: Spotted Harrier (*Circus assimilis*), Little Eagle (*Hieraaetus morphnoides*), Little Lorikeet (*Glossopsitta pusilla*), Barking Owl (*Ninox connivens*), Painted Honeyeater (*Grantiella picta*), Diamond Firetail (*Stagonopleura guttata*), Koala (*Phascolarctos cinereus*), Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*), Greater Long-eared Bat (south-eastern form) (*Nyctophilus timoriensis*), Large-eared Pied Bat (*Chalinolobus dwyeri*) and Eastern Cave Bat (*Vespadelus troughtoni*) (TCPL 2012).

There are also potential habitat resources in the Project area for an additional nine threatened fauna species listed under the TSC Act: the Grey Falcon (*Falco hypoleucos*), Square-tailed Kite (*Lophoictinia isura*), Glossy Black-cockatoo (*Calyptorhynchus lathamii*), Swift Parrot (*Lathamus discolor*), Superb Parrot (*Polytelis swainsonii*), Regent Honeyeater (*Anthochaera phrygia*), Spotted-tailed Quoll (*Dasyurus maculatus*), Eastern False Pipistrelle (*Falsistrellus tasmaniensis*) and Little Pied Bat (*Chalinolobus picatus*). The Square-tailed Kite was recently recorded flying over the Leard State Forest to the north of the Project area. For some of these species the limited habitat resources present in the Project area are unlikely to be sufficient to support a resident population (TCPL 2012).

No threatened species or ecological communities listed under the NSW *Fisheries Management Act, 1994* were considered to be relevant to the Project fauna assessment.

No threatened fauna species listed under the EPBC Act have been recorded in the Project area. The Greater Long-eared Bat (south-eastern form) and Large-eared Pied Bat are listed as 'Vulnerable' under the EPBC Act and are known from within Leard State Forest (mainly towards the north). The Swift Parrot, Superb Parrot, Regent Honeyeater and Spotted-tailed Quoll are also listed under the EPBC Act, but there have been no recorded local sightings of these species (TCPL 2012).

Migratory Species

Two migratory species were located during the survey, the Rainbow Bee-eater (*Merops ornatus*) and White-throated Needletail (*Hirundapus caudacutus*). A number of other migratory species are known to occur in the wider area (TCPL 2012).

Introduced Fauna

Nine introduced species were recorded during the survey. These included one fish (*Gambusia holbrooki*), one bird (Common Starling [*Sturnus vulgaris*]), and seven mammal species (Red Fox [*Vulpes vulpes*]; Brown Hare [*Lepus capensis*]; Rabbit [*Oryctolagus cuniculus*]; Black Rat [*Rattus rattus*]; House Mouse [*Mus musculus*]; Feral Pig [*Sus scrofa*]; and Feral Cat [*Felis catus*]) (TCPL 2012).

The Rabbit, Red Fox, Feral Cat and Feral Pig have been recorded during surveys undertaken in the Project area. The land clearance associated with the Project is likely to displace any resident foxes and cats. If not controlled, there is a potential for an increase in the pressure on native fauna in the Leard State Forest. Also, activities associated with the Project may provide increased refuge and scavenging resources (e.g. discarded food scraps) for these species, unless appropriately managed to discourage exotic animals (TCPL 2012).

Groundwater Dependent Fauna

All stygofauna that inhabit the portion of the aquifer within the Project area will be lost, as the open cut operation involves direct excavation into the alluvial groundwater systems. However, the alluvial groundwater system extends upstream, downstream and to the east of the planned open cut and is therefore likely to provide continuous habitat for stygofauna; that is, species that may occur within the open cut are also likely to occur outside it (TCPL 2012).

3.2 “Willeroi” Offset Area

The biodiversity offset area (BOA) for the Project comprises approximately 1,660 ha of freehold land that has been purchased by Whitehaven. The offset is situated approximately 20 km to the north-east of the Project and adjoins Mount Kaputar National Park to the south east. It is also directly south of an area proposed as a conservation area for the Maules Creek Coal Project. The offset area forms a part of the former “Willeroi” property (TCPL 2012). **Figure 3-4** and **Figure 3-5** provide the broad vegetation communities and habitat types in the BOA. **Table 3-3** provides a list of vegetation communities in the

BOA, and **Table 3-4** provides vegetation communities in BOA associated with the Box Gum Woodland EEC.

Table 3-3: Native vegetation communities in the biodiversity offset area

Community Number ¹	Community Name	Area (ha) ²
1	White Cypress Pine - Narrow-leaved Ironbark ± White Box Shrubby Open Forest	569.5
2	White Box - White Cypress Pine Shrubby Woodland	382
3	White Box - White Cypress Pine Grassy Woodland	216
5	Bracteata Honey Myrtle Low Riparian Forest	27.23
7	Silver-leaved Ironbark - Narrow Leaved Ironbark - White Box Shrubby Open Forest	260
8	Yellow Box – Rough-barked Apple Grassy Woodland	16
9	River Oak - River Red Gum Riparian Forest	88.46
10	Rough-barked Apple Riparian forb/grass Open Forest	58.76
TOTAL		1, 616

¹Vegetation Community 6 is cleared Farmland and is not considered to be a native vegetation community

²Excludes cleared land with introduced grasses

Table 3-4: EEC Associated Native vegetation communities in BOA .

Community Number	Community Name	Area (Ha)
3	White Box - White Cypress Pine Grassy Woodland	23
3a	White Cypress Pine Regeneration	0
3b	White Box - White Cypress Pine Regeneration	0
3c	Derived Native Grassland	193
8	Yellow Box – Rough Barked Apple Grassy Woodland	14
8c	Derived Native Grassland	2
TOTAL		232

The proposed biodiversity offset area is located within an OEH recognised 'high priority area', 'regional key fauna habitat' and climate change linkage as described and mapped in the *Wildlife Corridors for Climate Change – New England Tablelands and Nandewar bioregions – Landscape Selection Process, Connectivity for response to Climate Change* (TCPL 2012).

Two creek lines occur in the Project biodiversity offset area (Maules Creek and its tributary Teatree Gully). Approximately 13.5 km of Maules Creek and 6 km of Teatree Gully (its entire length) are located within the biodiversity offset (TCPL 2012).

The Project area supports a range of flora species known from the lower Western Slopes and Plains that are absent from the proposed biodiversity offset, primarily due to the difference in altitude between the two areas. Notwithstanding, the vegetation within the biodiversity offset area is considered an acceptable match for that within the Project area (TCPL 2012).

A range of vertebrate fauna species were recorded during surveys within the biodiversity offset area (**Figure 3-6**) with many similarities between the vertebrate species present in the Project area including, amphibians, reptiles, woodland and forest birds, and arboreal and ground dwelling mammals (TCPL 2012).

Further detail of the biodiversity values for the “Willeroi” Offset Area will be provided in Stage 2 of the BMP.

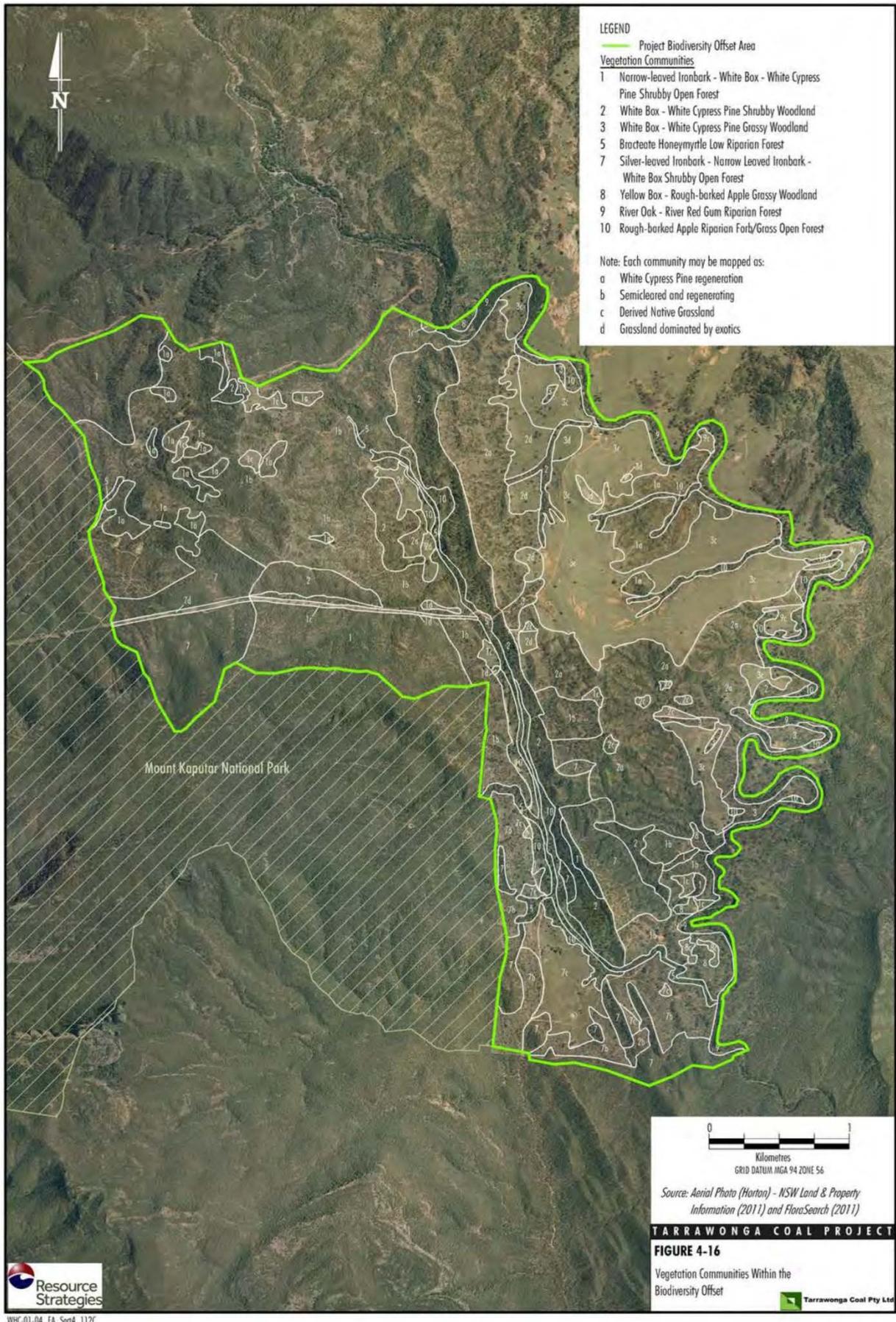


Figure 3-4: Vegetation communities within the biodiversity offset area (TCPL 2012)

