SHENHUA WATERMARK COAL PTY LIMITED
神华沃特马克煤矿有限公司

Biodiversity Management Plan

Watermark Coal Mine

EPBC 2011/6201

Watermark Coal Project, NSW

Shenhua Watermark Coal Pty Ltd - ABN: 21 133 264 230

Proposed Action: To construct and operate an open cut coal mine – and associated infrastructure, including a coal handling and preparation plant and upgrades to transport infrastructure – approximately 3 km to the west of Breeza and 25 km south-east of Gunnedah, NSW.

Biodiversity Management Plan preparation date: 20 May 2020

Quality Information

Document Biodiversity Management Plan

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Glossary

AHD	Australian Height Datum
BC Act	NSW *Biodiversity Conservation Act 2016*
Biosecurity Act	NSW *Biosecurity Act 2015*
BMDB GDP	Beyond Mine Disturbance Boundary Ground Disturbance Permit
BMP	Biodiversity Management Plan
BNC Act	NSW *Brigalow and Nandewar Community Conservation Area Act 2005*
CEEC	Critically Endangered Ecological Community
DAWE	Commonwealth Department Agriculture, Water and the Environment
DoEE	Commonwealth Department of the Environment and Energy
DP&E	NSW Department of Planning and Environment
DPIE	NSW Department of Planning, Infrastructure and Environment
DPI-LW	NSW Department of Primary Industries – Land and Water
EEC	Endangered Ecological Community
EES	Environment, Energy and Science Division
EIS	Environmental Impact Statement
EP&A Act	NSW *Environmental Planning and Assessment Act 1979*
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
ha	Hectares
IKHP	Interim Koala Habitat Plan
km	Kilometres
KPoM	Koala Plan of Management
LGA	Local Government Area
Mining Act	NSW *Mining Act 1992*
Mtpa	Million tonnes per annum
NSW	New South Wales
PAC	Planning Assessment Commission

PCT	Plant Community Type
PEOA Act	NSW *Protection of the Environment Operations Act 1997*
RMP	Rehabilitation Management Plan
ROM	Run-of-Mine
RTS	Response to Submissions
Rural Fires Act	NSW *Rural Fires Act 1997*
SEPP44	NSW *State Environmental Planning Policy No 44 – Koala Habitat Protection*
SSD	State Significant Development
SWC	Shenhua Watermark Coal Pty Limited
TEC	Threatened ecological community
the Mine	The Watermark Coal Mine
WCM GDP	Watermark Coal Mine Ground Disturbance Permit
WoNS	Weeds of National Significance

1.0 Introduction

Shenhua Watermark Coal Pty Limited (SWC) own and operate the Watermark Coal Mine (the Mine). The Mine was granted State Significant Development Consent (under Division 4.1 of Part 4 of the New South Wales (NSW) *Environmental Planning and Assessment Act 1979* (*EP&A Act*)) by the NSW Planning Assessment Commission (PAC), as delegate for the Minister for Planning, on 28 January 2015 (NSW Development Consent) and received approval from the Australian Government (under Sections 130(1) and 133 of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (*EPBC Act*)) on 4 July 2015. The NSW Development Consent was modified on 21 December 2018 (Modification 1).

The Mine consists of the construction and operation of an open cut coal mining operation producing up to 10 Million tonnes ('run-of-mine', ROM) per annum over a period of approximately 30 years.

This *Biodiversity Management Plan* (*BMP*) provides a comprehensive framework for the implementation of the biodiversity impact mitigation and offset measures proposed for the Mine. The *BMP* will ensure that the Mine's conservation objectives are met and that impacts to biodiversity are adequately managed for the life of the Mine. The *BMP* includes all of the impact mitigation measures proposed in the *Watermark Coal Project Environmental Impact Statement* (*EIS*) and *Response to Submissions* document (*RTS*) and addresses the NSW Development Consent conditions and the Commonwealth approval conditions for the Mine. The *BMP* details how these measures will be implemented, including details of conservation management actions on the offset lands. The offsets, when combined with rehabilitation within the Disturbance Boundary, are intended to achieve a significant increase in the quantity and quality of forest and woodland habitat within the locality.

1.1 Background

1.1.1 Project Location

The Mine is located approximately 25 kilometres (km) south, south-east of the township of Gunnedah and to the immediate west of the village of Breeza within the Gunnedah Local Government Area (LGA). This area forms part of the Brigalow Belt South bioregion.

The Mine is located within Exploration Licence 7223. The Mine is approximately 282 km by rail from the export Port of Newcastle. *Figure 1* illustrates the location of the Mine in relation to the town centre of Gunnedah.

The majority of land within the Project Boundary has been cleared for agriculture and only higher elevation areas and fence lines support woodland vegetation. Land within the Project Boundary has had a long history of agricultural development with associated degradation and land clearing. Historical photographs indicate that the majority of the clearing that has taken place within the Project Boundary was undertaken prior to 1954, and that levels of native vegetation have not changed significantly since then, either in configuration or overall amount.

Topography is variable across land within the Project Boundary, ranging from topographic highs associated with Mt Watermark (512 metres (m) Australian Height Datum (AHD)) and Smokey Point (447m AHD) through to the black soil plains to the south and south-east of the Project Boundary. Gently undulating cleared grasslands (approximately 310 m AHD) dominate the central and western portions of land within the Project Boundary.

No major watercourses occur within the Project Boundary. A number of small, mostly discrete drainage lines such as Watermark Gully and Native Dog Gully direct surface water in various directions, however these are ephemeral streams that only flow following significant rainfall. A larger river, the Mooki River, is located outside of the Project Boundary near the eastern boundary. The Mooki River is a meandering inland river that joins the Namoi River, which is part of the major Darling River system that extends across northern NSW.

1.1.2 Project Description

The Mine generally comprises:

- the construction and operation of an open cut mining operation extracting up to 10 Million tonnes per annum (Mtpa) of ROM coal for a 30 year period;
- an open cut mining fleet of excavators and shovels, supported by haul trucks, dozers, graders, drill rigs and water carts;
- progressive rehabilitation of all disturbed areas;
- the construction and operation of a Coal Handling and Preparation Plant with a throughput of 10 Mtpa ROM coal;
- the co-disposal of tailings and coarse reject within the Overburden Emplacement Areas;
- the construction and operation of a rail spur, rail loop, Kamilaroi Highway rail overpass, associated load out facility and connection to the Werris Creek - Moree Railway Line;
- the construction and operation of a Mine Access Road;
- the construction and operation of administration, workshop and related facilities;
- the construction and operation of ground and surface water management and reticulation infrastructure including pipelines, pumping stations and associated infrastructure for access to water from groundwater aquifers, the Mooki River and private dams to the north-east of the Project Boundary;
- the installation of communications and electricity reticulation infrastructure; and
- a workforce of up to approximately 600 full-time equivalent employees during construction and up to 600 full-time equivalent employees during the operation of the Mine.

The Mine layout is shown in *Figure 2*.

1.1.3 Biodiversity Offset Areas

In order to compensate for the residual ecological impacts of the Mine, particularly those to threatened ecological communities (TECs) and the Koala *(Phascolarctos cinerea*), a package of offsets has been developed for the Mine. This has been developed following review of the submissions received from the public exhibition of the *EIS* and in consultation with government departments.

The biodiversity offset package comprises Offset Areas (direct offsets) and indirect offsets, including the following:

a. Onsite Offset Areas, comprising:
   i. Mt Watermark Offset Area - conservation and ongoing management of existing vegetated land together with restoration of vegetation communities and associated habitat;
   ii. Offset Area 6 - conservation and ongoing management of existing vegetated land together with restoration of vegetation communities and associated habitat;
   iii. Mooki River Offset Area - restoration of vegetation communities and associated habitat; and
   iv. Mine Rehabilitation Offset Area - rehabilitation of mined areas.
b. Offsite Offset Areas, comprising:
   i. Barraba Offset Area - conservation of existing vegetated areas together with restoration of vegetation communities and associated habitat; and
   ii. Glendowda Offset Area - conservation of existing vegetated together with restoration of vegetation communities and associated habitat.
c. Indirect Offsets, comprising:
   i. support for a koala research project;

ii. a proposed Box Gum Woodland restoration research project; and

iii. Landcare Namoi biodiversity habitat restoration project(s), if available.

The location of the Onsite and Offsite Offset Areas are shown in *Figure 3*.

1.1.4 Land Ownership

SWC owns all of the land for the Mine and Offset Areas, with the exception of two small parcels of Crown Land. One of these parcels is located upon Mt Watermark and the other is the former Watermark School site. SWC proposes to obtain a Crown land licence over Lot 7012, DP92765 and to manage this land parcel in the same manner as the remainder of the proposed Mt Watermark Offset Area (i.e. the portion owned by SWC) – subject to the conditions nominated upon the land licence. The former Watermark School site does not lie within an offset area and will not be impacted by the Mine.

Private freehold land primarily surrounds the Project Boundary with the exception of the Breeza State Forest to the south-west, which is owned by the State and managed by Forestry Corporation of NSW.

1.2 Aims and Objectives

The aims of this *BMP* are to:

- present a comprehensive plan for the management of flora and fauna within the Project Boundary and Offset Areas that makes provisions for:
    - minimising human disturbance to native flora, fauna, and their habitats;
    - minimising vegetation disturbance or clearing;
    - minimising impacts to threatened species and communities;
    - controlling threats to remnant native vegetation;
    - managing the impacts of feral animals and weeds; and
    - monitoring and reporting activities to inform adaptive management of the Project Area and Offset Areas.
- present a comprehensive plan for the conservation management of the Offset Areas in order to:
    - maintain and improve the ecological integrity of existing areas of woodland and forest in the Offset Areas and to enhance the native vegetation they contain;
    - increase the area and quality of native vegetation by regenerating areas of Derived Native Grassland to woodland by the planting of canopy trees and the implementation of assisted natural regeneration methods;
    - create fully viable and self-sustaining ecological communities through revegetation in areas of Low Diversity Native Grassland in the Offset Areas, as well as in areas to be rehabilitated after mining;
    - manage enhancement works in Offset Areas with consideration of cultural and archaeological Aboriginal heritage values; and
    - manage and reduce weed species, plant pathogens and feral animal distribution and abundance.
- provide indirect offsets to support direct offsets.

The broad overall management strategy for the Offset Areas is to maximise long-term environmental outcomes through the protection, maintenance and enhancement of existing woodland and forest vegetation and the establishment of high quality ecological communities in degraded and cleared areas to provide habitat for a wide range of species. In addition, some areas will be retained as agricultural land and some areas of current agricultural land in the Disturbance Area will be returned to agricultural use after mining.

1.3 Interaction with Other Management Plans

This *BMP* makes reference to and interacts with the following management plans prepared for the Mine:

- *Interim Koala Habitat Plan* (*IKHP*);
- *Koala Plan of Management* (*KPoM*);
- *Weed and Pest Management Plan (WPMP)*;
- *Rehabilitation Management Plan* (*RMP*);
- *Bush Fire Management Plan (BFMP)*; and
- *Heritage Management Plan* (*HMP*).

The aforementioned plans will be publicly available through the SWC website.

1.4 Document Structure

The structure of the remainder of the *BMP* is as follows:

- Chapter 2: provides an overview of the statutory requirements and approvals process for the Mine, including the NSW Development Consent conditions and Commonwealth approval conditions relevant to this *BMP* and details of the consultation that has taken place with government agencies.
- Chapter 3: provides a summary of the existing flora and fauna values within the Project Boundary and a brief summary of the predicted impacts of the Mine.
- Chapter 4: provides details of the proposed short, medium and long term biodiversity management measures to be undertaken within the Project Boundary. This focuses mainly on biodiversity m**anagement in the Disturbance Area, including activities to be undertaken on areas to be cleared prior to the removal of trees such as pre-clearance surveys and salvage of habitat features, protocols to be followed during clearing and other policies and procedures to be followed during the operation of the mine, such as vehicle driving policies and induction requirements.
- Chapter 5: provides an overview of the Offset Areas and a description of the biodiversity values that are present in each.
- Chapter 6: provides details of the proposed short, medium and long term biodiversity management measures to be undertaken within the Offset Areas. It identifies five management zones within the Offset Areas, the main goals of the management of each of these zones in addition to details of vegetation management, weed management and feral animal management strategies to be implemented.
- Chapter 7: addresses indirect and additional offset obligations.
- Chapter 8: provides details on the monitoring program that will be undertaken, including vegetation monitoring, threatened species monitoring, weed monitoring and feral animal monitoring within the Project Boundary and Offset Areas.
- Chapter 9: provides details of the reporting requirements of the monitoring and overall *BMP* review and auditing process.
- Chapter 10: provides a summary of the personnel responsible for each management action.

2.0 Statutory Requirements

2.1 NSW Assessment Process

2.1.1 Overview

In February 2013, an *EIS* was lodged with the then NSW Department of Planning and Environment (DP&E) for the Project. The *EIS* supported a development application for State Significant Development (SSD) under Division 4.1 of Part 4 of the *EP&A Act* (SSD-4975). In November 2013, the *RTS* was lodged and the project was subsequently assessed by the NSW Planning Assessment Commission (PAC).

The Mine was approved under the *EP&A Act* by the PAC on 28 January 2015. The Mine is subject to a number of conditions contained within the NSW Development Consent.

2.1.2 Consent Conditions

Table 1 outlines the relevant consent conditions for the NSW Development Consent to the *BMP* and where they have been addressed within this document. Table 12 and Table 13 referred to in the consent conditions are reproduced in *Table 2* and *Table 3*, respectively.

A number of other biodiversity conditions are contained within the NSW Development Consent, however these are addressed in other management plans, as follows:

- Condition 32: *IKHP; and*
- Conditions 35 and 36: *KPoM.*

Table 1 Compliance with Relevant Conditions of the NSW Development Consent

Requirement	Section
Schedule 3 Environmental Performance Conditions – General	
Biodiversity Offset Strategy	
28. The Applicant shall implement the biodiversity offset strategy described in the EIS, summarised in Table 12 and shown conceptually in Appendix 6 to the satisfaction of the Secretary	*Chapter 5 and 6*
The indirect offsets identified in Table 12 must be fully defined in the Biodiversity Management Plan The research projects may be undertaken as a standalone peer reviewed research project, or via a contribution to an existing research project. The Landcare habitat restoration project/s is to be undertaken as a contribution to an existing or planned Landcare projects.	*Section 7.1 – 7.3*
29. Prior to the commencement of mining operations, unless otherwise agreed by the Secretary, the Applicant shall revise the biodiversity offset strategy to identify an additional offset for the Grey Box Grassy Woodland EEC, in consultation with DOEE and to the satisfaction of the Secretary. The Offset Area shall be of equal or greater in size than that determined by the NSW Biodiversity Banking and Offsets Scheme methodology, and must achieve the outcomes required by the EPBC Act Environmental Offsets Policy 2012 (or subsequent published revisions) and user guide.	*Section 7.4*

Requirement	Section
Threatened Species	
30. The Applicant shall ensure that the biodiversity offset strategy and/or the rehabilitation strategy for the development focus on the re-establishment of: (a) Box Gum Woodland EEC/CEEC, including • White Box Grassy Woodland; • Blakely's Red Gum Grassy Woodland; • Yellow Box/Grassy Woodland; • White Box/Yellow Box/Blakely's Red Gum Woodland (b) Inland Grey Box Grassy Woodland EEC; (c) Weeping Myall Woodland EEC; (d) Fuzzy Box Woodland EEC; and (e) potential Koala habitat (see condition 31); and (f) habitat for other threatened flora and fauna species	The biodiversity offset strategy presented in *Chapter 6* includes details of proposed re-establishment of these vegetation communities in the Offset Areas. *Section 6.15* provides detail of how the proposed rehabilitation will provide potential Koala habitat. The proposed rehabilitation will provide habitat for threatened flora and fauna as described in *Chapter 5*.
Koala Habitat	
31. The Applicant shall ensure that the biodiversity offset strategy and/or the rehabilitation strategy for the development establishes the potential koala habitat areas described in the EIS and summarised in Table 13, to the satisfaction of the Secretary.	*Section 6.15*
Long Term Security of Offsets	
33. The Applicant shall make suitable arrangements to protect the offset areas in perpetuity: (a) within 4 months of the commencement of construction, unless the Secretary agrees otherwise, for all On-site and Off-site Offsets in Table 12 excluding the Rehabilitation Area Offset; (b) within 6 months of identifying the additional offset required under condition 29, for the additional Grey Box offset area; and (c) by the end of June 2046 unless the Secretary agrees otherwise, for the Rehabilitation Area Offset in Table 12, to the satisfaction of the Secretary.	*Section 6.21*
Biodiversity Management Plan	
34. The Applicant shall prepare and implement a Biodiversity Management Plan for the development to the satisfaction of the Secretary. This plan must:	
(a) be prepared in consultation with OEH and DoI Lands & Water, and be submitted to, and approved by, the Secretary prior to the commencement of construction;	*Section 2.3*

Requirement	Section
(b) describe the short, medium, and long term measures that would be implemented to:	
• manage the remnant vegetation and fauna habitat on the site;	*Chapter 4*
• implement the biodiversity offset strategy;	*Chapter 6* and *8*
• establish and/or maintain the potential koala habitat areas identified in Table 13;	*Section 6.15*
• integrate the implementation of the biodiversity offset strategy to the greatest extent practicable with the rehabilitation of the site'	*Chapter 6*
(c) include detailed performance and completion criteria for evaluating the performance of the biodiversity offset strategy, and triggering remedial action (if necessary)	*Table 23* and *27*
(d) include a detailed description of the measures that would be implemented over the next 10 years for:	
• enhancing the quality of existing vegetation and fauna habitat in the biodiversity Offset Areas;	*Chapter 6*
• creating native vegetation and fauna habitat in the biodiversity Offset Areas and rehabilitation area through focusing on assisted natural regeneration, targeted vegetation establishment and the introduction of naturally scarce fauna habitat features (where necessary);	*Chapter 6*
• maximising the salvage of resources within the approved disturbance area – including vegetative and soil resources – for beneficial reuse in the enhancement of the biodiversity Offset Areas or rehabilitation area	*Section 4.7, 4.8* and *6.6*
• collecting and propagating seed;	*Section 4.6* and *6.5*
• protecting vegetation and fauna habitat outside the approved disturbance area on-site;	*Section 4.2.1*
• minimising the impacts on fauna on site, including undertaking pre-clearance surveys;	*Section 4.2.2*
• managing any potential conflicts between the proposed enhancement works in the biodiversity offset strategy areas and any Aboriginal heritage values (both cultural and archaeological) in these areas;	*Section 6.19*
• managing salinity using best practice dryland salinity management revegetation measures;	*Section 4.12* and *6.12*
• controlling weeds and feral pests;	*Section 4.9, 4.10, 6.8* and *6.10*

Requirement	Section
• controlling erosion;	*Section 4.11*
• managing grazing and agriculture on site;	*Section 4.13*
• controlling access; and	*Section 4.3* and *6.3*
• bushfire management	*Section 4.14* and *6.18*
(e) include a seasonally-based program to monitor and report on the effectiveness of these measures, and progress against the detailed performance and completion criteria;	*Chapter 8*
(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; and	*Section 8.7*
(g) include details of who would be responsible for monitoring, reviewing, and implementing the plan.	*Table 31*
<u>Conservation Bond</u>	
37. Within 3 months of the approval of the Biodiversity Management Plan, unless otherwise agreed by the Secretary, the Applicant shall lodge a Conservation Bond with the Department to ensure that the biodiversity offset strategy is implemented in accordance with the performance and completion criteria of the Biodiversity Management Plan. The sum of the bond shall be determined by: (a) calculating the full cost of implementing the biodiversity offset strategy (other than land acquisition costs); and (b) employing a suitably qualified quantity surveyor to verify the calculated costs, to the satisfaction of the Secretary. If the offset strategy is completed generally in accordance with the completion criteria in the Biodiversity Management Plan to the satisfaction of the Secretary, the Secretary will release the bond. If the offset strategy is not completed generally in accordance with the completion criteria in the Biodiversity Management Plan, the Secretary will call in all, or part of, the conservation bond, and arrange for the satisfactory completion of the relevant works. Notes: • Alternative funding arrangements for long-term management of the biodiversity offset strategy, such as provision of capital and management funding as agreed by OEH as part of a Biobanking Agreement or transfer to conservation reserve estate can be used to reduce the liability of the conservation and biodiversity bond. • The sum of the bond may be reviewed in conjunction with any revision to the biodiversity offset strategy.	*Section 6.22*

Requirement	Section
Schedule 5 Environmental Management, Reporting and Auditing	
Management Plan Requirements	
3. The Applicant shall ensure that the management plans required under this consent are prepared in accordance with any relevant guidelines, and include:	
(a) detailed baseline data;	*Chapter 3* and *5*
(b) a description of:	
• the relevant statutory requirements (including any relevant approval, licence or lease conditions);	*Chapter 2*
• any relevant limits or performance measures/criteria;	*Table 11, 23* and *27*
• the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures;	*Table 11, 23* and *27*
(c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;	*Chapter 4, 6* and *8*
(d) a program to monitor and report on the:	
• impacts and environmental performance of the development;	*Chapter 8*
• effectiveness of any management measures (see c above);	*Chapter 8*
(e) a contingency plan to manage any unpredicted impacts and their consequences;	*Section 8.7*
(f) a program to investigate and implement ways to improve the environmental performance of the development over time and meet best management practice standards;	
(g) a protocol for managing and reporting any:	*Section 9.2*
• incidents;	
• complaints;	
• non-compliances with statutory requirements; and	
• exceedances of the impact assessment criteria and/or performance criteria; and	
(h) a protocol for periodic review of the plan.	*Section 9.2*

Table 2 Table 12 of the NSW Development Consent: Summary of the Biodiversity Offsets Strategy

Area	Offset Name	Minimum Size Hectares (ha)
Onsite Offsets	Mt Watermark Offset Area	296
	Offset Area 6	2,003
	Mooki River Offset Area	44
	Rehabilitation Area Offset	2,384
Offsite Offsets	Barraba Offset Area	2,878
	Mt Erin and Glendowda Offset Area	3,581
Indirect Offsets	Koala Research Project	n/a
	Box Gum Woodland Restoration Research Project	n/a
	Landcare Namoi Biodiversity Habitat Restoration Project/s	n/a
Total Area		**11,186**

Table 3 Table 13 of the NSW Development Consent: Koala Habitat Areas

Area	Offset Name	Minimum Potential Koala Habitat Area (ha)		Total (ha)
		Existing	Revegetation / Rehabilitation	
On-site Offsets	Mt Watermark Offset Area	192	47	239
	Offset Area 6	874	1,112	1,986
	Mooki River Offset Area	-	44	44
	Rehabilitation Area Offset	-	2,357	2,357
Off-site Offset	Barraba Offset Area	-	-	-
	Mt Erin and Glendowda Offset Area	2,649	884	3,533
Total (ha)		**3,715**	**4,444**	**8,159**

2.1.3 Statement of Commitments

Table 4 outlines the relevant commitments detailed within Appendix 3 of the NSW Development Consent to the *BMP* and where they have been addressed within this document.

Table 4 Compliance with Relevant Commitments in NSW Development Consent

Commitment	Section
<u>Environmental Management</u>	
3. Shenhua Watermark will develop an EMS in consultation with the relevant regulators and to the satisfaction of the Department. The EMS will include the following: • Construction Management Plan (including noise and any required archaeological clearances); • Water Management Plan; • Erosion and Sediment Control Plan; • Air Quality Management Plan (including a Trigger Action Response Plan); • Energy Savings Action Plan; • Operational Noise Management Plan (including a Trigger Action Response Plan); • Blast Management Plan; • Biodiversity Management Plan; • Biodiversity Offset Management Plan; • Koala Plan of Management (including translocation plan); • Aboriginal Archaeology and Cultural Heritage Management Plan; • Historic Heritage Management Plan; • Visual and Lighting Management Plan; • Weed and Pest Management Plan; • Land Management Plan; • Rehabilitation Management Plan; • Hazard Management Plan; • Mine Closure Management Plan; • Social Impact Management Plan; • Bushfire Management Plan; and • Waste Management Plan. The EMS may be added to, amended and altered during the life of the project	In line with Condition 34 of the NSW Development Consent, a single *BMP* has been prepared. This *BMP* provided a consolidated management plan for biodiversity within the Project Boundary (*Biodiversity Management Plan*) and Offset Areas (*Biodiversity Offset Management Plan).*
<u>Ecology</u>	
32. Shenhua Watermark will progressively rehabilitate mined areas, with an emphasis on re-establishing Box Gum woodland community.	*Section 6.2.8 and 6.3.5*
33. Shenhua Watermark will implement the biodiversity offset strategy outlined in this EIS for the purposes of initially	*Chapter 6*

Commitment	Section
maintaining and ultimately improving the ecological values of the region.	
34. In accordance with the Koala Plan of Management Shenhua Watermark will implement the mitigation and management measures for the Koala as outlined in this EIS, including: • Installation of Koala proof fencing where necessary; • Road controls; • Vertebrate pest control; • Bushfire management; • Monitoring of health during translocation; • Promotion of public education; • Encourage staged natural movement of Koalas; • Staged relocation of Koalas if required; • Habitat protection; • Habitat enhancement and revegetation (including revegetation of the Mooki River Offset Area and Onsite Biodiversity Offset Area); • Mine site rehabilitation including species favourable for Koalas; • Population monitoring (SAT method) and reporting within the Project Boundary and Offset Areas; and • Monitoring of performance against Key Performance Indicators.	Addressed within the *KPoM*.

2.2 Commonwealth Assessment Process

2.2.1 Overview

A Referral was submitted to the then Commonwealth Department of Sustainability, Environment, Water, Population and Communities on 14 November 2011. On 22 December 2011, the Minister deemed the mine project a Controlled Action given the likelihood of impacts on threatened species and communities and migratory species covered by the *EPBC Act*.

The Mine was approved under the *EPBC Act* by the Minister for the Environment on 4 July 2015. The Mine is subject to the conditions of consent outlined by the NSW Development Consent, and the further conditions of consent outlined by the then Commonwealth Department of Environment under EPBC Approval 2011/6201.

2.2.2 Approval Conditions

EPBC Approval 2011/6201 states a *BMP* must be prepared for the Minister's approval which addresses additional conditions of approval to be met by SWC, along with NSW Development Consent Condition 34 (Schedule 3). The additional Commonwealth Approval Conditions are listed below in *Table 5.*

Table 5 Compliance with Relevant Conditions of EPBC Act Approval 2011/6201

Requirement	Section
Conditions attached to the approval	
Biodiversity	
To minimise impacts to threatened species and ecological communities, the approval holder must:	
3. Not disturb more than: 738 ha of Box Gum Woodland 30 ha of Grey Box Woodland 3ha of Weeping Myall Woodland within the project area	*Section 3.2*
4. In addition to NSW consent condition 34 (Schedule 3), submit a Biodiversity Management Plan for the Minister's approval that must:	
a. make particular reference to the threatened species and ecological communities protected by the Biodiversity Management Plan and demonstrate how the mitigation and management measures described in the Biodiversity Management Plan will protect threatened species and ecological communities;	*Chapter 4*
b. include measures to be implemented to avoid, suppress and control the spread of plant pathogens that may degrade the habitat for threatened species and ecological communities;	*Section 4.5*
c. provide a detailed description of pre-clearance surveys to be undertaken by a fauna survey expert, no earlier than 48 hours prior to the removal of vegetation within the project area, in respect of individuals of the Large-eared Pied Bat, South-eastern Long-eared Bat and Spotted-tailed Quoll;	*Section 4.1.2*
d. provide a detailed description of translocation procedures to be undertaken by a fauna survey expert to ensure any individuals of the Large-eared Pied Bat, South-eastern Long-eared Bat and Spotted-tailed Quoll found during pre-clearance surveys described in condition 2.c. are not present when vegetation removal commences within the project area; and	*Section 4.1.2*
e. specify clear timeframes for the completion of all management and mitigation measures.	*Table 11* and *23*

2.3 Agency Consultation

The NSW Development Consent states that the *BMP* must be prepared to the satisfaction of the Secretary of the Department of Planning and Environment (DPE) (now Department of

Planning, Industry and Environment (DPIE)), and in consultation with NSW Office of Environment and Heritage (now the Environment, Energy and Science (EES) Division of DPIE) and the NSW Department of Industry – Lands & Water (DPI-LW). This section also outlines consultation undertaken with the Commonwealth Department of Agriculture, Water and the Environment (DAWE).

Details of consultation with DPIE, ESS, DPI-LW and DAWE are outlined below.

- Revision 1 of the *BMP* was submitted to DPIE on 12 April 2019 for consultation purposes. SWC understood that DPIE would provide the document to ESS and DPI-LW;
- Revision 1 of the *BMP* was submitted to DAWE on 12 April 2019 for consultation purposes;
- site visit undertaken on 15 May 2019 and included representatives of SWC, Cumberland Ecology, DPIE, ESS, DAWE and a number of other consultants; and
- DPIE provided SWC comments following review of Revision 1 of the *BMP* on 11 July 2019, which addressed both DPIE and ESS comments.
- DAWE provided SWC with comments on Revisions 2 and 3 of the *BMP* on 6 December 2019 and 2 April 2020, respectively.
- DPIE provided SWC with comments on Revisions 2, 3 and 4 of the *BMP* on 9 January 2020, 29 April 2020 and 19 May 2020, respectively, which addressed ESS comments.

2.4 Relevant Legislation

2.4.1 Key Legislation

Key legislation relevant to this *BMP* includes the following:

- NSW *Environment Planning and Assessment Act 1979* (*EP&A Act*);
- NSW *Biodiversity Conservation Act 2016* (*BC Act*);
- NSW *Biosecurity Act 2015* (*Biosecurity Act*);
- NSW *Rural Fires Act 1997* (*Rural Fires Act*);
- NSW *Mining Act 1992* (*Mining Act*);
- NSW *Protection of the Environment Operations Act 1997* (*PEOA Act*);
- NSW *Brigalow and Nandewar Community Conservation Area Act 2005* (*BNC Act*); and
- *State Environmental Planning Policy No 44 – Koala Habitat Protection* (*SEPP 44*).

A summary of the relevance of this legislation to this *BMP* is provided in *Table 6*.

Table 6 Key Legislation

Legislation	Purpose and Relevance
Environment Planning and Assessment Act 1979	The *EP&A Act* is the overarching planning legislation in NSW that provides for the creation of planning instruments that guide land use. The *EP&A Act* also provides for the protection of the environment, including the protection and conservation of native animals and plants including threatened species, populations and ecological communities, and their habitats. The Project is considered to be SSD and as the Minister for Planning is the consent authority for SSD, Shenhua Watermark will seek Project Approval from the Minister for Planning under Division 4.1 of Part 4 of the *EP&A Act*.

Legislation	Purpose and Relevance
Biodiversity Conservation Act 2016	The *BC Act* is currently the key piece of legislation in NSW relating to the protection and management of biodiversity and threatened species, and it replaced the NSW *Threatened Species Conservation Act 1995* in 2016. The *BC Act* aims to protect and encourage the recovery of threatened species, populations and communities that are listed under the Act through threat abatement and species recovery programs. This *BMP* has been prepared to address the potential impacts of the Mine on species and communities listed under the *BC Act*.
Biosecurity Act 2015	The *Biosecurity Act* came into force in 2017, and provides for the identification, classification and control of priority weeds in NSW. Under the *Biosecurity Act*, weeds have been placed into the following weed management categories based on their environmental characteristics and distribution: Prevention; Eradication; Containment and Asset Protection. This *BMP* has been prepared to reflect the listings of weeds in the *Biosecurity Act* and has used these listings to prioritise weeds for control.
Rural Fires Act 1997	The main objectives of the *Rural Fires Act* are to provide for the prevention, mitigation and suppression of bush fires in rural fire districts. According to the Project EIS, the land within the project boundary poses a moderate to low bush fire risk to the Mine however, the adjoining Breeza State Forest could pose a significant bush fire risk to the Mine. A *Bush Fire Management Plan* has been prepared for the Mine in accordance with the *Rural Fires Act* and will be implemented following commencement of this *BMP*.
Mining Act 1992	The objectives of the *Mining Act* are to encourage and facilitate the discovery and development of mineral resources in NSW, having regard to ecologically sustainable development. The *Mining Act* is relevant to this *BMP* in that it aims to provide for the rehabilitation of mine sites, rehabilitation of disturbed land and water, and to ensure mineral resources are identified and developed in ways that minimise impacts on the environment.
Protection of the Environment Operations Act 1997	The main objectives of the *PEOA Act* are to protect, restore and enhance the quality of the environment in NSW, through regulating operations that have potential to impact the environment. The main regulatory authority for this *Act* is the Environment Protection Authority. The *PEOA Act* is not directly relevant this *BMP*, however the Mine has obligations under this *Act.*
Brigalow and Nandewar Community Conservation Area Act 2005	The Project Boundary is located adjacent to the Breeza State Forest which falls under the *BNC Act*. Under the *BNC Act*, three Community Conservation Areas (BNC Conservation Areas) (Border/Gwydir, Namoi, Central West) were established in the Brigalow and Nandewar bioregions. The Project Boundary does not encompass any areas protected under the *BNC Act*, however Breeza State Forest is in Zone 4 Forestry, Recreation and Mineral Extraction, where mining and forestry activities are permitted.
State Environmental Planning Policy No	*SEPP 44* encourages the conservation and management of Koala habitats, to ensure permanent free-living Koala populations will be maintained over their present range. Under *SEPP 44* Koala Plans of

Legislation	Purpose and Relevance
44 – Koala Habitat Protection	Management are required to be prepared where important Koala populations and / or Koala habitat are under threat. Populations of Koalas have been recorded within and surrounding the Project Boundary and a comprehensive *KPoM* has been prepared for the Project.

2.5 Other Relevant Plans and Guidelines

Other plans and guidelines relevant to this *BMP* include the following:

- *Namoi Catchment Action Plan 2010-2020*; and
- *Guide to Managing Box Gum Grassy Woodlands.*

A summary of the relevance of this legislation to this *BMP* is provided in *Table 7*.

Table 7 Relevant Plans and Guidelines

Plan/Guideline	Purpose and Relevance
Namoi Catchment Action Plan 2010-2020	The *Namoi Catchment Action Plan* (*CAP*) *2010–2020* is a 10-year plan that has been developed to guide the implementation of natural resource management (NRM) in the Namoi Catchment. The *CAP* was written in 2010, approved in 2011 and updated in 2013. The *CAP* identifies the most critical assets in the Namoi Catchment that are a priority for NRM intervention, together with their critical thresholds. For each threshold, the *CAP* provides targets and actions that, if successfully implemented, will ensure that the thresholds are not crossed. The CAP is relevant to this *BMP* as one of the critical assets identified is “biodiversity” with an associated range of thresholds including woody vegetation cover and population size of threatened species. This *BMP* is consistent with the objectives of the *CAP* as it provides for the protection of biodiversity associated with the Project.
A Guide to Managing Box Gum Grassy Woodlands	This document is a handbook that was prepared to assist private land managers to improve the amount and condition of Box Gum Grassy Woodland on their properties. It is relevant to this *BMP* as it includes information on a range of topics that are also addressed in this document including weed control, grazing management, and revegetation of areas of Box Gum Grassy Woodland.

3.0 Existing Environment of the Project Boundary

3.1 Existing Flora and Fauna Values

The majority (approximately 80%) of the Project Boundary has been cleared for agricultural practices, with woodland vegetation limited to fragmented patches surrounded by paddocks, narrow tracts along fence lines and road verges and intact patches at higher elevations. Historical photographs indicate that the majority of the clearing that has taken place within the Project Boundary was undertaken prior to 1954 and that levels of native vegetation have not changed significantly since then, either in configuration or overall amount.

Despite the historic clearing and land degradation from agricultural practices, the Project Boundary still supports significant flora and fauna values, including several threatened vegetation communities and habitat for a range of fauna species, including several threatened species. The majority of threatened species within the Project Boundary are associated with the remnant patches of box and ironbark woodland communities, in particular large areas of vegetation associated with Mt Watermark. As the Project Boundary is surrounded by heavily cleared agricultural land, these patches also provide a "stepping stone" corridor for a range of highly mobile species, particularly birds and bats.

3.1.1 Vegetation Communities

3.1.1.1 Overview

The vegetation within the Project Boundary is predominantly cleared and used as cattle grazing or crop production and consequently the vegetation is dominated by low diversity grassland that has been derived from the previous clearance of the pre-existing woodland.

Treed vegetation within the Project Boundary is characterised by a mixture of grassy and shrubby open forests and woodland types. These mostly occur as fragmented narrow tracts of woodland along boundary fences and road verges, isolated patches of remnant or regrowth open forest or woodland patches on hills and steeper slopes and scattered paddocks trees. Some small areas of regenerating woodland are present within the Project Boundary.

The treed vegetation within the Project Boundary consists of several broad associations consisting of grassy woodlands and shrubby woodlands. The distribution of the vegetation communities is determined largely by soil type and topography. Within the Project Boundary, *Eucalyptus blakelyi* (Blakely's Red Gum) and *Callitris glaucophylla* (White Cypress Pine) are largely found on well-drained soils, particularly on ridges and rises, whilst the box Eucalypt species have an affinity with the lower-lying parts of the landscape on more fertile soil derived from colluvial wash off the sandstone hills within the Project Boundary. The presence of box Eucalypts (e.g. *Eucalyptus albens* (White Box) and *Eucalyptus melliodora* (Yellow Box), *Acacia pendula* (Weeping Myall) and *Casuarina cristata* (Belah) trees typically indicate dark soils derived from basalts and/or alluvium and since much has been cleared for crop lands, is commonly observed as fragmented remnant vegetation on the fringes of cropping land and road verges.

Table 8 lists the Plant Community Types (PCTs) within the Project Boundary, as well as their variants and TEC status. The distribution of vegetation and TECs within the Project Boundary is shown in *Figure 4* and *Figure 5*, respectively.

Table 8 Vegetation communities within the Project Boundary

PCT #	PCT Name	Ancillary PCT Label ^	BC Act Status	EPBC Act Status	EPBC Act Community	Project Boundary (ha)
1383	White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion	White Box	EEC	CEEC	Box Gum Woodland	988
1383	White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion	White Box (Regenerating)	EEC	CEEC	Box Gum Woodland	28
1329	Yellow Box - Blakelys Red Gum grassy woodland of the Nandewar Bioregion	Blakely's Red Gum	EEC	CEEC	Box Gum Woodland	90
1329	Yellow Box - Blakelys Red Gum grassy woodland of the Nandewar Bioregion	Blakely's Red Gum (Regenerating)	EEC	CEEC	Box Gum Woodland	17
1329	Yellow Box - Blakelys Red Gum grassy woodland of the Nandewar Bioregion	Yellow Box	EEC	CEEC	Box Gum Woodland	73
1383 / 1329	White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion / Yellow Box - Blakelys Red Gum grassy woodland of the Nandewar Bioregion	Derived Native Grassland	EEC	CEEC	Box Gum Woodland	73
101	Poplar Box - Yellow Box - Western Grey Box grassy woodland on cracking clay soils mainly in the Liverpool Plains, Brigalow Belt South Bioregion	Inland Grey Box	EEC	EEC	Inland Grey Box Woodland	55
27	Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion	Weeping Myall	EEC	EEC	Grey Box Woodland	22
35	Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion	Brigalow	EEC	EEC	Brigalow (Acacia harpophylla dominant and co-dominant)	9

PCT #	PCT Name	Ancillary PCT Label ^	BC Act Status	EPBC Act Status	EPBC Act Community	Project Boundary (ha)
147	Mock Olive - Wilga - Peach Bush - Carissa semi-evergreen vine thicket (dry rainforest) mainly on basalt soils in the Brigalow Belt South Bioregion	Vine Thicket	EEC	EEC	Semi-evergreen Vine Thicket	n/a*
202	Fuzzy Box woodland on colluvium and alluvial flats in the Brigalow Belt South Bioregion (including Pilliga) and Nandewar Bioregion	Fuzzy Box	EEC	-		32
56	Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW	Poplar Box	-	EEC	Poplar Box Grassy Woodland	223
55	Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions	Belah	-	-		7
146	Whitewood low open woodland of the Brigalow Belt South Bioregion and north-eastern Darling Riverine Plains Bioregion	Whitewood	-	-		76
1315	White Cypress Pine - Silver-leaved Ironbark grassy woodland of the Nandewar Bioregion	Tumbledown Red Gum	-	-		50
1308	White Box - White Cypress Pine shrubby open forest of the Nandewar Bioregion and Brigalow Belt South Bioregion	Shrubby White Box	-	-		234
1308	White Box - White Cypress Pine shrubby open forest of the Nandewar Bioregion and Brigalow Belt South Bioregion	Shrubby White Box (Regenerating)	-	-		72
1308	White Box - White Cypress Pine shrubby open forest of the Nandewar Bioregion and Brigalow Belt South Bioregion	Shrubby Blakely's Red Gum	-	-		6
1308	White Box - White Cypress Pine shrubby open forest of the Nandewar Bioregion and Brigalow Belt South Bioregion	Shrubby Blakely's Red Gum / Motherumbah	-	-		15

PCT #	PCT Name	Ancillary PCT Label ^	BC Act Status	EPBC Act Status	EPBC Act Community	Project Boundary (ha)
n/a	n/a	Low Diversity Grassland, Planted and Exotic Pasture	-	-		7,290
n/a	n/a	Cleared Areas	-	-		141
GRAND TOTAL						9,501

** Area of occurrence is <0.1 ha and has not been mapped*

^ Ancillary PCT labels represent the locally-defined vegetation communities determined as part of the EIS. These labels have been retained to differentiate between different forms of the same PCT.

3.1.1.2 Threatened Ecological Communities

Land within the Project Boundary contains several ecological communities that are listed under either the *BC Act* and/or the *EPBC Act*. The majority of these are variants of the community known as "*White Box, Yellow Box and Blakely's Red Gum Woodland and Derived Native Grasslands*" (Box Gum Woodland), which is listed as an Endangered Ecological Community (EEC) under the *BC Act* and as a Critically Endangered Ecological Community (EEC) under the *EPBC Act*. These variants include:

- PCT 1383_White Box;
- PCT 1383_White Box (Regenerating);
- PCT 1329_Blakely's Red Gum;
- PCT 1329_Blakely's Red Gum (Regenerating);
- PCT_1329_Yellow Box; and
- PCT 1383 / 1329_Derived Native Grassland.

In addition to the variants of Box Gum Woodland, other TECs that have been recorded from the Project Boundary include the following:

- Inland Grey Box Grassy Woodland (listed as an EEC under both the *BC Act* and the *EPBC Act*);
- Weeping Myall Woodland (listed as an EEC under both the *BC Act* and the *EPBC Act*);
- Brigalow (listed as an EEC under both the *BC Act* and the *EPBC Act*);
- Semi-evergreen Vine Thicket (listed as an EEC under both the *BC Act* and the *EPBC Act*);
- Fuzzy Box Woodland (listed as an EEC under the *BC Act*); and
- Poplar Box Woodland (listed as an EEC under the *EPBC Act*).

It is noted that Poplar Box Woodland was only listed under the *EPBC Act* in 2019 and therefore was not assessed as a TEC at the time the *EIS* documentation was prepared.

The extent of TECs within the Project Boundary is detailed in *Table 8* and the distribution is shown in *Figure 5*.

3.1.2 Flora

3.1.2.1 General Flora Species

The Project Boundary supports vegetation containing a high diversity of species, including both native and exotic species. Over 500 flora species have been recorded within the Project Boundary and the surrounding landscape. The dominant plant families within the Project Boundary include the Myrtaceae, Fabaceae, Asteraceae and Poaceae families. The most common genera encountered is *Eucalyptus* (canopy tree species). The Poaceae (grasses) family is has the highest diversity of species within the Project Boundary, although it is not strongly represented by any one genus.

3.1.2.2 Exotic Species

Approximately 30% of the flora species diversity within the Project Boundary is comprised of exotic species. Exotic species occur predominantly in the disturbed areas of the Project Boundary, including grasslands and fragmented woodland patches. *Table 9* lists the Weeds of National Significance (WoNS), Priority Weeds and High Threat Exotic Weeds that have previously been recorded within the Project Boundary.

A baseline survey of weeds is required to be completed within the Project Boundary following the approval of this *BMP*. Information collected during these baseline surveys will be used to refine the management activities for weeds within the Project Boundary and the *BMP* will be updated accordingly. Weed mapping will be included within the updated *BMP*.

Table 9 Significant Weeds within the Project Boundary

Scientific Name	Common Name	WoNS	Priority Weed Species	High Threat Exotic Species
Alternanthera pungens	Khaki Weed			Yes
Bidens pilosa	Cobbler's Pegs			Yes
Bryophyllum delagoense	Mother-of-millions		Regional Priority Weed (Asset Protection)	Yes
Carthamus lanatus	Saffron Thistle			Yes
Chloris gayana	Rhodes Grass			Yes
Cyperus eragrostis	Umbrella Sedge			Yes
Eragrostis curvula	African Lovegrass			Yes
Lycium ferocissimum	African Boxthorn		State Priority (Asset Protection), Regional Priority Weed (Asset Protection)	Yes
Opuntia aurantiaca	Tiger Pear	Yes	State Priority (Asset Protection), Regional Priority Weed (Asset Protection)	Yes
Opuntia stricta	Common Prickly Pear	Yes	State Priority (Asset Protection)	Yes
Paspalum dilatatum	Paspalum			Yes
Phyla nodiflora	Carpet Weed			Yes
Stenotaphrum secundatum	Buffalo Grass			Yes
Xanthium spinosum	Bathurst Burr			Yes

3.1.2.3 Threatened Species

Land within the Project Boundary provides habitat for a wide range of flora species; however no threatened flora species currently listed under either the *BC Act* or the *EPBC Act* have been recorded within the Project Boundary. Although not recorded from the Project Boundary during targeted surveys undertaken for the *EIS*, the following threatened flora species have some potential to occur due to the presence of suitable habitat:

- *Dichanthium setosum* (Bluegrass) (*BC Act*: Vulnerable; *EPBC Act*: Vulnerable);
- *Digitaria porrecta* (Finger Panic Grass) (*BC Act*: Endangered);

- *Cadellia pentastylis* (Ooline) (*BC Act*: Vulnerable; *EPBC Act*: Vulnerable); and
- *Swainsona murrayana* (Slender Darling-pea) (*BC Act*: Vulnerable; *EPBC Act*: Vulnerable).

3.1.3 Fauna

3.1.3.1 Fauna Habitat Values

As noted above, the majority of the Project Boundary has been cleared for agricultural practices, with woodland vegetation limited to fragmented patches surrounded by paddocks, narrow tracts along fence lines and road verges and intact patches at higher elevations. Despite the historic clearing and land degradation from agricultural practices, the matrix of woodland patches and cleared areas still supports habitat for a range of native vertebrate fauna species, including amphibians, reptiles, birds, microbats and arboreal and terrestrial mammals. Key habitat features within the Project Boundary include:

- wetland and riparian environments suitable for fauna species dependent on these habitats such as wetland birds, some amphibians and reptiles;
- ground cover, leaf litter, coarse woody debris and rocky outcrops suitable as shelter for small terrestrial fauna species;
- tree hollows suitable as shelter and breeding habitat for a range of hollow-dependent fauna;
- blossom-producing trees suitable as forage for a range of nectarivores;
- Koala feed tree species; and
- caves, culverts and other suitable shelter or breeding habitat for a range of cave-dependent fauna.

3.1.3.2 General Species

The matrix of woodland and grassland communities within the Project Boundary and in the surrounding locality provides extensive forage, breeding and shelter habitat for a range of fauna species. Nearly 150 fauna species have been recorded within the Project Boundary. This includes five amphibians, 100 birds, 25 mammals and 17 reptiles.

3.1.3.3 Exotic Species

The following exotic species were previously recorded within the Project Boundary:

- Birds:
  - Rock Dove (*Columba livia*);
  - Spotted Dove (Streptopelia chinensis);
  - Common Starling (*Sturnus vulgaris*);
- Mammals:
  - House Mouse (*Mus musculus*);
  - Black Rat (*Rattus rattus*);
  - Feral Dog (Canis familiaris);
  - European Red Fox (*Vulpes vulpes*);
  - Feral Cat (*Felis catus*);
  - European Cattle (*Bos taurus*);
  - Brown Hare (*Lepus capensis*); and
  - European Rabbit (Oryctolagus cuniculus).

3.1.3.4 Threatened Species

Despite the historic clearing and land degradation from agricultural practices, the matrix of woodland and grassland communities within the Project Boundary and in the surrounding locality provides extensive forage, breeding and shelter habitat for a range of fauna species including birds, bats and terrestrial mammals. Several threatened fauna species listed under the *BC Act* have been recorded within the Project Boundary. In addition to those recorded from the Project Boundary, database records indicate that several threatened fauna species listed under either the *EPBC Act* and/or the *BC Act* have been recorded from the Gunnedah LGA.

The threatened fauna species listed under the *BC Act* and/or the *EPBC Act* that have been recorded from within the Project Boundary and those that are known to occur in the locality and considered to have potential to occur within the Project Boundary are presented below in *Table 10*. The location of threatened fauna recorded within the Project Boundary is shown on *Figure 6*.

Table 10 Summary of Threatened Fauna Species Known or Potentially Occurring within the Project Boundary

Common Name	Scientific Name	BC Act Status	EPBC Act Status	Occurrence within Project Boundary
Birds				
Little Lorikeet	*Glossopsitta pusilla*	Vulnerable	-	Known
Brown Treecreeper	*Climacteris picumnus victoriae*	Vulnerable	-	Known
Speckled Warbler	*Chthonicola sagittatus*	Vulnerable	-	Known
Grey-crowned Babbler	*Pomatostomus temporalis temporalis*	Vulnerable	-	Known
Diamond Firetail	*Stagonopleura guttata*	Vulnerable	-	Known
Spotted Harrier	*Circus assimilis*	Vulnerable	-	Known
White-bellied Sea-eagle	*Haliaeetus leucogaster*	Vulnerable	-	Known
Little Eagle	*Hieraaetus morphnoides*	Vulnerable	-	Known
Barking Owl	*Ninox connivens*	Vulnerable	-	Known
Painted Honeyeater	*Grantiella picta*	Vulnerable	Vulnerable	Potential
Black-chinned Honeyeater	*Melithreptus gularis gularis*	Vulnerable	-	Potential
Regent Honeyeater	*Anthochaera phrygia*	Critically Endangered	Critically Endangered	Potential
Swift Parrot	*Lathamus discolor*	Endangered	Critically Endangered	Potential
Hooded Robin	*Melanodryas cucullata cucullata*	Vulnerable	-	Potential
Varied Sittella	*Daphoenositta chrysoptera*	Vulnerable	-	Potential
Turquoise Parrot	*Neophema pulchella*	Vulnerable	-	Potential
Superb Parrot	*Polytelis swainsonii*	Vulnerable	Vulnerable	Potential
Bush Stone-curlew	*Burhinus grallarius*	Endangered	-	Potential
Square-tailed Kite	*Lophoictinia isura*	Vulnerable	-	Potential

Common Name	Scientific Name	BC Act Status	EPBC Act Status	Occurrence within Project Boundary
Black-breasted Buzzard	*Hamirostra melanosternon*	Vulnerable	-	Potential
Masked Owl	*Tyto novaehollandiae*	Vulnerable	-	Potential
White-throated Needletail	*Hirundapus caudacutus*	Not listed	Migratory	Potential
Fork-tailed Swift	*Apus pacificus*	Not listed	Migratory	Potential
White-bellied Sea-eagle	*Haliaeetus leucogaster*	Not listed	Migratory	Known
Mammals				
Koala	*Phascolarctos cinereus*	Vulnerable	Vulnerable	Known
Spotted-tailed Quoll	*Dasyurus maculatus*	Vulnerable	Endangered	Potential
Squirrel Glider	*Petaurus norfolcensis*	Vulnerable	Not listed	Potential
Yellow-bellied Sheathtail Bat	*Saccolaimus flaviventris*	Vulnerable	Not listed	Known
Eastern Freetail-bat	*Mormopterus norfolkensis*	Vulnerable	Not listed	Potential
Little Pied Bat	*Chalinolobus picatus*	Vulnerable	Not listed	Potential
Eastern Cave Bat	*Vespadelus troughtoni*	Vulnerable	Not listed	Potential
Large-eared Pied Bat	*Chalinolobus dwyeri*	Vulnerable	Vulnerable	Potential
Corben's Long-eared Bat	*Nyctophilus corbeni*	Vulnerable	Vulnerable	Potential
Reptiles				
Border Thick-tailed Gecko	*Underwoodisaurus sphyrurus*	Vulnerable	Vulnerable	Potential
Five-clawed Worm-skink	*Anomalopus mackayi*	Endangered	Vulnerable	Potential

Common Name	Scientific Name	BC Act Status	EPBC Act Status	Occurrence within Project Boundary
Pink-tailed Legless Lizard	*Aprasia parapulchella*	Vulnerable	Vulnerable	Potential
Pale-headed Snake	*Hoplocephalus bitorquatus*	Vulnerable	Not listed	Potential

3.2 Impacts of the Project

The largest direct impact of the Mine is the removal of threatened woodland vegetation communities that also provides habitat for a wide range of flora and fauna species. Although there are different types of flora and fauna habitat within the Project Boundary such as natural and semi-natural vegetation, rock outcrops and minor areas of ephemeral streams or gullies, the most extensive habitat is represented by woodland vegetation.

A total of approximately 4,084 ha of woodland and grassland habitat will be removed by the Mine, comprising a suite of vegetation communities. The vegetation communities that would be most impacted by the Mine include: Box Gum Woodland, Inland Grey Box Woodland, Weeping Myall Woodland and Fuzzy Box Woodland TEC in addition to other non-threatened woodland communities and grasslands. Limitations for disturbance to specific communities have been established by the *EPBC* Approval at:

- 738 ha of Box Gum Woodland;
- 30 ha of Grey Box Woodland; and
- 3 ha of Weeping Myall Woodland.

The woodland and derived grassland communities within the Project Boundary provide habitat for a range of fauna, including some species that are listed as threatened or migratory under the *BC Act* and/or the *EPBC Act.* Within these vegetation communities, a range of habitat features provide foraging, shelter and breeding opportunities for fauna. The quality of habitat is dependent upon location and is very dependent upon past land use. Regrowth areas generally lack many habitat features but areas of good quality habitat were identified at several locations. Important fauna habitat features that will be removed by the Mine are:

- dense understorey vegetation – shelter and foraging habitat for amphibians, reptiles, small birds and terrestrial mammals;
- fallen logs, debris and leaf litter – shelter habitat for amphibians, reptiles and terrestrial mammals;
- rocky outcrops – shelter and breeding habitat for amphibians, reptiles and terrestrial mammals;
- hollow-bearing living trees and stags – providing shelter and breeding habitat for a range of reptiles, birds, arboreal mammals and microbats;
- nectar-producing trees and shrubs – foraging habitat for insects, blossom-dependent birds, arboreal mammals and megachiropteran bats (flying-foxes);
- feed trees, shrubs and grasses for a range of species – food for small birds, cockatoos, Koalas and other herbivorous mammals;
- ecotonal (edge) communities – foraging habitat for many species, particularly birds;
- ephemeral drainage lines - foraging, shelter and breeding habitat for amphibians, aquatic reptiles, wetland birds and aquatic mammals; and

- constructed farm dams with aquatic vegetation - foraging and breeding habitat for amphibians, aquatic reptiles and wetland birds.

4.0 Biodiversity Management in the Project Boundary

This chapter outlines the short, medium and long term actions to be taken within the Project Boundary to minimise the impact of the Mine on native flora and fauna species. Areas of the Project Boundary that overlap with the Onsite Offset Areas are managed in accordance with management actions detailed in *Chapter 6*.

4.1 Inductions and Staff Education

Inductions for staff, contractors and visitors to the Mine will be conducted to make them aware of the ecological issues present in these areas and to ensure they know their role and responsibilities to the protection and/or minimisation of impacts to all native biodiversity. Inductions will address the location of sensitive flora and fauna and the policies being implemented to protect the biodiversity values within the Project Boundary.

The induction will include information on the following activities that are prohibited unless these activities are required as part of ongoing management practices:

- fires;
- removal of firewood;
- removal of rocks, sand or gravel;
- clearing of native vegetation;
- recreational hunting;
- baiting (unless permitted as part of the control of feral animals);
- trapping or shooting (unless permitted as part of the control of feral animals); and
- use of fertilisers.

The induction will also include identification of key threats to the Koala and reference the mitigation measures being undertaken within the Project Boundary. In particular, the induction will address the threat of vehicle movement on the Koala and the mitigation measures to be undertaken by on-site personnel, including but not limited to:

- adhering to speed limited and warning signs;
- taking extra care at dawn and dusk when driving around site; and
- following protocols when Koalas are encountered.

A comprehensive description of Koala mitigation measures to be undertaken within the Project Boundary are detailed within the *KPoM* (in preparation).

Additional targeted and specific inductions will be provided for staff and contractors directly involved in clearing of native vegetation in relation to the two-staged clearing protocols, exclusions zones and types of flora and fauna, in particular threatened species.

It will be made clear to those receiving inductions and staff education, that an individual's failure to satisfactorily comply with site directions and rules could result in that individual being subject to disciplinary action.