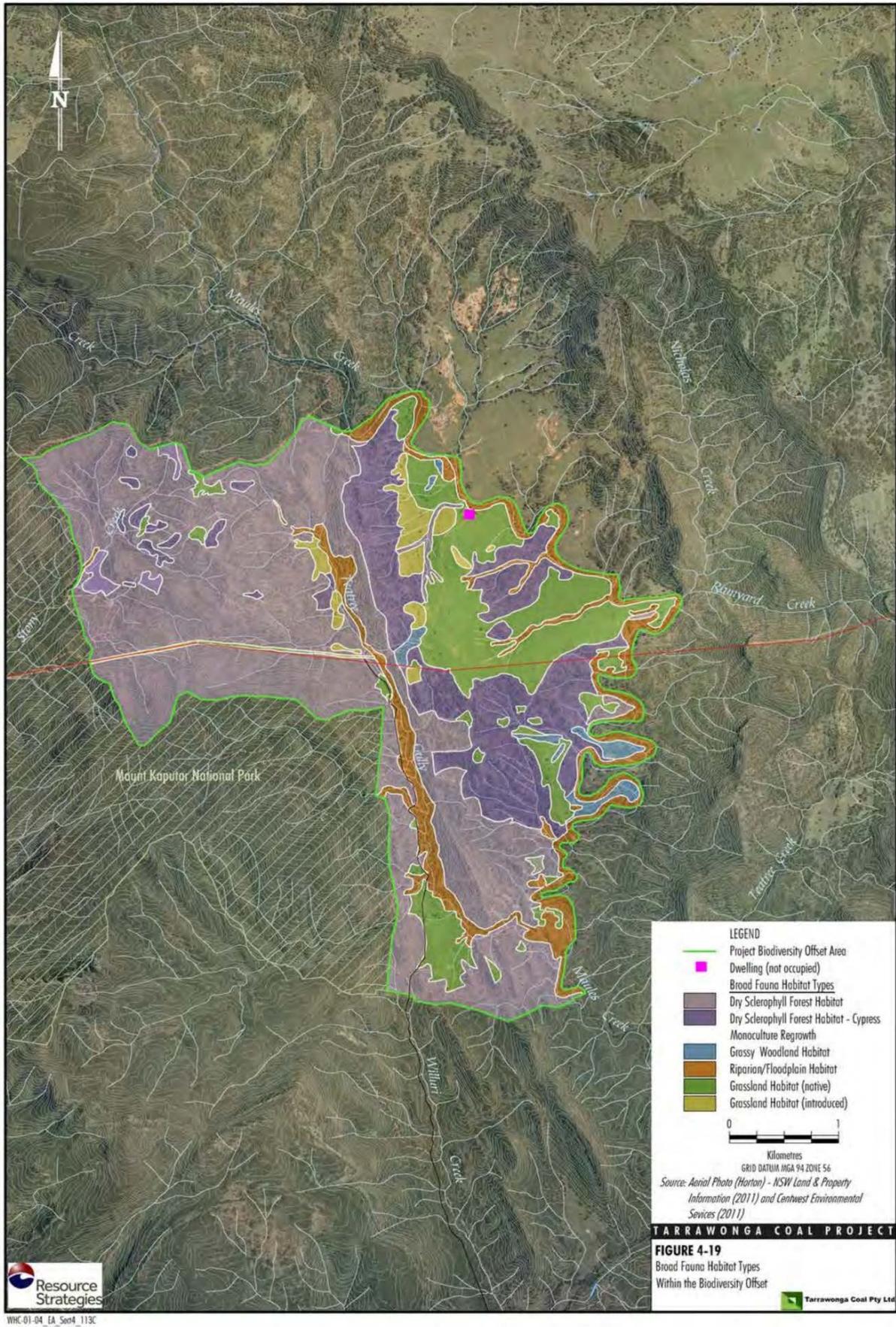


Figure 3-5: Broad fauna habitat types within the biodiversity offset area (TCPL 2012)

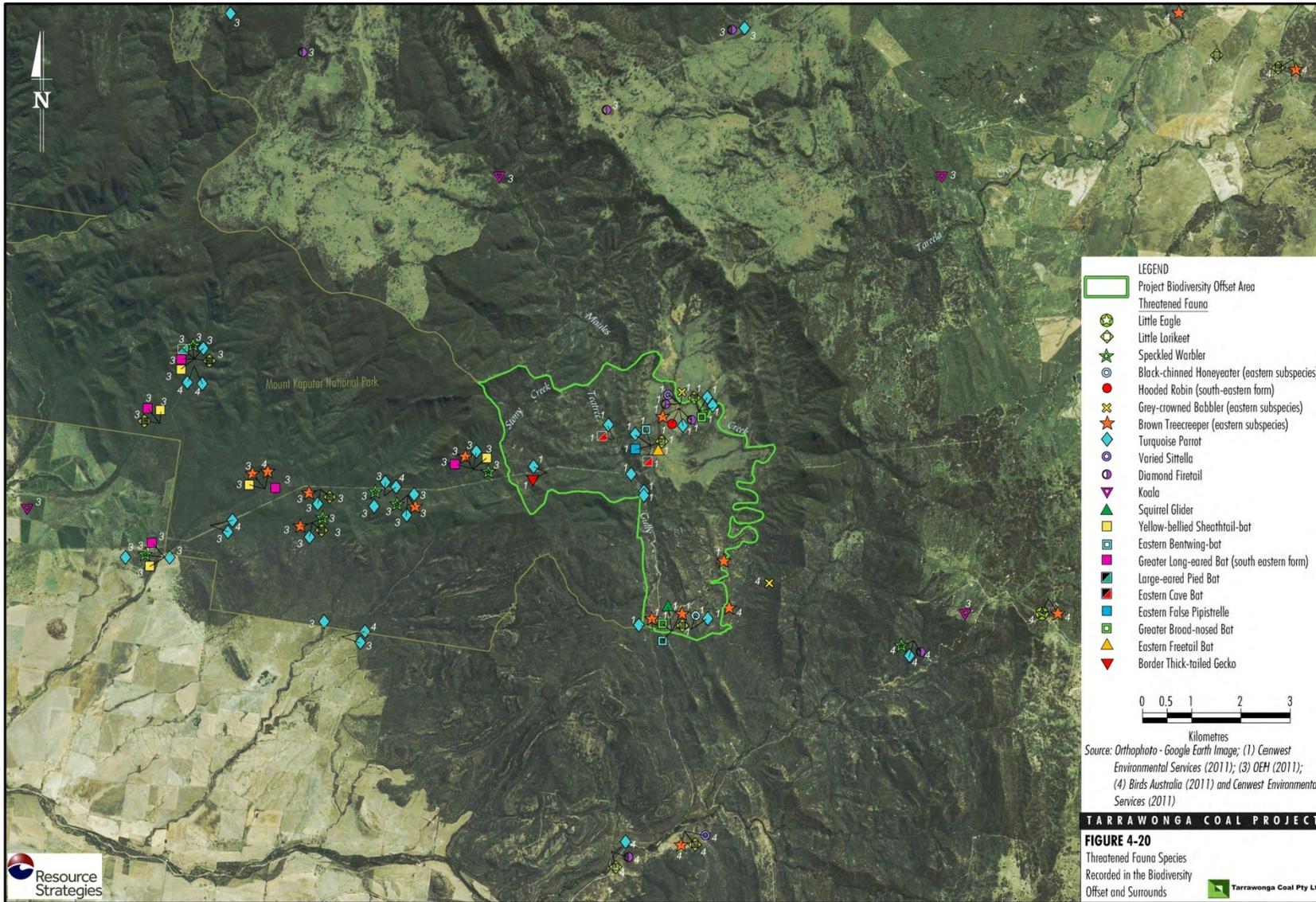


Figure 3-6: Threatened fauna species recorded in the biodiversity offset and surrounds (TCPL 2012)

4 Biodiversity Management within the Project Area

This section describes the management measures that will be implemented by WCL to manage remnant vegetation, maintenance and completed rehabilitation, Goonbri Creek and Farm Management areas of the Project. This section also includes performance and completion criteria which will be used to determine whether the objectives for biodiversity management have been met.

4.1 Enhancing the Quality of Existing Vegetation and Fauna Habitat

4.1.1 Aim

To maintain or improve the quality of the existing vegetation and fauna habitat within the Project area and outside of Project disturbance limits (refer **Figure 3.3**).

4.1.2 Management Strategies

- The Project BOA would result in the sterilisation of approximately 305ha of agricultural lands by returning this area to native woodland/open woodland. A Farm Management Plan, including baseline condition assessment, performance measures and review, will be developed by WCL to maintain or enhance agricultural production of non-operational project related land. This plan will encompass all non-operational project related land outside of ML 1579, ML 1693 and ML 1685. The FMP will incorporate the requirements of condition 66 of the project approval and those commitments made in the EA (s4.3.3 and s4.10.3). The preparation of the FMP will be commenced by end of June 2015 and implemented as soon as possible thereafter.
- The faunal value of suitable farm dams surrounding the Project area ie identified FMP area, will be improved by:
 - excluding livestock grazing
 - planting a range of submerged and fringing vegetation (rushes)
 - placing a partially submerged log in the dam for use by a variety of fauna
 - placing a log pile for refuge habitat on the dam shores
 - selective woodland tree plantings, including some shrub species.
- The permanent re-alignment of Goonbri Creek east of the proposed open cut extent would be designed to include restoration of flora characteristic of the existing vegetation community (refer **Section 4.1.3**)
- A nest box program will be implemented in the Leard State Forest and/or other identified locations within Project area (refer **Section 5**)
- Implement weed control measures (see **Section 4.7** below) to prevent the establishment and spread of weeds throughout the mining tenement.