Records of inductions and staff education will be maintained. Such records are to include:

- the person receiving the training;
- the date the training was received;
- the name of the person conducting the training; and
- a summary of the training provided to the trainee.

4.2 Pre-Clearance and Clearing Activities

4.2.1 Marking Limits of Clearing

Disturbance of vegetation will be limited to the minimum necessary for each stage of pre-strip clearing. Clearance for mining will take place in strips/stages and will occur no more than 12 months in advance of mining operations.

The current limits of clearing will be marked either by high visibility tape on trees, metal/wooden pegs, fencing or an equivalent boundary marker that will be installed any time prior to clearing. To avoid unnecessary or inadvertent vegetation and habitat removal or impacts on fauna, disturbance will be restricted to the delineated area and no stockpiling of equipment, machinery, soil or vegetation will occur beyond this boundary.

The Environmental Superintendent will be responsible for ensuring that the clearing limit markers are installed and maintained to enable the suitable environmental and technical inspections of the proposed disturbance can be undertaken and that disturbance is limited to the approved disturbance.

4.2.2 Pre-Clearance Surveys

Prior to clearing taking place, flora and fauna that have the potential to be disturbed as a result of clearing activities will be identified and where possible relocated to minimize impacts on these species. Pre-clearance surveys will include both general surveys and targeted surveys.

General pre-clearance surveys will be conducted by a Project Ecologist within two weeks of clearing activities and the purpose of these will be to identify and mark potential habitat features for fauna that are present in the clearing area. Targeted pre-clearance surveys will be undertaken by a Fauna Survey Expert if suitable habitat for the Large-eared Pied Bat (*Chalinolobus dwyeri*), South-eastern Long-eared Bat (*Nyctophilus corbeni*) and Spotted-tailed Quoll (*Dasyurus maculatus*) has been identified. The targeted pre-clearance surveys will involve an initial walkover of the clearing area to identify suitable trapping locations and then trapping for these species 48 hours prior to clearing to remove any individuals from the clearing area. Details of pre-clearance protocols and the translocation process for the Koala will be developed during preparation of the *KPoM*. A preparer of the *KPoM* was endorsed by DPIE in October 2019. The endorsed preparer, Greencap, has commenced preparation of the *KPoM*. Pre-clearance and translocation information specific to the Koala will be included within the *BMP* when available. This may occur beyond initial approval of the *BMP*, in which case, the subject material's inclusion will result in a revision of the *BMP.*

Note that for the purposes of this *BMP* a Fauna Survey Expert must be a person with at least five years' experience in undertaking fauna surveys in NSW, including at least four years' experience in locating cave- and tree-dwelling bat species (which includes the Large-eared Pied Bat and South-eastern Long-eared Bat) and the Spotted-tailed Quoll. The Project Ecologist must be someone who is experienced in undertaking fauna surveys and identifying habitat for fauna species, but they are not required to have the same level of experience as the Fauna Survey Expert.

Further detail on the two types of pre-clearance surveys is provided below in subsequent subheadings.

4.2.2.1 General Pre-Clearing Surveys

General pre-clearing surveys will be undertaken within two weeks of clearing by a Project Ecologist. These will involve the identification and marking of fauna habitat features including the following:

- hollow-bearing trees;
- large hollow-bearing logs;
- significant rocky outcrops/boulders with crevices; and
- nests within the tree canopy.

Such features have the potential to contain native species such as bats, gliders, possums, reptiles and birds.

All trees observed to contain hollows will be identified, recorded and flagged with fluorescent marking tape and will have an “H” spray painted with marking paint on two sides of the tree. If the habitat tree is observed to be a potential scar tree, flagging will be limited to fluorescent marking tape. The Environmental Superintendent will be notified of the potential scar tree. No clearing works will to be undertaken in the immediate vicinity of the hollow-bearing or scar tree until approval to clear is issued by the Environmental Superintendent

4.2.2.2 Targeted Flora Pre-clearance Surveys and Translocation Protocol

Targeted pre-clearance surveys for threatened flora species will be conducted by a Project Ecologist prior to the clearing of vegetation. Threatened flora species may include the following:

- *Dichanthium setosum* (Bluegrass);
- *Digitaria porrecta* (Finger Panic Grass);
- *Cadellia pentastylis* (Ooline); and
- *Swainsona murrayana* (Slender Darling-pea).

Pre-clearance surveys for threatened flora species will include traverses through proposed clearing areas. Threatened flora species will be flagged with fluorescent marking tape, or alternative method and the population estimated or mapped, with the location recorded with a GPS. Threatened flora species finds during pre-clearance surveys will be reported via the Unexpected Threatened Species Find Protocol (see *Section 4.2.6*) and through annual compliance reports to ESS and DAWE.

In the event that a threatened flora species is recorded within a clearing area, a *Species-specific Translocation Plan* will be developed. The plan will be prepared in consultation with EES, and will detail appropriate translocation methods and actions. The *BMP* will be updated to include details of any *Species-specific Translocation Plan*.

4.2.2.3 Targeted Fauna Pre-Clearance Surveys and Translocation Protocol

If the initial walkover by the Fauna Survey Expert identified potential habitat for the Large-eared Pied Bat (*Chalinolobus dwyeri*), South-eastern Long-eared Bat (*Nyctophilus corbeni*) and Spotted-tailed Quoll (*Dasyurus maculatus*) in the clearing area, then targeted pre-clearance surveys involving trapping for these species will be conducted by a Fauna Survey Expert prior to the clearing of vegetation.

Initially, within two weeks of clearing, an initial walkover of the clearing area will be conducted by a Fauna Survey Expert to look for suitable trapping locations and to verify the presence of suitable habitat features for these species. If such features are found, then two nights of targeted fauna trapping for each species will be conducted by a Fauna Survey Expert in the vicinity of these areas within 48 hours of clearing activities. The specific pre-clearance survey techniques for these species are presented below, together with a protocol for capture and relocation of any individuals found within the Project Disturbance Boundary.

4.2.2.3.1 Large-eared Pied Bat (Chalinolobus dwyeri)

A *Large-eared Pied Bat Management Plan* will be prepared in consultation with EES in order to appropriately manage potential impacts to the species. This plan will be prepared prior to the commencement of construction. The *Large-eared Pied Bat Management Plan* will provide details on all the management measures proposed for the Large-eared Pied Bat and may include implementing best practice methods from previous studies, undertaking further survey work, identifying appropriate alternative habitat for relocating captured individuals, installing artificial habitat or blocking off entrances to caves or crevices after bats have exited.

The Large-eared Pied Bat is predominantly a cave roosting species, inhabiting the same cave or cliff face crevice throughout their lifetime (OEH, 2017b). A walkover of the clearing area will be conducted by the Fauna Survey Expert within two weeks of clearing to search for signs of occupation and identify suitable trapping locations. Signs of bat occupation include

the sighting of individuals, the presence of guano and prey remnants, or aural detection of chirping, or twittering.

If suitable habitat for this species is located in the clearing area, harp trapping will be conducted for two nights within 48 hours of clearing activities to determine if it is being occupied by the Large-eared Pied Bat. Harp traps will be set in likely flyways in the vicinity of the potential Large-eared Pied Bat habitat. Each harp will be set prior to nightfall and checked before dawn. All bats captured will be identified and relocated to a suitable relocation site. Criteria for suitable relocation sites are detailed within *Section 4.2.4*, however these may be refined as part of the *Large-eared Pied Bat Management Plan*. Bats will be released after nightfall to avoid the risk of predation.

All Large-eared Pied Bats captured during pre-clearance trapping surveys and during clearing supervision will be translocated by the Fauna Survey Expert. All personnel involved with handling bats must be vaccinated against Australian Bat Lyssavirus.

As detailed in *Section 4.2.3.2*, clearing of woodland/forest vegetation and paddock trees within the Project Disturbance Boundary will be limited to the period between 15 February and 30 April each year (unless circumstances necessitate clearance outside this period and DPIE agrees to clearance at another time) to minimise the impact to bats, which go into torpor over winter.

4.2.2.3.2 South-eastern Long-eared Bat (Nyctophilus corbeni)

The South-eastern Long-eared Bat inhabits tree hollows, exfoliating bark and crevices in a variety of vegetation types, although is most commonly found in box/ironbark/cypress pine communities of semi-arid areas (OEH 2017a). A walkover of the clearing area will be conducted by the Fauna Survey Expert within two weeks of clearing to search for suitable habitat.

If suitable habitat for this species is located in the clearing area, harp trapping will be conducted for two nights within 48 hours of clearing activities by a Fauna Survey Expert to determine if it is being occupied by the South-eastern Long-eared Bat. Harp traps will be set in likely flyways in the vicinity of the potential South-eastern Long-eared Bat habitat. Each harp will be set prior to nightfall and checked before dawn. All bats captured will be identified and relocated to a suitable relocation site.

All South-eastern Long-eared Bats captured during pre-clearance trapping surveys and during clearing supervision will be translocated by the Fauna Survey Expert. Criteria for suitable relocation sites is detailed within *Section 4.2.4*. They will be released after nightfall to avoid the risk of predation. All personnel involved with handling bats must be vaccinated against Australian Bat Lyssavirus.

As detailed in *Section 4.2.3*, clearing of woodland/forest vegetation and paddock trees within the Project Disturbance Boundary will be limited to the period between 15 February and 30 April each year (unless circumstances necessitate clearance outside this period and DPIE agrees to clearance at another time) to minimise the impact to bats, which go into torpor over winter.

4.2.2.3.3 Spotted-tailed Quoll (Dasyurus maculatus)

Spotted-tailed Quolls inhabit a wide variety of forested environments, occasionally frequenting cleared agricultural lands and rocky escarpments. They make their dens in rock shelters, small caves, hollow logs and tree hollows and are primarily solitary animals (OEH, 2017c). A walkover of the clearing area will be conducted by the Fauna Survey Expert within two weeks of clearing to search for suitable habitat and record the presence of any potential dens and search for signs of scat, scratches or latrine sites.

If such signs are present, then the walkover of the clearing area will identify suitable trapping locations and two nights of targeted trapping will be conducted for the Spotted-tailed Quoll by the Fauna Survey Expert, using cage traps. The traps will be left in place for two nights within 48 hours of clearing activities to determine if it is being occupied by the Spotted-tailed Quoll. After checking the traps at dawn, they will be then closed until late afternoon, when the traps will be re-baited and opened for the night. Any Spotted-tailed Quolls captured will

be relocated to a suitable relocation site. Criteria for suitable relocation sites is detailed within *Section 4.2.4*.

4.2.3 Clearing Process

4.2.3.1 Ground Disturbance Permit

A *Watermark Coal Mine Ground Disturbance Permit* – (*WCM GDP*) (SWC 2018) is required for all ground disturbance works within the Mine Disturbance Boundary. An application for a *WCM GDP* must be provided to the Environmental Officer no less than 14 days prior to the proposed date for ground disturbance. This requirement can be lessened in the case of an emergency or with agreement of both the Environmental Officer and the Mine Surveyor.

The purpose of the *WCN GDP* is to ensure that ground disturbance activities are conducted such that:

- the area for proposed disturbance can be subject of disturbance in accordance with project approvals;
- worker safety is not jeopardized by buried or above ground services;
- vegetation is removed in accordance with Development Consent and other obligations;
- native fauna and fauna habitat impacts are acceptable;
- natural resources (e.g. topsoil, tree hollows, rock) are recovered and retained;
- heritage impacts (Aboriginal and/or European) are managed;
- erosion and sediment control is adequate; and
- impacts to surface water are acceptable.

Outside the Mine Disturbance Boundary, a *Beyond Mine Disturbance Boundary Ground Disturbance Permit* (*BMDB GDP*) (SWC 2020) is required for all ground disturbance works.

4.2.3.2 Timing of Clearing

Clearing of woodland/forest vegetation and paddock trees within the Project Disturbance Boundary will be limited to the period between 15 February and 30 April each year to minimise the impact to the breeding or hibernation seasons of threatened bird and bat species known to occur within the Project Boundary. Clearing of woodland/forest vegetation and paddock trees outside of this period is permitted in 'exceptional circumstances' on the condition that written consent is provided by the Secretary of DPIE. Exceptional circumstances are taken to be minor clearing of woodland/vegetation and paddock trees and will require the implementation of additional mitigation measures, to be determined in consultation with DPIE, beyond those described within this *BMP* (e.g. additional targeted surveys).

During clearing of woodland/forest vegetation and paddock trees, if the temperature exceeds 35 degrees Celsius clearing must cease. Temperatures will be monitored by the Environmental Superintendent or delegate and communicated to personnel undertaken clearing activities.

Clearing of non woody vegetation (such as grassland), clearing of regrowth vegetation in areas previously cleared and other clearing processes (such as racking of felled trees, mulching, and topsoil removal) is permitted to be undertaken throughout the year and not subject to temperature restrictions.

4.2.3.3 Staging of Clearing

The clearing will be conducted using a two-stage clearing process as follows:

> Stage 1: Clearing will commence following the identification of potential habitat features during the general pre-clearance surveys by a Project Ecologist as well as following the translocation of animals captured during targeted pre-clearing surveys by the Fauna Survey Expert . Hollow-bearing trees marked during pre-clearing will not be cleared during the first stage; however, all vegetation around these trees will be

cleared to enable isolation of the feature. Other habitat features, such as hollow-bearing logs, can be removed during Stage 1 only if done under supervision by a Project Ecologist. Identified hollow-bearing trees will be left at a minimum overnight after Stage 1 clearing to allow resident fauna to voluntarily move from the area.

Stage 2: After hollow-bearing trees have been left overnight, the trees will be cleared using the following protocols:

- trees marked as containing hollows will be shaken by machinery prior to clearing to encourage any animals remaining to leave the hollows and move on;
- use a bulldozer or excavator to start pushing the tree over. Move the bulldozer/excavator over the roots and continue gently pushing the tree over. The tree should not fall heavily to the ground;
- remove branches with hollows and sections of trunk and set aside for immediate transfer to a storage area for placement within rehabilitation areas; and
- all hollows will be investigated by a Project Ecologist for the presence of fauna following felling of the tree.

Given the scale of clearing supervision required by the Project, a team of Project Ecologists will be utilised. Supervision of other habitat features will also be undertaken by a Project Ecologist, if these features were not cleared during Stage 1.

The felled habitat tree will be left overnight to allow any remaining fauna time to leave the hollows and disperse to adjacent habitat. For isolated felled trees, an additional investigation for the presence of fauna will be undertaken by a Project Ecologist.

4.2.3.4 Additional Clearing Protocols

For trees identified during the pre-clearance survey as containing nestlings or juveniles, the trees will be cleared using the following protocols:

- trees will be inspected after a minimum of one night after Stage 1 clearing works are undertaken to determine if animals are still present;
- if animals have self-relocated following Stage 1 clearing works, the tree will be removed using the Stage 2 clearing protocols; and
- if animals have not self-relocated following Stage 1 clearing works, the habitat tree will be left in-situ and inspected to determine animal presence. The following measures will be taken following these inspections:
    - once animals have self-relocated, clearing can be undertaken in accordance with Stage 2 protocols;
    - if animals have not self-relocated within one-week of cessation of clearing activities, the animals are to be removed from the tree using an Elevated Work Platform or by a tree climber. Captured animals are to be relocated to nearby remnant vegetation or if found to be injured/sick are to be taken to a veterinary clinic for treatment. If the animals are unlikely to survive, they will be humanely euthanized.

4.2.4 Fauna Relocation

Any uninjured fauna captured during clearing will be moved to a relocation site. All fauna handling will be carried out by licenced wildlife careres and/or ecologists, or a Fauna Suvey Expert in the case of individuals of the Large-eared Pied Bat, South-eastern Long-eared Bat and Spotted-tailed Quoll.

The location of relocation sites will be determined each year, prior to the commencement of clearing of woodland/forest vegetation and paddock trees. Relocation sites will be established in areas of habitat and will include areas of remnant vegetation retained within the Project Boundary and/or areas of remnant vegetation within the Onsite Offset Areas. To determine the suitability of a relocation site, an assessment of habitat resources will be

undertaken both within the clearing site and relocation site using a plot-based assessment. The number of plots undertaken within the clearing site and relocation site will be determined in accordance with Table 4 of the *Biodiversity Assessment Method* (*BAM*) (OEH, 2017). The plot-based assessment will include collection of the following attributes within a 20 x 50 m plot:

- count of hollow-bearing trees;
- tree stem size classes, measured as 'diameter at breast height over bark' (DBH);
- total length in metres of fallen logs over 10 cm in diameter; and
- area (m^2) of bush rock.

Relocation sites will only be utilised if the habitat resources present are the same in extent and composition to those within the clearing site.

In addition, if a clearing site has the following features for species targeted during pre-clearance surveys, the relocation site must also contain these features:

- Large-eared Pied Bat: Woodland and forest on land within 2 km of caves, scarps, cliffs, rock overhangs and/or disused mines;
- Corben's Long-eared Bat: Hollow-bearing trees; and
- Spotted-tailed Quoll: Rock shelters, small caves and hollow-bearing logs.

If the Large-eared Pied Bat, South-eastern Long-eared Bat or Spotted-tailed Quoll are captured during targeted pre-clearance surveys, they will be placed in a calico bag by the Fauna Survey Expert and kept in a cool, dark, quiet room for the remainder of the day. They will be then released after nightfall by the Fauna Survey Expert in areas of suitable habitat as identified above.

Specific translocation procedures for the Koala will be developed for the *KPoM* and as such all translocations of Koalas will be undertaken in accordance with the *KPoM*.

Details of fauna relocation be documented within the *Fauna Injury and Relocation Report* with the following information recorded:

- species and numbers of individuals recorded;
- location of the relocation site/s; and
- the species and numbers of individuals that were relocated at each relocation site.

In accordance with the *Translocation Operational Policy*, a Biodiversity Conservation Licence may be required if the relocation site is not covered by the development consent.

4.2.5 Injured Fauna Rescue

All persons working on vegetation clearing will be briefed about the possible fauna present and what procedures should be undertaken in the event of an animal being injured or disturbed. All fauna handling will be carried out by licensed wildlife carers and/or ecologists.

An ecologist will be present while clearing to rescue animals injured during the clearance operation. Any animals that are inadvertently injured will be taken to the nearest veterinary clinic for treatment, or if the animal is unlikely to survive, it will be humanely euthanized. Specific rescue procedures for the Koala will be developed for the *KPoM* and as such the management of injured Koalas will be undertaken in accordance with the *KPoM*.

The closest veterinary clinics to the Mine are:

Gunnedah Animal Health Centre

32 Chandos Street

Gunnedah NSW 2380

Telephone: (02) 6742 5585

Gunnedah Veterinary Hospital

14-16 Barber Street, Gunnedah NSW 2380

Telephone: 02 6742 1834

Fax: 02 6742 4422

Email: gunvet@bigpond.com

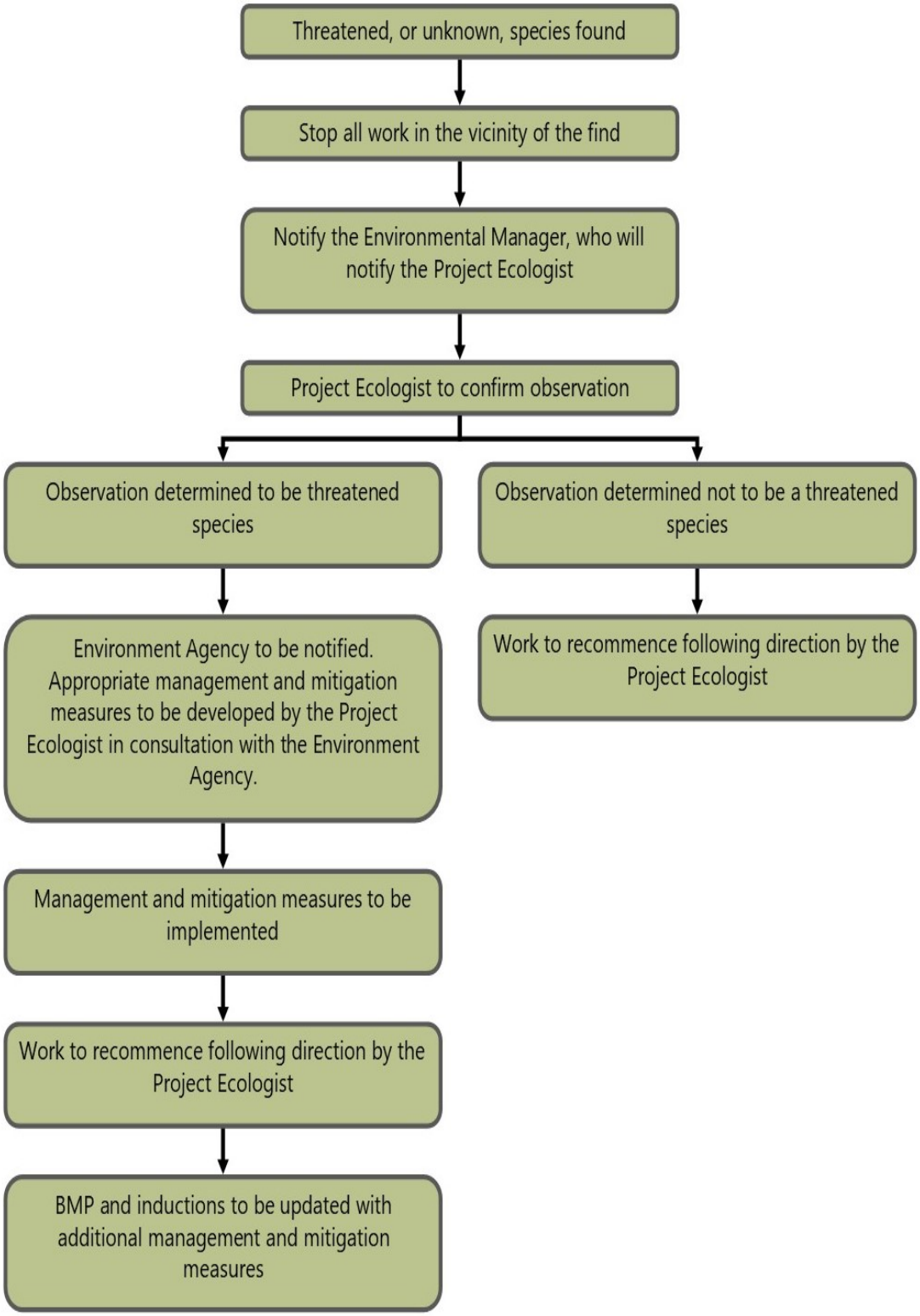
These veterinary clinics should be notified prior to the proposed clearing to ensure they are willing to treat injured animals.

Results and outcomes of fauna rescue activities shall be documented within the *Fauna Injury and Relocation Report* and detail the incidence of sick or injured animals and the actions taken to care for the fauna, if available from the veterinary clinics.

4.2.6 Unexpected Threatened Species Find Protocol

In the event of an unexpected threatened species find within the Project Boundary, in particular during pre-clearing and clearing activities, the protocols outlined in *Plate 1* will be followed. This protocol applies to threatened species not previously assessed as known or potentially occurring within the Project Boundary (see *Chapter 3*). Unexpected threatened species finds are to be documented within the *Unexpected Threatened Species Find Report.*

Plate 1 Unexpected Threatened Species Find Protocol



4.3 Access Control

Measures will be implemented to control access to the Project Disturbance Boundary to minimise disturbance to biodiversity values, including:

- provision of designated access roads to the Mine;
- maintaining existing fencing.
- fencing and restricting no-access areas; and
- installing signage indicating access restrictions.

Access control measures are to be implemented as required for the life of the Mine.

4.4 Vehicle Driving Policies

A *Vehicle Driving Policy* will be prepared and implemented with speed restrictions to minimise the risk to fauna, especially collision risks on internal roads due to the proximity of woodland habitat. Speeds on internal roads within the Project Disturbance Boundary should not exceed 60 km/hr. Signs will be erected to remind drivers to be alert at known fauna crossings and to signal the speed limit.

Details of vehicle driving policies to better ensure the safety of the Koala will be derived from the *KPoM*, once prepared. Once established, such policy detail will be incorporated into the *BMP*.

All vehicles that enter the site must be fit-for-task and should follow the designated tracks throughout the Project Disturbance Boundary, where possible. That notwithstanding, it will be necessary for equipment or vehicles to leave existing access tracks from time to time for maintenance and/or monitoring purposes. In addition, equipment may be required to conduct maintenance activities on tracks to maintain safe access and for bush fire management.

4.5 Soil Pathogen Management

Annual testing for *Phytophthora* pathogens, including *Phytophthora cinnamomi* in trafficked areas and areas to be cleared will be undertaken prior to clearing. If detected, hygiene procedures and guidelines described in *Best Practice Management Guidelines for Phytophthora cinnamomi within the Sydney Metropolitan Catchment Management Authority Area* (Botanic Gardens Trust, 2008) will be followed.

This will involve the disinfection of all machinery, clothing (such as boots and gloves) and tools which have been in contact with soil in the vicinity of the pathogen prior to entering and leaving areas of retained native vegetation inside the Project Disturbance Boundary.

A vehicle wash down area will be established at entry points to the pathogen affected areas and all vehicles entering these areas will be required to be hosed down prior to entry. Shoes will also be disinfected. The wash down area will remain in place until the affected area is no longer utilised, or further testing determined the pathogen is no longer present.

In order to prevent the introduction of pathogens from outside the Project Boundary, all machinery and vehicles entering the mine will also be required to be disinfected prior to entering and after exiting native vegetation areas.

Recommended disinfectant products include:

- non corrosive disinfectants including Coolacide®, Phytoclean®, or Biogram® for cleaning footwear, tools, tyres, machinery and other items in contact with soil;
- 70% Methylated spirits solution in a spray bottle which is suitable for personal use (clothing); and
- sodium hypochlorite 1%, which is effective, but can damage clothing and degrades rapidly in light.

4.6 Seed Collection

Seed will be collected from native vegetation within the Project Boundary and/or Onsite Offset Areas for later use in rehabilitation and revegetation to ensure genetic diversity is maintained. Seed collection will commence as soon as practical in order to collect suitable volumes of seed to commence rehabilitation works.

Seed harvest of most native species within the Project Boundary such as trees, shrubs and groundcover species will be conducted prior to clearing. Seed collection of canopy species will also take place after clearing when the seed in the canopy can be stripped from felled trees.

Seed collection will be conducted throughout the year and from all areas within the Project Boundary (as well as Offset Areas) as required by the seeding times of target species. Indicative seed collection times for native species, with particular focus on species characteristic of the threatened Box Gum Woodland, are shown in *Appendix A*. Many species will produce seed in late spring or summer (following winter or early spring flowering) and/or autumn (e.g. *Microlaena stipoides* and *Acacia* species), whilst *Eucalyptus* species can hold their seed in the canopy for up to a year after seed is produced (e.g. *Eucalyptus blakelyi*).

Seed collection will continue annually to ensure volumes of seed are maintained.

Suitable seed collection techniques include:

- brush harvesting, to obtain seeds from a diversity of understorey species;
- suction or vacuum harvesting of grass species with less persistent seed units (e.g. *Microlaena stipoides*);
- hay strewing - this may be appropriate if a recipient site is ready to receive seed at the time of harvest; and
- on-ground collection of Eucalypt fruit.

Seed of many species will need to be dried and sorted to remove capsules/chaff. A seed drying shed with drying racks will be established for this process and will be well ventilated and rodent proof. Following sorting and drying, all seed should be stored in a refrigerated facility in rodent proof, sealed containers. Seed will also be treated with an insecticide to ensure insects do not damage seed.

The seed that is collected will be stored for use in rehabilitation and revegetation of the Offset Areas in order to maintain the genetic integrity of the vegetation. Some seed will also be germinated to provide tubestock for planting. This may be contracted out to a native plant nursery located off site.

Should seed collection be required to be undertaken outside of the Project Boundary or Offset Areas, a licence would be required to collect seeds from threatened species or TECs.

All seed collection will be undertaken following the *Florabank Guidelines, Native Seed Collection Methods* (Australian Seed Centre and Mortlock, 1999). The seed species, location of collection and weight of seed will be documented within the *Seed Collection Report.*

In addition to these records, a database of seed volume for all species will be established in which seed used and seed collected will be recorded in order to identify priorities for future seed collection and to predict future shortages. As a guide, a minimum requirement of two years seed for rehabilitation will be collected and stored (with consideration of seed viability). Seed mixes are detailed in the *Rehabilitation Management Plan* (SLR 2018) from which seed volumes for mine areas can be calculated. Any batches of seed more than two years old will be tested for viability on an annual basis (with viability recorded) and if seed becomes unviable, replacement batches of seed will be collected.

4.7 Salvage of Habitat Features

A selection of habitat features disturbed within the Project Disturbance Boundary will be salvaged for use within revegetation and rehabilitation areas of the Onsite Offset Areas.

The quantity of habitat resources available within a clearing site will be determined each year, prior to the commencement of clearing using a plot-based assessment. The number of plots undertaken within the clearing site will be determined in accordance with Table 4 of the *Biodiversity Assessment Method* (*BAM*). The plot-based assessment will include collection of the following attributes within a 20 x 50 m plot:

- count of hollow-bearing trees (tree with hollows visible from the ground);
- size class of tree hollows;
- total length in metres of fallen logs over 10 cm in diameter; and
- area (m^2) of bush rock.

This data will be utilised to estimate the extent of habitat features across the clearing site.

Due to the potential damage of habitat features during felling, salvage items will be identified following clearing. Habitat features to be selected for salvage include:

- hollow-bearing limbs, that are assessed as having structural integrity. Where possible, hollows are to be removed from felled trees with a minimum length of 1 m using a chainsaw. A range of size classes of hollows are required;
- fallen timber (over 10 cm in diameter and 1 m in length), that are assessed as having structural integrity; and
- bush rocks (>50 cm in width) assessed as structurally suitable for relocation.

The following procedures apply to habitat features salvaged within a clearing area:

- type of habitat feature, and likely threatened species that use that feature, is recorded;
- original location of habitat feature is recorded using a GPS; and
- habitat features to be marked using fluorescent tape on the feature.

All habitat features identified as suitable for salvage will be itemised within the *Salvaged Habitat Feature Report.*

The salvage target for each clearing event will be minimum 50% of habitat features identified within each clearing site during pre-clearing surveys. This target takes into account that not all habitat features will have structural integrity that is suitable for relocation. The target for salvaging of hollows extracted using a chainsaw is 5% of hollow-bearing limbs identified as suitable for salvage.

- 5% of small and medium sized hollows identified as suitable for salvage; and
- 10% of large hollow identified as suitable for salvage.

Targets will be reviewed annually following the completion of clearing/salvage activities.

All salvaged items will be relocated to a temporary stockpile area prior to relocation to the Onsite Offset Areas. The location of any stockpiling areas will be identified prior to each clearing event. Salvaged features will generally not remain within temporary stockpile areas for more than one year. For salvaged features being relocated to the Mine Rehabilitation Offset Area, it may be necessary to stockpile features within a storage area for up to three years due to the lag in commencement of revegetation of the Mine Rehabilitation Offset Area.

Woody vegetation that is not salvaged will be mulched and re-spread over the topsoil of the clearing site. Any weed species with the potential to establish in mulch from seed or other propagules, such as prickly pear (Opuntia species) and Mother-of-millions (*Bryophyllum delagoense*) will not be mulched. Trees will not be chipped if those species produce wood chips that are not suitable for use in rehabilitation activities. For example, Black Cypress (*Callitris endlicheri*) can leach chemicals that prevent other species from germinating.

4.8 Soil Management

4.8.1 Topsoil Stripping and Management

Where possible, topsoil will be translocated from active mining areas to areas being rehabilitated to conserve the native seed bank of local ecological communities. Topsoil from areas of Derived Native Grassland or other native vegetation is a priority for salvage and topsoil from areas of exotic grassland will be salvaged but preferentially not utilised in proposed woodland areas due to the likely detrimental impact of the weed propagules present in the soil. This will improve the quality and diversity of native vegetation in rehabilitation areas and maximise the establishment of a diversity of native species, particularly the understorey species that maintain the ecological function of native vegetation communities. Topsoil translocation is likely to be most applicable to the rehabilitation of the Mine Rehabilitation Offset Area after mining is complete.

Topsoil will be stripped after clearing to the depth determined from soil surveys, while avoiding stripping of subsoil. Following stripping the soil may be briefly stockpiled while ameliorants (such a gypsum, lime or organic matter) is added, before being transported for use in rehabilitation.

Topsoil stockpiling will be avoided as it can result in declines in soil micro-organisms, declines in the soil seed bank and the growth of weeds on soil stockpiles. Stockpiles – both topsoil and subsoil – with any weed infestations will be managed via application of an appropriate herbicide or 'scalped' prior to respreading.

Topsoil will be spread to a minimum depth of 200mm when recreating the topsoil profile in areas being rehabilitated.

As fresh topsoil will not be available for the final area to be rehabilitated, some topsoil will need to be stockpiled for the final area of rehabilitation. Alternatively, a blend of topsoil and subsoil may be used for rehabilitation if soil testing of subsoil indicates it is suitable for this application.

All topsoiled areas will be contour ripped (after topsoil spreading) to create a 'key' between soil and the spoil. On slopes ripping should be undertaken on the contour and the tynes lifted for approximately 2m every 200m to reduce the potential for channelized erosion. Best results will be obtained by ripping when soil is dry and when undertaken immediately prior to sowing. The respread topsoil surface should be scarified prior to, or during, seeding to reduce run-off and increase infiltration. This can be undertaken by contour tilling with a fine-tyned plough or harrows.

An inventory of topsoil volumes will be retained and maintained to ensure that sufficient soil is available to rehabilitate all areas. In some cases it may be necessary to spread topsoil more thinly than it occurs naturally.

Sampling and analysis of topsoil (and subsoil) resources, whether stockpiled or in-situ, will be undertaken no more than 12 months prior to respreading. This will assist in ensuring that soil quality is consistent with proposed land use objectives and Land Capability Class requirements. Understanding soil characteristics will also assist in determining the required rates of fertiliser and/or ameliorants that may be required to blende specific soil types to achieve enhanced outcomes.

4.8.2 Subsoil Management

Subsoil typically contains a range of properties that makes it unsuitable for use as a growth media: high salinity, high sodicity and low nutrient availability. As such the use of subsoil will be avoided as a growth media, except where soil testing indicates that it can be used alone or blended with topsoil and effectively improved through the addition of ameliorants. Topsoil will be stripped separately to subsoil, after which subsoil will be removed and subsequently placed below topsoil in the recreated soil profile as part of rehabilitation earthworks.

Subsoil depth in rehabilitation areas will be 500mm deep for Rural Land Capability Classes IV and V and 300mm deep for Rural Land Capability Class VI. The subsoil layer will be spread on an even but roughened surface that has been ripped on the contour to break any

compacted and/or smooth surfaces. Ripping will also assist the keying of subsoil into the overburden, which will in turn assist in the prevention of land slip, assist vegetation to penetrate the soil profile, encourage water infiltration and percolation and to minimise erosion.

4.9 Weed Management

Detailed specifications for weed management are included within *Weed and Pest Management Plan* (*WPMP*) (SWC, 2019). The objectives of weed management are as follows:

- identify the location of target weed species:
    - compile maps of known occurrences of weed species and update with new occurrences;
    - develop and maintain a *Weed Register*. This *Weed Register* will include for each species, details of distribution, abundance, relevant biological information, a history of control methods and their relative success; and
    - conduct inspections during exploration, construction and operations to identify new weed outbreaks. Record any new outbreaks within the *Weed Register;*
- control existing infestations or future outbreaks of Priority Weeds within the Mine area:
    - implement control measures for Priority Weeds identified on site;
    - conduct timed spot spraying of emergent plants;
    - conduct follow-up weed control as required. Follow-up weed control involves the selective removal or treatment of weeds, whilst allowing regenerating or planted native plants to increase in size, abundance and percentage cover. All weeds will be targeted during the follow-up weed control phase;
    - conduct maintenance weed control as required. It is expected that the amount of weed management required will decrease once initial infestations are controlled and areas become more resistant to disturbance and weed colonisation; and
    - after physical removal of any plant material, the plant material should be stockpiled well away from sensitive areas (native flora, waterways etc) and disposed of in an environmentally sensitive manner to prevent the spread of propagules or further seed production from the cut plant material;
    - weed control with chemicals:
        - only use products registered for use on the weed in question;
        - select a product with less residual impacts, where possible. Always avoid contact of the chemical with waterways or water bodies;
        - maintain a *Safety Data Sheet* (*SDS*) for each herbicide and ensure it is readily accessible; and
        - chemical application is only to be carried out by persons holding a minimum current qualification of the AHCSS00027 Agricultural Chemical Skill Set or Nationally recognised equivalent;
    - regularly consult with North West Local Land Services, Gunnedah Shire Council and other authorities involved in regional weed management for changes to noxious weed listing and recommended management measures;
    - ensure seed collected for use in rehabilitation is free of weeds;
    - Include information on noxious weeds in environmental inductions and information posters to the workforce; and
    - provide specialist training to employees directly involved in weed control;
- Prevent the introduction and spread of weeds by plant and equipment:

- infestations of significant weeds (Priority Weeds or WoNS) will be recorded and mapped in areas designated for disturbance. If required, control of weeds will be undertaken prior to vegetation clearing;
- ensure all plant and equipment, coming to and from site, are washed down to prevent the spread of weeds, if required;
- consult on an annual basis with North West Local Land Services, Gunnedah Shire Council and other authorities involved in regional weed management; and
- maintain existing groundcover for as long as possible prior to disturbance.

Control measures for specific weed species present within mine areas are detailed in *Appendix A* of the *WPMP* (SWC, 2019). Weed control methods will be implemented in accordance with the *NSW Weed Control Handbook*. Weed management within the Project Disturbance Boundary will be undertaken over the life of the Mine.

4.10 Feral Animal Management

4.10.1 Overview

Detailed pest management is included within *Weed and Pest Management Plan* (SWC, 2019). In summary, the following specific pest management measures will be adopted for what are considered to likely be the most problematic species within the Project Disturbance Boundary. Feral animal management within the Project Disturbance Boundary will be undertaken over the life of the Mine.

Control measures for significant feral animal occurrences, or newly identified feral animals, will be implemented within one year of identification.

4.10.2 Control Measures

4.10.2.1 European Red Fox

Control measures for the European Red Fox includes:

- baiting with '1080' (in accordance with the *Pesticides Act 1999*) is the recommended control method;
- poisons are typically placed into meat baits, or carcasses, for subsequent consumption by the fox;
- prior to baiting with 1080, it is recommended that bait stations using non-poisoned bait be established. This will allow the bait stations to be monitored for visitation by native fauna by studying tracks via a sand pit. Non-poisoned bait should be buried to a depth of 10-15 cm in the sand pit;
- when it can be ascertained that foxes are the only fauna regularly taking the bait then baiting with 1080 can commence;
- it is recommended that the baits targeting foxes are buried 10-15 cm in the ground to protect native fauna that dig for food. Foxes are able to detect bait buried at depths greater than 10 cm due to their extremely sensitive sense of smell;
- baits should be placed at least 500 metres apart so that foxes do not cache the bait instead of eating it and to avoid the risk of native fauna eating multiple baits;
- after baiting is complete, all untaken baits and carcasses will be recovered and disposed of; and
- other control measures include shooting, electric fencing, trapping, fumigation and fertility control / biological control.

4.10.2.2 Feral Pig

The main control measure for feral pigs is poisoning, primarily using 1080 poison in grain or meat baits. Other control measures include trapping, shooting and fence exclusion.

Slightly different baiting methods are used to the European Red Fox (including application of a higher concentration of monosodium fluoroacetate per bait) as follows:

- when feral pig control is required, an area of feral pig activity will be located based on observation of fresh signs such as wallows, faeces, rooting, tracks, watering point activity and sightings;
- bait stations will be established in these areas by placing small piles of grain, fruit or several un-poisoned pre-feed baits every 50 to 100 metres for about three to ten days. This free-feeding step, although taking time and effort, is essential for attracting the local feral pig population and increasing bait consumption. The bait stations should be checked regularly over several days for evidence confirming pig activity and the non-toxic feed replaced with new material at sites where free-feed was taken;
- once baits are taken, the number of feeding points will be gradually reduced to draw feral pigs into 'cluster bait' stations or 'feeding hot spots'. This ensures that toxic baits can then be presented across the smallest possible area;
- toxic baits will be introduced to cluster bait stations once free-feed bait uptake levels off, and this is continued until toxic bait uptake ceases (1–3 nights). Feral pigs are often killed within the first few nights of the lethal baiting phase; and
- follow-up monitoring will be undertaken to determine if pigs remain in the area and whether further baiting is needed.

After baiting is complete, all untaken baits and carcasses will be recovered and disposed of.

Feral pig populations have the capacity to recover rapidly within two years of control. Effective feral pig control is likely to require follow up control programs.

4.10.2.3 Wild Dog

Wild dogs will be controlled via 1080 poisoning. Such poisoning should be carried out under the conditions set down in the *1080 Pesticide Control Order*.

4.10.2.4 Feral Cat

Broad scale control methods for feral cats are in development. Small scale control methods include trapping, shooting and exclusion fencing.

4.10.2.5 European Rabbit/Brown Hares

Tree guards can prevent or limit animal grazing of tree tubestock and will be utilised as appropriate.

The most effective way of controlling rabbits is through a combination of activities such as warren ripping, fumigation, fencing, poisoning and shooting.

Use of chemical control (such as poisons are "1080" and oats coated with Pindone (marketed as RABBAIT®) will be utilised, if and where appropriate. Usually a trail of poisoned grain is created away from warrens (as rabbits do not usually eat near the warren). It is advantageous to disturb the soil nearby, as rabbits are known to investigate disturbed soil. Pindone is most effective when administered to rabbits in three doses about four days apart over a 10-12 day period.

Brown hares are typically a lesser problem than rabbits.

4.11 Erosion Control Measures

Erosion and migration of sediment from the Mine into adjacent vegetation has the potential to facilitate weed invasion through the introduction of weed seeds and nutrients that favour weed species. This potential impact will be avoided through the implementation of appropriate erosion and sediment control measures such as:

- stabilisation of areas of bare soil using jute matting or mulch (to be applied to areas most prone to erosion due to the limited availability of mulch from salvaged material);
- stabilisation of areas of bare soil by re-vegetating immediately with appropriate local native plants;

- appropriate placement of soil stockpiles;
- stabilising soil stockpiles by seeding with a sterile cover crop (e.g. Japanese millet (summer) or oats (winter)); and
- control of sediment by installing erosion fences downslope of all construction works, prior to commencement of any earthworks to avoid potentially nutrient and seed rich run-off entering neighbouring areas of vegetation.

In accordance with a SWC statement of commitment, a *Sediment and Erosion Control Management Plan* (*SECMP*) (SWC, 2019) has also been prepared in accordance with the *Managing Urban Stormwater, Soils, and Construction* (Landcom, 2004) and *Managing Urban Stormwater, Soils, and Construction, Volume 2E Mine and Quarries* (DECC, 2008). The *SECMP* will be implemented following commencement of this *BMP*.

A baseline assessment of current erosion levels is required to be completed within the Project Boundary following the commencement of implementation of this *BMP*. Information collected during these baseline surveys will be used to refine the management activities for the Project Boundary and the *BMP* will be updated accordingly.

4.12 Salinity Management

Vegetation clearance has the potential to contribute to dryland salinity, as the removal of deep-rooted native vegetation causes groundwater levels to rise, bringing with them dissolved salt that accumulates in the surface zone. Symptoms of soil salinity include slow and spotty seed germination, sudden wilting, stunted growth, marginal burn on leaves (especially lower, older leaves), leaf yellowing, leaf fall, restricted root development and sudden or gradual death of plants (Munns et al., 2017).

Salinity is not known to be a significant issue currently within the Project Boundary, although the presence of saltbush species on the eastern boundary indicates that elevated salt levels may be naturally present in the soil in some locations. The removal of native vegetation by the Mine has the potential to result in an increase in surface salinity levels. This possible groundwater level elevation should be seen in the context that under over cut mining the counter potential of localised lowering of groundwater levels over the short to medium term also exists. Further subsoil may naturally contain higher salt levels than topsoil, and as such, the use of subsoil as a growth media will be avoided in rehabilitation.

Where possible, native vegetation will be retained within the Project Disturbance Boundary. During detailed mine planning opportunities to retain vegetation will be considered.

The revegetation measures outlined in this *BMP* (see *Chapter 6*) provide for the establishment of large areas of native vegetation within the Offset Areas. This revegetation is expected to contribute to managing salinity.

4.13 Agricultural Land Management

4.13.1 During Mining

Agricultural land will be retained within some portions of the Project Boundary. Such areas are to be fenced to limit access to the active mining areas, Mt Watermark Offset Area, Offset Area 6 and Mooki River Offset Area as well as dedicated Conservation Areas. SWC will continue to work with land managers on SWC owned land to ensure the continued productivity of agricultural land not directly impacted by the Mine.

A *Land Management Plan* (SWC, 2019) has been prepared to guide the management of SWC owned land within the mining lease area (excluding the Offset Areas). This will include provisions for grazing and cropping management, erosion and sediment controls and weed and pest controls. This will be communicated and enforced with land managers to ensure the ongoing agricultural productivity of SWC owned land.

Within the Project Disturbance Boundary, agricultural activities will progressively cease as clearing extends across the mining areas.

4.13.2 Post-Mining

Some areas of agricultural land will progressively be reinstated post-mining. Detailed management actions for this agricultural land are detailed within the *RMP*. The objective for the agricultural land is to restore or maintain at least:

- 351 ha of Class II land capability;
- 3,233 ha of Class III land capability; and
- 100 ha of Biophysical Strategic Agricultural Land (BSAL).

The reinstatement of agricultural land will compensate for the loss in available agricultural land as a result of the Mine.

SWC will rehabilitate a minimum of 1,000 ha of land to Class III characteristics as provided in S*ystems Used to Classify Rural Lands in New South Wales* (Cunningham et al.,1988). Reinstated agricultural land will be located proximal to the existing agricultural lands with consideration for road infrastructure and paddock size economies of scale. Upon completion, this land will be dedicated for agricultural purposes. The indicative reinstatement areas for agricultural land are shown in *Figure 7* of the *RMP*.

Within the agricultural area, 100 ha will be rehabilitated to conform to the definition of BSAL as prescribed in the NSW Office of Environment and Heritage and Office of Agricultural Sustainability and Food Security (OEH-OAS&FS) *Interim protocol for site verification and mapping of biophysical strategic agricultural land* (Interim Protocol) (OEH-OAS&FS, 2013). The rehabilitated BSAL will be developed as a single continuous area located on the most favourable topography and proximity to farm tracks and road access. This will facilitate future efficiencies for agricultural activities having regard to access, transport and production. Consideration will also be given to avoiding groundwater seepage sites, to reduce the risk of waterlogging during high rainfall periods. Where ponding occurs, drainage control structures will be installed to direct water back into the natural catchment.

Revegetation activities in agricultural land rehabilitation areas will be planned to occur after the completion of reshaping, topdressing with growth media and construction of drainage structures. Where possible, the timing of the topdressing and drainage works will be scheduled to enable immediate sowing of pasture seed (grasses and legumes) after preliminary ground preparation works are completed in order to minimise the potential for soil erosion and weed invasion.

Cover crops will be used in revegetation to provide an effective groundcover until the specific native and exotic pastures are established. This will minimise the likelihood for erosion during the initial establishment phase of the rehabilitation.

All areas will be scarified prior to sowing to provide a suitable environment that encourages water infiltration in the soil. Any large rocks not covered by the topsoil/subsoil layer will be raked and removed from the scarified soil surface prior to sowing. Seeding will be undertaken as soon as possible after scarifying in order to limit surface crusting and sealing to occur. This will enhance the likelihood of successful seed germination and vegetation establishment.

The pasture species will be appropriate for the season and will include but not be limited to the annual and perennial grass and legume species as identified in the *RMP*. Di-ammonium phosphate (DAP) fertilizer will be applied at a rate of 250 kg / ha at sowing.

4.14 Bush Fire Management

SWC as the owner of the land will take practicable steps to prevent the occurrence of bush fires on the land and to minimise the spread of bush fire.

According to the Project *EIS*, the land within the Project Boundary poses a moderate to low bush fire risk to the Mine due to the limited fuel source, the existing vegetation composition and current agricultural land use practices. However, the adjoining Breeza State Forest experiences build-up of high fuel loads over time from dense vegetation, leaf drop and tinder. A combination of relatively low rainfall, the dry nature of the landscape and high fuel loads

suggests Breeza State Forest could pose a significant bush fire risk to the Mine. Consultation will continue with the Forestry Corporation of NSW over the ongoing management of this risk.

A *Bush Fire Management Plan (BFMP)* (SWC, 2019) has been prepared for the Mine in accordance with a range of legislation including the *NSW Rural Fires Act 1997* and *Work Health & Safety (Mines & Petroleum Sites) Act 2013 and Work Health & Safety (Mines & Petroleum Sites) Regulation 2014*. The *Bush Fire Management Plan* will be implemented following commencement of this *BMP*. The *BFMP* will be publicly available through the SWC website.

4.15 Management of Aboriginal Cultural Heritage Values

4.15.1 Potential Conflicts

There is not expected to be any conflict between the proposed works under this *BMP* and any Aboriginal heritage values (both cultural and archaeological). Aboriginal artefacts will be managed in accordance with the *Heritage Management Plan (HMP)* (SWC, 2019). The approved *HMP* will be publicly available through the SWC website.

Continuous consultation with Registered Aboriginal Parties (RAPs) will be maintained over the life of the Project as part of implementing the *HMP.* That consultation will serve to address any issues that may arise as a consequence of works undertaken in implementing the *BMP*. Where issues arises, mutually acceptable alternative practices will be implemented.

4.15.2 Heritage Conservation Areas

Heritage conservation areas, namely the Watermark Gully Aboriginal Cultural Heritage Conservation Area (ACHCA) and Mooki River ACHCA, will be managed in accordance with the *HMP.* Management activities include fencing, signage and access restrictions. As the Mooki River ACHA overlaps with the Mooki River Offset Area, dual purpose management will be undertaken (see *Section 6.19*).

4.16 Performance Criteria and Trigger Action Response Plan

Table 11 details the performance criteria for management actions within the Project Boundary, as well as how these actions will be monitored and the additional actions required.

Table 11: Performance/Completion Criteria and Trigger Action Response Plan for Management Actions within the Project Boundary Area

Management Theme	Management Actions	Timing	Responsibilities	Monitoring	Trigger	Action/Response
Induction and staff education	All staff, contractors and visitors to the Mine inducted.	Prior to entry to the Mine (ongoing)	Safety Manager	Records reviewed monthly.	Staff, contractor or visitor found not to be inducted to the Mine.	Staff, contractor or visitor unable to enter the Mine until induction completed.
	Additional targeted inductions for staff and contractors involved in clearing of native vegetation.	Within 7 days prior to clearing (ongoing)	Safety Manager	Records reviewed monthly.	Staff and contractors found not to have undertaken additional targeted induction.	Staff and contractors unable to undertake clearing of native vegetation until additional targeted induction completed.
	Records of inductions and staff education will be maintained.	Ongoing	Safety Manager	Records reviewed monthly.	Records not reviewed monthly.	Immediate review and update of records. If require, update record keeping procedures.
Marking limits of clearing	Clearing of vegetation will occur no more than 12 months in advance of the proposed mine plan during operations.	Ongoing	Environmental Superintendent	Clearing boundaries reviewed every six months, or when changes made to the mine plan.	Clearing found to occur more than 12 months in advance of proposed mine plan.	Immediate cessation of clearing at the location of early clearing. Review and update scheduling of clearing works.
	Clearing limits marked either by high visibility tape on trees of metal/wooden pickets, fencing or an equivalent boundary marker.	Within 7 days prior to clearing (ongoing)	Environmental Superintendent	Monthly inspections of clearing limits.	Clearing limits found not to be appropriately marked.	Immediate marking of clearing limits.
	Disturbance, including stockpiling, restricted to clearing limits.	Ongoing	Environmental Superintendent	Monthly inspection of areas adjoining clearing limits.	Disturbance found to occur outside of disturbance area.	If disturbance found to occur within the Mine's approved Disturbance Area, all clearing activity within this area to cease, and any items moved into this area relocated to approved disturbance areas. If disturbance found to occur outside of the Mine's approved Disturbance Area, all activity within this area ceased and relevant agencies notified to determine follow up actions.
	Clearing limit markers maintained.	Ongoing	Environmental Superintendent	Monthly inspection of clearing limits.	Clearing limits found not to be appropriately marked.	Immediate marking of clearing limits.
General pre-clearance surveys	Pre-clearance survey completed in accordance with *Section 4.2.2.1.*	Within 7 days prior to clearing (ongoing)	Ecologist	Annual review of *Pre-Clearance Survey Reports*.	Pre-clearance surveys found not to be undertaken in accordance with *Section 4.2.2.1.*	Review and update training. Review and update scheduling of clearing works.
Targeted pre-clearance surveys (threatened flora species)	Targeted pre-clearance survey completed in accordance with *Section 4.2.2.2.*	Within 7 days prior to clearing (ongoing)	Ecologist	Annual review of *Pre-Clearance Survey Reports.*	Pre-clearance surveys found not to be undertaken in accordance with *Section 4.2.2.2.ii.*	Review and update training. Review and update scheduling of clearing works.

Management Theme	Management Actions	Timing	Responsibilities	Monitoring	Trigger	Action/Response
	Threatened flora species reported to EES and DAWE, as required.	Within 7 days prior to clearing (ongoing)	Ecologist	Annual review of *Pre-Clearance Survey Reports.*	Threatened flora species found not to be reported to EES and DAWE, as required.	EES and DAWE, as required, notified of threatened species find. Review and update reporting procedure.
	Species-Specific Translocation Plan developed, if required.	Within 14 days prior to clearing (ongoing)	Ecologist	Annual review of *Pre-Clearance Survey Reports*.	*Species-Specific Translocation Plan* not developed.	Prepare *Species-Specific Translocation Plan.*
	Threatened flora species managed in accordance with the translocation program.	Within 14 days prior to clearing (ongoing)	Ecologist	Annual review of *Translocation Program*.	Threatened flora species found not to be managed in accordance with the *Species-Specific Translocation Plan.*	Review and update procedures for managing threatened flora species.
Targeted pre-clearance surveys (threatened fauna species)	Targeted pre-clearance survey completed in accordance with *Section 4.2.2.3.* by a Fauna Survey Expert.	Within 7 days prior to clearing (ongoing)	Ecologist	details to be derived from *KPoM*	details to be derived from *KPoM*	details to be derived from *KPoM*
	EES consulted and *Large-eared Pied Bat Management Plan* developed.	Prior to commencement of mine construction.	Ecologist	Annual Review of *Large-eared Pied Bat Management Plan.*	*Large-eared Pied Bat Management Plan* not prepared.	Prepare *Large-eared Pied Bat Management Plan*.
	Large-eared Pied Bat management undertaken in accordance with the *Large-eared Pied Bat Management Pla*n.	Ongoing	Ecologist	Annual Review of *Large-eared Pied Bat Management Plan.*	Management not undertaken in accordance with the *Large-eared Pied Bat Management Plan.*	Review and update training.
	Targeted pre-clearance survey (South-eastern Long-eared Bat) completed in accordance with *Section 4.2.2.3.2*	Within 7 days prior to clearing (ongoing)	Ecologist	Annual review *of Pre-Clearance Survey Reports.*	Pre-clearing found not to be undertaken in accordance with *Section 4.2.2.3.2.*	Review and update training.
	Targeted pre-clearance survey (Spotted-tailed Quoll) completed in accordance with *Section 4.2.2.3.3.*	Within 7 days prior to clearing (ongoing)	Ecologist	Annual review *of Pre-Clearance Survey Reports.*	Pre-clearing found not to be undertaken in accordance with *Section 4.2.2.3.3.*	Review and update training.
Ground disturbance permit	*Ground Disturbance Permit* to be completed prior to ground disturbance.	Prior to clearing (ongoing)	Environmental Superintendent	Monthly review of GDPs.	GDPs found not to be undertaken in accordance with *Section 4.2.3.1*.	Immediate cessation of disturbance in areas for which a GDP was not completed. Disturbance to commence once GDP process followed.
Timing of clearing	Clearing undertaken between 15 February and 30 April each year.	Clearing (ongoing)	Environmental Superintendent	Annual review *of Clearing Reports.*	Clearing undertaken outside of 15 February and 30 April where exceptional circumstances has not been approved.	Immediate cessation of clearing. Relevant agencies notified to determine follow up actions.
	Exceptional circumstance clearing undertaken in accordance with approved additional management measures.	Clearing (ongoing)	Environmental Superintendent	Annual review of *Pre-Clearance Survey Reports*. Annual review of *Clearing Reports.*	Exceptional circumstance clearing not undertaken in accordance with approved additional management measures.	Immediate cessation of clearing. Relevant agencies notified to determine follow up actions.