4.1.3 Performance / Completion Criteria

- The progress and effects of measures to enhance the quality of existing vegetation and fauna habitat will be monitored and reported annually as part of the Annual Environmental Management Report (AEMR)/Annual Review.
- Commencement of revegetation in the riparian zone along 3.2 km of Goonbri Creek south of the Project area (refer **Figure 3-3**) will be undertaken following the completion of the Farm Management Plan (FMP). A Goonbri Creek Management Plan, referencing the FMP, will provide detail on the required works that will generally include revegetation works either side of the creek, using species characteristic of the Bracteata Honey Myrtle (*Melaleuca bracteata*) community, fencing of the creek to limit stock access and minor remedial earthworks.
- Performance and completion criteria will be prepared as part of the FMP.
- Adherence to Farm Management Plan.
- A report detailing the investigation of factors likely to enhance or impede the effective long term provision of suitable habitat(s) shall be submitted for approval by the Secretary. An implementation plan, including flora and fauna monitoring programs, will also be provided for

approval at the same time, to ensure delivery of suitable areas of viable habitat for the nominated species (being Speckled Warbler, Brown Treecreeper, Grey-crowned Babbler, Hooded Robin, Varied Sittella, Turquoise Parrot, Masked Own, Yellow-bellied Sheath Tail Bat and Squirrel Glider). This plan will then be incorporated into the revised Biodiversity Management Plan.

4.2 Restoring Native Vegetation and Fauna Habitat

4.2.1 Aim

To restore native vegetation and fauna habitat on the rehabilitation area through focusing on assisted natural regeneration, targeted vegetation establishment and introduction of naturally scarce fauna habitat features.

4.2.2 Management Strategies

- Ecosystem establishment within the rehabilitation area will be undertaken in accordance with the measures described in the Rehabilitation Management Plan that forms Appendix 3 of the approved Mining Operations Plan. The MOP sets performance indicators and completion criteria for mine rehabilitation.
- The disturbance areas will be progressively rehabilitated and revegetated to either native bushland and/or agricultural land.
- The rehabilitated areas shall be protected by the following measures:
 - Establishment and maintenance of perimeter fencing around the active mine site and rehabilitated areas to exclude stock.
 - Temporary fencing around tree lots on the re-created agricultural land. Fencing will be removed at the completion of mining or once the trees attain a height of 4 - 5 m and are not liable to damage from stock.
 - Permanent fencing of native bushland re-establishment areas to prevent stock access.
 - Exotic vertebrate pest control (see **Section 4.7**).
 - Fire protection (see **Section 4.10**).
 - Restriction of vehicles within revegetated areas.
- Revegetation of woodland/forest areas would include the planting of species characteristic of the local vegetation communities, including species from the Box-Gum Woodland EEC/CEEC (e.g. White Box overstorey as well as appropriate understorey) such as *Eucalyptus albens*, *E. melliodora* and *E. blakelyi*. Other species would include Bull-Oak (*Allocasuarina luehmannii*) and Belah (*Casuarina cristata*), and mallee tree species when appropriate. Additional typical species to be used in revegetation are described in the approved MOP.
- Irrigation shall be used to promote revegetation where practically possible.
- Hygiene protocols will be put in place to minimise the risk of plant diseases
- A Goonbri Creek Management Plan will be developed and implemented to describe the measures to revegetate the permanent Goonbri Creek alignment, including the revegetation of the low flow channel (within and approximately 40 m either side) using species characteristic of the Bracteata Honey Myrtle (*Melaleuca bracteata*) community. The design of the creek alignment will include in-stream and riparian habitats including the establishment of a pool-riffle system and wetland spaces.
- The use of supplementary habitat measures to provide suitable habitat, including the use of naturally scarce fauna habitat features will be undertaken by WCL (outlined in **Section 4.3.2**).
- Implement weed control measures (see **Section 4.7**) to prevent the establishment and spread of weeds throughout the mining tenement.
- Pre-clearance surveys, including for likely threatened flora species, will be undertaken prior to clearing activities by a suitably qualified ecologist. If new threatened species are found OEH will be notified and consulted on potential mitigation options prior to clearing. These surveys will follow the Land Disturbance Protocol (**Appendix B**).

4.2.3 Performance / Completion Criteria

- The Rehabilitation Management Plan provides the details in regards to the performance measures for rehabilitation of disturbed areas following, including **Table 4-1**.
- Native vegetation species associations are established in accordance with the typical species mix and tubestock and seed planting density specifications.

- Vegetation is consistent with the mean percentage across analogue sites (refer **Figure 3.3**). Use of analogue sites is described in **Section 8.2.1** of the approved MOP.
- Minimum tree height and girth standards for selected indicator species of the vegetation association are within the range of analogue site benchmarks at 1, 5 and 15 years.
- Canopy cover is within the range of analogue sites for the vegetation association at 1, 5 and 15 years.
- Species are capable of setting viable seed, flowering or otherwise reproducing.
- Vegetation develops and maintains a litter layer evidenced by a consistent mass and depth of litter over subsequent seasons.
- Rehabilitation of 752 ha of the woodland/forest post-mine landform.
- A report detailing the investigation of factors likely to enhance or impede the effective long term provision of suitable habitat(s) shall be submitted for approval by the Secretary. An implementation plan will also be provided for approval at the same time, to ensure delivery of suitable areas of viable habitat for the nominated species (being Speckled Warbler, Brown Treecreeper, Grey-crowned Babbler, Hooded Robin, Varied Sittella, Turquoise Parrot, Masked Own, Yellow-bellied Sheath Tail Bat and Squirrel Glider). This plan will then be incorporated into the revised Biodiversity Management Plan.
- Short to mid term (1, 5 and 15 years) performance criteria for height, girth and canopy cover are described in the RMP.
- Long-term performance criteria are provided in **Table 4-1**.

Table 4-1: Performance criteria for restoration of native vegetation and fauna habitat (TCPL 2012)

Timing	Performance Criteria
Long-term (greater than 17 years)	The final landform and revegetation program will provide for approximately 752 ha of native woodland/forest areas, including the planting of species characteristic of the local vegetation communities.

4.3 Maximising the Salvage of Resources

4.3.1 Aim

To maximise the salvage of resources within the approved disturbance area, including vegetative, top and sub soils and cultural heritage resources, for beneficial reuse in the rehabilitation area.

4.3.2 Management Strategies

Selective Soil Stripping

- Soil resource management will be undertaken in accordance with measures provided in the RMP.
- Identify and quantify potential soil resources for rehabilitation.
- Depth for soil stripping for the disturbance area are as follows (**Figure 4-1**):
 - Cleared creek flats (relatively recent alluvium; Stratic Rudosols), there is potential to collect soil (from an average depth of 3 m) with the high quality soil to be used as topdressing material for agricultural post-mining land use, following treatment with coarse-grade gypsum (approximately 80 ha total).
 - Sub-sections of the vegetated areas in the north of the Project site have soil conditions that allow a cut of 0.25 m (approximately 30 ha total).
 - Due to major subsoil constraints, a cutting depth of 0.10 m is recommended elsewhere in the remaining Project disturbance areas (approximately 405 ha). These soils could be used for woodland/forest rehabilitation (McKenzie Soil Management 2011).
 - In addition to the high quality soil resources described above, large volumes of other soils could be used in rehabilitation without amelioration to provide conditions suitable for the native woodland/forest. This additional soil could be obtained from the Class 3 Agricultural Suitability areas that are not Stratic Rudosols to a depth of approximately 1 m.

- Areas of disturbance will be stripped progressively to reduce potential erosion and sediment degeneration, and to minimise the extent of topsoil stockpiles and the period of soil storage.
- Areas of disturbance requiring soil stripping will be clearly defined following vegetation clearing.
- Topsoil and subsoil stripping during periods of high soil moisture content (i.e. following heavy rain) will be avoided to reduce the likelihood of damage to soil structure.
- Stripped soil will either be directly re-emplaced in rehabilitation areas or stockpiled for future reuse. Preference will be given to placing subsoils and topsoil (in reverse stripping order) directly onto re-contoured areas.
- Subsoils and topsoils will be characterised prior to re-spreading to determine the type and application rates for any required soil ameliorants (e.g. lime, gypsum, fertiliser and organics) to maximise the availability of soil reserves for rehabilitation works.
- Erosion and sediment control measures will be installed prior to the commencement of soil stripping and rehabilitation activities. Erosion control measures, including the management of soil stockpiles, are outlined in **Section 4.8**.

Vegetation and Habitat Salvaging

- A selection of hollow-bearing trees, hollow-bearing logs, woody ground debris, and rocks will be salvaged for reuse in rehabilitation areas. Such materials vary in quality and quantity among different parts of the Project Area. Whilst some woody materials provide a valuable habitat resource for native fauna, others are not suitable for salvage because they are structurally unsound and/or decayed to the extent that they may not survive felling, translocation and replacement on the recipient site.
- The following method will be applied during both Stage 1 and 2 clearing, to rationalise the salvage of habitat resources to ensure that key habitat resources are retained and utilised in rehabilitation and offset areas (where appropriate).

i. Quantifying the Habitat Resource for Replication at Recipient Sites

Prior to clearing, 20 x 50 m plots will be surveyed in each vegetation type to quantify the habitat resource.

The number of plots per vegetation type will be commensurate with the area of clearing to be undertaken.