Management Theme	Management Actions	Timing	Responsibilities	Monitoring	Trigger	Action/Response
Staging of clearing	Clearing undertaken using the two-stage clearing process identified in *Section 4.2.3.3.*	Clearing (ongoing)	Environmental Superintendent	Annual review of *Pre-Clearance Survey Reports*. Annual review of *Clearing Reports.*	Clearing found not to be undertaken in accordance with *Section 4.2.3.3.*	Review and update training.
Additional clearing protocols	If juveniles or nestlings are observed, clearing undertaken using the procedure identified in *Section 4.2.3.4.*	Clearing (ongoing)	Environmental Superintendent	Annual review *of Pre-Clearance Survey Reports*. Annual review of *Clearing Reports.*	Clearing found not to be undertaken in accordance with *Section 4.2.3.4.*	Review and update training.
Fauna relocation	Assessment of habitat resources will be undertaken both within the clearing site and relocation site using a plot-based assessment.	Within 14 days prior to clearing (ongoing)	Ecologist	Annual review of *Fauna Injury and Relocation Reports.*	Assessment of habitat resources not undertaken in accordance with *Section 4.2.4.*	Undertake habitat resource assessment in surrogate clearing site. Undertake habitat resource assessment in relocation site.
	All uninjured fauna captured during clearing (excluding targeted species) relocated to a previously identified and approved relocation site by licensed wildlife carers and/or ecologists in accordance with *Section 4.2.4.*	During clearing (ongoing)	Ecologist	Annual review *of Fauna Injury and Relocation Reports.*	Clearing found not to be undertaken in accordance with *Section 4.2.4.*	Review and update relocation sites and procedures, and educate staff.
	Large-eared Pied Bat, Corben's Long-eared Bat and Spotted Tailed Quoll relocated to relocation sites containing suitable habitat features identified in *Section 4.2.4.*	Prior to clearing (ongoing) / During clearing (ongoing)	Ecologist	Annual review of *Fauna Injury and Relocation Reports.*	Species found not to be relocated to relocation sites.	Review and update relocation sites and procedures, and educate staff.
	Koala relocation undertaken in accordance with the *KPoM*.	Prior to clearing (ongoing) / During clearing (ongoing)	Ecologist	details to be derived from *KPoM*	details to be derived from *KPoM*	details to be derived from *KPoM*
	Fauna relocation details documented within the *Fauna Relocation Report.*	During clearing (ongoing)	Ecologist	Annual Review of *Fauna Injury and Relocation Reports.*	Fauna relocation details found not to be documented within a *Fauna Relocation Report.*	*Fauna Relocation Report* to be prepared or amended.
Injured fauna rescue	Additional targeted inductions for staff and contractors involved in clearing of native vegetation include details of possible fauna present.	Within 14 days prior to clearing (ongoing)	Safety Manager	Records reviewed monthly.	Induction found not to include details of possible fauna present.	Review and update induction content.
	Any animals (except Koalas) that are inadvertently injured taken to the nearest veterinary clinic for treatment, or if required, humanely euthanized.	During clearing (ongoing)	Ecologist	Annual Review of *Clearing Reports.*	Fauna rescue found not to be undertaken in accordance with *Section 4.2.5.*	Fauna rescue procedures reviewed and updated, as required.
	Any injured Koalas have been treated in accordance with the *KPoM*.	During clearing (ongoing)	Ecologist	details to be derived from *KPoM*	details to be derived from *KPoM*	details to be derived from *KPoM*
	Appropriate records have been made of any injured fauna rescues within the *Clearing Report.*	During clearing (ongoing)	Ecologist	Annual Review of *Clearing Reports.*	Fauna rescue details found not to be documented within a *Clearing Report.*	*Clearing Report* to be prepared or amended.

Management Theme	Management Actions	Timing	Responsibilities	Monitoring	Trigger	Action/Response
Unexpected threatened species find protocol	The protocols outlined in *Plate 1* have been followed in the event of any record of a threatened species not previously assessed as known or potentially occurring within the Project Boundary.	Ongoing	Ecologist	Annual Review of *Clearing Reports*.	Protocols in *Plate 1* not followed.	Review and update protocol, and educate staff.
	Unexpected threatened species finds documented within the *Unexpected Threatened Species Find Report*.	Ongoing	Ecologist	Annual Review of *Unexpected Threatened Species Find Report*.	Unexpected threatened species finds details found not to be documented within an *Unexpected Threatened Species Find Report*.	*Fauna Relocation Report* to be prepared or amended.
Access control	The access control measured detailed in *Section 4.3* have been implemented to control access to the Project Boundary to minimise disturbance to biodiversity values.	Prior to commencement of mine construction.	Land Asset Mgr	Twice-annual check of control measures.	Access control measures found not to be implemented.	Undertake access control measures.
Vehicle driving policies	*Vehicle Driving Policy* prepared and implemented in accordance with *Section 4.4* to minimise the risk to native fauna of collisions with vehicles on mine roads.	Prior to commencement of mine construction.	Safety Manager	Twice-annual check of control measures, and monthly review of driving incident reports.	Any aspects of the *Vehicle Driving Policy* found not to be implemented.	Review and update induction content. Install and maintain any required signage.
Soil pathogen management	Annual testing conducted within the clearing area to determine presence of soil pathogens.	Annually (ongoing)	Environmental Superintendent	Annual review of test reports.	Annual testing not undertaken prior to clearing.	Implementation of hygiene procedures until testing confirmed soil pathogens are absent.
	Wash down areas established and utilised by vehicles at the entry to the Project Boundary and in the vicinity of the occurrence of the pathogen.	Prior to the commencement of the mine construction / During clearing (ongoing)	Environmental Superintendent	Twice-annual check of control measures.	Wash down bays not established, maintained or utilised.	Cessation of vehicle movements in the vicinity of the occurrence of the soil pathogen until control measures are implemented.
Seed collection	Seed collected from a diversity of species.	Prior to clearing / During clearing (ongoing)	Ecologist	Annual review of *Seed Collection Report.*	Seed volumes found to be deficient for species groups (e.g. Eucalypts, Acacias) or strata.	Undertake seed collection targeted to species/strata.
	Seed dried, sorted and refrigerated in accordance with *Section 4.6*.	Ongoing	Ecologist	Annual review of *Seed Collection Report.*	Seed management found not to be undertaken in accordance with *Section 4.6*.	Review and update procedures.
	Details of seed collection is documented within the *Seed Collection Report.*	Ongoing	Ecologist	Annual review of *Seed Collection Report.*	Seed collection details found not to be documented within the *Seed Collection Report.*	*Seed Collection Report* to be prepared or amended.
Salvage of habitat features	Assessment of habitat resources will be undertaken within the clearing site using a plot-based assessment.	Within 14 days prior to clearing (ongoing)	Environmental Superintendent	Annual review of *Salvaged Habitat Feature Report.*	Assessment of habitat resources not undertaken in accordance with *Section 4.7.*	Undertake habitat resource assessment in surrogate areas.

Management Theme	Management Actions	Timing	Responsibilities	Monitoring	Trigger	Action/Response
	Habitat features suitable for salvage identified.	During clearing (ongoing)	Environmental Superintendent	Annual review of *Salvaged Habitat Feature Report.*	Habitat features not identified within the *Salvaged Habitat Feature Report.*	Any shortfalls in salvaged items to be made up in subsequent clearing events.
	50% of habitat features identified within a clearing site salvaged.	During clearing / Post clearing (ongoing)	Environmental Superintendent	Annual review of *Salvaged Habitat Feature Report*.	Less than 50% of habitat features identified within a clearing site salvaged.	Any shortfalls in salvaged items to be made up in subsequent clearing events.
	Hollows from 5% of salvaged hollow-bearing limbs extracted using a chainsaw.	During clearing / Post clearing (ongoing)	Environmental Superintendent	Annual review of *Salvaged Habitat Feature Report.*	Less than 5% of salvaged hollow-bearing limbs extracted using a chainsaw.	Any shortfalls in salvaged items to be made up in subsequent clearing events, or supplemented with the use of nest boxes.
	Salvaged items re-used within one year of stockpiling, or within three years if used in the Mine Rehabilitation Offset Area.	Within one year post clearing or three years if in Mine Rehabilitation Offset Area (ongoing)	Environmental Superintendent	Annual review of *Salvaged Habitat Feature Report*.	Salvaged items retained in stockpiles for longer than specified periods.	Salvaged items inspected for suitability to re-use after described time periods. Any shortfalls in re-use to be made up in subsequent clearing events.
	Details of habitat salvage is documented within the *Salvaged Habitat Feature Report*.	Annually post clearing (ongoing)	Environmental Superintendent	Annual review of *Salvaged Habitat Feature Report*.	Details of habitat salvage found not to be documented within the *Salvaged Habitat Feature Report.*	*Salvaged Habitat Feature Report* to be prepared or amended.
	Woody vegetation (excluding significant weeds or Black Cypress) that is not salvaged is mulched and re-spread over topsoil.	Within 14 days post clearing (ongoing)	Environmental Superintendent	Post clearing check of clearing site.	Non-salvaged woody vegetation not managed in accordance with *Section 4.7.*	Undertake mulching, and remove mulch containing significant weeds or Black Cypress.
Soil Management	Topsoil stripped in accordance with *Table 41, Appendix Y, EIS.*	Post clearing (ongoing)	Environmental Superintendent	Annual review of soil management.	Soil not stripped in accordance with *EIS* recommendations.	Soil not utilised until tested and confirmed suitable for use.
	Topsoil stockpiling avoided, unless for final stages of rehabilitations.	Post clearing (ongoing)	Environmental Superintendent	Annual review of soil management.	Topsoil stockpiled prior to final stages of rehabilitation.	Soil considered for immediate translocation.
	Subsoil stripped in accordance with *Table 41, Appendix Y, EIS.*	Post clearing (ongoing)	Environmental Superintendent	Annual review of soil management.	Soil not stripped in accordance with *EIS* recommendations.	Soil not utilised until tested and confirmed suitable for use.
Weed management	Locations of target weed species identified	Ongoing	Land Asset Mgr	Annual review within *BMP Annual Report.*	Target weed locations not identified.	Weed mapping conducted and *Weed and Pest Management Plan* updated.
	Implementation of control measures detailed in *Section 4.9* within the Project Disturbance Boundary.	Ongoing	Land Asset Mgr	Annual review within *BMP Annual Report.*	Control measures not implemented in accordance with *Section 4.9.*	Undertake weed control measures.

Management Theme	Management Actions	Timing	Responsibilities	Monitoring	Trigger	Action/Response
	Prevention of the introduction and spread of weeds by plant and equipment.	Ongoing	Land Asset Mgr	Annual review within *BMP Annual Report.*	Weeds found to be spread by plant and equipment.	Undertake targeted weed control measures in new infestation areas, and review control measures to determine if additional controls required.
Feral animal management	Implementation of European Red Fox, Feral Pig, Wild Dog, Feral Cat and European Rabbit/Brown Hare control measures in accordance with *Section 4.10,* as required.	Within one year of commencement of mine construction.	Land Asset Mgr	Annual review within *BMP Annual Report.*	Feral animals not controlled in accordance with *Section 4.10.*	Undertake targeted feral animal management, and review control measures to determine if additional controls required.
	Control measures for significant feral animal occurrences, or newly identified feral animals, implemented within one year of identification.	Within one year of identification	Land Asset Mgr	Annual review within *BMP Annual Report.*	Control measures for significant feral animal occurrences, or newly identified feral animals, not implemented within one year of identification.	Undertaken control measures, and review need for additional controls.
Erosion control measures	Baseline assessment of erosion levels within the Project Disturbance Boundary undertaken.	Within one year of commencement of the Project	Environmental Superintendent	Annual review *of Sediment and Erosion Control Plan.*	Baseline assessment not undertaken within Year 0-1 of Mine.	Baseline assessment undertaken immediately.
	Erosion and sediment controls undertaken in accordance with the *Sediment and Erosion Control Plan.*	At the commencement of mine construction (ongoing)	Environmental Superintendent	Annual review of erosion and sediment control related *EIS* commitments.	Erosion and sediment control related EIS commitments not followed.	Undertake outstanding erosion and sediment control works.
Salinity management	Retain native vegetation, where possible within the Project Disturbance Boundary.	Ongoing	Environmental Superintendent	Annual review of *Clearing Reports.*	Clearing found to occur outside of planned clearing areas within Project Disturbance Boundary.	Review mine plans to seek opportunities to retain native vegetation with the Project Disturbance Boundary.
Agricultural land management	Agricultural land fenced off from the active mining areas, Mt Watermark Offset Area, Mooki River Offset Area and Aboriginal Conservation areas.	Within 14 days prior to clearing (ongoing)	Land Asset Mgr	Annual review of the *Land Management Plan.*	Agricultural areas found not to be fenced.	Cessation of grazing until fencing installed.
	Management of agricultural land undertaken in accordance with the *Land Management Plan*.	Within one year of commencement of mine construction (ongoing)	Land Asset Mgr	Annual review of the *Land Management Plan.*	Annual review identifies deviation from *Land Management Plan* objectives and/or performance criteria.	Undertake appropriate corrective action.
Bush fire management	Bush fire management undertaken in accordance with the *Bush Fire Management Plan.*	Within one year of commencement of mine construction (ongoing)	Land Asset Mgr	Annual review of the *Bush Fire Management Plan.*	Annual review identifies deviation from *Bush Fire Management Plan* objectives and/or performance criteria.	Undertake appropriate corrective action.
	Ongoing consultation with the Forestry Corporation of NSW.	Within one year of commencement of mine construction (ongoing)	Land Asset Mgr	Annual review of the *Bush Fire Management Plan.*	Breeza State Forest fuel load visibly significant.	Discuss fire management options with Forestry Corporation of NSW.

Management Theme	Management Actions	Timing	Responsibilities	Monitoring	Trigger	Action/Response
Management of potential conflicts with Aboriginal cultural heritage values	SWC's archaeologist notified of any artefacts found or impacted.	As early as practical following the artefact find or impact.	Environmental Superintendent	Annual review of *Heritage Management Plan.*	Archaeologist found to not have been notified.	All activity within the vicinity of the artefact ceased and archaeologist notified to determine follow up actions.
	Ongoing consultation with local Indigenous groups.	In accordance with timing nominated within *Heritage Management Plan* protocols.	Environmental Superintendent	Annual review of *Heritage Management Plan.*	Consultation with local Indigenous groups found to not have been undertaken.	Undertake immediate consultation with local Indigenous groups.
	Management within heritage Conservation Areas to be undertaken in accordance with the *Heritage Management Plan.*	In accordance with timing commitments provided in the *Heritage Management Plan*.	Environmental Superintendent	Annual review of *Heritage Management Plan.*	Obligation with respect to management of Conservation Areas not met.	Determine appropriate corrective action and proceed to implement.

4.17 Completion and Relinquishment

Following the cessation of mining, a number of works will be undertaken before the mining lease can be relinquished. These will include:

- monitoring for, and demonstrating, attainment and maintenance of rehabilitation completion criteria (see *RMP*);
- closure of access tracks that are not required for subsequent land use;
- fencing and fence repair, including fencing off unsafe areas such as final voids;
- weed and pest control to attain/maintain rehabilitation completion criteria;
- repair of erosion areas to attain/maintain rehabilitation completion criteria; and
- removal of all equipment and above ground infrastructure and remediation and rehabilitation of infrastructure areas (if not to be re-used or re-purposed for subsequent land use).

5.0 Existing Environment of the Biodiversity Offset Areas

5.1 Mt Watermark Offset Area

The Mt Watermark Offset Area is contained within the Project Boundary and forms part of the Onsite Offset Area together with Offset Area 6, Mooki River Offset Area and Mine Rehabilitation Offset Area. The Mt Watermark Offset Area is centred on Mt Watermark and represents a largely intact patch of woodland within an extensively cleared landscape. *Table 12* lists the vegetation communities currently occurring within the Mt Watermark Offset Area, their *BC Act* and *EPBC Act* status and their total area. The vegetation community distribution is shown in *Figure 7*. TECs within the Mt Watermark Offset Area are shown in *Figure 8*. An example of the woody vegetation and grassland vegetation within the Mt Watermark Offset Area is provided in *Photograph 1* and *Photograph 2*, respectively.

Table 12 Vegetation Communities within the Mt Watermark Offset Area

PCT #	PCT Name	Ancillary PCT Label	BC Act Status	EPBC Act Status	Area (ha)
1383	White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion	White Box	EEC	CEEC	166
147	Mock Olive - Wilga - Peach Bush - Carissa semi-evergreen vine thicket (dry rainforest) mainly on basalt soils in the Brigalow Belt South Bioregion	Vine Thicket	EEC	EEC	n/a[1]
146	Whitewood low open woodland of the Brigalow Belt South Bioregion and north-eastern Darling Riverine Plains Bioregion	Whitewood			26
1308	White Box - White Cypress Pine shrubby open forest of the Nandewar Bioregion and Brigalow Belt South Bioregion	Shrubby White Box			26
n/a[2]	n/a[2]	Low Diversity Native Grassland			68
n/a[3]	n/a[3]	Cropland / Exotic Pasture			10
TOTAL[4]					**296**

1. Area of occurrence is <0.1 ha and has not been mapped
2. Low diversity grassland not assigned to a PCT
3. Cropland / exotic pasture not assigned to a PCT
4. In some cases totals may not equal the appropriate total number due to rounding

Over 170 flora species have been recorded within the Mt Watermark Offset Area, of which approximately 25% are exotic species. No threatened flora species were recorded within the Mt Watermark Offset Area. Of the threatened flora species predicted to potentially occur

within the Project Boundary, the Mt Watermark Offset Area is considered to provide potential habitat for *Dichanthium setosum* (Bluegrass), *Digitaria porrecta* (Finger Panic Grass) and *Cadellia pentastylis* (Ooline) in the form of woodland and grassland vegetation.

Mt Watermark represents a largely intact patch of woodland within an extensively cleared agricultural landscape that provides habitat for a variety of fauna species, including threatened species that are predicted to be impacted by the Project. Existing agricultural practices have fragmented connectivity in the adjoining areas of the offset and surrounds. The habitats provided by the Mt Watermark Offset Area vary in condition from moderate to good. Structural diversity varies across this area with both grassy and shrubby understoreys present. The habitat features present in this area provide potential foraging, shelter and breeding opportunities for a variety of threatened fauna species and the following threatened fauna species have been recorded:

- Grey-crowned Babbler (*Pomatostomus temporalis temporalis*) (*BC Act*: Vulnerable);
- Diamond Firetail (*Stagonopleura guttata*) (*BC Act*: Vulnerable);
- Little Eagle (*Hieraaetus morphnoides*) (*BC Act*: Vulnerable); and
- Koala (*Phascolarctos cinereus*) (*BC Act*: Vulnerable; *EPBC Act*: Vulnerable).

Threatened species recorded within the Mt Watermark Offset Area are shown in *Figure 9*. There is also the potential for other threatened fauna species known from the locality to occur within the Mt Watermark Offset Area, including threatened microbats, birds and mammals, as detailed within the *Biodiversity Offsets Report* (Cumberland Ecology 2013).

A portion (8.1 hectares) of the proposed Mt Watermark Offset Area is currently not owned by SWC. This land parcel is Lot 7012, Deposited Plan (DP) 92765 and is owned by the NSW Department of Planning, Industry and Environment (DPIE). This land parcel is also subject to a Native Title claim.

SWC proposes to obtain a Crown land licence over Lot 7012, DP92765 and to manage this land parcel in the same manner as the remainder of the proposed Mt Watermark Offset Area (i.e. the portion owned by SWC) – subject to the conditions nominated upon the land licence. Upon resolution of the Native Title claim, there may be an opportunity to incorporate the land parcel into Mt Watermark Offset Area outside the framework of a land licence. This will be reviewed in due course and the Department advised of the outcome of this review.

Photograph 1 Woody Vegetation within the Mt Watermark Offset Area

Photograph 2 Grassland Vegetation within the Mt Watermark Offset Area

5.2 Offset Area 6

Offset Area 6 occurs in the immediate vicinity of the Mine, overlapping with the north western portion of the Project Boundary and extending further north-west. It comprises a number of properties primarily surrounding Long Mountain. The vegetation within Offset Area 6 comprises both intact and fragmented woodland and extensive agricultural areas. *Table 13* lists the vegetation communities currently occurring within Offset Area 6, their *BC Act* and *EPBC Act* status and their total area. The vegetation communities' distribution is shown in *Figure 7*. TECs within Offset Area 6 are shown in *Figure 8*. An example of the woody vegetation and grassland vegetation within Offset Area 6 is provided in *Photograph 3* and *Photograph 4*, respectively.

Table 13 Vegetation Communities within Offset Area 6

PCT #	PCT Name	Ancillary PCT Label	BC Act Status	EPBC Act Status	Area (ha)
1383	White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion	White Box	EEC	CEEC	223
1329	Yellow Box - Blakelys Red Gum grassy woodland of the Nandewar Bioregion	Yellow Box	EEC	CEEC	36
1383	White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion	Derived Native Grassland	EEC	CEEC	5
101	Poplar Box - Yellow Box - Western Grey Box grassy woodland on cracking clay soils mainly in the Liverpool Plains, Brigalow Belt South Bioregion	Poplar Box		EEC	1
146	Whitewood low open woodland of the Brigalow Belt South Bioregion and north-eastern Darling Riverine Plains Bioregion	Whitewood			4
1308	White Box - White Cypress Pine shrubby open forest of the Nandewar Bioregion and Brigalow Belt South Bioregion	Shrubby White Box			548
1308	White Box - White Cypress Pine shrubby open forest of the Nandewar Bioregion and Brigalow Belt South Bioregion	Shrubby Blakely's Red Gum / Motherumbah			47
1511	Dwyers Red Gum woodland on siliceous substrates in the Brigalow Belt South Bioregion	Dwyer's Red Gum			19
885	Heathy shrublands on rocky outcrops of the western slopes	Heathy Shrubland			1
n/a[1]	n/a[1]	Low Diversity Native Grassland			967
n/a[2]	n/a[2]	Cropland / Exotic Pasture			139
n/a[3]	n/a[3]	Cleared Areas			12

PCT #	PCT Name	Ancillary PCT Label	BC Act Status	EPBC Act Status	Area (ha)
TOTAL[4]					**2,003**

1. Low diversity grassland not assigned to a PCT
2. Cropland / exotic pasture not assigned to a PCT
3. Cleared land not assigned to a PCT
4. In some cases totals may not equal the appropriate total number due to rounding

Over 300 flora species have been recorded within Offset Area 6, of which approximately 25% are exotic species. These are primarily confined to within or in close proximity to agricultural areas.

No threatened flora species have been recorded within Offset Area 6. Of the threatened flora species with potential to occur within the Project Boundary, Offset Area 6 is considered to provide potential habitat for *Dichanthium setosum* (Bluegrass), *Digitaria porrecta* (Finger Panic Grass) and *Cadellia pentastylis* (Ooline) in the form of woodland and grassland vegetation.

There are areas of intact woodland and scattered remnants and roadside corridors in Offset Area 6 that provide habitat for a wide variety of fauna species, including threatened species that are predicted to be impacted by the Mine. The habitats provided by Offset Area 6 vary in condition from poor to good. Intact connectivity predominantly occurs in the northern portion of the offset and extends along Long Mountain, which forms stepping stone habitat in the wider locality. Existing agricultural practices has fragmented connectivity in the remaining areas of the offset and surrounds. Within the offset there are existing patches of remnant woodland and roadside corridors which provide some additional connectivity.

The habitats available within Offset Area 6 provide potential habitat for a suite of species listed under the *BC Act* and/or *EPBC Act* and the following threatened fauna species have been recorded:

- Little Lorikeet (*Glossopsitta pusilla*) (*BC Act*: Vulnerable);
- Brown Treecreeper (*Climacteris picumnus victoriae*) (*BC Act*: Vulnerable);
- Grey-crowned Babbler (*Pomatostomus temporalis temporalis*) (BC Act: Vulnerable);
- Speckled Warbler (*Chthonicola sagittatus*) (*BC Act*: Vulnerable);
- Spotted Harrier (*Circus assimilis*) (*BC Act*: Vulnerable);
- Barking Owl (*Ninox connivens*) (*BC Act*: Vulnerable);
- Koala (*Phascolarctos cinereus*) (*BC Act*: Vulnerable; *EPBC Act*: Vulnerable); and
- Corben's Long-eared Bat (*Nyctophilus corbeni*) (*BC Act*: Vulnerable; *EPBC Act*: Vulnerable).

Threatened species recorded within Offset Area 6 are shown in *Figure 9*. There is also the potential for other threatened fauna species known from the locality to occur within Offset Area 6, including threatened microbats, birds and mammals, as detailed within the *Biodiversity Offsets Report* (Cumberland Ecology, 2013).

Photograph 3 Woody Vegetation within Offset Area 6

Photograph 4 Grassland Vegetation within Offset Area 6

5.3 Mooki River Offset Area

The Mooki River Offset Area is located to the south-east of the Mine and comprises an area of land that extends for approximately 4 km along the Mooki River (see *Figure 3*). No detailed assessments have been undertaken within the Mooki River Offset Area and it is considered to have limited ecological value in its current largely cleared state. The vegetation in the Mooki

River Offset Area comprises low diversity native grassland with few canopy trees or other habitat features such as hollow logs or rocks.

Baseline surveys, comprising vegetation and habitat assessments, are required to be completed within the Mooki River Offset Area following the commencement of implementation of this *BMP*. Information collected during these baseline surveys will be used to refine the management activities for this Offset Area and the *BMP* will be updated accordingly.

In accordance with the NSW Development Consent conditions, 44 ha of native vegetation will be revegetated in the Mooki River Offset Area. This will also form part of the Koala habitat areas that will be created as part of the offsets package.

5.4 Mine Rehabilitation Offset Area

Significant portions of the Eastern, Western and Southern Mining Areas disturbed by mining activities will be progressively rehabilitated over the life of the Mine and collectively form the Mine Rehabilitation Offset Area. A detailed description of the biodiversity values within the Mine Rehabilitation Offset Area has not been provided as prior to the establishment of the area, the land will be subject to clearing for mining activities.

Table 14 lists the vegetation communities currently occurring within Mine Rehabilitation Offset Area, their *BC Act* and *EPBC Act* status and their total area. The vegetation communities' distribution is shown in *Figure 7*. TECs within the Mine Rehabilitation Offset Area are shown in *Figure 8*. Approximately 2,384 ha of land is proposed to be rehabilitated within the Mine Rehabilitation Offset Area to meet the characteristics of several vegetation communities present within the Project Boundary.

Table 14 Vegetation Communities within the Mine Rehabilitation Offset Area

PCT #	PCT Name	Ancillary PCT Label	BC Act Status	EPBC Act Status	Area (ha)
1383	White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion	White Box	EEC	CEEC	298
1383	White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion	White Box (Regenerating)	EEC	CEEC	16
1329	Yellow Box - Blakelys Red Gum grassy woodland of the Nandewar Bioregion	Blakely's Red Gum	EEC	CEEC	53
1329	Yellow Box - Blakelys Red Gum grassy woodland of the Nandewar Bioregion	Blakely's Red Gum (Regenerating)	EEC	CEEC	17
1329	Yellow Box - Blakelys Red Gum grassy woodland of the Nandewar Bioregion	Yellow Box	EEC	CEEC	4
1383 / 1329	White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion / Yellow Box - Blakelys Red Gum grassy woodland of the Nandewar Bioregion	Derived Native Grassland	EEC	CEEC	73
101	Poplar Box - Yellow Box - Western Grey Box grassy	Inland Grey Box	EEC	EEC	23

PCT #	PCT Name	Ancillary PCT Label	BC Act Status	EPBC Act Status	Area (ha)
	woodland on cracking clay soils mainly in the Liverpool Plains, Brigalow Belt South Bioregion				
202	Fuzzy Box woodland on colluvium and alluvial flats in the Brigalow Belt South Bioregion (including Pilliga) and Nandewar Bioregion	Fuzzy Box	EEC	-	18
56	Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW	Poplar Box	-	EEC	20
146	Whitewood low open woodland of the Brigalow Belt South Bioregion and north-eastern Darling Riverine Plains Bioregion	Whitewood	-	-	9
1315	White Cypress Pine - Silver-leaved Ironbark grassy woodland of the Nandewar Bioregion	Tumbledown Red Gum	-	-	13
1308	White Box - White Cypress Pine shrubby open forest of the Nandewar Bioregion and Brigalow Belt South Bioregion	Shrubby White Box	-	-	13
1308	White Box - White Cypress Pine shrubby	Shrubby White Box (Regenerating)	-	-	24

PCT #	PCT Name	Ancillary PCT Label	BC Act Status	EPBC Act Status	Area (ha)
	open forest of the Nandewar Bioregion and Brigalow Belt South Bioregion				
1308	White Box - White Cypress Pine shrubby open forest of the Nandewar Bioregion and Brigalow Belt South Bioregion	Shrubby Blakely's Red Gum	-	-	6
n/a	n/a	Low Diversity Grassland, Planted and Exotic Pasture	-	-	1,762
n/a	n/a	Cleared Areas	-	-	34
TOTAL[1]					2,383

1. In some cases totals may not equal the appropriate total number due to rounding

5.5 Barraba Offset Area

The Barraba Offset Area is located approximately 30 km west of the township of Barraba (see *Figure 3*) and approximately 100 km north of the Mine. The two properties comprising the Barraba Offset Area, namely *Clonmeen* and *Aandra*, are located adjacent to one another within the northern reaches of the Nandewar Ranges.

Connectivity within the Barraba Offset Area is maintained by existing patches of remnant woodland and open forest connected to extensive areas outside the site. Both properties connect to the proposed Northern Offset Area for the Maules Creek Coal Project and are indirectly connected to Mount Kaputar National Park and Horton Falls National Park.

The vegetation within the Barraba Offset Area comprises both intact and fragmented woodland and extensive agricultural areas. *Table 15* lists the vegetation communities currently occurring within Barraba Offset Area, their *BC Act* and *EPBC Act* status and their total area. The vegetation communities' distribution is shown in *Figure 10*. TECs within the Barraba Offset Area are shown in *Figure 11*. An example of the woody vegetation and grassland vegetation within the Barraba Offset Area is provided in *Photograph 5* and *Photograph 6*, respectively.

Table 15 Vegetation Communities within the Barraba Offset Area

PCT #	PCT Name	Ancillary PCT Label	BC Act Status	EPBC Act Status	Area (ha)
1329	Yellow Box - Blakelys Red Gum grassy woodland of the Nandewar Bioregion	Box Gums	EEC	CEEC	269
1329	Yellow Box - Blakelys Red Gum grassy woodland of the Nandewar Bioregion	Derived Native Grassland	EEC	CEEC	486
1354	Blakelys Red Gum - Rough-barked Apple - Red Stringybark grassy open forest of the western New England Tablelands	Red Stringybark / Blakely's Red Gum			304
1382	Rough-barked Apple - Red Stringybark shrubby open forest of the western New England Tableland Bioregion	Red Stringybark/ Rough-barked Apple Open Forest			1217
1382	Rough-barked Apple - Red Stringybark shrubby open forest of the western New England Tableland Bioregion	New England Blackbutt Open Forest			170
1366	Orange Gum - Caleys Ironbark - Red Stringybark shrub/grass open forest of the southern New England Tablelands	Orange Gum - Ironbark Open Forest			293
921	Manna Gum - Rough-barked Apple - Yellow Box grassy woodland/open forest of the New England Tableland Bioregion and NSW North Coast Bioregion	Manna Gum Riparian Forest			24
84	River Oak - Rough-barked Apple - red gum - box riparian tall woodland (wetland) of the Brigalow Belt South Bioregion and Nandewar Bioregion	River Oak Riparian Forest			38
n/a[1]	n/a[1]	Low Diversity Native Grassland			77
TOTAL[2]					**2,878**

** In some cases totals may not equal the appropriate total number due to rounding*

Over 350 flora species have been recorded within the Barraba Offset Area, with approximately 15% of the flora species comprising exotic species. These flora species were primarily confined to within or in close proximity to agricultural areas and along drainage lines.

No threatened flora species were recorded within the Barraba Offset Area. Of the threatened flora species predicted to potentially occur within the Project Boundary, the Barraba Offset Area is considered to provide habitat for *Dichanthium setosum* (Bluegrass) in the form of woodland and grassland vegetation.

There are extensive areas of well-connected woodland and forest that provides good quality habitat for a wide variety of species, including threatened species that are predicted to be impacted by the Mine. Structural diversity varies across the properties with both grassy and shrubby understoreys present. The habitats provided by the Barraba Offset Area are currently in moderate to good condition and provide potential foraging, shelter and breeding opportunities for a variety of threatened fauna species. These habitats occur at a range of altitudes including along ridgelines, steep and gently sloping topography and along creek lines.

The following threatened fauna species have been recorded during surveys of the Barraba Offset Area:

- Little Lorikeet (*Glossopsitta pusilla*) (*BC Act*: Vulnerable; *EPBC Act*: not listed);
- Brown Treecreeper (*Climacteris picumnus victoriae*) (*BC Act*: Vulnerable; *EPBC Act*: not listed);
- Speckled Warbler (*Chthonicola sagittatus*) (*BC Act*: Vulnerable; *EPBC Act*: not listed);
- Varied Sittella (*Daphoenositta chrysoptera*) (*BC Act*: Vulnerable; *EPBC Act*: not listed);
- Diamond Firetail (*Stagonopleura guttata*) (*BC Act*: Vulnerable; *EPBC Act:* not listed);
- Turquoise Parrot (*Neophema pulchella*) (*BC Act*: Vulnerable; *EPBC Act*: not listed); and
- Scarlet Robin (*Petroica boodang*) (*BC Act*: Vulnerable; *EPBC Act*: not listed).

Threatened species recorded within the Barraba Offset Area are shown in *Figure 12*. There is also the potential for other threatened fauna species known from the locality to occur within the Barraba Offset Area, including threatened microbats, birds and mammals, as detailed within the *Biodiversity Offsets Report* (Cumberland Ecology, 2013).

Photograph 5 Woody Vegetation within the Barraba Offset Area

Photograph 6 Grassland Vegetation within the Barraba Offset Area

5.6 Mt Erin and Glendowda Offsite Offset Area

The Mt Erin and Glendowda Offset Area is located approximately 5 km northwest of the township of Tambar Springs and approximately 50 km west of the Mine (see *Figure 3*). The two properties comprising the Mt Erin and Glendowda Offset Area, namely *Mount Erin* and *Glendowda-Currajong*, are adjacent to one another. Both properties are indirectly connected to Tinkrameanah National Park.

The vegetation within the Mt Erin and Glendowda Offset Area is predominantly native and forms a mosaic of woodland, forest, grassland and agricultural areas and reflects topography, geology and land use history.

Table 16 lists the vegetation communities currently occurring within Mt Erin and Glendowda Offset Area, their *BC Act* and *EPBC Act* status and their total area. The vegetation communities' distribution is shown in *Figure 13*. TECs within the Mt Erin and Glendowda Offset Area are shown in *Figure 14*. An example of the woody vegetation and grassland vegetation within the Mt Erin and Glendowda Offset Area is provided in *Photograph 7* and *Photograph 8*, respectively.

Table 16 Vegetation Communities within the Mt Erin and Glendowda Offset Area

PCT #	PCT Name	Ancillary PCT Label	BC Act Status	EPBC Act Status	Area (ha)
1383	White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion	White Box Woodland	EEC	CEEC	2,483
1329	Yellow Box - Blakelys Red Gum grassy woodland of the Nandewar Bioregion	Yellow Box	EEC	CEEC	146
1329	Yellow Box - Blakelys Red Gum grassy woodland of the Nandewar Bioregion	Derived Native Grassland	EEC	CEEC	607
27	Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion	Weeping Myall	EEC	EEC*	3
1315	White Cypress Pine - Silver-leaved Ironbark grassy woodland of the Nandewar Bioregion	Tumbledown Red Gum Woodland			20
1380	Narrow-leaved Ironbark - pine - Brown Bloodwood shrub/grass open forest in the north west of the Nandewar Bioregion	Ironbark / Bloodwood			7
n/a[1]	n/a[1]	Low Diversity Native Grassland			170
n/a[2]	n/a[2]	Cropland / Exotic Pasture			655
n/a[3]	n/a[3]	Cleared Areas (roads, dams, buildings, etc.)			4
TOTAL[4]					4,095

1. Low diversity grassland not assigned to a PCT.
2. Cropland / exotic pasture not assigned to a PCT.
3. Cleared land not assigned to a PCT.
4. In some cases totals may not equal the appropriate total number due to rounding.

Over 300 flora species have been recorded within the Mt Erin and Glendowda Offset Area, with approximately 25% of the flora species comprising exotic species. These occur predominantly where previous clearing for agricultural purposes has been undertaken.

No currently listed threatened flora species have been recorded within the Mt Erin and Glendowda Offset Area. Of the threatened flora species predicted to potentially occur within the Project Boundary, the Mt Erin and Glendowda Offset Area is considered to provide habitat for *Dichanthium setosum* (Bluegrass) and *Digitaria porrecta* (Finger Panic Grass) in the form of woodland and grassland vegetation.

There are extensive areas of connected woodland that provides moderate to good quality habitat for a wide variety of fauna species, including threatened species that are predicted to be impacted by the Mine. Structural diversity varies across the properties, however most areas have a grassy understorey. The canopy species present within the properties are dominated by Box species (White Box and Yellow Box).

In addition to the native vegetation communities present, approximately 544 ha of existing agricultural land occurs within the Mt Erin and Glendowda Offset Area will be retained for agricultural use.

The habitat features available in the Mt Erin and Glendowda Offset Area provide potential foraging, shelter and breeding opportunities for a variety of threatened fauna species. Connectivity within the site is maintained by existing patches of woodland connected to extensive areas outside the site.

The following threatened fauna species have been recorded from the Mt Erin and Glendowda Offset Area:

- Little Lorikeet (*Glossopsitta pusilla*) (*BC Act*: Vulnerable; *EPBC Act*: not listed);
- Brown Treecreeper (*Climacteris picumnus victoriae*) (*BC Act*: Vulnerable; *EPBC Act*: not listed);
- Speckled Warbler (*Chthonicola sagittatus*) (*BC Act*: Vulnerable; *EPBC Act*: not listed);
- Grey-crowned Babbler (*Pomatostomus temporalis temporalis*) (*BC Act*: Vulnerable; *EPBC Act*: not listed);
- Diamond Firetail (*Stagonopleura guttata*) (*BC Act*: Vulnerable; *EPBC Act*: not listed);
- Black-chinned Honeyeater (eastern subspecies) (*Melithreptus gularis gularis*) (*BC Act*: Vulnerable; *EPBC Act*: not listed);
- Hooded Robin (*Melanodryas cucullata cucullata*) (*BC Act*: Vulnerable; *EPBC Act*: not listed);
- Varied Sittella (*Daphoenositta chrysoptera*) (*BC Act*: Vulnerable; *EPBC Act*: not listed);
- Spotted Harrier (*Circus assimilis*) (*BC Act*: Vulnerable; *EPBC Act*: not listed); and
- Koala (*Phascolarctos cinereus*) (*BC Act*: Vulnerable; *EPBC Act*: Vulnerable).

Threatened species recorded within the Mt Erin and Glendowda Offset Area are shown in *Figure 15*. There is also the potential for other threatened fauna species known from the locality to occur within the properties, including threatened microbats, birds and mammals, as detailed within the *Biodiversity Offsets Report* (Cumberland Ecology, 2013).

Photograph 7 Woody Vegetation within the Mt Erin and Glendowda Offset Area

Photograph 8 Grassland Vegetation within the Mt Erin and Glendowda Offset Area

6.0 Management of Biodiversity Offset Areas

6.1 Objectives

Significant work is proposed to occur within the Onsite and Offsite Offset Areas in order to establish extensive areas of woodland. The draft *National Recovery Plan for Box Gum Woodland and Derived Native Grassland* and other manuals on restoration of grassy woodlands (e.g. McIntyre *et al,* 2002; Rawlings *et al,* 2010) support the notion that woodland is quite feasible to recover or regenerate from derived native grassland, with correct management. Correct management can involve reductions or controls on grazing to promote recovery of vegetation, fencing, weeding and monitoring, as well as supplementary planting of canopy species. Restoration of forest and woodland to a structural complexity with diverse age classes comparable to the original community structure will take many decades, however it is considered to be achievable with appropriate management.

The objectives for vegetation management within the Offset Areas are as follows:

- provide future habitat for the local population of the Koala (particularly the Revised Offset Area 6);
- restore extensive areas of vegetation, including Box Gum Woodland;
- restore extensive areas of habitat for the suite of threatened species impacted by the Mine;
- replace canopy trees in areas of derived native grassland and promote natural succession towards woodland and or open forest;
- revegetation of areas of low diversity native grassland by replanting trees and shrubs to promote a more rapid regeneration towards forest or woodland;
- establish linkages between patches of remnant vegetation; and
- improvement of habitat connectivity across offset lands and from offset lands to adjacent native vegetation and mine rehabilitation in order to improve wildlife movement in the long term.

Specific objectives for each Offset Area are detailed below.

6.1.1 Mt Watermark Offset Area

The management objectives for the Mt Watermark Offset Area include the following:

- retain and improve areas of Box Gum Woodland;
- retain and improve areas of known and potential threatened species habitat;
- improve habitat for the Koala by supplementary planting of feed trees;
- revegetate areas of Low Diversity Native Grassland and Cropland/Exotic Pasture to Box Gum Woodland and Whitewood Woodland; and
- provide connectivity with other areas of habitat during the life of mine through corridor management, including the provision of a rail underpass.

The Mt Watermark Offset Area includes Management Zones 1 and 3 (see *Section 6.2*). Zone 1 and 3 and will involve removal of threats such as grazing and the management of weeds and feral animals. Zone 3 will also involve revegetation of Low Diversity Native Grassland and Cropland to the modelled previous extent of PCTs. In particular woodland and forest will be created to strategically link to other areas of retained native vegetation within the Project Boundary. Further to these measures, Zone 3 will involve the targeted replacement of koala feed trees. The species to be planted within these areas will be consistent with the PCTs into which the planting is occurring.

6.1.2 Offset Area 6

The management objectives for Offset Area 6 include the following:

- retain and improve areas of Box Gum Woodland and other vegetation communities known to be impacted by the Mine;
- revegetate areas of Low Diversity Native Grassland and Cropland/Exotic Pasture to modified forms Box Gum Woodland, Inland Grey Box Woodland and Poplar Box Woodland;
- provide habitat for the Koala through the planting of feed trees including *Eucalyptus albens*, *E. melliodora* and *E. populnea* as well as the provision of shelter habitat; and
- retain and improve existing corridors within the landscape, including improving connectivity between Long Mountain and Breeza State Forest.

Offset Area 6 includes Management Zones 1-3 (see *Section 6.2*). Zone 1-3 and will involve removal of threats such as grazing and management of weeds and feral animals. Zone 2 will also involve replacement of canopy trees within existing areas of Derived Native Grassland. Zone 3 will also involve revegetation of Low Diversity Native Grassland and Cropland to the modelled previous extent of PCTs. In particular woodland and forest will be created to strategically link Long Mountain to Breeza State Forest. Further to these measures, Zone 2 and 3 will involve the targeted replacement of koala feed trees. The species to be planted within these areas will be consistent with the PCTs into which the planting is occurring.

6.1.3 Mooki River Offset Area

The management objectives for the Mooki River Offset Area include the following:

- revegetate areas of Cropland/Exotic Pasture to provide habitat for the Koala through the planting of the primary feed tree - River Red Gum (*Eucalyptus camaldulensis)*; and
- provision of treed habitat in the form of PCT 78 for some threatened species, such as woodland birds and raptors, known to be impacted by the Mine along a water resource.

The Mooki River Offset Area includes Management Zone 3 (see *Section 6.2*), which will involve removal of threats such as grazing and the management of weeds and feral animals, as well and revegetation of Low Diversity Native Grassland and Cropland to the modelled previous extent of PCTs. In particular woodland will be created along the Mooki River to provide woodland habitat along a water resource. The species to be planted within these areas will be consistent with the PCTs into which the planting is occurring.

Further to these measures, Zone 3 will involve the targeted replacement of koala feed trees. River Red Gums are known to form primary feed trees for the Koala and such riparian areas are known to form important refuge habitat for Koalas during dry conditions. Accordingly, in order to improve the habitat quality of this area for the Koala, significant plantings of *Eucalyptus camaldulensis* will take place according to the methodology provided in *Section 6.3.*

Provision of habitat in proximity to water resources is considered a significant contribution to the conservation of the Koala as studies have shown that during drought conditions, Koalas move from drier areas to the vegetation along creek lines and rivers where soil moisture is higher (Reed *et al.,* 1990). Additional benefits of such riparian plantings include erosion control and bank stabilisation. Works will be undertaken in conjunction with the North West Local Land Services (LLS) (or similar group).

6.1.4 Mine Rehabilitation Offset Area

The management objectives for the Mine Rehabilitation Offset Area comprises the following:

- progressively rehabilitate mining areas to modified forms of Box Gum Woodland and other communities impacted by the Project;
- progressively provide habitat for threatened fauna species known to be impacted by the Project, in particular the Koala; and
- progressively build corridors between existing native vegetation, allowing continued fauna movement across the Project Boundary.

The Mine Rehabilitation Offset Area includes Management Zones 5 (see *Section 6.2*). The species to be planted within these areas will be consistent with the PCTs into which the planting is occurring.

6.1.5 Barraba Offset Area

The management objectives for the Barraba Offset Area include the following:

- retain and improve areas of Box Gum Woodland and areas of known and potential threatened species habitat;
- revegetate areas of Low Diversity Native Grassland to Box Gum Woodland; and
- increase connectivity in the landscape, including the addition of habitat directly and/or indirectly connected to conservation reserves (Mt Kaputar National Park and Horton Falls National Park) and other offset properties (Maules Creek Project – Northern Offsets).

The Barraba Offset Area includes Management Zones 1-3(see *Section 6.2*). Zone 1-3 and will involve removal of threats such as grazing and the management of weeds and feral animals. Zone 2 will also involve replacement of canopy trees within existing areas of Derived Native Grassland. Zone 3 will also involve revegetation of Low Diversity Native Grassland and Cropland to the modelled previous extent of PCTs.

6.1.6 Mt Erin and Glendowda Offset Area

The management objectives for the Mt Erin and Glendowda Offset Area include the following:

- retain and improve areas of Box Gum Woodland and other vegetation communities known to be impacted by the Project, including areas of known and potential threatened species habitat, including the Koala;
- revegetate areas of Low Diversity Native Grassland and Cropland / Exotic Pasture to modified Box Gum Woodland and Weeping Myall Woodland;
- provide habitat for the Koala through the planting of feed trees including *Eucalyptus albens* and *E. melliodora* as well as the provision of shelter habitat; and
- retain areas of land for agricultural use.

The Mt Erin and Glendowda Offset Area includes Management Zones 1-4 (see *Section 6.2*). Zone 1-3 and will involve removal of threats such as grazing and the management of weeds and feral animals. Zone 2 will also involve replacement of canopy trees within existing areas of Derived Native Grassland. Zone 3 will also involve revegetation of Low Diversity Native Grassland and Cropland to the modelled previous extent of PCTs. Further to these measures, Zone 2 and 3 will involve the targeted replacement of Koala feed trees. The species to be planted within these areas will be consistent with the PCTs into which the planting is occurring.

Approximately 544 ha of existing agricultural land occurring within the Mt Erin and Glendowda Offset Area will be retained for agricultural use (Zone 4). This will not involve any detailed management measures; these areas will be fenced off to delineate them from the conservation management areas and agricultural land use will continue in these areas.

6.2 Management Zones

In order to facilitate the management of different kinds of vegetation in the Offset Areas, they have been divided into the following management zones:

- Zone 1: Conservation and management of existing forest and woodland;
- Zone 2: Replacement of canopy species in Derived Native Grassland;
- Zone 3: Revegetation of Low Diversity Native Grassland and Cropland;
- Zone 4: Agriculture; and
- Zone 5: Mine Rehabilitation.

The management zones within the Onsite Offset Areas, Barraba Offset Area and Mt Erin and Glendowda Offset Area are shown in *Figures 16-18.* These management zones largely correspond to the patterns of existing vegetation in the Offset Areas. This is because the different existing levels of ecological condition of the vegetation in the Offset Areas dictate different management strategies to return them to high quality woodland and forest vegetation.

The area of each management zone in the Offset Areas is shown in *Table 17*. Further description of the management objectives for each management zone is provided in subsequent subsections.

The areas of each PCT to be managed within each of the management zones within the Offset Areas is detailed in *Table 18*. The future distribution of PCTs within the Offset Areas is shown in *Figures 19-21*.

Table 17 Area of Land in each Management Zone in Onsite and Offsite Offset Areas

Offset Area	Zone 1 (ha)	Zone 2 (ha)	Zone 3 (ha)	Zone 4 (ha)	Zone 5 (ha)	Cleared Land	Total (ha)
Mt Watermark Offset Area	218	0	78	0	0	0	296
Offset Area 6	879	5	1,107	0	0	12	2,003
Mooki River Offset Area	0	0	44	0	0	0	44
Mine Rehabilitation Offset Area	0	0	0	0	2,384	0	2,384
Barraba Offset Area	2,315	486	77	0	0	0	2,878
Mt Erin and Glendowda Offset Area	2,659	607	281	544	0	4	3,544
Total	6,071	1,098	1,587	544	2,384	16	11,700

6.2.1 Management Zone 1

Areas of existing woodland and open forest in the Offset Areas contain extensive, substantial biodiversity values and provide immediate and ongoing habitats for native plants and animals. In these areas, healthy mature seed producing trees are present and the understorey is dominated by native species, therefore little restoration effort is required, as the impacts on the overall ecology of the community are likely to have been relatively minor. These areas of existing vegetation will form nuclei for regeneration of trees and shrubs into nearby areas of native grassland.

The objectives for the management of existing forest and woodland vegetation within the offsets are:

- maintenance and improvement of the condition of existing forest and woodland; and
- maintenance and improvement of habitat for threatened flora and fauna.

Conservation and ongoing management of existing forest and woodland vegetation will occur within the Offset Areas in order to maintain and improve their ecological value and facilitate regeneration of native vegetation and associated fauna habitat. In general, due to the relatively good condition of these areas, management activities will be low key and will mainly

comprise actions to minimise threats and allow natural regenerative processes to occur. Conservation management measures will be undertaken in these areas including the removal of threats such as grazing and weeds in addition to ongoing maintenance.

Management will include access control, re-use of salvaged habitat features, weed management, feral animal management, bush fire management and ongoing monitoring. Weed invasion and feral animals represent some of the most significant impacts to areas of existing woody vegetation within the Offset Areas and managing these two processes is expected to result in significant improvements in biodiversity.

6.2.2 Management Zone 2

Replacement of canopy species will be undertaken in areas where the ground layer is relatively intact, however the canopy trees have been removed. In these areas, management will comprise replacement of the canopy tree species and ongoing control of threats such as those listed above. Such areas have usually been mapped as Derived Native Grassland.

In areas of Derived Native Grassland, replacement of canopy trees will take place to return these areas into high quality forest and woodland. These areas typically comprise a relatively diverse native grassland community that just lacks trees due to previous clearing.

The objectives for the replacement of canopy trees within the offsets are:

- improvement of existing areas of Derived Native Grassland to forest and woodland communities;
- improvement of habitat for threatened flora and fauna; and
- targeted replacement of Koala feed trees.

In some areas, Derived Native Grassland occurs in close proximity to forest and woodland habitat and in these areas it is expected that natural regeneration of canopy trees will take place. In the medium to long term, trees and shrubs are expected to regenerate into such areas that are proximate to existing forest and woodland as the condition of the land is improved through grazing and weed management (Lindenmayer et al., 2010) and as such little planting is likely to be required.

In areas that are too distant from existing woodland vegetation to allow for natural colonisation and regeneration, planting of canopy trees will be undertaken to restore these areas into high quality woodland. Due to the existing diversity of the understorey in these areas, large scale seeding is not considered to be appropriate and therefore canopy trees will generally be planted using tubestock.

6.2.3 Management Zone 3

Revegetation, including replacement of canopy trees as well as understorey and ground layer vegetation, will take place in areas that are highly degraded and lack these features. These consist of areas that have been mapped as Low Diversity Native Grassland and Cropland. In these areas, complete replacement of vegetation communities will occur, including a wide range of canopy trees, understorey species and ground layer vegetation.

The objectives for the revegetation of low diversity native grassland within the offsets are:

- improvement of the condition of existing areas of low diversity native grassland and cropland to forest and woodland communities;
- improvement of habitat for threatened flora and fauna; and
- targeted replacement of Koala feed trees.

In areas that have been mapped as Low Diversity Native Grassland and Cropland, complete revegetation of vegetation communities will occur. These areas are mapped as Zone 3 and contain native understorey species however a low diversity of species is present and no canopy is present. Accordingly, revegetation will involve replacing most species including a wide range of canopy trees, understorey species and ground layer vegetation. Local provenance plant species from the Offset Areas (or Project Boundary for Onsite Offset Areas) will be utilised, whenever possible, when required for revegetation. If required, additional sources of species from within the Liverpool Plains subregion may also be sourced.

6.2.4 Management Zone 4

Some land within the Mt Erin and Glendowda Offset Area will be retained for agricultural purposes. The objectives for this management zone are to retain agricultural land and minimise impacts of this land use on the surrounding land within the offset.

6.2.5 Management Zone 5

Mine rehabilitation will occur on areas that have been disturbed by open cut coal mining. Rehabilitation of these areas will involve reshaping of the ground surface, relocation of topsoil from within other mine areas and the establishment of vegetation. The overarching rehabilitation objectives for the Mine, as detailed within the *RMP*, are:

- rehabilitation will comply with the relevant regulatory requirements and regulatory consensus will be attained on the successful closure and rehabilitation of the Mine;
- the rehabilitated final landforms will be stable with soils, hydrology and ecosystems having maintenance needs no greater than those of the comparable surrounding land;
- appropriately recover, store and re-handle suitable soil resources for future rehabilitation;
- undertake progressive rehabilitation as soon as areas become available;
- establish healthy and self-sustaining soil profiles and vegetation cover for future land use on re-contoured mined lands;
- create a post-mining landform which enables agricultural land use and areas of native vegetation;
- conduct maintenance (e.g. weed control, follow-up fertiliser, reseeding, erosion repair etc.) until rehabilitation is sustainable; and
- monitor and manage rehabilitation areas to facilitate the process of achieving sign-off on pre-determined completion criteria.

A final land use plan for the Mine Rehabilitation Offset Area is shown in *Figure 7* of the *RMP*.

Overall long-term mine rehabilitation objectives are to provide a landform that is safe, requires low maintenance, is geotechnically stable, blends in with the surrounding topography and is non-polluting. Specific long-term objectives for rehabilitated land within the Mine Rehabilitation Offset Area (excluding agricultural land) include:

- The re-establishment to native vegetation in areas disturbed by the Mine; and
- The provision of habitat for fauna and the creation of corridors for fauna movement within the final landform.

The proposed extent of PCTs within the Mine Rehabilitation Offset Area is shown in *Figure 19* and areas are provided in *Table 18*.

Table 18 PCTs Within Each Management Zone in the Offset Areas

PCT #	PCT Name	Ancillary PCT Label	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Total
Mt Watermark Offset Area								
1383	White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion	White Box	166	-	47	-	-	213
146	Whitewood low open woodland of the Brigalow Belt South Bioregion and north-eastern Darling Riverine Plains Bioregion	Whitewood	26	-	31	-	-	57
1308	White Box – White Cypress Pine shrubby open forest of the Nandewar Bioregion and Brigalow Belt South Bioregion	Shrubby White Box	26	-	-	-	-	26
	Subtotal		*218*	*0*	*8*	*0*	*0*	*296*
Offset Area 6								
1383	White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion	White Box	223	5	404	-	-	632
1329	Yellow Box – Blakelys Red Gum grassy woodland of the Nandewar Bioregion	Yellow Box	36	-	611	-	-	647
101	Poplar Box – Yellow Box – Western Grey Box grassy woodland on cracking clay soils mainly in the Liverpool Plains, Brigalow Belt South Bioregion	Inland Grey Box	0	-	70	-	-	70
56	Poplar Box – Belah woodland on clay-loam soils on alluvial plains of north-central NSW	Poplar Box	1	-	22	-	-	23

PCT #	PCT Name	Ancillary PCT Label	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Total
146	Whitewood low open woodland of the Brigalow Belt South Bioregion and north-eastern Darling Riverine Plains Bioregion	Whitewood	4	-	0	-	-	4
1308	White Box – White Cypress Pine shrubby open forest of the Nandewar Bioregion and Brigalow Belt South Bioregion	Shrubby White Box	548	-	0	-	-	548
1308	White Box – White Cypress Pine shrubby open forest of the Nandewar Bioregion and Brigalow Belt South Bioregion	Shrubby Blakely's Red Gum / Motherumbah	47	-	0	-	-	47
1511	Dwyers Red Gum woodland on siliceous substrates in the Brigalow Belt South Bioregion	Dwyer's Red Gum	19	-	0	-	-	19
885	Heathy shrublands on rocky outcrops of the western slopes	Heathy Shrubland	1	-	0	-	-	1
	Subtotal		*879*	*5*	*1,107*	*0*	*0*	*1,991*
Mooki River Offset Area								
78	River Red Gum riparian tall woodland / open forest wetland in the Nandewar Bioregion and Brigalow Belt South Bioregion	River Red Gum	0	-	44	-	-	44
	Subtotal		*0*	*0*	*44*	*0*	*0*	*44*
Mine Rehabilitation Offset Area								
1383	White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion	White Box	-	-	-	-	1,631	1,631

PCT #	PCT Name	Ancillary PCT Label	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Total
1329	Yellow Box – Blakelys Red Gum grassy woodland of the Nandewar Bioregion	Blakely's Red Gum	-	-	-	-	313	313
1329	Yellow Box – Blakelys Red Gum grassy woodland of the Nandewar Bioregion	Yellow Box	-	-	-	-	31	31
101	Poplar Box – Yellow Box – Western Grey Box grassy woodland on cracking clay soils mainly in the Liverpool Plains, Brigalow Belt South Bioregion	Inland Grey Box	-	-	-	-	46	46
202	Fuzzy Box woodland on colluvium and alluvial flats in the Brigalow Belt South Bioregion (including Pilliga) and Nandewar Bioregion	Fuzzy Box	-	-	-	-	36	36
56	Poplar Box – Belah woodland on clay-loam soils on alluvial plains of north-central NSW	Poplar Box	-	-	-	-	73	73
146	Whitewood low open woodland of the Brigalow Belt South Bioregion and north-eastern Darling Riverine Plains Bioregion	Whitewood	-	-	-	-	27	27
1315	White Cypress Pine – Silver-leaved Ironbark grassy woodland of the Nandewar Bioregion	Tumbledown Red Gum	-	-	-	-	39	39
1308	White Box – White Cypress Pine shrubby open forest of the Nandewar Bioregion and Brigalow Belt South Bioregion	Shrubby White Box	-	-	-	-	171	171
1308	White Box – White Cypress Pine shrubby open forest of the Nandewar Bioregion and Brigalow Belt South Bioregion	Shrubby Blakely's Red Gum	-	-	-	-	17	17
n/a	n/a	Agricultural Land	-	-	-		-	0
	Subtotal		0	0	0	0	2,384	2,384

PCT #	PCT Name	Ancillary PCT Label	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Total
Barraba Offset Area								
1329	Yellow Box – Blakelys Red Gum grassy woodland of the Nandewar Bioregion	Box Gums	269	486	77	-	-	832
1354	Blakelys Red Gum – Rough-barked Apple – Red Stringybark grassy open forest of the western New England Tablelands	Red Stringybark / Blakely's Red Gum	304	-	-	-	-	304
1382	Rough-barked Apple – Red Stringybark shrubby open forest of the western New England Tableland Bioregion	Red Stringybark / Rough-barked Apple	1,217	-	-	-	-	1,217
1382	Rough-barked Apple – Red Stringybark shrubby open forest of the western New England Tableland Bioregion	New England Blackbutt	170	-	-	-	-	170
1366	Orange Gum – Caleys Ironbark – Red Stringybark shrub/grass open forest of the southern New England Tablelands	Orange Gum / Ironbark	293	-	-	-	-	293
921	Manna Gum – Rough-barked Apple – Yellow Box grassy woodland/open forest of the New England Tableland Bioregion and NSW North Coast Bioregion	Manna Gum	24	-	-	-	-	24
84	River Oak – Rough-barked Apple – red gum – box riparian tall woodland (wetland) of the Brigalow Belt South Bioregion and Nandewar Bioregion	River Oak	38	-	-	-	-	38
	Subtotal		*2,315*	*486*	*77*	*0*	*0*	*2,878*

PCT #	PCT Name	Ancillary PCT Label	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Total
Mt Erin and Glendowda Offset Area								
1383	White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion	White Box	2,483	463	237	-	-	3,183
1329	Yellow Box – Blakelys Red Gum grassy woodland of the Nandewar Bioregion	Yellow Box	146	144	40	-	-	330
27	Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion	Weeping Myall	3	-	5	-	-	8
1315	White Cypress Pine – Silver-leaved Ironbark grassy woodland of the Nandewar Bioregion	Tumbledown Red Gum	20	-		-	-	20
1380	Narrow-leaved Ironbark – pine – Brown Bloodwood shrub/grass open forest in the north west of the Nandewar Bioregion	Ironbark / Bloodwood	7	-		-	-	7
n/a	n/a	Agricultural Land	-	-	-	-	-	0
	Subtotal		*2,659*	*607*	*282*	*0*	*0*	*3,548*

6.3 Access Control

Measures will be implemented to control access to the Onsite and Offsite Offset Areas to minimise disturbance to biodiversity values, including:

- maintaining existing boundary fencing;
- installing and maintaining secure (locked) gates at all access points;
- installing signage indicating access restrictions;
- installing and maintaining fencing around land designated for agricultural land use (Mt Erin and Glendowa Offset Area only);
- removal of unnecessary internal fencing;
- maintenance of existing internal access tracks to facilitate ongoing management, including biodiversity and bush fire management; and
- managing access during implementation of management activities (e.g. bush fire management, baiting).

Access control measures are to be implemented as required for the life of the Offset Areas.

6.4 Soil Pathogen Management

Testing for *Phytophthora* pathogens, including *Phytophthora cinnamomi* will be undertaken once the Offset Areas are established. If detected, appropriate hygiene procedures and guidelines described in *Best Practice Management Guidelines for Phytophthora cinnamomi within the Sydney Metropolitan Catchment Management Authority Area* (Botanic Gardens Trust, 2008) will be followed.

This will involve the disinfection of all vehicles, clothing (such as boots and gloves) and tools which have been in contact with soil in the vicinity of the pathogen prior to entering and leaving the Offset Areas.

A vehicle wash down area will be established at entry points to the Offset Areas and all vehicles entering will be required to be hosed down prior to entry. Shoes will also be disinfected. The wash down area will remain in place for the duration of the project. Recommended disinfectant products include:

- non-corrosive disinfectants including Coolacide®, Phytoclean®, or Biogram® which can be for cleaning footwear, tools, tyres, machinery and other items in contact with soil;
- 70% methylated spirits solution in a spray bottle which is suitable for personal use (clothing); and
- sodium hypochlorite 1%, which is effective, but can damage clothing and degrades rapidly in light.

Additionally, contractors in these areas will be required to clean equipment and clothing prior to commencing work and after completion of work, in order to prevent transport of weed propagules.

6.5 Seed Collection

Seed will be collected from native vegetation within the Project Boundary and/or Offset Areas (including Offset Areas lying beyond the Project Boundary - being the portion of Offset Area 6 which is located beyond the Project Boundary and Offsite Offset Areas) for later use in rehabilitation and revegetation to ensure genetic diversity is maintained. Seed collection will commence as soon as practical in order to collect suitable volumes of seed to commence revegetation works.

Seed collection will be conducted throughout the year within the Project Boundary and/or Offset Areas as required by the seeding times of target species. Indicative seed collection times for native species, with particular focus on species characteristic of the threatened Box

Gum Woodland, are shown in *Appendix B*. Many species will produce seed in late spring or summer (following winter or early spring flowering) and/or autumn (e.g. *Microlaena stipoides*, and *Acacia* species), whilst *Eucalyptus* species can hold their seed in the canopy for up to a year after seed is produced (e.g. *Eucalyptus blakelyi*).

Seed collection will continue to take place annually to ensure volumes of seed are maintained.

Suitable seed collection techniques include:

- brush harvesting, to obtain seeds from a diversity of understorey species;
- suction or vacuum harvesting of grass species with less persistent seed units (e.g. *Microlaena stipoides*); and
- hay strewing – this may be appropriate if a recipient site is ready to receive seed at the time of harvest.

Seed of many species will need to be dried and sorted to remove capsules/chaff. A seed drying shed with drying racks will be established for this process and will be well ventilated and rodent proof. Following sorting and drying, all seed should be stored in a refrigerated facility in rodent proof, sealed containers. Seed will also be treated with an insecticide to ensure insects do not damage seed.

The seed that is collected will be stored for use in revegetation of the Offset Areas in order to maintain the genetic integrity of the vegetation. Some seed will also be germinated to provide tubestock for planting. This may be contracted out to a native plant nursery located off site.

Should seed collection be required to be undertaken outside of the Project Boundary or Offset Areas, a licence would be required to collect seeds from threatened species or TECs.

All seed collection will be undertaken following the *Florabank Guidelines*, *Native Seed Collection Methods* (Australian Seed Centre and Mortlock, 1999). The seed species, location of collection and weight of seed shall be documented appropriately. In addition to these records, a database of seed volume for all species will be established in which seed used and seed collected will be recorded in order to identify priorities for future seed collection and to predict future shortages. As a guide, a minimum requirement of two years seed for rehabilitation will be collected and stored (with consideration of seed viability). Seed mixes are detailed in the *RMP* (SWC, 2019) from which seed volumes for mine areas can be calculated. Any batches of seed more than two years old will be tested for viability on an annual basis (with viability recorded) and if seed becomes unviable, replacement batches of seed will be collected.

6.6 Re-use of Salvaged Habitat Features

A selection of habitat features will be salvaged from clearing sites within the Project Disturbance Boundary (see *Section 4.7*) for re-use within the Onsite Offset Areas. Habitat features to be re-used within the Onsite Offset Areas include:

- hollow limbs extracted using chainsaw;
- fallen timber, including hollow limbs; and
- bush rocks.

Management zones in which re-use of salvaged habitat features can be undertaken are detailed in *Table 19*.

Table 19 Management Zones for Re-Use of Salvaged Habitat Features

Offset Area	Hollow Limbs	Fallen Timber	Bush Rock
Mt Watermark Offset Area	Zone 1 Zone 3 (once revegetation is mature enough to support feature)	Zone 3	Zone 3
Offset Area 6	Zone 1 Zone 2 (once revegetation is mature enough to support feature) Zone 3 (once revegetation is mature enough to support feature)	Zone 2 Zone 3	Zone 2 Zone 3
Mooki River Offset Area	Zone 3 (once revegetation is mature enough to support feature)	Zone 3	Zone 3
Mine Rehabilitation Offset Area	Zone 5 (once rehabilitation is mature enough to support feature)	Zone 5	Zone 5

The re-use target of salvaged items is 80%, which takes into account potential deterioration of salvaged items between salvage and re-use. Re-use of salvaged items will occur as follows:

- hollow limbs:
  - hollows limbs will be re-used within existing vegetation (Zone1), revegetation (Zone 2 and Zone 3) and rehabilitation areas (Zone 5); and
  - hollows extracted using a chainsaw are to be attached to recipient trees, at least two metres from the ground, avoiding facing north-west. Living trees without existing hollows will be preferentially selected as recipient trees. Prior to attaching the hollow to the recipient tree, nesting material will be placed in the hollow. A GPS location of the hollow will be recorded.
- fallen timber:
  - fallen timber will be re-used within revegetation (Zone 2 and Zone 3) and rehabilitation areas (Zone 5);
  - fallen timber, including hollow limbs not extracted using a chainsaw, placed on the ground on leaning against mature trees to increase the structural complexity of habitat; and
  - placement of fallen timber will avoid log piles.
- bush rocks:
  - bush rocks will be re-used within revegetation (Zone 2 and Zone 3) and rehabilitation areas (Zone 5);
  - bush rocks will be placed on the ground to increase the structural complexity of habitat; and
  - bush rocks may be place in small piles.

6.7 Installation of Nest Boxes

In the event that the target for re-use of hollows extracted using a chainsaw is not met (i.e. re-use of less than 80% of salvaged), the shortfall will be addressed by the installation of nest boxes in the Offset Areas. The number of nest boxes required will be equivalent to the shortfall to the target. In the event of this requirement, a nest box procedure will be developed and incorporated into this *BMP*.

In order to determine the target density of hollows in the offset areas, tree hollow surveys will be conducted to determine the existing density of hollows in local reference sites. These reference sites will be areas of mature native vegetation that occur within a 10 km radius of the offset areas and which contain the same vegetation communities as the offset areas. The surveys will identify the average density of hollows per hectare in the reference sites and use this density to guide how many nestboxes or hollows will be established in the offset areas. This will ensure that the level of hollow availability mimics as closely as possible existing examples of mature vegetation.

The target fauna will include fauna groups that have been recorded from the Project Boundary that are known to use hollows including microchiropteran bats, possums and gliders, owls and cockatoos. As each of these fauna groups require different sized tree hollows and nest boxes, a range of nest box sizes and designs will be constructed and installed. Further details of the designs will be incorporated into the next box procedure prior to its implementation.

Each of the nest boxes will be monitored annually as part of the monitoring program outlined in *Chapter 8.*

6.8 Weed Management

Weeds represent one of the most significant risks to biodiversity within the Project Boundary and in the Offset Areas. Weed management will be based on best management practice and will focus on weed control at the interface between disturbed areas and adjacent native vegetation. This includes both the interface between the disturbance boundary and adjacent vegetation, but also the interface between degraded cropping or grazing land and nearby native vegetation in the Offset Areas. Particular attention will be given to Weeds of National Significance (WoNS) and Priority Weeds.

An indicative list of WoNS, Priority Weeds and other environmental weeds requiring management within the Offset Areas is provided in *Table 20* below.

Table 20 Significant Weeds within the Offset Areas

Scientific Name	Common Name	WoNS	Priority Weed Species	High Threat Exotic Species
Acetosella vulgaris	Sheep Sorrel			Yes
Alternanthera pungens	Khaki Weed			Yes
Bidens pilosa	Cobbler's Pegs			Yes
Carthamus lanatus	Saffron Thistle			Yes
Hedera helix	English Ivy			Yes
Hyparrhenia hirta	Coolatai Grass			Yes
Hypericum perforatum	St. John's Wort		Regional Priority Weed (Containment)	Yes
Lycium ferocissimum	African Boxthorn		State Priority (Asset Protection), Regional Priority Weed (Asset Protection)	Yes
Olea europaea	Common Olive		Regional Priority Weed (Asset Protection)	Yes
Opuntia aurantiaca	Tiger Pear	Yes	State Priority (Asset Protection), Regional Priority Weed (Asset Protection)	Yes
Opuntia stricta	Common Prickly Pear	Yes	State Priority (Asset Protection)	Yes
Paspalum dilatatum	Paspalum			Yes
Rosa rubiginosa	Sweet Briar		Regional Priority Weed (Asset Protection)	Yes
Xanthium spinosum	Bathurst Burr			Yes

A baseline survey of weeds is required to be completed within the Offset Areas following the commencement of implementation of this *BMP*. Information collected during this baseline survey will be used to refine the management activities for weeds within the Offset Areas and the *BMP* will be updated accordingly.

Weed management will commence within the Offset Areas following approval of this *BMP*. Weed control activities will be conducted twice annually within the Offset Areas. Weed management within the Offset Areas will be undertaken in perpetuity.

6.8.1 Objectives

6.8.1.1 Existing Forest and Woodland

The Onsite and Offsite Offset areas contain areas of existing native forest and woodland vegetation with significant biodiversity values and therefore it is important to ensure that vegetation and habitat degradation due to weeds is not introduced or exacerbated in these areas. The goal of weed management of these areas of existing forest and woodland will be to enhance their existing ecological value by reducing the abundance of existing weeds and to limit potential weed incursion from surrounding disturbed areas.

6.8.1.2 Derived Native Grassland

Areas of Derived Native Grassland contain relatively few weeds and are dominated by native species, however ongoing maintenance weed control will be undertaken in these areas to maintain low levels of weeds and to prevent significant incursions of weeds. Some soil disturbance will take place during the planting of canopy tree species into these areas, which has the potential to allow weeds to establish. Some localised areas of weeds occur in Derived Native Grassland, in particular around cattle camps (where cattle rest during the day) and these areas, in addition to any other weed infestations, will be targeted for weed control.

6.8.1.3 Low Diversity Native Grassland and Cropland

Low Diversity Native Grassland and Cropland are particularly prone to weed invasion due to their already degraded condition and the goal of weed management in these areas will be to promote the revegetation of native species by suppressing weeds. Due to the relatively higher levels of weeds in these areas, more effort is likely to be required to reduce weeds to an acceptable level and to maintain these low levels. In particular, areas of cropland that are being rehabilitated are likely to have substantial weed issues, as these areas do not currently contain any native vegetation. Until native vegetation has colonised sufficiently to suppress weeds naturally, areas of cropland will need ongoing weed control (i.e. maintenance weeding) to minimise competition and facilitate the establishment of native species.

6.8.2 Weed Control Strategy

6.8.2.1 Initial Inspection

An initial inspection of areas to be subject to weed control will be conducted by a suitably qualified person with experience in weed management and control to conduct a baseline weed survey and develop a site-specific weeding plan for each offset area for the primary weeding phase. This baseline weed survey will be completed within three months of approval of the *BMP.*

These site-specific weeding plans are to be prepared as soon as practical and prior to the commencement of weed control works. This site-specific plan will include identification of weeding areas and weed species to target, identification of sensitive areas to avoid, as well as recommendations regarding appropriate weeding techniques to implement. These site-specific plans including all relevant details and maps will be incorporated into the *BMP* within six months of the approval of the *BMP.*

6.8.2.2 Primary Weeding

Primary weeding will take place following the initial inspection and preparation of the site-specific weeding plan and will target Priority Weeds and Weeds of National Significance, as well as any other environmental weeds present. For areas to be cleared for mining, primary weed control should also take place targeting these weeds 6 months ahead of clearing (as detailed in *Section 4.1.3*) so as to reduce the volume of weed seed likely to be present in the soil to be used in rehabilitation.

Primary weeding may involve techniques such as but not limited to:

- selective spraying of weeds, with selective and non-selective herbicide;

- cutting or scraping deep rooted woody weeds and climbers with hand tools, chainsaws and brush cutters, and painting cut stumps with herbicides containing Glyphosate or Picloram;
- target drilling and injecting large tree weeds (such as large prickly pear) with herbicides such as Glyphosate and a Garlon/diesel mix or use of biological control (e.g. cactoblastis moth - *cactoblastis cactorum* – for prickly pear); and
- selective hand removal of weeds; and wicker wiping with herbicide of tall weeds in situations where damage to proximate, low growing native plants can be avoided.

Recommended techniques for removal of Priority Weeds that have been published by agencies/organisations such as the NSW Department of Primary Industries (DPI) such as the *NSW Weed Control Handbook* (DPI, 2018) are publicly available and will be consulted prior to weed control.

After physical removal of any plant material, the plant material should be stockpiled well away from sensitive areas and disposed of in an environmentally sensitive manner to prevent the spread of propagules or further seed production on the cut plant material. For species with the potential to spread vegetatively from plant fragments such as prickly pears (*Opuntia* species) it may be practical to collect material from site stockpiles and bury this material in a mine pit before ensuring it is completely buried under mine spoil or subsoil. Note that some removal guidelines are available for highly invasive weed species such as African Boxthorn.

6.8.2.3 Follow-Up Weeding

Follow-up or secondary weeding will be undertaken in areas that have received past primary weeding treatments and eradication is not complete. Areas for follow-up weeding will be identified during annual weed monitoring. Follow-up weeding involves the selective removal or treatment of weeds, whilst allowing regenerating or planted native plants to increase in size, abundance and percentage cover. All weeds will be targeted during the follow-up weeding phase. Follow-up weeding is likely to be required at least bi-annually/seasonal for a period of 2 years or until weeds are at negligible levels, after which a review will be conducted to determine the on-going maintenance requirements. Areas of cropland are likely to require more sustained weed control efforts, including ongoing maintenance weeding.

6.8.2.4 Maintenance Weeding

Maintenance weeding will be undertaken annually for the life of the Mine. It is expected that all areas being managed for biodiversity will always require a certain level of maintenance weeding, as weed seeds and vegetative propagules make their way on site from the soil stored seedbank, via wind and bird droppings. It is expected that the amount of weeding required will decrease once initial infestations are controlled and areas become more resistant to disturbance and weed colonisation.

Adaptive management/restoration practices will be adopted if weed species increase counter to these expectations.

6.8.3 Weed Control Measures

For sensitive areas of native vegetation, weeds should be controlled by hand weeding or manual removal in preference to herbicide application. No high disturbance manual removal of woody weeds should be undertaken near native trees. In areas of Cropland however, where the dominant existing vegetation type is exotic, then large scale herbicide spraying is likely to be appropriate. In other areas, herbicide application should be limited to backpack sprayers or hand application.

Weed control will be undertaken following the procedures outlined in the *NSW Weed Control Handbook* (DPI, 2018). Control measures for specific weed species present within mine areas are detailed in *Appendix A* of the *WPMP* (SWC, 2019) and will also be used where the same weed species are present in Offset Areas. The following sections provide specific guidelines for the use of the most common weed control measures.

6.8.3.1 Foliar Spray Application

- suitable for shrubs, grasses and dense vines less than 6 m tall and perennial weeds with a small roost system and simple stem;
- herbicide is diluted with water or diesel at a specific rate and sprayed over the foliage to point of runoff (until every leaf is wetted, but not dripping); and
- techniques differ depending on size of weed plant or infestation.

6.8.3.2 Stem Injection

- suitable for woody weeds and trees;
- drill or cut through bark into live sapwood;
- where low branches are encountered place a cut immediately below the branch;
- immediately apply herbicide (within 15 seconds) for active uptake by plant; and
- do not treat trees with poor sap flow that occurs when plants are stressed.

6.8.3.3 Cut Stump Application

- suitable for woody weeds, saplings and trees;
- put plant off completely at base (no higher than 15cm from ground);
- use a chainsaw, axe, brush cutter or machete depending on the thickness of the stem/trunk;
- apply herbicide using knapsack, paint brush, drench gun or a hand-spray bottle;
- spray or paint herbicide immediately onto the exposed surface of the cut stump (within 15 seconds for water-based herbicides and 1 minute for diesel-soluble herbicides); and
- for trees with large circumferences, it is only necessary to place the solution around the edge of the stump in the living tissue. The stump circumference should be bruised with the back of an axe and each successive blow treated with herbicide.

6.8.3.4 Cut and Swab

- suitable for vines and multi-stemmed shrubs;
- similar to cut stump method;
- herbicide applied via spray or brush; and
- in the case of vines with aerial tubers, both ends of the cut stems must be treated with herbicide. Hold both ‘bunches’ of cut stems in a container of herbicide for 15 seconds after cutting, so that maximum translocation occurs to both ground and aerial tubers.

6.8.3.5 Stem Scrape

- suitable for plants and vines with aerial tubers;
- sharp knife used to scrape a very thin layer of bark from a 10 cm section of stem; and
- herbicide immediately applied to the exposed soft underlying green tissue.

6.8.3.6 Basal Bark Application

- suitable for thin-barked woody weeds, saplings, regrowth and multi-stemmed shrubs and trees;
- mix an oil soluble herbicide with diesel;
- spray (saturate) the full circumference of the trunk or stem of the plant from ground level to 30cm height; and
- best undertaken by contractors.

6.8.3.7 Pellet or Granular Soil Application

- suitable for woody weeds with extensive fine stems and root-suckering plants to 3m in height; and
- apply herbicide pellets evenly to root area (soil under canopy from root crown or stems to 30cm beyond drip line) prior to spring or summer rains.

6.8.4 Best Management Practice

Weed removal will have regard to the following, to minimise impacts upon existing vegetation and habitats:

- avoid over-clearing and remove only targeted species;
- limit spread of weeds from disturbance areas or off-site areas to weed control areas by washing down vehicles and machinery prior to moving them out of designated disturbance / clearance areas;
- employ minimal disturbance techniques to avoid soil and surrounding vegetation disturbance and replacement of disturbed mulch/leaf-litter;
- remove of fruiting/seeding parts of weeds carefully, to minimise spread of plant propagules;
- use of chemicals and sprays only during suitable weather conditions (i.e. not during wet or windy conditions) and only during appropriate seasons;
- avoid disturbance of native fauna or nesting/breeding sites; and
- minimise and suppress the spread of plant pathogens by the utilisation of appropriate hygiene protocols.

6.9 Invasive Native Flora Species Management

Several native species have the potential to be invasive, such that they can form dense stands such that they have the potential to exclude other native species. Such species can include cypress pines (*Callitris glaucophylla* and *Callitris endlicheri*). Control of these species can be achieved through controlled burning while plants are still young (i.e. less than 30 cm tall) (Jessop, 2009). Revegetation areas will be assessed within two years of planting/seeding to identify any areas with dense Cypress Pine Stands. These areas will be assessed to determine if a low intensity controlled burn can be practically undertaken (with consideration of fuel loads and location relative to active mine areas and other assets). Other management techniques will also be considered, including ecological thinning and controlled grazing.

6.10 Feral Animal Management

6.10.1 Overview

Feral animal management will be undertaken to minimise the impacts to native fauna within the Onsite and Offsite Offset Areas.

Feral animal management will focus on the main feral animals recorded within the Project Boundary, namely the Feral Pig, the European Red Fox, the Black Rat and the European Rabbit. The appropriate management of these feral fauna species will require close coordination between monitoring and control activities. Since different feral species can respond differently to control measures, monitoring is required to respond appropriately to each species. Prior to the implementation of feral control measures, a population survey will be conducted as part of the annual *Feral Animal Monitoring Program* (*Section 7.4*) to ascertain the severity and primary areas of infestation and to determine which species need to be controlled. Control measures will be implemented at least twice annually (unless feral animal numbers do not justify) and post-control monitoring will be conducted as part of the annual *Monitoring Program* to determine whether the controls were effective.

The management of feral fauna is intended to be adaptive and will be informed/reviewed based on the key findings and recommendations of the *Feral Animal Monitoring Program*.

Further control above the routine annual control will be informed by the results of the monitoring survey.

Feral animal management will commence within the Offset Areas following approval of this *BMP*. Feral animal control activities will be conducted twice annually within the Offset Areas. Feral animal management within the Offset Areas will be undertaken across the entirety of the Offset Areas in perpetuity. Control measures for significant feral animal occurrences, or newly identified feral animals, will be implemented within one year of identification.

6.10.2 Control Methods

Detailed pest management is included within *WPMP* (SWC, 2019). In summary, the following specific pest management measures will be adopted for what are considered to likely be the most problematic species within the Project Disturbance Boundary. Feral animal management within the Project Disturbance Boundary will be undertaken over the life of the Mine.

6.10.2.1 European Red Fox

Control measures for the European Red Fox includes:

- baiting with '1080' (in accordance with the *Pesticides Act 1999*) is the recommended control method;
- poisons are typically placed into meat baits, or carcasses, for subsequent consumption by the fox;
- prior to baiting with 1080, it is recommended that bait stations using non-poisoned bait be established. This will allow the bait stations to be monitored for visitation by native fauna by studying tracks via a sand pit. Non-poisoned bait should be buried to a depth of 10-15 cm in the sand pit;
- when it can be ascertained that foxes are the only fauna regularly taking the bait then baiting with 1080 can commence;
- it is recommended that the baits targeting foxes are buried 10-15 cm in the ground to protect native fauna that dig for food. Foxes are able to detect bait buried at depths greater than 10 cm due to their extremely sensitive sense of smell;
- baits should be placed at least 500 metres apart so that foxes do not cache the bait instead of eating it and to avoid the risk of native fauna eating multiple baits;
- after baiting is complete, all untaken baits and carcasses will be recovered and disposed of; and
- other control measures include shooting, electric fencing, trapping, fumigation and fertility control / biological control.

6.10.2.2 Feral Pig

The main control measure for feral pigs is poisoning, primarily using 1080 poison in grain or meat baits. Other control measures include trapping, shooting and fence exclusion.

Slightly different baiting methods are used to the European Red Fox (including application of a higher concentration of monosodium fluoroacetate per bait) as follows:

- when feral pig control is required, an area of feral pig activity will be located based on observation of fresh signs such as wallows, faeces, rooting, tracks, watering point activity and sightings;
- bait stations will be established in these areas by placing small piles of grain, fruit or several un-poisoned pre-feed baits every 50 to 100 metres for about three to ten days. This free-feeding step, although taking time and effort, is essential for attracting the local feral pig population and increasing bait consumption. The bait stations should be checked regularly over several days for evidence confirming pig activity and the non-toxic feed replaced with new material at sites where free-feed was taken;

- once baits are taken, the number of feeding points will be gradually reduced to draw feral pigs into 'cluster bait' stations or 'feeding hot spots'. This ensures that toxic baits can then be presented across the smallest possible area;
- toxic baits will be introduced to cluster bait stations once free-feed bait uptake levels off, and this is continued until toxic bait uptake ceases (1–3 nights). Feral pigs are often killed within the first few nights of the lethal baiting phase; and
- follow-up monitoring will be undertaken to determine if pigs remain in the area and whether further baiting is needed.

After baiting is complete, all untaken baits and carcasses will be recovered and disposed of.

Feral pig populations have the capacity to recover rapidly within two years of control. Effective control is likely to require follow up control programs, as appropriate.

6.10.2.3 Wild Dog

Wild dogs, where necessary, are typically controlled via 1080 poisoning. Such poisoning should be carried out under the conditions set down in the *1080 Pesticide Control Order*.

6.10.2.4 Feral Cat

Broad scale control methods for feral cats are in development. Small scale control methods include trapping, shooting and exclusion fencing.

6.10.2.5 European Rabbit/Brown Hares

Tree guards can prevent or limit animal grazing of tree tubestock and will be utilised as appropriate.

The most effective way of controlling rabbits is through a combination of activities such as warren ripping, fumigation, fencing, poisoning and shooting.

Use of chemical control (such as poisons are "1080" and oats coated with Pindone (marketed as RABBAIT®) will be utilised, if and where appropriate. Usually a trail of poisoned grain is created away from warrens (as rabbits do not usually eat near the warren). It is advantageous to disturb the soil nearby, as rabbits are known to investigate disturbed soil. Pindone is most effective when administered to rabbits in three doses about four days apart over a 10-12 day period.

Brown hares are typically a lesser problem than rabbits.

6.11 Overabundant Native Fauna Species Management

Macropods have the potential to become overabundant and result in grazing pressure within revegetation and rehabilitation area. If macropod grazing is found to have a significant impact on survival rates of plantings within these areas, plastic tree guards will be placed around the shrub and tree plantings.

6.12 Revegetation

The draft *National Recovery Plan for Box Gum Woodland and Derived Native Grassland* and other manuals on restoration of grassy woodlands (e.g. McIntyre *et al,* 2002; Rawlings *et al,* 2010) support the notion that woodland is quite feasible to recover or regenerate from derived native grassland, with correct management. In addition to these resources, the management of the revegetation works will be guided by the findings of the restoration project described in Section 7.2.

For the purposes of restoring and increasing the extent of wildlife habitat through revegetation areas, floristic diversity of between 10 to 30 native plant species is generally accepted. Of these, a rough guide to attaining structural complexity is by planting 30% tree species, 40% shrubs and 30% groundcovers including grasses (Staubmann and Staubmann 2004). As a general indication, a tree density of about 30 to 40 mature trees per hectare is accepted as being ecological optimal for woodland habitat maintenance and minimum woodland patch sizes should be at least 5 ha to be viable (McIntyre et al. 2002). Continuous groundcover of

tussock grasses, forbs and woody debris are also important in woodland and riparian corridors for soil stabilisation and attenuation of surface water flows.

It is not contended that the revegetated woodland in Zone 2 and Zone 3 will be a copy of the original woodland. However, broad areas of grassland will be revegetated with trees and shrubs and as such it is predicted that sufficient native trees and shrubs will be reintroduced to provide self-regenerating vegetation. Case studies, including the *Grassy Groundcover Restoration Project* (Gibson-Roy 2008) have shown that largely or completely depleted grassland can be reconstructed or restored to species-rich native assemblages representative of locally occurring remnants. However, for cropping land and improved pastures where fertilisers have been applied there is likely to be ongoing competition from annual weeds, which may limit the establishment of ground-layer species in particular. Once trees and shrubs are established, species diversity and structural complexity can then be added by undertaking weed control and then planting additional ground, midstorey and canopy species.

Methods for revegetation include direct seeding and tubestock planting. Direct seeding involves sowing seeds directly into the site to be revegetated, either using a machine or by broadcasting seed. Methods to plant tubestock include manual planting by hand (hand spot planting) or using mechanical planters. Revegetation methods will be undertaken in conjunction with weed control and feral animal management, so as to minimise threats to seedlings/tubestock. A number of other factors, such as site preparation, monitoring and adaptive management are an important component of revegetation works.

Local provenance plant species from the Offset Areas (or Project Boundary for Onsite Offset Areas) will be utilised, whenever possible, when required for revegetation. If required additional sources of species from within the Liverpool Plains subregion may also be sourced.

Local benchmark vegetation data will be collected from reference sites and compared with data collected from sites that are being revegetated or rehabilitated in order to determine their progress. Reference sites will be used to inform the target densities and floristic diversity for revegetation within the Offset Areas.

Specifications for revegetation to be undertaken in Zone 2 and 3 of the Offset Areas are provided below. A comprehensive list of species appropriate to be used for the revegetation works is provided in *Appendix A.*

6.12.1.1 Indicative Schedule

Table 21 provides an indicative schedule for revegetation works within the Offset Areas for the first 10 years of this *BMP*. The schedule details proposed areas to be revegetated, with locations to be determined two years in advance based on review of habitat corridor locations and outcomes of weed management.

Table 21 Indicative Revegetation Schedule

Year	Zone 2 (ha)	Zone 3 (ha)	Total (ha)
0-2	0	163	163
2-4	55	76	131
4-6	55	76	131
6-8	110	152	262
8-10	110	152	262
>10	769	900	1668
Total	**1,098**	**1,518**	**2,616**

6.12.1.2 Site Preparation

Site preparation prior to planting is essential to provide the best conditions for seedlings and increase planting and growth success in revegetated areas (DSE (VIC), 2009). Weed control and fencing to exclude stock should be undertaken to minimise threats to the seedlings. Maintaining a planting zone that is generally free of weeds for at least one year prior to planting has shown to have the best revegetation results (ANBG, 2012). Site preparation allows soil moisture to build up and create an additional reserve for seedlings. This can be achieved by a range of chemical and non-chemical methods, but is dependent on the technique used for planting, the soil type, the weed burden and the desired outcome (Doherty,1998).

In addition to weed control and fencing, site preparation will include deep ripping along the contour to reduce soil compaction and may include shallow cultivation directly before direct seeding to create a disturbed seed bed in areas where there is no existing native vegetation cover. During this cultivation, any shallow-rooted weeds will be mechanically removed. This will be undertaken immediately prior to seeding to prevent soil loss through erosion. Site preparation will commence one year prior to the commencement of revegetation. Some activities (such as shallow cultivation) will occur closer to the commencement of revegetation.

6.12.1.3 Species Composition

The species to be planted within these areas will be consistent with the PCTs into which the planting is occurring. Species previously recorded within the PCTs within this zone will be preferentially selected, followed by other characteristic species of the PCT. Species selection will also take into account microclimatic conditions.

6.12.1.4 Tubestock Planting

Tubestock refers to seedlings which have been propagated and raised in nursery tubes for the easy transport and planting of already successfully established and conditioned stock. Tubestock is more time consuming, labour intensive and expensive than direct seeding methods. However, the preparation and nurturing of plants means revegetation results are immediate and a higher success rate is assured. Due to this, fewer plants are required to be planted and plant placement can be controlled.

Tubestock can also be used when specific species are required to be planted due to either a lack of some species that need to be replaced or to provide targeted habitat for species with specific requirements. This can include planting *Casuarina/Allocasuarina* trees as habitat for Glossy Black Cockatoos or planting species of Eucalypt such as *Eucalyptus camaldulensis* that are known to provide favoured forage for the Koala. In some Offset Areas, Koala feed trees will be planted in order to provide additional habitat for the Koala (see *Section 6.2.2*), which may include planting in selected areas such as riparian zones. Further, some species cannot be established through direct seeding due to particular germination requirements and as such are best propagated in a nursery and then planted as tubestock. An example of such species is Wilga (*Geijera parviflora*).

Methods to plant tubestock include manual planting by hand (hand spot planting) or using mechanical planters. Prior to planting soil should be broken up through deep ripping along the contour to reduce soil compaction, to improve water infiltration and to allow seedling roots to take hold. Tubestock will be planted to a depth equivalent to the depth of the tubestock, or buried deeper using long-stem planting. Dense groundcover surrounding the planting areas should be cleared so as not to smother the seedlings. If necessary, mesh plant protectors or fencing can be used to protect the plants from browsing by animals and tags attached for identification purposes.

Inspections of seedlings will be undertaken every six months for the first two years after implementation of revegetation works to determine the need for replacement plantings. During the inspections, Dead plantings will be replace as required, in order to maintain the plantings at 80% of original planting density. Dead plantings should be replaced with the same species, if possible.

Watering will be undertaken at the time of planting and supplementary watering will be undertaken during dry periods until seedlings are established (i.e. until the end of the first

summer after planting). Watering will continue past the end of the first summer after planting where seedlings have not yet established.

6.12.1.5 Direct Seeding

Direct seeding involves sowing directly into the site to be revegetated. Sowing methods include mechanical and manual techniques, the appropriateness of which differs for different revegetation sites and outcomes. For large revegetation sites where extensive seeding is required, machine seeding is recommended. This will allow the quick distribution of seed onto or into the soil bed by simultaneously scalping the topsoil, placing the seed and pressing it into the soil (O'Shea, 2001).

Low-disturbance methods include brush mulching, niche seeding, hand broadcasting and node seeding. These are detailed below in more detail.

While *Appendix B* contains a list of species to be established through direct seeding, specific seed mixes are not specified as these will need to be developed through trial and error with consideration of:

- local species composition;
- the objectives of each zone; and
- seed viability and availability.

I. Brush mulching

Brush mulching can be applied to bare soil when adequate fresh brush material containing seed is available (i.e. immediately after clearing). Brush mulching is likely to be used in selected rehabilitation areas in conjunction with more widespread direct seeding. For brush mulching, the following procedure should be followed:

- The best sites are weed-free patches of bare soil which can be roughened with a rake;
- branches, stems and fruit clusters containing ripe seeds are cut from existing plants during clearing and laid on bare sites;
- for shrubs, take less than 10% of the foliage from any individual. For grasses and forbs only harvest in patches, leaving at least 50% of fruiting plants undisturbed;
- commonly used for wattles, tea trees, bottle brush, eucalypts and daisies;
- brush mulching kangaroo grass uses ‘lay and spray’ technique. When seeds are ripe, the grass is harvested (late January) and spread across site allowing seeds to drop. Herbicide is then applied to site in winter after the perennial weeds have grown through. After the weeds die Kangaroo Grass is likely to germinate; and
- debris provides shelter and protection to seedlings from browsing.

II. Node Seeding

For node seeding the following procedure should be followed:

- method for establishing species-rich patches within existing low-diversity pastures (i.e. to be used within offset sites) that can provide a continuous source of seed for gradual dispersal into surrounding areas;
- small quantities of seed of a large number of species; and
- nodes up to 10 x 10m; seeds sown in moist, turned soil and surface lightly raked over.

Local provenance plant species will be utilised when required for revegetation and additional seed will be collected from native vegetation within the Offset Areas (or Project Boundary for Onsite Offset Areas) to ensure genetic diversity is maintained (see *Section 4.1.4*). If required additional sources of species from within the Liverpool Plains subregion may also be sourced.

6.12.1.6 Translocation

If feasible, species considered to have a high retention value, such as epiphytic orchids and grass trees (*Xanthorrhoea* species), will be translocated from the Disturbance Area to elsewhere within the Project Boundary that has similar site conditions. For orchids if plants are noticed during clearing, they should be removed from the host tree retaining bark and roots and relocated to an established tree in a rehabilitation area holding it in place with biodegradable string. For grass trees the plants should be dug up prior to clearing, retaining as much soil as possible around the root ball. The root ball should be wrapped in hessian following removal to prevent soil loss and planted as soon as possible within a suitable rehabilitation area.

Where possible, topsoil will be translocated from active mining areas to areas being rehabilitated/revegetated to conserve the native seed bank of local ecological communities. This will improve the quality and diversity of native growth in rehabilitation areas and maximise the establishment of a diversity of native species, particularly the understorey species that maintain the ecological function of native vegetation communities.

6.12.1.7 Post-planting Management

Ongoing pest control, of both animals and weeds, is critical for the success of plant growth. Weeds should be kept 1.5 m away from seedlings to maintain access to resources such as light, moisture and nutrients and minimise seedling exposure to herbicides (O'Shea, 2001). Weed control measures should be undertaken twice yearly for at least two years after sowing and planting. Should herbicide application be required, a selective chemical should be chosen (refer to manufacture details and SDS) and shielded sprayers used. Further details of weed control to be undertaken in the Offset Areas are provided in *Section 6.5*.

Temporary fencing and tree guards around seedlings may be installed to prevent the young plants being foraged or grazed. This will be undertaken if a high proportion of seedings are observed with browsing/foraging damage. Wire, mesh or thick plastic guards are recommended in sites with rabbits and macropods. Feral animal management will also be undertaken to minimise damage from feral animals such as European Rabbits and Feral Pigs (see *Section 6.6.1*).

Plantings will be inspected and dead plantings will be replaced as required, in order to maintain the plantings at 80% of original planting density. Depending on the results from the first and second year of monitoring, supplementary seeding or planting of groundcover species associated with PCT being revegetated will be undertaken, if required.

6.13 Rehabilitation

Approximately 2,384 ha is proposed to be rehabilitated to native vegetation within the Mine Rehabilitation Offset Area. The objectives of rehabilitation of the Mine Rehabilitation Offset Area is detailed within the *RMP* and include restoring ecosystem function, involving maintaining or establishing self-sustaining ecosystems. The list of PCTs to be rehabilitated within the Mine Rehabilitation Offset Area is details within *Table 18*, as well as within *Table 22* of the *RMP*.

The *RMP* contains the following information:

- rehabilitation phases - *Table 16*;
- staging of rehabilitation works – *Figures 12-17*;
- rehabilitation methodologies – *Section 6.2*;
- species composition within PCTs bring rehabilitated – *Tables 23-32.*

6.14 Agricultural Land Management

For the Mt Erin and Glendowda Offset Area, the agricultural areas to be retained include those that are currently being used for agricultural activities and therefore the current land use will simply be continued.

All areas to be used for agricultural purposes in Zone 4 will be adequately fenced to enable grazing and to prevent the animals from accessing nearby areas that are being managed for conservation. Stock will be run at low stocking densities to avoid the risks of overgrazing and subsequent erosion of bare ground by hooves, wind or water.

Routine agricultural activities such as fertilizing and spraying for weeds will be undertaken with due consideration of the nearby areas that are being managed or rehabilitated for conservation to ensure that no impacts of fertilizer runoff or herbicide overspray occur.

Ongoing management for agriculture will include feral animal management to ensure that no feral animals will be introduced or exacerbated by agricultural land use and management. Priority weeds or WoNS will also be managed within the agricultural areas.

6.15 Koala Habitat Management

As described in the *EIS*, areas of land within the Onsite Offset Areas and Mt Erin and Glendowda Offset Area will be managed to provide habitat for the Koala. This includes areas of existing habitat and areas of potential habitat that will be provided following revegetation/rehabilitation.

The areas of each PCT that forms existing and potential habitat for the Koala within the Onsite Offset Areas and Mt Erin and Glendowda Offset Area is detailed in *Table 22* and shown in *Figure 22* and *Figure 23,* respectively.

Section 6.1 provides detail of how the existing and revegetated/rehabilitated habitat within the Onsite Offset Areas and Mt Erin and Glendowda Offset Area will be managed.

Section 6.2 and *Section 6.3* provide details of how canopy species will be replaced in areas of Derived Native Grassland and how Low Diversity Native Grassland / Cropland will be revegetated respectively.

Further Koala management measures for the Onsite Offset Areas will be provided within the *KPoM*.

Table 22 Koala Habitat Areas within the Management Zones in the Onsite Offset Areas and Mt Erin and Glendowda Offset Area

PCT #	PCT Name	Ancillary PCT Label	Zone 1	Zone 2	Zone 3	Zone 5	Total
Mt Watermark Offset Area							
1383	White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion	White Box	166	-	47	-	213
1308	White Box – White Cypress Pine shrubby open forest of the Nandewar Bioregion and Brigalow Belt South Bioregion	Shrubby White Box	26	-	-	-	26
	Subtotal		*192*	*0*	*47*	*0*	*239*
Offset Area 6							
1383	White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion	White Box	223	5	404	-	632
1329	Yellow Box – Blakelys Red Gum grassy woodland of the Nandewar Bioregion	Yellow Box	36	-	610	-	646
101	Poplar Box – Yellow Box – Western Grey Box grassy woodland on cracking clay soils mainly in the Liverpool Plains, Brigalow Belt South Bioregion	Inland Grey Box	0	-	70	-	70
56	Poplar Box – Belah woodland on clay-loam soils on alluvial plains of north-central NSW	Poplar Box	1	-	22	-	22
1308	White Box – White Cypress Pine shrubby open forest of the Nandewar Bioregion and Brigalow Belt South Bioregion	Shrubby White Box	548	-	0	-	548
1308	White Box – White Cypress Pine shrubby open forest of the Nandewar Bioregion and Brigalow Belt South Bioregion	Shrubby Blakely's Red	47	-	0	-	47

PCT #	PCT Name	Ancillary PCT Label	Zone 1	Zone 2	Zone 3	Zone 5	Total
		Gum / Motherumbah					
1511	Dwyers Red Gum woodland on siliceous substrates in the Brigalow Belt South Bioregion	Dwyer's Red Gum	19	-	0	-	19
	Subtotal		*874*	*5*	*1,107*	*0*	*1,986*
Mooki River Offset Area							
78	River Red Gum riparian tall woodland / open forest wetland in the Nandewar Bioregion and Brigalow Belt South Bioregion	River Red Gum	0	-	44	-	44
	Subtotal		*0*	*0*	*44*	*0*	*44*
Mine Rehabilitation Offset Area							
1383	White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion	White Box	-	-	-	1,631	1,631
1329	Yellow Box – Blakelys Red Gum grassy woodland of the Nandewar Bioregion	Blakely's Red Gum	-	-	-	313	313
1329	Yellow Box – Blakelys Red Gum grassy woodland of the Nandewar Bioregion	Yellow Box	-	-	-	31	31
101	Poplar Box – Yellow Box – Western Grey Box grassy woodland on cracking clay soils mainly in the Liverpool Plains, Brigalow Belt South Bioregion	Inland Grey Box	-	-	-	46	46

PCT #	PCT Name	Ancillary PCT Label	Zone 1	Zone 2	Zone 3	Zone 5	Total
202	Fuzzy Box woodland on colluvium and alluvial flats in the Brigalow Belt South Bioregion (including Pilliga) and Nandewar Bioregion	Fuzzy Box	-	-	-	36	36
56	Poplar Box – Belah woodland on clay-loam soils on alluvial plains of north-central NSW	Poplar Box	-	-	-	73	73
1315	White Cypress Pine – Silver-leaved Ironbark grassy woodland of the Nandewar Bioregion	Tumbledown Red Gum	-	-	-	39	39
1308	White Box – White Cypress Pine shrubby open forest of the Nandewar Bioregion and Brigalow Belt South Bioregion	Shrubby White Box	-	-	-	171	171
1308	White Box – White Cypress Pine shrubby open forest of the Nandewar Bioregion and Brigalow Belt South Bioregion	Shrubby Blakely's Red Gum	-	-	-	17	17
	Subtotal		0	0	0	2,357	2,357
Mt Erin and Glendowda Offset Area							
1383	White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion	White Box	2,483	463	237	-	3,183
1329	Yellow Box – Blakelys Red Gum grassy woodland of the Nandewar Bioregion	Yellow Box	146	144	40	-	330
1315	White Cypress Pine – Silver-leaved Ironbark grassy woodland of the Nandewar Bioregion	Tumbledown Red Gum	20	-		-	20
	Subtotal		*2,649*	*607*	*277*	*0*	*3,533*

PCT #	PCT Name	Ancillary PCT Label	Zone 1	Zone 2	Zone 3	Zone 5	Total
Summary							
	Total Onsite Offset Areas		1,066	5	1,198	2,357	4,626
	Total Mt Erin and Glendowda Offset Area		2,649	607	277	0	3,533
	GRAND TOTAL		**3,715**	**612**	**1,475**	**2,357**	**8,159**

6.16 Establishment of Wildlife Corridors

The reinstatement and/or improvement of existing wildlife corridors has been an important consideration in the design of the biodiversity offsets for the Mine. Conservation of existing habitat, revegetation and rehabilitation will address the loss of connectivity resulting from the Mine.

Research has highlighted the importance of maintaining treed habitats in the intervening disturbed landscape between remnant patches of vegetation, as these patches or corridors are important for fauna movement and seed dispersal ((Cooper et al., 2002; Fischer and Lindenmayer, 2002; DSE (VIC), 2008; Goldingay and Taylor, 2009). Remnant patches also serve as "stepping stone" corridors that facilitate the movement of fauna in the landscape (DSE (VIC), 2008). Stepping stones have been shown to be important in maintaining landscape connectivity and maintaining gene flow between separate vegetation populations due to the movement of pollen and seed vectors such as animals and insects (Lindenmayer and Fischer, 2006).

The Onsite and Offsite Offset Areas will provide for the movement of species across the landscape and will improve the current connectivity values of the lands in several important ways:

- vegetation will be planted to connect existing patches of remnant vegetation that are currently isolated and/or fragmented;
- planting will increase the size of the existing remnant patches, which will decrease the distance between patches and provide better connectivity; and
- planting will increase the size and number of patches in the existing landscape to provide better stepping stone corridors.

An important component of the Onsite Offset Areas is the restoration and establishment of a corridor linking Breeza State Forest to stepping stone habitat to the north (including Long Mountain), which continues on to the Wondoba State Conservation Area. This corridor has been identified as regionally significant (Taylor and Drielsma, 2012). It is currently fragmented, with larger stepping stones of habitat surrounded by agricultural land with some scattered trees, primarily along road corridors. Management activities within the Offset Areas, particularly within the Offset Area 6 and Mine Rehabilitation Offset Areas, will assist in the reinstatement of connectivity. Additionally, the local corridor will be extended to the east through the Mine Rehabilitation Areas.

The *IKHP* identifies eight key Koala habitat corridors within the Project Boundary and Onsite Offset Areas, some of which are existing treed corridors and some require complete revegetation to act as Koala corridors (see *Figure 22*). The points below summarise the key features of the Koala habitat corridors to be maintained and/or improved:

- **Corridor Area 1**: Rail underpass and associated tree replanting and fencing to help keep dispersing Koalas off the main rail line and to direct them under the rail corridor and facilitate movement between the woodland centred on Mount Watermark and the large existing woodland habitats in the Revised Offset Area 6:
    - minimum width: 10 metres;
    - tree species in corridor: White Box, Yellow Box, Blakely's Red Gum and Poplar Box; and
    - other specifications: Aligned with rail underpass and in such a way to direct movement towards underpass. This corridor will be designed in conjunction with Koala-proof fencing that will prevent Koalas from crossing the rail line and which will direct them through the underpass. Efficacy of underpass will be monitored by automated cameras and by tracking collared individual Koalas;
- **Corridor 2**: Existing treed area dominated by Poplar Box and occurring along creek line. This is both an existing corridor of Koala habitat and a habitat in its own right. It will be maintained throughout the life of the Mine and it will help facilitate movement to corridors 1, 3 and 6:

  - minimum width: current extent;
  - tree species in corridor: mainly Poplar Box; and
  - other specifications: n/a;

- **Corridor Area 3:** Farmland corridors to be created along paddock margins to help create connected belts of trees across farmland. The purpose is to help create new linkages between the woodland centred on the Mt Watermark Offset Area and the large existing woodland habitats in the Revised Offset Area 6:
  - minimum width: 15-20 metres;
  - tree species in corridor: White Box, Yellow Box, Blakely's Red Gum and Poplar Box; and
  - other specifications: corridors will be located preferentially along paddock margins to minimise impact upon farmland;
- **Corridor Area 4**: This is an existing treed corridor along the eastern portion of The Dip Road. This is a known Koala habitat area and has potential to facilitate east/west movement of dispersing Koalas from the southern area of Mt Watermark (and future rehabilitation of trees in the Eastern Mining Area) westwards towards Breeza State Forest. Note that the western end of The Dip Road corridor will remain until the Southern Mining Area severs it. It is proposed that connectivity will be restored via re-plantings in Corridors 5 and 6 (see below):
  - minimum width: current extent;
  - tree species in corridor: White Box, Yellow Box, Blakely's Red Gum, Fuzzy Box and Inland Grey Box;
  - other specifications: This pre-existing habitat will be monitored and protected during the life of the Project;
- **Corridor 5**: Proposed future treed corridors to be replanted and established after the mining of the Southern Mining Area is completed to link the eastern half of The Dip Road to Breeza State Forest:
  - minimum width: 15-20 metres;
  - tree species in corridor: White Box, Yellow Box and Blakely's Red Gum;
  - other specifications: Corridors will be located preferentially along paddock margins to minimise impact upon farmland;
- **Corridor 6**: Proposed future treed corridors (after mining the Southern and Western Mining Areas are completed) to be replanted and established to link the eastern half of The Dip Road to future southern replanting of trees within the Revised Offset Area 6:
  - minimum width: 15-20 metres;
  - tree species in corridor: White Box, Yellow Box and Blakely's Red Gum;
  - other specifications: Corridors will be located preferentially along paddock margins to minimise impact upon farmland;
- **Corridor 7**: Proposed future treed corridor to be replanted after mining the Southern and Western Mining Areas are completed and established to link the Revised Offset Area 6 with Breeza State Forest:
  - minimum width: 15-20 metres;
  - tree species in corridor: White Box, Yellow Box and Blakely's Red Gum;
  - other specifications: corridors will be located preferentially along paddock margins to minimise impact upon farmland;
- **Corridor 8**: Proposed future treed corridors to be replanted and established to link existing habitat within the Revised Offset Area 6 to Corridor 7 and Breeza State Forest:

- minimum width: n/a;
- tree species in corridor: White Box, Yellow Box, Blakely's Red Gum, Poplar Box and Inland Grey Box; and
- other specifications: n/a;

The location and size of the Koala habitat corridors within the Project Boundary and adjoining areas will be revised as part of the *KPoM*. This *BMP* will be updated to reflect these revisions.

6.17 Grazing Management

The use of grazing management within the Offsets Areas is not proposed as part of this *BMP*. If the outcomes of monitoring recommend grazing management is undertaken within the Offset Areas, such as crash grazing the *BMP* will be updated with relevant information.

6.18 Bush Fire Management

Offset Area 6 will be managed in accordance with the *Bush Fire Management Plan* (SWC, 2019).

In order to maintain existing values across all Offset Areas, it may be necessary to undertake occasional ecological burns. For example, in the event that dense stands of Black Cypress Pine (*Callitris endlicheri*) be identified through monitoring to be forming, it may be necessary to undertake ecological monitoring. Monitoring will also identify if fuel loads are at a level where low intensity ecological burning can be undertaken.

6.19 Management of Potential Conflicts with Aboriginal Cultural Heritage Values

The Mooki River ACHCA overlaps with a portion of the Mooki River Offset Area. Revegetation within the overlapping area will need to avoid known Aboriginal heritage values and heavy plant or machinery will only be permitted access for activities associated with emergency vegetation management.

There is not expected to be any conflict between the proposed works under this *BMP* and any Aboriginal heritage values (both cultural and archaeological) within Offset Areas. All ground disturbance works in the BOAs will avoid all known Aboriginal cultural heritage sites. If any artefacts are found or known to occur, then consultation will be undertaken with SWC's archaeologist and an appropriate course of action identified. Any potential conflict between the proposed enhancement works in the BOAs and the Aboriginal heritage values in these areas will require consultation with the Registered Aboriginal Parties (RAPs). If the dispute cannot be resolved via RAP consultation, then the Dispute Resolution Process (refer *Section 7.2* of the *Heritage Management Plan* (SWC, 2020*)* will apply.

All activities undertaken within the Offset Areas will be subject to the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW*.

Aboriginal cultural values of the landscape are linked, in general terms, to the biodiversity of the natural environment: such as the health of habitat, rivers, flora and fauna; enhancing biodiversity; establishing wildlife corridors and controlling feral species. As a result, the enhancement and conservation of Aboriginal cultural values is directly linked to the biodiversity management of the landscape, including the Watermark Biodiversity Offset Areas. The protection of the known tangible Aboriginal cultural heritage (archaeological) sites is also an important component in 'enhancing and conserving' the Aboriginal cultural heritage values of the offsets.

Continuous consultation with Indigenous groups will be maintained and they will be provided with copies of the final *BMP* so that they are aware of what management actions are proposed to be undertaken and advance notice will be provided of proposed field surveys and survey locations, where applicable. This will provide Indigenous groups the opportunity to provide feedback on the activities proposed under this *BMP* and to identify where conflict may arise, so that mutually acceptable alternatives can be found and implemented.

6.20 Performance Criteria and Trigger Action Response Plan

Table 23 details the performance criteria for management actions within the Project Boundary, as well as how these actions will be monitored and the corrective actions required.