Within these plots the following information will be recorded as a minimum:

- photographs;
 - GPS location;
 - numbers of tree hollows;
 - size class of tree hollows;
 - species of trees;
 - percentage cover of bush rocks; and
 - length of fallen logs (>200 mm diameter).
- This data will be used to inform the types and densities of resources to be relocated to recipient sites.

ii. Selection Criteria for Salvage Material

Prior to clearing, suitable salvage items will be identified, recorded, flagged with marking tape, and marked with a large (>1 m) "S" using spray paint on two sides if a tree. The following criteria will be applied as part of the selection process:

Hollow trees will be considered for salvage based on structural integrity, number and size of hollows. Hollows to be salvaged will include a range of diameter sizes. Ideally, hollows should be in trunks or solid living branches to maximise the chance that they would survive the felling process. Trees will be favoured if single stemmed to ensure that they would remain intact during felling. Stags (dead trees) will be selected if they appear solid and have good hollows in the trunk.

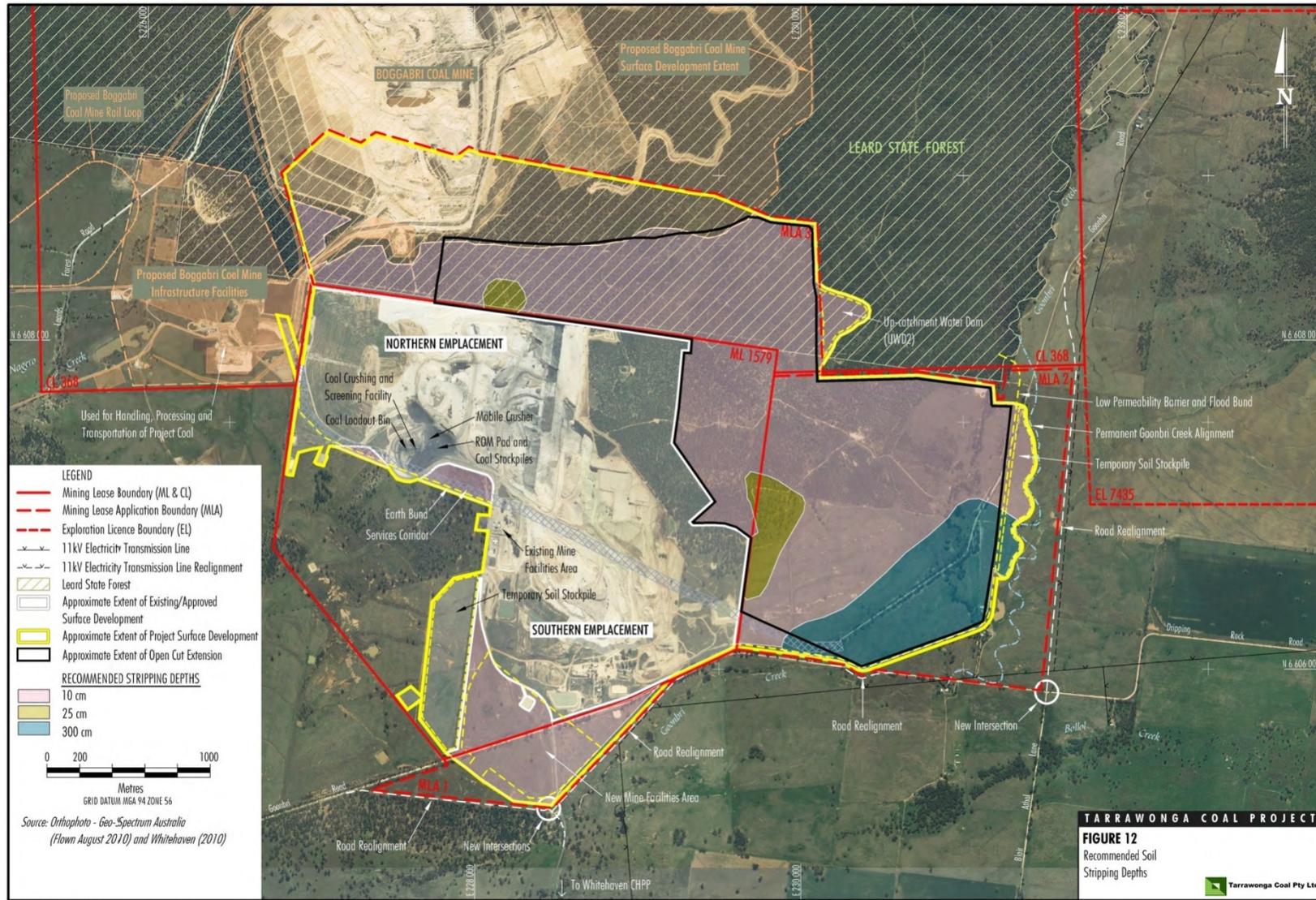


Figure 4-1: Recommended soil stripping depths (McKenzie Soil Management 2011)

Trees and fallen logs without hollows. It is also intended that a number of trees without hollows, or large logs in good condition, will be collected for retention in addition to those marked by ecologists during pre-clearing. As these trees/logs do not require identification by ecologists, they can be selected at random during clearing and stock-piled to provide additional habitat features in rehabilitated land.

Large flat or creviced rocks (>500 mm width) that appear solid enough to survive translocation will be considered for translocation to rehabilitation or offset sites. In areas where few hollow trees or logs are present, most of the habitat features are likely to be marked for collection. In areas where hollows and logs were abundant, only those with significant value as habitat features (as described above) will be marked for retention as habitat. All habitat features selected for salvage will be fully itemised within the Habitat Resource Recovery Inventory.

- All cleared vegetation, with the exception where practicable of areas that have Cypress Pine as the dominant species, not retained for habitat augmentation is mulched on site and mixed into topsoil as a soil conditioner. Cypress Pine will be mulched and stockpiled separately for future use.
- The ground-layer vegetation and low shrubs will be incorporated into the topsoil when it is stripped to assist rehabilitation by increasing the seed bank and organic matter within the stockpiled soil.

Salvaging of Cultural Heritage Resources

- Refer to the Cultural Heritage Management Plan for procedures for the salvage of known sites and management of new sites found within the disturbance footprint.
- Personnel conducting pre-clearing inspections will undertake inductions that include identification of potential artefacts, particularly culturally modified trees; and be supported by advice from appropriately experienced and qualified archaeologists.
- Seed collection strategies (refer **Section 4.4**) will incorporate consideration of traditional plants used by the Aboriginal community to facilitate reintroduction into rehabilitation areas.
- The BTM Aboriginal Heritage Conservation Strategy has been developed by Tarrawonga Coal, Boggabri Coal and Maules Creek Coal. This strategy aims to enhance and conserve Aboriginal cultural heritage values (both cultural & archaeological) and provide for their long term protection and management. The Strategy has not yet been approved by DP&E.

4.3.3 Performance / Completion Criteria

- The progress and effects of salvaging and reusing habitat resources are monitored annually.
- Topsoils and subsoils are mapped and soil resources for Agricultural and Woodland land-uses are selectively stripped and managed.
- Habitat features (hollow bearing logs, felled timber and large rocks) are salvaged during pre-stripping operations.
- Photographic evidence and documentation of salvaging resources and reusing in the rehabilitation area for beneficial reuse is to be monitored and reported annually as part of the Biodiversity Monitoring Program.

4.4 Collecting and Propagating Seed

4.4.1 Aim

To maintain the biodiversity values of the site through seed collection and propagation and to ensure that the areas of revegetation are genetically comparable with those in the surrounding woodland areas.

4.4.2 Management Strategies

Seed collection and propagation will take place in accordance with the protocols summarised below:

- TCPL will arrange for the collection of seed at the site at appropriate times after flowering.
- The seed collection program will be aimed at producing the maximum quantity and quality of seed incorporating the correct degree of maturity for maximum germination.
- Species targeted for seed collection will reflect those identified in the typical species mix and include identification and collection of traditional plant species where practicable.
- Trees will not be felled solely for seed collection reasons. Where trees are cleared for mining purposes, available seed will be collected. Wherever practicable, tree felling will be timed to coincide with maximum seed load (but avoiding times when native fauna would be using trees for roosts, nests).
- Seed collection undertaken to date has involved hand collection from the ground and collection from felled trees; however, a variety of additional seed collection techniques may be adopted, including:
 - For plants with a low density of occurrence, collection may require the placing of bags over the flowers after pollination. Alternatively, dropped seed may be collected by placing plastic on the ground below.
 - Seed from small plants close to the ground could be collected by machine harvesters or hand picking/pruning.
 - Seed pods from the upper and middle portions of the crown of trees are more desirable as they tend to be of better quality. Collection techniques for trees may include cherry picker, ladder or hoist attached to a vehicle, long handled pruners, rope saw, etc.
 - For grasses and other groundcover species, use of a forage harvester to collect seed and mulch material after seed maturity and the direct placement of this material on the post-mining landscapes is an appropriate means of collection and transferral of seed where safe machine access is possible.
- Seed handling and storage varies with the type of seed and will require specialised techniques and equipment. This task will be contracted to the personnel undertaking seed collection and/or propagation works.
- Seedling propagation activities will be undertaken by personnel who are experienced in the propagation of native species.
- TCPL will advise the nursery / propagation contractor of its rehabilitation requirements (in terms of area) sufficiently in advance of the programmed planting time to enable seedling propagation, hardening-off (if required) and planting each year.
- Planting will preferentially be undertaken in the Autumn period on previously established ripelines followed by mulching around each seedling.
- Procedures for sowing seeds and planting densities for tubestock are outlined in the RMP.

4.4.3 Performance / Completion Criteria

- Monitoring of plant flowering and seeding cycles by the seed collectors and their establishment of a comprehensive database and detailed strategy.
- Adaptive management undertaken and documented if required.

4.5 Minimising the Impacts on Fauna

4.5.1 Aim

To minimise the impacts on fauna within the Project Area, including undertaking pre-clearance surveys.

4.5.2 Management Strategies

- Some potential impacts have been avoided/reduced through refinement of the mine design, and other impacts are likely to be mitigated by progressive rehabilitation as well as local habitat restoration, management and supplementation strategies.
- Residual impacts will be addressed by the long-term conservation and enhancement of significant areas of fauna habitats in the offset area that can be enhanced by appropriate management and/or the creation of significant areas of fauna habitat resulting from the revegetation programme.
- Progressive backfilling of the open cut mine voids instead of only out-of-pit dumping to avoid additional native vegetation clearance.

- Land clearance for the Project will be undertaken progressively, and the area cleared at any particular time would be no greater than that required to accommodate the mine's needs for the following twelve months.
- Areas requiring clearing will be clearly delineated with high visibility survey tape/markers, purpose of which to be communicated to relevant ecologists and machinery operators, and would be restricted to the minimum area necessary to undertake the approved activities.
- Clearing will be subject to a pre-clearance survey by an appropriately qualified ecologist to ensure clearing activities are managed to minimise impacts on fauna. The Land Disturbance Protocol will be implemented for clearing activities in accordance with **Appendix B** of this BMP.
- A two stage clearing approach will be employed to minimise impacts on possible fauna in identified habitat trees, with these trees retained for a minimum period overnight prior to commencing 2nd stage clearing. Stage 2 habitat trees will be shaken prior to felling. Where possible trees will be lowered slowly to the ground. Felled trees will be inspected for fauna and retained overnight to provide time for remaining fauna to vacate hollows, should they be identified.
- Removal of vegetation will be restricted to a clearing window of 15 February to 30 April – this includes all contiguous vegetation within project boundary, inside and outside of the Leard State Forest.
- Clearing will cease when temperature exceeds 35°C (averaged over a 15 minute period),
- Under exceptional circumstances minor removal of vegetation may be undertaken outside the 15 February to 30 April period with the prior written consent of the Secretary including identifying specific mitigation measures for breeding/ nesting of target fauna species recorded or likely to occur.
- Suitably trained or qualified person(s) will be present during the felling of identified hollow bearing trees to provide assistance with the identification, and if necessary, rescue and care of any injured fauna.
- The species, number and condition of fauna identified during clearing activities will be recorded and a summary provided in the Annual Environmental Management Report (AEMR)/Annual Review.
- The chainsaw felling and/or bulldozing of larger vegetation to just above the ground to minimise soil disturbance. Groundcover will be retained and subsequently collected when the topsoil is stripped.
- The location of suitable nearby habitat for the release of fauna that may be encountered during the pre-clearing process will be identified and marked on a map.
- Updated maps/plans, pre-determined habitat for the release of fauna, habitat features present in the site and recommended clearing procedures will be submitted to the EO and shall be recorded and signed off in the Land Disturbance Protocol (**Appendix B**) form.
- Translocation of fauna will not be undertaken unless appropriate licences, including agreed translocation strategy, have been obtained from OEH. Although unlikely, if a Koala is found, it will be left to move away from the clearance area on its own accord.
- Radio tracking of suitable species to be translocated will be undertaken. In the first few years of pre-clearing and clearing surveys, information (such as capture rates and types of fauna captured) will be collected to determine which species are most suitable for use in a tracking program. Prior to implementation of the tracking program, consultation with OEH and other relevant regulators will be undertaken.
- The salvage of cleared trunks, logs, branches, small stumps and roots will be transferred directly to an area that has been prepared to the post mining landform, or alternatively stockpiled for later use in the rehabilitation.
- The salvage of hollow tree trunks and branches will be placed on rehabilitated areas to provide fauna habitat.
- Pre-clearance surveys of ancillary infrastructure areas (e.g. water management structures, monitoring equipment areas) for threatened flora species will be undertaken. Relocation (if practicable) of ancillary infrastructure areas (e.g. water management structures, monitoring equipment) should be considered to avoid any threatened species.
- Feral animal and weed control shall be undertaken in accordance with **Section 4.7**.
- The use of pesticides and herbicides will be limited in native habitat.
- Adequate noise and dust management, controlling the use of artificial lighting and fire management will also assist in minimising the impact on fauna within the Project Area. Lighting

strategies/control measures to minimise potential artificial lighting impacts will include the use of unidirectional lighting fixtures and light shrouds and reflectors to minimise the spill of lighting.

- The on-site speed limit of 60 km/hr will continue to be applied to new haul roads and internal roads.
- Firewood collection will not be permitted.

4.5.3 Performance / Completion Criteria

- Documenting and reporting in accordance with the Land Disturbance Protocol to verify that clearing has been undertaken in accordance with the measures described above and **Appendix B**.
- The species, number and condition of fauna identified during clearing activities would be recorded and a summary provided in the Annual Environmental Management Report (AEMR)/Annual Review.

4.6 Managing Salinity

4.6.1 Aim

To manage the impacts of salinity of soils and water from impacting on biodiversity values.

4.6.2 Management Strategies

- Overburden and interburden will be characterised prior to emplacement in waste dumps to ensure the final outer surfaces of the overburden emplacements (and structures such as drainage elements) are constructed with suitable non-sodic or low sodicity material where possible.
- Any sodic materials that may be exposed or near-surface will be ameliorated (e.g. treated with gypsum) to minimise dispersivity
- Irrigation activities of pasture areas will be undertaken to maximise evapo-transpiration but avoid surface runoff to minimise the risk of impacts on downstream water resources
- Conduct soil and inter/over burden testing for salinity and sodicity in rehabilitation areas. Any material identified as being saline/sodic shall be treated in-pit or in emplacement areas
- Water quality monitoring of sites on Goonbri Creek shall continue to be undertaken on an event based frequency
- Implement and review the soil management protocols (refer **Section 6.4.2** of the RMP and **Section 2.4.2** of MOP) that includes requirements for soil surveys, assessments of soil suitability for mine rehabilitation and calculation of annual soil balances,

4.6.3 Performance / Completion Criteria

- Soil tested for chemical properties, including salinity.
- Salinity down the soil profile is within the range of analogue sites at year 5.
- Rehabilitation completion criteria is met
- No unregulated discharge of saline water from the Project Site.

4.7 Controlling Weeds and Feral Pests

4.7.1 Aim

To prevent and control weed and feral animal populations within the Project Area and adjoining land.

4.7.2 Management Strategies

Weed Control

- Weeds from topsoil stockpiles will be scalped prior to re-spreading in rehabilitation areas.
- Maximising the retention of ground cover (cover crop stubble) when planting tubestock to minimise opportunities for weed activity.
- Regular inspections (at least monthly) of revegetated areas and other parts of the mining tenements, including areas proposed to be cleared, will be undertaken to identify and demarcate areas of noxious and environmental weeds. These inspections will include

comparison to previous inspection findings to assess programs effectiveness against performance criteria, **Section 4.7.3**.

- Mechanical removal and/or the application of approved herbicides in areas identified as being affected by weeds (in accordance with the *Pesticides Act 1999*).
- Appropriate herbicide application methods (spot-spraying, basal spraying, stem injection or cut and paint methods) will be used to minimise the amount of herbicide used. The method of application will be determined on a case by case basis.
- Follow-up site inspections to evaluate the effectiveness of weed control programs.
- Follow-up weed control in previously treated areas where weed management has been sub-optimal
- Minimise the potential for seed and organic matter transport to or from the rehabilitation area by ensuring all plant and equipment are weed free (via inspection of vehicles and plant and use of the site's vehicle wash bay).
- Focused weed management/suppression measures will be undertaken on stockpiles, roadsides and disturbance areas.
- Regular liaison with local landholders and relevant government agencies to monitor the spread and management of weeds within the local area.

Feral Animal Control

- Trapping and/or baiting of animal pests (e.g. Rabbits and Red Foxes), in accordance with the requirements of the Livestock Health and Pest Authorities
- Follow-up site monitoring eg spotlighting/cameras, to determine the effectiveness of trapping and/or baiting programs.
- Annual review of the feral species management program based on the results of monitoring of the revegetation areas for the presence of feral species.
- Development of a Vertebrate Pest Management program to occur in consultation with OEH and any relevant stakeholders (ie. local landholders). The proposed strategy would include:
 - Shooting feral goats using a high powered (calibre) rifle as humanely as possible (i.e. a single shot to the head)
 - Joint aerial control of feral goats with OEH
 - Fox baiting using 1080 poison or Pindone baits with safety precautions. Fox control will be undertaken through baiting programmes as necessary. Fox control should be undertaken in autumn, when young foxes are leaving the den and dispersing and in spring, when foxes are breeding
 - Rabbit baiting (as per fox) with warren destruction if found.

4.7.3 Performance / Completion Criteria

- Reduce weed and feral animal populations if there is an existing problem.
- Weed species presence and densities are monitored and control programs implemented when population size and/or distribution become problematic, in the view of the relevant authority (LLS), to achievement of environmental objectives. Control programs will be considered effective when vertebrate species populations are returned to being non-problematic.
- Faunal exclusion fencing is installed to exclude vertebrate pest species from rehabilitation areas / juvenile vegetation.
- Vertebrate pest species presence and densities are monitored, and control programs implemented when population size and/or distribution become problematic, in the view of the relevant authority (LLS), to achievement of environmental objectives. Control programs will be considered effective when vertebrate species populations are returned to being non-problematic.
- Monitoring results and any control activities will be reported in the Annual Environmental Management Report (AEMR)/Annual Review.

4.8 Controlling Erosion

4.8.1 Aim

To control soil erosion and sediment generation close to the source and minimise the potential for erosion to adversely affect remnant vegetation and habitat on the site (include aquatic habitats).