Table 23 Management Actions and Trigger Action Response Plan for the Offset Areas

Management Theme	Management Action	Timing	Responsibilities	Monitoring	Trigger	Action/Response
Access control	The access control measured detailed in *Section 6.3* have been implemented to control access to the Offset Areas to minimise disturbance to biodiversity values.	Ongoing	Land Asset Mgr	Twice-annual check of control measures.	Access control measures found not to be implemented.	Undertake access control measures.
Soil pathogen management	Initial testing conducted within the offset area to determine presence of soil pathogens.	Short term	Environmental Superintendent	Annual review of test reports.	Initial testing not undertaken within one year of establishment of Offset Areas.	Implementation of hygiene procedures until testing confirmed soil pathogens are absent.
	Wash down areas established and utilised by vehicles in the vicinity of the occurrence of the pathogen.	Short term	Environmental Superintendent	Twice-annual check of control measures.	Wash down bays not established, maintained or utilised.	Cessation of vehicle movements in the vicinity of the occurrence of the soil pathogen until control measures are implemented.
	Wash down areas established and used at the entry to the Project Boundary.	Short term	Environmental Superintendent	Twice-annual check of control measures.	Wash down bays not established, maintained or utilised.	Cessation of vehicle movements into the Project Boundary until control measures are implemented.
Seed collection	Seed collected from a diversity of species.	Prior to clearing / During clearing (ongoing)	Ecologist	Annual review of seed colletion.	Seed volumes found to be deficient for species groups (e.g. Eucalypts, Acacias) or strata.	Undertake seed collection targeted to species/strata.
	Seed dried, sorted and refrigerated in accordance with *Section 6.5.*	Ongoing	Ecologist	Annual review of seed colletion.	Seed management found not to be undertaken in accordance with *Section 6.5*.	Review and update procedures to ensure seed management undertaken.
	Details of seed collection is documented within the *Seed Collection Report*.	Ongoing	Ecologist	Annual review of seed colletion.	Seed collection details found not to be documented within the *Seed Collection Report.*	*Seed Collection Report* to be prepared or amended.
Re-use of salvaged habitat features	80% of salvaged items re-used within appropriate management zones within the Offset Areas.	Ongoing	Environmental Superintendent	Annual review of habitat salvage items.	Less than 80% of salvaged habitat features re-used within the Offset Areas.	Any shortfalls in salvaged items to be made up in subsequent clearing events, or supplemented with the use of nest boxes.
Installation of nest boxes	Nest boxes install within the Offset Areas where salvage targets not met	Ongoing	Ecologist	Annual review of habitat salvage items annual monitoring of Offset Areas.	Insufficient nest boxes installed.	Install required number of nest boxes.
Weed management	Locations of target weed species identified.	Ongoing	Land Asset Mgr	Annual monitoring of Offset Areas.	Target weed locations not identified	Weed mapping conducted and *Weed and Pest Management Plan* updated.
	Implementation of control measures detailed in *Section 6.8* within the Offset Areas.	Ongoing	Land Asset Mgr	Annual monitoring of Offset Areas.	Control measures not implemented in accordance with *Section 6.4.*	Undertake weed control measures.
	Prevention of the introduction and spread of weeds by plant and equipment.	Ongoing	Land Asset Mgr	Annual monitoring of Offset Areas.	Weeds found to be spread by plant and equipment.	Undertake targeted weed control measures in new infestation areas, and review control measures to determine if additional controls required.

Management Theme	Management Action	Timing	Responsibilities	Monitoring	Trigger	Action/Response
Invasive native flora species management	Revegetation areas inspected within two years of planting/seeding to identify dense Cypress Pine stands.	Ongoing	Land Asset Mgr	Annual monitoring of Offset Areas.	Inspections not undertaken within two years of planting/seeding.	Undertake inspections and determine if management actions required.
	Dense Cypress Pine stands managed in accordance with methods determined following site inspection	Ongoing	Land Asset Mgr	Annual monitoring of Offset Areas.	Management actions not undertaken in accordance with recommendations following site inspection.	Undertake management actions, and review control measures to determine if additional controls required.
Feral animal management	Implementation of European Red Fox, Feral Pig, Wild Dog, Feral Cat and European Rabbit/Brown Hare control measures in accordance with *Section 4.10,* as required.	Ongoing	Land Asset Mgr	Annual monitoring of Offset Areas.	Feral animals not controlled in accordance with *Section 4.10.*	Undertake targeted feral animal management, and review control measures to determine if additional controls required.
	Control measures for significant feral animal occurrences, or newly identified feral animals, implemented within one year of identification	Ongoing	Land Asset Mgr	Annual monitoring of Offset Areas.	Control measures for significant feral animal occurrences, or newly identified feral animals, not implemented within one year of identification.	Undertaken control measures, and review need for additional controls.
Overabundant native fauna species management	Installation of plastic tree guards around shrub and tree plantings in areas assessed as being significantly impacted by macropod grazing.	Ongoing	Ecologist	Twice annual review of revegetation works (first two years), followed by annual reviews.	Tree guards not installed within areas assessed as significantly impacted by macropod grazing.	Installation of tree guards and review control measures to determine if additional controls required.
Revegetation	Revegetation works undertaken in accordance with *Section 6.12.*	Ongoing	Environmental Superintendent	Annual review of revegetation areas.	Revegetation works undertaken in accordance with *Section 6.12.*	Implementation of revegetation works, and review actions to determine if additional measures required.
	80% survival of all planted vegetation	Ongoing	Environmental Superintendent	Monthly checks of plantings.	Less than 80% survival rate of planted vegetation	Supplementary planting undertaken to meet target survival rate.
	Supplementary seeding or planting undertaken in accordance with *Section 6.12.1.6.*	Ongoing	Environmental Superintendent	Annual review of supplementary seeding of planting.	Supplementary seeding or planting not undertaken as required.	Review requirement, and undertake supplementary seeding or planting as required.
Rehabilitation	Rehabilitation works undertaken in accordance with *Section 6.13* and the *RMP.*		Environmental Superintendent	Annual review of the rehabilitation areas		
Agricultural land management	Agricultural land fenced.	Year 0-1	Land Asset Mgr	Annual inspection of agricultural land.	Agricultural areas found not to be fenced.	Cessation of agricultural activities until fencing installed.
	Agricultural activities confined to management zone 4.	Ongoing	Land Asset Mgr	Annual inspection of agricultural land.	Agricultural activities found to extend beyond management zone 4.	Immediate cessation of agricultural activities outside management zone 4 and implementation of additional management actions and controls.
Koala habitat management	Revegetation and rehabilitation works providing suitable habitat for the Koala.	Ongoing	Ecologist	Annual inspection of agricultural land.	Revegetation and rehabilitation works found not to provide suitable habitat for the Koala.	Review of revegetation and rehabilitation species plantings and seeding to target species in PCTs suitable for the Koala.

Management Theme	Management Action	Timing	Responsibilities	Monitoring	Trigger	Action/Response
Establishment of wildlife corridors	Wildlife corridors maintained or established in accordance with the *KPoM.*	Ongoing	Ecologist	Annual review wildlife corridors in accordance with the *KPoM.*	details to be derived from *KPoM*	details to be derived from *KPoM*
Bush fire management	Bush fire management undertaken in accordance with the *Bush Fire Management Plan.*	Ongoing for the life of the mine	Land Asset Mgr	Annual review of bushfire management activities.	Management practices not undertaken in accordance with the *Bush Fire Management Plan.*	Complete outstanding management practices.
Management of potential conflicts with Aboriginal cultural heritage values	Management within Heritage Conservation Areas to be undertaken in accordance with the *Heritage Management Plan.*	Ongoing	Environmental Superintendent	Annual review of heritage management activities.	Obligation with respect to management of Offset Areas not met.	Determine appropriate corrective action and proceed to implement.

6.21 Offset Security

SWC is currently liaising with NSW State Government agencies to evaluate available and appropriate means to secure offset areas in perpetuity which will satisfy the Secretary of DPIE. SWC is evaluating various mechanisms, including Biodiversity Stewardship Agreements, Conservation Agreements and Positive and Restrictive Covenants.

SWC commits to providing long term security for dedicated offsets in accordance within the required timeframes established by SSD-4975 Schedule 3, Condition 33, namely:

- within 4 months of the commencement of construction, unless the Secretary agrees otherwise, for all On-site and Off-sites in Table 12 (SSD-4975, Schedule 3) excluding the Rehabilitation Area Offset;
- within 6 months of identifying the additional offset required under Condition 29 (SSD-4975, Schedule 3), for the additional Grey Box offset area; and
- by the end of June 2046, unless the Secretary agrees otherwise, for the Rehabilitation Area Offset in Table 12 (SSD-4975, Schedule 3).

6.22 Conservation Bond

SWC is required to provide a Conservation Bond to the NSW Government in accordance with SSD-4975 Schedule 3, Condition 37.

The purpose of this Conservation Bond is to ensure sufficient financial resources are available at all times to enable the biodiversity offset strategy to be implemented in accordance with the performance and completion criteria nominated within the *BMP.*

In accordance with Condition 37, the sum of the bond is to be determined by:

> (a) calculating the full cost of implementing the biodiversity offset strategy (other than land acquisition costs); and
>
> (b) employing a suitably qualified quantity surveyor to verify the calculated costs,
>
> to the satisfaction of the Secretary.

In the event that offset strategy is not completed by SWC generally in accordance with the completion criteria nominated in the *BMP*, the Secretary can draw upon the Conservation Bond to fund the satisfactory completion of relevant works commissioned by the DPIE.

SWC will not be in a position to calculate the cost to implement the biodiversity offset strategy until the *BMP* has been finalised. Finalisation of the *BMP* will only occur with its regulatory approval.

SWC commits to determining the Conservation Bond, to the satisfaction of the Secretary, within 3 months of the approval of the *BMP* unless otherwise agreed by the Secretary.

7.0 Indirect Offsets

7.1 Indirect Offset – Koala Research Project

Condition 28 of Schedule 3 of the NSW Development Consent requires SWC to undertake/support a 'Koala Research Project'.

Sydney University undertook and completed a koala research project for which SWC provided financial support. This project was entitled '*Rehabilitating a Changing Landscape: Using the Latest Advances in Koala Ecology to Direct Adaptive Management'* and was undertaken over a three (3) year period between 2015 and 2017.

The project had four (4) aims:

- map the distribution and quality of koala habitat by calibrating tree-use measures with tree, leaf and soil characteristics;
- relate the current distribution of koalas to habitat quality and landscape structure;
- quantify koala abundance, fertility and mortality as a function of the interacting influence of disease, temperature (heatwave) and rainfall (drought) conditions; and
- develop a predictive spatial and temporal model for future conditions.

The results of the koala research project will be used to inform the *KPoM*. The results of the project can be made available upon request.

7.2 Indirect Offset – Box Gum Woodland Restoration Research Project

Condition 28 of Schedule 3 of the NSW Development Consent requires SWC to undertake a 'Box Gum Woodland Restoration Research Project'.

SWC considers that research in this area would best focus on a clear, apparent need.

SWC proposes the following:

- first mining rehabilitation activities to establish Box Gum Woodland is to occur during Mining Years 3-5;
- rehabilitation methodology will be in accordance with the approved *Rehabilitation Management Plan*;
- research and trials will be undertaken per *Section 9* of the *Rehabilitation Management Plan*, particularly with reference to the anticipated key aspects of weeds, germination and establishment of/from native seed, species proportions and densities, native grasses, fertiliser alternatives and soil amelioration as well as felled timber mulch – specifically with reference to Box Gum Woodland;
- determine observed deficiencies for trajectory to a Box Gum Woodland as demonstrated by the comparative performance of the reference/analogue site(s);
- a targeted research project would then be devised which would target the most problematic area of observed failure that could, in all probability, be not successfully overcome as a result of standard rehabilitation practice. It is anticipated that such a project would be undertaken by an appropriately qualified external party; and
- the findings of such a targeted research project would then be incorporated into future Box Gum rehabilitation and restoration campaigns.

The scope of the research project will be determined in consultation with EES. The *BMP* will be updated with relevant details.

7.3 Indirect Offset – Landcare Namoi Biodiversity Habitat Restoration Project

Condition 28 of Schedule 3 of the NSW Development Consent requires SWC to undertake a 'Landcare Namoi Biodiversity Habitat Restoration Project'. There is also a requirement that 'the Landcare habitat restoration project/s is to be undertaken as a contribution to an existing or planned Landcare project/s.'

SWC's research has revealed that there is only one currently active Landcare group within the Gunnedah/Breeza area. This active group is the 'Gunnedah Urban Landcare Group' (GULG).

SWC provided GULG with a proposal to assist GULG in an existing or planned Landcare project. GULG has formally declined SWC's offer of assistance. SWC will discuss with DPIE the Department's requirements in regard to this matter. The *BMP* will be updated with relevant details.

7.4 Additional Grey Box Grassy Woodland EEC Offset

Condition 29 of Schedule 3 of the NSW Development Consent requires SWC to:

- 'prior to the commencement of mining operations, unless otherwise agreed by the Secretary, revise the biodiversity offset strategy to identify an additional offset for the Grey Box Grassy Woodland EEC, in consultation with DoEE and to the satisfaction of the Secretary. The offset area shall be of equal or greater in size than that determined by the NSW Biodiversity Banking and Offsets Scheme methodology, and must achieve the outcomes required by the EPBC Act *Environmental Offsets Policy 2012* (or subsequent published revisions) and user guide.'

SWC is currently searching for an area of Grey Box Grassy Woodland which would satisfy the requirements of the Condition 29 obligation. The quantum of offset required will be commensurate with the deficit of offsets calculated during the *EIS* process using BioBanking. The final calculated liability for Grey Box Grassy Woodland EEC was 1,885 credits for an impact of approximately 30 ha (see *Table 5.2* of *the Biodiversity Offsets Report*, part of the *Response to Submissions*). The proposed offsets package was calculated as providing a total of 1,462 credits for revegetation areas within Offset Area 6 and rehabilitation areas within the Mine Rehabilitation Offset Area. Based on the provision of these two offsets only, there would be a deficit of 423 credits. Should the additional Grey Box Grassy Woodland offset contain similar values as within the Project Boundary and Onsite Offset Areas (being 14 credits/ha for existing woodland vegetation and 15 credits/hectare for low diversity grassland revegetated to woodland), it would need to contain approximately 20 ha of existing woodland, or 28 ha of low diversity grassland, or combination of these.

SWC commits to having a suitable additional offset in place prior to the commencement of mining operations in accordance with the Condition 29 obligation. A proposal will be provided to the DPIE Energy and Resources, Planning and Assessment Group for consideration by 1 December 2020.

8.0 Monitoring Program

The purpose of the monitoring program is to monitor the health of flora and fauna within the Project Boundary and Offset Areas to provide information to quantify the change in biodiversity over time within the Offset Areas. Monitoring of changes in the quality and quantity of biodiversity will enable measurement against performance and completion criteria.. This includes both vegetation monitoring and species monitoring to indicate when further management actions are required. This will provide feedback data to determine the level of success of the mitigation and amelioration measures.

The monitoring program includes the following:

- vegetation monitoring (Offset Areas only);
- fauna monitoring (Offset Areas only);
- weed monitoring; and
- feral animal monitoring.

The monitoring program will commence in the first year following approval of the *BMP*.

8.1 Vegetation Monitoring

8.1.1 Purpose

Vegetation monitoring will be conducted to provide information to quantify the change in biodiversity over time within the Offset Areas. Vegetation monitoring will provide information to guide corrective action (e.g. weed control and revegetation) and data with which to compare the condition of revegetation and rehabilitation when it occurs. It will also establish a baseline condition of vegetation prior to the commencement of revegetation.

8.1.2 Methods

8.1.2.1 Monitoring Sites

Vegetation will be monitoring using a plot-based assessment. At each monitoring site, a 20 x 50 m plot will be established as per the standard layout shown in *Plate 2*. If required, due to linear vegetation, this plot may be modified to a 10 x 100 m plot. The establishment of each plot will include installation of a star picket, or wooden peg, at each end of the 50 m centre line of the plot. The location of the monitoring plot will be recorded with a GPS.

Within each plot, data will be collected in accordance with *Sections 5.3.4.9-5.3.4.30* of the *BAM*. This includes collection of the following data:

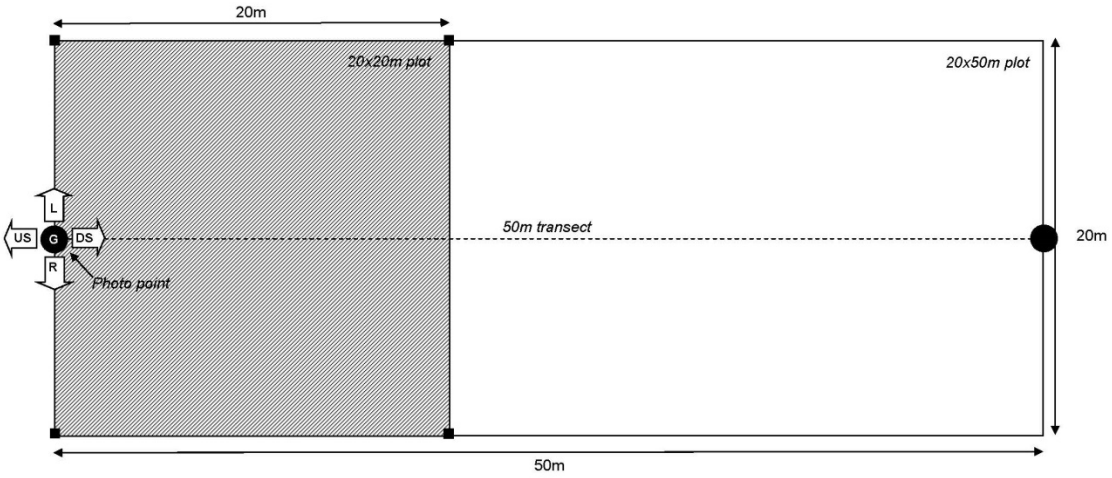
- composition for each growth form group by counting the number of native plant species recorded for each growth form group within a 20 m x 20 m plot;
- structure of each growth form group as the sum of all the individual projected foliage cover estimates of all native plant species recorded within each growth form group within a 20 m x 20 m plot;
- cover of High Threat Exotic weed species within a 20 m x 20 m plot;
- assessment of function attributes within a 20 m x 50 m plot, including:
    - count of number of large trees;
    - tree stem size classes, measured as ‘diameter at breast height over bark’ (DBH);
    - regeneration based on the presence of living trees with steams <5cm DBH; and
    - the total length in metres of fallen logs over 10 cm in diameter.
- assessment of litter cover within five 1 m x 1 m plots evenly spread within the 20 m x 50 m plot; and

- number of trees with hollows that are visible from the ground within the 20 m x 50 m plot.

Five directional photographs will be taken at each of the monitoring sites at the photo point location shown in *Plate 2*.

Data from the monitoring sites will be assessed against the benchmarks for each PCT, which are held within the *BioNet Vegetation Information System* database (for Zone 1), or to reference sites (for Zones 2, 3 and 5).

Plate 2 Layout of the Vegetation Monitoring Plot



8.1.2.2 Reference Sites

The establishment of reference sites is recommended by the *ICMM Good Practice for Mining and Biodiversity Guidelines* (ICMM, 2006) to enable impacts resulting from mining to be better understood and quantified. Reference areas serve as a benchmark against which changes in biodiversity over time can be compared (for example, through the use of the before-after/control-impact (BACI) approach). This approach collects and compares data from sites before and after the impact has occurred and also from control (un-impacted) and impacted sites. Reference sites help to determine which changes are directly attributable to the mining operations and which are the results of unrelated outside factors.

Vegetation monitoring sites established within in Zone 1 of the Offset Areas will be utilised as reference sites for revegetation and rehabilitation areas. Vegetation monitoring sites that are suitable for reference sites will be those that contain the same PCTs as being revegetation or rehabilitated. The use of reference sites will allow a desired endpoint to be set for revegetation and rehabilitation efforts such that progress towards this endpoint through time can be quantified. Local benchmark vegetation data will be collected from reference sites and compared with data collected from sites that are being revegetated or rehabilitated in order to determine their progress. Reference sites will be used to inform the target densities and floristic diversity for revegetation and rehabilitation within the Offset Areas.

8.1.2.3 Revegetation Areas

Site visits will be required in order to monitor the seedlings for death of individual plants within revegetation areas. Monitoring will be undertaken across the revegetation area to determine the survival rates of planted tubestock.

8.1.2.4 Threatened Flora

No threatened flora species have been recorded from Offset Areas and therefore no threatened flora monitoring will be conducted. If any threatened flora species are recorded during other monitoring surveys within the Offset Area, the *BMP* will be updated to include provisions to undertake appropriate monitoring of the species in subsequent monitoring surveys.

8.1.3 Locations

Monitoring locations will be determined as part of the first monitoring period. The number of monitoring sites to be established within each Offset Area is detailed within *Table 24*. Once established, the locations of monitoring sites will be included within this *BMP*.

- The number of monitoring sites was determined as follows:
    - Zone 1: Minimum of one plot, with one additional plot for vegetation >2 ha;
    - Zone 2: Minimum number of plot as required in Table 4 of BAM; and
    - Zone 3: Minimum number of plot as required in Table 4 of BAM.

Table 24 Number of Vegetation Monitoring Sites

PCT #	PCT Name	Ancillary PCT Label	Zone 1	Zone 2	Zone 3	Zone 5	Total
Mt Watermark Offset Area							
1383	White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion	White Box	2	-	4	-	6
146	Whitewood low open woodland of the Brigalow Belt South Bioregion and north-eastern Darling Riverine Plains Bioregion	Whitewood	2	-	4	-	6
1308	White Box – White Cypress Pine shrubby open forest of the Nandewar Bioregion and Brigalow Belt South Bioregion	Shrubby White Box	2	-	-	-	-
	Subtotal		*6*	-	*8*	-	*14*
Offset Area 6							
1383	White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion	White Box	2	2	7	-	11
1329	Yellow Box – Blakelys Red Gum grassy woodland of the Nandewar Bioregion	Yellow Box	2	-	7	-	9
101	Poplar Box – Yellow Box – Western Grey Box grassy woodland on cracking clay soils mainly in the Liverpool Plains, Brigalow Belt South Bioregion	Inland Grey Box	-	-	5	-	5
56	Poplar Box – Belah woodland on clay-loam soils on alluvial plains of north-central NSW	Poplar Box	1	-	4	-	5

PCT #	PCT Name	Ancillary PCT Label	Zone 1	Zone 2	Zone 3	Zone 5	Total
146	Whitewood low open woodland of the Brigalow Belt South Bioregion and north-eastern Darling Riverine Plains Bioregion	Whitewood	2	-	-	-	2
1308	White Box – White Cypress Pine shrubby open forest of the Nandewar Bioregion and Brigalow Belt South Bioregion	Shrubby White Box	2	-	-	-	2
1308	White Box – White Cypress Pine shrubby open forest of the Nandewar Bioregion and Brigalow Belt South Bioregion	Shrubby Blakely's Red Gum / Motherumbah	2	-	-	-	2
1511	Dwyers Red Gum woodland on siliceous substrates in the Brigalow Belt South Bioregion	Dwyer's Red Gum	2	-	-	-	2
885	Heathy shrublands on rocky outcrops of the western slopes	Heathy Shrubland	1	-	-	-	1
	Subtotal		*14*	*2*	*23*	*-*	*39*
Mooki River Offset Area							
78	River Red Gum riparian tall woodland / open forest wetland in the Nandewar Bioregion and Brigalow Belt South Bioregion	River Red Gum	-	-	4	-	4
	Subtotal		*-*	*-*	*4*	*-*	*4*
Mine Rehabilitation Offset Area							

PCT #	PCT Name	Ancillary PCT Label	Zone 1	Zone 2	Zone 3	Zone 5	Total
1383	White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion	White Box					
1329	Yellow Box – Blakelys Red Gum grassy woodland of the Nandewar Bioregion	Blakely's Red Gum					
1329	Yellow Box – Blakelys Red Gum grassy woodland of the Nandewar Bioregion	Yellow Box					
101	Poplar Box – Yellow Box – Western Grey Box grassy woodland on cracking clay soils mainly in the Liverpool Plains, Brigalow Belt South Bioregion	Inland Grey Box					
202	Fuzzy Box woodland on colluvium and alluvial flats in the Brigalow Belt South Bioregion (including Pilliga) and Nandewar Bioregion	Fuzzy Box					
56	Poplar Box – Belah woodland on clay-loam soils on alluvial plains of north-central NSW	Poplar Box					
146	Whitewood low open woodland of the Brigalow Belt South Bioregion and north-eastern Darling Riverine Plains Bioregion	Whitewood					
1315	White Cypress Pine – Silver-leaved Ironbark grassy woodland of the Nandewar Bioregion	Tumbledown Red Gum					
1308	White Box – White Cypress Pine shrubby open forest of the Nandewar Bioregion and Brigalow Belt South Bioregion	Shrubby White Box					
1308	White Box – White Cypress Pine shrubby open forest of the Nandewar Bioregion and Brigalow Belt South Bioregion	Shrubby Blakely's Red Gum					
	Subtotal						

PCT #	PCT Name	Ancillary PCT Label	Zone 1	Zone 2	Zone 3	Zone 5	Total
Barraba Offset Area							
1329	Yellow Box – Blakelys Red Gum grassy woodland of the Nandewar Bioregion	Box Gums	2	7	5	-	14
1354	Blakelys Red Gum – Rough-barked Apple – Red Stringybark grassy open forest of the western New England Tablelands	Red Stringybark / Blakely's Red Gum	2	-	-	-	2
1382	Rough-barked Apple – Red Stringybark shrubby open forest of the western New England Tableland Bioregion	Red Stringybark / Rough-barked Apple	2	-	-	-	2
1382	Rough-barked Apple – Red Stringybark shrubby open forest of the western New England Tableland Bioregion	New England Blackbutt	2	-	-	-	2
1366	Orange Gum – Caleys Ironbark – Red Stringybark shrub/grass open forest of the southern New England Tablelands	Orange Gum / Ironbark	2	-	-	-	2
921	Manna Gum – Rough-barked Apple – Yellow Box grassy woodland/open forest of the New England Tableland Bioregion and NSW North Coast Bioregion	Manna Gum	2	-	-	-	2
84	River Oak – Rough-barked Apple – red gum – box riparian tall woodland (wetland) of the Brigalow Belt South Bioregion and Nandewar Bioregion	River Oak	2	-	-	-	2
	Subtotal		*14*	-	-	-	*26*

PCT #	PCT Name	Ancillary PCT Label	Zone 1	Zone 2	Zone 3	Zone 5	Total
Mt Erin and Glendowda Offset Area							
1383	White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion	White Box	2	7	6	-	15
1329	Yellow Box – Blakelys Red Gum grassy woodland of the Nandewar Bioregion	Yellow Box	2	6	4	-	12
27	Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion	Weeping Myall	2	-	2	-	4
1315	White Cypress Pine – Silver-leaved Ironbark grassy woodland of the Nandewar Bioregion	Tumbledown Red Gum	2	-	-	-	2
1380	Narrow-leaved Ironbark – pine – Brown Bloodwood shrub/grass open forest in the north west of the Nandewar Bioregion	Ironbark / Bloodwood	2	-	-	-	2
	Subtotal		*10*	*13*	*12*	*0*	*35*

8.1.4 Timing and Frequency

Vegetation monitoring sites will primarily be surveyed between September and November, with six-monthly monitoring undertaken between March and May, .

The frequency of vegetation monitoring site surveys is as follows:

- Management Zone 1:
  - once in the first year (baseline monitoring); and
  - every five years post baseline monitoring;
- Management Zone 2 and 3:
  - once prior to implementation of revegetation works (baseline monitoring);
  - every six months for the first two years after implementation of revegetation works;
  - every two years from year two to year 16; and
  - every five years from year 16.
- Management Zone 5:
  - every six months for the first two years after implementation of rehabilitation works;
  - every two years from year two to year 16; and
  - every five years from year 16.

The frequency of monitoring will be reviewed every 10 years, and updated as required within this *BMP*.

The reason for the high initial frequency of monitoring of revegetation areas is that there is some uncertainty involved in replacing native species and it is necessary to closely monitor the survival rates of the planted vegetation in order to trigger any required remedial action in a timely manner and to determine if the performance indicators detailed in *Section 8.1.4* are being met.

Within the revegetation areas, seedlings will be monitored every month for 12 months following revegetation works.

8.2 Fauna Monitoring

8.2.1 Purpose

Fauna monitoring will be undertaken within the Offset Areas to document the improvement in fauna usage over time in response to management actions. Monitoring will enable assessment of progression towards the completion criteria. The fauna monitoring program targets the following fauna groups:

- frogs (Mooki River Offset Area only);
- birds;
- bats;
- terrestrial mammals; and
- reptiles.

In addition to these fauna groups, monitoring surveys will also target the Koala, as detailed within the *KPoM*.

The fauna monitoring program will also include the monitoring of nest boxes.

8.2.2 Methods

The survey methods for each fauna group being targeted during fauna monitoring surveys is detailed below.

These methods have been developed in accordance with the *NSW Threatened Biodiversity Survey and Assessment Guidelines* (DEC (NSW) 2004) as well as consideration of the *EPBC Act Survey guidelines for Australia's threatened bats* (DEWHA 2010a), *Survey guidelines for Australia's threatened birds* (DEWHA 2010b), *Survey guidelines for Australia's threatened frogs* (DEWHA 2010c), *Survey guidelines for Australia's threatened reptiles* (SEWPaC 2011b) and *Survey guidelines for Australia's threatened mammals* (SEWPaC 2011a).

In addition to these methods, any vertebrate fauna species that are observed, heard calling or otherwise detected will be recorded in the total species list for each Offset Area.

8.2.2.1 Frogs

Monitoring surveys for frogs will be limited to the Mooki River Offset Area. The following survey methods will be undertaken at each monitoring site:

- spotlighting: A 20 person minute spotlighting survey on two separate nights. All species observed or heard calling will be recorded.

8.2.2.2 Birds

The following survey methods will be undertaken for birds within the Offset Areas:

- diurnal area search (October – February): A 2 ha area for 20 minutes, recording only species detected visually and/or aurally within this area (including fly-over species). Surveys will be undertaken at a subset of the vegetation monitoring sites, with the quantum as per in Table 25;
- diurnal area search (June – August): A 2 ha area for 20 minutes, recording only species detected visually and/or aurally within this area (including fly-over species). Surveys undertaken in June – August to target Regent Honeyeater (*Anthochaera phrygia*) and Swift Parrot (*Lathamus discolor*). Surveys will be undertaken at a subset of the vegetation monitoring sites, with the quantum as per in Table 25; and
- nocturnal call playback/spotlighting: Call playback, and associated spotlighting undertaken for Barking Owl (Ninox connivens) and Masked Owl (Tyto novaehollandiae) on two separate nights. Surveys will be undertaken at a subset of the vegetation monitoring sites, with the quantum as per in Table 25.

8.2.2.3 Bats

The following survey methods will be undertaken for bats within the Offset Areas:

- ultrasonic bat detection survey: Ultrasonic bat detection units placed in suitable habitat, such as along tracks, creeks and near caves, for a period of two nights. Units set to record data between dusk and dawn. Surveys will be undertaken at a subset of the vegetation monitoring sites, with the quantum as per in Table 25. The survey data collected will be used to record all the species of bat present and the relative number of calls for each species.

8.2.2.4 Terrestrial Mammals

The following survey methods will be undertaken for terrestrial mammals within the Offset 99

- motion sensor camera survey: Cameras will be deployed between October - February and left in-situ until collected between June - August (minimum three months deployed). Cameras will be un-baited and set to capture images.

8.2.2.5 Reptiles

The following survey methods will be undertaken for reptiles within the Offset Areas:

- diurnal active search: A 20 minute active search on two separate days; and

- nocturnal active search, with spotlighting: A 20-minute active search will be undertaken at each monitoring site on two separate nights. Searches will involve lifting fallen logs, bush rock and leaf litter.

8.2.2.6 Nest Boxes

Nest box monitoring will include inspection of the nest boxes and recording the following information:

- fauna species present; and
- condition of the nest box.

8.2.3 Locations

Fauna monitoring locations will be determined as part of the first monitoring period. The number of monitoring sites to be established within each Offset Area is detailed within *Table 25*. Once established, the locations of monitoring sites will be included within this *BMP*.

Monitoring locations for nest boxes will be determined once nest boxes have been established.

Table 25 Required Number of Monitoring Sites for Fauna

Fauna Group	Survey Method	Mt Watermark Offset Area	Offset Area 6	Mooki River Offset Area	Mine Rehabilitation Offset Area	Barraba Offset Area	Mt Erin and Glendowda Offset Area
Frogs	Spotlighting			Zone 3: 2 sites			
Birds	Diurnal area search (October – February)	Zone 1: 2 sites Zone 3: 2 sites	Zone 1: 3 sites Zone 2: 1 site Zone 3: 3 sites	Zone 3: 2 sites	Zone 5: 6 sites	Zone 1: 3 sites Zone 2: 2 sites Zone 3: 1 site	Zone 1: 2 sites Zone 2: 2 sites Zone 3: 2 sites
	Diurnal area search (June – August)	Zone 1: 1 site Zone 3: 1 site	Zone 1: 2 sites Zone 2: 1 site Zone 3: 2 sites	Zone 3: 1 sites	Zone 5: 6 sites	Zone 1: 3 sites Zone 2: 2 sites Zone 3: 1 site	Zone 1: 2 sites Zone 2: 2 sites Zone 3: 2 sites
	Call playback / spotlighting	Zone 1: 1 site Zone 3: 1 site	Zone 1: 1 site Zone 2: 1 site Zone 3: 1 site	Zone 3: 1 site	Zone 5: 6 sites	Zone 1: 3 sites Zone 2: 2 sites Zone 3: 1 site	Zone 1: 2 sites Zone 2: 2 sites Zone 3: 2 sites
Bats	Ultrasonic call detection	Zone 1: 1 site Zone 3: 1 site	Zone 1: 2 sites Zone 2: 1 site Zone 3: 2 sites	Zone 3: 1 site	Zone 5: 6 sites	Zone 1: 3 sites Zone 2: 2 sites Zone 3: 1 site	Zone 1: 2 sites Zone 2: 2 sites Zone 3: 2 sites
Terrestrial mammals	Motion-sensor camera	Zone 1: 1 site Zone 3: 1 site	Zone 1: 1 site Zone 2: 1 site Zone 3: 1 site	Zone 3: 1 site	Zone 5: 1 site	Zone 1: 1 site Zone 2: 1 site Zone 3: 1 site	Zone 1: 1 site Zone 2: 1 site Zone 3: 1 site
Reptiles	Diurnal active search	Zone 1: 2 sites Zone 3: 2 sites	Zone 1: 3 sites Zone 2: 1 site	Zone 3: 2 sites	Zone 5: 6 sites	Zone 1: 3 sites Zone 2: 2 sites	Zone 1: 2 sites Zone 2: 2 sites

Fauna Group	Survey Method	Mt Watermark Offset Area	Offset Area 6	Mooki River Offset Area	Mine Rehabilitation Offset Area	Barraba Offset Area	Mt Erin and Glendowda Offset Area
			Zone 3: 3 sites			Zone 3: 1 site	Zone 3: 2 sites
	Nocturnal active search	Zone 1: 1 site Zone 3: 1 site	Zone 1: 1 site Zone 2: 1 site Zone 3: 1 site	Zone 3: 1 site	Zone 5: 6 sites	Zone 1: 3 sites Zone 2: 2 sites Zone 3: 1 site	Zone 1: 2 sites Zone 2: 2 sites Zone 3: 2 sites

8.2.4 Timing and Frequency

The timing of each fauna survey method utilised during monitoring surveys is detailed within *Table 26*. These are consistent with the recommended survey periods for each fauna group as provided by the fauna survey guidelines mentioned in *Section 8.2.2*.

Table 26 Timing of Monitoring Methods for Fauna

Fauna Group	Survey Method	Timing
Frogs	Spotlighting	October – February
Birds	Diurnal area search (October – February)	October – February
	Diurnal area search (June – August)	June – August
	Call playback / spotlighting	October – February
Bats	Ultrasonic call detection	October – February
Terrestrial mammals	Motion-sensor camera	Deployment: October – February Collection: June – August
Reptiles	Diurnal active search	October – February
	Nocturnal active search	October – February
Nest Boxes	Nest box inspection	October - February

Initially, baseline fauna monitoring will be undertaken every two years for six years, which provides baseline data from three monitoring periods. Following the completion of baseline monitoring, the frequency of monitoring will be determined by the management zone in which the monitoring site occurs.

The frequency of fauna monitoring surveys is as follows:

- Management Zone 1:
  - every two years for the first six years (baseline monitoring); and
  - every five years post baseline monitoring;
- Management Zone 2:
  - every two years for the first six years (baseline monitoring);
  - every two years from year six to year 16; and
  - every five years from year 16.
- Management Zone 3:
  - every two years for the first six years (baseline monitoring);
  - every two years from year six to year 16; and
  - every five years from year 16.

The data will initially be used to determine the existing species richness and abundance of fauna at each monitoring site (baseline monitoring). The data collected from subsequent monitoring will be compared with the results of the baseline monitoring in order to determine any changes in species richness and abundance. The performance and completion criteria are provided in *Section 8.6*. Completion criteria for fauna is taken to be documented increases in species richness at all monitoring sites in the long term.

At a minimum, the first monitoring survey undertaken within zones 2 and 3 must be undertaken prior to any revegetation works. Therefore monitoring site locations need to take into account the revegetation schedule.

The frequency of monitoring will be reviewed every 10 years, and updated as required within this *BMP*.

8.3 Weed Monitoring

8.3.1 Purpose

Weeds are a threat to the integrity of the vegetation within the Project Boundary and Offset Areas. Weeds also pose a significant threat to revegetation areas as they can out-compete native seedlings and reduce the success of revegetation measures. Monitoring is critical to the success of weed control as it allows comparison of records from before control activities began with those collected during and after control to determine the effectiveness of the control strategy and allow it to be adapted where needed. For these reasons, weed monitoring will be undertaken within the Offset Areas to provide the necessary information to trigger management action and to determine the efficacy of management actions undertaken aimed at reducing weed extent and abundance.

Monitoring will focus on WoNS, Priority Weeds and High Threat Exotics which have been recorded within the Offset Areas. Should any other WoNS, Priority Weeds and High Threat Exotics be detected within the Offset Areas, this *BMP* will be updated to include monitoring measures for these species.

8.3.2 Methods

8.3.2.1 Vegetation Monitoring Sites

Weeds within the Offset Areas will be monitored as part of the standard vegetation monitoring procedure outlined in *Section 8.1*. This includes collection of cover and abundance data within a 20 x 20 m plot.

8.3.2.2 Significant Weed Infestations

Significant weed infestations, being those that are widespread with high densities, will be mapped as part of baseline surveys within the Project Boundary and Offset Areas. Monitoring surveys will include traverses across these mapped infestations to provide an updated extent. A 20 x 20 m quadrat will be established and density will be estimated within the quadrat and extrapolated to give overall population size estimates.

Where new significant weed infestations, or newly-occurring weeds are detected, the location, density and size will be recorded and the occurrences mapped and included within the *BMP*. If required, the performance criteria and completion criteria will be updated to reflect these occurrences.

8.3.3 Locations

8.3.3.1 Vegetation Monitoring Sites

The locations of vegetation monitoring sites will be determined in accordance with *Section 8.1.3.* Once determined, the locations of vegetation monitoring sites will be included within this *BMP*.

8.3.3.2 Significant Weed Infestations

A baseline survey of weeds is required to be completed within the Project Boundary and Offset Areas following the approval this *BMP*. Information collected during this baseline survey will determine the location of significant weed infestations. Once determined, the locations of significant infestations monitoring sites will be included within this *BMP*. Should new species, or additional infestations be detected within the Offset Areas, these locations will also be included within the *BMP*.

8.3.4 Timing and Frequency

8.3.4.1 Vegetation Monitoring Sites

The timing and frequency of vegetation monitoring sites will be determined in accordance with *Section 8.1.4.* Once determined, the timing of vegetation monitoring sites will be included within this *BMP*.

8.3.4.2 Significant Weed Infestations

Weed monitoring will be undertaken twice annually for the first three years of implementation of this *BMP*. It is anticipated that the frequency of monitoring will reduce over time as weed control measures are implemented. After the initial three years of monitoring, the frequency of future monitoring will be reviewed and updated within this *BMP*.

8.4 Feral Animal Monitoring

8.4.1 Purpose

Feral animals, particularly foxes and pigs, are a threat to the integrity of forest and woodland habitats within the Project Boundary and Offset Areas. Feral animals may change in distribution and abundance seasonally and there is potential for additional species to become prevalent within the Project Boundary as a result of human activities associated with mining. Monitoring is critical to the success of feral animal control as it allows comparison of records from before control activities began with those collected during and after control to determine the effectiveness of the control strategy and allow it to be adapted, where needed. For these reasons, feral animal monitoring will be undertaken within the Project Boundary and Offset Areas to provide the necessary information to trigger management action and to determine the efficacy of management actions undertaken aimed at reducing feral animal abundance.

Monitoring will focus on the feral animals recorded within the Project Boundary and Offset Areas. Should any other feral animals or weeds be detected within the Offset Areas, this *BMP* will be updated to include monitoring measures for these species.

Although the Black Rat and House Mouse have been recorded within the Project Boundary, these species are not expected to cause significant impact to the biodiversity values within this area and therefore are not included within feral animal management or monitoring.

8.4.2 Methods

Feral animal monitoring will be undertaken within the Project Boundary Offset Areas using motion-sensor cameras. Cameras will be established at permanent monitoring locations and will be un-baited and will be set to record images for subsequent identification. Cameras will be left in-situ for a minimum of 3 months. Analysis of data collected from the motion-sensor cameras will include review detection frequencies of each feral animal.

In addition to motion sensor camera surveys, data collected at vegetation monitoring sites within the Offset Areas will also include collection of data on evidence of feral animal disturbance (e.g. diggings, droppings).

8.4.3 Locations

Monitoring locations will be determined as part of the first monitoring period. Once established, the locations of monitoring sites will be included within this *BMP*.

A total of fifteen motion-sensor cameras will be utilised within the Project Disturbance Boundary. If possible, camera locations within the Offset Areas will coincide with motion-sensor camera fauna monitoring locations detailed in *Section 8.2.3*. One motion-sensor camera will be deployed within each management zone (excluding Zone 4), within the Offset Areas.

8.4.4 Timing and Frequency

Feral animal monitoring utilising motion-sensor cameras will be undertaken twice annually for the first three years of implementation of this *BMP*. It is anticipated that the frequency of

monitoring will reduce over time as feral animal control measures are implemented. After the initial three years of monitoring, the frequency of future monitoring will be reviewed and updated within this *BMP*.

Monitoring of habitat disturbance at the vegetation monitoring sites will be conducted in accordance with *Section 8.1.4.*

8.5 Data Storage

All monitoring data will be collated and stored electronically in the SWC data system. Monitoring data will include:

- Excel spreadsheets containing survey data (e.g. plot data, fauna lists);
- photographs (e.g. plot photographs, motion-sensor camera photographs); and
- GIS mapping files (e.g. monitoring site locations, significant weed infestation extents).

Monitoring data will be updated annually, and stored for use in subsequent monitoring analyses.

8.6 Performance and Completion Criteria

Performance and completion criteria developed for monitoring the success of management action actions have implemented the SMART principals:

- specific – specific outcomes relevant to biodiversity conservation objectives;
- measurable –quantifiable performance measures that can be compared over time to demonstrate whether the outcomes are attained and/or maintained;
- achievable – the performance measures are realistic;
- relevant – outcomes are directly relevant to the biodiversity matter; and
- timely – includes specific timeframes for the attainment of the outcome.

Table 27 details the performance measures and completion criteria. Timeframes utilised in this table include the following:

- short term: 0-5 years.
- medium term: >5-15 years; and
- long term: >15-25 years.

In the event that performance criteria are not being met within the nominated timeframes, the contingency measures detailed in *Section 8.7,* or measures that become apparent in the meantime will be implemented to ensure the plan attains and maintains the offset completion criteria.

Table 27 Performance and Completion Criteria for Assessing Effectiveness of Management Actions

Outcomes	Management Zone	Performance and Completion Criteria	Timeframe
Improved native vegetation condition	Offset Areas (Zone 1)	At each monitoring site:	
		Number of native plant species for each growth form group: At least benchmark value.	Short term
		Number of native plant species for each growth form group: At or above benchmark value.	Medium term
		Structure of each growth form group: At least benchmark value.	Short term
		Structure of each growth form group: At or above benchmark value.	Medium term
		Cover of High Threat Exotic weed species: At, or less than benchmark value.	Short term
		Cover of High Threat Exotic weed species: Less than 5%.	Medium term
		Number of large trees: At least benchmark value.	Short term
		Number of large trees: At or above benchmark value.	Medium term
		Tree stem size classes: At least benchmark value.	Short term
		Tree stem size classes: At or above benchmark value.	Medium term
		Regeneration: At least benchmark value.	Short term
		Regeneration: Present.	Medium term
		Length of fallen logs over 10 cm in diameter: At lease benchmark value.	Short term
		Length of fallen logs over 10 cm in diameter: At or above benchmark value.	Medium term

Outcomes	Management Zone	Performance and Completion Criteria	Timeframe
		Assessment of litter cover: At least benchmark value.	Short term
		Assessment of litter cover: At or above benchmark value.	Medium term
		Number of trees with hollows that are visible from the ground: At lease benchmark.	Short term
		Number of trees with hollows that are visible from the ground: At or above benchmark.	Medium term
	Offset Areas (Zone 2)	At each monitoring site:	
		Number of native plant species for each growth form group: Increase to at least 20% of local reference site benchmark.	Short term
		Number of native plant species for each growth form group: Increase to at least 60% of local reference site benchmark.	Medium term
		Number of native plant species for each growth form group: Increase to at least 80% of local reference site benchmark.	Long term
		Structure of each growth form group: Increase to at least 20% of local reference site benchmark.	Short term
		Structure of each growth form group: Increase to at least 60% of local reference site benchmark.	Medium term
		Structure of each growth form group: Increase to at least 80% of local reference site benchmark.	Long-term
		Cover of High Threat Exotic weed species: Less than 10%.	Short term
		Cover of High Threat Exotic weed species: Less than 10%.	Medium term
		Cover of High Threat Exotic weed species: Less than 5%.	Long term

Outcomes	Management Zone	Performance and Completion Criteria	Timeframe
		Number of large trees: Maintenance of baseline levels.	Short term
		Number of large trees: Consistent progression towards presence of large trees.	Medium term
		Number of large trees: Consistent progression towards presence of large trees.	Long term
		Tree stem size classes: Maintenance of baseline levels.	Short term
		Tree stem size classes: Consistent progression towards presence of 50% of stem size classes from local reference site benchmark.	Medium term
		Tree stem size classes: Consistent progression towards presence of 50% of stem size classes from local reference site benchmark.	Long term
		Regeneration: Maintenance of baseline levels.	Short term
		Regeneration: Present.	Medium term
		Regeneration: Present.	Long term
		Length of fallen logs over 10 cm in diameter: Maintenance of baseline levels.	Short term
		Length of fallen logs over 10 cm in diameter: 20% of local benchmark.	Medium term
		Length of fallen logs over 10 cm in diameter: 50% of local benchmark.	Long term
		Assessment of litter cover: Maintenance of baseline levels.	Short term
		Assessment of litter cover: Increase to at least 20% of local reference site average.	Medium term
		Assessment of litter cover: Increase to at least 50% of local reference site average.	Long term
		Number of trees with hollows that are visible from the ground: Maintenance of baseline levels.	Short term

Outcomes	Management Zone	Performance and Completion Criteria	Timeframe
		Number of trees with hollows that are visible from the ground: Maintenance of baseline levels.	Medium term
		Number of trees with hollows that are visible from the ground: Increase to at least 50% of local reference site benchmark.	Long term
	Offset Areas (Zone 3)	At each monitoring site:	
		Number of native plant species for each growth form group: Increase to at least 10% of local reference site average.	Short term
		Number of native plant species for each growth form group: Increase to at least 30% of local reference site average.	Medium term
		Number of native plant species for each growth form group: Increase to at least 60% of local reference site average.	Long term
		Structure of each growth form group: Increase to at least 10% of local reference site average.	Short term
		Structure of each growth form group: Increase to at least 30% of local reference site average.	Medium term
		Structure of each growth form group: Increase to at least 60% of local reference site average.	Long term
		Cover of High Threat Exotic weed species: Less than 15%.	Short term
		Cover of High Threat Exotic weed species: Less than 10%.	Medium term
		Cover of High Threat Exotic weed species: Less than 5%.	Long term
		Number of large trees: Maintenance of baseline levels.	Short term

Outcomes	Management Zone	Performance and Completion Criteria	Timeframe
		Number of large trees: Maintenance of baseline levels.	Medium term
		Number of large trees: Consistent progression towards presence of large trees.	Long term
		Tree stem size classes: Maintenance of baseline levels.	Short term
		Tree stem size classes: Maintenance of baseline levels.	Medium term
		Tree stem size classes: Consistent progression towards presence of 50% of stem size classes from local reference site benchmark.	Long term
		Regeneration: Maintenance of baseline levels.	Short term
		Regeneration: Maintenance of baseline levels.	Medium term
		Regeneration: Present.	Long term
		Length of fallen logs over 10 cm in diameter: Maintenance of baseline levels.	Short term
		Length of fallen logs over 10 cm in diameter: Maintenance of baseline levels.	Medium term
		Length of fallen logs over 10 cm in diameter: 50% of local benchmark.	Long term
		Assessment of litter cover: Maintenance of baseline levels.	Short term
		Assessment of litter cover: Increase to at least 20% of local reference site average.	Medium term
		Assessment of litter cover: Increase to at least 50% of local reference site average.	Long term
		Number of trees with hollows that are visible from the ground: Maintenance of baseline levels.	Short term
		Number of trees with hollows that are visible from the ground: Maintenance of baseline levels.	Medium term

Outcomes	Management Zone	Performance and Completion Criteria	Timeframe
		Number of trees with hollows that are visible from the ground: Increase to at least 50% of local reference site benchmark.	Long term
	Offset Areas (Zone 5)	At each monitoring site:	
		Number of native plant species for each growth form group: Increase to at least 5% of local reference site average.	Short term
		Number of native plant species for each growth form group: Increase to at least 25% of local reference site average.	Medium term
		Number of native plant species for each growth form group: Increase to at least 50% of local reference site average.	Long term
		Structure of each growth form group: Increase to at least 5% of local reference site average.	Short term
		Structure of each growth form group: Increase to at least 25% of local reference site average.	Medium term
		Structure of each growth form group: Increase to at least 50% of local reference site average.	Long term
		Cover of High Threat Exotic weed species: Less than 15%.	Short term
		Cover of High Threat Exotic weed species: Less than 10%.	Medium term
		Cover of High Threat Exotic weed species: Less than 5%.	Long term
		Number of large trees: Maintenance of baseline levels.	Short term
		Number of large trees: Maintenance of baseline levels.	Medium term
		Number of large trees: Consistent progression towards presence of large trees.	Long term

Outcomes	Management Zone	Performance and Completion Criteria	Timeframe
		Tree stem size classes: Maintenance of baseline levels.	Short term
		Tree stem size classes: Maintenance of baseline levels.	Medium term
		Tree stem size classes: Consistent progression towards presence of 50% of stem size classes from local reference site benchmark.	Long term
		Regeneration: Maintenance of baseline levels.	Short term
		Regeneration: Maintenance of baseline levels.	Medium term
		Regeneration: Present.	Long term
		Length of fallen logs over 10 cm in diameter: Maintenance of baseline levels.	Short term
		Length of fallen logs over 10 cm in diameter: Maintenance of baseline levels.	Medium term
		Length of fallen logs over 10 cm in diameter: 50% of local benchmark.	Long term
		Assessment of litter cover: Maintenance of baseline levels.	Short term
		Assessment of litter cover: Increase to at least 20% of local reference site average.	Medium term
		Assessment of litter cover: Increase to at least 50% of local reference site average.	Long term
		Number of trees with hollows that are visible from the ground: Maintenance of baseline levels.	Short term
		Number of trees with hollows that are visible from the ground: Maintenance of baseline levels.	Medium term
		Number of trees with hollows that are visible from the ground: Increase to at least 50% of local reference site benchmark.	Long term

Outcomes	Management Zone	Performance and Completion Criteria	Timeframe
Increased native fauna species richness			
Frogs (Mooki River Offset Area only)	Offset Areas (Zone 3)	Baseline surveys conducted over initial six year period.	Short term to medium term (0-6 years)
		Ongoing monitoring following commencement shows maintenance or increase from baseline frog species richness.	Medium term
		Ongoing monitoring over 16 years following commencement shows increase from baseline frog species richness.	Long term
Birds	Offset Areas (Zone 1)	Baseline surveys conducted over initial six year period.	Short term to medium term (0-6 years)
		Ongoing monitoring following commencement shows maintenance or increase from baseline bird species richness at 80% of the monitoring sites.	Medium term
		Ongoing monitoring over 16 years following commencement shows increase from baseline bird species richness.	Long term
	Offset Areas (Zone 2)	Baseline surveys conducted over initial six year period.	Short term to medium term (0-6 years)
		Ongoing monitoring following commencement shows maintenance or increase from baseline bird species richness at 80% of the monitoring sites.	Medium term
		Ongoing monitoring over 16 years following commencement shows increase from baseline bird species richness at all monitoring sites.	Long-term

Outcomes	Management Zone	Performance and Completion Criteria	Timeframe
	Offset Areas (Zone 3)	Baseline surveys conducted over initial six year period.	Short term to medium term (0-6 years)
		Ongoing monitoring following commencement shows maintenance or increase from baseline bird species richness at 80% of the monitoring sites.	Medium term
		Ongoing monitoring over 16 years following commencement shows increase from baseline bird species richness at all monitoring sites.	Long-term
		Ongoing monitoring following commencement shows maintenance or increase from baseline bird species richness at 80% of the monitoring sites.	Medium term
	Offset Areas (Zone 5)	Ongoing monitoring over 16 years following commencement shows consistent increase in bird species richness at all monitoring sites.	Long-term
Bats	Offset Areas (Zone 1)	Baseline surveys conducted over initial six year period.	Short term to medium term (0-6 years)
		Ongoing monitoring following commencement shows maintenance or increase from baseline bat species richness at 80% of the monitoring sites.	Medium term
		Ongoing monitoring over 16 years following commencement shows increase from baseline bat species richness.	Long-term
	Offset Areas (Zone 2)	Baseline surveys conducted over initial six year period.	Short term to medium term (0-6 years)
		Ongoing monitoring following commencement shows maintenance or increase from baseline bat species richness at 80% of the monitoring sites.	Medium term
		Ongoing monitoring over 16 years following commencement shows increase from baseline bat species richness at all monitoring sites.	Long-term

Outcomes	Management Zone	Performance and Completion Criteria	Timeframe
	Offset Areas (Zone 3)	Baseline surveys conducted over initial six year period.	Short term to medium term (0-6 years)
		Ongoing monitoring following commencement shows maintenance or increase from baseline bat species richness at 80% of the monitoring sites.	Medium term
		Ongoing monitoring over 16 years following commencement shows increase from baseline bat species richness at all monitoring sites.	Long-term
	Offset Areas (Zone 5)	Ongoing monitoring over 16 years following commencement shows consistent increase in bat species richness at all monitoring sites.	Long-term
Terrestrial mammals	Offset Areas (Zone 1)	Baseline surveys conducted over initial six year period.	Short term to medium term (0-6 years)
		Ongoing monitoring following commencement shows maintenance or increase from baseline terrestrial mammal species richness at 80% of the monitoring sites.	Medium term
		Ongoing monitoring over 16 years following commencement shows increase from baseline terrestrial mammal species richness.	Long-term
	Offset Areas (Zone 2)	Baseline surveys conducted over initial six year period.	Short term to medium term (0-6 years)
		Ongoing monitoring following commencement shows maintenance or increase from baseline terrestrial mammal species richness at 80% of the monitoring sites.	Medium term
		Ongoing monitoring over 16 years following commencement shows increase from baseline terrestrial mammal species richness at all monitoring sites.	Long-term

Outcomes	Management Zone	Performance and Completion Criteria	Timeframe
	Offset Areas (Zone 3)	Baseline surveys conducted over initial six year period.	Short term to medium term (0-6 years)
		Ongoing monitoring following commencement shows maintenance or increase from baseline terrestrial mammal species richness at 80% of the monitoring sites.	Medium term
		Ongoing monitoring over 16 years following commencement shows increase from baseline terrestrial mammal species richness at all monitoring sites.	Long term
	Offset Areas (Zone 5)	Ongoing monitoring over 16 years following commencement shows consistent increase in terrestrial mammal species richness at all monitoring sites.	Long term
Reptiles	Offset Areas (Zone 1)	Baseline surveys conducted over initial six year period.	Short term to medium term (0-6 years)
		Ongoing monitoring following commencement shows maintenance or increase from baseline reptile species richness at 80% of the monitoring sites.	Medium term
		Ongoing monitoring over 16 years following commencement shows increase from baseline reptile species richness.	Long term
	Offset Areas (Zone 2)	Baseline surveys conducted over initial six year period.	Short term to medium term (0-6 years)
		Ongoing monitoring following commencement shows maintenance or increase from baseline reptile species richness at 80% of the monitoring sites.	Medium term
		Ongoing monitoring over 16 years following commencement shows increase from baseline reptile species richness at all monitoring sites.	Long term

Outcomes	Management Zone	Performance and Completion Criteria	Timeframe
	Offset Areas (Zone 3)	Baseline surveys conducted over initial six year period.	Short term to medium term (0-6 years)
		Ongoing monitoring following commencement shows maintenance or increase from baseline reptile species richness at 80% of the monitoring sites.	Medium term
		Ongoing monitoring over 16 years following commencement shows increase from baseline reptile species richness at all monitoring sites.	Long term
	Offset Areas (Zone 5)	Ongoing monitoring over 16 years following commencement shows consistent increase in reptile species richness at all monitoring sites.	Long term
Reduced weed species extent	Project Disturbance Boundary	Baseline surveys conducted within one year of commencement.	Short term
		Significant weed infestations reduced by 50% in extent.	Medium term
		No new significant weed infestations for five years.	Medium term
	Offset Areas (Zone 1)	Baseline surveys conducted within one year of commencement.	Short term
		Ongoing monitoring over 16 years following commencement shows reduction in weed species richness and cover at all monitoring sites.	Long-term
		Significant weed infestations reduced by 50% in extent.	Medium term
		No new significant weed infestations for five years.	Medium term
	Offset Areas (Zone 2)	Baseline surveys conducted within one year of commencement.	Short term

Outcomes	Management Zone	Performance and Completion Criteria	Timeframe
		Ongoing monitoring over 16 years following commencement shows reduction in weed species richness and cover at all monitoring sites.	Long-term
		Significant weed infestations reduced by 50% in extent.	Medium term
		No new significant weed infestations for five years.	Medium term
	Offset Areas (Zone 3)	Baseline surveys conducted within one year of commencement.	Short term
		Ongoing monitoring over 16 years following commencement shows reduction in weed species richness and cover at all monitoring sites.	Long-term
		Significant weed infestations reduced by 50% in extent.	Medium term
		No new significant weed infestations for five years.	Medium term
		Baseline surveys conducted within one year of commencement.	Short term
	Offset Areas (Zone 5)	Ongoing monitoring over 16 years following commencement show weed species richness and cover commensurate with Zone 3.	Long-term
Reduced feral animal occupation	Project Boundary	Reduced frequency of feral animal detections (number and extent).	Long term
	Offset Areas (Zones 1, 2, 3, 5)	Reduced frequency of feral animal detections (number and extent).	Long term
		Observed reduction in habitat disturbance by feral animals.	Long term

8.7 Contingency Measures

Contingency measures are required to manage the consequence of any unplanned or unanticipated events or circumstances (i.e. risks to achieving the plan objectives). Such events and their impacts can be identified within during the monitoring and reporting process. Contingency measures will be utilised should monitoring indicate that offset completion criteria or project area performance criteria are unlikely to or have not been met. Contingency measures for this *BMP* are identified within *Table 28*.