4.8.2 Management Strategies

- Erosion and sediment control plans will be developed over the life of the Project as part of the Water Management Plan (WMP). The WMP will describe the specific controls (including locations, function and water monitoring structure capacities) that will be used to minimise the potential for soil erosion and transport of sediment off-site. The WMP will be updated periodically to meet the particular changes to the Project over the life of the mine. All erosion and sediment control storages will have sufficient capacity to manage disturbed area runoff in accordance with design criteria recommended in the Landcom (2004) guidelines.
- Approved drainage and sediment and erosion controls will be implemented progressively, including sediment basins and contour banks
- General soil resource management practices will include the stripping and stockpiling of soil resources prior to any mine-related disturbance for use in rehabilitation, including.
 - Identify and quantify potential soil resources for rehabilitation
 - Optimise the recovery of useable topsoil and subsoil during stripping operations
 - Manage topsoil and subsoil reserves so as not to degrade the resource when stockpiled
 - Establish effective soil amelioration procedures to maximise the availability of soil reserves for future rehabilitation works
 - Disturbance areas will be stripped progressively in order to reduce sediment generation and the extent of topsoil stockpiles, and to enable use of stripped topsoil as soon as possible for rehabilitation.
- Erosion and sediment control measures will be installed prior to the commencement of soil stripping and rehabilitation activities.
- Areas of disturbance will be stripped progressively, as required, to reduce potential erosion and sediment generation, and to minimise the extent of topsoil stockpiles and the period of soil storage.
- Areas of disturbance requiring soil stripping will be clearly defined following vegetation clearing.
- Cover crops will be planted on newly rehabilitated mine landform areas as soon as possible after completing earthworks.
- New infrastructure disturbance areas (e.g. road and dam embankments) will be stabilised as soon as possible by topsoiling and seeding.
- Topsoil and subsoil stripping during periods of high soil moisture content (i.e. following heavy rain) will be avoided to reduce the likelihood of damage to soil structure.
- Any long-term soil stockpiles will be managed to maintain long-term soil viability through the implementation of the following management practices:
 - Topsoil and subsoil stockpiles will be retained at a height of 3 m, with slopes no greater than 1:2 (vertical to horizontal [V:H]) and a slightly roughened surface to minimise erosion
 - Topsoil stockpiles will be constructed to minimise erosion, encourage drainage, and promote revegetation
 - Where additions such as lime, gypsum and fertiliser are needed to improve the condition of cut soil, they will be applied to the stockpiles in-between the application of separate layers from the scrapers
 - Wherever practicable, soil will not be trafficked, deep ripped or removed in wet conditions to avoid breakdown in soil structure
 - All topsoil and subsoil stockpiles will be seeded with a non-persistent cover crop to reduce erosion potential as soon as practicable after completion of stockpiling
 - Where seasonal conditions preclude adequate development of a cover crop, stockpiles will be treated with a straw/vegetative mulch to improve stability
 - Soil stockpiles will be located in positions to avoid surface water flows. Silt stop fencing will be placed immediately down-slope of stockpiles until stable vegetation cover is established

- An inventory of soil resources (available and stripped) on the Project site will be maintained and regularly reconciled with rehabilitation requirements
- In preference to stockpiling, wherever practicable, stripped topsoil and subsoil will be directly replaced on completed sections of the final landform.

4.8.3 Performance / Completion Criteria

- Surface Water Management Plan is developed and implemented, including erosion and sediment control plans. Periodic review of these plans is undertaken regularly.
- Sediment control structures are in accordance with the relevant site management plans and standards.
- Erosion and sediment control measures meet the requirements of the Landcom (2004) guideline.
- Absence of slumping and/or uncontrolled erosion.

4.9 Controlling Access

4.9.1 Aim

To prevent unauthorised access to remnant vegetation and habitat on the site through the provision of designated access roads and signage.

4.9.2 Management Strategies

- Maintain access roads and tracks within the Project Boundary
- Maintain boundary fencing
- Maintain signage to advise not to enter Project Boundary.

4.9.3 Performance / Completion Criteria

- All fences are maintained in good working order
- Designated access roads and tracks are maintained
- Signage is installed and clearly visible.

4.10 Managing Bushfire Risk

A Bushfire Management Plan has been developed for the Tarrawonga Coal Mine and has been referred to the Rural Fire Service (Narrabri) and Narrabri Shire Council. An overview of the management strategies and criteria is provided below.

4.10.1 Aim

To minimise the risks and hazards to biodiversity values at the site associated with bushfires.

4.10.2 Management Strategies

- Clearing will not be undertaken during periods of extreme fire danger as defined by the Bureau of Meteorology
- Controlled high intensity, short-term grazing will be employed to assist in the reduction of vegetative fuel loads on areas on which active mining operations are not occurring and appropriate fencing is available
- All personnel and contractors would be required to use diesel vehicles and/or remain on defined roads or tracks
- A fire break and fire trails shall be established and maintained around the perimeter of the mining leases.
- Prohibition of smoking in fire prone areas
- Fire fighting equipment shall be provided on-site including water carts equipped with water cannons to provide immediate response to a bushfire
- Appropriate mine personnel will receive basic fire control training
- Fire prevention and fuel load reduction in rehabilitated mine areas will be undertaken if required and will involve measures such as a combination of fire breaks and short periods of high intensity grazing. Controlled burns may also be used through consultation with Narrabri Shire Council and the local fire brigades.

- Controlled burns will not be undertaken during whilst vegetation is establishing
- Mosaic burning shall be prescribed to reduce potential negative impacts

4.10.3 Performance / Completion Criteria

- Fuel load/fire security will be inspected at a minimum of 12 monthly intervals, occurring prior to the commencement of each bushfire season
- All fire equipment will be kept in a serviceable condition and inspected at least once every 6 months by a fire equipment service provider (3 months for mining equipment)
- Bushfire incidents will be recorded and managed via the Whitehaven incident management process. Occurrence of bushfires will be reported to the relevant authorities and discussed in the Annual Environmental Management Report (AEMR)/Annual Review.
- The bushfire management plan will be reviewed every two years and following any significant changes in bushfire management at the site.
- The frequency of fire within existing patches of Box-Gum Woodland EEC is to be no less than 5 years and must occur in either spring or autumn. However, it is understood that timing of these burns is dependent upon a range of factors such as wind speed and direction and temperature.

5 Monitoring

Proposed monitoring of biodiversity offset areas will be included in Stage 2 of the BMP.

Biodiversity monitoring requirements for Project areas are presented in **Table 5-1**.

Table 5-1: Biodiversity monitoring requirements

Monitoring Commitment	Source	Monitoring
<p>Rehabilitation of Project disturbance areas, including the reinstatement of key agricultural and ecological values</p> <ul style="list-style-type: none"> A Rehabilitation Management Plan will be developed and implemented for the Project, including a rehabilitation monitoring program designed to track the progress of rehabilitation and revegetation. 	<p>TCPL 2012 - Section 7, pp. SOC1 TCPL 2012 - Section 7, pp. SOC5</p>	<p>Monitoring methods for rehabilitation areas are described in the Rehabilitation Management Plan.</p>
Goonbri Ck		
<ul style="list-style-type: none"> A monitoring/maintenance program for water quality, ecological, hydrological and geomorphic integrity of the permanent Goonbri Creek alignment. The Goonbri Creek Management Plan would include details of the monitoring program that would be designed and implemented to track the progress of the revegetation (in terms of plant growth, species diversity and fauna usage) in both instream and riparian habitats of the permanent Goonbri Creek alignment. Monitoring results would be summarized in the Annual Environmental Management Report (AEMR)/Annual Review. 	<p>TCPL 2012 - Section 7, pp. SOC4 TCPL 2012 - Section 5, pp. 5-12</p>	<p>The Goonbri Creek Management Plan will address this requirement. TCM intend to submit a Mining Operations Plan for a five year term in 2015. The realignment of Goonbri Creek is not intended to form part of the MOP.</p>
Flora - Revegetation of the permanent Goonbri	TCPL 2012 – Section	The Goonbri Creek Management Plan will address this requirement. TCM intend to submit

Monitoring Commitment	Source	Monitoring
<p>Creek alignment</p> <ul style="list-style-type: none"> • A monitoring program would be designed and implemented to track the progress of the revegetation (in terms of plant growth, species diversity and fauna usage) in both instream and riparian habitats. • A monitoring report would be prepared annually that includes a summary of previous monitoring reports, results of that year's monitoring and planned remedial works, if required. The monitoring results would be summarized in the Annual Environmental Management Reports (AEMR)/Annual Reviews. • The Goonbri Creek revegetation activities and monitoring program would be documented in the Goonbri Creek Management Plan. 	4, pp. 4-72	a Mining Operations Plan for a five year term in 2015. The realignment of Goonbri Creek is not intended to form part of the MOP.
Flora		
<p>Weed control</p> <ul style="list-style-type: none"> • Regular inspections of revegetated areas and other parts of the mining tenements to identify and demarcate areas of noxious and environmental weeds • Monitoring of areas of existing infestation to assess the effectiveness of management control actions • Regular liaison with local landholders and relevant government agencies to monitor the spread and management of weeds within the local area • Follow up site inspections to evaluate the effectiveness of weed control programs. 	TCPL 2012 – Section 4, pp. 4-72	The weed monitoring program will be incorporated into the floristic monitoring program. The approved Rehabilitation Management Plan requires monthly weed monitoring of all rehabilitation and topsoil stockpile areas.
Flora - Rehabilitation management plan	TCPL 2012 – Section 4, pp. 4-72	Rehabilitation monitoring is addressed in Section 8 (Rehabilitation Monitoring, Research and Reporting) of the Mining Operations Plan.

Monitoring Commitment	Source	Monitoring
Fauna		
<p>Land clearing strategies</p> <ul style="list-style-type: none"> • Suitably trained or qualified person(s) would be present during the felling of identified hollow bearing trees to provide assistance with the identification, and if necessary, rescue and care of any injured fauna. • The species, number and condition of fauna identified during clearing activities would be recorded and a summary provided in the Annual Environmental Management Report (AEMR)/Annual Review. • Vegetation clearance protocols would be documented in the Biodiversity Management Plan and would be used to minimise impacts on flora and fauna. • Key components of the vegetation clearance protocols would include aspects such as the clear delineation of areas to be cleared of native remnant vegetation, timing and methods to be used, pre-start clearing inspections by suitably qualified ecologist to confirm no impact on threatened species, and re-use of cleared vegetation debris in revegetation programs. 	<p>TCPL 2012 – Section 4, pp. 4-88</p> <p>TCPL 2012 - Section 5, pp. 5-12</p>	<p>To be undertaken in accordance with the Land Disturbance Protocol (Appendix B). Database records of all fauna species identified during clearing activities is to be created.</p>
<p>Feral animal control</p> <ul style="list-style-type: none"> • Follow-up site monitoring to determine the effectiveness of trapping and/or baiting programs. 	<p>TCPL 2012 – Section 4, pp. 4-89</p>	<p>Feral animal monitoring program will be incorporated into the fauna monitoring program, and will utilise infra-red cameras to detect the presence or absence of feral animals across the mining and offset areas. The number, location and frequency of cameras used will be determined in consultation with ecological contractors and results obtained from the monitoring.</p>
<p>Nest box program</p> <ul style="list-style-type: none"> • A nest box program will be implemented in the Leard State Forest and/or other identified locations within Project area 	<p>TCPL 2012 – Section 4, pp. 4-89</p>	<p>The program will comprise:</p> <ul style="list-style-type: none"> • a pre-installation assessment of proposed nest box placement areas (e.g. to identify areas with low hollow abundance and with semi-mature regenerated vegetation); • installation of a variety of nest boxes for use by birds, arboreal mammals, and bats; • installation of similar types of nest boxes in groups; • design of nest boxes to maximise the likelihood that local, in particular threatened

Monitoring Commitment	Source	Monitoring
		species, hollow-dwelling fauna would use them for shelter and breeding; <ul style="list-style-type: none"> • installation of bat boxes; • seasonally based monitoring eg spring for nesting species, to observe target fauna usage; • reporting of program findings within the AEMR.

Sources:

TCPL 2012 – Tarrawonga Coal Project: Environmental Assessment.

6 Risks and Contingencies

6.1 Risks to Biodiversity Management

Risks that may impact on the ability of TCPL to successfully implement this Biodiversity Management Plan may include those listed in **Table 6-1** below. Risks associated with the biodiversity offset area will be addressed in Stage 2 of the BMP.

Table 6-1: Potential risks to the implementation of this BMP

Risk	Control Method	Relevant Section
Inadequate final landform design leading to an unstable landform.	<ul style="list-style-type: none"> Detailed landform design outlining drainage paths, contour drains, ridgelines and emplacements, keeping with natural landforms Substrate preparation prior to landform being shaped 	Section 4.8
Damage to offset and rehabilitation areas as a result of bushfire and/or inappropriate fire regimes	<ul style="list-style-type: none"> Implement bushfire management plan Selection of fire-tolerant species in native vegetation areas Maintaining fire breaks by maintaining cleared easements and fence lines Maintain fire-fighting access tracks and water sources (sediment dams) in rehabilitation areas Monitoring fuel loads and considering mosaic back-burning programs (where appropriate) to reduce fuel loads Maintaining sufficient viable seed for key native vegetation species to re-seed areas after bushfire events 	Section 4.10
Lack of availability of locally occurring species to be either seeded or planted in revegetation or regeneration	<ul style="list-style-type: none"> Seed collection and propagation 	Section 4.4
Potential harm to species (both threatened and non-threatened) as part of clearing activities	<ul style="list-style-type: none"> Clearing limited to minimum area necessary Progressive clearing Pre-clearance surveys Translocation of species (with appropriate licences) 	Section 4.5
Loss of biological resources for use in rehabilitation (topsoil salvage, hollow salvage, timber and woody debris, etc.).	<ul style="list-style-type: none"> Maximise salvage of resources during clearing and mining activities and re-use in rehabilitated areas 	Section 4.3
Poor soils/substrate material inhibiting plant establishment and growth	<ul style="list-style-type: none"> Substrate preparation prior to landform design 	Section 4.6

Risk	Control Method	Relevant Section
	<ul style="list-style-type: none"> • Soil and overburden quality testing in rehabilitation areas 	
<p>Rehabilitation failure due to prevailing weather conditions, poor soil conditions and propagation of required species.</p>	<ul style="list-style-type: none"> • Soil and overburden quality testing in rehabilitation areas • The species mix for rehabilitation areas should optimise the use of local provenance seed tolerant of the region's drought regime. • Soils will be ameliorated where necessary to optimise infiltration and water holding capacity in the soil profile prior to tube stock planting and direct seeding. • Monitoring following drought periods will identify areas where re-seeding and replanting is required. A contingency supply of viable seed for key native vegetation species will be maintained until relinquishment that is sufficient to re-seed rehabilitation areas in the event of a widespread rehabilitation failure. • Adaptive management is to be adopted 	<p>Section 4.6</p>
<p>Weed infestation within offset and rehabilitation areas leading to degradation of biodiversity values</p>	<ul style="list-style-type: none"> • Continuous weed management/suppression • Regular monitoring 	<p>Section 4.7</p>

6.2 Trigger Action Response Plan

The Trigger Action Response Plan (TARP) provides a framework to guide the management of risks to biodiversity management. A TARP includes:

- Identification of the principal contributing factors and impacts for each major risk to biodiversity management.
- Development of quantitative or qualitative monitoring tools for causes and impacts.
- Identification of upper limits or trigger values for causes and impacts that are considered to represent an unacceptable level of risk.
- Identification of appropriate responses to mitigate or remediate the causes and impacts, including a notification protocol.

The TARP provides management responses for lower (first tier) and upper (second tier) trigger values. First tier trigger values identify opportunities for closer monitoring or early intervention that may mitigate potential impacts before substantial damage to biodiversity is realised. Second tier trigger values identify when indicators have reached a threshold that requires more substantive or widespread remedial actions to remediate or mitigate rehabilitation failure.

6.2.1 First Tier Triggers

First tier triggers are intended to detect early indications that biodiversity management is not trending toward desired completion criteria. TCPL are trialling the use of NDVI remote sensing techniques to establish and monitor first tier triggers to identify, on an annual basis:

- Deteriorating vegetation health in rehabilitation and offset areas;
- Variability in total biomass and vegetation density in each strata of vegetation communities; and
- Changes in soil properties without disturbance.

A statistically significant variation ie beyond expected range, in monitoring results or a statistically significant overall decline in vegetation health will trigger further on-ground assessments. These assessments will be used to confirm any adverse impacts and early intervention management responses.

The effectiveness of remote sensing techniques will be evaluated against on ground assessments in its first year of use and, if adopted for ongoing use, reviewed biannually

6.2.2 Second Tier Triggers

Quantitative or qualitative trigger values for key indicators will be developed in for both the Project Area and the BOS. Trigger values will be developed based on monitoring program outcomes (including the rehabilitation areas, BOS and selected analogue sites).

A high-level TARP is provided in **Table 6-2**. This TARP should be developed further once quantitative/qualitative trigger values for key indicators have been developed based on monitoring program outcomes at both rehabilitation and analogue sites.

Table 6-2: TARP for Biodiversity Management

Aspect	Element	Trigger	Action	Responsibility
Vegetation (existing and restoring)	Percentage cover Health Species diversity Recruitment	Decline in trend in vegetation condition based on proposed quadrat monitoring using biometric data.	Engage ecologist to undertake investigation to determine the cause of change A site specific management report to be prepared and implemented where necessary that aligns with the RMP. Actions may include planting of endemic species and weed control measures Environmental Officer to inform the Group Environmental Manager and General Manager DP&E, OEH and DDOE to be notified and actions discussed. Where clearing exceeds trigger value, undertake rehabilitation and revegetation of equivalent area in accordance with the RMP	Environmental Officer
	Area	Extent of clearing exceeds Conditions of Approval Clearing occurs outside of delineated areas	Environmental Officer to inform the Group Environmental Manager and General Manager DP&E, OEH and DDOE to be notified and actions discussed. Where clearing exceeds trigger value, undertake rehabilitation and revegetation of equivalent area in accordance with the RMP	Environmental Officer
	Revegetation/restoration	Planting failure	Field reconnaissance to determine likely cause of change. If required, engage ecologist to undertake additional assessments and prepare a site specific management report Revegetation/restoration works to be undertaken in alignment with recommendations from site assessment	Environmental Officer
Fauna and fauna habitat	Vertebrate species presence Invertebrate species presence Habitat structure Vertebrate pests	Loss of habitat presence Decline in trend in recorded fauna numbers and/or presence and abundance (allow for natural variation occurring in analogue sites)	Engage ecologist to undertake investigation to determine the cause of change A site specific management report to be prepared and implemented where necessary that aligns with the RMP	Environmental Officer

Aspect	Element	Trigger	Action	Responsibility
	Habitat augmentation – nest boxes	<p>Loss of nest boxes or deterioration of nest boxes</p> <p>Feral species usage of nest boxes, including ants and feral honeybees</p>	<p>Replace nest boxes as soon as practical after identification of sub-standard nest boxes</p> <p>Condition monitoring can be completed by visual inspection from the ground and documented</p> <p>Where feral species are identified within nest boxes, they should be removed, or the nest box should be replaced (in the case of ants and feral honeybees)</p>	<p>Nest box monitoring should be completed by suitably qualified, licensed and experienced ecologist</p> <p>Nest box monitoring should be completed by suitably qualified, licensed and experienced ecologist</p>
Weed control	<p>Percentage cover</p> <p>Declared noxious weeds presence</p>	Increasing trend in number of exotic species and / or weed cover.	<p>Site inspection to verify.</p> <p>Contractor engaged to undertake weed control measures implemented as per the RMP and BMP.</p>	Environmental Officer
Feral animals	Feral animal presence and/or abundance	Increase in number of feral animals	Contractor engaged to undertake feral animal control measures implemented as per the RMP/this BMP	Environmental Officer
Salinity	<p>Salinity (EC)</p> <p>Bare soil/salt scalds</p>	Increasing trend in soil/water salinity levels	Site inspection and testing to verify. A site specific management report to be prepared and implemented where necessary	Environmental Officer
Erosion	Slumping/erosion	Areas of uncontrolled erosion identified	Site inspection to verify. Control measures to be implemented as per the Surface Water Management Plan	Environmental Officer

7 Roles and Responsibilities

All Whitehaven employees and contractors are responsible for undertaking work practices in accordance with this BMP, and to report any biodiversity management issues. The key personnel responsible for implementing actions within this BMP are provided in **Table 7-1** below.