Table 28 Contingency Measures for Biodiversity Value Outcomes

Sought Outcomes	Contingency Measures
Improved native vegetation condition	• undertake controlled grazing • undertake studies to develop alternative revegetation techniques • increase frequency of revegetation works • undertake additional weed and feral animal management
Increased native fauna species richness	• Increase re-use of salvages items • Install nest boxes • undertake additional weed and feral animal management
Reduced weed species extent	• increase frequency of control • additional efforts to control target species or methods extended to cover newly occurring weed species • increase monitoring frequency
Reduced feral animal occupation	• increase frequency of control • change method of control • implement additional efforts to control target species or methods extended to cover new feral species

Contingency measures have also been developed for potential natural hazards within the Offset Areas. *Table 29* details the hazards, potential impacts and the contingency measures to address the hazard.

Table 29 Contingency Measures for Potential Hazards

Hazard	Impact	Contingency Measures
Drought	• dieback of plant species • increase in severity of bush fire • increase in erosion post-fire	• increased frequency of monitoring and management of fuel loads • increased frequency of monitoring and management of feral animals • implement erosion control measures
Bush fire	• loss of tree hollows • plant mortality • fauna mortality	• increased frequency of monitoring and management of fuel loads • re-use of additional salvage items • installation of nest boxes
Flood	• major erosion • plant mortality	• implement erosion control measures • undertaken revegetation works within affected areas.

9.0 Reporting

9.1 Documentation

Reports required to be prepared in accordance with this *BMP* are listed in *Table 30*.

Table 30 Reporting Requirements

Report	Timing	Purpose
Induction records maintenance	Weekly	Internal SWC document to detail completion of inductions
Pre-clearance Report	Daily during pre-clearance surveys	Internal SWC document to detail pre-clearance activities
Large-eared Pied Bat Management Plan	As required	Document outlining mitigation measures to be approved by EES.
Species-specific Translocation Program	As required	Document outlining species-specific translocation measures (e.g. Koala) to be approved by DPIE and EES.
Clearing Report	Daily during clearing	Internal SWC document to detail clearing activities
Fauna Injury and Relocation Report	Annual, post clearing event	Internal SWC document to detail fauna injury and relocation during clearing activities
Unexpected Threatened Species Find Report	As required	Internal SWC document to detail implementation of the unexpected threatened species find protocol, including consultation with EES.
Seed Collection Report	Annual	Internal SWC document to detail seed collection activities
Salvaged Habitat Features Report	Annual, post clearing event	Internal SWC document to detail salvage of habitat items
Weed Management Report	Annual	Internal SWC document to detail weed management activities
Feral Animal Management Report	Annual	Internal SWC document to detail feral animal management activities
Re-used Habitat Features Report	Annual	Internal SWC document to detail re-use of salvaged habitat items
Revegetation Works Report	Annual	Internal SWC document to detail revegetation works undertaken within the Biodiversity Offsets Areas

Report	Timing	Purpose
Rehabilitation Works Report	Annual	Internal SWC document to detail rehabilitation works undertaken within the Biodiversity Offsets Areas
BMP Annual Report	Annual	To be utilised to demonstrate implementation of management actions within the *BMP* in accordance with State and Commonwealth approval conditions

9.2 Biodiversity Management Plan Annual Report

A *Biodiversity Management Plan Annual Report* (*BMP Annual Report*) will be submitted annually in order to track and assess the performance of the biodiversity management measures contained in the *BMP* over the preceding 12 month period. The *BMP Annual Report* will be created following the completion of annual monitoring and will provide the results of the year's surveys and compare them to previous years. The *BMP Annual Report* will contain details of all the vegetation monitoring, fauna monitoring, weed monitoring and feral animal monitoring that has been conducted during the preceding year. This report will describe the works undertaken, present the findings of the monitoring activities, discuss any problems encountered in implementing the *BMP* and will recommend any adaptations or additions to the *BMP*. Recommendations will be made to guide the management of each area during the coming year.

The *BMP Annual Report* will also summarise the extent of habitat within the Offset Areas for fauna species, in particular the Koala.

The *BMP Annual Report* will form a long term record of the flora and fauna management within the Project Boundary and Offset Areas and will help determine what the overall impact of the Project has been and will determine the efficacy of the mitigation measures implemented. The *BMP Annual Report* will be submitted to DPIE, EES and DAWE to meet compliance reporting requirements in respective conditions of consent and approval.

9.3 Annual Review

An annual review of the environmental performance of the project must be conducted by the end of March each year (unless otherwise agreed by the DPIE Secretary) following the commencement of development. In accordance with Condition 4 of Schedule 5 of the NSW Development Consent, *the Annual Review* must:

(a) describe the development that was carried out in the previous calendar year, and the development that is proposed to be carried out over the next year;

(b) include a comprehensive review of the monitoring results and complaints records of the development over the previous calendar year, which includes a comparison of these results against the:

- *the relevant statutory requirements, limits or performance measures/criteria;*
- *the monitoring results of previous years; and*
- *the relevant predictions in the EIS;*

(c) identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance;

(d) identify any trends in the monitoring data over the life of the development;

(e) identify any discrepancies between the predicted and actual impacts of the development, and analyse the potential cause of any significant discrepancies; and

(f) describe what measures will be implemented over the next year to improve the environmental performance of the development.

The documents listed in *Table 30* will contribute to the *Annual Review* prepared by SWC. The *Annual Review* will be published on the SWC website.

9.4 Review of the BMP

Following completion of the *BMP Annual Report* and *Annual Review*, it may be necessary to update the *BMP*. The review of the *BMP* will be conducted within three months of submission of the *Annual Review*. Any amendments to the *BMP* will be undertaken in consultation with DPIE and EES. Once the amendments are approved by relevant regulators (including Federal Minister or delegate), the updated *BMP* will be published on the SWC website within one month of approval.

9.5 Independent Environmental Audit

An *Independent Environmental Audit* of the environmental performance of the development must be conducted within 12 months of the commencement of construction and every three years thereafter. In accordance with Condition 5 of Schedule 5 of the NSW Development Consent, the *Independent Environmental Audit* must:

(a) be conducted by a suitably qualified, experienced and independent team of experts whose appointment has been endorsed by the Secretary;

(b) include consultation with the relevant agencies;

(c) assess the environmental performance of the development and assess whether it is complying with the requirements in this consent, and any other relevant approvals, relevant EPL/s and/or Mining Lease (including any assessment, plan or program required under these approvals);

(d) review the adequacy of any approved strategy, plan or program required under the abovementioned approvals; and

(e) recommend measures or actions to improve the environmental performance of the development, and/or any strategy, plan or program required under these approvals.

Note: This audit team must be led by a suitably qualified auditor, and include experts in water resources, noise, air quality, ecology, and any other fields specified by the Secretary.

The documents listed in *Table 30* will be available as source material for the *Independent Environmental Audit.* The *Independent Environmental Audit* will be published on the SWC website.

10.0 Responsibilities

The works to be undertaken according to this *BMP* are summarised in *Table 31*. This includes all the activities proposed to be undertaken as part of this *BMP*, including those to be undertaken prior to clearing within the Project Boundary, weed and feral animal control measures and monitoring and revegetation and rehabilitation of native vegetation.

Table 31 Responsibilities

Item	Responsibilities
Project Boundary Management	
Induction and staff education	Safety Manager
Marking limits of clearing	Environmental Superintendent
General pre-clearance surveys	Ecologist
Targeted pre-clearance surveys (threatened flora species)	Ecologist
Targeted pre-clearance surveys (threatened fauna species)	Ecologist
Timing of clearing	Environmental Superintendent
Staging of clearing	Environmental Superintendent
Additional clearing protocols	Environmental Superintendent
Fauna relocation	Ecologist
Injured fauna rescue	Ecologist
Unexpected threatened species find protocol	Ecologist
Access control	Land Asset Manager
Vehicle driving policies	Safety Manager
Soil pathogen management	Environmental Superintendent
Seed collection	Ecologist
Salvage of habitat features	Environmental Superintendent
Soil Management	Environmental Superintendent
Weed management	Land Asset Manager
Feral animal management	Land Asset Manager
Erosion control measures	Environmental Superintendent
Salinity management	Environmental Superintendent
Agricultural land management	Land Asset Manager
Bush fire management	Land Asset Manager
Management of potential conflicts with Aboriginal cultural heritage values	Environmental Superintendent
Offset Areas Management	
Access control	Land Asset Manager
Soil pathogen management	Environmental Superintendent
Seed collection	Ecologist
Re-use of salvaged habitat features	Ecologist
Weed management	Land Asset Manager
Invasive native flora species management	Land Asset Manager

Item	Responsibilities
Feral animal management	Land Asset Manager
Overabundant native fauna species management	Land Asset Manager
Revegetation	Environmental Superintendent
Rehabilitation	Environmental Superintendent
Agricultural land management	Land Asset Manager
Koala habitat management	Ecologist
Establishment of wildlife corridors	Ecologist
Bush fire management	Land Asset Manager
Management of potential conflicts with Aboriginal cultural heritage values	Environmental Superintendent
Monitoring	Environmental Superintendent
Improved native vegetation condition	Ecologist
Increased native fauna species richness	Ecologist
Reduced weed extent	Land Asset Manager
Reduced feral animal occupation	Land Asset Manager
Reporting	
Project Boundary	
Induction records maintenance	Safety Manager
Pre-clearance Report	Ecologist
Large-eared Pied Bat Management Plan	Ecologist
Species-specific Translocation Program	Ecologist
Clearing Report	Ecologist
Fauna Injury and Relocation Report	Ecologist
Unexpected Threatened Species Find Report	Ecologist
Seed Collection Report	Ecologist
Salvaged Habitat Features Report	Environmental Superintendent
Weed Management Report	Land Asset Manager
Feral Animal Management Report	Land Asset Manager
BMP Annual Report	Ecologist
Offset Areas	
Seed Collection Report	Ecologist
Re-used Habitat Features Report	Ecologist
Weed Management Report	Land Asset Manager
Feral Animal Management Report	Land Asset Manager
Revegetation Works Report	Environmental Superintendent
Rehabilitation Works Report	Environmental Superintendent
BMP Annual Report	Ecologist

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Appendix A –Species List for Revegetation

The following species list provided in *Table 13.1* is for the *EPBC Act*-listed threatened ecological community White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland Ecological Community (Box-Gum Woodland). The list is not exhaustive, and not all species are found in all Box-Gum Woodland communities across its distribution. However, the list provides a reference for suitable planting species for rehabilitation and revegetation sites.

Table 13.1 Box-Gum Woodland Species and Planting List

Form	Family	Scientific Name	Common name
Climber	Pittosporaceae	*Billardiera scandens*	Appleberry, Snotberry, Apple Dumplings
	Ranunculaceae	*Clematis microphylla*	Small-leaved Clematis
Dominant tree	Myrtaceae	*Eucalyptus albens*	White Box
Dominant tree	Myrtaceae	*Eucalyptus blakelyi*	Blakely's Red Gum
Dominant tree	Myrtaceae	*Eucalyptus melliodora*	Yellow Box, Yellow Jacket, Honey Box (Qld), Yellow Ironbark (Qld)
Dominant tree (in Nandewar)	Myrtaceae	*Eucalyptus microcarpa*	Grey Box, Narrow-leaved Box, Inland Grey Box, Western Grey Box
Dominant tree (in Nandewar)	Myrtaceae	*Eucalyptus moluccana*	Grey Box, Gum-topped Box
Fern	Aspleniaceae	*Asplenium flabellifolium*	Necklace Fern
	Ophioglossaceae	*Botrychium australe*	Parsley Fern
	Adiantaceae	*Cheilanthes austrotenuifolia*	Rock-fern
	Adiantaceae	*Cheilanthes distans*	Bristly Cloak Fern
	Adiantaceae	*Cheilanthes sieberi*	Narrow Rock Fern
	Dennstaedtiaceae	*Pteridium esculentum*	Common Bracken, Gurgi (Cadigal), Austral Bracken, Bracken
Grass	Poaceae	*Aristida behriana*	Brush Wiregrass, Bunch Wiregrass
	Poaceae	*Aristida calycina*	Dark Wire-grass, Branched Wiregrass
	Poaceae	*Aristida ramosa*	Purple Wiregrass, Kerosene Grass, Prickly Threeawn

Table 13.1 Box-Gum Woodland Species and Planting List			
Form	Family	Scientific Name	Common name
	Poaceae	*Austrodanthonia auriculata*	Lobed Wallaby-grass
	Poaceae	*Austrodanthonia bipartita*	Bandicoot Grass, Wallaby Grass, Leafy Wallaby Grass
	Poaceae	*Austrodanthonia caespitosa*	Ringed Wallaby-grass, Common Wallaby-grass
	Poaceae	*Austrodanthonia carphoides*	Short Wallaby-grass
	Poaceae	*Austrodanthonia eriantha*	Hill Wallaby-grass
	Poaceae	*Austrodanthonia laevis*	Wallaby Grass
	Poaceae	*Austrodanthonia monticola*	Small-flower Wallaby Grass
	Poaceae	*Austrodanthonia pilosa*	Velvet Wallaby Grass, Smooth-flowered Wallaby-grass
	Poaceae	*Austrodanthonia racemosa*	Clustered Wallaby-grass, Slender Wallaby Grass
	Poaceae	*Austrodanthonia setacea*	Bristly Wallaby Grass
	Poaceae	*Austrofestuca eriopoda*	Snow Fescue
	Poaceae	*Austrostipa bigeniculata*	Tall Speargrass
	Poaceae	*Austrostipa blackii*	Crested Spear-grass
	Poaceae	*Austrostipa densiflora*	Dense Spear-grass
	Poaceae	*Austrostipa nodosa*	Knotty Speargrass
	Poaceae	*Austrostipa rudis*	Veined Speargrass
	Poaceae	*Austrostipa scabra*	Corkscrew, Corkscrew Speargrass, Rough Spear-grass, Rough Needle-grass, Speargrass
	Poaceae	*Bothriochloa macra*	Redgrass, Redleg Grass
	Poaceae	*Chloris truncata*	Windmill Grass
	Poaceae	*Chloris ventricosa*	Tall Windmill Grass

Table 13.1 Box-Gum Woodland Species and Planting List			
Form	Family	Scientific Name	Common name
	Poaceae	*Cymbopogon refractus*	Barbed Wire Grass
	Poaceae	*Deyeuxia quadriseta*	Reed Bent-grass
	Poaceae	*Dichanthium sericeum*	Queensland Blue-grass
	Poaceae	*Dichelachne crinita*	Longhair Plumegrass
	Poaceae	*Dichelachne hirtella*	Slender Plumegrass
	Poaceae	*Dichelachne inaequiglumis*	Plume Grass
	Poaceae	*Dichelachne micrantha*	Short-hair Plumegrass
	Poaceae	*Dichelachne parva*	Plume Grass
	Poaceae	*Dichelachne rara*	Plume Grass
	Poaceae	*Echinopogon caespitosus*	Tufted Hedgehog-grass
	Poaceae	*Echinopogon cheelii*	Long-flowered Hedgehog Grass
	Poaceae	*Echinopogon ovatus*	Forest Hedgehog-grass, Hedgehog Grass, Rough-bearded Grass
	Poaceae	*Elymus scaber*	Common Wheat-grass, Wheatgrass, Rough Wheatgrass
	Poaceae	*Enneapogon nigricans*	Black-head Grass
	Poaceae	*Glyceria australis*	Australian Sweetgrass
	Poaceae	*Imperata cylindrica*	Blady Grass
	Poaceae	*Joycea pallida*	Silvertop Wallaby Grass, Redanther Wallaby Grass
	Poaceae	*Microlaena stipoides*	Microlaena, Weeping Grass
	Poaceae	*Panicum effusum*	Hairy Panic, Poison Panic
	Poaceae	*Poa labillardierei*	Tussock Grass
	Poaceae	*Poa meionectes*	Fine-leaved Snow Grass, Fine-leaved Tussock-grass
	Poaceae	*Poa petrophila*	Rock Tussock-grass

Table 13.1 Box-Gum Woodland Species and Planting List			
Form	Family	Scientific Name	Common name
	Poaceae	*Poa sieberiana*	Snow Grass, Fine-leaved Tussock-grass
	Poaceae	*Rytidosperma nudiflorum*	Alpine Wallby Grass
	Poaceae	*Sorghum leiocladum*	Wild Sorghum
	Poaceae	*Sporobolus creber*	Western Rat-tail Grass, Slender Rat's Tail Grass
	Poaceae	*Sporobolus elongatus*	Slender Rat's-tail Grass
	Poaceae	*Themeda australis (syn. Themeda triandra)*	Kangaroo Grass
	Poaceae	*Themeda triandra (syn. Themeda australis)*	Kangaroo Grass
	Poaceae	*Tripogon loliiformis*	Fiveminute Grass
Grass Tree	Xanthorrhoeaceae	*Xanthorrhoea australis*	Grass Tree
Herb	Rosaceae	*Acaena agnipila*	Sheep's Burr, Bidgee-widgee
	Rosaceae	*Acaena echinata*	Sheep's Burr
	Rosaceae	*Acaena novae-zelandiae*	Bidgee-widgee, Biddy Biddy
	Rosaceae	*Acaena ovina*	Sheep's Burr, Bidgee-widgee
	Lamiaceae	*Ajuga australis*	Australian Bugle, Austral Bugle
	Amaranthaceae	*Alternanthera nana*	Hairy Joyweed, Downy Pigweed
	Asteraceae	*Ammobium alatum*	Tall Ammobium
	Asteraceae	*Ammobium craspedioides*	Yass Daisy
	Rosaceae	*Aphanes australiana*	Australian Piert
	Orchidaceae	*Arachnorchis spp.*	Spider Orchids
	Anthericaceae	*Arthropodium milleflorum*	Vanilla-lily, Pale Vanilla-lily
	Anthericaceae	*Arthropodium minus*	Small Vanilla Lily
	Rubiaceae	*Asperula conferta*	Common Woodruff

Table 13.1 Box-Gum Woodland Species and Planting List			
Form	Family	Scientific Name	Common name
	Rubiaceae	*Asperula scoparia*	Prickly Woodruff
	Asteraceae	*Brachyscome aculeata*	Hill Daisy
	Asteraceae	*Brachyscome decipiens*	Field Daisy
	Asteraceae	*Brachyscome diversifolia*	Large-headed Daisy
	Asteraceae	*Brachyscome graminea*	Grass Dairy
	Asteraceae	*Brachyscome heterodonta*	Lobe-seed Daisy
	Asteraceae	*Brachyscome multifida*	Cut-leaved Daisy
	Asteraceae	*Brachyscome rigidula*	Leafy Daisy
	Asteraceae	*Brachyscome scapigera*	Tufted Daisy
	Asteraceae	*Brachyscome spathulata*	Spoon Daisy
	Brunoniaceae	*Brunonia australis*	Pincushion, Blue Pincushion
	Acanthaceae	*Brunoniella australis*	Blue Trumpet
	Asphodelaceae	*Bulbine bulbosa*	Bulbine Lily, Native Onion, Native Leek, Golden Lily
	Asphodelaceae	*Bulbine glauca*	Rock Lily
	Colchicaceae	*Burchardia umbellata*	Milkmaids
	Anthericaceae	*Caesia calliantha*	Blue Grass-Lily
	Asteraceae	*Calocephalus citreus*	Lemon Beautyheads
	Orchidaceae	*Calochilus robertsonii*	Purplish Beard Orchid
	Asteraceae	*Calotis cuneifolia*	Purple Burr-daisy
	Asteraceae	*Calotis glandulosa*	Mauve Burr-daisy
	Asteraceae	*Calotis lappulacea*	Yellow Burr-daisy, Yellow Daisy-burr
	Asteraceae	*Calotis scabiosifolia*	Rough Burr-daisy
	Cyperaceae	*Carex inversa*	Knob Sedge, Common Sedge
	Apiaceae	*Centella asiatica*	Pennywort

Table 13.1 Box-Gum Woodland Species and Planting List			
Form	Family	Scientific Name	Common name
	Apiaceae	*Centella cordifolia*	Centella
	Centrolepidaceae	*Centrolepis strigosa*	Hairy Centrolepis
	Euphorbiaceae	*Chamaesyce drummondii*	Caustic-weed
	Chenopodiaceae	*Chenopodium pumilio*	Clammy Goosefoot, Small Crumbweed
	Asteraceae	*Chrysocephalum apiculatum*	Yellow Buttons, Common Everlasting
	Asteraceae	*Chrysocephalum semipapposum*	Clustered Everlasting, Yellow Buttons
	Convolvulaceae	*Convolvulus erubescens*	Australian Bindweed, Blushing Bindweed
	Rutaceae	*Correa reflexa*	Common Correa, Native Fuchsia
	Asteraceae	*Cotula australis*	Common Cotula, Carrot Weed
	Asteraceae	*Craspedia canens*	Billy Buttons, Grey Billybuttons
	Asteraceae	*Craspedia variabilis*	Billy Buttons
	Crassulaceae	*Crassula colorata*	Annual Stonecrop, Dense Crassula, Dense Stonecrop
	Crassulaceae	*Crassula helmsii*	Swamp Stonecrop
	Crassulaceae	*Crassula sieberiana*	Australian Stonecrop, Sieber Crassula
	Fabaceae	*Cullen microcephalum*	Dusky Scurf-pea, Mountain Psoralea
	Fabaceae	*Cullen tenax*	Emu-foot, Emu Grass, Tough Scurf-pea
	Asteraceae	*Cymbonotus lawsonianus*	Bear's Ear, Austral Bears-ears, Bears-ears
	Asteraceae	*Cymbonotus preissianus*	Austral Bear's Ear
	Boraginaceae	*Cynoglossum australe*	Australian Forget-me-not, Australian Hound's-tongue
	Boraginaceae	*Cynoglossum suaveolens*	Sweet Hound's-tongue

Table 13.1 Box-Gum Woodland Species and Planting List			
Form	Family	Scientific Name	Common name
	Apiaceae	*Daucus glochidiatus*	Australian Carrot, Native Carrot, Austral Carrot
	Fabaceae	*Desmodium brachypodum*	Large Tick-trefoil
	Fabaceae	*Desmodium varians*	Slender Tick-trefoil
	Phormiaceae	*Dianella longifolia*	Smooth Flax Lily
	Phormiaceae	*Dianella revoluta*	Blueberry Lily, Black-Anther Flax Lilly, Spreading Flax Lily
	Convolvulaceae	*Dichondra repens*	Kidney Grass, Kidney Weed
	Anthericaceae	*Dichopogon fimbriatus*	Chocolate Lily, Nodding Chocolate Lily
	Anthericaceae	*Dichopogon strictus*	Chocolate Lily
	Orchidaceae	*Dipodium punctatum*	Hyacinth Orchid, Pink Hyacinth Orchid
	Orchidaceae	*Diuris aequalis*	Buttercup Doubletail
	Orchidaceae	*Diuris behrii*	Golden Cowslips
	Orchidaceae	*Diuris chryseopsis*	Common Golden Moths
	Orchidaceae	*Diuris dendrobioides*	Long-tail Purple Diuris, Wedge Diuris
	Orchidaceae	*Diuris maculata*	Leopard Orchid, Nanny Goats, Leopard Diuris, Spotted Doubletail
	Orchidaceae	*Diuris monticola*	Highland Golden Moths
	Orchidaceae	*Diuris ochroma*	Pale Golden Moths
	Orchidaceae	*Diuris pedunculata*	Small Snake Orchid, Two-leaved Golden Moths, Golden Moths, Cowslip Orchid, Snake Orchid
	Orchidaceae	*Diuris punctata*	Purple Donkey-orchid, Purple Double-tails, Purple Diuris, Purple Cowslip, Dotted Double-tails
	Orchidaceae	*Diuris semilunulata*	Donkey-ears
	Orchidaceae	*Diuris sulphurea*	Tiger Orchid, Hornet Orchid

Table 13.1 Box-Gum Woodland Species and Planting List			
Form	Family	Scientific Name	Common name
	Droseraceae	*Drosera peltata*	Hairy Climbing Sundew, Pale Sundew
	Droseraceae	*Drosera pygmaea*	Pigmy Sundew, Tiny Sundew
	Chenopodiaceae	*Einadia nutans*	Climbing Saltbush, Nodding Saltbush
	Orchidaceae	*Eriochilus cucullatus*	Parson's Bands
	Geraniaceae	*Erodium crinitum*	Native Crowfoot, Blue Storks-bill, Blue Crowfoot, Blue Herons-bill
	Apiaceae	*Eryngium ovinum*	Blue Devil
	Apiaceae	*Eryngium rostratum*	Blue Devil
	Apiaceae	*Eryngium vesiculosum*	Prostrate Blue Devil, Prickfoot
	Asteraceae	*Euchiton gymnocephalus*	Creeping Cudweed
	Asteraceae	*Euchiton involucratus*	Star Cudweed
	Asteraceae	*Euchiton sphaericus*	Annual Cudweed, Star Cudweed
	Scrophulariaceae	*Euphrasia collina*	Eyebright
	Rubiaceae	*Galium gaudichaudii*	Rough Bedstraw
	Orchidaceae	*Gastrodia sesamoides*	Cinnamon Bells, Potato Orchid
	Orchidaceae	*Genoplesium*	Midge Orchids
	Geraniaceae	*Geranium antrorsum*	Antrorse Geranium
	Geraniaceae	*Geranium graniticola*	Granite Cranesbill
	Geraniaceae	*Geranium neglectum*	Swamp Cranes-bill
	Geraniaceae	*Geranium retrorsum*	Common Cranes-bill
	Geraniaceae	*Geranium solanderi*	Native Geranium
	Orchidaceae	*Glossodia major*	Wax-lip Orchid, Parson-in-the-pulpit
	Fabaceae	*Glycine clandestina*	Twining Glycine
	Fabaceae	*Glycine tabacina*	Glycine Pea, Variable Glycine

Table 13.1 Box-Gum Woodland Species and Planting List			
Form	Family	Scientific Name	Common name
	Haloragaceae	*Gonocarpus elatus*	Hill Raspwort
	Haloragaceae	*Gonocarpus tetragynus*	Common Raspwort
	Goodeniaceae	*Goodenia bellidifolia*	Daisy-leaved Goodenia, Rocket Goodenia
	Goodeniaceae	*Goodenia hederacea*	Forest Goodenia, Ivy Goodenia
	Goodeniaceae	*Goodenia humilis*	Swamp Goodenia
	Goodeniaceae	*Goodenia pinnatifida*	Scrambled Eggs, Cut-leaf Goodenia
	Goodeniaceae	*Goodenia stelligera*	Spiked Goodenia
	Scrophulariaceae	*Gratiola nana*	Creeping Brooklime
	Scrophulariaceae	*Gratiola pedunculata*	Brooklime
	Scrophulariaceae	*Gratiola peruviana*	Austral Brooklime
	Caryophyllaceae	*Gypsophila tubulosa*	Annual Chalkwort
	Asteraceae	*Helichrysum collinum*	Hill Daisy
	Asteraceae	*Helichrysum scorpioides*	Button Everlasting
	Apiaceae	*Hydrocotyle laxiflora*	Stinking Pennywort
	Orchidaceae	*Hymenochilus bicolor*	Bicolor Greenhood
	Orchidaceae	*Hymenochiluscycnocephalus*	Swan Greenhood
	Orchidaceae	*Hymenochilus muticus*	Midget Greenhood, Blunt Greenhood, Dwarf Greenhood
	Clusiaceae	*Hypericum gramineum*	Small St John's Wort
	Clusiaceae	*Hypericum japonicum*	Small St John's Wort, Matted St John's Wort
	Asteraceae	*Isoetopsis graminifolia*	Grass Cushion
	Lobeliaceae	*Isotoma axillaris*	Rock Isotome
	Fabaceae	*Kennedia prostrata*	Running Postman, Scarlet Running Pea, Scarlet Coral-pea
	Asteraceae	*Lagenophora stipitata*	Blue-bottle Daisy, Common Lagenophora

Table 13.1 Box-Gum Woodland Species and Planting List			
Form	Family	Scientific Name	Common name
	Anthericaceae	*Laxmannia gracilis*	Slender Wire-Lily
	Asteraceae	*Leptorhynchos elongatus*	Lanky Buttons, Hairy Buttons
	Asteraceae	*Leptorhynchos squamatus*	Scaly Buttons
	Asteraceae	*Leucochrysum albicans*	Hoary Sunray
	Scrophulariaceae	*Limosella australis*	Australian Mudwort
	Linaceae	*Linum marginale*	Wild Flax, Native Flax
	Lobeliaceae	*Lobelia dentata*	Toothed Lobelia, Wavy Lobelia
	Lobeliaceae	*Lobelia gibbosa*	Tall Lobelia
	Lomandraceae	*Lomandra bracteata*	Mat-rush
	Lomandraceae	*Lomandra filiformis*	Wattle Mat-rush
	Lomandraceae	*Lomandra longifolia*	Spiny-headed Mat-rush, Honey Weed
	Lomandraceae	*Lomandra multiflora*	Many-flowered Matrush
	Fabaceae	*Lotus australis*	Austral Trefoil, Australian Trefoil
	Lythraceae	*Lythrum salicaria*	Purple Loosestrife
	Lamiaceae	*Mentha diemenica*	Slender Mint
	Lamiaceae	*Mentha satureioides*	Creeping Mint, Native Pennyroyal
	Asteraceae	*Microseris lanceolata*	Yam Daisy, Murnong
	Orchidaceae	*Microtis parviflora*	Slender Onion-orchid
	Orchidaceae	*Microtis unifolia*	Common Onion-orchid, Onion-orchid
	Scrophulariaceae	*Mimulus repens*	Creeping Monkey-flower
	Rubiaceae	*Opercularia diphylla*	Stinkweed
	Rubiaceae	*Opercularia hispida*	Hairy Stinkweed
	Ophioglossaceae	*Ophioglossum lusitanicum*	Adder's Tongue

Table 13.1 Box-Gum Woodland Species and Planting List			
Form	Family	Scientific Name	Common name
	Apiaceae	*Oreomyrrhis argentea*	Silvery Carraway
	Apiaceae	*Oreomyrrhis eriopoda*	Australian Carraway
	Oxalidaceae	*Oxalis exilis*	Shady Wood Sorrel, Indian Sorrel
	Oxalidaceae	*Oxalis perennans*	Grassland Wood Sorrel, Grass Wood-sorrel, Creeping Yellow Sorrel
	Iridaceae	*Patersonia sericea*	Silky Purple-flag
	Geraniaceae	*Pelargonium australe*	Native Storks-bill, Austral Storks-bill, Wild Geranium
	Geraniaceae	*Pelargonium inodorum*	Scentless Storks-bill
	Geraniaceae	*Pelargonium rodneyanum*	Magenta Storks-bill
	Plantaginaceae	*Plantago debilis*	Shade Plantain, Slender Plantain
	Plantaginaceae	*Plantago euryphylla*	Plantain
	Plantaginaceae	*Plantago gaudichaudii*	Narrow-leaf Native Plantain, Narrow Plantain
	Plantaginaceae	*Plantago varia*	Variable Plantain, Small Plantain, Sago-weed
	Asteraceae	*Podolepis hieracioides*	Tall Copper-wire Daisy
	Asteraceae	*Podolepis jaceoides*	Showy Copper-wire Daisy
	Polygalaceae	*Polygala japonica*	Dwarf Milkwort
	Euphorbiaceae	*Poranthera microphylla*	Small Poranthera, Small-leaved Poranthera
	Portulaceae	*Portulaca oleracea*	Common Pigweed, Common Purslane, Munyeroo
	Orchidaceae	*Prasophyllum petilum*	Tarengo Leek Orchid
	Lobeliaceae	*Pratia purpurascens*	Whiteroot
	Asteraceae	*Pseudognaphalium luteoalbum*	Jersey Cudweed
	Amaranthaceae	*Ptilotus erubescens*	Hairy Tails, Hairy Heads

Table 13.1 Box-Gum Woodland Species and Planting List			
Form	Family	Scientific Name	Common name
	Ranunculaceae	*Ranunculus graniticola*	Granite Buttercup
	Ranunculaceae	*Ranunculus lappaceus*	Common Buttercup, Australian Buttercup
	Ranunculaceae	*Ranunculus pachycarpus*	Thick-fruited Buttercup
	Asteraceae	*Rhodanthe anthemoides*	White Sunray, Chamomile Sunray
	Asteraceae	*Rhodanthe pygmaea*	Pigmy Sunray
	Acanthaceae	*Rostellularia adscendens*	Pink-tongues, Bearded Anthem, Dwarf Justicia
	Polygonaceae	*Rumex brownii*	Swamp Dock, Slender Dock
	Polygonaceae	*Rumex dumosus*	Wiry Dock
	Polygonaceae	*Rumex tenax*	Shiny Dock
	Asteraceae	*Rutidosis leiolepis*	Monaro Golden Daisy
	Asteraceae	*Rutidosis leptorhynchoides*	Button Wrinklewort
	Asteraceae	*Rutidosis multiflora*	Small Wrinklewort
	Caryophyllaceae	*Scleranthus biflorus*	Spiny Mat-plant, Knawel, Cushion-bush, Two-flowered Knawel
	Caryophyllaceae	*Scleranthus diander*	Tufted Knawel
	Lamiaceae	*Scutellaria humilis*	Dwarf Skullcap
	Gentianaceae	*Sebaea ovata*	Yellow Centaury
	Goodeniaceae	*Selliera radicans*	Swamp Weed
	Asteraceae	*Senecio hispidulus*	Hill Fireweed
	Asteraceae	*Senecio quadridentatus*	Cotton Fireweed
	Asteraceae	*Senecio tenuiflorus*	Woodland Groundsel, Narrow Groundsel, Cotton Groundsel, Slender Fireweed
	Malvaceae	*Sida corrugata*	Corrugated Sida
	Asteraceae	*Solenogyne dominii*	Smooth Solenogyne

Table 13.1 Box-Gum Woodland Species and Planting List			
Form	Family	Scientific Name	Common name
	Asteraceae	*Solenogyne gunnii*	Hairy Solenogyne
	Orchidaceae	*Spiranthes sinensis*	Austral Ladies' Tresses
	Stackhousiaceae	*Stackhousia monogyna*	Creamy Candles, Creamy Stackhousia
	Stackhousiaceae	*Stackhousia viminea*	Slender Stackhousia
	Caryophyllaceae	*Stellaria angustifolia*	Swamp Starwort
	Caryophyllaceae	*Stellaria filiformis*	Thread Starwort
	Caryophyllaceae	*Stellaria multiflora (Back Creek)*	Back Creek Many Flowered Starwort, Back Creek Rayless Starwort
	Caryophyllaceae	*Stellaria pungens*	Prickly Starwort
	Asteraceae	*Stuartina hamata*	Crooked Cudweed, Hooked Cudweed
	Asteraceae	*Stuartina muelleri*	Spoon Cudweed
	Stylidiaceae	*Stylidium despectum*	Dwarf Triggerplant
	Stylidiaceae	*Stylidium graminifolium*	Grass Triggerplant
	Phormiaceae	*Stypandra glauca*	Nodding Blue Lily
	Fabaceae	*Swainsona behriana*	Behr's Swainson-pea
	Fabaceae	*Swainsona monticola*	Moutain Swainson-pea
	Fabaceae	*Swainsona oroboides*	Variable Swainson-pea
	Fabaceae	*Swainsona queenslandica*	Smooth Darling Pea
	Fabaceae	*Swainsona recta*	Mountain Swainson-pea, Small Purple-pea
	Fabaceae	*Swainsona reticulata*	Kneed Swainson-pea
	Fabaceae	*Swainsona sericea*	Silky Swainson-pea
	Tremandraceae	*Tetratheca spp.*	Black-eyed Susans
	Orchidaceae	*Thelymitra ixioides*	Spotted Sun-orchid, Dotted Sun-orchid
	Orchidaceae	*Thelymitra malvina*	Mauve-tuft Sun-orchid, Mauve-tufted sun orchid

Table 13.1 Box-Gum Woodland Species and Planting List			
Form	Family	Scientific Name	Common name
	Orchidaceae	*Thelymitra pauciflora*	Slender Sun-orchid, Few-flowered Sun-orchid
	Orchidaceae	*Thelymitra rubra*	Pink Sun-orchid, Salmon Sun-orchid, Red Sun-orchid
	Santalaceae	*Thesium australe*	Austral toadflax, Austral Toad-flax, Australian Toadflax
	Anthericaceae	*Thysanotus patersonii*	Twining Fringe-lily
	Anthericaceae	*Thysanotus tuberosus*	Common Fringe-lily
	Apiaceae	*Trachymene humilis*	Alpine Trachymene
	Anthericaceae	*Tricoryne elatior*	Yellow Rush-lily, Yellow Autumn-lily
	Asteraceae	*Triptilodiscus pygmaeus*	Austral Sunray
	Urticaceae	*Urtica incisa*	Stinging Nettle
	Goodeniaceae	*Velleia montana*	Velleia
	Goodeniaceae	*Velleia paradoxa*	Spur Velleia
	Scrophulariaceae	*Veronica calycina*	Hairy Speedwell
	Scrophulariaceae	*Veronica gracilis*	Slender Speedwell
	Scrophulariaceae	*Veronica plebeia*	Trailing Speedwell, Creeping Speedwell
	Violaceae	*Viola betonicifolia*	Showy Violet, Arrow-head Violet, Native Violet, Purple Violet
	Violaceae	*Viola caleyana*	Swamp Violet
	Violaceae	*Viola hederacea*	Native Violet, Ivy-leaf Violet, Ivy-leaved Violet
	Violaceae	*Viola sieberiana*	Diamond Violet
	Asteraceae	*Vittadinia cuneata*	Fuzzweed
	Asteraceae	*Vittadinia muelleri*	Narrow-leaf New Holland Daisy
	Campanulaceae	*Wahlenbergia ceracea*	Waxy Bluebell
	Campanulaceae	*Wahlenbergia communis*	Tufted Bluebell

Table 13.1 Box-Gum Woodland Species and Planting List			
Form	Family	Scientific Name	Common name
	Campanulaceae	*Wahlenbergia densifolia*	Fairy Bluebell
	Campanulaceae	*Wahlenbergia gracilenta*	Annual Bluebell
	Campanulaceae	*Wahlenbergia gracilis*	Australian Bluebell, Sprawling Bluebell
	Campanulaceae	*Wahlenbergia graniticola*	Granite Bluebell
	Campanulaceae	*Wahlenbergia littoricola*	Edge Bluebell, Coast Bluebell
	Campanulaceae	*Wahlenbergia luteola*	Yellow-wash Bluebell
	Campanulaceae	*Wahlenbergia multicaulis*	Tadgell's Bluebell
	Campanulaceae	*Wahlenbergia planiflora*	Bluebell
	Campanulaceae	*Wahlenbergia stricta*	Tall Bluebell, Austral Bluebell, Australian Bluebell
	Colchicaceae	*Wurmbea dioica*	Early Nancy
	Asteraceae	*Xerochrysum bracteatum*	Golden Everlasting
	Asteraceae	*Xerochrysum subundulatum*	Orange Everlasting, Alpine Everlasting
	Asteraceae	*Xerochrysum viscosum*	Sticky Everlasting
	Fabaceae	*Zornia dyctiocarpa*	Zornia
Herb/Shrub	Scrophulariaceae	*Derwentia perfoliata*	Digger's Speedwell
Sedge/Rush	Cyperaceae	*Isolepis cernua*	Nodding Club-rush
	Cyperaceae	*Isolepis hookeriana*	Grassy Club-sedge, Grassy Club-rush
	Cyperaceae	*Isolepis inundata*	Swamp Club-sedge, Swamp Club-rush
	Juncaceae	*Juncus australis*	Austral Rush
	Juncaceae	*Juncus bufonius*	Toad Rush
	Juncaceae	*Juncus flavidus*	Yellow Rush
	Juncaceae	*Juncus fockei*	Slender Joint-leaf Rush

Table 13.1 Box-Gum Woodland Species and Planting List			
Form	Family	Scientific Name	Common name
	Juncaceae	*Juncus homalocaulis*	Wiry Rush
	Juncaceae	*Juncus sarophorus*	Broom Rush
	Juncaceae	*Juncus subsecundus*	Finger Rush
	Cyperaceae	*Lepidosperma laterale*	Sword Sedge, Variable Swordsedge
	Juncaceae	*Luzula densiflora*	Dense Woodrush
	Juncaceae	*Luzula meridionalis*	Common Woodrush
	Juncaceae	*Luzula modesta*	Southern Woodrush
	Juncaceae	*Luzula ovata*	Clustered Woodrush
	Cyperaceae	*Schoenus apogon*	Common Bog Sedge, Fluke Bogrush
Shrub	Mimosaceae	*Acacia brownii*	Prickly Moses, Golden Prickly Wattle, Heath Wattle
	Mimosaceae	*Acacia dawsonii*	Poverty Wattle, Dawson's Wattle, Mitta Wattle
	Mimosaceae	*Acacia decora*	Western Silver Wattle, Showy Wattle, Western Golden Wattle, Pretty Wattle
	Mimosaceae	*Acacia falcata*	Sickle Wattle, Burra, Sickle-shaped Acacia, Sally, Hickory Wattle, Silver-leaved Wattle
	Mimosaceae	*Acacia genistifolia*	Spreading Wattle, Early Wattle, Wild Irishman
	Mimosaceae	*Acacia gunnii*	Ploughshare Wattle, Dog's Tooth Wattle
	Mimosaceae	*Acacia paradoxa*	Prickly Acacia, Acacia Hedge, Kangaroo Thorn, Hedge Wattle, Kangaroo Acacia, Prickly Wattle, Paradoxa Wattle
	Mimosaceae	*Acacia siculiformis*	Dagger Wattle
	Mimosaceae	*Acacia ulicifolia*	Prickly Moses, Juniper Wattle
	Epacridaceae	*Acrotriche serrulata*	Honeypots
	Epacridaceae	*Astroloma humifusum*	Native Cranberry, Cranberry Heath

Table 13.1 Box-Gum Woodland Species and Planting List			
Form	Family	Scientific Name	Common name
	Araliaceae	*Astrotricha ledifolia*	Common Star-hair
	Rutaceae	*Boronia algida*	Alpine Boronia
	Fabaceae	*Bossiaea buxifolia*	Box-leaved Bitter-pea
	Fabaceae	*Bossiaea prostrata*	Creeping Bossiaea, Prostrate Bitter-pea
	Fabaceae	*Bossiaea riparia*	River Leafless Bossiaea
	Epacridaceae	*Brachyloma daphnoides*	Daphne Heath
	Myrtaceae	*Calytrix tetragona*	Fringe Myrtle, Common Fringe-myrtle, Heath Myrtle
	Asteraceae	*Cassinia aculeata*	Common Cassinia, Chinese-scrub, Sifton Bush, Dogwood, Dolly Bush
	Asteraceae	*Cassinia arcuata*	Drooping Cassinia, Chinese Tea-scrub, Sifton Bush, Chinese Shrub
	Asteraceae	*Cassinia longifolia*	Shiny Cassinia, Cauliflower Bush, Long-leaf Dogwood
	Asteraceae	*Cassinia quinquefaria*	Rosemary Cassinia
	Pittosporaceae	*Cheiranthera cyanea*	Finger Flower
	Polygalaceae	*Comesperma ericinum*	Heath Milkwort, Heath-leaved False-pea, Pyramid Flower
	Rhamnaceae	*Cryptandra amara*	Bitter Cryptandra
	Fabaceae	*Daviesia genistifolia*	Spiny Bitter-pea, Broom Bitter-pea
	Fabaceae	*Daviesia latifolia*	Hop Bitter-pea
	Fabaceae	*Daviesia leptophylla*	Narrow-leaf Bitter-pea
	Fabaceae	*Daviesia mimosoides*	Narrow-leaf Bitter-pea
	Fabaceae	*Daviesia ulicifolia*	Gorse Bitter-pea
	Fabaceae	*Dillwynia cinerascens*	Grey Parrot-pea
	Fabaceae	*Dillwynia glaucula*	Michelago Parrot-pea
	Fabaceae	*Dillwynia prostrata*	Matted Parrot-pea

Table 13.1 Box-Gum Woodland Species and Planting List			
Form	Family	Scientific Name	Common name
	Fabaceae	*Dillwynia retorta*	Heathy Parrot-pea
	Fabaceae	*Dillwynia sericea*	Showy Parrot-pea
	Rhamnaceae	*Discaria pubescens*	Australian Anchor-plant
	Sapindaceae	*Dodonaea procumbens*	Trailing Hop-bush
	Sapindaceae	*Dodonaea viscosa*	Sticky Hop-bush, Giant Hop-bush
	Chenopodiaceae	*Einadia hastata*	Saloop, Berry Saltbush
	Epacridaceae	*Epacris spp.*	Native Heaths
	Myoporaceae	*Eremophila debilis*	Winter Apple, Creeping Boobialla, Amulla
	Santalaceae	*Exocarpos strictus*	Pale Ballart, Pale-fruit Ballart, Dwarf Cherry
	Fabaceae	*Gompholobium huegelii*	Pale Wedge-pea
	Proteaceae	*Grevillea iaspicula*	Wee Jasper Grevillea
	Proteaceae	*Grevillea lanigera*	Woolly Grevillea
	Proteaceae	*Grevillea ramosissima*	Fan Grevillea, Branching Grevillea, Prickly Parsley Bush
	Proteaceae	*Grevillea rosmarinifolia*	Rosemary Grevillea
	Proteaceae	*Grevillea wilkinsonii*	Tumut Grevillea
	Proteaceae	*Hakea microcarpa*	Small-fruit Hakea, Small-fruited Needlebush
	Fabaceae	*Hardenbergia violacea*	False Sarsparilla, Purple Coral-pea, Native Lilac
	Dilleniaceae	*Hibbertia calycina*	Lesser Guinea-flower
	Dilleniaceae	*Hibbertia obtusifolia*	Hoary Guinea-flower
	Dilleniaceae	*Hibbertia riparia*	Stream Guinea-flower, Erect Guinea-flower
	Fabaceae	*Hovea linearis*	Creeping Hovea
	Violaceae	*Hymenanthera dentata*	Tree Violet
	Fabaceae	*Indigofera adesmiifolia*	Tick Indigo, Leafless Indigo, Broad-leaved Indigo

Table 13.1 Box-Gum Woodland Species and Planting List			
Form	Family	Scientific Name	Common name
	Fabaceae	*Indigofera australis*	Austral Indigo, Australian Indigo, Native Indigo, Hill Indigo
	Oleaceae	*Jasminum suavissimum*	Native Jasmine, Sweet Jasmine
	Myrtaceae	*Kunzea parvifolia*	Violet Kunzea, Tickbush
	Myrtaceae	*Leptospermum myrtifolium*	Swamp Myrtle, Swamp Tea-tree, Myrtle-leaved Tea-tree, Grey Tea-tree
	Myrtaceae	*Leptospermum obovatum*	River Tea-tree, Blunt-leaf Tea-tree
	Fabaceae	*Lespedeza juncea*	Perennial Lespedeza
	Epacridaceae	*Leucopogon fletcheri*	Pendant Beard Heath
	Epacridaceae	*Leucopogon fraseri*	Beard Heath
	Epacridaceae	*Leucopogon virgatus*	Common Beard Heath
	Epacridaceae	*Lissanthe strigosa*	Peach Heath
	Chenopodiaceae	*Maireana microphylla*	Eastern Cottonbush, Small-leaf Bluebush, Bluebush
	Epacridaceae	*Melichrus urceolatus*	Urn Heath
	Fabaceae	*Mirbelia oxylobioides*	Mountain Mirbelia
	Polygonaceae	*Muehlenbeckia axillaris*	Wire Plant, Matted Lignum
	Polygonaceae	*Muehlenbeckia tuggeranong*	Tuggeranong Lignum
	Asteraceae	*Olearia elliptica*	Sticky Daisy-bush
	Asteraceae	*Ozothamnus spp.*	Everlastings
	Thymelaeaceae	*Pimelea curviflora*	Curved Rice-flower
	Thymelaeaceae	*Pimelea glauca*	Shrubby Rice-flower
	Thymelaeaceae	*Pimelea pauciflora*	Poison Pimelea, Poison Rice-flower
	Rhamnaceae	*Pomaderris pallida*	Pale Pomaderris
	Fabaceae	*Pultenaea fasciculata*	Bush-pea
	Fabaceae	*Pultenaea microphylla*	Spreading Bush-pea

Table 13.1 Box-Gum Woodland Species and Planting List			
Form	Family	Scientific Name	Common name
	Fabaceae	*Pultenaea procumbens*	Heathy Bush-pea
	Fabaceae	*Pultenaea spinosa*	Bush-pea
	Fabaceae	*Pultenaea subspicata*	Low Bush-pea
	Pittosporaceae	*Rhytidosporum procumbens*	White Marianth
	Rosaceae	*Rubus parvifolius*	Small-leaf Raspberry, Small-leaved Rasberry, Native Rasberry
	Sterculiaceae	*Rulingia prostrata*	Dwarf Kerrawang
	Solanaceae	*Solanum linearifolium*	Mountain Kangaroo-apple, Kangaroo-apple
	Epacridaceae	*Styphelia triflora*	Pink Five-corners
	Fabaceae	*Templetonia stenophylla*	Leafy Templetonia, Leafy Mallee-pea
	Asteraceae	*Vittadinia gracilis*	Woolly New Holland Daisy
	Lamiaceae	*Westringia eremicola*	Slender Westringia
	Convolvulaceae	*Wilsonia rotundifolia*	Round-leaf Wilsonia
Shrub/Tree	Mimosaceae	*Acacia deanei*	Deane's Wattle, Green Wattle
	Mimosaceae	*Acacia decurrens*	Black Wattle, Early Black Wattle, Green Wattle, Queen Wattle, Sydney Green Wattle
	Mimosaceae	*Acacia doratoxylon*	Currawang, Lancewood, Spearwood, Cooriwan, Hickory, Brown Lancewood
	Mimosaceae	*Acacia mearnsii*	Black Wattle, Green Wattle, Late Black Wattle
	Mimosaceae	*Acacia parramattensis*	Sydney Green Wattle, Parramatta Wattle, Parramatta Green Wattle
	Mimosaceae	*Acacia rubida*	Red-stem Wattle, Red-leaved Wattle
	Mimosaceae	*Acacia verniciflua*	Varnish Wattle

Table 13.1 Box-Gum Woodland Species and Planting List			
Form	Family	Scientific Name	Common name
	Proteaceae	*Banksia marginata*	Silver Banksia, Honeysuckle Banksia, Dwarf Honeysuckle, Warrock
	Pittosporaceae	*Bursaria spinosa*	Australian Blackthorn, Bursaria, Blackthorn, Native Blackthorn, Sweet Bursaria (Native Box), Whitethorn, Christmas Bush, Prickly Pine, Prickly Box
	Myrtaceae	*Callistemon sieberi*	Alpine Bottlebrush, River Bottlebrush
	Santalaceae	*Exocarpos cupressiformis*	Cherry Ballart, Native Cherry, Wild Cherry, Cherry Wood
	Rutaceae	*Geijera parviflora*	Wilga
	Fabaceae	*Jacksonia scoparia*	Winged Broom-pea, Dogwood, Broom
	Myrtaceae	*Kunzea ericoides*	Burgan, Kanuka
	Myrtaceae	*Melaleuca parvistaminea*	Honey-myrtle
	Rhamnaceae	*Pomaderris spp.*	Pomaderris
Tree	Mimosaceae	*Acacia implexa*	Lightwood, Hickory Wattle, Black Wattle, Hickory, Sally Wattle, Scrub Wattle, Screw-pod Wattle, Bastard Myall, Lignum Vitae, Fish Wattle, Broad-leaf Wattle
	Mimosaceae	*Acacia melanoxlyon*	Blackwood, Black Wattle, Hickory, Mudgerabah, Paluma Blackwood, Sally Wattle
	Mimosaceae	*Acacia obliquinervia*	Mountain Hickory Wattle
	Casuarinaceae	*Allocasuarina littoralis*	Black Sheoak
	Casuarinaceae	*Allocasuarina luehmannii*	Buloke, Bull Oak, Bulloak, Bull Sheoak
	Casuarinaceae	*Allocasuarina verticillata*	Drooping Sheoak, Coast She-oak, Hill-oak, Sheoak
	Myrtaceae	*Angophora floribunda*	Rough-barked Apple, Roughbark Apple, Apple Box (Qld), Apple, Boondah, Gum Myrtle, Rusty Gum

Table 13.1 Box-Gum Woodland Species and Planting List			
Form	Family	Scientific Name	Common name
	Sterculiaceae	*Brachychiton populneus*	Kurrajong
	Cupressaceae	*Callitris endlicheri*	Black Cypress Pine, Black Cypress, Red Cypress, Black Pine, Mountain Pine, Black Callitris, Red Cypress Pine
	Cupressaceae	*Callitris glaucophylla*	White Cypress-pine, White Cypress, White Pine
	Myrtaceae	*Eucalyptus aggregata*	Black Gum
	Myrtaceae	*Eucalyptus amplifolia*	Cabbage Gum
	Myrtaceae	*Eucalyptus bridgesiana*	Apple Box, But-but
	Myrtaceae	*Eucalyptus caliginosa*	New England Stringybark
	Myrtaceae	*Eucalyptus camaldulensis*	River Red Gum, Red Gum, Murray Red Gum, River Gum (WA)
	Myrtaceae	*Eucalyptus cinerea*	Argyle Apple, Silver-leaved Stringybark
	Myrtaceae	*Eucalyptus conica*	Fuzzy Box
	Myrtaceae	*Eucalyptus dalrympleana*	Mountain Gum
	Myrtaceae	*Eucalyptus dives*	Broad-leaved Peppermint, Peppermint, Blue Peppermint (Vic)
	Myrtaceae	*Eucalyptus goniocalyx*	Long-leaved Box, Bundy, Olive-barked Box
	Myrtaceae	*Eucalyptus macrorhyncha*	Red Stringybark
	Myrtaceae	*Eucalyptus mannifera*	Brittle Gum
	Myrtaceae	*Eucalyptus nortonii*	Mealy Bundy, Large-flowered Bundy
	Myrtaceae	*Eucalyptus ovata*	Swamp Gum, Black Gum (southern Tas), White Gum
	Myrtaceae	*Eucalyptus pauciflora*	Snow Gum, Cabbage Gum (Tas), Weeping Gum (Tas), White Sally

Table 13.1 Box-Gum Woodland Species and Planting List			
Form	Family	Scientific Name	Common name
	Myrtaceae	*Eucalyptus populnea*	Bimble Box, Poplar Box, Bimbil Box
	Myrtaceae	*Eucalyptus rossii*	Scribbly Gum, Snappy Gum, White Gum, Inland Scribbly Gum
	Myrtaceae	*Eucalyptus rubida*	Candlebark, Ribbon Gum, White Gum
	Myrtaceae	*Eucalyptus sideroxylon*	Red Ironbark, Mugga, Mugga Ironbark
	Myrtaceae	*Eucalyptus viminalis*	Manna Gum, Ribbon Gum
	Oleaceae	*Notelaea microcarpa*	Native Olive
Tree/Mallee	Myrtaceae	*Eucalyptus polyanthemos*	Red Box
	Myrtaceae	*Eucalyptus stellulata*	Black Sally
	Mimosaceae	*Acacia dealbata*	Silver Wattle

Appendix B – Seed Collection Times

Table 13.2 Indicative Seed Collection Times for Flora Species Relevant to the Mine													
Species	Common Name	Summer		Autumn			Winter			Spring			Summer
		Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
TREES AND SHRUBS													
Acacia acinacea	Gold Dust Wattle								x	x	x		
Acacia dealbata	Early Black Wattle	x	x										x
Acacia decora	Western Silver Wattle				x	x	x	x	x	x	x		
Acacia implexa	Lightwood	x	x	x									
Acacia melanoxylon	Blackwood Wattle	x	x	x									x
Acacia paradoxa	Kangaroo Thorn						x	x					
Acacia rubida	Red-Stemmed Wattle	x	x										x
Allocasuarina leuhmanii	Buloke	x											x
Brachychiton populneus	Kurrajong	x	x	x	x	x							x
Bursaria spinosa	Blackthorn	x	x	x	x								

Table 13.2 Indicative Seed Collection Times for Flora Species Relevant to the Mine													
Species	Common Name	Summer		Autumn			Winter			Spring			Summer
		Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Callitris endlicheri	Black Cypress Pine	x	x	x	x	x	x	x	x	x	x	x	x
Callitris glaucophylla	White Cypress Pine	x	x	x	x	x	x	x	x	x	x	x	x
Cassinia arcuata	Drooping Cassinia	x	x	x	x						x	x	x
Casuarina cunninghamiana	River Oak	x	x	x	x	x	x	x	x	x	x	x	x
Daviesia genistifolia	Broom Bitter Pea	x											x
Daviesia latifolia	Broad-leaved Bitter-pea											x	x
Daviesia mimosoides	-	x									x	x	x
Dilwynia sericea	Showy Parrot-pea	x	x										x
Dodonea viscosa	Hop Bush									x	x	x	
Eucalyptus melanophloia	Silverleaf Ironbark	x	x	x	x							x	x
Eucalyptus albens	White Box	x	x	x	x							x	x
Eucalyptus blakelyi	Blakeylis Red Gum	x	x	x	x							x	x

Table 13.2 Indicative Seed Collection Times for Flora Species Relevant to the Mine													
Species	Common Name	Summer		Autumn			Winter			Spring			Summer
		Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Eucalyptus bridgesiana	Apple Box	x	x	x	x	x	x	x	x	x	x	x	x
Eucalyptus camaldulensis	River Red Gum	x	x	x	x	x	x	x	x	x	x	x	x
Eucalyptus melliodora	Yellow Box	x	x	x	x							x	x
Eucalyptus microcarpa	Inland Greybox	x	x	x	x							x	x
Hibbertia obtusifolia	Grey Guinea Flower	x	x	x								x	x
Indigofera aedesmifolia	Tick Indigo	x	x									x	x
Indigofera australis	Austral Indigo	x	x									x	x
Pimelea glauca	Smooth Rice-flower	x	x								x	x	x
HERBS AND GRASSES													
Austrodanthonia caespitosa	Wallaby Grass	x											x
Austrodanthonia setacea	Wallaby Grass	x											x

Table 13.2 Indicative Seed Collection Times for Flora Species Relevant to the Mine													
Species	Common Name	Summer		Autumn			Winter			Spring			Summer
		Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Austrostipa scabra	Spear Grass	x	x							x	x	x	x
Bothriochloa macra	Red-leg Grass	x	x	x							x	x	x
Bulbine bulbosa	Bulbine Lily	x	x									x	x
Burchardia umbellata	Milkmaids												
Calocephalus citreus	Lemon Beauty-heads	x	x	x									
Calotis lappulacea	Yellow Burr-Daisy	x	x	x								x	x
Chrysocephalum apiculatum	Golden Buttons	x	x	x							x	x	x
Chrysocephalum semipapposum	Clustered Everlasting	x	x	x							x	x	x
Clematis microphylla	Old Man's Beard								x	x	x	x	x
Convolvulus angustissimus	Australian Bindweed								x	x	x	x	
Cymbopogon refractus	Barbed Wire Grass	x	x	x	x					x	x	x	x
Desmodium varians	Slender Tick-trefoil	x	x							x	x	x	x

Table 13.2 Indicative Seed Collection Times for Flora Species Relevant to the Mine													
Species	Common Name	Summer		Autumn			Winter			Spring			Summer
		Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Dianella longifolia	Smooth Flax Lily	x									x	x	x
Dianella revoluta	Blueberry Lily	x											x
Einatia nutans	Nodding Saltbush	x	x									x	x
Eremophila debilis	Winter Apple	x	x	x									
Geranium solanderi	Austral Cranesbill								x	x	x	x	x
Glycine clandestina	Twining Glycine	x	x								x	x	x
Glycine tabacina	Variable Glycine	x	x	x	x	x	x				x	x	x
Hardenbergia violaceae	False Sarsparilla	x	x										x
Linum marginale	Native Flax	x	x	x	x							x	x
Lomandra filiformis	Wattle Matt-rush	x	x										
Lomandra longifolia	Spiny-headed Mat-rush	x	x										x
Lomandra multiflorus	Many-flowered Matt-rush	x	x										
Lotus australis	Australian Trefoil	x	x										x

Table 13.2 Indicative Seed Collection Times for Flora Species Relevant to the Mine													
Species	Common Name	Summer		Autumn			Winter			Spring			Summer
		Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Microlaena stipoides	Weeping Grass	x	x							x	x	x	x
Microseris lanceolata	Murnong	x	x	x								x	x
Poa labillardieri	Tussock Grass	x	x							x	x	x	x
Sorghum leiocladum	Wild Sorghum	x	x	x								x	x
Themeda australis	Kangaroo Grass	x	x									x	x
Tricoryne elatior	Yellow Rush-lily	x	x	x							x	x	x
Vittadinia cuneata	Burr Daisy	x	x	x							x	x	x
Vittadinia gracilus	Woolly New Holland Daisy	x	x									x	x
Vittadinia muelleri	Narrow-leaf New Holland Daisy	x	x								x	x	x
Wahlenbergia gracilis	Sprawling Bluebell								x	x	x	x	
Wurmbea dioica	Early Nancy							x	x	x	x		
Xerochrysum viscosum	Sticky Everlasting										x	x	x

Appendix C – Declaration of Accuracy

In making this declaration, I am aware that section 491 of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth)(EPBC Act) makes it an offence in certain circumstances to knowingly provide false or misleading information or documents to specified persons who are known to be performing a duty or carrying out a function under the EPBC Act or the *Environment Protection and Biodiversity Conservation Regulations 200*0 (Cth). The offence is punishable on conviction by imprisonment or a fine, or both. I am authorised to bind the approval holder to this declaration and that I have no knowledge of authorisation being revoked at the time of making this declaration.

Signed: 

Full name: John Mardon Trotter

Organisation: Shenhua Watermark Coal Pty Limited, ABN 21 133 264 230

Date: 20 May 2020

Appendix D – Risk Assessment

An ecological hazard and risk assessment is provided in this Appendix. The risk assessment utilises the risk framework and likelihood of consequence descriptors provided in Table E.1 and E.2, respectively. The assessment for the Project Boundary is provided in Table E.3 and the assessment for the Offset Areas is provided in Table E.4.

Table E 1 Risk framework

		Consequence				
Likelihood		Minor	Moderate	High	Major	Critical
	Highly Likely	Medium	High	High	Severe	Severe
	Likely	Low	Medium	High	High	Severe
	Possible	Low	Medium	Medium	High	Severe
	Unlikely	Low	Low	Medium	High	High
	Rare	Low	Low	Low	Medium	High

Table E 2 Likelihood and consequence descriptors

Qualitative measure of likelihood (how likely is it that this event/circumstances will occur after management actions have been put in place/are being implemented)	
Highly likely	Is expected to occur in most circumstances
Likely	Will probably occur during the life of the project
Possible	Might occur during the life of the project
Unlikely	Could occur but considered unlikely or doubtful
Rare	May occur in exceptional circumstances
Qualitative measure of consequences (what will be the consequence/result if the issue does occur)	
Minor	Minor risk of failure to achieve the plan's objectives. Results in short term delays to achieving plan objectives, implementing low cost, well characterised corrective actions.
Moderate	Moderate risk of failure to achieve the plan's objectives. Results in short term delays to achieving plan objectives, implementing well characterised, high cost/effort corrective actions.
High	High risk of failure to achieve the plan's objectives. Results in medium-long term delays to achieving plan objectives, implementing uncertain, high cost/effort corrective actions.
Major	The plan's objectives are unlikely to be achieved, with significant legislative, technical, ecological and/or administrative barriers to attainment that have no evidenced mitigation strategies.
Critical	The plan's objectives are unable to be achieved, with no evidenced mitigation strategies.

Table E3 Risk Assessment for the Project Boundary

Management objective/desired outcome	Event or circumstance (risk)	Existing management, mitigation and offset actions	Residual risk			Trigger detection and monitoring activity/ies	Feasible/effective corrective actions
			L	C	RL		
To ensure all personnel on the site have been inducted	Un-inducted personnel recorded on the Project Boundary	Induction requirement for all visitors and staff Records of inductions and staff education are maintained.	Possible	Minor	Low	Records reviewed monthly	Induction carried out immediately and no work dependant on an induction is carried out until induction is complete Immediate review and update of records. If required, update record keeping procedures.
To ensure no disturbance occurs to vegetation beyond clearing limits	Clearing occurs beyond clearing limit	Clearing limits marked either by high visibility tape on trees of metal/wooden pickets, fencing or an equivalent boundary marker. Clearing limit markers maintained.	Possible	Minor	Low	Clearing boundaries reviewed every six months, or when changes made to the mine plan. Monthly inspections of clearing limits.	Immediate cessation of clearing at the location of early clearing. Review and update scheduling of clearing works. Immediate marking/re-marking of clearing limits.
	Disturbance found to occur outside of disturbance area.	Disturbance, including stockpiling, restricted to clearing limits.	Possible	Minor	Low	Monthly inspection of areas adjoining clearing limits.	If disturbance found to occur within the Mine's approved Disturbance Area, all clearing activity within this area

Management objective/desired outcome	Event or circumstance (risk)	Existing management, mitigation and offset actions	Residual risk			Trigger detection and monitoring activity/ies	Feasible/effective corrective actions
			L	C	RL		
							to cease, and any items moved into this area relocated to within approved disturbance areas. If disturbance found to occur outside of the Mine's approved Disturbance Area, all activity within this area ceased and relevant agencies notified to determine follow up actions.
To minimise impacts to native flora and fauna species	Threatened flora and/or fauna species recorded during pre-clearance surveys and clearing supervision surveys	Pre-clearance survey completed in accordance with *Section 4.2.2.1.* Targeted pre-clearance survey completed in accordance with *Section 4.2.2.2.ii.* Pre-clearance survey results documented in *Pre-*	Likely	Minor	Low	Pre-clearance surveys Clearance supervision Annual review of *Pre-Clearance Survey Reports* and *Clearance Reports* Annual review of *Fauna Injury and Relocation Reports.*	EES and DoEE, as required, notified of threatened species find. *Species-Specific Translocation Plan* developed, if required. Threatened flora species managed in accordance with the translocation program. If recorded, Large-eared Pied Bat,

Management objective/desired outcome	Event or circumstance (risk)	Existing management, mitigation and offset actions	Residual risk			Trigger detection and monitoring activity/ies	Feasible/effective corrective actions
			L	C	RL		
		Clearance Survey Reports. Clearing supervised and undertaken using the two-stage clearing process identified in *Section 4.2.3.3.* Fauna rescues documented within a *Clearing Report.* Unexpected threatened species finds documented within an *Unexpected Threatened Species Find Report*. Fauna relocation details documented within the *Fauna Relocation Report.* Threatened species managed in accordance with the translocation program (if required)				Annual review of *Translocation Program*.	Corben's Long-eared Bat and Spotted Tailed Quoll relocated to relocation sites containing suitable habitat features identified in *Section 4.2.4* Review and update reporting procedure if required

Management objective/desired outcome	Event or circumstance (risk)	Existing management, mitigation and offset actions	Residual risk			Trigger detection and monitoring activity/ies	Feasible/effective corrective actions
			L	C	RL		
	Large-eared Pied Bat recorded	Targeted pre-clearance survey for this species completed in accordance with *Section 4.2.2.2.ii.*	Possible	Minor	Low	Pre-clearance surveys Clearance supervision Annual review of *Pre-Clearance Survey Reports* and *Clearance Reports*.	EES consulted and *Large-eared Pied Bat Management Plan* developed.
	Koala recorded	Pre-clearance survey completed in accordance with *Section 4.2.2.1.* Targeted pre-clearance survey completed in accordance with *Section 4.2.2.2.ii.* Further details provided in the *KPoM*	Likely	Minor	Low	Pre-clearance surveys Clearance supervision Annual review of *Pre-Clearance Survey Reports* and *Clearance Reports* Annual review of the *KPoM*	If required, Koala relocation undertaken in accordance with the *KPoM*. Any injured Koalas treated in accordance with the *KPoM*.
	Other non-threatened fauna species recorded or injured	Pre-clearance survey completed in accordance with *Section 4.2.2.1.*	Likely	Minor	Low	Pre-clearance surveys Clearance supervision	All uninjured fauna captured during clearing (excluding targeted threatened species) relocated to a

Management objective/desired outcome	Event or circumstance (risk)	Existing management, mitigation and offset actions	Residual risk			Trigger detection and monitoring activity/ies	Feasible/effective corrective actions
			L	C	RL		
		Fauna rescue details documented within a *Clearing Report.* If juveniles or nestlings are observed, clearing undertaken using the procedure identified in *Section 4.2.3.4.*				Annual review of *Pre-Clearance Survey Reports.* Review of *Clearing Reports* Annual review of *Fauna Injury and Relocation Reports.*	previously identified and approved relocation site by licensed wildlife carers and/or ecologists in accordance with *Section 4.2.4.* Any animals (except Koalas) that are inadvertently injured taken to the nearest veterinary clinic for treatment, or if required, humanely euthanized.
Avoid/minimise spread of soil pathogens	Soil pathogen detected	Annual testing conducted within the clearing area to determine presence of soil pathogens. Wash down areas established and utilised by vehicles	Possible	Minor	Low	Review results of annual pathogen testing	Additional wash down areas established and utilised by vehicles in the vicinity of the occurrence of the pathogen Cessation of vehicle movements in the vicinity of the occurrence of the soil pathogen until control measures are implemented.

Management objective/desired outcome	Event or circumstance (risk)	Existing management, mitigation and offset actions	Residual risk			Trigger detection and monitoring activity/ies	Feasible/effective corrective actions
			L	C	RL		
							.
Prevent unauthorised access to the Project Boundary	Unauthorised access recorded	Implementation of the access control measured detailed in *Section 6.3*	Possible	Minor	Low	Twice-annual check of access control measures.	Review and update access control measures if required
Reduce weed species extent	Weed species extent does not reduce and/or increases	Monitor for weeds according to *Section 8.3* Undertake weed control as per *Section 6.8*	Possible	Minor	Low	Annual weed monitoring according to *Section 8.3* Incidental observations of weed infestations Annual review of *Weed and Pest Management Plan* Annual review of *BMP Annual Report.*	Increase frequency of weed control Review control measures to determine if additional controls required. Additional efforts to control target species or methods extended to cover newly occurring weed species Increase monitoring frequency Review and update *Weed and Pest Management Plan* if required.

Management objective/desired outcome	Event or circumstance (risk)	Existing management, mitigation and offset actions	Residual risk			Trigger detection and monitoring activity/ies	Feasible/effective corrective actions
			L	C	RL		
Reduced feral animal occupation	Feral animal occupation does not reduce and/or increases	Undertake feral animal monitoring according to *Section 8.4* Control feral animals according to *Section 6.10*	Possible	Minor	Low	Review annual feral animal monitoring Annual review of *Weed and Pest Management Plan* Annual review of *BMP Annual Report.*	Increase frequency of feral animal control Review control measures to determine if alternate or additional controls required. Increase monitoring frequency Implement additional efforts to control target species or methods extended to cover new feral species
Manage erosion	Increased levels of erosion recorded relative to baseline levels	Baseline assessment of erosion levels within the Project Disturbance Boundary undertaken. Annual monitoring of erosion levels Erosion and sediment control measures specified	Possible	Minor	Low	Annual monitoring of erosion. Annual review *of Sediment and Erosion Control Plan.* Annual review of erosion and sediment control related *EIS* commitments	Undertake remedial erosion and sediment control works as soon as practicable. Increase frequency of erosion monitoring if required. If required, revise *Sediment and Erosion Control Plan* to include

Management objective/desired outcome	Event or circumstance (risk)	Existing management, mitigation and offset actions	Residual risk			Trigger detection and monitoring activity/ies	Feasible/effective corrective actions
			L	C	RL		
		in the *Sediment and Erosion Control Plan.*					additional control and remediation measures.
Minimise occurrence of bushfire	Occurrence of bushfire • Loss of tree hollows • Plant mortality • Fauna mortality	Reduce fuel loads as per Bush Fire Management Plan. Ongoing consultation with the Forestry Corporation of NSW.	Possible	Moderate	Medium	Annual monitoring Annual review of the *Bush Fire Management Plan.* Breeza State Forest fuel load visibly significant.	Increase frequency of monitoring Re-use of additional salvage items/nest boxes to compensate for lost habitat Review and update *Bush Fire Management Plan* if required Discuss additional fire management options with Forestry Corporation of NSW.

Table E4 Risk Assessment for the Biodiversity Offset Areas

Management objective/desired outcome	Event or circumstance (risk)	Management, mitigation and offset actions	Residual risk			Trigger detection and monitoring activity/ies	Feasible/effective corrective actions
			L	C	RL		
To legally secure approved offset properties for conservation.	Failure to legally secure approved offset properties	Efforts to legally secure approved offset properties	Unlikely	High	Medium	Offset sites not secured	Continue efforts to legally secure approved offset properties. Locate alternative offset properties
	Legislative reform prejudices proposed tenure arrangements for offset properties.	Efforts to secure proposed tenure arrangements for offset properties	Unlikely	High	Medium	Tenure arrangements not obtained	Continue efforts to secure appropriate tenure arrangements for offset properties Investigate alternative tenure arrangements.
To achieve performance targets and completion criteria for all MNES	Flood • major erosion • plant mortality	Conduct revegetation according to *Section 6.12*	Possible	Moderate	Medium	Annual monitoring	Implement erosion control measures Undertaken revegetation works within affected areas.
	Bushfire • Loss of tree hollows • Plant mortality • Fauna mortality	Manage fuel loads as per *Bush Fire Management Plan*. Ongoing consultation with the Forestry	Possible	Moderate	Medium	Annual monitoring Annual review of *Bush Fire Management Plan*.	Increased frequency of monitoring Re-use of additional salvage items to compensate for those lost

Management objective/desired outcome	Event or circumstance (risk)	Management, mitigation and offset actions	Residual risk			Trigger detection and monitoring activity/ies	Feasible/effective corrective actions
			L	C	RL		
		Corporation of NSW.				Breeza State Forest fuel load visibly significant.	Installation of nest boxes to compensate for those lost Review and update *Bush Fire Management Plan* if required Discuss additional fire management options with Forestry Corporation of NSW.
	Drought • Dieback of plant species • Increase in severity of bush fire • Increase in erosion post-fire	Conduct revegetation according to *Section 6.12* Manage fuel loads as per *Bush Fire Management Plan* Implement erosion and sediment control measures specified in the *Sediment and Erosion Control Plan.*	Likely	Moderate	Medium	Annual Monitoring	Undertaken additional revegetation works within affected areas. Increased frequency of monitoring and management of fuel loads Implement additional erosion control measures

Management objective/desired outcome	Event or circumstance (risk)	Management, mitigation and offset actions	Residual risk			Trigger detection and monitoring activity/ies	Feasible/effective corrective actions
			L	C	RL		
Attain and maintain completion criteria	Failure to attain/maintain offset completion criteria	Review of BMP Annual report	Possible	Moderate	Medium	Annual review of BMP	Identification and implementation of measures required to attain offset completion criteria
Successful revegetation in specified parts of the Offset Areas	Less than 80% survival of revegetation	Revegetation works undertaken in accordance with *Section 6.12* Establishment of wildlife corridors according to *Section 6.15*	Possible	Minor	Low	Annual review of revegetation areas. Review annual flora monitoring specified in *Section 8.1* Review weed monitoring specified in Section 8.3 to determine if weeds may impact on revegetation success. Annual review wildlife corridors	Review current management actions to determine if additional measures required. Consider irrigation to increase survivorship of planted vegetation Supplementary planting undertaken to meet target survival rate. Increased weed control if required.
Provision of habitat that provides appropriate habitat for the Koala	Revegetation does not provide appropriate habitat for the Koala .	Revegetation works undertaken in accordance with *Section 6.12* and the *KPoM*.	Possible	Minor	Low	Annual review of revegetation areas. Review annual flora monitoring	Review current management actions to determine if additional measures required.

Management objective/desired outcome	Event or circumstance (risk)	Management, mitigation and offset actions	Residual risk			Trigger detection and monitoring activity/ies	Feasible/effective corrective actions
			L	C	RL		
		Establishment of wildlife corridors according to *Section 6.15*				specified in *Section 8.1* Annual review wildlife corridors in accordance with the *KPoM.*	Review of revegetation and rehabilitation species plantings and seeding to target species in PCTs suitable for the Koala.
Improvement in native vegetation condition and cover	Native vegetation condition and cover does not improve and/or deteriorates	Undertake revegetation according to *Section 6.12* Undertake weed and feral animal management according to *Section 6.10* Manage potential impacts from macropods by installing tree guards as specified in *Section 6.11*	Possible	Minor	Low	Review annual flora monitoring specified in *Section 8.1* Review weed monitoring specified in *Section 8.3*	Conduct additional revegetation Increase frequency of revegetation works Undertake studies to develop alternative revegetation techniques Undertake additional weed and feral animal management
Increased native fauna species richness and abundance	Native fauna species richness and abundance does not increase and/or decreases	Re-use salvaged habitat items in offset areas according to *Section 6.6*	Unlikely	Moderate	Low	Annual review of fauna monitoring specified in *Section 8.2*	Increase re-use of salvaged items Conduct additional revegetation

Management objective/desired outcome	Event or circumstance (risk)	Management, mitigation and offset actions	Residual risk			Trigger detection and monitoring activity/ies	Feasible/effective corrective actions
			L	C	RL		
		Undertake weed and feral animal management according to *Section 6.8* and *Section 6.10* Undertake revegetation according to *Section 6.12* Establishment of wildlife corridors according to *Section 6.15* Conduct fauna monitoring as specified in *Section 8.2*				Annual review of BMP Annual report	Increase frequency of revegetation works Undertake additional weed and feral animal management
Reduced weed species extent	Weed species extent does not reduce and/or increases Weeds found to be spread by plant and equipment. Known weed infestations not managed appropriately	Baseline surveys conducted within one year of commencement Annual monitoring of Offset Areas for weeds according to *Section 8.3*	Unlikely	Moderate	Low	Annual review of weed monitoring specified in *Section 8.3* Incidental observations of weed infestations	Undertake targeted weed control measures in new infestation areas Conduct additional weed mapping and update the *Weed and Pest Management Plan*

Management objective/desired outcome	Event or circumstance (risk)	Management, mitigation and offset actions	Residual risk			Trigger detection and monitoring activity/ies	Feasible/effective corrective actions
			L	C	RL		
		Implementation of control measures detailed in *Section 4.9* within the Offset Areas. Prevention of the introduction and spread of weeds by plant and equipment. Revegetation areas inspected within two years of planting/seeding to identify dense Cypress Pine stands and management of these in accordance with methods determined following site inspection					Increase frequency of weed control Review weed control measures to determine if additional controls required. Additional efforts to control target species or methods extended to cover newly occurring weed species Increase monitoring frequency
Reduced feral animal occupation	Feral animal numbers do not reduce and/or increases	Undertake feral animal monitoring according to *Section 8.4*	Unlikely	Moderate	Low	Review the results annual feral animal monitoring	Review feral animal control measures to determine if additional controls required.

Management objective/desired outcome	Event or circumstance (risk)	Management, mitigation and offset actions	Residual risk			Trigger detection and monitoring activity/ies	Feasible/effective corrective actions
			L	C	RL		
		Implementation of European Red Fox, Feral Pig, Wild Dog, Feral Cat and European Rabbit/Brown Hare control measures in accordance with *Section 6.10,* as required.				according to *Section 8.4*	Increase frequency of feral animal control Change method of control Implement additional efforts to control target species or methods extended to cover new feral animal species
Avoid/minimise spread of soil pathogens	Soil pathogen detected	Initial testing conducted within the offset area to determine presence of soil pathogens. Wash down areas established and utilised by vehicles	Possible	Minor	Low	Review results of testing conducted within the offset area. Twice-annual check of control measures.	Implementation of hygiene procedures until testing confirmed soil pathogens are absent. Cessation of vehicle movements in the vicinity of the occurrence of the soil pathogen until control measures are implemented.
Prevent unauthorised access to the offset properties	Unauthorised access to offset properties recorded	Implementation of the access control measured detailed in *Section 6.3*	Possible	Minor	Low	Twice-annual check of access control measures.	Review and update access control measures if required

FIGURES

Figure 1 Project Location

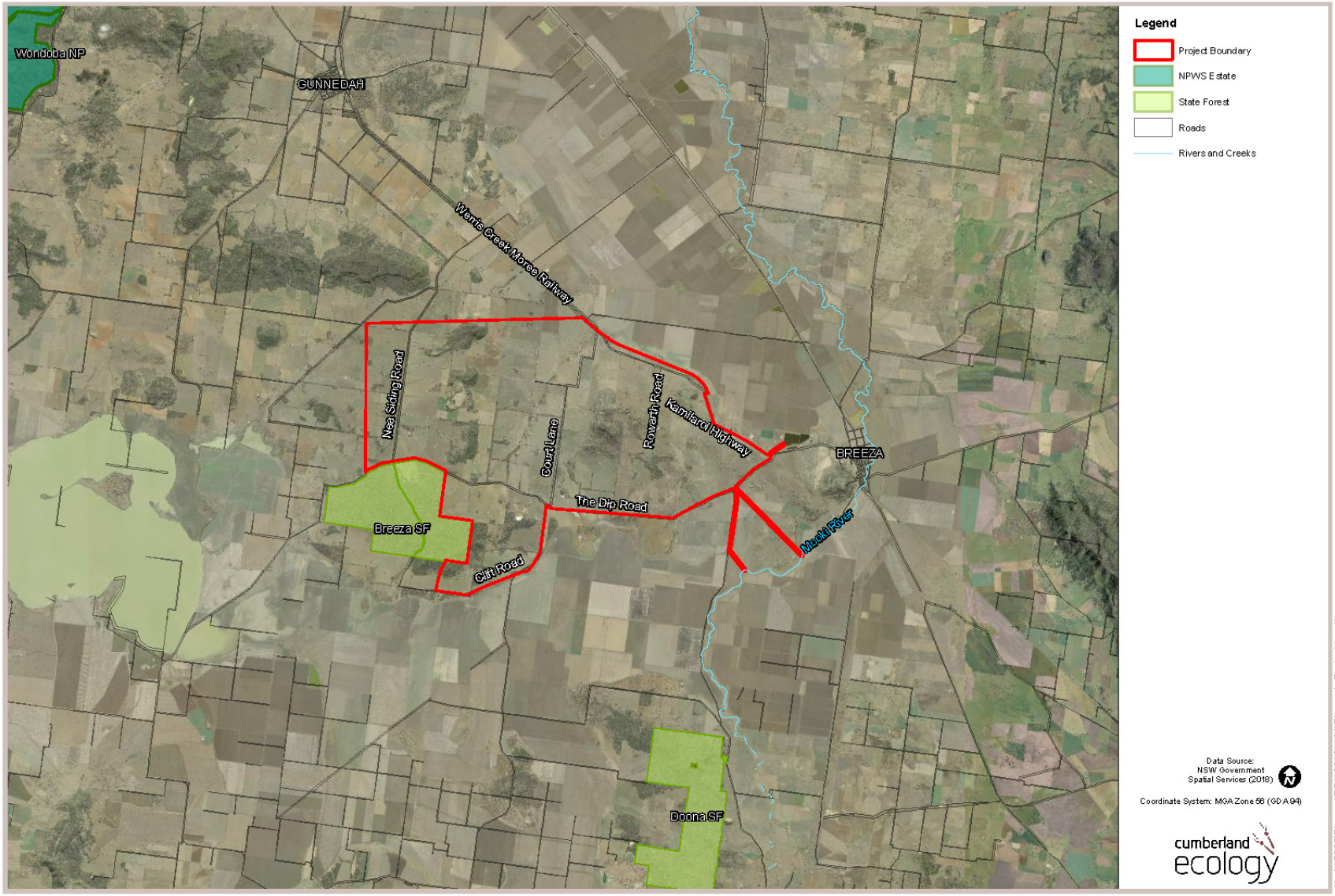

Figure 1. Project location

Figure 2 Project Layout

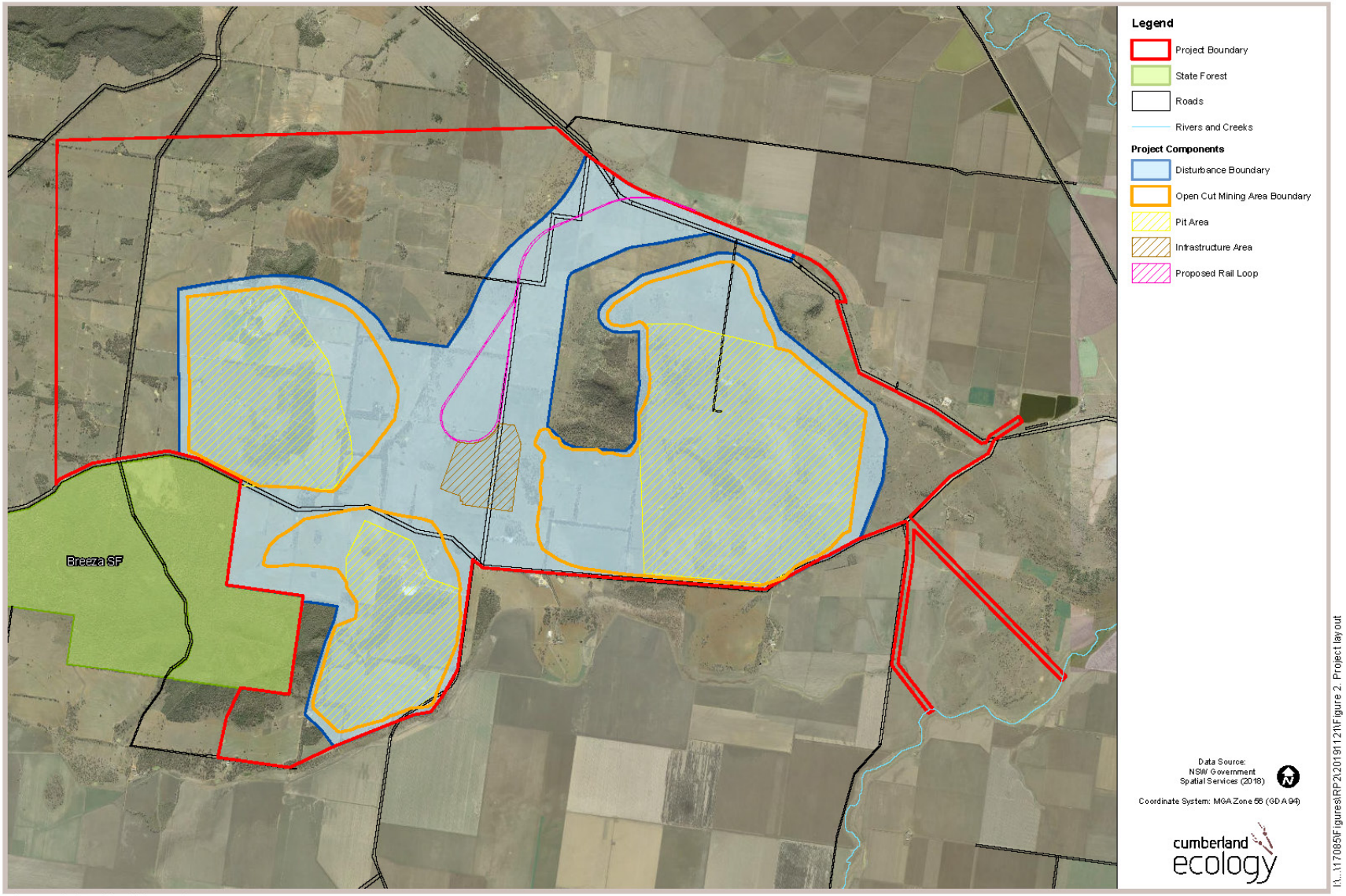

Figure 2. Project layout

Figure 3 Onsite and Offsite Biodiversity Offset Areas

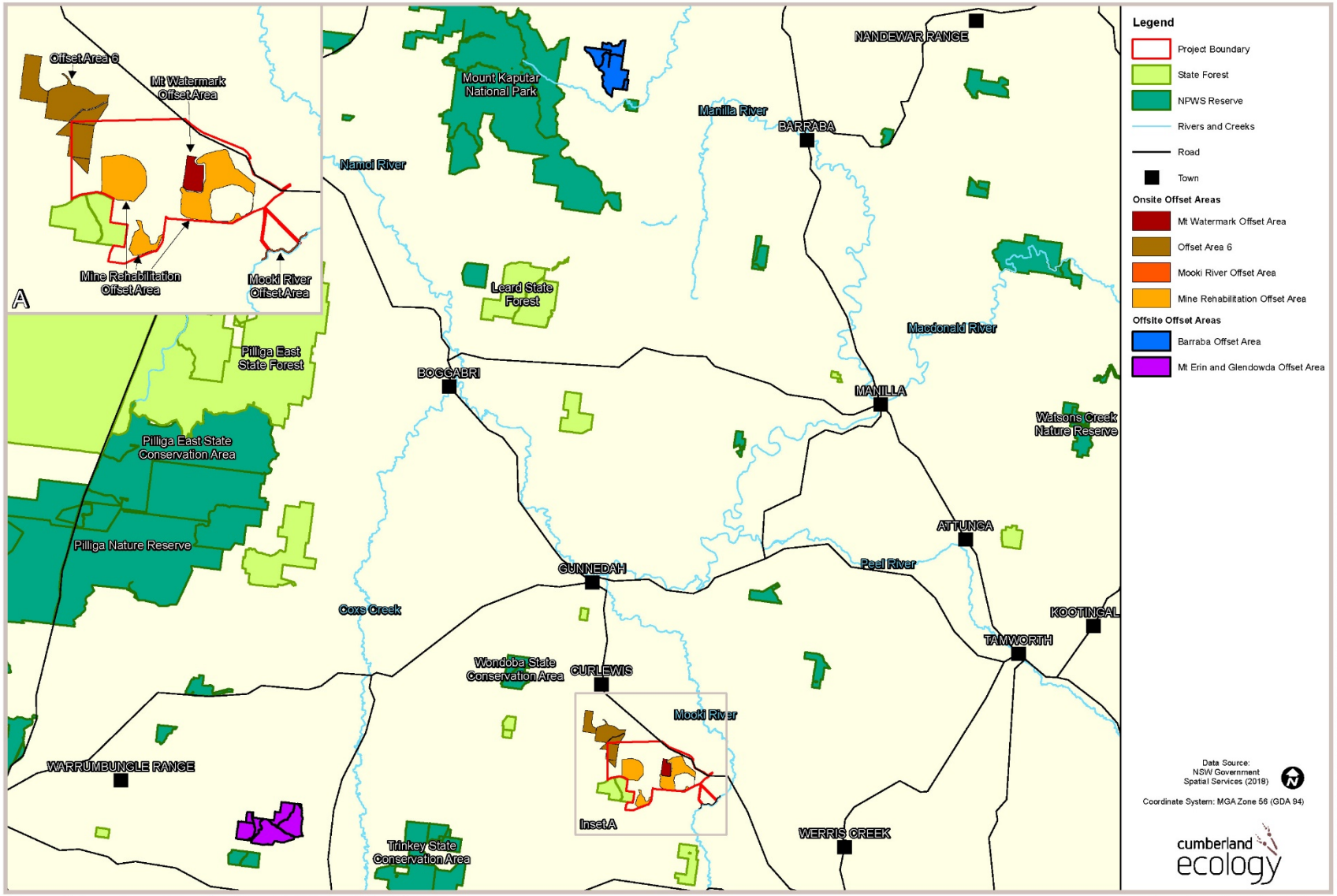

Figure 3. Location of the Onsite and Offsite Offset Areas

Figure 4 Plant community types within the Project Boundary

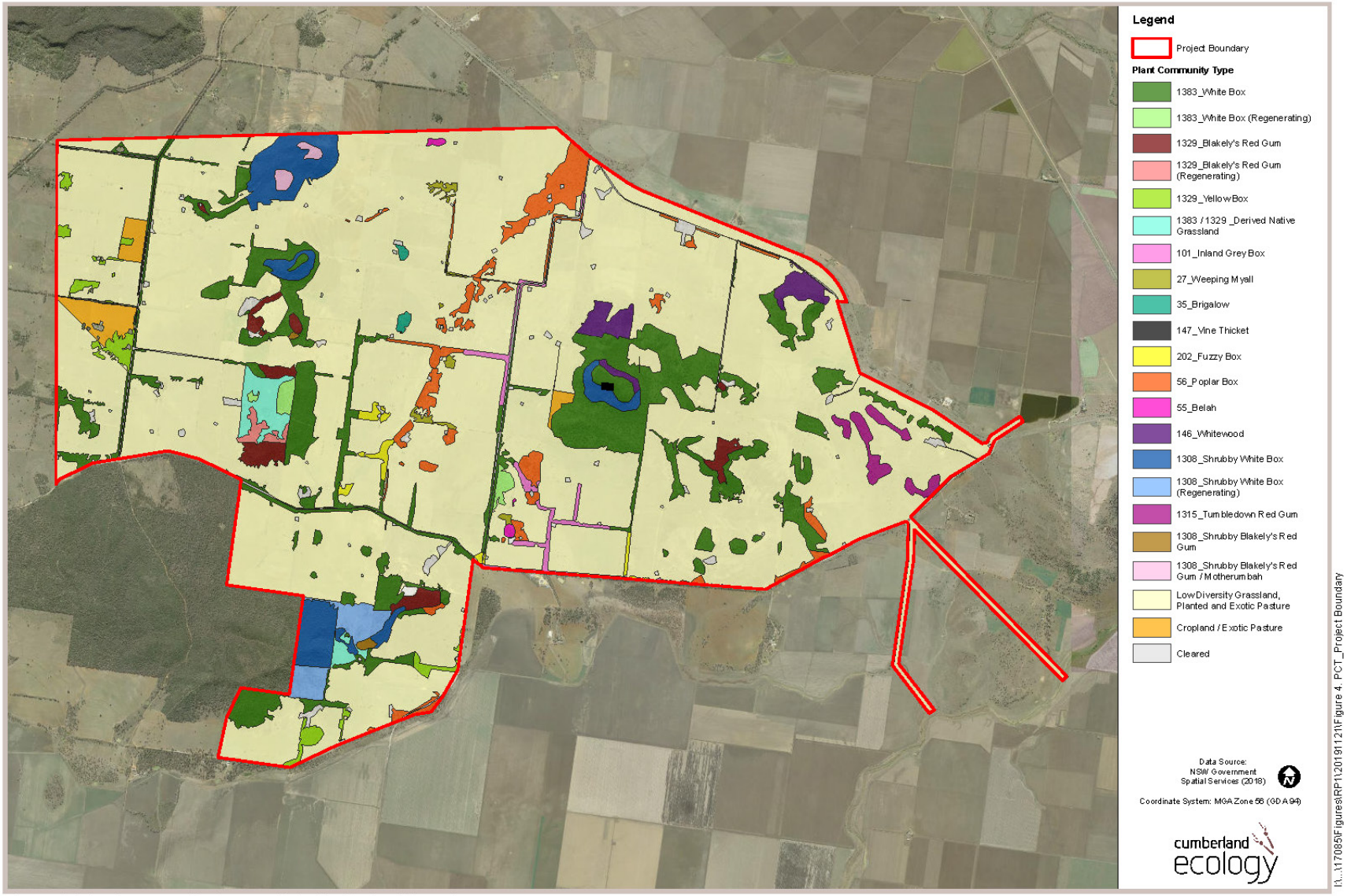

Figure 4. Plant community types within the Project Boundary

Figure 5 Threatened ecological communities within the Project Boundary

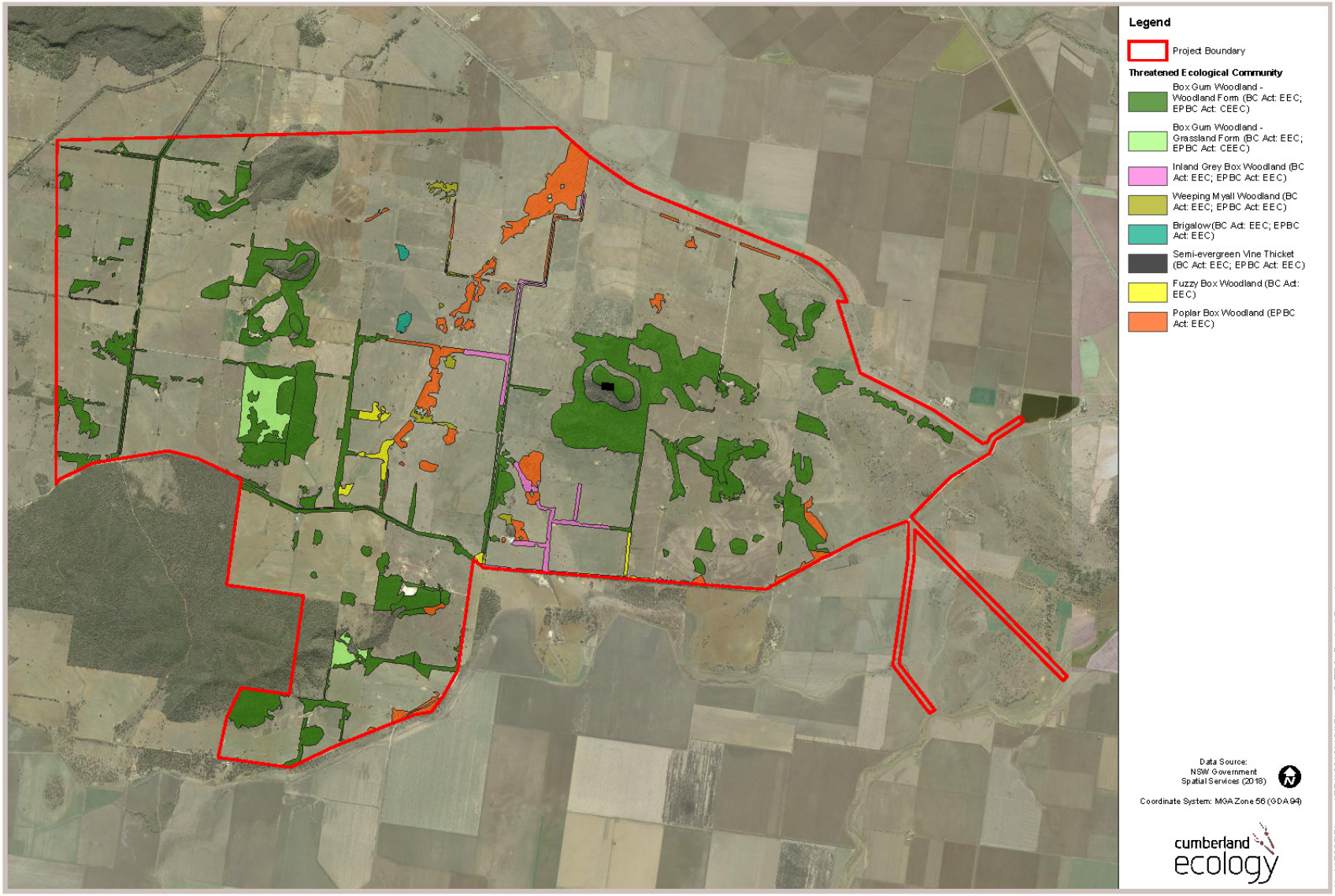

Figure 5. Threatened ecological communities within the Project Boundary

Figure 6 Threatened species recorded within the Project Boundary

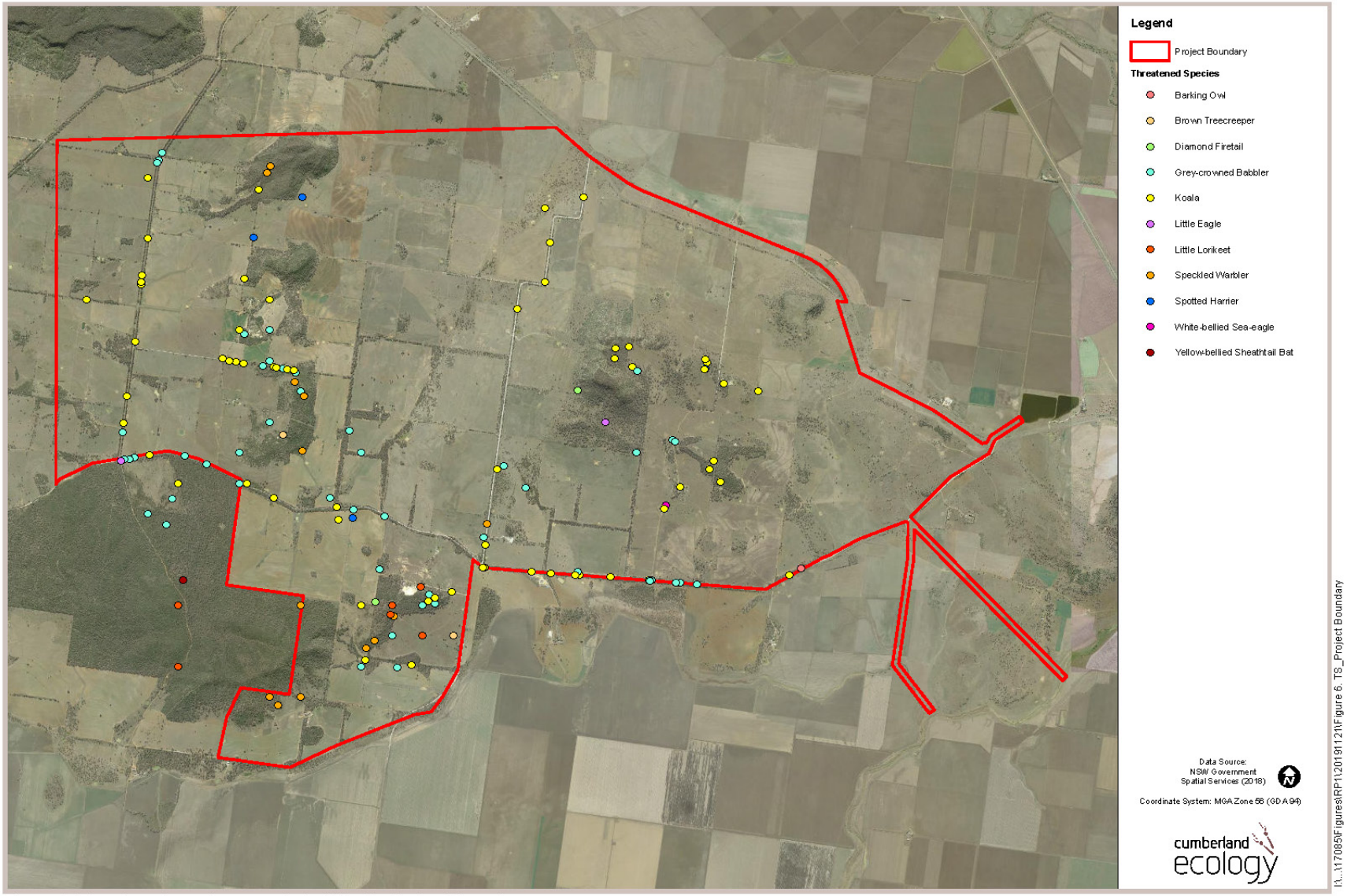

Figure 6. Threatened species recorded within the Project Boundary

Figure 7 Plant community types within the Onsite Offset Areas

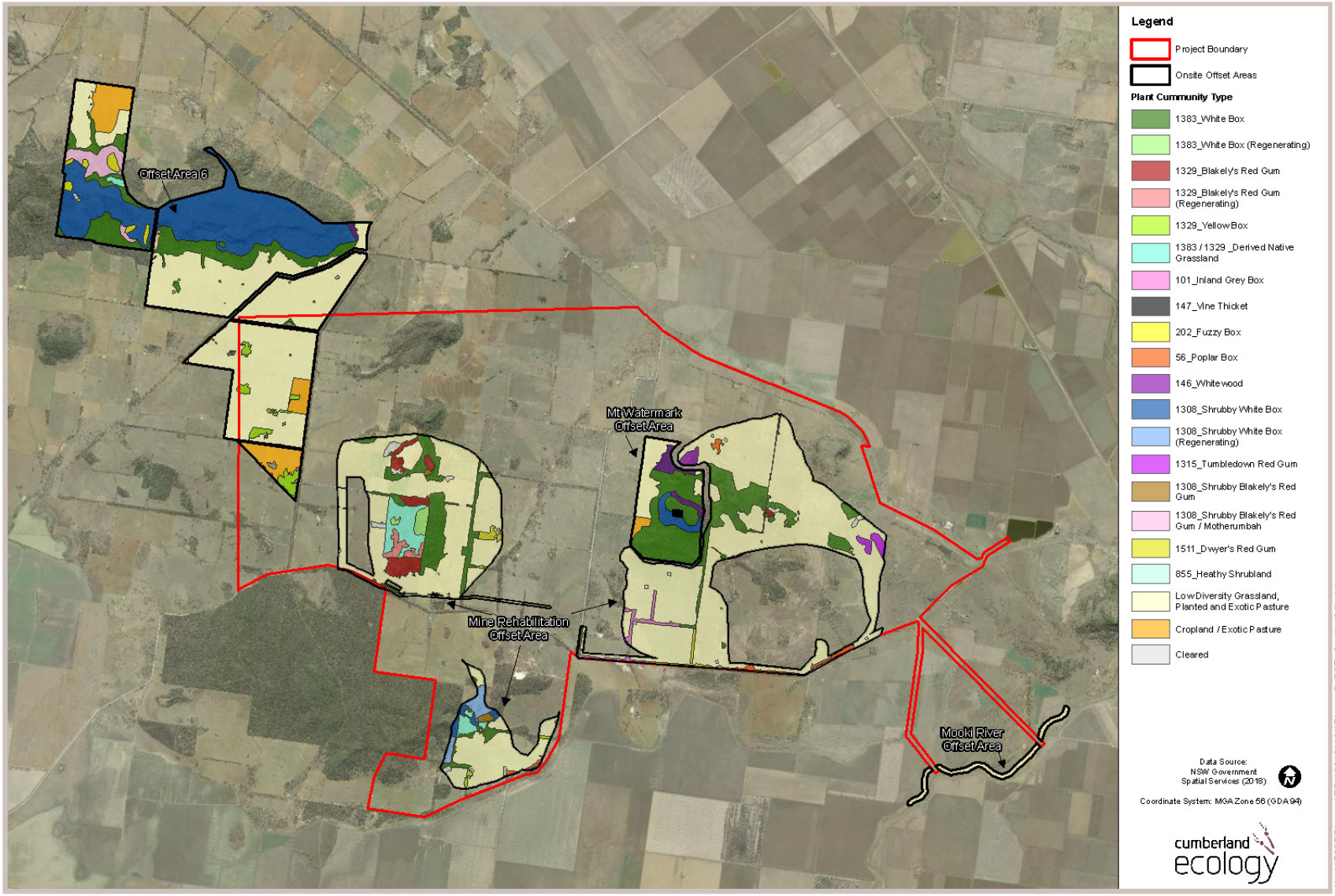

Figure 7. Existing plant community types within the Onsite Offset Areas

Figure 8 Threatened ecological communities within the Onsite Offset Areas

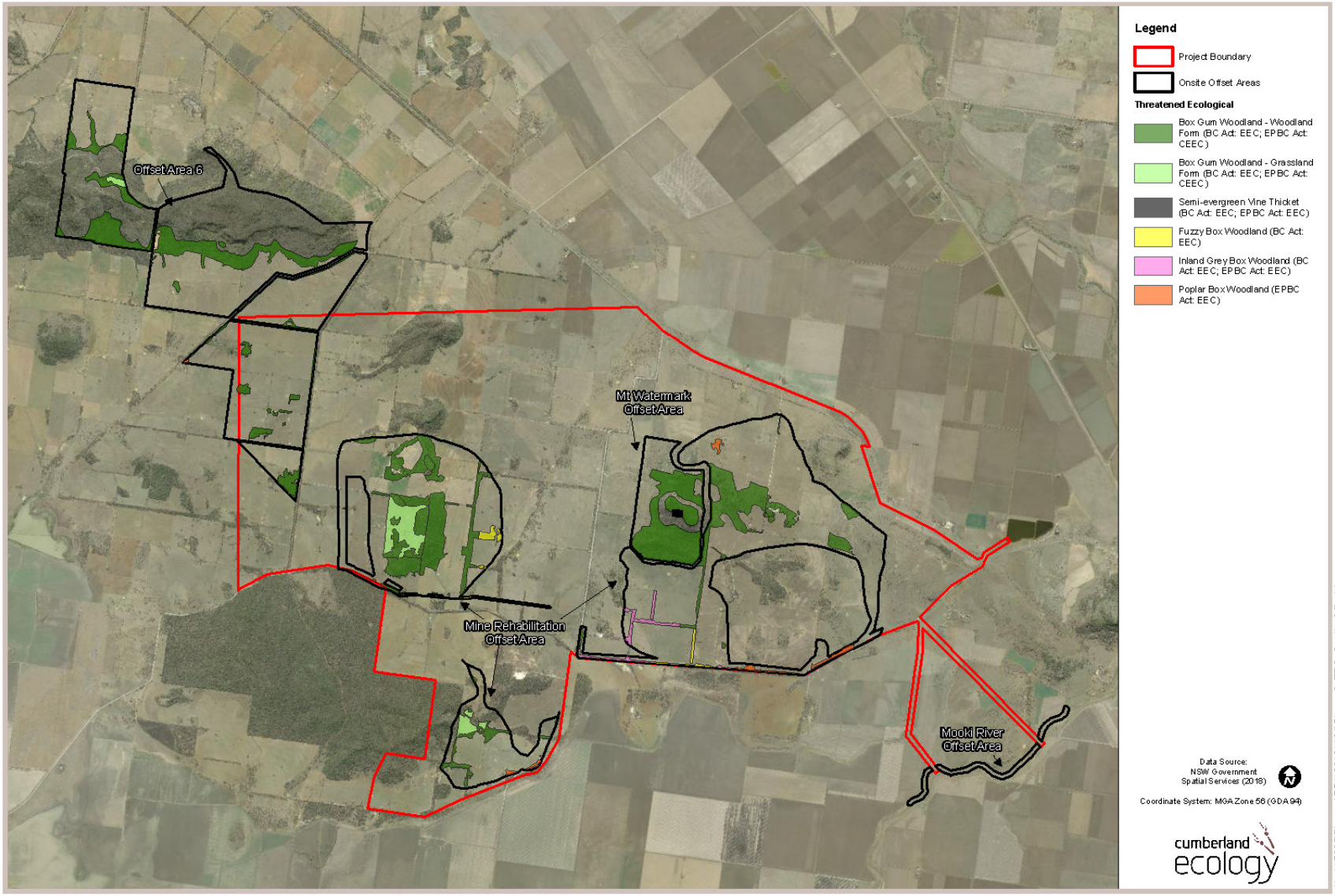

Figure 8. Existing threatened ecological communities within the Onsite Offset Areas