Table 7-1: Roles and responsibilities

Position	Role and Responsibility
General Manager – HSEC	The General Manager – HSEC will obtain and provide adequate resources for the Group Environmental Manager to implement the BMP.
Group Environmental Manager	Reporting to the General Manager – HSEC, the Group Environmental Manager will be responsible for the overall implementation of the BMP, which will include: <ul style="list-style-type: none"> Developing a program for the implementation of works and activities required by the BMP. Assisting the Environmental Officer in approvals (where required) to implement works and activities required by the BMP. Assisting the Environmental Officer arranging site works and activities, including the commissioning of relevant contractors. Assisting the Environmental Officer with training and awareness programs related to the BMP to assist with overall employee implementation of the BMP. Point of contact for environmental matters, including those relating to biodiversity management. Ensuring reporting requirements in relation to the BMP are implemented. Responding to complaints, where required. Regulatory and community liaison. Undertaking reporting, auditing and review of the requirements of the BMP.
Environmental Officer	Reporting to the Group Environmental Manager, the Environmental Officer will be responsible for the day to day implementation of works and activities required by the BMP, including: <ul style="list-style-type: none"> Undertaking or managing surveys and monitoring activities required by the BMP. Providing site specific advice to Whitehaven personnel on management of biodiversity required by the BMP. Implementing training and awareness programs in relation to biodiversity management. Implementing the Land Disturbance Protocol, Appendix B.
Contract Ecologists	Reporting to the Environmental Officer, contract ecologists will be responsible for: <ul style="list-style-type: none"> Undertaking and reporting of pre-clearance and monitoring surveys required by the BMP, Rescue, care and translocation of fauna, if required, Providing specific advice, as required, to Whitehaven personnel on management of biodiversity required by the BMP.

8 Reporting

TCPL reporting and auditing procedures, as outlined in the Environmental Management Strategy (EMS), address the principal strategies to be adopted in the event of, or in prevention of, non-compliances and complaints regarding the implementation of the BMP. Procedures including incident reporting, complaint receipt and response, and response to non-compliance are outlined below.

8.1 Incident Reporting

TCPL shall notify, at the earliest opportunity, the Secretary 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, TCPL will notify the Secretary and any other relevant agencies as soon as practicable after the TCPL becomes aware of the incident. TCPL will provide the Secretary and any relevant agencies a report on the incident, within seven days of the date of the incident, and such further reports as may be requested.

8.2 Annual Biodiversity Monitoring

Annual biodiversity monitoring will be undertaken to assess the effectiveness and progress of biodiversity management against the performance/completion criteria, and identify triggers for adaptive management.

Monitoring will be undertaken as described in **Section 5**. An annual monitoring report will be prepared that includes record monitoring results and discusses performance against key performance/completion criteria and TCPL commitments. Trends will also be identified and any non-compliances or triggers identified. Results of the annual biodiversity monitoring will be reported in the Annual Environmental Management Report.

8.3 Regular Reporting and Review

By the end of June each year, TCPL will prepare an Annual Review which reviews the environmental performance of the project for the previous calendar year (Schedule 5, Condition 5 of Project Approval (PA 11_0047) Approval. This review will:

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

The AEMR/Annual Review also addresses the matters identified in the Department of Trade and Investment (Resources and Energy) document entitled “Guidelines to the Mining, Rehabilitation and Environmental Management Process” (2006).

The AEMR/Annual Review is provided to relevant agencies, the CCC members and is made available for public viewing on the Whitehaven Coal website. Copies of all management plans / strategies or monitoring programs, together with the results of independent audits undertaken in accordance with PA

11_0047 are provided to relevant authorities, and made publicly available on the Whitehaven Coal Website.

8.4 Complaint Receipt and Response Procedure

In order to receive, record and respond to any complaints in a timely manner, TCPL maintains a telephone complaints line for the purpose of receiving complaints from any member of the public in relation to its activities. The complaints line operates 24 hours per day, seven days per week, is publicly advertised and the details are supplied to adjacent landowners (TCPL 2009).

All complaints are recorded and responded to within 24 hours of the receipt of a complaint. A message bank will capture calls when they cannot be answered. The recorded message records the time of receipt and requests the following information.

1. Complainant's name
2. Telephone number
3. Preferred contact time
4. Nature of complaint.

The nature of the response depends on the nature and source of complaints but includes one or more of the following actions.

1. Liaison with the complainant to ascertain all details and to identify the nature and source of the complaint and provide supplementary details for the log. Details recorded in the log include:
 - a. the date and time of the complaint
 - b. the method by which the complaint was made
 - c. personal details
 - d. the nature of the complaint
 - e. action taken by TCPL in relation to the complaint including any follow-up contact and
 - f. if no action, the reason why. This activity may extend to other landowners /residents to determine the overall extent of the perceived problem.
2. As appropriate, the initiation of monitoring or other investigations to verify or otherwise the exceedence or non-compliance with consent, licence or lease conditions
3. Initiation of appropriate changes in operating practices or procedures
4. Conducting a follow-up interview with the resident to determine their level of satisfaction with the mine's response and the resultant outcome.

A copy of the report sheet is supplied to the complainant, if requested.

A summary of the complaints received in each 12 month period is included in each AEMR/Annual Review, together with a comparison with the number and nature of complaints received in the previous five years (TCPL 2009).

8.5 Response to Non-Compliances

Compliance with all approvals, plans and procedures is the responsibility of all personnel and contractors employed on, or in association with, the mine and is achieved through promotion of project ownership under the direction of the General Manager – Open Cut Operations and Group Environmental Manager.

The Group Environmental Manager undertakes regular inspections, internal audits and initiates directions identifying any remediation/rectification work required, and areas of actual or potential non-compliance, which have the potential to cause environmental harm or result in complaints are also reported to the relevant authority.

Non-compliances with the requirements of the mine site's Environment Protection Licence (EPL) are reported on each Annual Licence Return.

A review of TCPL's compliance with all conditions of the Project Approval, mining lease and all other approvals and licences is undertaken as part of each AEMR/Annual Review submitted to the Secretary and DRE. This information is also made publically available on the Whitehaven Coal website.

Additionally an independent audit is undertaken a minimum of once every three years and report submitted to the Secretary, and any other relevant authorities and made available to the public on the Whitehaven Coal Website.

A set of environmental procedures that deal with the renewal of licences, leases and approvals, and also prescribe the means to ensure compliance with the regulatory requirements has been established to ensure ongoing compliance in the event of personnel changes.

9 Auditing

Whitehaven will undertake annual internal audits to align with its AEMR/Annual Review and MOP reporting requirements, as well as independent audits every 3 years. A summary of these audits is provided in **Sections 9.1** and **9.2**.

9.1 Annual Internal Auditing

An internal annual environmental audit will be undertaken to align with reporting requirements for the MOP and AEMR/Annual Review. The annual audit will focus on the compliance with the requirements of the BMP and where corrective action is required.

An annual audit and compliance report will be prepared which will include the methodology of the audit, actions implemented in accordance with the BMP, non-compliances with the BMP, and corrective actions taken. A summary of this report will be included in the AEMR/Annual Review.

9.2 Independent Audit

In accordance with Schedule 5, Condition 10 of the Project Approval, an independent audit was undertaken by the end of June 2014 and will be undertaken every 3 years thereafter, unless the Secretary directs otherwise.

The audit was led by a suitably qualified auditor, and included experts in noise, air quality, water, ecology, and any other fields specified by the Secretary, who are endorsed by the Secretary.

Specifically in relation to this BMP, the audits will include:

- Consultation with relevant agencies
- Assessment of the environmental performance in complying with this BMP
- Review of the adequacy of this BMP and
- Recommend measures or actions to improve the environmental performance in relation to the requirements of this BMP.

A document will be prepared within 3 months of commissioning the audit, or as otherwise agreed with the Secretary, which includes the audit report, together with responses to recommendations contained in the audit report.

10 Review of this BMP

As discussed in **Section 1.3**, there are other related requirements under both the State and Commonwealth approval that will provide additional information on the Project area and surrounds. This information is expected to allow more detailed management, monitoring and contingency measures to be developed, which would enhance the value of this BMP.

Consequently, it is proposed that this BMP is reviewed and, if required, revised following completion of the related State and Commonwealth approval requirements, including:

- Stage 2 of the Leard Forest Mining Precinct Regional Biodiversity Management Strategy (State Condition 41 and Commonwealth Condition 22)
- Revised Biodiversity Offset Strategy (State Condition 42)
- Box Gum Woodland EEC - Implementation Plan (State Condition 43)
- Threatened Fauna - Implementation Plan (State Condition 44)
- Independent verification of Offset areas (Commonwealth Condition 7)
- Offset Management Plan (Commonwealth Condition 12 to 15)
- Mine Site Rehabilitation Plan (Commonwealth Condition 23 to 26).

Following the review described above, the BMP will be reviewed and, if required, revised every 3 years following the findings of the independent audit (**Section 9.2**). The review will be undertaken in consultation with key stakeholders (including OEHL, DoE, Forests NSW, the CCC, DPI Catchments and Lands and the NWLLS) and approved by DP&E.

A review of this BMP should be undertaken after 12 months from date of approval, and from then on at least every three years. The BMP review should examine trends, investigate the sampling effort in terms of redundancy or shortfalls, and provide the opportunity to incorporate new monitoring technologies or techniques if required. Regular review of this BMP will allow for adaptive management of the Project Area to be adopted and ensure that the BMP is consistent to overarching management plans, environmental policies, objectives and legal requirements. If preventative measures indicate that amendments to the BMP are necessary, the BMP will also be reviewed. Any review will be undertaken in consultation with key stakeholders and with the approval of relevant agencies.

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