Figure 9 Threatened species recorded within the Onsite Offset Areas

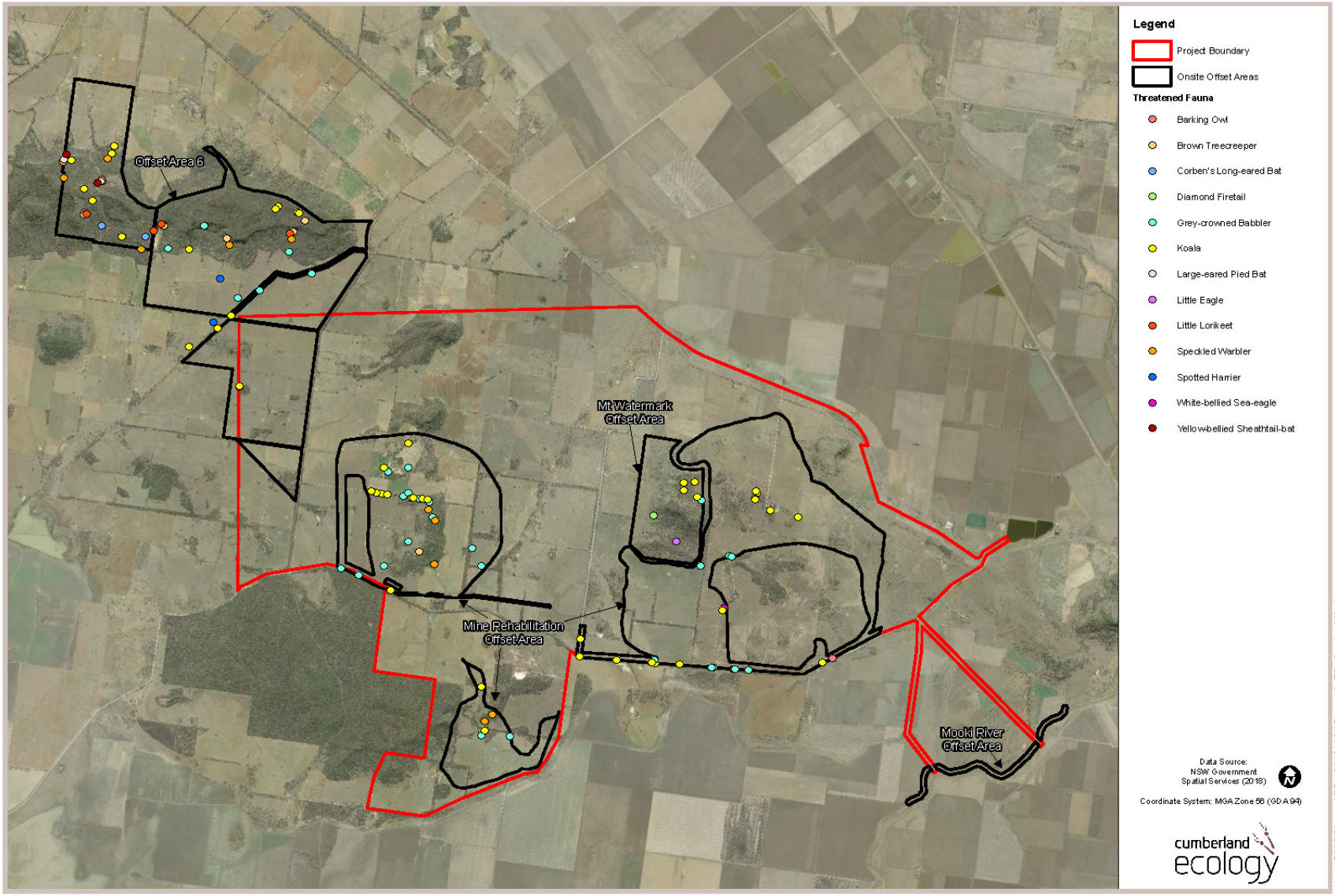

Figure 9. Existing threatened species recorded within the Onsite Offset Areas

Figure 10 Plant community types within the Barraba Offset Area

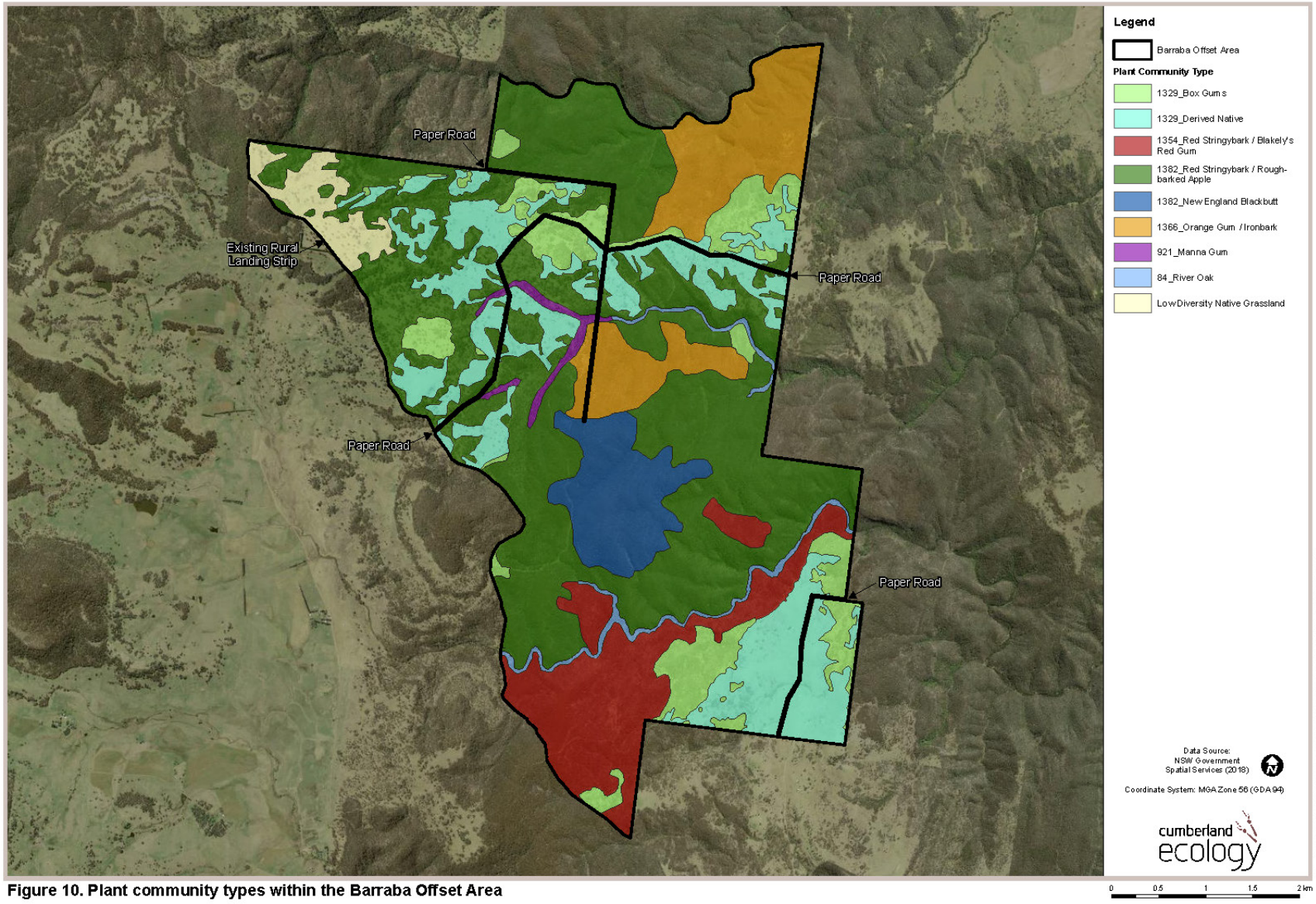

Figure 10. Plant community types within the Barraba Offset Area

Figure 11 Threatened ecological communities within the Barraba Offset Area

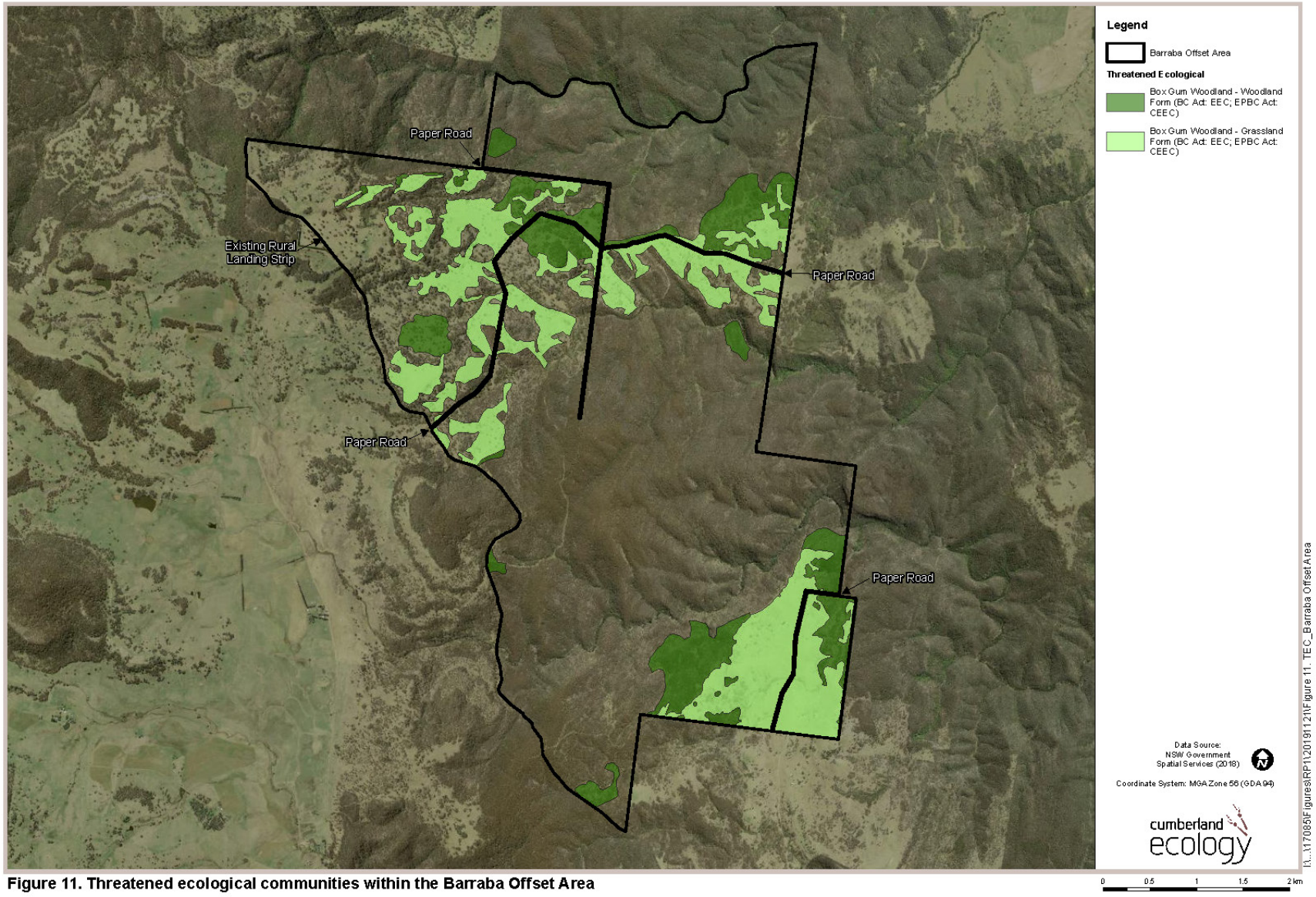

Figure 11. Threatened ecological communities within the Barraba Offset Area

Figure 12 Threatened species recorded within the Barraba Offset Area

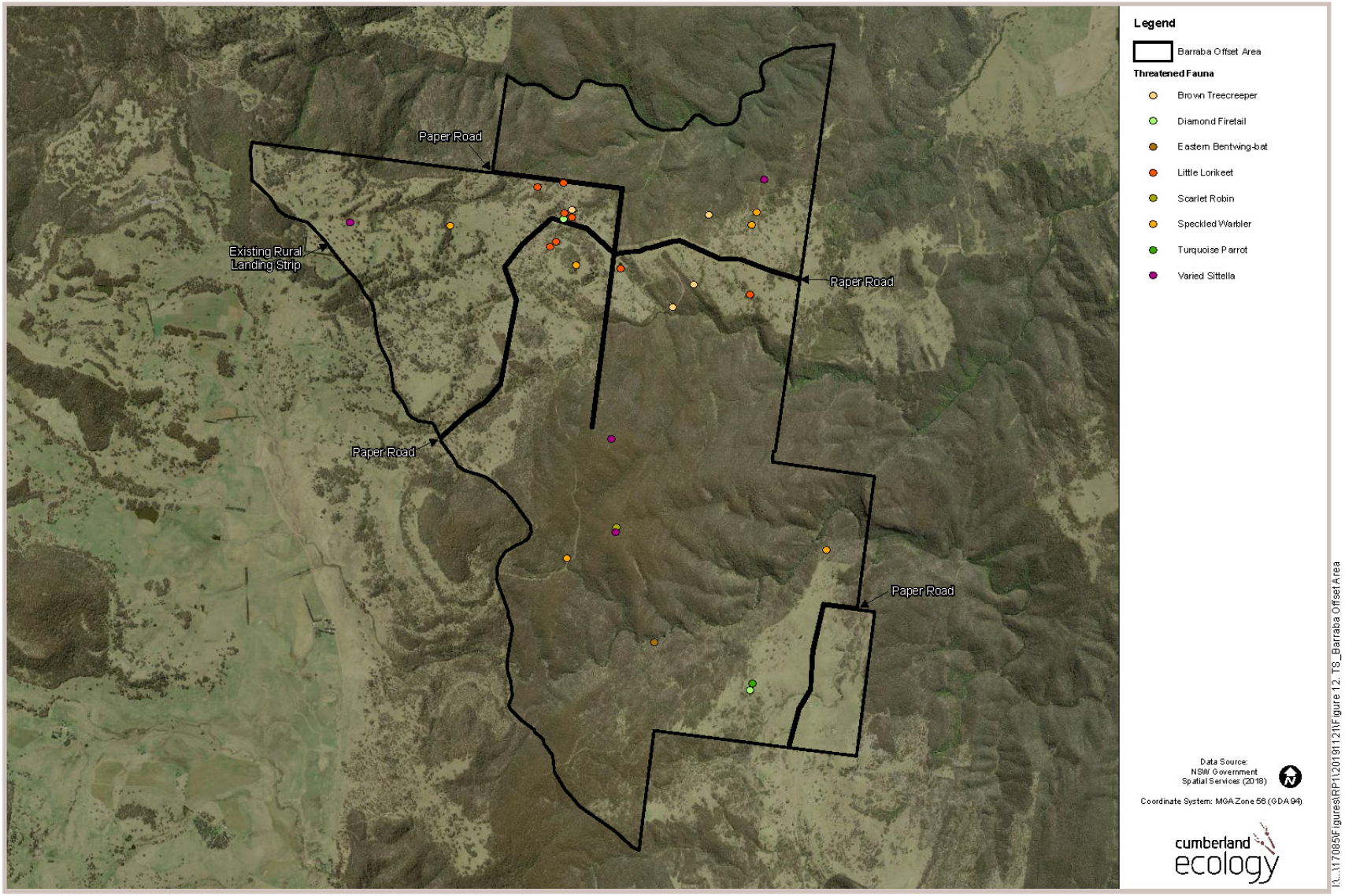

Figure 12. Threatened species recorded within the Barraba Offset Area

Figure 13 Plant community types within the Mt Erin and Glendowda Offset Area

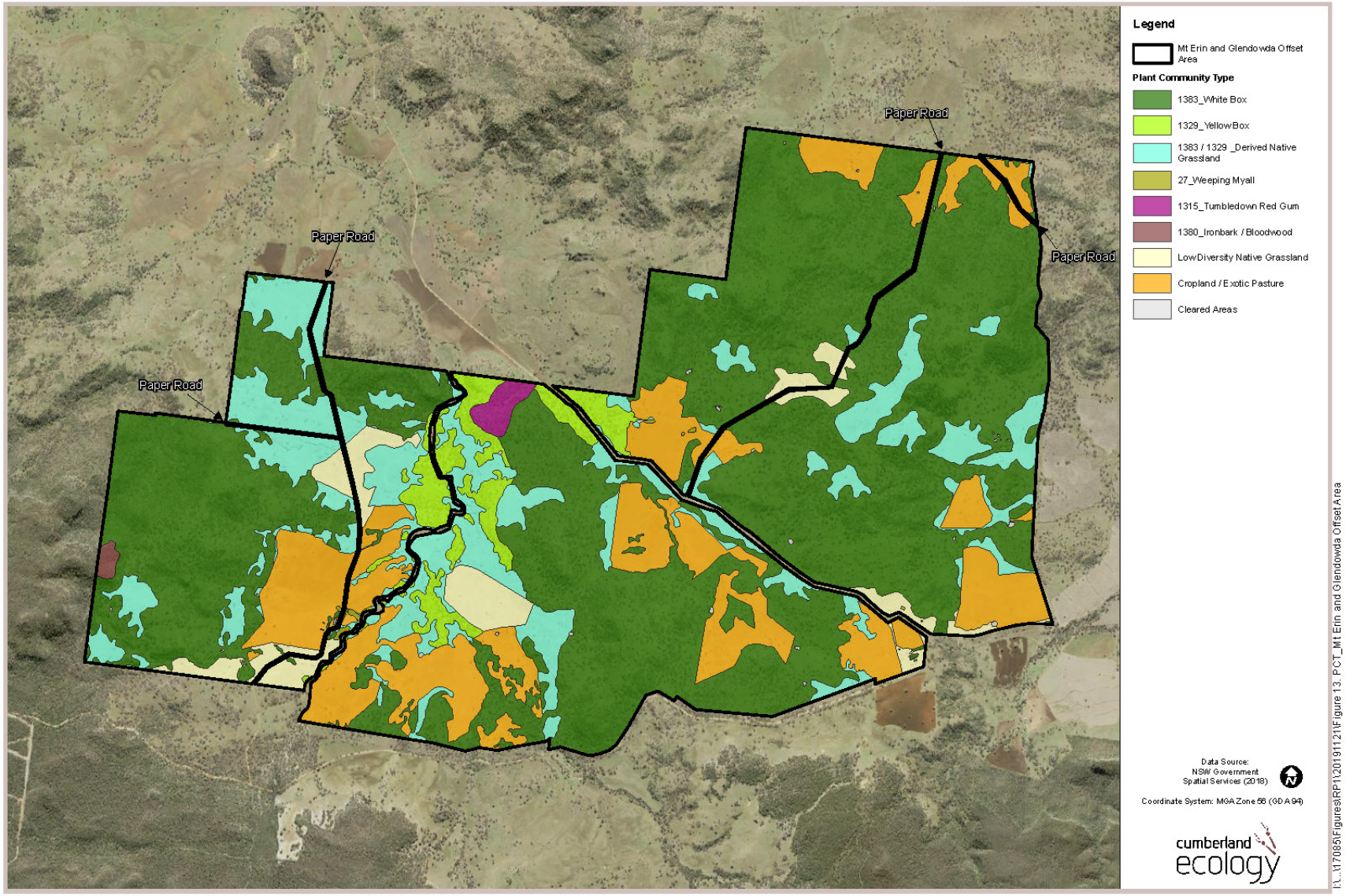

Figure 13. Plant community types within the Mt Erin and Glendowda Offset Area

Figure 14 Threatened ecological communities within the Mt Erin and Glendowda Offset Area

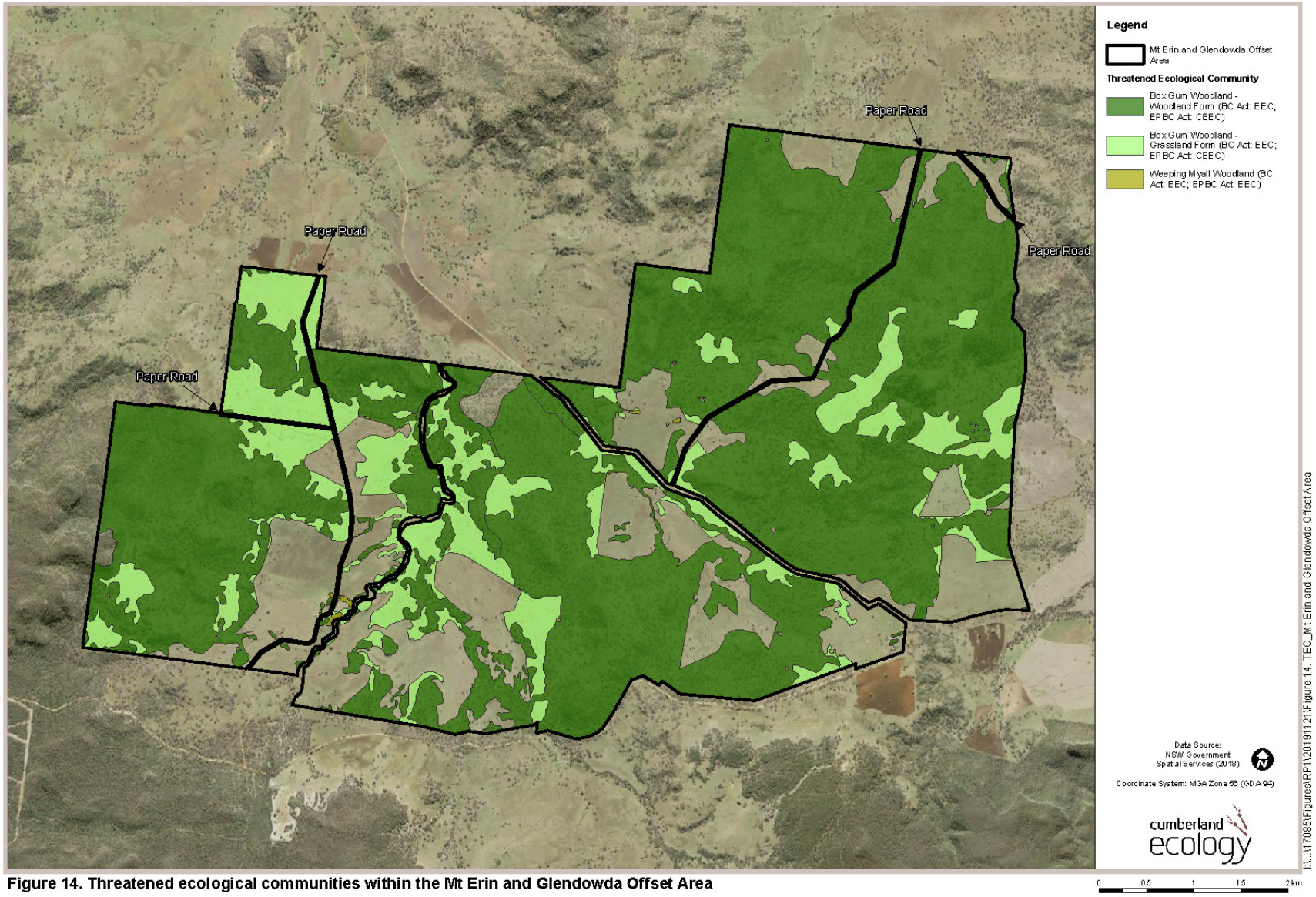

Figure 14. Threatened ecological communities within the Mt Erin and Glendowda Offset Area

Figure 15 Threatened species recorded within the Mt Erin and Glendowda Offset Area

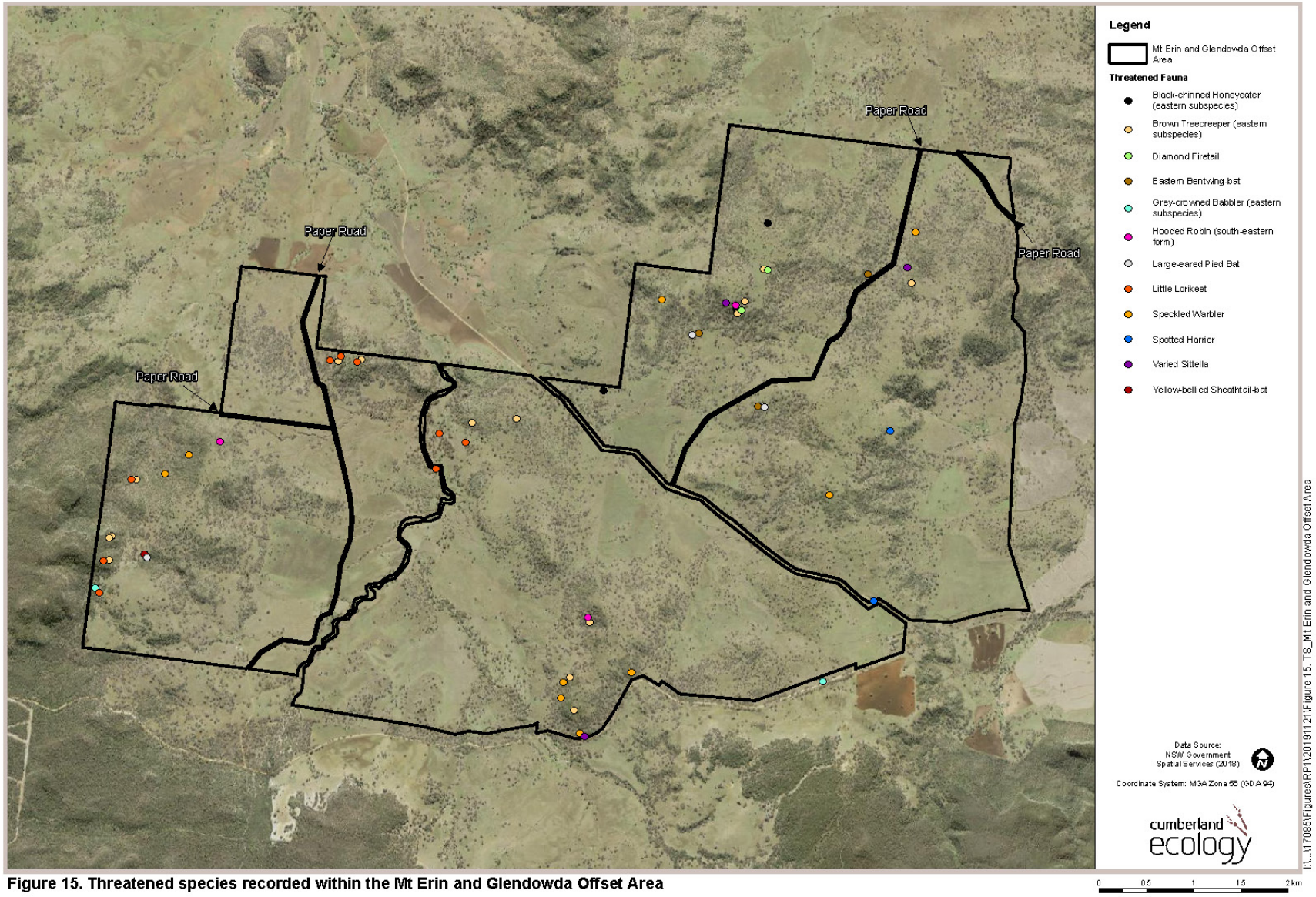

Figure 15. Threatened species recorded within the Mt Erin and Glendowda Offset Area

Figure 16 Management zones within the Onsite Offset Areas

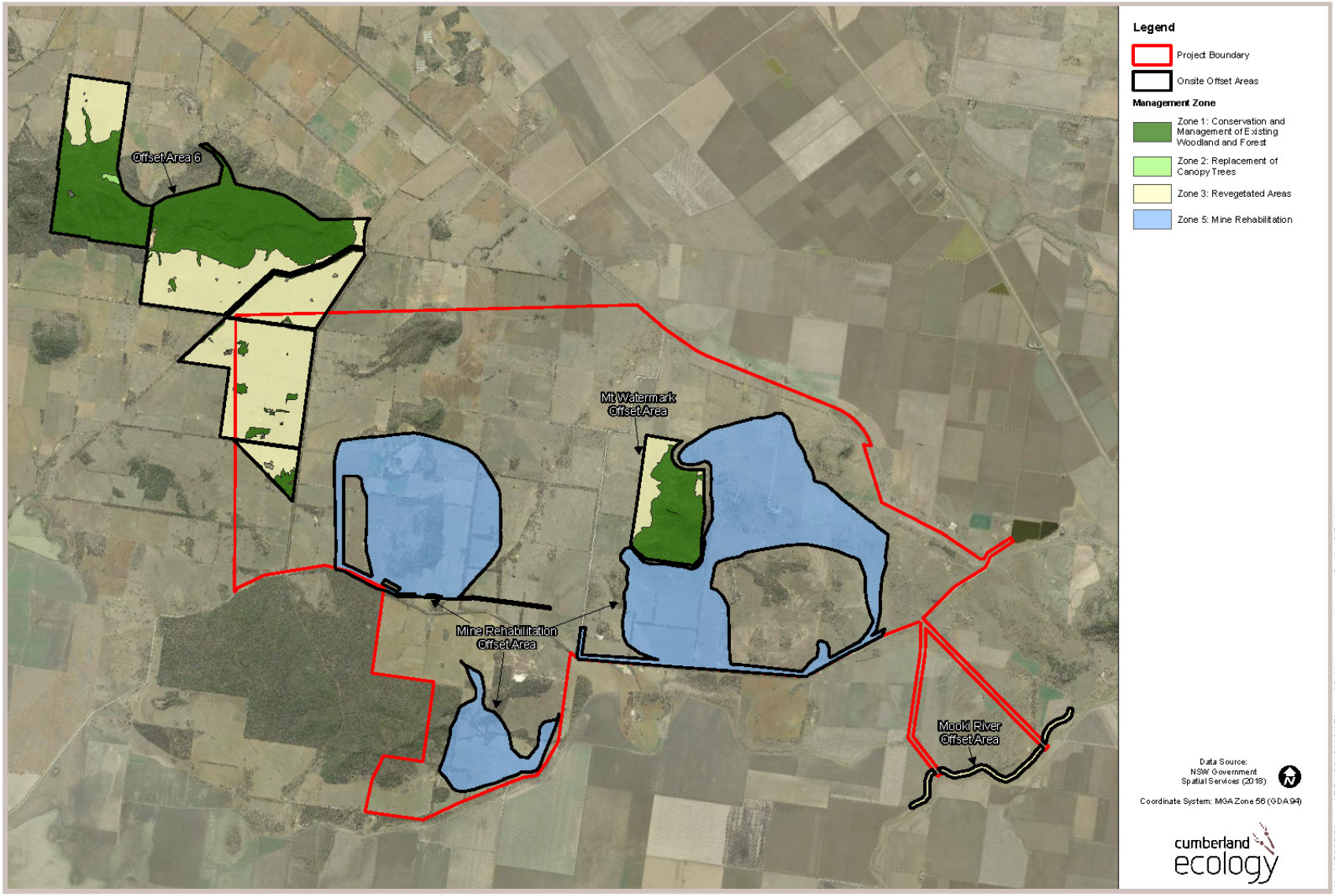

Figure 16. Management zones within the Onsite Offset Areas

Figure 17 Management zones within the Barraba Offset Area

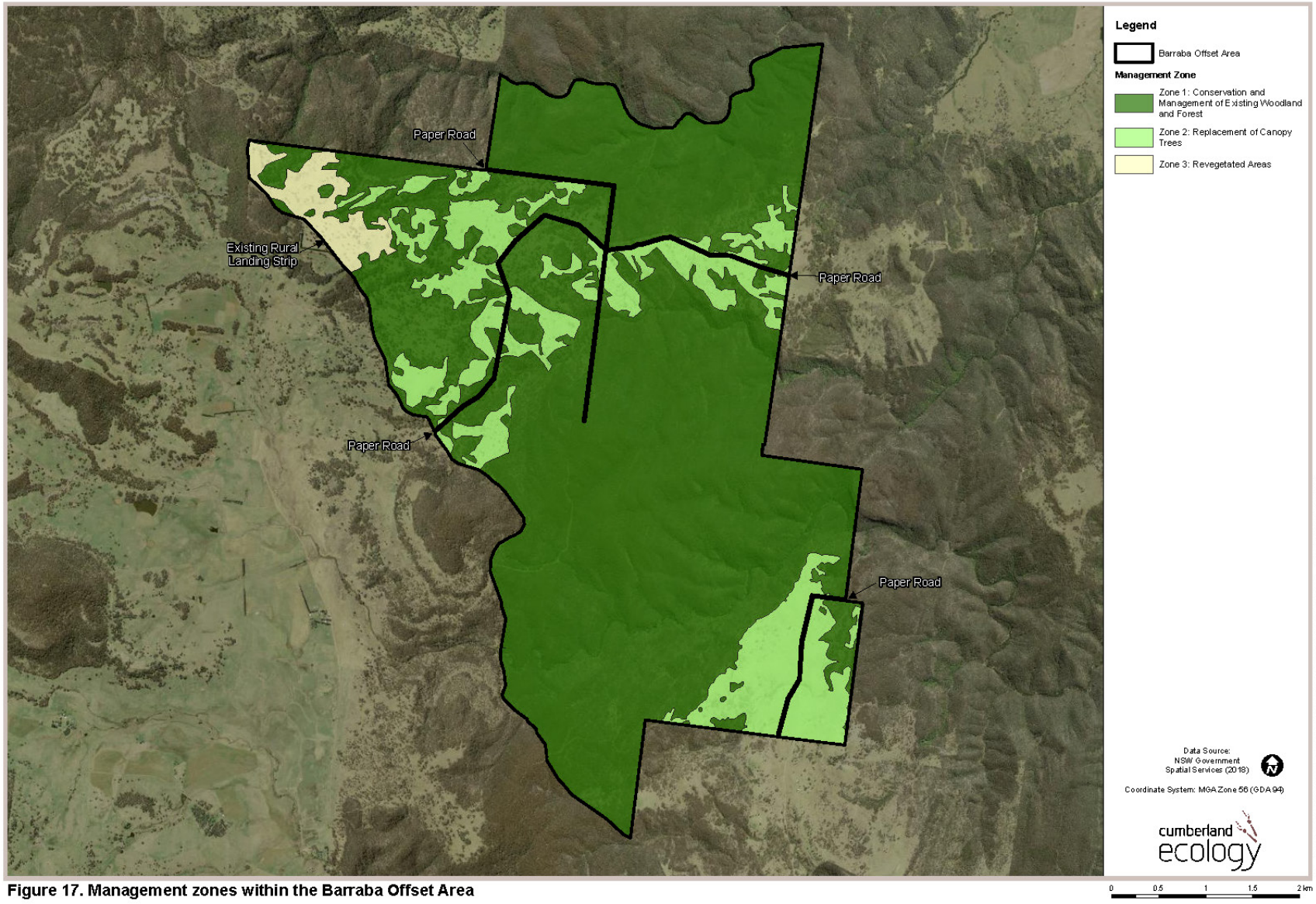

Figure 17. Management zones within the Barraba Offset Area

Figure 18 Management zones within the Mt Erin and Glendowda Offset Area

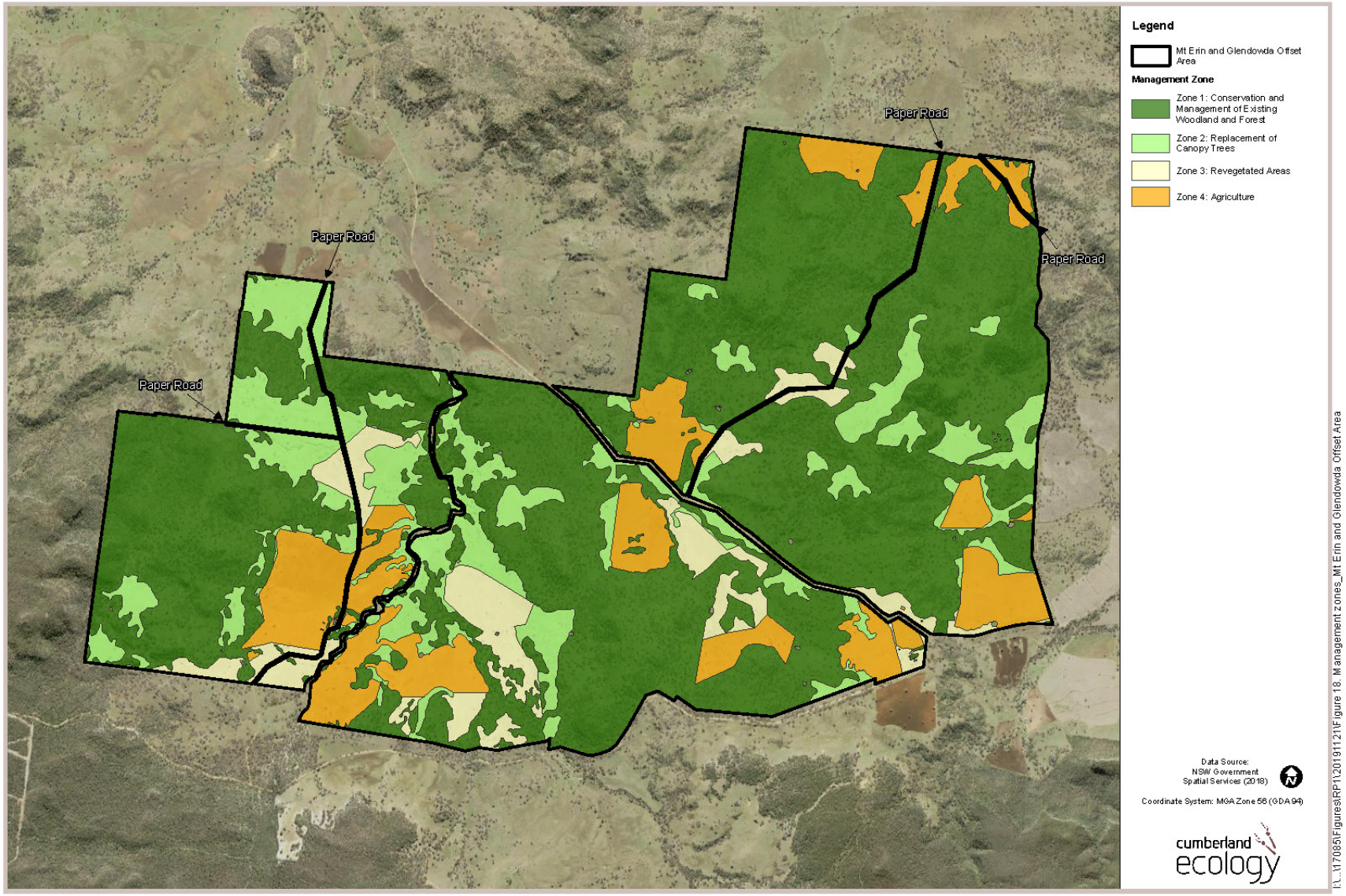

Figure 18. Management zones within the Mt Erin and Glendowda Offset Area

Figure 19 Revegetated plant community types within the Onsite Offset Area

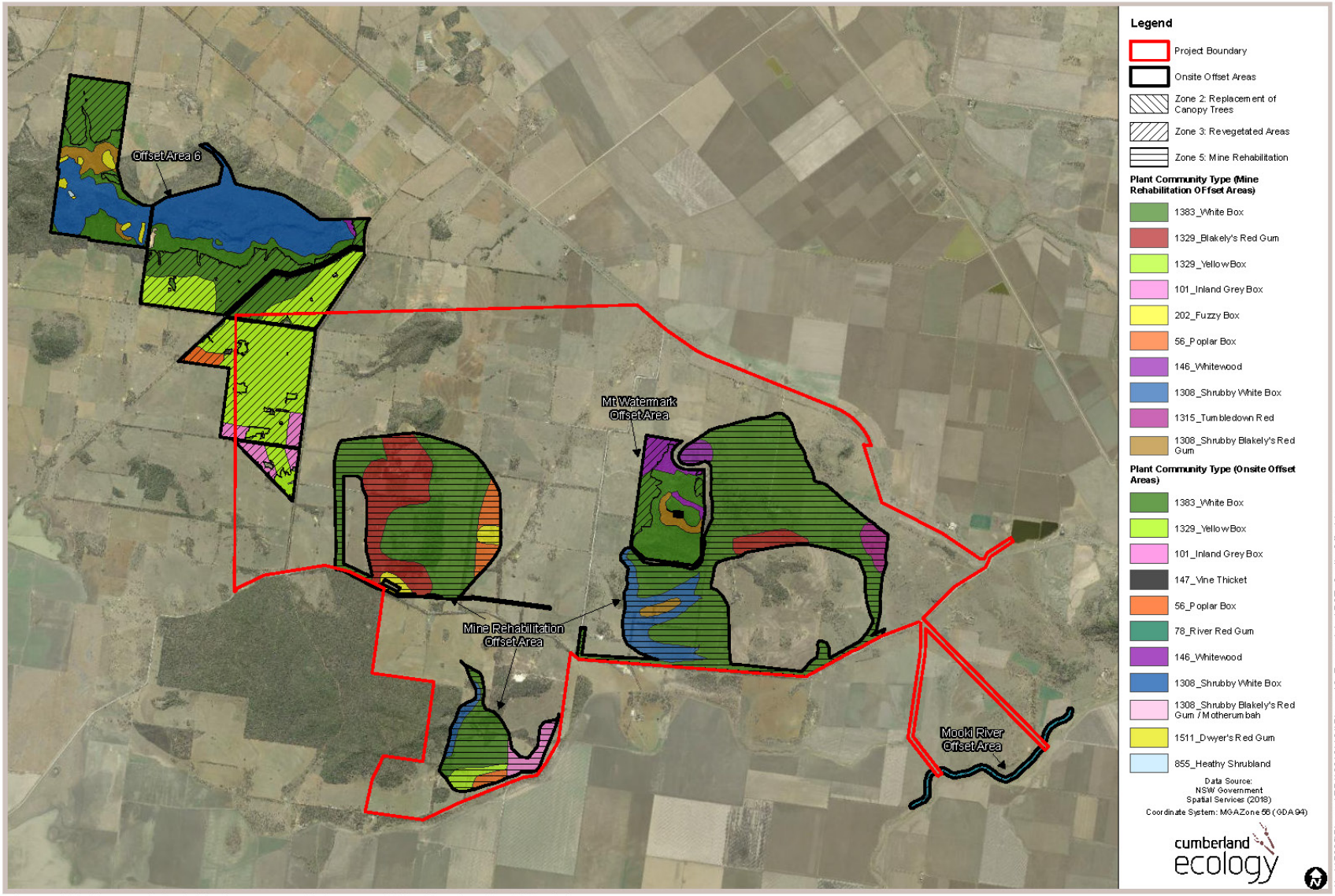

Figure 19. Revegetated plant community types within the Onsite Offset Areas

Figure 20 Revegetated plant community types within the Barraba Offset Area

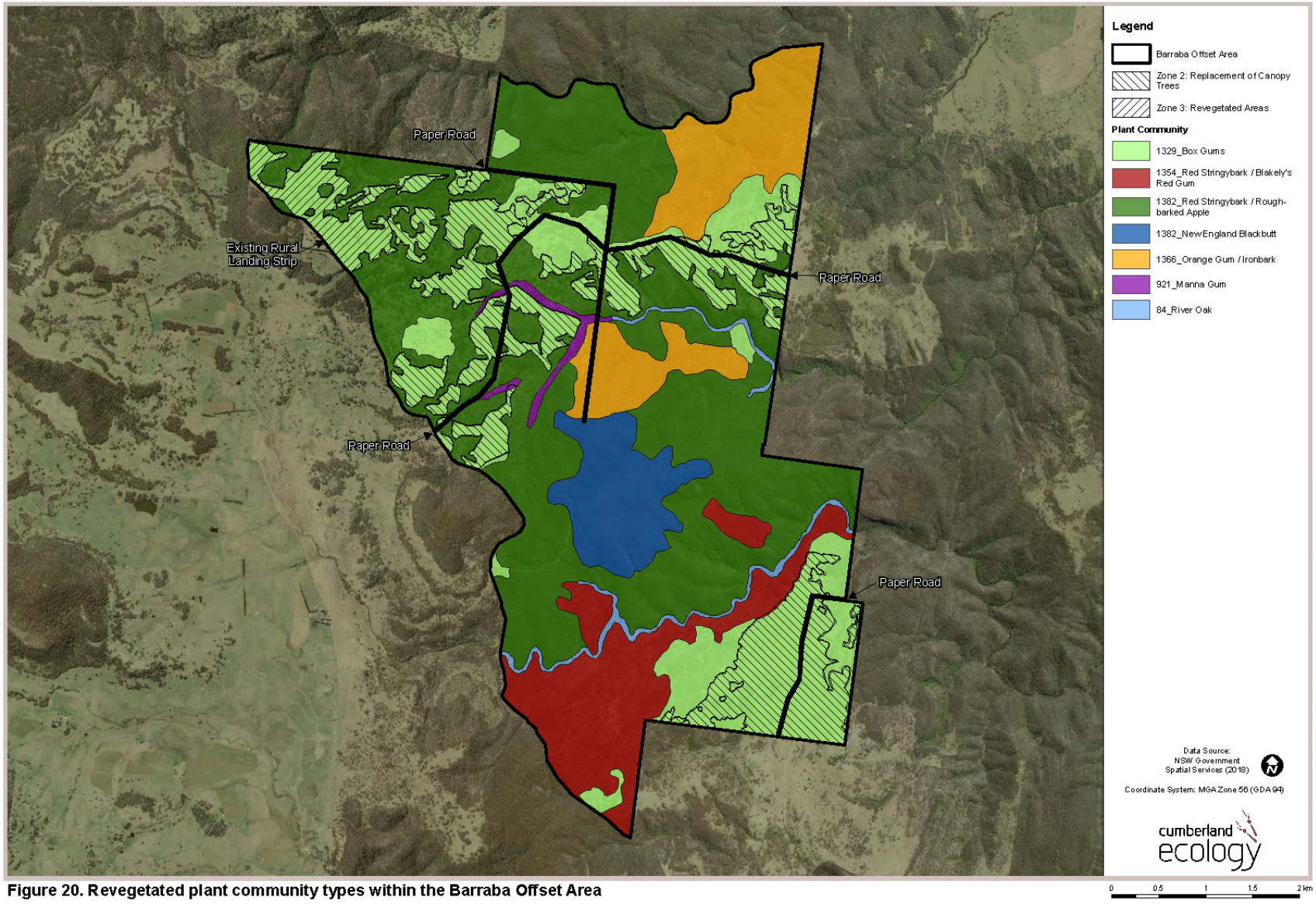

Figure 20. Revegetated plant community types within the Barraba Offset Area

Figure 21 Revegetated plant community types within the Mt Erin and Glendowda Offset Area

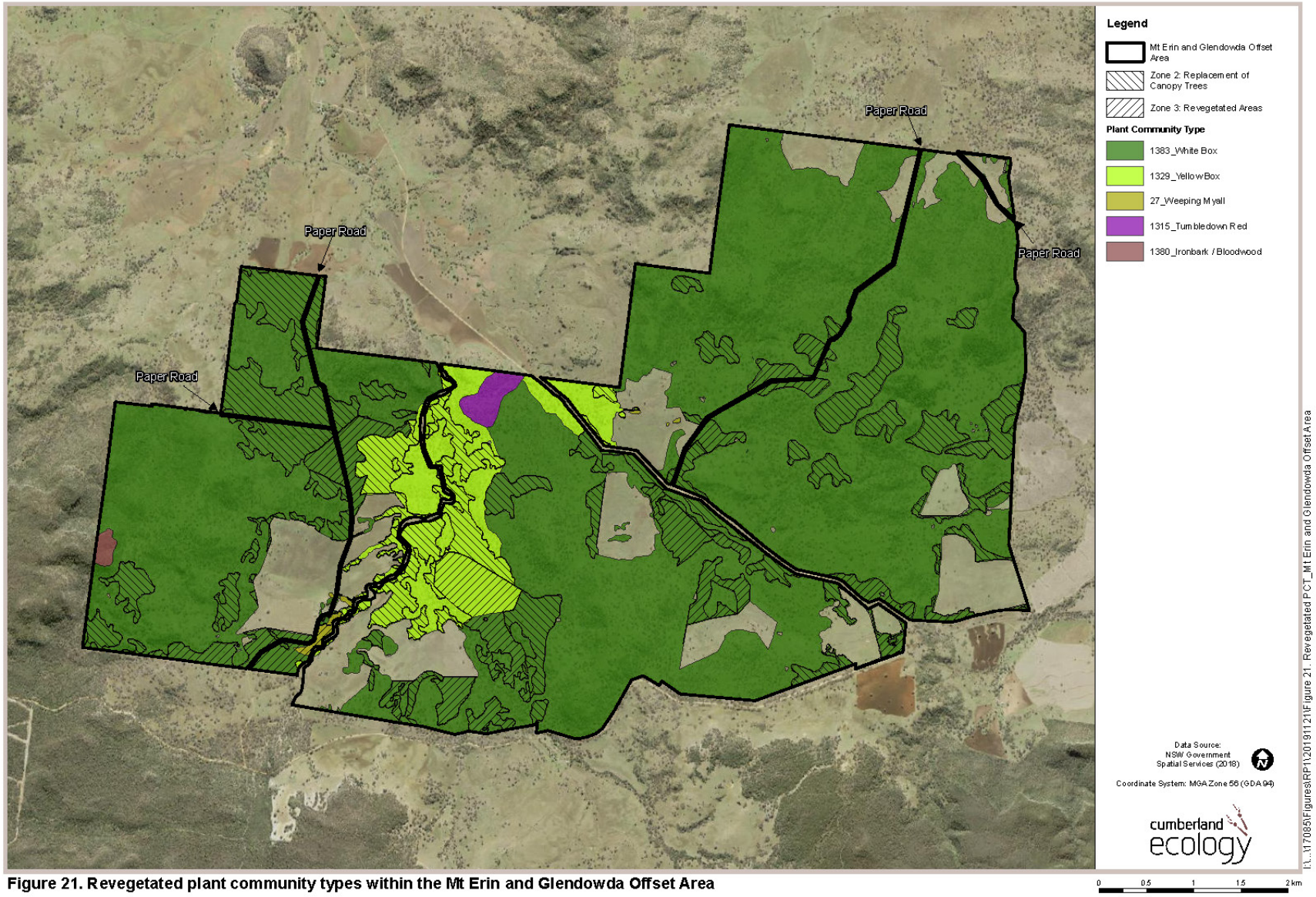

Figure 21. Revegetated plant community types within the Mt Erin and Glendowda Offset Area

Figure 22 Current and future koala habitat within the Onsite Offset Areas

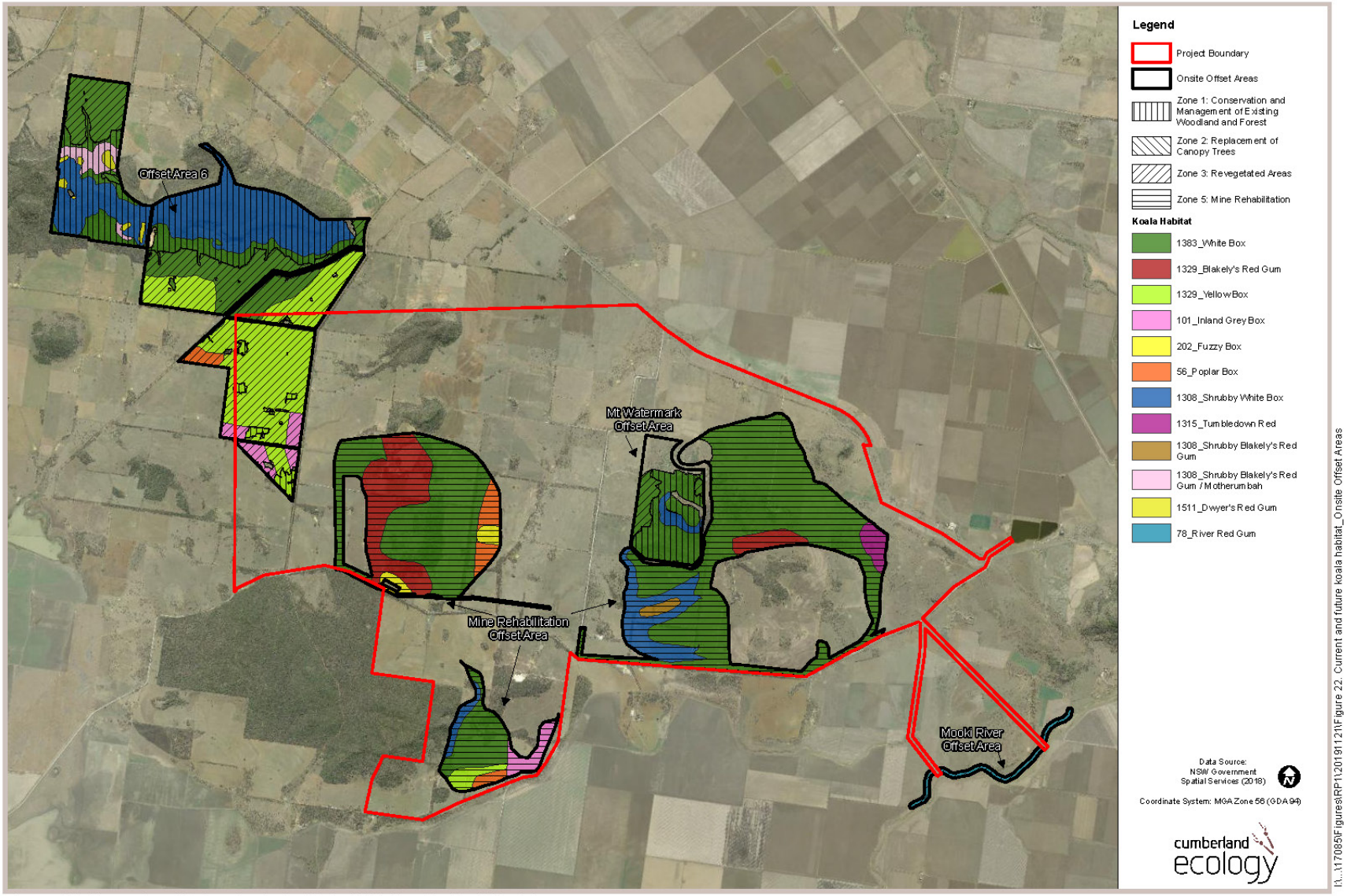

Figure 22. Current and future koala habitat within the Onsite Offset Areas

Figure 23 Current and future koala habitat within the Mt Erin and Glendowda Offset Area

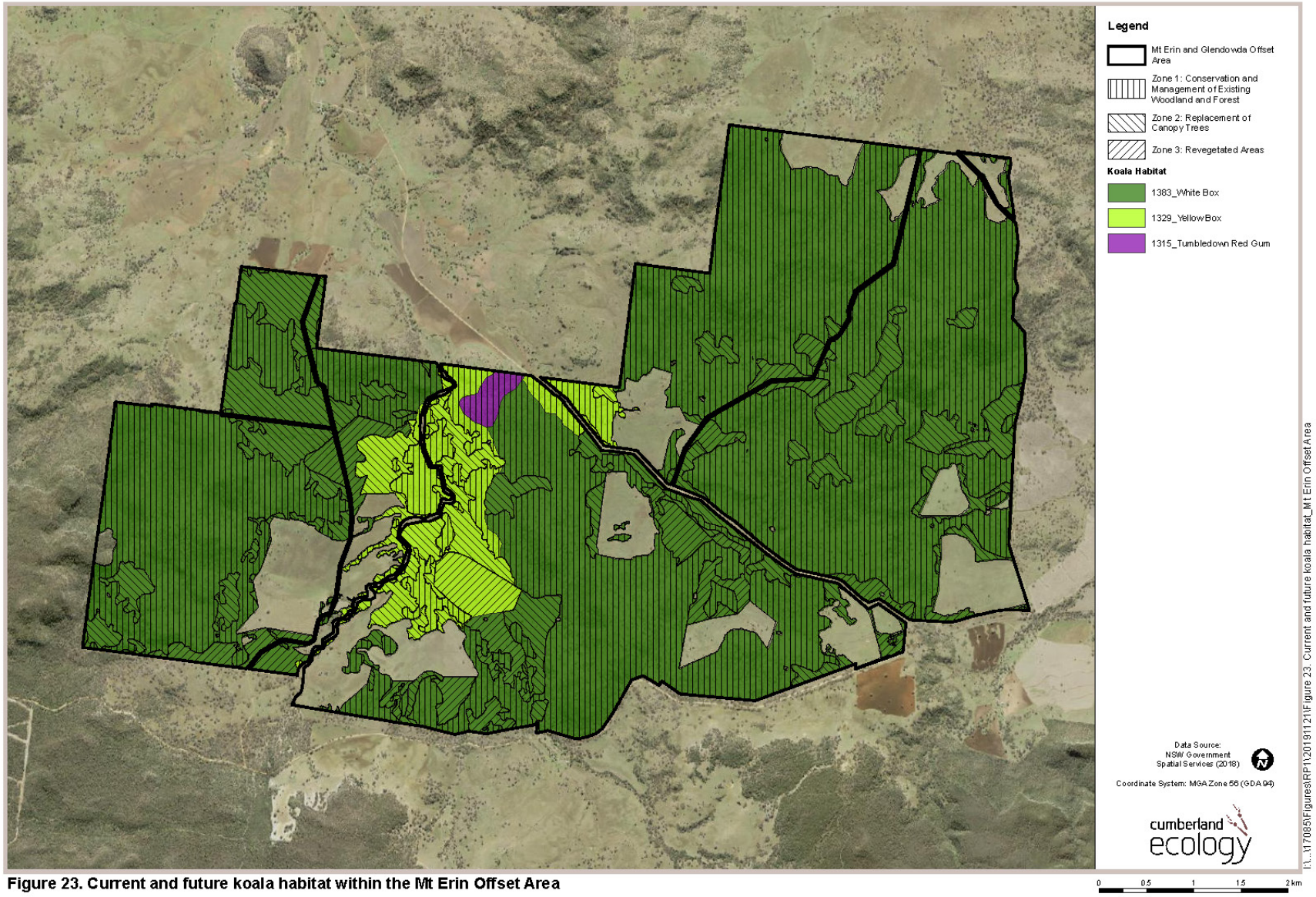

Figure 23. Current and future koala habitat within the Mt Erin Offset Area